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Bowen Water Hazards Assessment Stage 1:
Storm Tide Modelling Basis Report

December 2017

Whitsunday Regional Council

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Executive Summary

A detailed assessment of storm tide hazard throughout the Bowen region has been completed. Water levels generated by both tropical cyclone (TC) and non-TC events were considered.

The work has included the statistical analysis of the historical TCs that have impacted the region and the development of a detailed numerical modelling system to predict tropical cyclone generated surge and wave conditions. The numerical tools were calibrated to the recent TC Debbie event (March/April 2017), normal astronomic tide conditions and SEAsim parametric model outputs (the same forecasting system used by the Queensland Government and the Bureau of Meteorology in Queensland and the Northern Territory). The calibration focused on replicating wind, atmospheric pressure and water level measurements at various locations.

The calibrated detailed modelling system was used to simulate synthetic TC surge and wave events to establish a basis for statically describing TC generated peak water levels. In addition, tidal residual analysis and numerical modelling of the astronomic tide was used to derive non-TC generated peak water levels. The TC and non-TC water level statistics were combined and, together with consideration of wave conditions, provided the basis for recommended design storm tide levels throughout the Bowen region.

So-called 'surge plus tide' water levels for the 5, 10, 50, 100, 200, 500, 1000, 2000, 5000 and 10000 year Average Recurrence Interval (ARI) events have been derived. Wave conditions and the influence of wave processes on the total water level were also derived for the 100, 200, 500, 1000, 2000, 5000 and 10000 year ARI events. The recommended 'sustained peak' and 'coastal zone' design storm tide levels consider the combination of tide, surge and wave conditions.

In accordance with State Planning Policy (SPP) and the $QCoast_{2100}$ Minimum Standards & Guidelines (DEHP, 2016), future climate change storm tide assessments for the 2050 and 2100 planning horizons were completed. These outcomes, together with the current climate 2017 hazard assessment results, are expected to be considered in the context of existing and future planning schemes.

The storm tide hazard mapping, incorporating outcomes from the technical assessments described in this report, is presented in a separate document. The mapping provides the basis for storm tide hazard risk assessment as part of the Whitsunday Regional Council Coastal Hazard Adaptation Strategy (CHAS), support by the Department of Environment & Heritage Protection (DEHP) and Local Government Association of Queensland (LGAQ) through the $QCoast_{2100}$ program.

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1 Introduction

1.1 Project Background

The Whitsunday Regional Council (WRC) has identified potential risks to the Bowen region associated with inundation hazards, namely:

- Inundation of coastal areas due to storm tide; and
- The coincidence of coastal inundation and catchment flooding[1].

Throughout north Queensland these hazards are often associated with severe Tropical Cyclone (TC) weather systems.

This report is focuses on the technical assessments to derive statistical descriptions of extreme coastal water levels and waves due to the combined effect of tide, surge and wave processes. The work flow for this stage of the broader Bowen Water Hazards Assessment Study is summarised in Figure 1-1.

The assessments described herein consider the storm tide hazard for the 2017 current climate, 2050 future climate and 2100 future climate. As discussed below in Section 1.2, the future scenarios require consideration of forecast changes to the climate, such as an increase to mean sea level and changes to TC climatology statistics.

Chapters 2 to 5 of this report describes the detailed assessment of storm tide risk throughout the Bowen region and considers water levels generated by both TC and non-TC events. This has involved a statistical analysis of the historical TCs that have impacted the region and the development of a detailed numerical modelling system to predict tropical cyclone generated surge and wave conditions. The numerical tools were calibrated to the recent TC Debbie event (March/April 2017), to astronomic tide conditions and to SEAsim parametric model outputs (the same forecasting system used by the Queensland Government and the Bureau of Meteorology in Queensland and the Northern Territory). The calibration focused on replicating wind, atmospheric pressure and water level measurements at various locations.

The calibrated detailed modelling system was then used to simulate synthetic tropical cyclone surge and wave events to establish a basis for statically describing TC generated peak water levels. In addition, tidal residual analysis and numerical modelling of the astronomic tide was used to derive non-TC generated peak water levels. The TC and non-TC water level statistics have been combined and, together with consideration of wave conditions, provided the basis for recommended design storm tide levels throughout the Bowen region.

This work will provide key inputs for storm tide inundation hazard mapping, required to support strategic planning throughout the Bowen region. The mapping will also provide the basis for storm tide hazard risk assessment as part of the WRC Coastal Hazard Adaptation Strategy (CHAS), supported by the Department of Environment & Heritage Protection (DEHP) and Local Government Association of Queensland (LGAQ) through the QCoast$_{2100}$ program.

[1] Consideration of coincident coastal inundation and catchment flooding is presented in a separate report titled: *Bowen Water Hazards Assessment Stage 2: Coincident Event Modelling Basis Report & Mapping*.

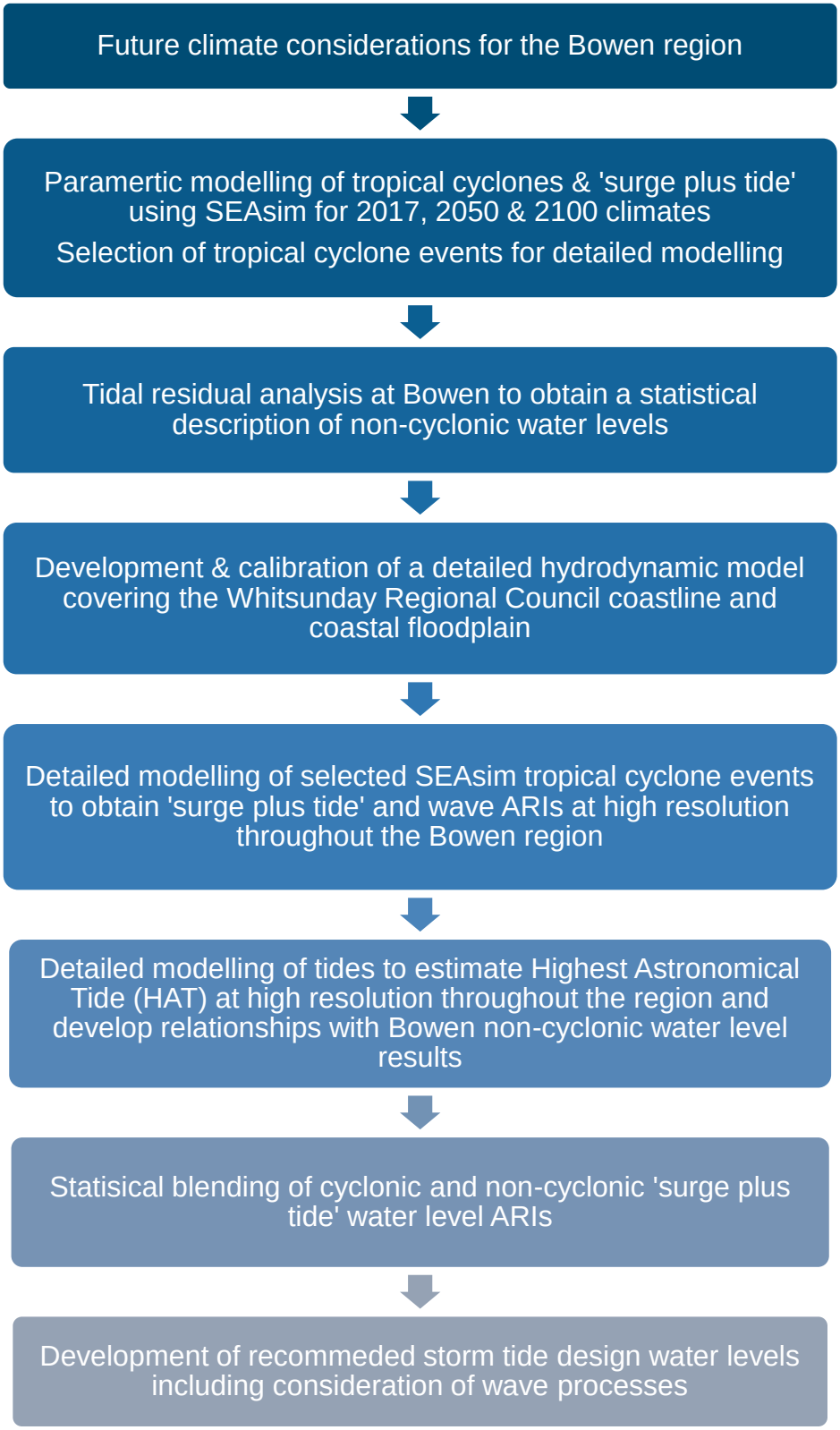


Figure 1-1 Storm tide hazard assessment work flow

1.2 Policy Context and Legislative Framework

The current State Planning Policy (SPP) was adopted in June 2017 and provides policy requirements for coastal hazards that must be integrated into a planning scheme. Therefore, the content of the new SPP must be given due consideration in the drafting of the new planning scheme.

With regard to coastal hazards, the SPP deals specifically with storm tide inundation and erosion prone areas. The policy requires:

- In an erosion prone area within a coastal management district, development does not occur unless it cannot be feasibly located elsewhere and is coastal dependent development; temporary, readily relocatable or able to be abandoned; essential community infrastructure or minor redevelopment of an existing permanent building;
- In a storm tide inundation or erosion prone area but outside of a coastal management district, development avoids natural hazard areas or, where not possible, mitigates the risks to people and property to an acceptable or tolerable level;
- In all other circumstances, development:
    - Supports and does not hinder disaster management response or recovery capacity;
    - Directly, indirectly and cumulatively avoids an increase in the severity of the natural hazard;
    - Avoids risks to public safety and the environment from the storage of hazardous materials; and
    - Maintains or enhances the natural processes and protective function of landforms and vegetation that can mitigate risks associated with the natural hazard.

The development of a new planning scheme will need to consider the outcomes of this study and associated hazard mapping. The storm tide hazard assessment will also inform the WRC CHAS and provide guidance on risk appropriate development to align with the SPP outcomes. The CHAS will assist council in demonstrating compliance with the SPP including consistency with the relevant ISO standard for risk mapping and ensure policy outcomes are informed by robust technical information and are responsive to the local content.

1.3 Future Climate Considerations

In accordance with the SPP and the $QCoast_{2100}$ Minimum Standards and Guidelines (DEHP 2016), future climate scenarios should be considered in long-term coastal risk assessment and planning along the Queensland coast, with the principal impacts likely to be felt in low-lying coastal margins due to gradual sea-level rise.

Following the Engineers Australia Guidelines for Responding to the Effects of Climate Change in Coastal and Ocean Engineering (Harper 2012, 2017), the topics addressed here that are deemed relevant to the Bowen area include:

- Sea-Level Rise
- Tropical Cyclones (tracks, intensity, frequency, rainfall)

- Astronomical Tides

1.3.1 Sea-Level Rise

Global sea levels have been rising as a consequence of enhanced greenhouse warming of the earth (IPCC 2013). The observed rate of global average sea level rise measured by satellite altimetry during the decade 1993 to 2012 was 3.2 ± 0.4 mm p.a., although there are large regional differences. For example, Figure 1-2 from CSIRO & BOM (2016) summarises the observed SLR around Australia as measured by satellite observations from 1993 to 2015. It notes that rates of SLR vary from year to year and spatially and that is partly due to the natural variability of the climate system from large scale influences such as El Niño and La Niña.

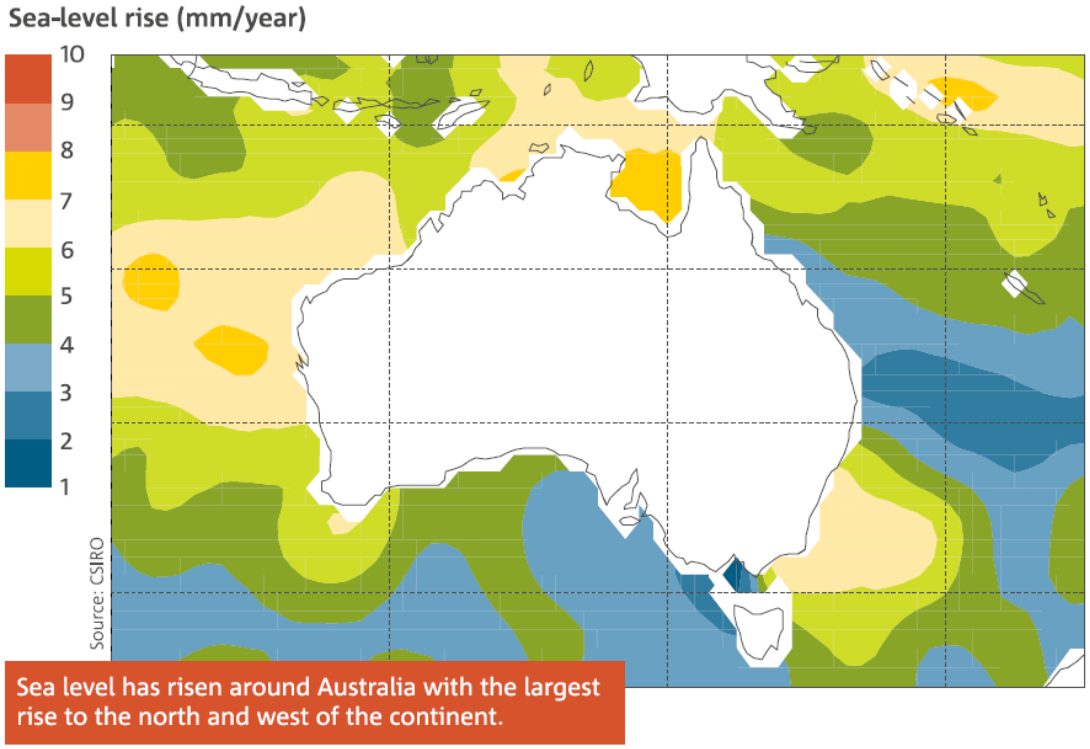


Figure 1-2 Sea-level rise around Australia from 1993-2015 (CSIRO & BOM 2016)

Global sea levels are projected to continue to rise at an estimated total rate of 2.8 ± 0.7 mm p.a. based on the following climate-related contributions, in order of decreasing contribution (IPCC 2013):

- An accelerating thermal expansion throughout the 21st century
- The melting of glaciers
- Retreat of the Greenland ice shelf
- Antarctic ice losses

The official projections of global average sea level rise by 2100 are in the range 0.28 to 0.98 m from the IPCC (2013) 'Assessment Report 5' (AR5) and are relative to the average sea level in 1995. This represents nominally 5% to 95% confidence levels for 5 Representative Concentration

Pathway (RCP) gas emission scenarios using the Coupled Model Intercomparison Project, Phase 5 (CMIP5) model (a collaborative climate modelling process coordinated by the World Climate Research Programme).

Quoting IPCC (2013) directly and based on current understanding, only the collapse of marine-based sectors of the Antarctic ice sheet, if initiated, could cause global mean sea level to rise substantially above the 'likely' range during the 21st century. There is medium confidence that this additional contribution would not exceed several tenths (30 cm) of a metre of sea level rise during the 21st century.

The presently projected IPCC (2013) sea level trends are displayed in Figure 1-3. Although the year 2100 is normally quoted as the most distant future planning horizon, it is important to note that if greenhouse gas concentrations were stabilised (even at present levels), sea level is nonetheless predicted to continue to rise for hundreds of years due to thermal expansion alone.

CSIRO & BOM (2015) provides coastal and marine SLR projections for Australia, recognising that the rates of SLR are not uniform around the country. These projections build on local data analysis and the CMIP5 model using downscaling techniques and report SLR projections for the range of RCPs used by the IPCC. In addition to SLR, projections for 'sea allowance' are provided which represent the minimum distance required to raise an asset to maintain the current frequency of breaches under projected SLR. The sea allowance projections broadly take into account the nature of extreme sea levels (storm surge) along the Australia coastline.

With reference to the Bowen region, Mackay is the closest location for SLR projections reported by CSIRO & BOM (2015). The projections for Mackay SLR are summarised in Table 1-1. These projections, together with considerations of IPCC AR5 and State policy recommendations, form the basis for SLR allowances adopted for the current study (discussed further in Section 1.3.4).

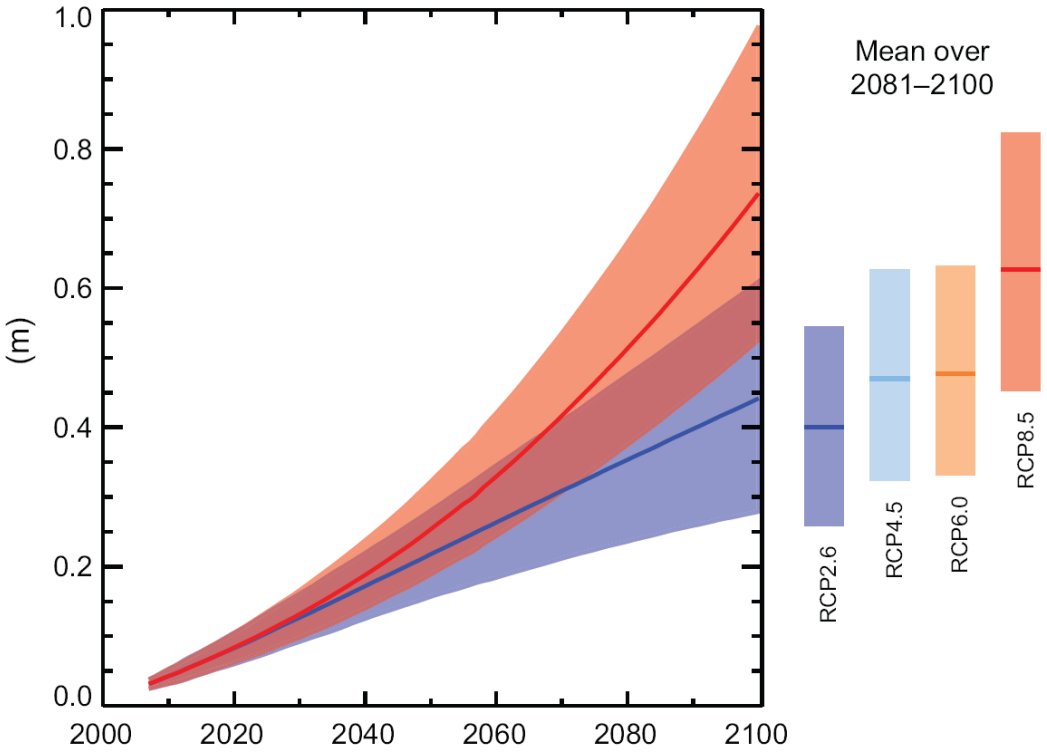


Figure 1-3 Projections of Global SLR Relative to 1986-2005 Mean Sea Level (IPCC, 2013)

Table 1-1 Projected Mean Sea Level Rise Mackay (CSIRO & BOM 2015)

Scenario	2030 Mean & *likely* range (m)	2090 Mean & *likely* range (m)
RCP2.6	0.13 (0.08 to 0.17)	0.38 (0.22 to 0.55)
RCP4.5	0.13 (0.09 to 0.17)	0.47 (0.30 to 0.64)
RCP8.5	0.14 (0.08 to 0.18)	0.64 (0.64 to 0.87)

1.3.2 Projected Changes to Tropical Cyclones

IPCC (2013) notes that global climate model projections for the 21st century show it is likely that the global frequency of TCs will either decrease or remain essentially unchanged, but there may be an increase in both global mean TC maximum wind speed and rain rates. This is a significant change from the previous IPCC report (IPPC 2007), which predicted increased frequency and intensity and did not have the benefit of a World Meteorological Organization (WMO) consensus statement formed in the late 2000s.

Subsequently, a WMO-endorsed published study by Knutson et al. (2010) summarised the status of current research in this area and it was concluded that there is an agreed likely increase in the Maximum Potential Intensity (MPI) of tropical cyclones with rises of 3 to 5% per degree Celsius of mean global temperature rise. Assuming a 2 to 4°C temperature range is possible, this may lead to

an upper level increase in peak wind speeds of as much as 10% by 2100. This could translate into a 20% increase in central pressure deficit.

Knutson et al. (2010) also reports that the consensus from many advanced modelling studies is rather for a potential reduction in the global number of TCs, although regional differences can be high. Regarding tracks, the most likely change might be a slight poleward movement in some regions. For the Bowen area, it is not expected that there would be any specific change in storm tracks under future climate scenarios, but there may be fewer storms.

CSIRO & BOM (2016) notes that the number of TCs in the Australian region varies with El Niño and La Niña events and that when this sometimes-high variability is accounted for there is a statistically significant downward trend in the number of TCs in the Australian region using satellite-derived data since 1982.

In regard to rainfall rates, Knutson et al. (2010) note that theoretically there could be roughly a 7% increase in total precipitable water vapour per °C warming. They imply this to mean a 10-14% increase in rainfall rate by 2100 is possible based on current mean temperature projections for the tropics of 1.5 to 2° C. However, the consensus from modelling studies is that TC-related rainfall rates are likely to increase with mean atmospheric warming of the order of 20% within 100 km of a storm centre, with a range of projections from +3% to +37%. Notwithstanding this, rainfall estimates from climate models in general and TCs in particular (model or data) tend to be very highly variable. It should be noted that while rainfall can scale with storm intensity due to moisture convergence, it is often the size and speed of a storm that dictates the total precipitation (rainfall depth) over a specific catchment. Hence the changed potential for flooding can only be assessed with regard to these and other associated parameters such as topography. Considering the likelihood of reduced frequency of occurrence, it remains possible that the total rainfall from TCs in future climates may actually decrease and this could act to reduce the likelihood of extreme flooding.

1.3.3 Projected Changes to the Astronomical Tide

IPCC (2013) appears silent on the matter of possible changes to the astronomical tide as a result of projected climate change scenarios. Notwithstanding this it can be expected that there will at least be small changes because of (1) increased water depths due to sea level rise in shallow regions modifying local tide wave propagation speeds (and hence component phasing and associated non-linear interactions) and (2) changes in ocean density patterns potentially modifying the wide-scale tidal propagation.

1.3.4 Adopted Future Climate Parameters

The future climate parameters adopted for the current study are summarised in Table 1-2. These assumptions are based on the review of literature described above.

The Queensland DEHP presently adopts an increase to mean sea level of 0.8 m by 2100 for planning purposes. This SLR projection has also been adopted for the present study; however, it is noted that considerations for engineering design should follow best practice engineering guidelines (e.g. Harper 2012, 2017) and relevant standards and in some cases require consideration of different SLR allowances.

Table 1-2 Year 2050 and 2100 climate change parameters

Parameter	2050	2100	Units
MSL Increase[2]	0.4	0.8	m
TC Maximum Potential Energy (MPI) Increase	5%	10%	m/s
	10%	20%	hPa
TC Frequency Change	0%	0%	-

1.4 Probability Terminology

Design event magnitude referred to throughout this report typically adopts Average Recurrence Interval (ARI) terminology. For completeness, the ARI intervals used in this study are listed in Table 1-3 with corresponding Annual Exceedance Probability (AEP) intervals.

Table 1-3 ARI - AEP conversions

ARI (years)	AEP
5	18.13%
10	10%
50	2%
100	1%
200	0.5%
500	0.2%
1000	0.1%
2000	0.05%
5000	0.02%
10000	0.01%
	$AEP = 1 - \exp\left(\frac{-1}{ARI}\right)$

[2] Specified MSL changes are relative to the nominal 1990 sea level. The SEAsim model uses MSQ published MSL and HAT values that are relative to the current (1992-2011) tidal epoch midpoint of 2001/2002. Tidal predictions apply an annual increase of 2.2 mm/y since 2002, such that in 2017 the increase would be 0.04 m approx. Using this approach, the SLR since 1990 is therefore assessed to be of the order of 0.05 m and the nominal projected future climate SLR values here have not been adjusted for this relatively small component.

2 Parametric Modelling of Tropical Cyclones

2.1 Basis of the Extreme Tropical Cyclone Event Design

This design event assessment is based on analyses using the recently-developed SEAsim model, which is a variant of the real-time storm tide forecasting model SEAtide (SEA 2016a) currently utilised by the Bureau of Meteorology (BOM) in Queensland and the Northern Territory and also the Queensland State Government. SEAtide is a further development of BOM-sponsored parametric TC storm surge model development following the Queensland Climate Change Study initiative (e.g. Harper 2001; SEA 2002).

SEAsim differs from SEAtide in that, rather than simulating the effects of individual real-time TCs, it simulates the long-term statistical storm tide response across many coastal locations. It achieves this by coupling with an Australia-wide synthetic climatology of TCs (Harper and Mason 2016). SEAsim has been used to simulate storm tide risks around the entire Australian coastline that is subject to TC impacts. For example, the Northern Territory Government Department of Land Resource Management (SEA 2016b) recently utilised SEAsim estimates for risk assessment of remote indigenous communities across the “Top End”.

SEAsim replaces and extends the earlier functionality of the SATSIM model that has provided statistical storm tide design water levels throughout Australia since the mid-1980s (e.g. Harper 2001). The new model combines regional parametric storm tide response models with the synthetic TC climatology and the astronomical tide variability to generate the equivalent synthetic time history of storm tide events, including nearshore wave conditions and estimated breaking wave setup.

The approach here is to select a number of candidate extreme TC events from the SEAsim statistical simulation and for each of these events to be modelled in greater detail by full hydrodynamic models using the SEAsim-generated wind and pressure fields.

2.2 SEAsim Model Description

SEAsim is built on pre-computed TC scenarios modelled by the 2D barotropic hydrodynamic model MMUSURGE and the 3rd generation spectral wave model WAMGBR with 24 directions and 25 frequencies (each described in Harper 2001). Both models implement sub-grid reef and bank representations. A nested uniform grid system was used, with details near the study site shown in Figure 2-1 at the adopted ‘B’ grid 2.78 km resolution, which is adequate for reproducing long-wave storm tide responses. The model provides statistical storm tide estimates for a wide range of Average Recurrence Intervals (ARIs) at each of the indicated orange-marked grid locations.

Figure 2-1 SEAsim modelled sites near Bowen (Google Earth™ imagery)

2.2.1 Astronomic Tide

Tides in and around Bowen are mixed semi-diurnal and have a reasonably large range (approximately 3.7 m). SEAsim utilises interpolation between published MSQ (2017) tidal constituents at the available Standard Ports. The official tidal planes for Bowen in 2017 are given below.

Table 2-1 Published tidal planes at Bowen (MSQ 2017)

Tidal Plane	Abbreviation	mAHD
Highest Astronomical Tide	HAT	1.95
Mean High Water Springs	MHWS	1.05
Mean Sea Level	MSL	-0.02
Mean Low Water Springs	MLWS	-1.11
Lowest Astronomical Tide	LAT	-1.78

2.2.2 Synthetic Tropical Cyclone Climatology

SEAsim utilises a synthetic TC climatology founded on a 'double Holland' wind profile that has produced well-verified extreme winds speeds across Australia (refer Harper and Mason 2016). Figure 2-2 shows a comparison between historical TC tracks for Australia and an equivalent period of the synthetic tracks.

Figure 2-3 summarises the statistical climate matching with various historical TC parameters for storms that make landfall within 300 km of Townsville. The correspondence is between the modelled (blue) and the original historical data (red) for the indicated frequency, intensity speed and direction parameters.

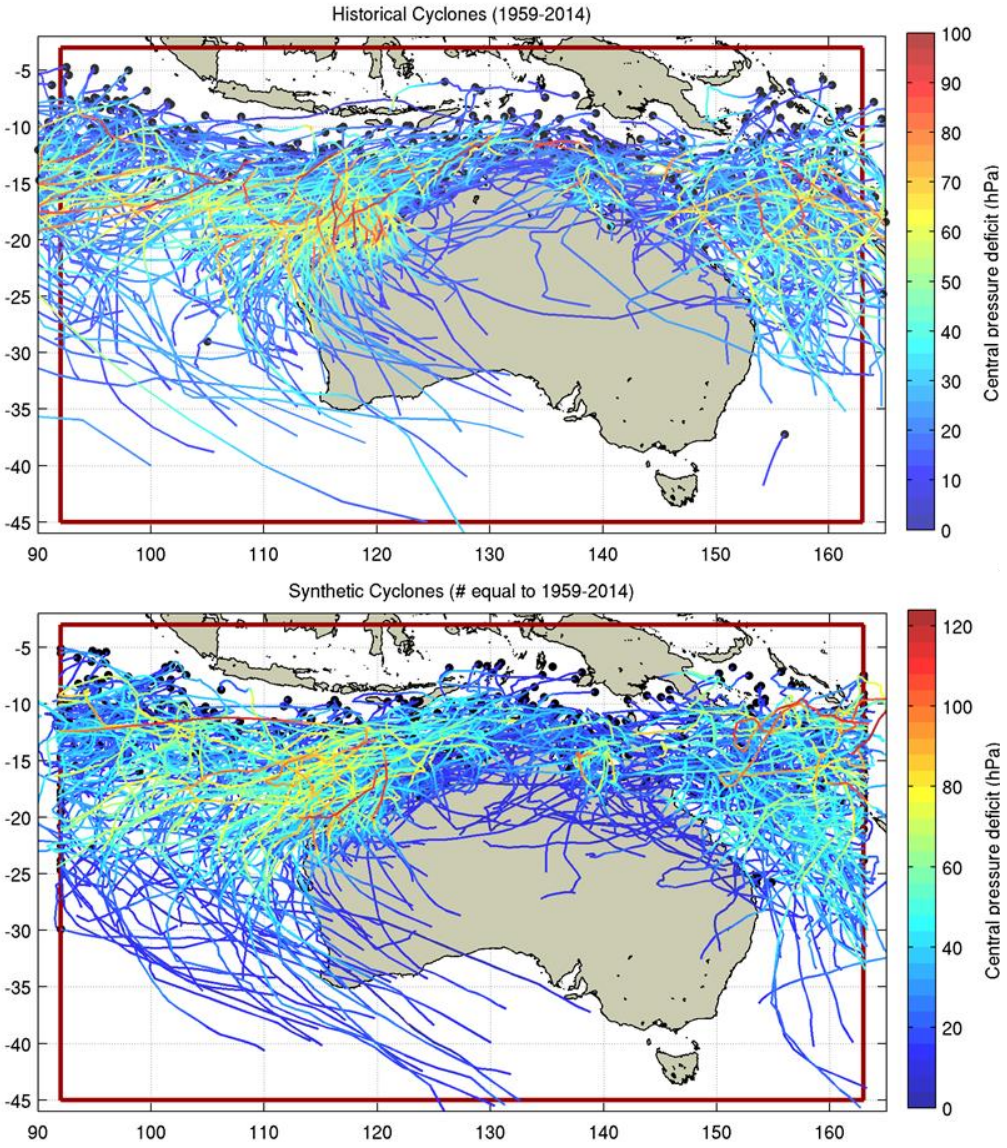


Figure 2-2 Example of the synthetic TC climate modelling; Top: full sample of the BoM historical tracks and intensities; Bottom: equivalent year sample extract from the synthetically generated dataset. The colour scale is intensity in MSL central pressure deficit

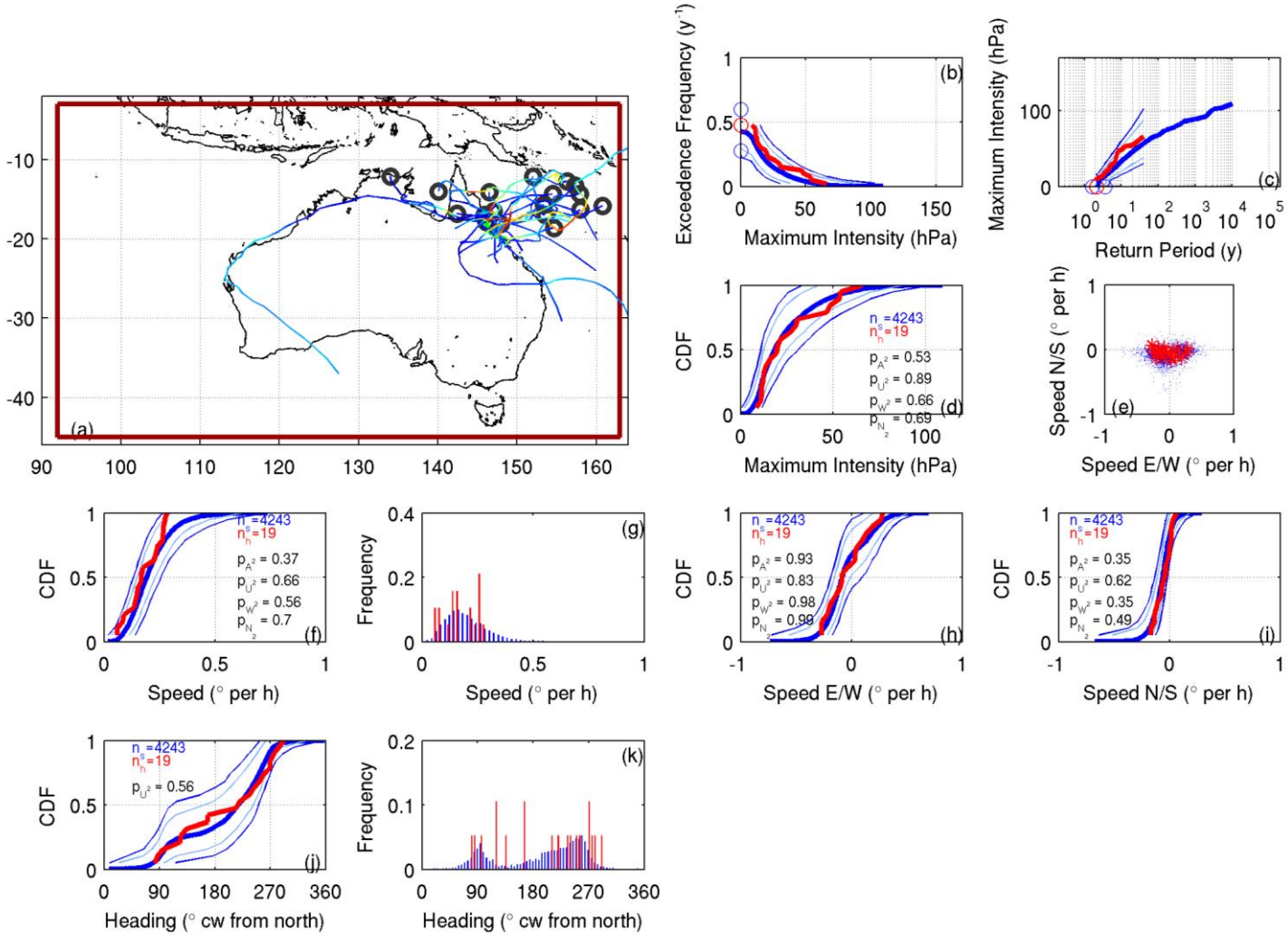


Figure 2-3 Statistical fits of a variety of TC track parameters comparing the original historical data (red) and the synthetic track data (blue) for TCs crossing any part of the coast within a 300 km radius of Townsville

2.2.3 SEAsim Simulation

The predicted wind, surge and wave magnitude response at each of the sites of interest is generated by parametric models for each synthetic TC, interpolating as necessary between the available modelled scenarios. The estimated surge time history is then superimposed on the background astronomical tide for that date in time, with allowance for surge-tide interaction.

The wave height and period estimate is converted into a breaking wave setup height that is sensitive to the total water depth and then combined with the combined surge and tide time history.

This is repeated for 50,000 years of synthetic storms and associated tide sequences. The exceedance statistics of the combined total water level at each site for each TC event then forms the basis of the probabilistic storm tide level predictions.

2.3 SEAsim Surge plus Tide Statistics

Figure 2-4 summarises the TC generate peak ‘surge plus tide’ return period curve based on the 50,000 year simulation at the study site extending to the 10,000 year ARI event. The 2017 HAT level at this location is 1.95 mAHD and the dune crest is approximately 3.5 mAHD.

Figure 2-5 summarises the storm tide components from the 2050 simulation at the study site where the red dashed line indicates the assumed 2050 HAT level of 2.35 mAHD (0.4 m increase to mean sea level).

Figure 2-6 summarises the storm tide components from the 2100 simulation at the study site where the red dashed line indicates the assumed 2100 HAT level of 2.75 mAHD (0.8 m increase to mean sea level).

It can be seen that TC events are projected to not exceed HAT until beyond about the 40 year ARI event. In north Queensland, the water level statistics at the lower end of the return period curve are generally dominated by ‘non-TC’ storms and other long waves (such as continental shelf waves) that generate tidal anomalies. The analysis to derive non-TC extreme water level events (up to approximately the 100 year ARI) and the adopted method for blending the TC and non-TC water level statistics are presented in Chapter 3.

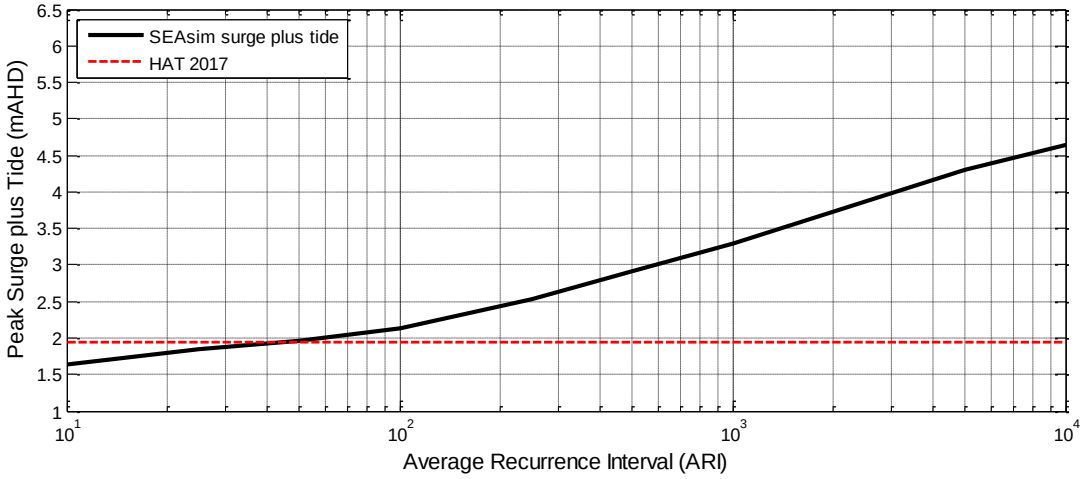


Figure 2-4 Simulated TC surge plus tide for present climate at Bowen

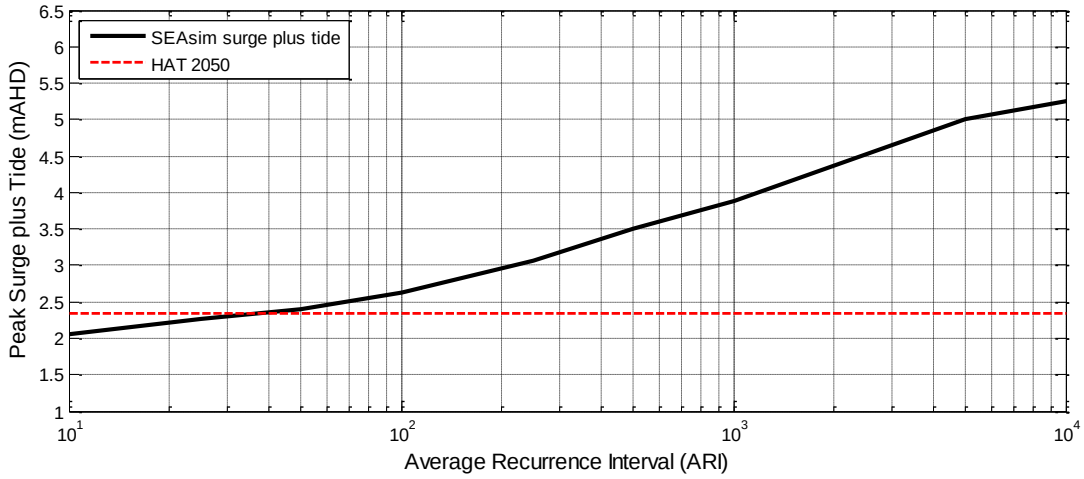


Figure 2-5 Simulated TC surge plus tide for 2050 climate at Bowen

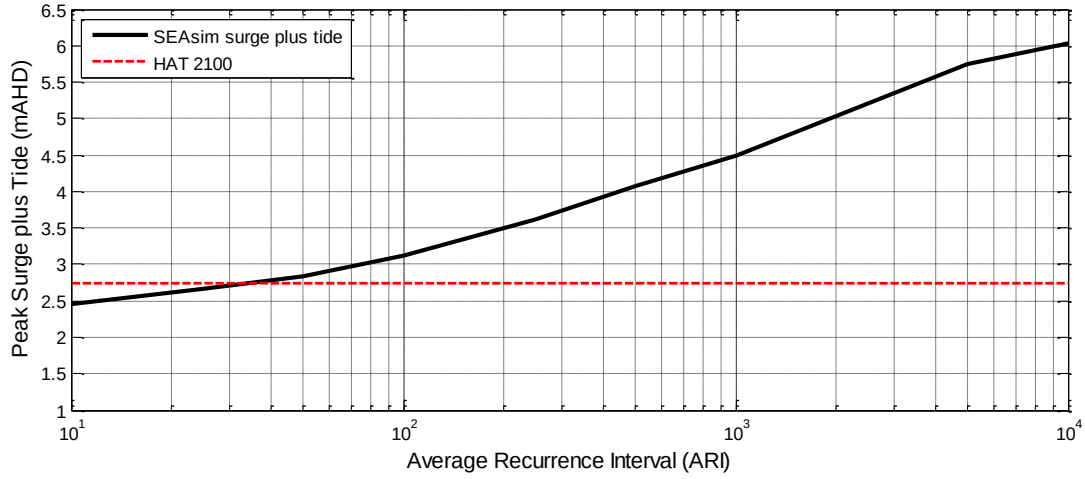


Figure 2-6 Simulated TC surge plus tide for 2100 climate at Bowen

2.4 Selected Events for Detailed Modelling

The sections above describe the basis for understanding the storm tide hazard for the Bowen region. This analysis has provided nearshore 'surge plus tide' statistics at a few point locations relevant to the Bowen study area. Further detailed hydrodynamic modelling of the SEAsim TC events is required to understand the local-scale variation in water level statistics and also the patterns of inundation over land.

To avoid detailed modelling of TC events expected to generate only minor storm tide conditions, a threshold water level was established and only SEAsim events that produced 'surge plus tide' levels greater than or equal the 100 year ARI value were selected[3]. The number of events selected for each of the planning years of interest is of the order of 400, with the single highest value being assigned the 1 in 50,000 year ARI probability of exceedance. Ranking the lower events and assigning an ARI will reproduce the 'surge plus tide' curves in Figure 2-4, Figure 2-5 and Figure 2-6. A summary of the water level threshold and number of events for each planning year is provided in Table 2-2. Each selected event has a specific date-time context, which specifies the peak tide level and, relative to the timing and shape of the peak surge, the peak 'surge plus tide' water level.

Table 2-2 SEAsim events selected for detailed modelling

Planning Year	100 year ARI surge plus tide threshold (mAHD)	Number of SEAsim events exceeding thresholds
Present-day	2.1	378
2050	2.6	433
2100	3.1	395

The detailed hydrodynamic models used to simulate the selected SEAsim events are described in Chapter 4 and results of the detailed modelling results are presented in Chapter 5.

[3] In north Queensland the water level statistics for more frequent events (up to approximately the 100 year ARI) is typically dominated by non-TC storms and other long waves such as continental shelf waves. The analysis to define the non-TC statistics for Bowen is presented in Chapter 3.

3 Tidal Residual Analysis

3.1 Tide and Tidal Residual Recombination Modelling

This analysis is used to determine statistics for common non-extreme total water level events and follows the method briefly described in Hardy et al. (2004) used for estimating extra-tropical storm surge contributions in the Townsville region. Termed here the TRRM (Tide and tidal Residual Recombination Model), it is based on the re-sampling of the tidal residual (residual) event record from suitably long and reliable tide gauge records in the region of interest. It is assumed that the residual and the astronomical tide are uncorrelated and occur in random combination to produce the total storm tide level recorded by each gauge. Recombination of the randomly re-sampled residual excluding TC events effectively extends the available record.

The incidence of the non-TC storms of interest is relatively frequent and a data record of the order of 30 years is highly likely to have sampled close to the maximum ocean forcing possible from these events. Implicitly it is then assumed that the available record of ocean water levels from tide gauges has sufficiently captured the inherent range of variability of non-TC storm surges in the region. It does not allow for any extrapolation of storm surge magnitudes beyond those already measured but, as the analysis shows, this is not a constraint on the effectiveness of the technique to represent water level statistics at ARIs higher than available from the original record. Because deemed-TC storm surge are excluded from this analysis, non-TC statistics can be computed independently of the TC surge statistics. Once available, the separate statistics can then be statistically added to produce a total storm tide statistic.

3.1.1 Analysis of Tidal Data

Observed tidal water level datasets were provided by the Tidal Unit of Maritime Safety Queensland (MSQ), Department of Science, Information Technology and Innovation (DSITI) at the locations and length of historical record listed in Table 3-1. It is noted that analysis at both the Bowen and Shute Harbour tide gauge locations was undertaken but only the results for Bowen have been used for the present study.

Table 3-1 Tidal station datasets

Tide Gauge Station	Record Analysed
Bowen	19/11/1986 – 31/12/2016
Shute Harbour	23/01/1977 – 31/12/2016

The data consisted of tidal heights at hourly and 10-minute intervals, with the shorter interval starting in 1996 when digital data collection technology was introduced at each station. Shute Harbour has the longest record although there are multi-year gaps prior to 1989. Tidal analysis was carried out separately for the hourly and 10-minute sections of the Bowen and Shute Harbour tide gauge data. The tide predictions were based on 152 constituents derived from each section of the raw tide data at each gauge site. The residuals obtained from the hourly sections of data where interpolated to 10-minute intervals and amalgamated with the residual already at 10-minute

intervals. The residuals are then filtered with a low-pass filter (cutoff = 24 hour) to remove any 'bad' data, which are often seen as spikes in the residual.

TC events are then removed from the records by identifying periods when the historical tracks of such storms were within 8 degrees of latitude (~880 km) of the study region. The resulting amalgamated tidal residuals shown in Figure 3-1 can be seen to be both positive and negative in magnitude with a large number of maxima occurring each year. Additionally, a number of multi-year variations in water levels are evident in the record, undoubtedly associated with large scale climate processes such as El Niño.

The recombination process requires whole-year periods be available in the record to ensure any correlation between seasonal variation in tide and storm occurrence is accommodated. Because of the gaps in data, the adopted approach yielded 30 years of data for Bowen and 31 years for the Shute Harbour.

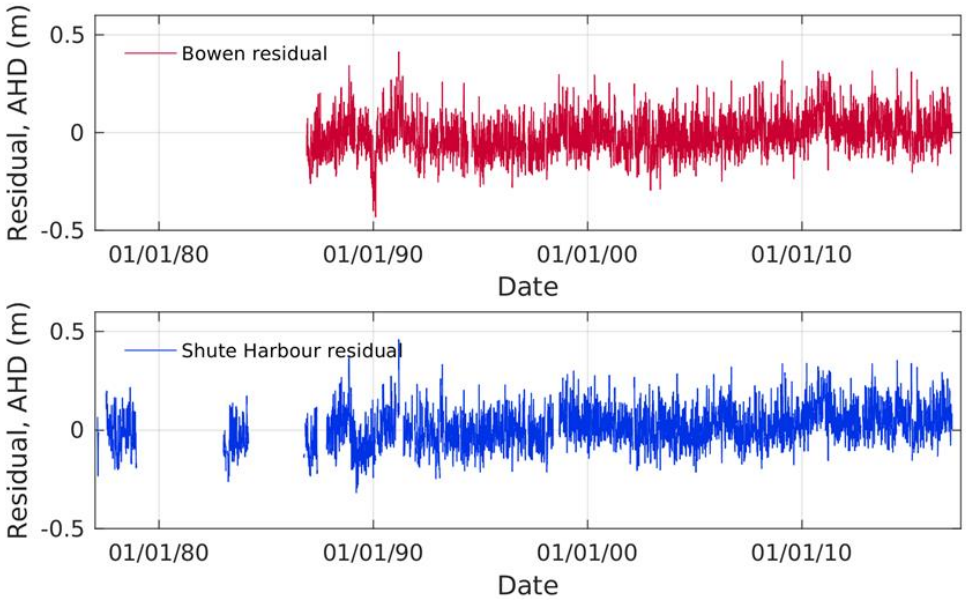


Figure 3-1 Tidal residual with TC events removed, Bowen (top) and Shute Harbour (bottom)

3.1.2 Simulation of Synthetic Water Level Time Histories

A fundamental assumption of TRRM is that the timing of the tide and the tide spring/neap cycle is uncorrelated to the residual but that there may be some correlation between the annual cycle of storm events and the annual patterns in the tide. It also assumes that the astronomical tide is largely predictable and that tide and residual can be linearly added to produce a combined result with only small errors.

Firstly, for each station, 30 separate tidal predictions were generated with each prediction set arbitrarily 50 years apart but starting on the same hour, day and month as the original set and with a 10-minute interval and duration that matches the amalgamated residual sets. This is simply a means of separating and sampling the natural tidal variability and providing a long time-base for overlaying the measured residuals.

Next, each tidal prediction was recombined with the measured residual but with the starting date of the residual randomly offset by up to ±1 weeks (±168 hours). The random offset was in 10-minute intervals equivalent to the time step of the amalgamated residuals. The maximum of 1 week offset is small enough to ensure retention of the principle seasonal couplings between tide variability and the occurrence of storms of interest. Finally, this 'tide plus residual' recombination process was repeated 10 times with different time offsets to provide a synthetic water level record of almost 10,000 years. The yearly maxima were then extracted and ranked to produce the summary statistical plots as shown below in Figure 2.

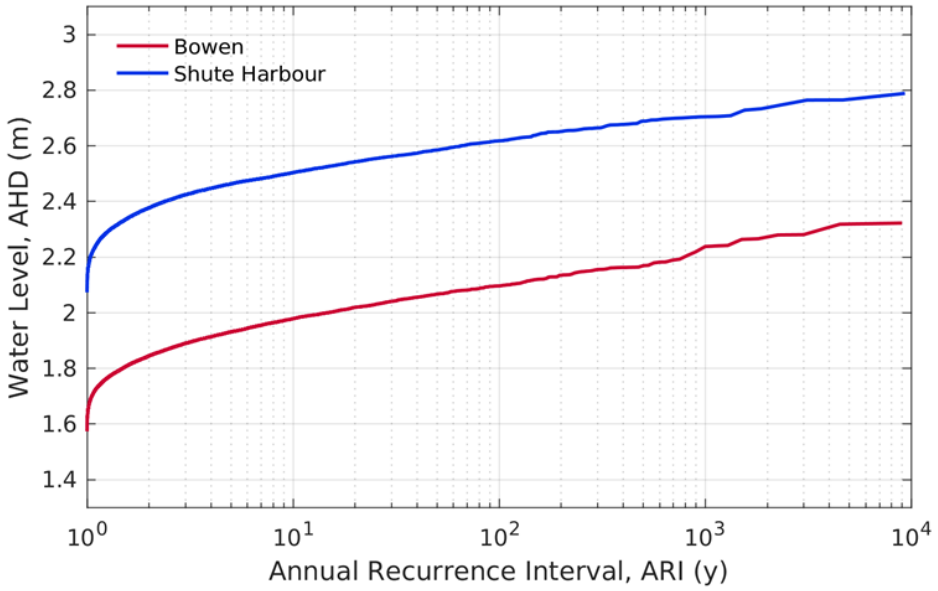


Figure 3-2 Non-Cyclonic water level statistics for Bowen and Shute Harbour

Although there are small differences in the residual range between Bowen and Shute Harbour there is an offset in results between these sites, which is a reflection of the changes in the tidal plane. In this region, the tidal range increases southward with a reasonably large change occurring between Bowen and Shute Harbour.

The re-sampling method can be directly used to estimate the variability of the ARI estimates, as shown in Figure 3-3 and Figure 3-4. These figures illustrate, in blue, the simulated estimate predicted for Bowen and Shute Harbour and, in red, the measured and ranked annual maximum tide gauge levels. Note that periods of TC activity are first removed from the measured records. In grey are then the 300 re-sampled periods of tide and residuals, which together produce the averaged blue line. The spread of the grey around the blue indicates the sampled natural variability imposed on the system by the effect of random tide phasing combined with the residual signal, which is generally much larger than other components represented by the residual. The measured ARI estimate lies slightly above the spread of the modelled data for ARIs between 3 to 7 years. The cause is unclear but may indicate some minor shortcomings of the approach or alternatively that there are some problems with the historical datasets.

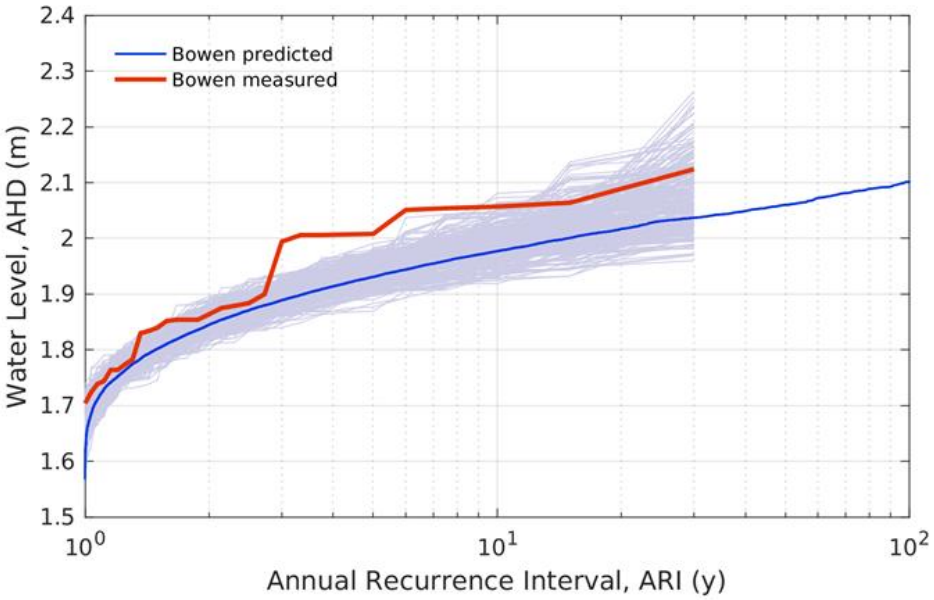


Figure 3-3 Tide-phase imposed variability for Bowen

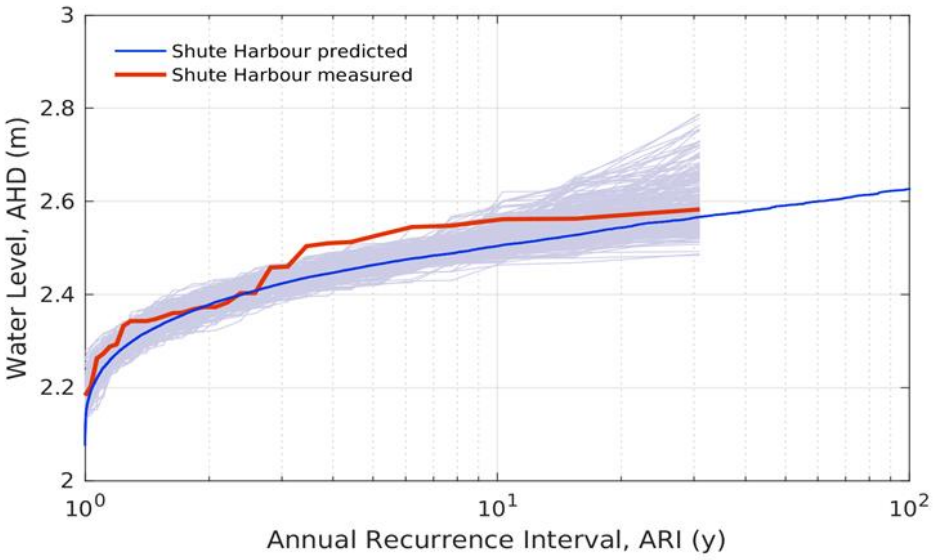


Figure 3-4 Tide-phase imposed variability for Shute Harbour

3.2 Blending TC and Non-TC Water Level Statistics

The combined extreme water level hazard due to each of the independently derived TC (refer Section 2.3) and Non-TC events have been statistically combined using the method originally described by Gomes and Vickery (1977):

$$R = \left[\frac{1}{Rtc} + \frac{1}{Rnc} - \frac{1}{Rtc * Rnc} \right]^{-1}$$

Equation 3-1

Where *Rtc* is the ARI of the cyclonic water level and *Rnc* is the ARI of the non-cyclonic water level.

The resulting combined 'surge plus tide' ARI curves for Bowen and Shute Harbour are shown in Figure 3-5 and Figure 3-6 respectively, together with the non-TC and TC components. Table 3-2 presents a selection of ARI water levels from these graphs together with MSQ (2017) HAT values.

The non-TC tidal residual results for Bowen are used as the basis for determining water level statistics for other nearby locations. This approach is described in Chapter 5.

Table 3-2 TC and non-TC water level components and the blended values

Location	HAT	10	50	100	500	1000	5000	10000
TC surge plus tide levels (mAHD)								
Bowen	1.95	1.64	1.96	2.14	2.91	3.29	4.30	4.64
Shute Harbour	2.42	1.91	2.28	2.35	2.67	2.90	3.44	3.56
Non-TC surge plus tide levels (mAHD)								
Bowen	1.95	1.97	2.07	2.10	2.18	2.22	2.30	2.32
Shute Harbour	2.42	2.50	2.58	2.62	2.69	2.71	2.77	2.80
Combined TC and non-TC surge plus tide levels (mAHD)								
Bowen	1.95	1.98	2.10	2.20	2.91	3.29	4.30	4.64
Shute Harbour	2.42	2.50	2.59	2.63	2.74	2.90	3.44	3.56

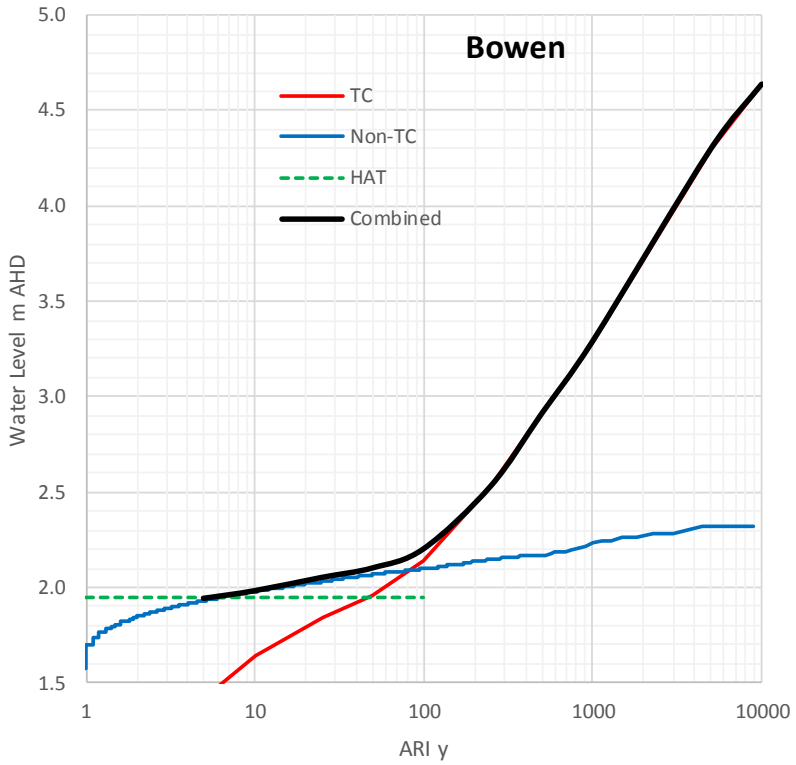


Figure 3-5 Blended TC and Non-TC surge plus tide extreme water levels for Bowen

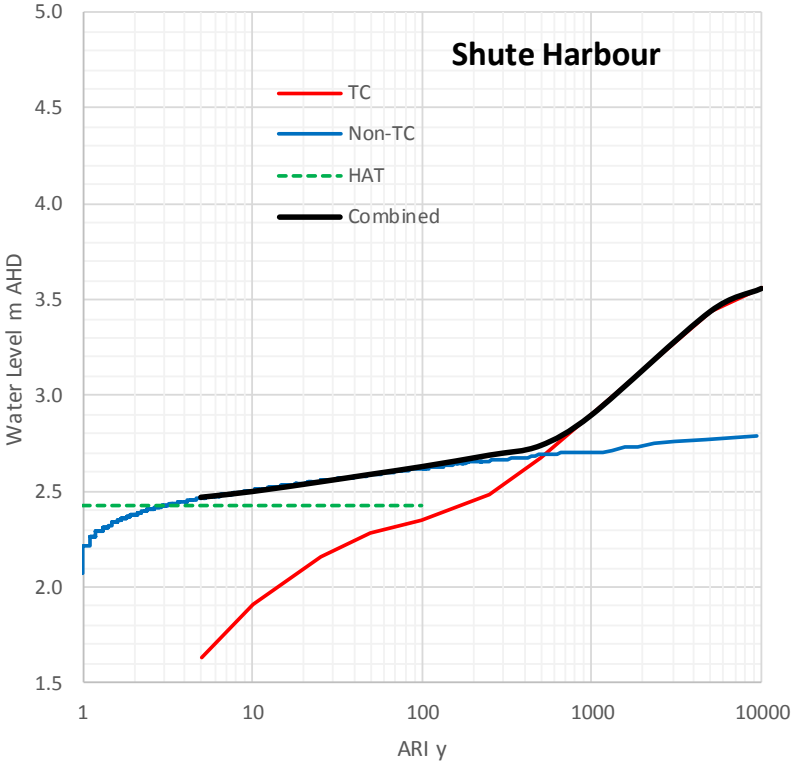


Figure 3-6 Blended TC and Non-TC surge plus tide extreme water levels for Shute Harbour

4 Numerical Modelling of Tropical Cyclones

4.1 Hydrodynamic Model Development

The hydrodynamic modelling component of these assessments has been undertaken using the TUFLOW FV software, which is developed and distributed by BMT WBM (http://www.tuflow.com/Tuflow%20FV.aspx). TUFLOW FV is a numerical hydrodynamic model for the two-dimensional (2D) and three-dimensional (3D) Non-Linear Shallow Water Equations (NLSWE). The model is suitable for solving a wide range of hydrodynamic systems ranging in scale from open channels and floodplains, through estuaries to coasts and oceans.

The Finite-Volume (FV) numerical scheme employed by TUFLOW FV is capable of solving the NLSWE on both structured rectilinear grids and unstructured meshes comprised of triangular and quadrilateral elements. The flexible mesh allows for seamless boundary fitting along complex coastlines or open channels as well as accurately and efficiently representing complex bathymetries with a minimum number of computational elements. The flexible mesh capability is particularly efficient at resolving a range of scales in a single model without requiring multiple domain nesting. Further details regarding the numerical scheme employed by TUFLOW FV are provided in the TUFLOW FV Science Manual (BMT WBM 2013).

4.1.1 Model Domain, Mesh and Bathymetry

The hydrodynamic model domain is shown in Figure 4-1 and extends from Agnes Water in the south to Innisfail in the north and includes the Great Barrier Reef lagoon and offshore reefs.

The model consists of 263,549 mesh cells with resolution varying from 10 km (approximate mesh cell side length) at the offshore boundary, increasing to <100 m across the coastal inundation floodplain. Figure 4-2 shows detail of the model mesh in the vicinity of Bowen.

Figure 4-1 also shows the model offshore bathymetry (note that overland elevations are not shown). Topographic and bathymetric Digital Elevation Models (DEMs) have been derived from the following sources, listed in decreasing order of priority:

- Topographic LiDAR survey acquired in 2016 and provided by WRC;
- Australian Electronic Navigational Charts (AusENC) (Australian Hydrographic Services 2016)
- James Cook University Project 3DGBR (Beaman 2010).

4.1.2 Boundary Conditions

The local hydrodynamics estimated by TUFLOW FV are influenced by boundary condition inputs. Information regarding appropriate boundary condition forcing for the study area was obtained from the following sources:

- Output from global models developed by third-parties; and
- Output from parametric wind and pressure field models.

Details of the specific information sources used to develop boundary conditions applied to the hydrodynamic model are provided below.

4.1.2.1 Wetting and Drying

TUFLOW FV simulates the wetting and drying of intertidal areas (during non-extreme conditions) and coastal inundation areas during extreme events. The minimum wetting and drying depths were set to 0.1 m and 0.01 m respectively. Numerically, the drying value corresponds to a minimum depth below which the mesh cell is dropped from computations (subject to the status of surrounding cells). The wet value corresponds to a minimum depth below which cell momentum is set to zero, in order to avoid unphysical velocities at very low depths.

4.1.2.2 Wind and Atmospheric Pressure

The wind and atmospheric pressure at mean sea level (mslp) boundary conditions applied to the hydrodynamic model[4] were either:

(1) For long term storm tide hazard assessment modelling: selected events from the SEAsim model (see Section 2.3 and Section 2.4); or

(2) For hindcast modelling of TC Debbie: output from the Holland (1980) parametric model of a single-vortex tropical cyclone wind and pressure field blended with NCEP Climate Forecast System Version 2 (CFSv2) (http://www.ncdc.noaa.gov/data-access/model-data/model-datasets/climate-forecast-system-version2-cfsv2).

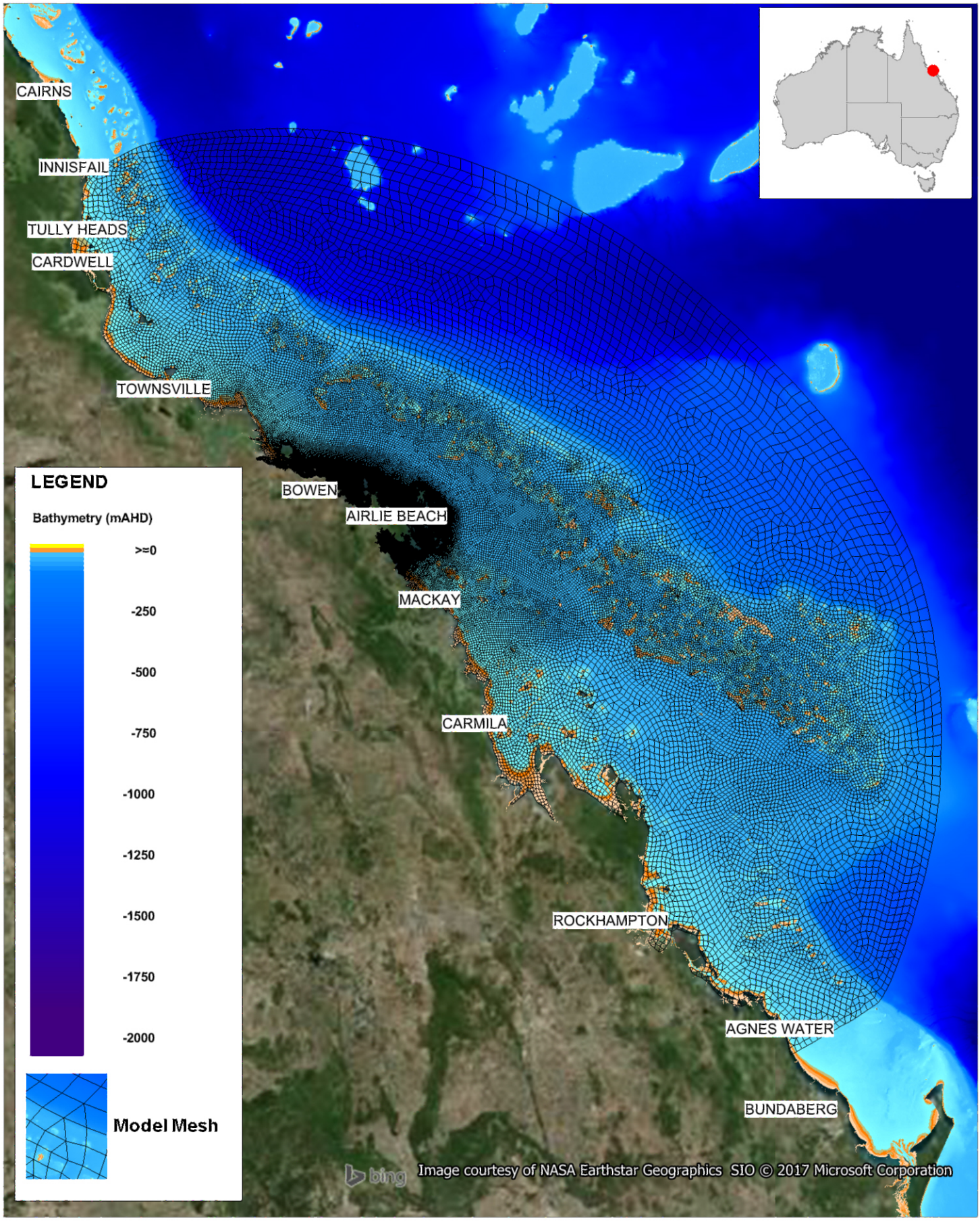
The results of the long term storm tide hazard assessment modelling are presented in Chapter 5.

For hindcast modelling of historical events, the Holland model output was blended with the CFSR or CFSv2 global model output. Following this approach the “near-field” tropical cyclone conditions are defined by the Holland model while the “far-field” atmospheric conditions are based on the NCEP forecasts. The blending of the wind and pressure fields was undertaken using the CyCal tool (developed by Jason McConochie) and is described further in Section 4.3.2. The blended wind and pressure fields provide a detailed boundary condition for hindcast modelling of historical surge and wave events. This allows the predictive skill of the numerical model to be tested against recorded data.

4.1.2.3 Tide

For hindcast simulations of surge plus tide, the hydrodynamic model required a temporal definition of the water surface elevation at the open boundary. Due to the large extent of the model domain, astronomic tidal elevations vary spatially and temporally along the length of the offshore boundary. The predicted water level variation due to ocean tides was derived using the TPXO7.2 global model (http://volkov.oce.orst.edu/tides/global.html) and applied to the open boundary of the TUFLOW FV hydrodynamic model.

[4] TUFLOW FV calculates the wind drag coefficient using the empirical formula of Wu (1980; 1982). For the present study, the parameters proposed by Wu (1982) were applied.



Title:

Hydrodynamic Model Mesh and Bathymetry

Figure: 4-1

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Approx. Scale

BMT WBM

www.bmtwbm.com.au

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Hydrodynamic Model Mesh Detail

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0 1.25 2.5km

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4.2 Wave Model Development

The wave modelling component of these assessments has been undertaken using the spectral wave model SWAN.

SWAN (Delft University of Technology 2006) is a third-generation spectral wave model, which is capable of simulating the generation of waves by wind, dissipation by whitecapping, depth-induced wave breaking, bottom friction and wave-wave interactions in both deep and shallow water. SWAN simulates wave/swell propagation in two-dimensions, including shoaling and refraction due to spatial variations in bathymetry and currents. This is a global industry standard modelling package that has been applied with reliable results to many investigations worldwide.

In this study, SWAN predictions are used as input to the general expression for estimating wave runup on a beach provided by Stockdon et al. (2006), as described in Section 4.2.3.

4.2.1 Model Domain and Bathymetry

A nested grid wave modelling approach has been adopted and is shown in Figure 4-3. The nested system comprises a regional (1000m grid resolution) model covering the Great Barrier Reef lagoon and extending beyond the continental shelf. Wave propagation throughout the vicinity of the WRC Local Government Area (LGA) coastline has been assessed using a local sub-model (250 m grid resolution).

The wave model bathymetry has been derived from the same sources adopted for hydrodynamic modelling. The DEM constructed from these combined sources is described in Section 4.1.1.

4.2.2 Boundary Conditions

Wave parameters in coastal areas estimated by SWAN are determined from the model inputs specified by the user. Appropriately representing the swell and wind conditions relevant to the study area are key inputs. The boundary conditions are described below.

4.2.2.1 Swell

For hindcast modelling, offshore swell conditions were derived from global Wavewatch III model output (http://polar.ncep.noaa.gov/waves/) and applied to the offshore boundary of the regional wave model. The swell conditions were specified as spatially uniform but variable in time wave parameters (significant wave height, peak period, peak direction).

4.2.2.2 Wind

The wind fields applied to the TUFLOW FV hydrodynamic model described in Section 4.1.2.2 were also applied to the wave models.

4.2.2.3 Water level & Currents

The wave modelling assumes static water levels and no currents. For each simulated TC event, the static water level was taken to be the peak ‘surge plus tide’ at Bowen, obtained from the equivalent TC event hydrodynamic simulation.

4.2.3 Wave Setup and Runup

In the present study the contribution of wave setup and runup processes to the extreme water level has been considered at exposed coastal locations. Within estuaries, inlets and across the coastal floodplain the contribution of wave driven processes to the extreme water level is assumed to be much smaller.

Wave setup is an elevation of the mean (time averaged) water surface due to the pumping effect of waves. Wave setup has the potential to cause a small to moderate increase in water levels in the coastal waterways and floodplains. The wave setup contribution to the mean water level along exposed coastal locations can be significant (of the order 0.5 to 1.0 m)

Wave runup is the intermittent process of advancement and retreat of the instantaneous shoreline position on a timescale that is of the order of the incoming wave period (~10 s for cyclone generated waves). Along exposed coastlines the wave runup can be a significant contributor to the peak water levels and inundation associated with the overtopping of coastal barriers. Furthermore, the large quantity of energy contained in individual wave runup can pose a serious risk to coastal barriers (natural or man-made) within the wave runup zone.

The wave setup and runup contribution to shoreline water levels within the coastal zone has been estimated using the SWAN model output and an empirical formulation based on 10 dynamically diverse field experiments described in Stockdon et al (2006). The runup height predicted with this formula is the level above the offshore mean water level that is exceeded by 2% of runup events (R_2). This formulation was demonstrated in previous studies to provide robust estimates of surveyed debris levels associated with TC Winifred, TC Larry and TC Yasi (BMT WBM 2008, BMT WBM 2016). The general expression for wave setup and wave runup on beaches provided in Stockdon et al. (2006):

Wave setup

$$S_{shoreline} = 0.35\beta_f \left(H_0 L_0\right)^{1/2}$$

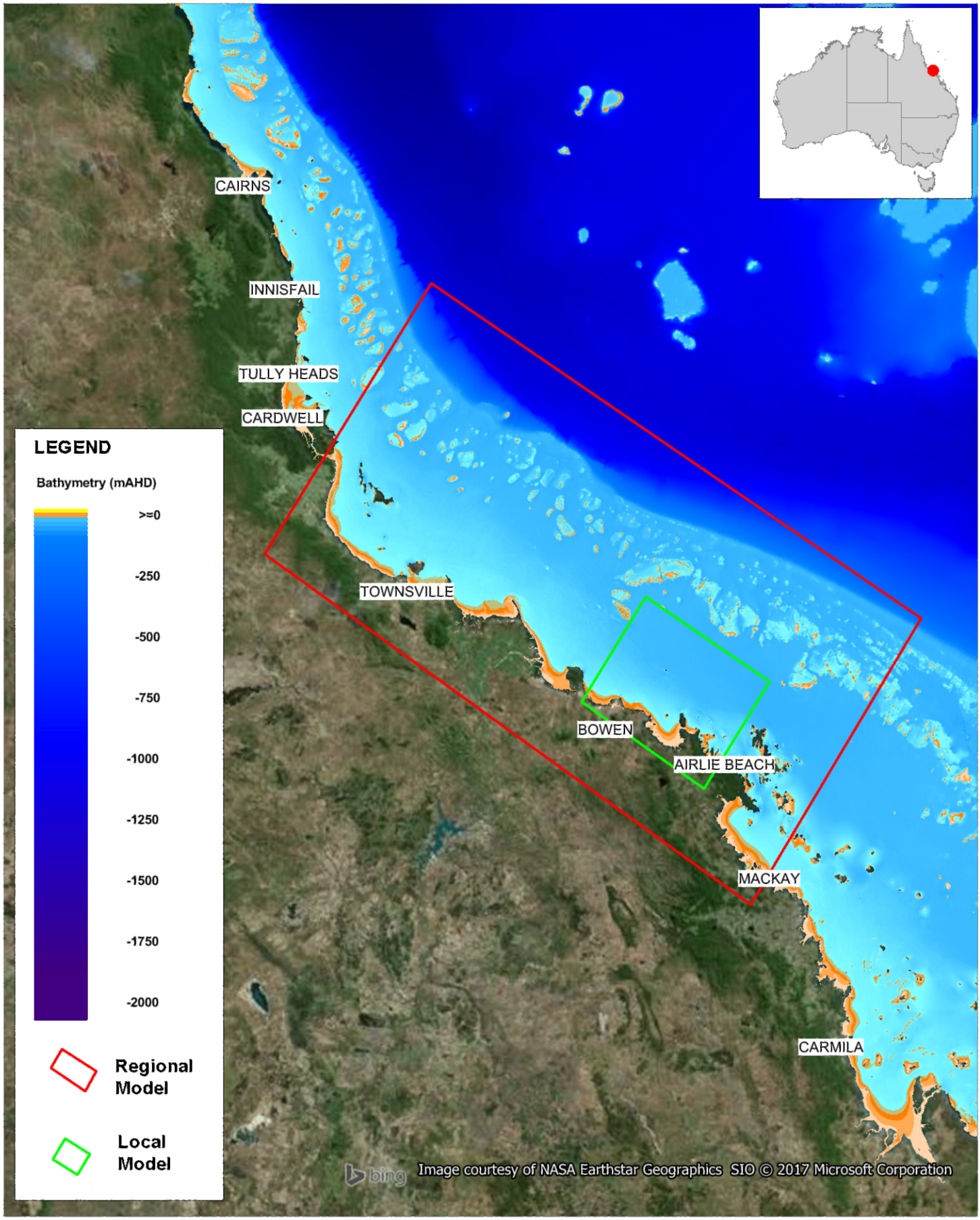
Equation 4-1

Wave runup

$$R_2 = 1.1\left(S_{shoreline} + \frac{H_0 L_0 \left(0.563\beta_f^2 + 0.004\right)^{1/2}}{2} \right)$$

Equation 4-2

Where β_f is the foreshore slope, H_0 is the deep water significant wave height and L_0 is the deep water wave length.



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Nested Wave Model Extents and Bathymetry

Figure: 4-3

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Approx. Scale

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4.3 Hydrodynamic Model Validation

Three independent methods for validating the detailed hydrodynamic model have been completed, including:

(1) Modelled astronomic tide compared to MSQ astronomic tide predictions at Bowen, Shute Harbour and Laguna Quays;

(2) Modelled TC Debbie-generated surge and storm tide compared recorded data from Bowen, Shute Harbour and Laguna Quays storm tide gauges; and

(3) Statistical validation of modelled peak water levels with SEAsim outputs at Bowen.

The model validation (1) and (2) exercises are described below in the following sections. The statistical validation of the hydrodynamic model with SEAsim outputs at Bowen is presented in Section 5.1.1.

4.3.1 Astronomic Tide

Throughout the study area the tide wave is significantly modified by the network of offshore reefs and islands and the relatively shallow continental shelf. These features cause significant tidal amplification at some locations. Model validation to astronomic tidal predictions, based on tidal predictions provided by MSQ, is provided in Figure 4-4. There is a tendency to slightly under predict the tidal amplitude, particularly at Shute Harbour and Laguna Quays, but generally the astronomic tidal variation is simulated with sufficient accuracy.

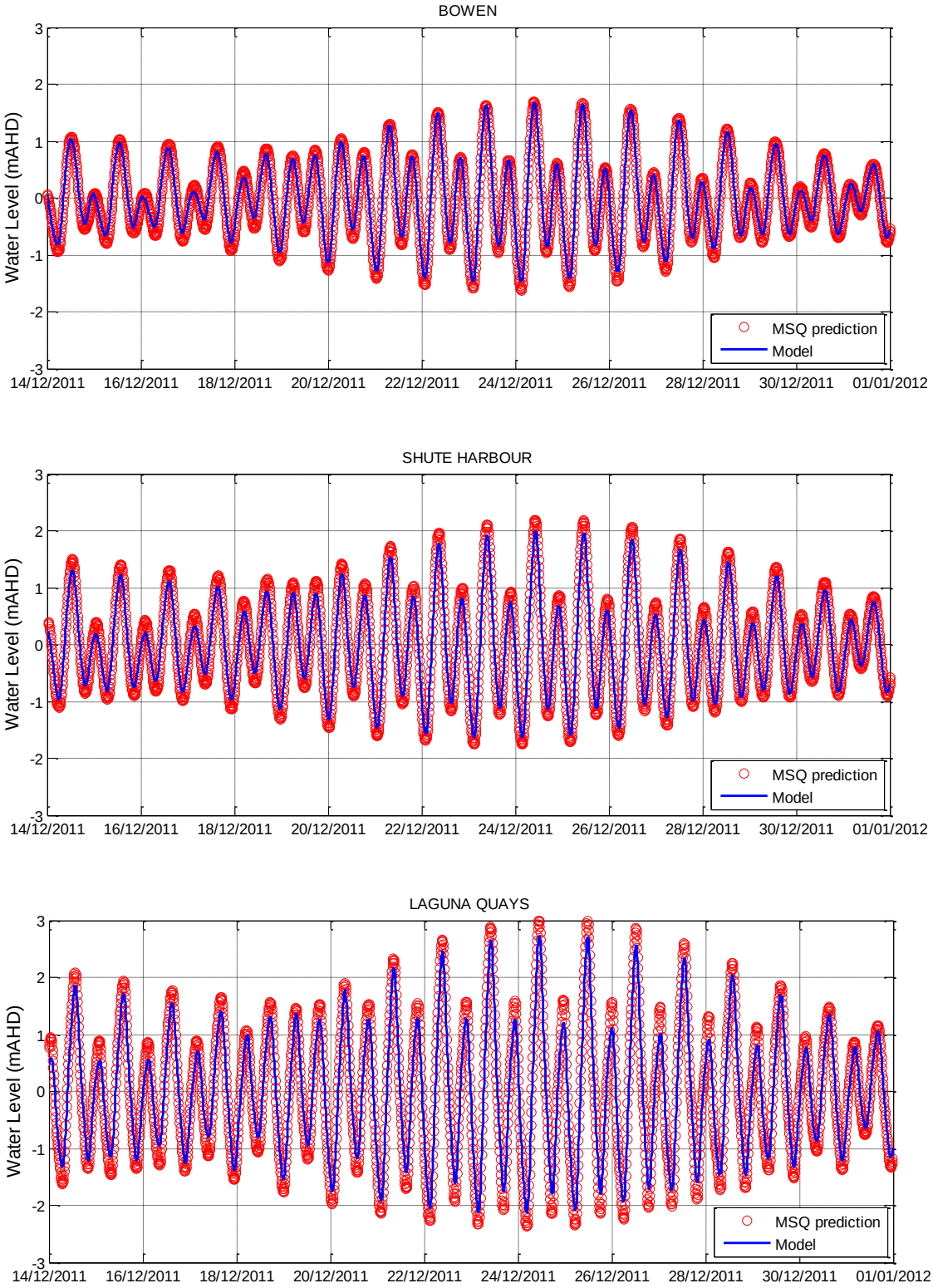


Figure 4-4 Modelled astronomic tide validation

4.3.2 TC Debbie Hindcast

TC Debbie (2016/17 season) strengthened to become a category 4 tropical cyclone and made landfall near Airlie Beach around 11:50 AEST on 28 March 2017. The lowest measured central pressure measured by the BOM was 962 hPa at Hamilton Island. A nearby pressure transducer deployed at Proserpine during the event also measured a minimum central pressure of 962 hPa (JCU 2017). A maximum storm surge of approximately 2.5 m was measured at Laguna Quays storm tide gauge corresponding to a total water level of 4.4 mAHD and close to 1 m above HAT. It is assumed that higher levels would have occurred due to wave setup and runup. This is typically inferred through surveying of the debris level elevation; however, at the time of writing it was not known whether this data was recorded (typically undertaken by the Queensland Coastal Impacts Unit).

Some key features of the TC Debbie event relevant to the present study include:

- Maximum 10-minute average wind speed offshore (estimated): 194 km/h (54 m/s)
- Maximum 10-minute average wind speed recorded at landfall (Hamilton Island): 191 km/h (53 m/s)
- Minimum central pressure offshore (estimated): 943 hPa
- Minimum central pressure recorded at landfall (Hamilton Island): 962 hPa
- Peak recorded storm surge (Laguna Quays storm tide gauge): 2.5 m
- Peak recorded water level (Laguna Quays storm tide gauge): 4.4 mAHD.

The BOM ‘best track’ for TC Debbie is shown in Figure 4-5, together with the locations of weather stations used to validate model performance.

4.3.2.1 Wind and Atmospheric Pressure

Holland (1980) model parameters used to describe the near-field TC Debbie cyclonic wind and pressure field are provided in Table 4-1. The cyclone position, central pressure and radius to maximum winds were taken from the BOM TC database (accessed on 05 June 2017). The wind field “peakedness” defined through the Holland ‘*B’* parameter was set to 1.2. A constant angle to maximum winds of 65 degrees and an ambient atmospheric pressure of 1010 hPa were assumed during the simulation period.

As described in Section 4.1.2.2, the Holland model output was blended with the CFSv2 global model output which provided the far-field atmospheric conditions. Snapshots of the resulting synoptics are shown in Figure 4-6 (mslp) and Figure 4-7 (10-minute wind speed).

The modelled wind and pressure field was calibrated against the available data recorded during the event. A selection of calibration plots are provided in Figure 4-8 to Figure 4-11 with the location of these sites previously indicated in Figure 4-5.

The blended wind and pressure field is shown to reproduce the general features of the recorded wind and pressure time series data. TC Debbie tracked very close to Lihou Reef and Hamilton Island. Good predictive skill is observed at these locations and also the other far-field locations

(Flinders Reef and Creal Reef). It is noted that the Hamilton Island pressure transducer stopped recording as the cyclone tracked over this location.

4.3.2.2 Surge and Surge plus Tide

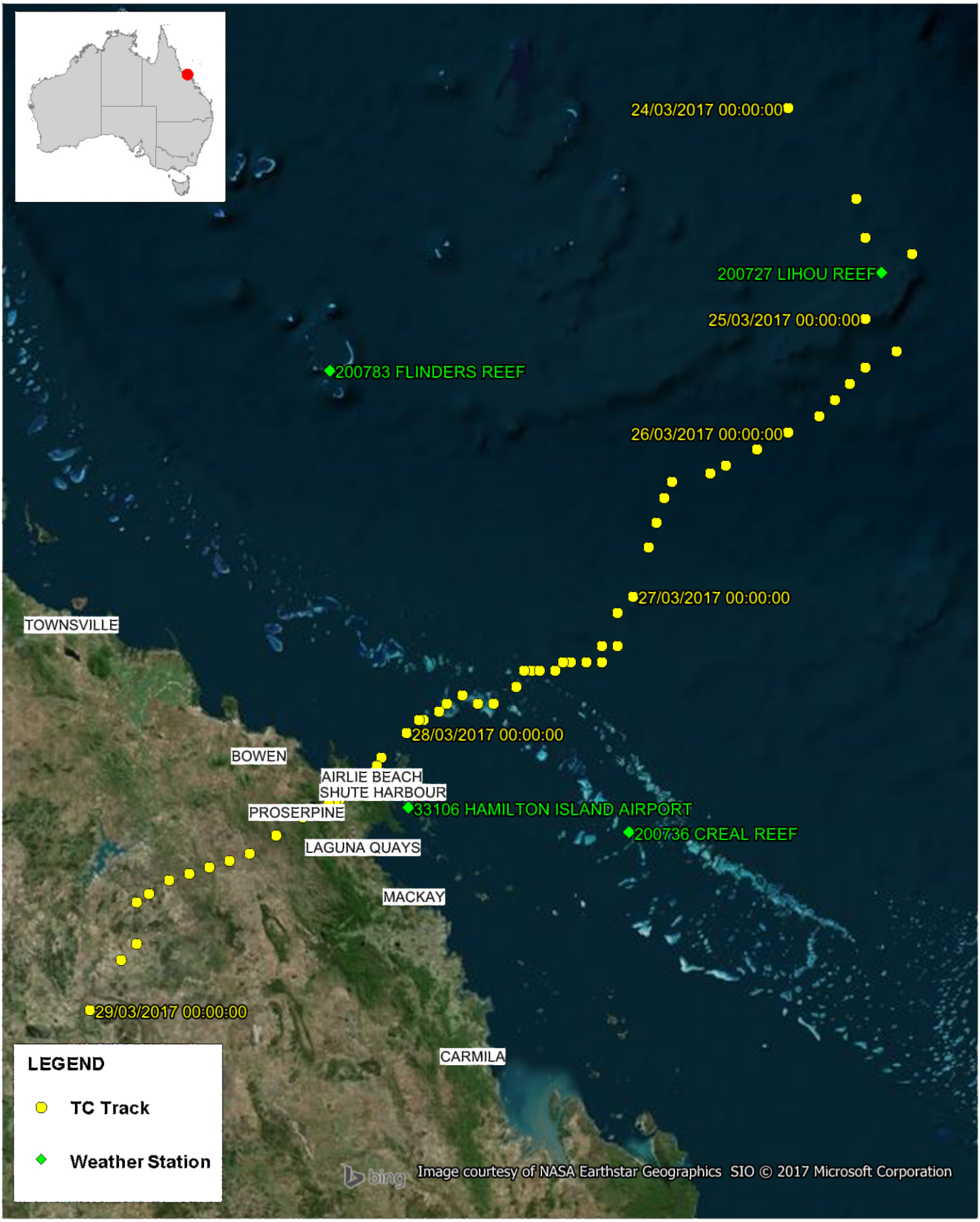
TC Debbie 'surge plus tide' simulations were undertaken using the modelling system. The model was forced by output from the TPXO7.2 global tide model (see Section 4.1.2.3) in addition to wind and pressure fields described in Section 4.3.2.1. A 'tide only' simulation (i.e. no atmospheric forcing) was also undertaken and this result was subtracted from the 'surge plus tide' simulation result to obtain the modelled tidal residual (or 'surge only' result).

The modelled 'surge plus tide' and tidal residual at Bowen, Shute Harbour and Laguna Quays are compared with recorded data in Figure 4-12, Figure 4-13 and Figure 4-14. The model predicts the recorded peaks within an accuracy of ±0.2 m at Shute Harbour and Laguna Quays. The negative tidal residual at Bowen is over predicted by the model. The water level 'set down' observed at Bowen was due to the offshore winds to the north of the tropical cyclone eye as the storm made landfall. It is likely the offshore winds are over predicted by the model (leading to an over prediction of the negative residual) since there was no attempt to account for modification to the wind field associated with frictional drag effects over land.

It is noted that the tendency of the model to over predict 'set down' does not influence the outcomes of the long term storm tide assessment (described in Chapter 5) which is based on the peak 'surge plus tide' levels only.

Table 4-1 Holland Model Parameters for TC Debbie

Time (AEST)	Latitude (deg)	Longitude (deg)	Rmax (km)	Central Pressure (hPa)	B (-)
27/03/2017 01:00	-18.5	150.6	46	979	1.2
27/03/2017 04:00	-18.65	150.55	46	983	1.2
27/03/2017 07:00	-18.8	150.5	46	981	1.2
27/03/2017 10:00	-19.1	150.4	46	975	1.2
27/03/2017 13:00	-19.2	150.3	37	961	1.2
27/03/2017 14:00	-19.4	150.3	37	957	1.2
27/03/2017 15:00	-19.4	150.2	37	952	1.2
27/03/2017 16:00	-19.5	150.2	37	952	1.2
27/03/2017 17:00	-19.5	150.1	37	952	1.2
27/03/2017 18:00	-19.5	150	37	952	1.2
27/03/2017 19:00	-19.5	149.95	37	952	1.2
27/03/2017 20:00	-19.55	149.9	30	948	1.2
27/03/2017 21:00	-19.55	149.8	28	947	1.2
27/03/2017 22:00	-19.55	149.75	28	943	1.2
27/03/2017 23:00	-19.55	149.7	28	945	1.2
28/03/2017 00:00	-19.65	149.65	28	944	1.2
28/03/2017 01:00	-19.75	149.5	28	945	1.2
28/03/2017 02:00	-19.75	149.4	28	946	1.2
28/03/2017 03:00	-19.7	149.3	28	946	1.2
28/03/2017 04:00	-19.75	149.2	28	946	1.2
28/03/2017 05:00	-19.75	149.2	28	946	1.2
28/03/2017 06:00	-19.75	149.2	28	943	1.2
28/03/2017 07:00	-19.8	149.15	28	943	1.2
28/03/2017 08:00	-19.85	149.05	28	943	1.2
28/03/2017 09:00	-19.85	149.02	33	943	1.2
28/03/2017 10:00	-19.93	148.94	33	943	1.2
28/03/2017 11:00	-20.08	148.78	33	943	1.2
28/03/2017 12:00	-20.13	148.75	33	943	1.2
28/03/2017 13:00	-20.26	148.62	33	943	1.2
28/03/2017 14:00	-20.33	148.51	33	949	1.2
28/03/2017 15:00	-20.34	148.48	33	958	1.2
28/03/2017 16:00	-20.36	148.44	19	962	1.2
28/03/2017 17:00	-20.4	148.39	15	968	1.2
28/03/2017 18:00	-20.42	148.33	15	974	1.2
28/03/2017 19:00	-20.44	148.27	15	976	1.2
28/03/2017 20:00	-20.55	148.1	15	978	1.2
28/03/2017 21:00	-20.66	147.93	15	983	1.2
28/03/2017 22:00	-20.7	147.8	15	983	1.2
28/03/2017 23:00	-20.74	147.67	15	987	1.2
29/03/2017 00:00	-20.78	147.54	15	990	1.2
29/03/2017 01:00	-20.82	147.41	15	990	1.2
29/03/2017 02:00	-20.9	147.28	15	994	1.2
29/03/2017 03:00	-20.95	147.2	15	995	1.2
29/03/2017 05:00	-21.2	147.2	15	995	1.2
29/03/2017 06:00	-21.3	147.1	15	995	1.2
29/03/2017 10:00	-21.6	146.9	15	996	1.2
29/03/2017 16:00	-22.01	146.8	15	997	1.2
29/03/2017 22:00	-23	147.3	15	998	1.2
30/03/2017 04:00	-24.2	148	15	998	1.2
30/03/2017 10:00	-24.7	148.8	15	1000	1.2



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TC Debbie BOM Best Track & Weather Stations

Figure: 4-5

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0 75 150km

Approx. Scale

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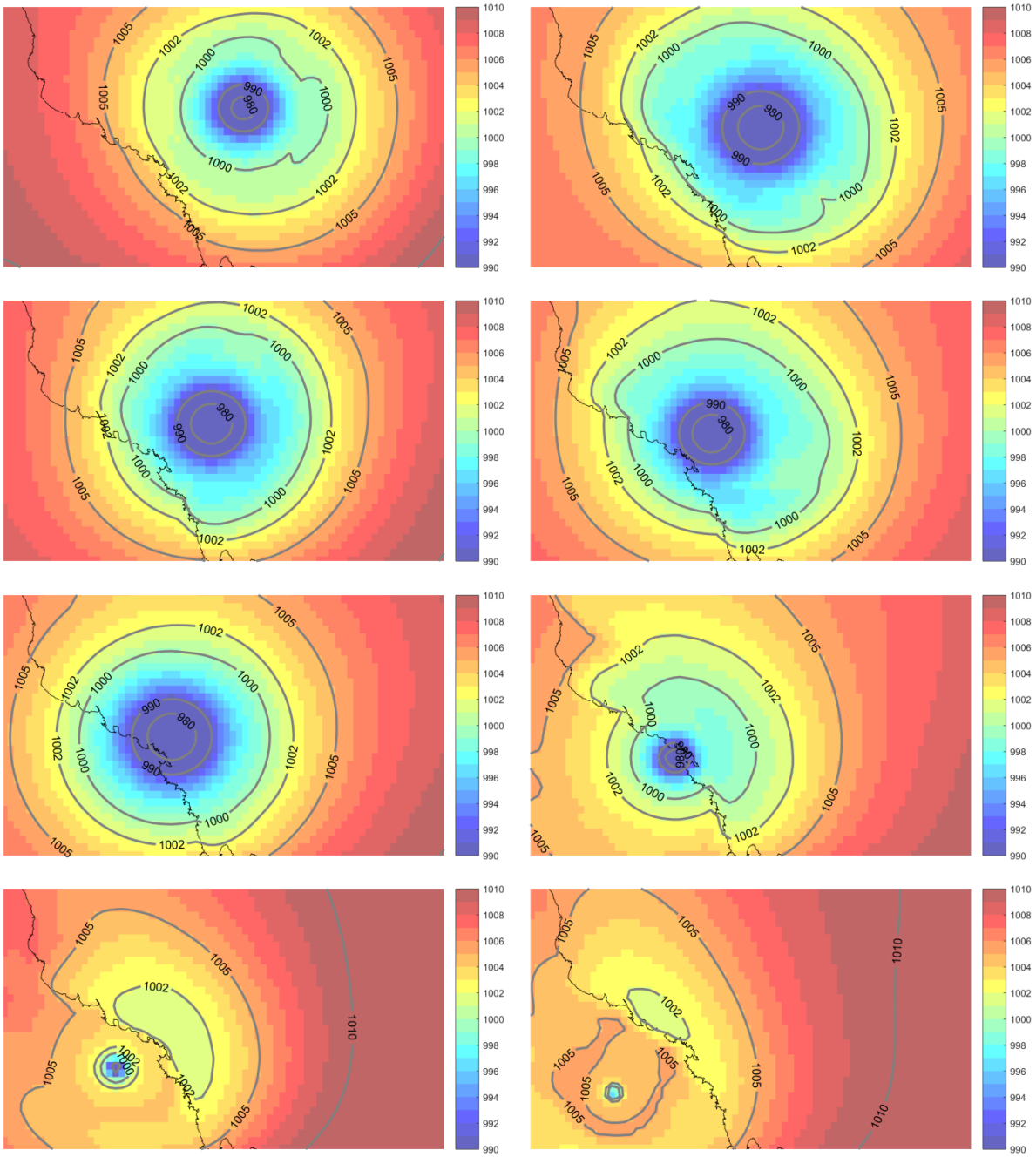

Figure 4-6 TC Debbie blended Holland model and CSFv2 mean sea level pressure (hPa) field at 6 hourly intervals from 27/03/2017 00:00

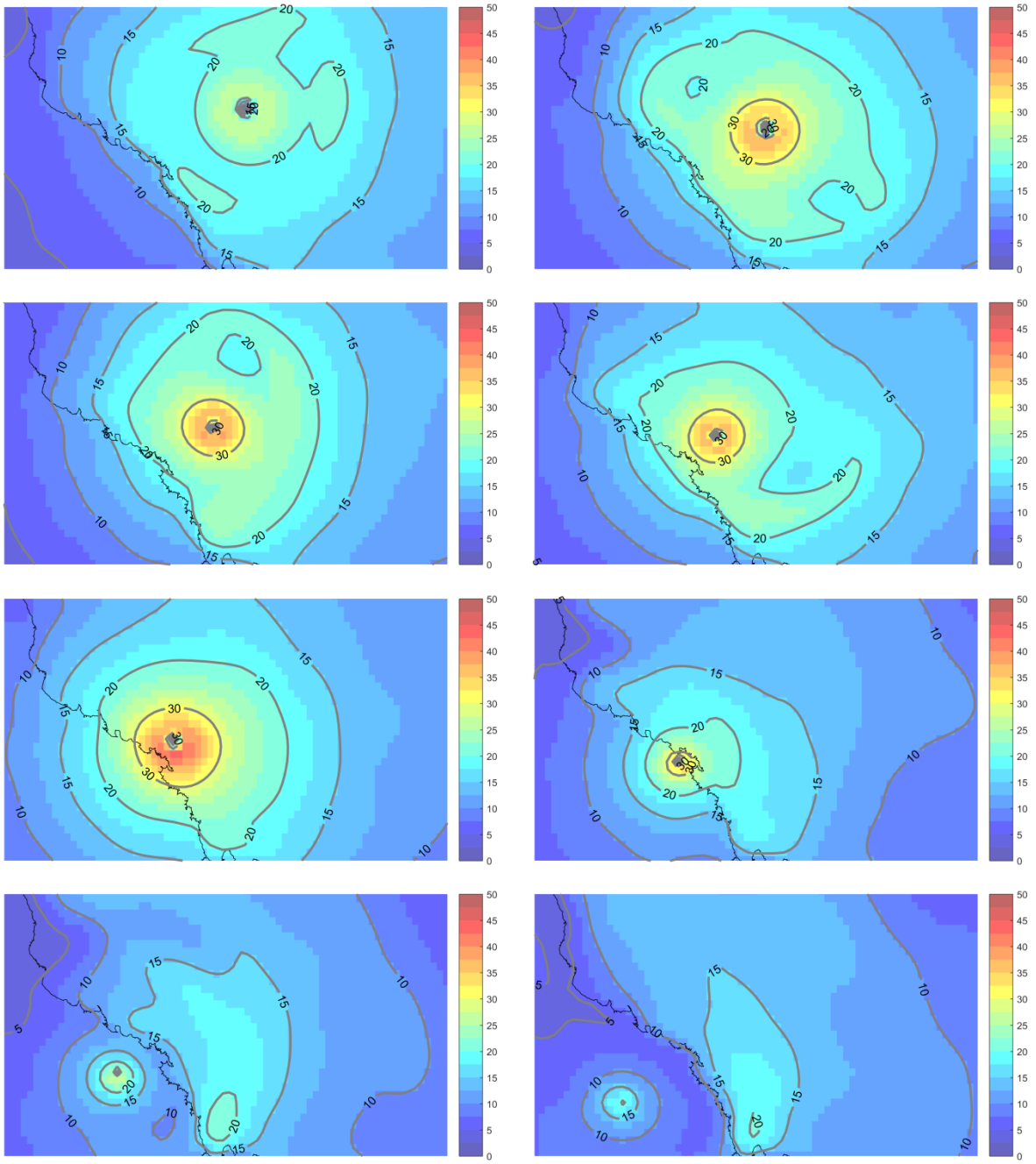

Figure 4-7 TC Debbie blended Holland model and CSFv2 10-minute wind speed (m/s) field at 6 hourly intervals from 27/03/2017 00:00

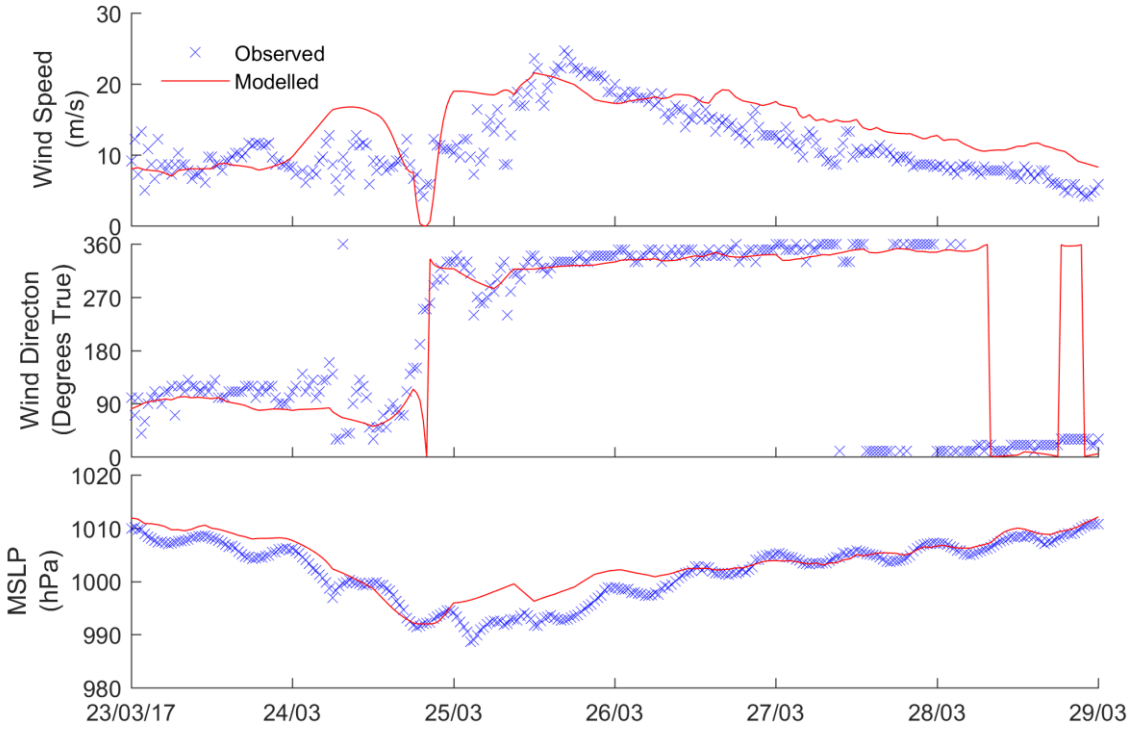

Figure 4-8 Lihou Reef wind and mean sea level pressure validation

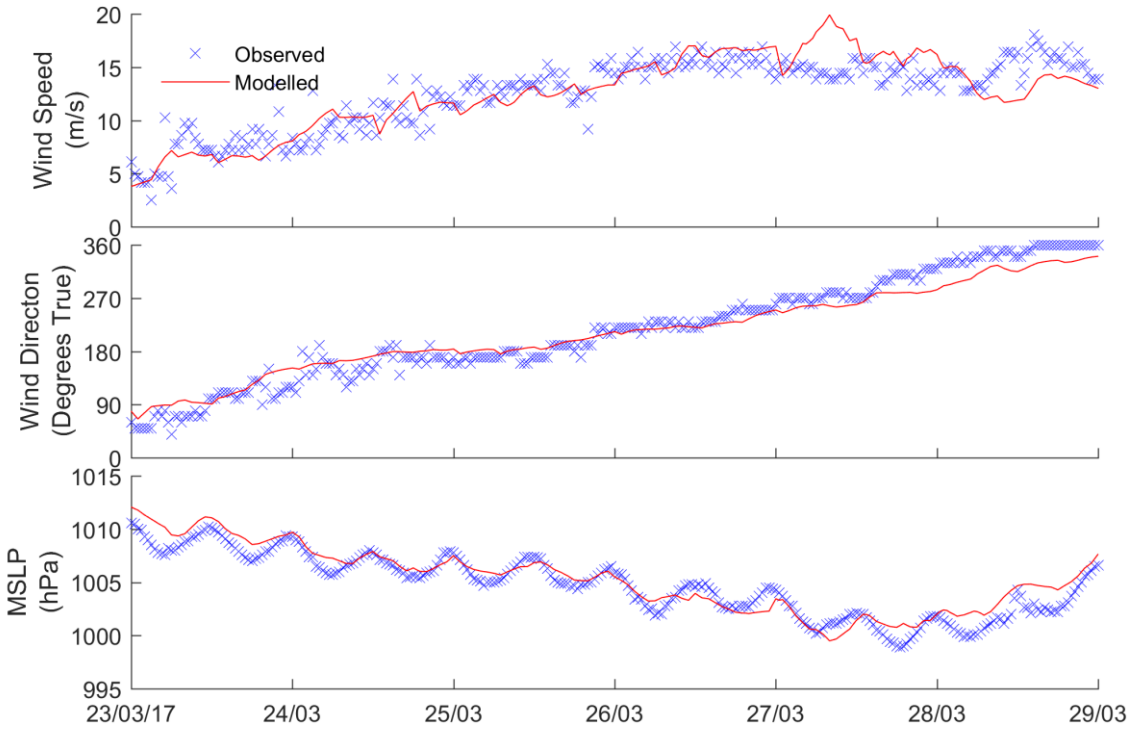

Figure 4-9 Flinders Reef wind and mean sea level pressure validation

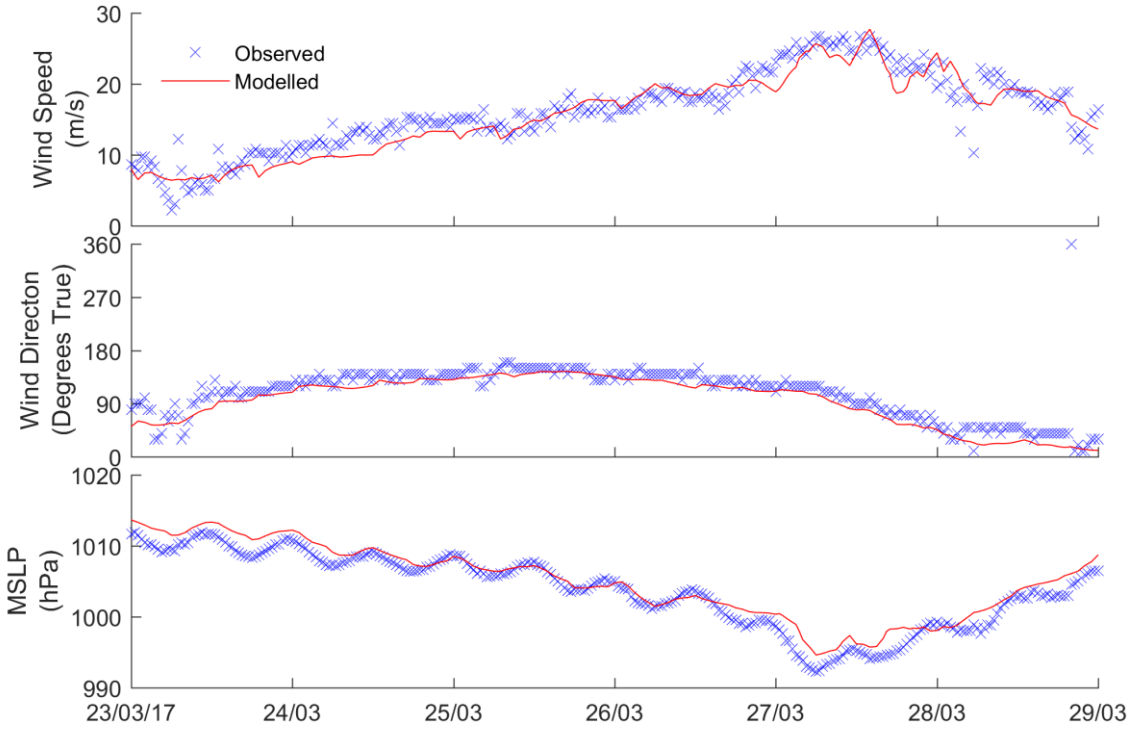

Figure 4-10 Creal Reef wind and mean sea level pressure validation

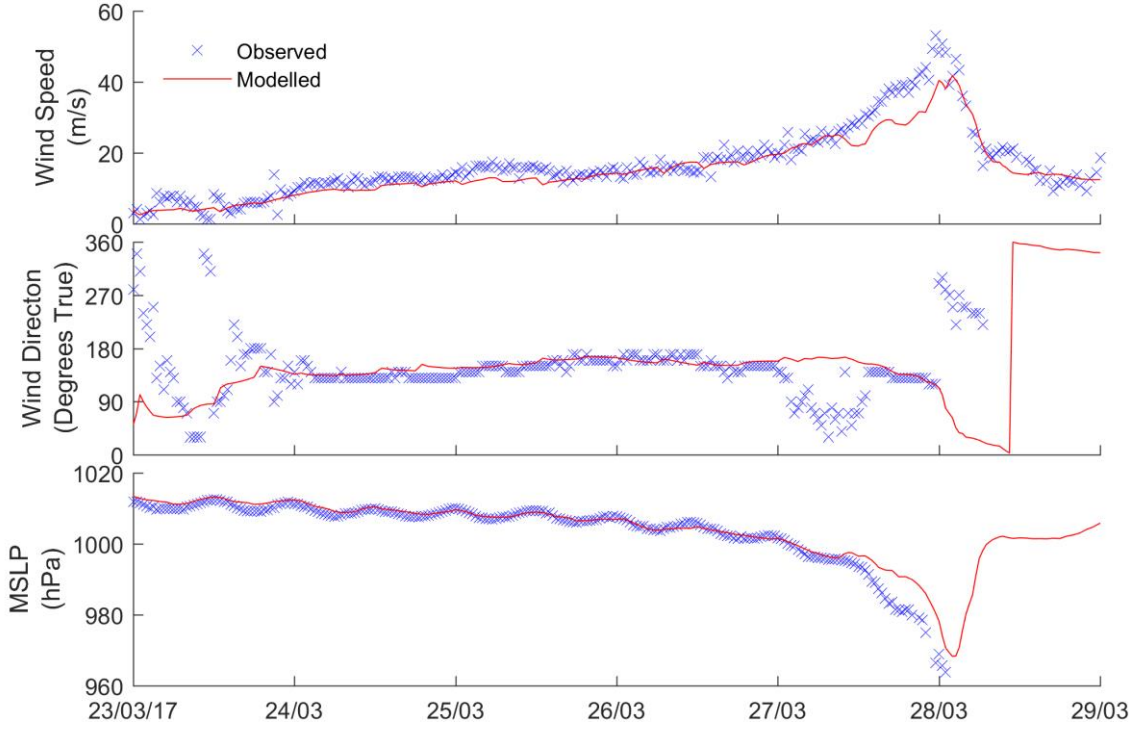

Figure 4-11 Hamilton Island wind and mean sea level pressure validation

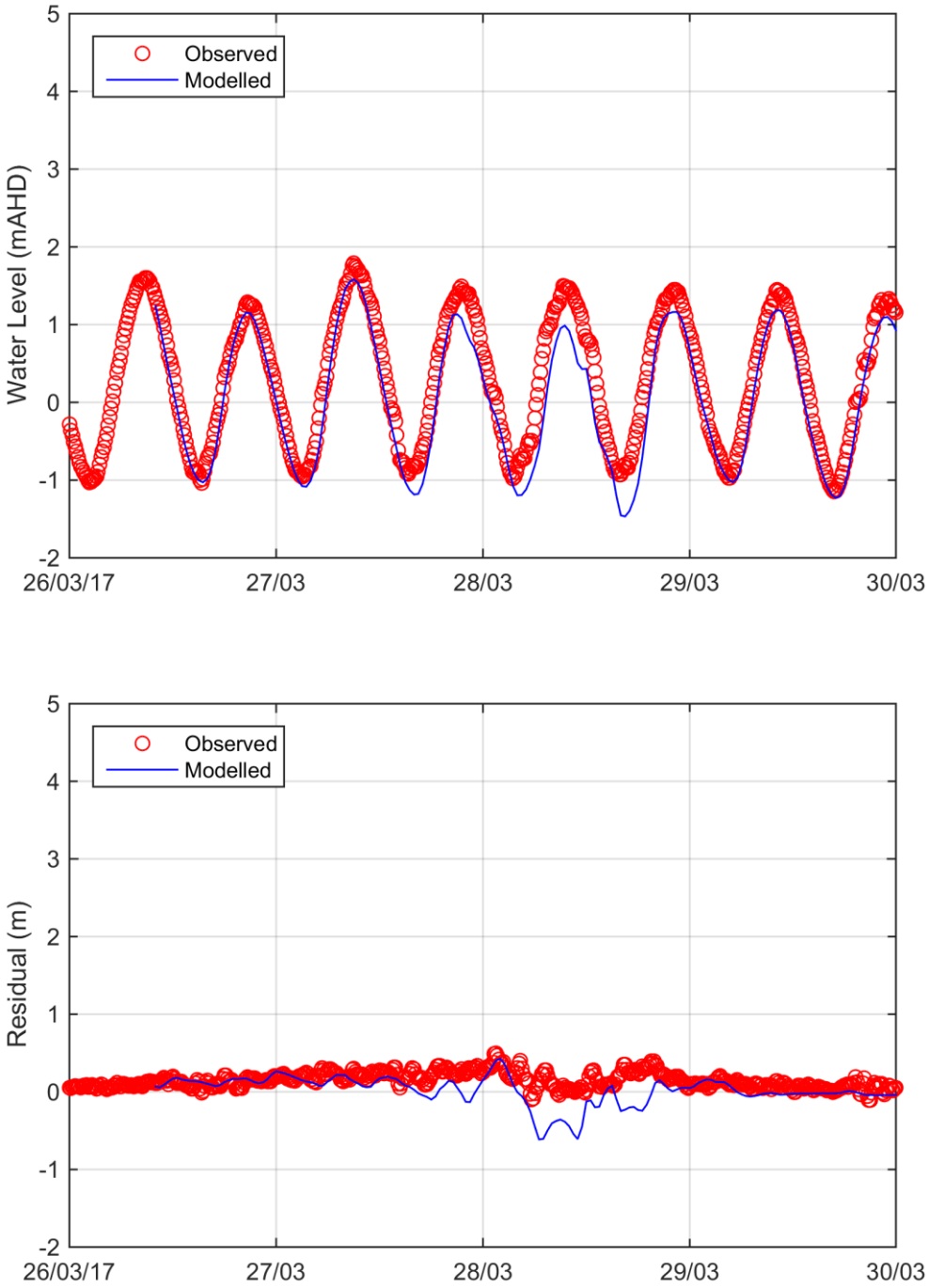

Figure 4-12 Bowen total water level and tidal residual validation

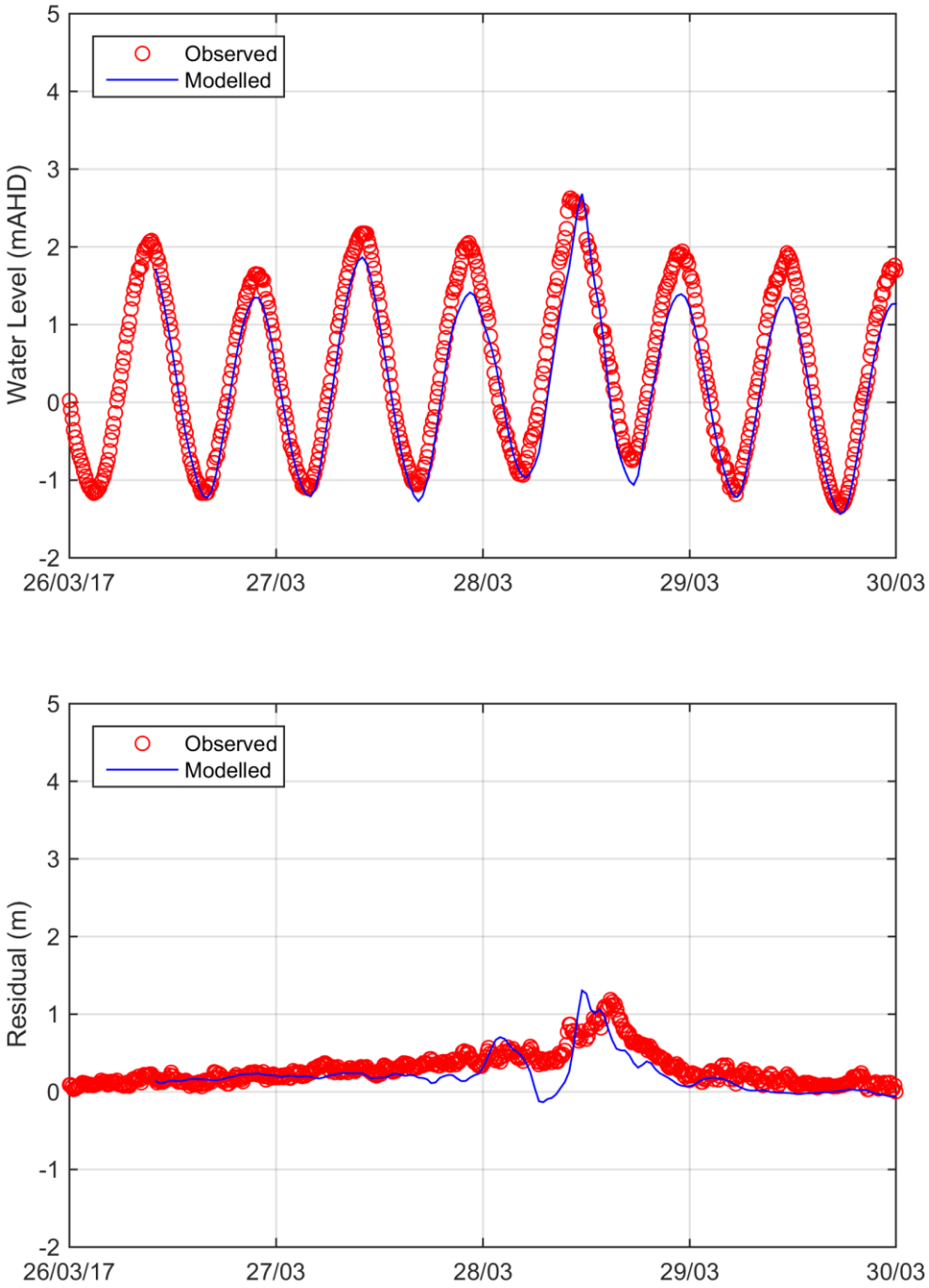

Figure 4-13 Shute Harbour total water level and tidal residual validation

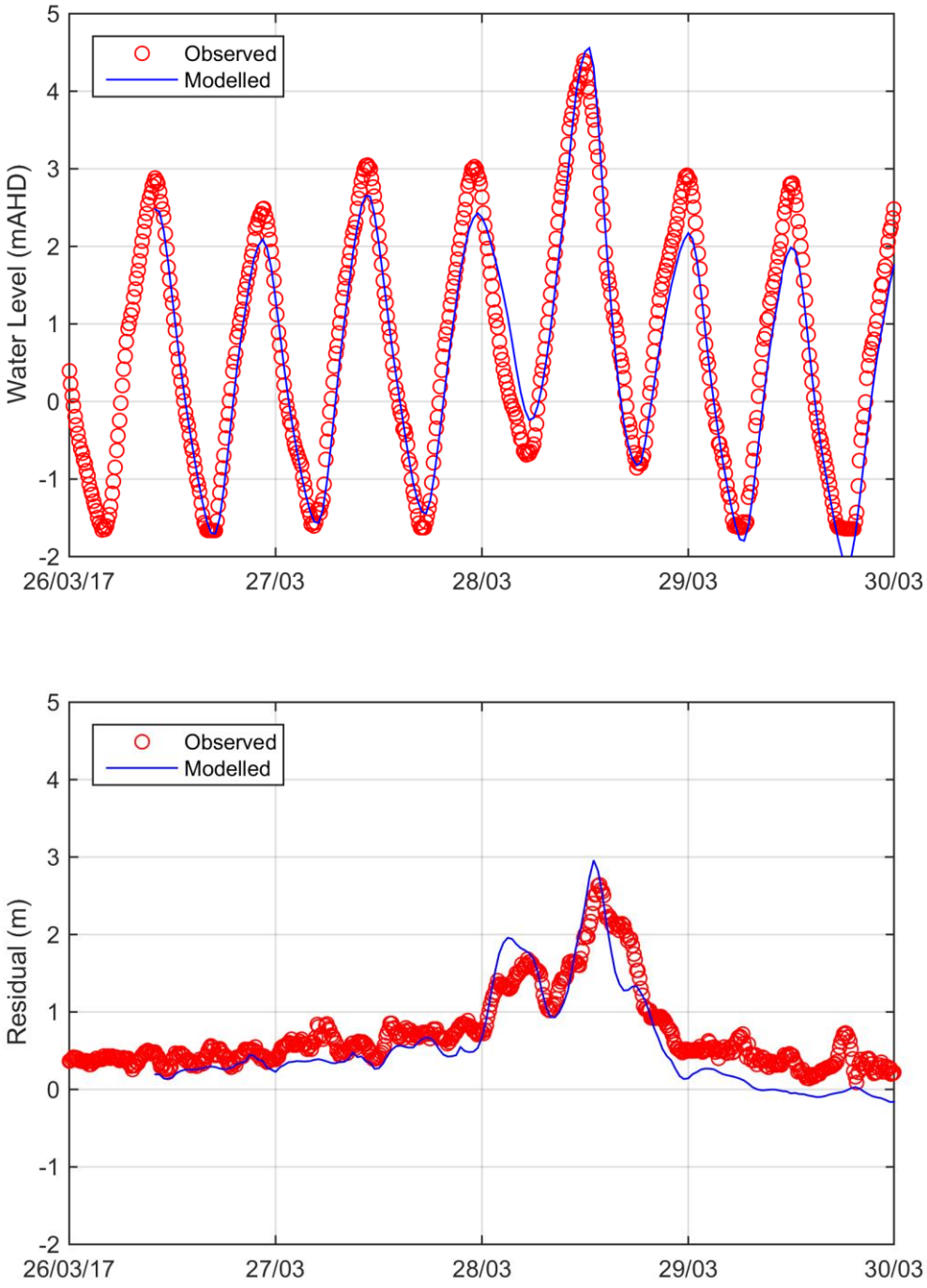

Figure 4-14 Laguna Quays total water level and tidal residual validation

5 Storm Tide Hazard Assessment Modelling

5.1 Detailed Modelling Assessment Approach

Storm tide statistics with and without the influence of wave processes are presented in this Chapter. The recommended levels consider:

- The tropical cyclone generated 'surge plus tide' water level statistics derived through detailed numerical modelling of the selected SEAsim events described in Section 2.4, corresponding to:
  - 378 unique 2017 current climate events;
  - 433 unique 2050 future climate events; and
  - 413 unique 2100 future climate events.
- The non-TC water level statistics derived through the tidal residual analysis presented in Chapter 3 and the offsets developed relative to the 'HAT Proxy' described below in Section 5.1.2.
- The combined TC and non-TC water level statistics following the methodology described in Section 3.2.
- The contribution of waves to the potential extreme water levels.

The detailed modelling output point locations are shown in Figure 5-1 with the numbered points indicating key reporting locations used in the summary tables. The points shown in Figure 5-1 approximately follow the 5 m depth contour. At each location the following statistics have been derived:

- Surge plus tide levels for the 5, 10, 50, 100, 200, 500, 1000, 2000, 5000 and 10000 year ARI. The results at key locations are provided in Section 5.1.2 and all locations in Appendix A.
- Tropical cyclone wave conditions for the 100, 200, 500, 1000, 2000, 5000 and 10000 year ARI. The results at key locations are provided in Section 5.1.3 and all locations in Appendix B (wave height) and Appendix C (wave period).
- Recommended design 'sustained peak' and 'coastal zone' water levels for the 100, 200, 500, 1000, 2000, 5000 and 10000 year ARI. The results at key locations are provided in Section 5.2 and all locations in Appendix D (sustained peak) and Appendix E (coastal zone).

The contribution of wave setup to the 'sustained peak' water level experienced within coastal floodplain areas has been estimated following Equation 4-1. This contribution is typically up to 0.5 m and has been added to the 'surge plus tide' component to obtain the 'sustained peak' level.

Within the 'coastal zone', the contribution of wave setup and runup is estimated following Equation 4-2. These levels represent the peak elevation of the intermittent process of advancement and retreat of the shoreline and should be considered within a 200 m landward buffer of the 'surge plus tide' shoreline at locations where wave runup processes occur. This contribution is typically between 1 to 2 m and has been added to the 'surge plus tide' component to obtain the 'coastal zone' peak level.

5.1.1 Hydrodynamic Model Validation with SEAsim

Detailed hydrodynamic modelling of the individual schematised TC storm events will differ slightly from the SEAsim parametric modelling described in Chapter 2 due to resolution of coastal features, bathymetry, land elevations, wetting and drying algorithms, model physical constants, and especially modelled tidal phase and amplitude. However, it can be expected that if all events are re-modelled then the peak nearshore water level results will be similar in a statistical context.

Comparisons of the detailed hydrodynamic model and SEAsim peak 'surge plus tide' ARIs at Bowen are provided in Figure 5-2, Figure 5-3 and Figure 5-4 for the current climate 2017, future climate 2050 and future climate 2100 scenarios. It can be seen that the independent modelling approaches yield similar results up to and beyond the 10000 year ARI. There is some discrepancy between the approaches beyond the 10000 year ARI for the 2050 and 2100 climates. The exact cause for this has not been explored since events rarer than the 10000 year ARI are not the focus of this study.

Title:

Detailed Modelling Point Location Output

Figure: 5-1

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0 3.75 7.5km

Approx. Scale

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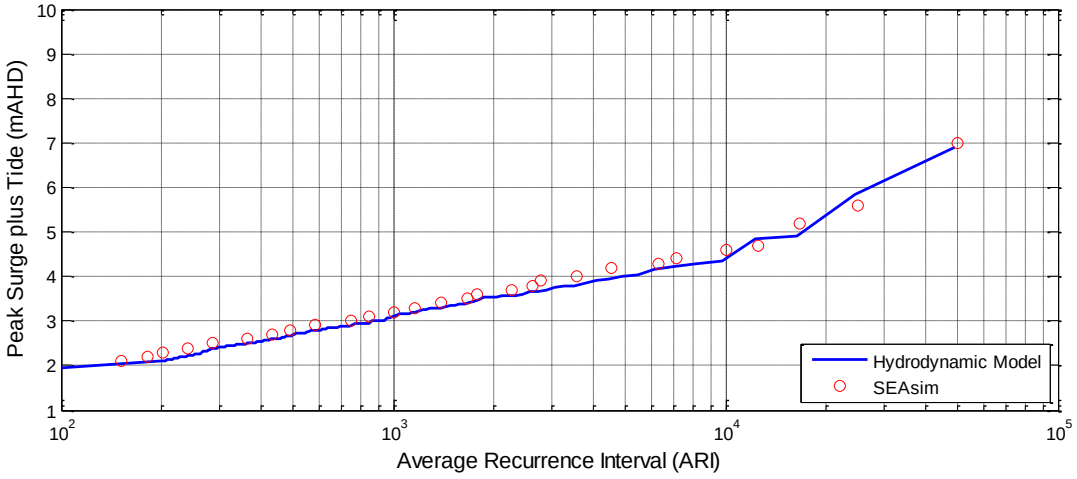

Figure 5-2 Hydrodynamic model and SEAsim comparison – 2017 Climate

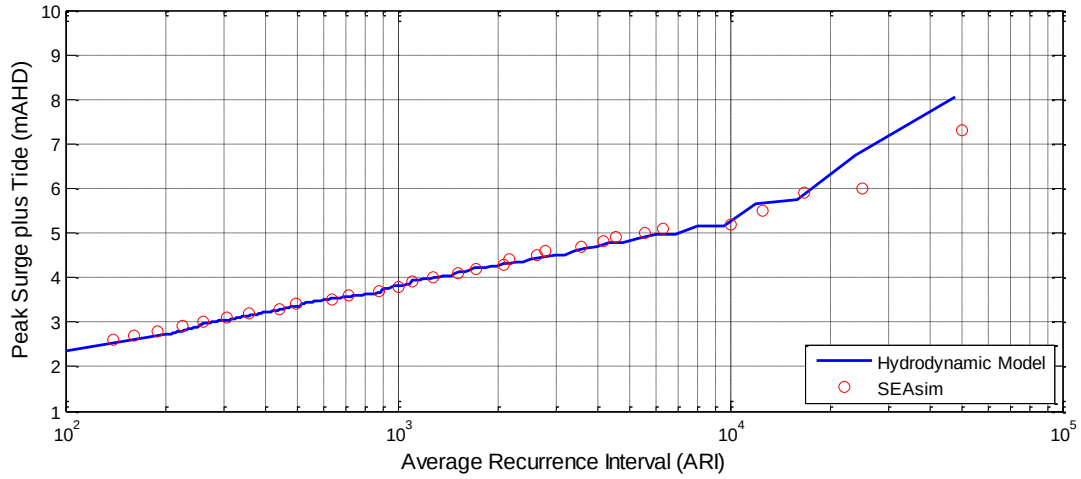

Figure 5-3 Hydrodynamic model and SEAsim comparison – 2050 Climate

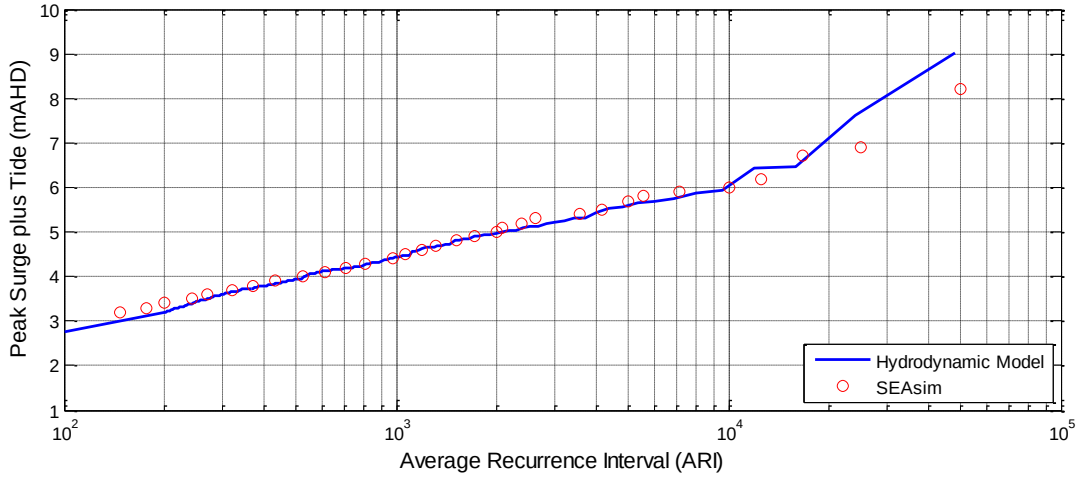

Figure 5-4 Hydrodynamic model and SEAsim comparison – 2100 Climate

5.1.2 Surge plus Tide Average Recurrence Interval

Peak surge plus tide water levels were derived at each output location using a combination of:

(1) Non-TC tidal residual analysis at Bowen (refer Chapter 3) supplemented with harmonic analysis of hydrodynamic model outputs from a 2-month astronomic tide only simulation; and

(2) Detailed modelling of the selected SEAsim TC events described in Section 2.4

With regard to (1), a tidal analysis was performed on the astronomic tide time series results at each output location to derive tidal constituents. At each location the tidal constituents were summed to obtain a proxy for HAT, which gives an indication of the variation in tidal amplitude along the coast.

The non-TC water level ARIs for Bowen were then used to calculate ratios relative to the HAT. The ratio for a given ARI at Bowen is summarised in Table 5-1. These ratios have been applied to the HAT Proxy at each output location throughout the study area to allow an estimate of non-TC water level ARIs.

With reference to (2) above, for each simulated TC event a time series of 'surge plus tide' water level was stored at each output location. The peak surge plus tide level was extracted from these results and subsequently ranked in order so that the corresponding ARIs could be derived.

Finally, the non-TC and TC water level statistics were combined in order to derive peak 'surge plus tide' water level ARIs throughout the study area. This procedure is described in Section 3.2.

The current climate 2017, future climate 2050 and future climate 2100 'surge plus tide' levels for key locations throughout the study area are summarised in Table 5-2, Table 5-3 and Table 5-4.

Table 5-1 HAT ratios relative to non-TC water levels at Bowen

Location	Non-TC Water Level (mAHD)										
	HAT	5 year ARI	10 year ARI	50 year ARI	100 year ARI	200 year ARI	500 year ARI	1,000 year ARI	2,000 year ARI	5,000 year ARI	10,000 year ARI
Bowen tide gauge	1.95	1.93	1.97	2.07	2.10	2.12	2.18	2.22	2.24	2.30	2.32
HAT ratio	1	0.99	1.01	1.06	1.08	1.09	1.12	1.14	1.15	1.18	1.19

Table 5-2 Current climate surge plus tide Average Recurrence Interval at key locations

Location	Output ID	Water Level (mAHD)										
		HAT Proxy	5 year ARI	10 year ARI	50 year ARI	100 year ARI	200 year ARI	500 year ARI	1,000 year ARI	2,000 year ARI	5,000 year ARI	10,000 year ARI
Abbot Point	1	1.90	1.88	1.92	2.02	2.05	2.09	2.20	2.37	2.62	3.17	3.32
Queens Bay	56	1.92	1.90	1.94	2.04	2.08	2.13	2.31	2.62	2.88	3.19	3.81
Horseshoe Bay	62	1.92	1.90	1.94	2.04	2.08	2.13	2.28	2.53	2.80	3.12	3.62
Kings Beach	68	1.94	1.92	1.96	2.06	2.10	2.16	2.37	2.67	3.00	3.35	3.81
Bowen	83	1.98	1.96	2.00	2.10	2.14	2.23	2.67	3.07	3.50	3.97	4.48
Heronvale	97	1.98	1.96	2.00	2.10	2.14	2.23	2.66	3.13	3.53	4.04	4.66
Brisk Bay	105	1.99	1.97	2.01	2.11	2.16	2.25	2.79	3.29	3.66	4.28	4.98
Edgecumbe Bay	130	2.01	1.99	2.03	2.13	2.17	2.25	2.73	3.26	3.77	4.44	5.29
Sinclair Bay	142	2.01	1.99	2.03	2.14	2.18	2.23	2.41	2.92	3.39	4.12	4.78
Cape Gloucester	150	1.99	1.97	2.01	2.12	2.16	2.20	2.33	2.70	3.01	3.59	4.26
Gloucester Island	164	1.96	1.94	1.98	2.08	2.12	2.16	2.25	2.34	2.62	2.98	3.43

Table 5-3 Future climate 2050 surge plus tide Average Recurrence Interval at key locations

Location	Output ID	Water Level (mAHD)										
		HAT Proxy	5 year ARI	10 year ARI	50 year ARI	100 year ARI	200 year ARI	500 year ARI	1,000 year ARI	2,000 year ARI	5,000 year ARI	10,000 year ARI
Abbot Point	1	2.30	2.28	2.32	2.42	2.45	2.51	2.71	2.95	3.25	3.85	3.98
Queens Bay	56	2.32	2.30	2.34	2.44	2.49	2.56	2.91	3.24	3.52	3.89	4.54
Horseshoe Bay	62	2.32	2.30	2.34	2.44	2.48	2.56	2.85	3.14	3.45	3.77	4.34
Kings Beach	68	2.34	2.32	2.36	2.46	2.51	2.59	2.97	3.32	3.67	4.07	4.55
Bowen	83	2.38	2.36	2.40	2.50	2.57	2.72	3.35	3.76	4.23	4.79	5.28
Heronvale	97	2.38	2.36	2.40	2.50	2.57	2.73	3.36	3.82	4.31	4.84	5.48
Brisk Bay	105	2.39	2.37	2.41	2.51	2.59	2.76	3.52	4.02	4.46	5.13	5.83
Edgecumbe Bay	130	2.41	2.39	2.43	2.53	2.58	2.70	3.44	3.97	4.53	5.31	6.17
Sinclair Bay	142	2.41	2.39	2.43	2.54	2.58	2.66	3.06	3.60	4.16	4.91	5.61
Cape Gloucester	150	2.39	2.37	2.41	2.52	2.56	2.62	2.89	3.37	3.73	4.34	5.05
Gloucester Island	164	2.36	2.34	2.38	2.48	2.53	2.57	2.71	2.95	3.20	3.62	4.12

Table 5-4 Future climate 2100 surge plus tide Average Recurrence Interval at key locations

Location	Output ID	Water Level (mAHD)										
		HAT Proxy	5 year ARI	10 year ARI	50 year ARI	100 year ARI	200 year ARI	500 year ARI	1,000 year ARI	2,000 year ARI	5,000 year ARI	10,000 year ARI
Abbot Point	1	2.70	2.68	2.72	2.82	2.85	2.92	3.20	3.50	3.83	4.46	4.62
Queens Bay	56	2.72	2.70	2.74	2.84	2.89	2.99	3.44	3.84	4.18	4.55	5.21
Horseshoe Bay	62	2.72	2.70	2.74	2.84	2.89	2.98	3.38	3.71	4.07	4.40	5.01
Kings Beach	68	2.74	2.72	2.76	2.86	2.92	3.02	3.52	3.92	4.31	4.73	5.24
Bowen	83	2.78	2.76	2.80	2.90	2.99	3.19	3.91	4.39	4.93	5.54	6.02
Heronvale	97	2.78	2.76	2.80	2.90	2.99	3.21	3.95	4.46	4.99	5.59	6.23
Brisk Bay	105	2.79	2.77	2.81	2.91	3.00	3.25	4.08	4.70	5.15	5.92	6.62
Edgecumbe Bay	130	2.81	2.79	2.83	2.93	2.99	3.13	3.98	4.56	5.17	6.04	6.96
Sinclair Bay	142	2.81	2.79	2.83	2.94	2.98	3.07	3.57	4.15	4.77	5.57	6.35
Cape Gloucester	150	2.79	2.77	2.81	2.92	2.96	3.03	3.39	3.93	4.34	5.03	5.76
Gloucester Island	164	2.76	2.74	2.78	2.88	2.93	2.98	3.18	3.50	3.74	4.23	4.78

5.1.3 Tropical Cyclone Wave Conditions

For each simulated SEAsim TC event, the time series of significant wave height and wave peak period at each output location was stored. The peak wave conditions were extracted from these results and subsequently ranked in order so that the corresponding ARIs could be derived. A summary of the peak significant wave height and peak period throughout the study area is given in Table 5-5, Table 5-6 and Table 5-7 for the current climate 2017, future climate 2050 and future climate 2100. With regard to deriving recommended design levels the design wave conditions are used for:

- Estimating the contribution of wave setup to the 'sustained peak' water level experienced throughout the region (following Equation 4-1); and
- Estimating the wave runup potential within the 'coastal zone', assumed to be within 200 m of the 'surge plus tide' shoreline (following Equation 4-2).

This procedure is described further in Section 5.2.

Table 5-5 Current climate tropical cyclone wave Average Recurrence Interval at key locations

Location	Output ID	100 year ARI		200 year ARI		500 year ARI		1,000 year ARI		10,000 year ARI	
		Hsig (m)	Tp (s)	Hsig (m)	Tp (s)	Hsig (m)	Tp (s)	Hsig (m)	Tp (s)	Hsig (m)	Tp (s)
Abbot Point	1	3.16	8.53	3.62	9.33	4.01	10.26	4.27	10.53	4.97	11.55
Queens Bay	56	2.32	8.41	2.86	9.25	3.25	10.20	3.45	10.45	4.25	11.52
Horseshoe Bay	62	2.74	8.39	3.54	9.27	4.08	10.29	4.39	10.57	5.28	11.50
Kings Beach	68	2.61	8.40	3.01	9.27	3.42	10.30	3.71	10.55	4.49	11.48
Bowen	83	1.51	4.15	1.88	4.59	2.44	6.47	2.71	6.68	3.43	7.57
Heronvale	97	1.74	5.39	2.51	6.65	3.26	9.05	3.56	9.38	4.42	10.37
Brisk Bay	105	1.58	5.01	2.13	6.07	2.71	7.37	3.01	9.10	3.80	10.34
Edgecumbe Bay	130	1.33	5.70	1.99	8.43	2.60	9.41	2.92	10.05	3.70	10.87
Sinclair Bay	142	1.17	3.93	1.71	8.00	2.32	9.37	2.59	10.12	3.27	11.03
Cape Gloucester	150	1.17	4.78	1.68	7.33	2.27	9.34	2.58	9.82	3.32	10.91
Gloucester Island	164	1.19	4.91	1.63	5.97	2.22	9.13	2.62	9.41	3.48	10.50

Table 5-6 Future climate 2050 tropical cyclone wave Average Recurrence Interval at key locations

Location	Output ID	100 year ARI		200 year ARI		500 year ARI		1,000 year ARI		10,000 year ARI	
		Hsig (m)	Tp (s)	Hsig (m)	Tp (s)	Hsig (m)	Tp (s)	Hsig (m)	Tp (s)	Hsig (m)	Tp (s)
Abbot Point	1	3.74	9.28	3.96	9.86	4.34	10.51	4.58	11.15	5.33	11.79
Queens Bay	56	2.90	9.20	3.16	9.50	3.54	10.40	3.76	10.78	4.61	11.68
Horseshoe Bay	62	3.58	9.18	3.94	9.68	4.41	10.51	4.73	11.12	5.75	11.74
Kings Beach	68	3.11	9.20	3.35	9.62	3.73	10.52	4.01	11.15	4.86	11.68
Bowen	83	1.86	4.55	2.14	4.99	2.75	6.62	3.01	7.09	3.76	7.66
Heronvale	97	2.43	6.12	2.89	6.89	3.57	9.16	3.87	9.61	4.80	10.73
Brisk Bay	105	2.12	5.96	2.48	6.59	3.02	7.55	3.33	9.19	4.16	10.69
Edgecumbe Bay	130	1.91	8.18	2.33	9.06	2.92	9.84	3.21	10.23	4.03	11.36
Sinclair Bay	142	1.66	4.87	1.99	8.58	2.60	9.71	2.84	10.27	3.56	11.35
Cape Gloucester	150	1.57	5.53	1.92	8.44	2.55	9.65	2.86	10.16	3.63	11.30
Gloucester Island	164	1.52	5.70	1.85	6.77	2.49	9.33	2.91	9.90	3.81	10.77

Table 5-7 Future climate 2100 tropical cyclone wave Average Recurrence Interval at key locations

Location	Output ID	100 year ARI		200 year ARI		500 year ARI		1,000 year ARI		10,000 year ARI	
		Hsig (m)	Tp (s)	Hsig (m)	Tp (s)	Hsig (m)	Tp (s)	Hsig (m)	Tp (s)	Hsig (m)	Tp (s)
Abbot Point	1	3.79	9.19	4.15	10.09	4.61	10.76	4.86	11.35	5.67	12.27
Queens Bay	56	2.94	9.11	3.34	9.71	3.80	10.52	4.03	11.20	4.95	12.05
Horseshoe Bay	62	3.57	9.12	4.12	9.90	4.69	10.73	5.03	11.35	6.15	12.21
Kings Beach	68	3.16	9.14	3.55	9.80	4.01	10.75	4.29	11.36	5.21	12.16
Bowen	83	1.86	4.52	2.25	5.01	2.94	6.74	3.24	7.31	4.07	8.13
Heronvale	97	2.36	6.02	3.02	6.90	3.81	9.17	4.15	10.10	5.13	11.08
Brisk Bay	105	2.11	5.87	2.60	6.64	3.25	7.57	3.60	9.25	4.49	11.16
Edgecumbe Bay	130	1.87	6.16	2.42	8.90	3.12	10.09	3.45	10.30	4.35	11.47
Sinclair Bay	142	1.61	4.63	2.06	8.24	2.75	10.04	3.06	10.33	3.84	11.51
Cape Gloucester	150	1.52	5.35	2.00	7.97	2.70	9.85	3.06	10.25	3.92	11.43
Gloucester Island	164	1.50	5.47	1.92	6.69	2.65	9.41	3.12	10.07	4.12	11.24

5.2 Recommended Design Water Levels

The recommended current climate 2017, future climate 2050 and future climate 2100 design water levels for key locations throughout the study area are summarised in Table 5-8, Table 5-9 and Table 5-10. The 'sustained peak' design water level considers the combined non-TC and TC 'surge plus tide' statistics following the methodology described in Section 3.2. The sustained peak also includes an allowance for wave setup (following Equation 4-1) and is assumed to persist for a sufficient duration to cause inundation of land areas below this design water level.

The 'coastal zone' levels are to be considered within a 200 m buffer measured landward from the 'surge plus tide' shoreline. These levels represent the peak elevation of the intermittent process of advancement and retreat of the shoreline associated with wave processes during the coastal inundation event and include an allowance for wave setup and wave runup (following Equation 4-2). The coastal zone levels are not expected to be sustained for an extended period. Where overtopping of the coastal barrier occurs due to wave processes 'coastal zone' design water levels are expected to be conservatively high. Nevertheless, coastal zone locations behind the coastal barrier and below the estimated design level are considered high hazard areas.

The design levels provided in Table 5-8, Table 5-9 and Table 5-10 do not include an additional freeboard allowance which should be applied to account for unresolved processes and model uncertainties. The minimum recommended freeboard allowances are as follows:

- + 0.5m for the sustained peak inundation level; and
- + 1.0m for exposure to intermittent wave processes within the coastal zone.

General model uncertainties and study limitations are discussed further in Section 5.3.

Table 5-8 Current climate recommended design water level Average Recurrence Interval at key locations

Location	Output ID	HAT Proxy (mAHD)	Water Level (mAHD)									
			100 year ARI		200 year ARI		500 year ARI		1,000 year ARI		10,000 year ARI	
			Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**
Abbot Point	1	1.90	2.38	3.05	2.48	3.26	2.65	3.55	2.85	3.81	3.88	5.02
Queens Bay	56	1.92	2.36	2.92	2.48	3.17	2.71	3.53	3.04	3.90	4.33	5.38
Horseshoe Bay	62	1.92	2.38	2.99	2.51	3.28	2.73	3.65	3.01	3.99	4.20	5.36
Kings Beach	68	1.94	2.40	3.00	2.51	3.22	2.79	3.63	3.11	4.01	4.34	5.42
Bowen	83	1.98	2.26	2.48	2.37	2.65	2.89	3.34	3.31	3.80	4.79	5.41
Heronvale	97	1.98	2.30	2.61	2.46	2.92	3.02	3.74	3.52	4.30	5.14	6.10
Brisk Bay	105	1.99	2.30	2.57	2.45	2.84	3.06	3.59	3.64	4.33	5.42	6.31
Edgecumbe Bay	130	2.01	2.32	2.61	2.51	3.03	3.06	3.73	3.64	4.39	5.75	6.67
Sinclair Bay	142	2.01	2.27	2.46	2.46	2.92	2.72	3.35	3.28	4.00	5.22	6.10
Cape Gloucester	150	1.99	2.27	2.50	2.41	2.83	2.64	3.26	3.04	3.74	4.69	5.57
Gloucester Island	164	1.96	2.24	2.48	2.33	2.66	2.54	3.14	2.67	3.35	3.86	4.72

*For locations outside of the direct coastal zone or where wave runup processes do not occur. The 'sustained peak' includes surge, tide and wave setup components.

**For locations within 200 m of the 'surge plus tide' shoreline and where wave runup processes occur. The 'coastal zone' includes surge, tide, wave setup and 2% wave runup components.

Table 5-9 Future climate 2050 recommended design water level Average Recurrence Interval at key locations

Location	Output ID	HAT Proxy (mAHD)	Water Level (mAHD)									
			100 year ARI		200 year ARI		500 year ARI		1,000 year ARI		10,000 year ARI	
			Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**
Abbot Point	1	2.30	2.70	3.50	2.85	3.72	3.19	4.15	3.47	4.53	4.58	5.78
Queens Bay	56	2.32	2.70	3.40	2.85	3.60	3.33	4.20	3.70	4.62	5.08	6.19
Horseshoe Bay	62	2.32	2.73	3.50	2.89	3.74	3.33	4.30	3.66	4.73	4.95	6.20
Kings Beach	68	2.34	2.74	3.46	2.90	3.68	3.41	4.31	3.80	4.79	5.12	6.25
Bowen	83	2.38	2.64	2.91	2.86	3.18	3.59	4.08	4.03	4.57	5.61	6.26
Heronvale	97	2.38	2.71	3.13	2.98	3.49	3.74	4.51	4.24	5.07	6.00	7.04
Brisk Bay	105	2.39	2.71	3.10	2.99	3.45	3.80	4.38	4.39	5.13	6.31	7.27
Edgecumbe Bay	130	2.41	2.72	3.22	2.95	3.56	3.81	4.55	4.37	5.18	6.67	7.68
Sinclair Bay	142	2.41	2.57	2.84	2.82	3.36	3.41	4.10	3.97	4.74	6.08	7.03
Cape Gloucester	150	2.39	2.55	2.86	2.78	3.30	3.23	3.91	3.74	4.50	5.52	6.47
Gloucester Island	164	2.36	2.52	2.83	2.67	3.07	3.00	3.65	3.32	4.07	4.58	5.51

*For locations outside of the direct coastal zone or where wave runup processes do not occur. The 'sustained peak' includes surge, tide and wave setup components.

**For locations within 200 m of the 'surge plus tide' shoreline and where wave runup processes occur. The 'coastal zone' includes surge, tide, wave setup and 2% wave runup components.

Table 5-10 Future climate 2100 recommended design water level Average Recurrence Interval at key locations

Location	Output ID	HAT Proxy (mAHD)	Water Level (mAHD)									
			100 year ARI		200 year ARI		500 year ARI		1,000 year ARI		10,000 year ARI	
			Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**	Sustained Peak*	Coastal Zone**
Abbot Point	1	2.70	3.24	4.03	3.37	4.28	3.71	4.73	4.04	5.15	5.26	6.55
Queens Bay	56	2.72	3.24	3.93	3.38	4.17	3.88	4.79	4.33	5.33	5.80	6.98
Horseshoe Bay	62	2.72	3.27	4.03	3.42	4.31	3.89	4.92	4.27	5.39	5.67	7.01
Kings Beach	68	2.74	3.27	3.99	3.43	4.24	3.99	4.94	4.43	5.47	5.85	7.08
Bowen	83	2.78	3.12	3.39	3.35	3.68	4.16	4.67	4.67	5.26	6.38	7.10
Heronvale	97	2.78	3.19	3.60	3.47	4.00	4.34	5.13	4.91	5.82	6.78	7.89
Brisk Bay	105	2.79	3.19	3.57	3.48	3.95	4.38	4.98	5.08	5.86	7.13	8.18
Edgecumbe Bay	130	2.81	3.17	3.54	3.43	4.05	4.37	5.16	4.98	5.83	7.48	8.54
Sinclair Bay	142	2.81	3.11	3.37	3.33	3.85	3.94	4.67	4.54	5.34	6.84	7.84
Cape Gloucester	150	2.79	3.10	3.40	3.28	3.78	3.74	4.46	4.32	5.11	6.25	7.25
Gloucester Island	164	2.76	3.07	3.37	3.19	3.59	3.52	4.19	3.89	4.68	5.28	6.29

*For locations outside of the direct coastal zone or where wave runup processes do not occur. The 'sustained peak' includes surge, tide and wave setup components.

**For locations within 200 m of the 'surge plus tide' shoreline and where wave runup processes occur. The 'coastal zone' includes surge, tide, wave setup and 2% wave runup components.

5.3 Study Limitations

The following limitations of the modelling will introduce inaccuracies in the predicted results in this study:

- The first source of uncertainty arises from fitting and extrapolating statistical distributions to a very limited historical dataset (in this case, approximately 50 years of historical tropical cyclone data). It is not possible to estimate the resulting storm tide prediction bias associated with this approach.
- Another source of uncertainty arises from the wind and pressure model adopted for the study. Experience gained from the calibration phase of this and other similar studies suggests that representation of real tropical cyclones with a simple parametric wind models has its limitations. Real tropical cyclone wind fields often display complexities not resolved by the wind model, such as strong asymmetries and/or sub scale features such as meso-vortices. Any limitation in the wind field model will directly translate to the predicted storm surge.
- The ability to predict wave runup over and beyond the sloping beach profile (into the residential and populated areas) is limited and has been approximated using an empirical relationship and consideration of recent overtopping events. Quantifying the risks to the community from inundation and wave action are limited by the resolution of the DEM in the nearshore areas and the assumption of a static coastal barrier.

It is difficult to estimate the order of magnitude of the combination of these inaccuracies due to the highly dynamic nature of a TC event and the infinite variation in the physical parameters involved. However, recent experience with model calibration for this and previous studies has indicated that prediction of water levels (excluding wave effects) is mostly within 0.5 m and the prediction of peak runup levels is often within 1 m. It should be noted that statistical analysis, where thousands of events are used to provide long term estimates, will generally tend to average out the variables and provide better accuracy in the final result than that predicted for a single event.

With the above uncertainties in mind, when setting planning levels an additional (minimum) +0.5 m freeboard allowance should be added to the reported sustained peak levels and an additional +1.0 m within the wave runup zone. These ‘factors of safety’ are recommended to compensate for potential model uncertainties, surface water oscillations during an inundation event and any unresolved regional or localised hydraulic effects.

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Appendix A Peak Surge plus Tide Level Average Recurrence Interval Tables

Table A-1 Current climate 2017 Tropical cyclone peak surge plus tide (mAHD) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	1.88	1.92	2.02	2.05	2.09	2.20	2.37	2.62	3.17	3.32
2	148.086644	-19.883904	1.88	1.92	2.02	2.05	2.10	2.24	2.45	2.79	3.29	3.49
3	148.086750	-19.888545	1.88	1.92	2.02	2.06	2.11	2.27	2.51	2.86	3.39	3.60
4	148.089981	-19.891699	1.88	1.92	2.02	2.06	2.11	2.26	2.52	2.86	3.40	3.63
5	148.091008	-19.896035	1.89	1.93	2.02	2.06	2.11	2.27	2.56	2.90	3.42	3.69
6	148.093536	-19.900072	1.89	1.93	2.03	2.06	2.11	2.27	2.57	2.89	3.42	3.72
7	148.094558	-19.904839	1.89	1.93	2.02	2.06	2.12	2.32	2.63	2.96	3.48	3.83
8	148.098229	-19.907849	1.89	1.93	2.03	2.06	2.12	2.32	2.63	2.95	3.47	3.84
9	148.098545	-19.912567	1.89	1.93	2.02	2.06	2.12	2.39	2.70	3.05	3.54	3.97
10	148.100573	-19.916953	1.89	1.93	2.03	2.07	2.12	2.39	2.72	3.05	3.55	3.99
11	148.103183	-19.921165	1.89	1.93	2.03	2.07	2.13	2.41	2.75	3.07	3.56	4.05
12	148.104466	-19.925655	1.89	1.93	2.03	2.07	2.14	2.43	2.77	3.09	3.59	4.10
13	148.108624	-19.927620	1.89	1.93	2.03	2.07	2.14	2.43	2.77	3.06	3.57	4.09
14	148.113182	-19.929278	1.89	1.93	2.03	2.07	2.14	2.42	2.75	3.03	3.55	4.08
15	148.117375	-19.929729	1.89	1.93	2.03	2.07	2.13	2.40	2.72	2.99	3.53	4.03
16	148.121854	-19.931592	1.89	1.93	2.03	2.07	2.13	2.38	2.71	2.98	3.50	4.00
17	148.125345	-19.933461	1.89	1.93	2.03	2.07	2.13	2.39	2.72	3.00	3.50	4.01
18	148.127812	-19.934900	1.89	1.93	2.03	2.07	2.13	2.40	2.74	3.01	3.50	4.02
19	148.131995	-19.936612	1.89	1.93	2.03	2.07	2.13	2.39	2.73	3.00	3.47	4.00
20	148.136880	-19.937041	1.89	1.93	2.03	2.07	2.13	2.35	2.71	2.97	3.42	3.95
21	148.140824	-19.937192	1.89	1.93	2.03	2.07	2.13	2.36	2.70	2.96	3.42	3.94
22	148.145755	-19.937202	1.89	1.93	2.03	2.07	2.13	2.34	2.67	2.92	3.38	3.90
23	148.150433	-19.937100	1.89	1.93	2.03	2.07	2.12	2.33	2.65	2.90	3.35	3.86
24	148.155285	-19.937381	1.89	1.93	2.03	2.07	2.12	2.32	2.64	2.89	3.33	3.83
25	148.159885	-19.937060	1.89	1.93	2.03	2.07	2.12	2.31	2.63	2.86	3.31	3.81
26	148.164842	-19.937020	1.89	1.93	2.03	2.07	2.12	2.30	2.61	2.85	3.29	3.78
27	148.169661	-19.936777	1.89	1.93	2.03	2.07	2.12	2.28	2.58	2.81	3.26	3.74
28	148.174386	-19.936171	1.89	1.93	2.03	2.07	2.12	2.27	2.56	2.78	3.22	3.71
29	148.178875	-19.934357	1.89	1.93	2.03	2.07	2.12	2.26	2.52	2.75	3.18	3.68
30	148.183291	-19.932014	1.89	1.93	2.03	2.07	2.11	2.23	2.46	2.70	3.12	3.60
31	148.187708	-19.929671	1.89	1.93	2.03	2.07	2.11	2.23	2.43	2.67	3.09	3.57
32	148.192125	-19.927329	1.89	1.93	2.03	2.07	2.11	2.20	2.40	2.60	3.04	3.49
33	148.191727	-19.923601	1.89	1.93	2.03	2.07	2.11	2.20	2.38	2.58	3.02	3.43
34	148.194813	-19.920579	1.89	1.93	2.03	2.07	2.11	2.19	2.35	2.56	2.98	3.39
35	148.197788	-19.923268	1.89	1.93	2.02	2.06	2.10	2.19	2.36	2.58	2.98	3.44
36	148.202372	-19.923354	1.89	1.93	2.02	2.06	2.10	2.20	2.36	2.58	2.97	3.43
37	148.205450	-19.926615	1.89	1.93	2.02	2.06	2.10	2.21	2.37	2.60	2.98	3.47
38	148.209140	-19.929434	1.89	1.93	2.02	2.06	2.10	2.21	2.38	2.61	2.98	3.50

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	1.89	1.93	2.03	2.07	2.11	2.22	2.39	2.63	3.00	3.53
40	148.215627	-19.936786	1.89	1.93	2.03	2.07	2.11	2.22	2.40	2.63	2.99	3.55
41	148.214572	-19.940165	1.89	1.93	2.03	2.06	2.11	2.24	2.44	2.66	3.03	3.61
42	148.212471	-19.944188	1.89	1.93	2.03	2.06	2.11	2.27	2.50	2.72	3.08	3.68
43	148.216694	-19.943252	1.89	1.93	2.03	2.07	2.12	2.25	2.45	2.67	3.03	3.62
44	148.218362	-19.945221	1.89	1.93	2.03	2.07	2.11	2.25	2.45	2.68	3.03	3.64
45	148.220269	-19.947553	1.89	1.93	2.03	2.07	2.12	2.26	2.49	2.72	3.05	3.66
46	148.225065	-19.948444	1.89	1.93	2.03	2.07	2.11	2.26	2.47	2.72	3.04	3.64
47	148.228945	-19.951074	1.89	1.93	2.03	2.07	2.12	2.26	2.49	2.74	3.06	3.65
48	148.232270	-19.954427	1.89	1.93	2.03	2.07	2.11	2.26	2.49	2.75	3.08	3.66
49	148.233553	-19.959077	1.89	1.93	2.03	2.07	2.12	2.28	2.54	2.80	3.13	3.71
50	148.235969	-19.962224	1.90	1.94	2.03	2.07	2.12	2.28	2.56	2.81	3.13	3.72
51	148.239458	-19.964269	1.90	1.94	2.04	2.07	2.12	2.28	2.55	2.80	3.12	3.72
52	148.235834	-19.966574	1.90	1.94	2.04	2.08	2.13	2.31	2.60	2.88	3.18	3.79
53	148.237823	-19.967997	1.90	1.94	2.04	2.08	2.13	2.30	2.61	2.88	3.18	3.78
54	148.241742	-19.969955	1.90	1.94	2.04	2.08	2.13	2.29	2.59	2.84	3.15	3.76
55	148.240437	-19.974113	1.90	1.94	2.04	2.08	2.14	2.32	2.64	2.91	3.21	3.84
56	148.244870	-19.976017	1.90	1.94	2.04	2.08	2.13	2.31	2.62	2.88	3.19	3.81
57	148.249720	-19.976634	1.90	1.94	2.04	2.08	2.13	2.30	2.57	2.84	3.17	3.76
58	148.254453	-19.975668	1.90	1.94	2.04	2.08	2.13	2.29	2.53	2.79	3.13	3.70
59	148.258300	-19.973152	1.90	1.94	2.04	2.08	2.12	2.25	2.47	2.69	3.02	3.60
60	148.261678	-19.970722	1.90	1.94	2.04	2.08	2.12	2.23	2.42	2.64	2.97	3.52
61	148.262453	-19.974990	1.90	1.94	2.04	2.08	2.13	2.26	2.49	2.75	3.05	3.59
62	148.264217	-19.978552	1.90	1.94	2.04	2.08	2.13	2.28	2.53	2.80	3.12	3.62
63	148.267362	-19.982284	1.91	1.95	2.05	2.09	2.13	2.29	2.56	2.84	3.15	3.63
64	148.269158	-19.991273	1.91	1.95	2.05	2.09	2.15	2.34	2.63	2.94	3.28	3.75
65	148.270711	-19.995376	1.91	1.95	2.05	2.09	2.14	2.33	2.62	2.93	3.27	3.74
66	148.274978	-19.996242	1.92	1.96	2.06	2.10	2.15	2.30	2.60	2.89	3.22	3.70
67	148.271075	-19.998710	1.92	1.96	2.06	2.10	2.15	2.34	2.63	2.96	3.30	3.77
68	148.271444	-20.001189	1.92	1.96	2.06	2.10	2.16	2.37	2.67	3.00	3.35	3.81
69	148.274741	-20.002383	1.92	1.96	2.06	2.10	2.16	2.36	2.64	2.97	3.31	3.79
70	148.274049	-20.006756	1.92	1.96	2.06	2.10	2.16	2.37	2.68	3.00	3.37	3.84
71	148.269895	-20.008342	1.92	1.96	2.06	2.10	2.16	2.40	2.73	3.04	3.43	3.89
72	148.272333	-20.012494	1.92	1.96	2.06	2.10	2.16	2.41	2.73	3.04	3.43	3.91
73	148.272977	-20.017247	1.93	1.97	2.07	2.11	2.17	2.41	2.74	3.06	3.45	3.95
74	148.276768	-20.019229	1.93	1.97	2.07	2.11	2.17	2.39	2.71	3.03	3.41	3.93
75	148.274990	-20.022727	1.95	1.99	2.10	2.14	2.21	2.48	2.82	3.20	3.59	4.12
76	148.271586	-20.025926	1.95	1.99	2.09	2.13	2.20	2.48	2.84	3.23	3.63	4.16
77	148.267692	-20.028749	1.96	2.00	2.10	2.14	2.21	2.55	2.94	3.34	3.75	4.29

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	1.96	2.00	2.10	2.14	2.22	2.59	3.01	3.40	3.86	4.38
79	148.261368	-20.026508	1.96	2.00	2.10	2.14	2.23	2.59	3.01	3.42	3.87	4.38
80	148.259291	-20.024495	1.96	2.00	2.10	2.15	2.23	2.61	3.03	3.44	3.89	4.40
81	148.255971	-20.024299	1.96	2.00	2.10	2.14	2.23	2.64	3.04	3.46	3.93	4.44
82	148.252083	-20.021789	1.96	2.00	2.10	2.14	2.23	2.66	3.04	3.46	3.94	4.45
83	148.251245	-20.025777	1.96	2.00	2.10	2.14	2.23	2.67	3.07	3.50	3.97	4.48
84	148.248982	-20.030165	1.96	2.00	2.10	2.15	2.24	2.69	3.11	3.55	4.01	4.53
85	148.245332	-20.033208	1.96	2.00	2.10	2.16	2.24	2.72	3.15	3.60	4.07	4.58
86	148.242842	-20.037255	1.96	2.00	2.11	2.16	2.25	2.75	3.19	3.64	4.15	4.65
87	148.243873	-20.040647	1.96	2.00	2.11	2.16	2.25	2.75	3.21	3.64	4.20	4.66
88	148.244798	-20.044245	1.96	2.00	2.11	2.16	2.26	2.75	3.22	3.65	4.24	4.67
89	148.249032	-20.046574	1.96	2.00	2.10	2.15	2.25	2.72	3.19	3.64	4.20	4.64
90	148.253496	-20.048272	1.96	2.00	2.10	2.15	2.24	2.70	3.15	3.63	4.14	4.62
91	148.257679	-20.050278	1.96	2.00	2.10	2.15	2.23	2.68	3.13	3.61	4.09	4.61
92	148.261930	-20.052620	1.96	2.00	2.10	2.15	2.23	2.66	3.12	3.58	4.05	4.59
93	148.266185	-20.054795	1.96	2.00	2.10	2.14	2.23	2.65	3.12	3.56	4.02	4.59
94	148.269755	-20.058061	1.96	2.00	2.10	2.14	2.23	2.64	3.11	3.54	4.00	4.58
95	148.272686	-20.061626	1.96	2.00	2.10	2.14	2.23	2.65	3.12	3.53	4.00	4.60
96	148.273958	-20.066064	1.96	2.00	2.10	2.14	2.23	2.66	3.15	3.55	4.04	4.64
97	148.277575	-20.069358	1.96	2.00	2.10	2.14	2.23	2.66	3.13	3.53	4.04	4.66
98	148.281505	-20.072299	1.96	2.00	2.10	2.14	2.23	2.66	3.11	3.50	4.02	4.67
99	148.285512	-20.075047	1.96	2.00	2.10	2.14	2.23	2.65	3.11	3.48	4.01	4.67
100	148.290102	-20.076880	1.96	2.00	2.10	2.14	2.22	2.64	3.09	3.45	3.99	4.68
101	148.294498	-20.078324	1.96	2.00	2.10	2.14	2.22	2.63	3.07	3.43	3.96	4.68
102	148.299196	-20.077609	1.96	2.00	2.10	2.14	2.21	2.57	2.98	3.35	3.85	4.61
103	148.300325	-20.081981	1.96	2.00	2.10	2.14	2.22	2.65	3.09	3.45	4.01	4.74
104	148.292584	-20.087326	1.96	2.00	2.11	2.16	2.24	2.74	3.22	3.58	4.19	4.90
105	148.289298	-20.090879	1.97	2.01	2.11	2.16	2.25	2.79	3.29	3.66	4.28	4.98
106	148.290225	-20.095212	1.97	2.01	2.11	2.16	2.26	2.80	3.30	3.68	4.32	5.04
107	148.293279	-20.099028	1.97	2.01	2.11	2.16	2.25	2.79	3.28	3.69	4.33	5.08
108	148.297255	-20.101326	1.97	2.01	2.11	2.16	2.25	2.78	3.26	3.68	4.33	5.09
109	148.302049	-20.101573	1.97	2.01	2.11	2.16	2.24	2.75	3.22	3.65	4.28	5.07
110	148.306507	-20.101082	1.96	2.01	2.11	2.15	2.24	2.72	3.18	3.60	4.20	5.01
111	148.310592	-20.099318	1.97	2.01	2.11	2.15	2.23	2.69	3.14	3.55	4.15	4.95
112	148.315271	-20.098604	1.97	2.01	2.11	2.15	2.23	2.65	3.10	3.48	4.08	4.89
113	148.316742	-20.106603	1.97	2.01	2.12	2.17	2.25	2.78	3.24	3.65	4.34	5.17
114	148.316380	-20.110729	1.97	2.01	2.12	2.17	2.26	2.79	3.27	3.68	4.38	5.21
115	148.319501	-20.114494	1.97	2.01	2.12	2.17	2.25	2.78	3.29	3.69	4.40	5.24
116	148.323564	-20.117222	1.97	2.01	2.12	2.16	2.25	2.78	3.30	3.69	4.40	5.24

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	1.97	2.02	2.12	2.16	2.25	2.79	3.32	3.70	4.43	5.26
118	148.329841	-20.123745	1.98	2.02	2.12	2.16	2.25	2.79	3.35	3.73	4.47	5.29
119	148.333052	-20.127385	1.98	2.02	2.12	2.17	2.26	2.82	3.39	3.76	4.55	5.35
120	148.336234	-20.130719	1.98	2.02	2.12	2.17	2.26	2.83	3.40	3.76	4.57	5.37
121	148.340377	-20.132311	1.98	2.02	2.12	2.17	2.26	2.83	3.40	3.75	4.58	5.38
122	148.344376	-20.134624	1.98	2.02	2.12	2.17	2.26	2.83	3.39	3.75	4.60	5.38
123	148.348920	-20.136182	1.98	2.02	2.12	2.17	2.26	2.83	3.37	3.76	4.60	5.38
124	148.353846	-20.136606	1.98	2.02	2.12	2.17	2.26	2.83	3.35	3.76	4.58	5.35
125	148.358463	-20.137963	1.98	2.02	2.13	2.17	2.26	2.83	3.33	3.77	4.56	5.33
126	148.363418	-20.138398	1.98	2.02	2.13	2.17	2.26	2.82	3.32	3.78	4.55	5.33
127	148.368134	-20.139890	1.98	2.02	2.13	2.17	2.25	2.80	3.31	3.79	4.53	5.32
128	148.372841	-20.141138	1.98	2.03	2.13	2.17	2.25	2.79	3.31	3.80	4.51	5.33
129	148.377743	-20.141775	1.99	2.03	2.13	2.17	2.25	2.76	3.29	3.80	4.49	5.32
130	148.382452	-20.141302	1.99	2.03	2.13	2.17	2.25	2.73	3.26	3.77	4.44	5.29
131	148.386864	-20.139825	1.99	2.03	2.13	2.17	2.25	2.68	3.23	3.75	4.39	5.25
132	148.390878	-20.137479	1.99	2.03	2.13	2.17	2.24	2.64	3.20	3.71	4.34	5.19
133	148.394081	-20.134107	1.99	2.03	2.13	2.17	2.24	2.61	3.15	3.64	4.26	5.09
134	148.398548	-20.132091	1.99	2.03	2.13	2.17	2.24	2.59	3.13	3.63	4.25	5.07
135	148.402767	-20.129617	1.99	2.03	2.13	2.17	2.23	2.55	3.08	3.58	4.20	5.00
136	148.406698	-20.126630	1.99	2.03	2.13	2.17	2.23	2.53	3.03	3.53	4.16	4.94
137	148.410754	-20.123973	1.99	2.03	2.13	2.17	2.23	2.50	3.01	3.48	4.14	4.89
138	148.414721	-20.120973	1.99	2.03	2.13	2.17	2.23	2.47	2.98	3.42	4.09	4.82
139	148.418583	-20.119000	1.99	2.03	2.13	2.17	2.22	2.45	2.96	3.38	4.06	4.77
140	148.423541	-20.118958	1.99	2.03	2.13	2.17	2.23	2.43	2.95	3.38	4.08	4.77
141	148.428185	-20.119954	1.99	2.03	2.13	2.18	2.23	2.41	2.93	3.39	4.11	4.79
142	148.432311	-20.120008	1.99	2.03	2.14	2.18	2.23	2.41	2.92	3.39	4.12	4.78
143	148.435300	-20.116110	1.99	2.03	2.13	2.18	2.23	2.39	2.87	3.32	4.06	4.69
144	148.435935	-20.111416	1.99	2.03	2.13	2.17	2.21	2.38	2.83	3.26	3.97	4.62
145	148.433214	-20.107398	1.98	2.02	2.13	2.17	2.21	2.37	2.82	3.22	3.89	4.57
146	148.429848	-20.103813	1.98	2.02	2.13	2.17	2.21	2.37	2.79	3.18	3.81	4.51
147	148.431249	-20.099813	1.98	2.02	2.12	2.16	2.20	2.36	2.77	3.14	3.74	4.45
148	148.435336	-20.098275	1.98	2.02	2.12	2.16	2.20	2.36	2.75	3.11	3.72	4.41
149	148.436763	-20.093754	1.98	2.02	2.12	2.16	2.20	2.34	2.72	3.06	3.66	4.34
150	148.435056	-20.089252	1.97	2.01	2.12	2.16	2.20	2.33	2.70	3.01	3.59	4.26
151	148.435796	-20.084412	1.97	2.01	2.11	2.15	2.20	2.32	2.66	2.96	3.53	4.18
152	148.436087	-20.079434	1.97	2.01	2.11	2.15	2.19	2.31	2.63	2.91	3.47	4.11
153	148.437662	-20.074881	1.97	2.01	2.11	2.15	2.19	2.30	2.58	2.85	3.40	4.02
154	148.439836	-20.070904	1.96	2.00	2.11	2.15	2.19	2.30	2.58	2.83	3.41	3.99
155	148.439573	-20.066377	1.96	2.00	2.11	2.15	2.19	2.28	2.51	2.77	3.32	3.89

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	1.96	2.00	2.10	2.14	2.18	2.28	2.49	2.76	3.25	3.84
157	148.432583	-20.062790	1.96	2.00	2.10	2.14	2.18	2.28	2.51	2.77	3.25	3.87
158	148.432001	-20.057986	1.96	2.00	2.10	2.14	2.18	2.27	2.48	2.76	3.20	3.79
159	148.434670	-20.053987	1.95	1.99	2.10	2.14	2.18	2.27	2.46	2.74	3.17	3.72
160	148.438544	-20.051181	1.95	1.99	2.09	2.13	2.17	2.26	2.44	2.71	3.12	3.65
161	148.442261	-20.047880	1.95	1.99	2.09	2.12	2.16	2.25	2.39	2.66	3.03	3.54
162	148.442424	-20.043005	1.95	1.99	2.09	2.12	2.16	2.25	2.38	2.65	3.03	3.51
163	148.443219	-20.038793	1.95	1.99	2.09	2.12	2.16	2.25	2.35	2.62	3.00	3.47
164	148.441517	-20.035168	1.94	1.98	2.08	2.12	2.16	2.25	2.34	2.62	2.98	3.43

Table A-2 Future climate 2050 Tropical cyclone peak surge plus tide (mAHD) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	2.28	2.32	2.42	2.45	2.51	2.71	2.95	3.25	3.85	3.98
2	148.086644	-19.883904	2.28	2.32	2.42	2.45	2.52	2.80	3.04	3.43	4.00	4.17
3	148.086750	-19.888545	2.28	2.32	2.42	2.46	2.54	2.85	3.13	3.52	4.10	4.33
4	148.089981	-19.891699	2.28	2.32	2.42	2.46	2.54	2.86	3.14	3.52	4.11	4.36
5	148.091008	-19.896035	2.29	2.33	2.42	2.47	2.55	2.88	3.17	3.55	4.14	4.44
6	148.093536	-19.900072	2.29	2.33	2.43	2.47	2.55	2.88	3.18	3.55	4.14	4.46
7	148.094558	-19.904839	2.29	2.33	2.42	2.47	2.56	2.94	3.25	3.63	4.20	4.59
8	148.098229	-19.907849	2.29	2.33	2.43	2.47	2.56	2.94	3.25	3.63	4.19	4.60
9	148.098545	-19.912567	2.29	2.33	2.42	2.47	2.57	2.99	3.34	3.73	4.27	4.74
10	148.100573	-19.916953	2.29	2.33	2.43	2.48	2.57	3.00	3.35	3.72	4.27	4.77
11	148.103183	-19.921165	2.29	2.33	2.43	2.48	2.58	3.03	3.39	3.73	4.29	4.82
12	148.104466	-19.925655	2.29	2.33	2.43	2.48	2.59	3.06	3.43	3.76	4.33	4.88
13	148.108624	-19.927620	2.29	2.33	2.43	2.48	2.59	3.07	3.42	3.74	4.30	4.88
14	148.113182	-19.929278	2.29	2.33	2.43	2.48	2.58	3.06	3.41	3.71	4.28	4.86
15	148.117375	-19.929729	2.29	2.33	2.43	2.48	2.58	3.02	3.37	3.67	4.26	4.81
16	148.121854	-19.931592	2.29	2.33	2.43	2.48	2.57	3.00	3.36	3.64	4.24	4.76
17	148.125345	-19.933461	2.29	2.33	2.43	2.48	2.57	3.01	3.38	3.65	4.25	4.77
18	148.127812	-19.934900	2.29	2.33	2.43	2.48	2.58	3.02	3.39	3.66	4.25	4.77
19	148.131995	-19.936612	2.29	2.33	2.43	2.48	2.58	3.00	3.39	3.65	4.24	4.74
20	148.136880	-19.937041	2.29	2.33	2.43	2.48	2.57	2.97	3.36	3.61	4.18	4.69
21	148.140824	-19.937192	2.29	2.33	2.43	2.48	2.57	2.96	3.35	3.60	4.17	4.67
22	148.145755	-19.937202	2.29	2.33	2.43	2.48	2.56	2.94	3.32	3.57	4.13	4.63
23	148.150433	-19.937100	2.29	2.33	2.43	2.48	2.56	2.92	3.29	3.55	4.10	4.59
24	148.155285	-19.937381	2.29	2.33	2.43	2.47	2.55	2.91	3.27	3.53	4.08	4.56
25	148.159885	-19.937060	2.29	2.33	2.43	2.47	2.55	2.90	3.26	3.51	4.06	4.53
26	148.164842	-19.937020	2.29	2.33	2.43	2.47	2.55	2.88	3.24	3.50	4.05	4.50
27	148.169661	-19.936777	2.29	2.33	2.43	2.47	2.55	2.86	3.20	3.48	3.99	4.45
28	148.174386	-19.936171	2.29	2.33	2.43	2.47	2.54	2.84	3.18	3.45	3.96	4.43
29	148.178875	-19.934357	2.29	2.33	2.43	2.47	2.54	2.81	3.15	3.42	3.91	4.39
30	148.183291	-19.932014	2.29	2.33	2.43	2.47	2.54	2.77	3.10	3.35	3.84	4.31
31	148.187708	-19.929671	2.29	2.33	2.43	2.47	2.54	2.76	3.07	3.30	3.80	4.27
32	148.192125	-19.927329	2.29	2.33	2.43	2.47	2.53	2.71	2.99	3.21	3.71	4.18
33	148.191727	-19.923601	2.29	2.33	2.43	2.47	2.52	2.69	2.95	3.17	3.69	4.12
34	148.194813	-19.920579	2.29	2.33	2.43	2.47	2.52	2.68	2.91	3.16	3.66	4.08
35	148.197788	-19.923268	2.29	2.33	2.42	2.46	2.52	2.70	2.93	3.19	3.68	4.13
36	148.202372	-19.923354	2.29	2.33	2.42	2.46	2.52	2.71	2.92	3.19	3.67	4.13
37	148.205450	-19.926615	2.29	2.33	2.42	2.46	2.52	2.72	2.94	3.22	3.67	4.16
38	148.209140	-19.929434	2.29	2.33	2.42	2.46	2.52	2.73	2.96	3.24	3.67	4.20

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	2.29	2.33	2.43	2.47	2.54	2.75	2.99	3.28	3.68	4.24
40	148.215627	-19.936786	2.29	2.33	2.43	2.47	2.53	2.75	2.99	3.26	3.67	4.26
41	148.214572	-19.940165	2.29	2.33	2.43	2.46	2.53	2.78	3.04	3.31	3.71	4.32
42	148.212471	-19.944188	2.29	2.33	2.43	2.46	2.54	2.83	3.10	3.39	3.76	4.39
43	148.216694	-19.943252	2.29	2.33	2.43	2.47	2.54	2.80	3.05	3.33	3.71	4.33
44	148.218362	-19.945221	2.29	2.33	2.43	2.47	2.53	2.80	3.06	3.33	3.71	4.35
45	148.220269	-19.947553	2.29	2.33	2.43	2.47	2.54	2.82	3.08	3.36	3.73	4.38
46	148.225065	-19.948444	2.29	2.33	2.43	2.47	2.54	2.81	3.07	3.35	3.72	4.36
47	148.228945	-19.951074	2.29	2.33	2.43	2.47	2.54	2.81	3.08	3.38	3.75	4.37
48	148.232270	-19.954427	2.29	2.33	2.43	2.47	2.54	2.82	3.08	3.40	3.78	4.38
49	148.233553	-19.959077	2.29	2.33	2.43	2.47	2.55	2.86	3.14	3.48	3.83	4.43
50	148.235969	-19.962224	2.30	2.34	2.43	2.48	2.55	2.87	3.15	3.49	3.83	4.45
51	148.239458	-19.964269	2.30	2.34	2.44	2.48	2.55	2.86	3.16	3.49	3.82	4.44
52	148.235834	-19.966574	2.30	2.34	2.44	2.49	2.56	2.90	3.22	3.56	3.89	4.52
53	148.237823	-19.967997	2.30	2.34	2.44	2.49	2.56	2.90	3.22	3.55	3.89	4.51
54	148.241742	-19.969955	2.30	2.34	2.44	2.48	2.56	2.88	3.20	3.51	3.84	4.48
55	148.240437	-19.974113	2.30	2.34	2.44	2.49	2.57	2.92	3.27	3.57	3.91	4.57
56	148.244870	-19.976017	2.30	2.34	2.44	2.49	2.56	2.91	3.24	3.52	3.89	4.54
57	148.249720	-19.976634	2.30	2.34	2.44	2.48	2.56	2.87	3.20	3.47	3.87	4.48
58	148.254453	-19.975668	2.30	2.34	2.44	2.48	2.56	2.84	3.14	3.41	3.83	4.42
59	148.258300	-19.973152	2.30	2.34	2.44	2.48	2.55	2.80	3.06	3.31	3.68	4.31
60	148.261678	-19.970722	2.30	2.34	2.44	2.48	2.54	2.75	3.00	3.27	3.62	4.24
61	148.262453	-19.974990	2.30	2.34	2.44	2.48	2.55	2.82	3.09	3.39	3.70	4.31
62	148.264217	-19.978552	2.30	2.34	2.44	2.48	2.56	2.85	3.14	3.45	3.77	4.34
63	148.267362	-19.982284	2.31	2.35	2.45	2.49	2.56	2.86	3.17	3.49	3.81	4.35
64	148.269158	-19.991273	2.31	2.35	2.45	2.50	2.58	2.94	3.28	3.61	4.00	4.48
65	148.270711	-19.995376	2.31	2.35	2.45	2.50	2.58	2.92	3.26	3.60	3.99	4.46
66	148.274978	-19.996242	2.32	2.36	2.46	2.50	2.58	2.89	3.22	3.56	3.92	4.43
67	148.271075	-19.998710	2.32	2.36	2.46	2.51	2.59	2.93	3.28	3.62	4.03	4.49
68	148.271444	-20.001189	2.32	2.36	2.46	2.51	2.59	2.97	3.32	3.67	4.07	4.55
69	148.274741	-20.002383	2.32	2.36	2.46	2.51	2.59	2.95	3.29	3.63	4.05	4.52
70	148.274049	-20.006756	2.32	2.36	2.46	2.51	2.59	2.97	3.33	3.68	4.10	4.58
71	148.269895	-20.008342	2.32	2.36	2.46	2.51	2.60	3.00	3.38	3.73	4.15	4.65
72	148.272333	-20.012494	2.32	2.36	2.46	2.51	2.60	3.01	3.38	3.75	4.17	4.66
73	148.272977	-20.017247	2.33	2.37	2.47	2.52	2.61	3.02	3.40	3.76	4.21	4.70
74	148.276768	-20.019229	2.33	2.37	2.47	2.52	2.61	3.01	3.38	3.75	4.17	4.68
75	148.274990	-20.022727	2.35	2.39	2.50	2.55	2.65	3.10	3.54	3.90	4.37	4.89
76	148.271586	-20.025926	2.35	2.39	2.49	2.54	2.65	3.14	3.55	3.93	4.42	4.94
77	148.267692	-20.028749	2.36	2.40	2.50	2.56	2.67	3.21	3.65	4.08	4.57	5.07

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	2.36	2.40	2.50	2.56	2.69	3.27	3.71	4.15	4.68	5.18
79	148.261368	-20.026508	2.36	2.40	2.50	2.57	2.70	3.28	3.71	4.15	4.69	5.18
80	148.259291	-20.024495	2.36	2.40	2.50	2.57	2.70	3.31	3.72	4.16	4.70	5.20
81	148.255971	-20.024299	2.36	2.40	2.50	2.57	2.71	3.34	3.73	4.18	4.74	5.23
82	148.252083	-20.021789	2.36	2.40	2.50	2.57	2.72	3.34	3.73	4.19	4.74	5.25
83	148.251245	-20.025777	2.36	2.40	2.50	2.57	2.72	3.35	3.76	4.23	4.79	5.28
84	148.248982	-20.030165	2.36	2.40	2.50	2.58	2.74	3.37	3.81	4.28	4.86	5.34
85	148.245332	-20.033208	2.36	2.40	2.50	2.59	2.75	3.40	3.86	4.33	4.93	5.40
86	148.242842	-20.037255	2.36	2.40	2.51	2.59	2.76	3.44	3.92	4.39	5.00	5.48
87	148.243873	-20.040647	2.36	2.40	2.51	2.59	2.76	3.45	3.93	4.40	5.04	5.50
88	148.244798	-20.044245	2.36	2.40	2.51	2.59	2.76	3.45	3.93	4.41	5.08	5.51
89	148.249032	-20.046574	2.36	2.40	2.50	2.59	2.75	3.44	3.90	4.39	5.05	5.47
90	148.253496	-20.048272	2.36	2.40	2.50	2.58	2.75	3.42	3.87	4.38	4.99	5.44
91	148.257679	-20.050278	2.36	2.40	2.50	2.58	2.74	3.40	3.86	4.39	4.93	5.43
92	148.261930	-20.052620	2.36	2.40	2.50	2.57	2.73	3.38	3.85	4.36	4.88	5.41
93	148.266185	-20.054795	2.36	2.40	2.50	2.57	2.73	3.36	3.84	4.35	4.86	5.41
94	148.269755	-20.058061	2.36	2.40	2.50	2.57	2.73	3.35	3.83	4.33	4.82	5.41
95	148.272686	-20.061626	2.36	2.40	2.50	2.57	2.73	3.34	3.82	4.32	4.80	5.43
96	148.273958	-20.066064	2.36	2.40	2.50	2.57	2.73	3.36	3.84	4.33	4.84	5.47
97	148.277575	-20.069358	2.36	2.40	2.50	2.57	2.73	3.36	3.82	4.31	4.84	5.48
98	148.281505	-20.072299	2.36	2.40	2.50	2.57	2.73	3.36	3.83	4.28	4.83	5.50
99	148.285512	-20.075047	2.36	2.40	2.50	2.57	2.72	3.34	3.83	4.25	4.83	5.50
100	148.290102	-20.076880	2.36	2.40	2.50	2.57	2.71	3.33	3.83	4.21	4.81	5.51
101	148.294498	-20.078324	2.36	2.40	2.50	2.56	2.70	3.31	3.81	4.18	4.79	5.51
102	148.299196	-20.077609	2.36	2.40	2.50	2.56	2.67	3.24	3.74	4.08	4.67	5.43
103	148.300325	-20.081981	2.36	2.40	2.50	2.56	2.71	3.35	3.82	4.21	4.85	5.58
104	148.292584	-20.087326	2.36	2.40	2.51	2.58	2.75	3.46	3.95	4.38	5.04	5.75
105	148.289298	-20.090879	2.37	2.41	2.51	2.59	2.76	3.52	4.02	4.46	5.13	5.83
106	148.290225	-20.095212	2.37	2.41	2.51	2.59	2.77	3.52	4.04	4.48	5.18	5.90
107	148.293279	-20.099028	2.37	2.41	2.51	2.59	2.77	3.51	4.03	4.47	5.20	5.94
108	148.297255	-20.101326	2.37	2.41	2.51	2.59	2.76	3.50	4.02	4.45	5.20	5.96
109	148.302049	-20.101573	2.37	2.41	2.51	2.58	2.74	3.47	3.97	4.39	5.14	5.93
110	148.306507	-20.101082	2.36	2.41	2.51	2.58	2.73	3.44	3.92	4.33	5.06	5.87
111	148.310592	-20.099318	2.37	2.41	2.51	2.57	2.71	3.40	3.87	4.28	5.00	5.80
112	148.315271	-20.098604	2.37	2.41	2.51	2.57	2.70	3.35	3.83	4.21	4.92	5.74
113	148.316742	-20.106603	2.37	2.41	2.52	2.59	2.75	3.52	3.99	4.41	5.25	6.01
114	148.316380	-20.110729	2.37	2.41	2.52	2.59	2.75	3.53	4.02	4.43	5.29	6.06
115	148.319501	-20.114494	2.37	2.41	2.52	2.59	2.75	3.54	4.02	4.43	5.33	6.09
116	148.323564	-20.117222	2.37	2.41	2.52	2.59	2.74	3.53	4.01	4.43	5.34	6.09

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	2.37	2.42	2.52	2.59	2.74	3.53	4.03	4.45	5.36	6.12
118	148.329841	-20.123745	2.38	2.42	2.52	2.59	2.74	3.53	4.06	4.48	5.40	6.15
119	148.333052	-20.127385	2.38	2.42	2.52	2.59	2.75	3.54	4.11	4.53	5.47	6.22
120	148.336234	-20.130719	2.38	2.42	2.52	2.59	2.74	3.54	4.12	4.54	5.50	6.24
121	148.340377	-20.132311	2.38	2.42	2.52	2.59	2.74	3.53	4.12	4.54	5.50	6.26
122	148.344376	-20.134624	2.38	2.42	2.52	2.59	2.74	3.53	4.13	4.56	5.51	6.26
123	148.348920	-20.136182	2.38	2.42	2.52	2.59	2.73	3.52	4.12	4.56	5.52	6.26
124	148.353846	-20.136606	2.38	2.42	2.52	2.59	2.72	3.50	4.09	4.56	5.49	6.24
125	148.358463	-20.137963	2.38	2.42	2.53	2.59	2.71	3.49	4.07	4.56	5.46	6.21
126	148.363418	-20.138398	2.38	2.42	2.53	2.59	2.71	3.47	4.07	4.56	5.44	6.21
127	148.368134	-20.139890	2.38	2.42	2.53	2.59	2.71	3.46	4.05	4.54	5.42	6.20
128	148.372841	-20.141138	2.38	2.43	2.53	2.59	2.70	3.48	4.03	4.53	5.39	6.21
129	148.377743	-20.141775	2.39	2.43	2.53	2.58	2.70	3.47	4.01	4.54	5.36	6.20
130	148.382452	-20.141302	2.39	2.43	2.53	2.58	2.70	3.44	3.97	4.53	5.31	6.17
131	148.386864	-20.139825	2.39	2.43	2.53	2.58	2.69	3.41	3.93	4.51	5.25	6.12
132	148.390878	-20.137479	2.39	2.43	2.53	2.58	2.69	3.36	3.89	4.48	5.19	6.06
133	148.394081	-20.134107	2.39	2.43	2.53	2.58	2.68	3.32	3.84	4.41	5.11	5.96
134	148.398548	-20.132091	2.39	2.43	2.53	2.58	2.68	3.29	3.81	4.40	5.09	5.93
135	148.402767	-20.129617	2.39	2.43	2.53	2.58	2.67	3.25	3.77	4.36	5.05	5.85
136	148.406698	-20.126630	2.39	2.43	2.53	2.58	2.67	3.21	3.73	4.30	5.01	5.78
137	148.410754	-20.123973	2.39	2.43	2.53	2.57	2.66	3.18	3.70	4.26	4.98	5.73
138	148.414721	-20.120973	2.39	2.43	2.53	2.57	2.66	3.14	3.67	4.19	4.92	5.65
139	148.418583	-20.119000	2.39	2.43	2.53	2.57	2.65	3.10	3.63	4.15	4.89	5.60
140	148.423541	-20.118958	2.39	2.43	2.53	2.57	2.66	3.09	3.62	4.15	4.90	5.60
141	148.428185	-20.119954	2.39	2.43	2.53	2.58	2.66	3.08	3.61	4.16	4.91	5.62
142	148.432311	-20.120008	2.39	2.43	2.54	2.58	2.66	3.06	3.60	4.16	4.91	5.61
143	148.435300	-20.116110	2.39	2.43	2.53	2.58	2.65	3.02	3.54	4.08	4.84	5.51
144	148.435935	-20.111416	2.39	2.43	2.53	2.57	2.64	2.99	3.51	4.01	4.77	5.43
145	148.433214	-20.107398	2.38	2.42	2.53	2.57	2.64	2.98	3.49	3.97	4.71	5.38
146	148.429848	-20.103813	2.38	2.42	2.53	2.57	2.64	2.96	3.48	3.92	4.63	5.32
147	148.431249	-20.099813	2.38	2.42	2.52	2.56	2.63	2.94	3.46	3.87	4.56	5.25
148	148.435336	-20.098275	2.38	2.42	2.52	2.56	2.63	2.93	3.43	3.85	4.53	5.21
149	148.436763	-20.093754	2.38	2.42	2.52	2.56	2.62	2.90	3.40	3.79	4.45	5.13
150	148.435056	-20.089252	2.37	2.41	2.52	2.56	2.62	2.89	3.37	3.73	4.34	5.05
151	148.435796	-20.084412	2.37	2.41	2.51	2.55	2.62	2.87	3.33	3.67	4.27	4.96
152	148.436087	-20.079434	2.37	2.41	2.51	2.55	2.61	2.86	3.31	3.61	4.20	4.89
153	148.437662	-20.074881	2.37	2.41	2.51	2.55	2.61	2.82	3.26	3.53	4.12	4.78
154	148.439836	-20.070904	2.36	2.40	2.51	2.55	2.61	2.82	3.26	3.51	4.14	4.75
155	148.439573	-20.066377	2.36	2.40	2.51	2.55	2.60	2.77	3.19	3.42	4.04	4.64

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	2.36	2.40	2.50	2.54	2.60	2.76	3.17	3.39	3.96	4.58
157	148.432583	-20.062790	2.36	2.40	2.50	2.54	2.60	2.79	3.19	3.41	3.96	4.61
158	148.432001	-20.057986	2.36	2.40	2.50	2.54	2.59	2.79	3.16	3.38	3.89	4.53
159	148.434670	-20.053987	2.35	2.39	2.50	2.54	2.59	2.77	3.13	3.37	3.85	4.45
160	148.438544	-20.051181	2.35	2.39	2.49	2.53	2.58	2.75	3.09	3.33	3.79	4.37
161	148.442261	-20.047880	2.35	2.39	2.49	2.53	2.58	2.73	3.04	3.26	3.68	4.25
162	148.442424	-20.043005	2.35	2.39	2.49	2.53	2.58	2.72	3.01	3.24	3.69	4.22
163	148.443219	-20.038793	2.35	2.39	2.49	2.53	2.58	2.72	2.98	3.22	3.66	4.17
164	148.441517	-20.035168	2.34	2.38	2.48	2.53	2.57	2.71	2.95	3.20	3.62	4.12

Table A-3 Future climate 2100 Tropical cyclone peak surge plus tide (mAHD) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	2.68	2.72	2.82	2.85	2.92	3.20	3.50	3.83	4.46	4.62
2	148.086644	-19.883904	2.68	2.72	2.82	2.86	2.94	3.31	3.61	4.02	4.66	4.83
3	148.086750	-19.888545	2.68	2.72	2.82	2.87	2.96	3.39	3.72	4.12	4.76	5.01
4	148.089981	-19.891699	2.68	2.72	2.82	2.87	2.96	3.40	3.73	4.12	4.77	5.05
5	148.091008	-19.896035	2.69	2.73	2.82	2.87	2.97	3.43	3.77	4.16	4.80	5.14
6	148.093536	-19.900072	2.69	2.73	2.83	2.87	2.97	3.43	3.77	4.16	4.80	5.16
7	148.094558	-19.904839	2.69	2.73	2.82	2.87	2.98	3.48	3.85	4.25	4.86	5.30
8	148.098229	-19.907849	2.69	2.73	2.83	2.87	2.98	3.48	3.85	4.25	4.85	5.31
9	148.098545	-19.912567	2.69	2.73	2.82	2.88	3.00	3.54	3.95	4.34	4.93	5.47
10	148.100573	-19.916953	2.69	2.73	2.83	2.89	3.01	3.54	3.96	4.34	4.94	5.50
11	148.103183	-19.921165	2.69	2.73	2.83	2.89	3.02	3.56	4.00	4.37	4.97	5.55
12	148.104466	-19.925655	2.69	2.73	2.83	2.89	3.03	3.59	4.03	4.40	5.01	5.62
13	148.108624	-19.927620	2.69	2.73	2.83	2.89	3.03	3.60	4.03	4.38	4.98	5.61
14	148.113182	-19.929278	2.69	2.73	2.83	2.89	3.02	3.59	4.02	4.36	4.96	5.59
15	148.117375	-19.929729	2.69	2.73	2.83	2.89	3.02	3.57	3.98	4.31	4.93	5.52
16	148.121854	-19.931592	2.69	2.73	2.83	2.89	3.01	3.55	3.96	4.28	4.90	5.48
17	148.125345	-19.933461	2.69	2.73	2.83	2.89	3.01	3.55	3.98	4.29	4.92	5.48
18	148.127812	-19.934900	2.69	2.73	2.83	2.89	3.01	3.56	4.00	4.30	4.92	5.48
19	148.131995	-19.936612	2.69	2.73	2.83	2.89	3.01	3.56	4.00	4.28	4.91	5.45
20	148.136880	-19.937041	2.69	2.73	2.83	2.88	3.00	3.52	3.95	4.23	4.87	5.37
21	148.140824	-19.937192	2.69	2.73	2.83	2.88	2.99	3.52	3.94	4.22	4.86	5.36
22	148.145755	-19.937202	2.69	2.73	2.83	2.88	2.99	3.49	3.91	4.18	4.82	5.31
23	148.150433	-19.937100	2.69	2.73	2.83	2.88	2.98	3.47	3.89	4.15	4.78	5.26
24	148.155285	-19.937381	2.69	2.73	2.83	2.88	2.98	3.46	3.87	4.14	4.77	5.23
25	148.159885	-19.937060	2.69	2.73	2.83	2.88	2.98	3.44	3.85	4.12	4.74	5.20
26	148.164842	-19.937020	2.69	2.73	2.83	2.88	2.97	3.43	3.82	4.12	4.72	5.17
27	148.169661	-19.936777	2.69	2.73	2.83	2.88	2.97	3.39	3.78	4.08	4.65	5.12
28	148.174386	-19.936171	2.69	2.73	2.83	2.88	2.96	3.37	3.75	4.05	4.61	5.10
29	148.178875	-19.934357	2.69	2.73	2.83	2.88	2.96	3.34	3.72	4.01	4.55	5.06
30	148.183291	-19.932014	2.69	2.73	2.83	2.87	2.95	3.30	3.66	3.95	4.48	4.98
31	148.187708	-19.929671	2.69	2.73	2.83	2.87	2.95	3.28	3.63	3.91	4.44	4.94
32	148.192125	-19.927329	2.69	2.73	2.83	2.87	2.94	3.23	3.56	3.82	4.34	4.84
33	148.191727	-19.923601	2.69	2.73	2.83	2.87	2.94	3.21	3.53	3.78	4.32	4.78
34	148.194813	-19.920579	2.69	2.73	2.83	2.87	2.94	3.19	3.48	3.76	4.29	4.73
35	148.197788	-19.923268	2.69	2.73	2.82	2.86	2.93	3.23	3.50	3.80	4.30	4.78
36	148.202372	-19.923354	2.69	2.73	2.82	2.86	2.93	3.23	3.49	3.79	4.29	4.79
37	148.205450	-19.926615	2.69	2.73	2.82	2.86	2.94	3.24	3.51	3.81	4.30	4.82
38	148.209140	-19.929434	2.69	2.73	2.82	2.86	2.94	3.25	3.52	3.83	4.29	4.85

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	2.69	2.73	2.83	2.87	2.95	3.27	3.56	3.87	4.31	4.90
40	148.215627	-19.936786	2.69	2.73	2.83	2.87	2.94	3.27	3.56	3.87	4.29	4.92
41	148.214572	-19.940165	2.69	2.73	2.83	2.87	2.95	3.30	3.60	3.91	4.33	4.98
42	148.212471	-19.944188	2.69	2.73	2.83	2.87	2.96	3.36	3.67	3.98	4.39	5.06
43	148.216694	-19.943252	2.69	2.73	2.83	2.88	2.95	3.32	3.62	3.93	4.33	4.99
44	148.218362	-19.945221	2.69	2.73	2.83	2.88	2.95	3.32	3.62	3.94	4.33	5.02
45	148.220269	-19.947553	2.69	2.73	2.83	2.88	2.96	3.36	3.65	3.97	4.36	5.04
46	148.225065	-19.948444	2.69	2.73	2.83	2.88	2.96	3.35	3.63	3.96	4.35	5.02
47	148.228945	-19.951074	2.69	2.73	2.83	2.88	2.97	3.36	3.66	4.00	4.39	5.04
48	148.232270	-19.954427	2.69	2.73	2.83	2.88	2.97	3.37	3.68	4.04	4.41	5.05
49	148.233553	-19.959077	2.69	2.73	2.83	2.88	2.98	3.39	3.73	4.11	4.47	5.10
50	148.235969	-19.962224	2.70	2.74	2.83	2.88	2.98	3.39	3.74	4.12	4.48	5.12
51	148.239458	-19.964269	2.70	2.74	2.84	2.88	2.98	3.39	3.74	4.11	4.47	5.12
52	148.235834	-19.966574	2.70	2.74	2.84	2.89	2.99	3.43	3.79	4.18	4.54	5.19
53	148.237823	-19.967997	2.70	2.74	2.84	2.89	2.99	3.42	3.80	4.18	4.54	5.19
54	148.241742	-19.969955	2.70	2.74	2.84	2.89	2.99	3.41	3.80	4.14	4.49	5.16
55	148.240437	-19.974113	2.70	2.74	2.84	2.90	3.00	3.47	3.86	4.23	4.57	5.24
56	148.244870	-19.976017	2.70	2.74	2.84	2.89	2.99	3.44	3.84	4.18	4.55	5.21
57	148.249720	-19.976634	2.70	2.74	2.84	2.89	2.99	3.40	3.78	4.12	4.53	5.16
58	148.254453	-19.975668	2.70	2.74	2.84	2.89	2.98	3.37	3.73	4.05	4.46	5.09
59	148.258300	-19.973152	2.70	2.74	2.84	2.89	2.97	3.32	3.63	3.93	4.30	4.98
60	148.261678	-19.970722	2.70	2.74	2.84	2.88	2.96	3.28	3.54	3.87	4.23	4.90
61	148.262453	-19.974990	2.70	2.74	2.84	2.89	2.97	3.34	3.67	4.01	4.33	4.98
62	148.264217	-19.978552	2.70	2.74	2.84	2.89	2.98	3.38	3.71	4.07	4.40	5.01
63	148.267362	-19.982284	2.71	2.75	2.85	2.90	2.99	3.40	3.75	4.12	4.44	5.02
64	148.269158	-19.991273	2.71	2.75	2.85	2.90	3.01	3.49	3.87	4.24	4.65	5.16
65	148.270711	-19.995376	2.71	2.75	2.85	2.90	3.01	3.47	3.85	4.23	4.64	5.15
66	148.274978	-19.996242	2.72	2.76	2.86	2.91	3.01	3.45	3.82	4.19	4.58	5.11
67	148.271075	-19.998710	2.72	2.76	2.86	2.91	3.02	3.48	3.88	4.26	4.67	5.19
68	148.271444	-20.001189	2.72	2.76	2.86	2.92	3.02	3.52	3.92	4.31	4.73	5.24
69	148.274741	-20.002383	2.72	2.76	2.86	2.91	3.02	3.50	3.89	4.29	4.70	5.21
70	148.274049	-20.006756	2.72	2.76	2.86	2.92	3.02	3.52	3.94	4.34	4.76	5.28
71	148.269895	-20.008342	2.72	2.76	2.86	2.92	3.03	3.55	3.99	4.37	4.81	5.35
72	148.272333	-20.012494	2.72	2.76	2.86	2.92	3.03	3.57	4.00	4.40	4.85	5.36
73	148.272977	-20.017247	2.73	2.77	2.87	2.93	3.04	3.58	4.01	4.41	4.88	5.41
74	148.276768	-20.019229	2.73	2.77	2.87	2.93	3.04	3.56	3.98	4.40	4.85	5.38
75	148.274990	-20.022727	2.75	2.79	2.90	2.96	3.10	3.69	4.15	4.58	5.09	5.61
76	148.271586	-20.025926	2.75	2.79	2.89	2.96	3.10	3.71	4.17	4.61	5.14	5.65
77	148.267692	-20.028749	2.76	2.80	2.90	2.97	3.13	3.79	4.27	4.76	5.29	5.80

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	2.76	2.80	2.90	2.98	3.16	3.84	4.33	4.84	5.42	5.91
79	148.261368	-20.026508	2.76	2.80	2.90	2.98	3.16	3.85	4.32	4.84	5.43	5.92
80	148.259291	-20.024495	2.76	2.80	2.90	2.98	3.16	3.85	4.33	4.85	5.44	5.93
81	148.255971	-20.024299	2.76	2.80	2.90	2.98	3.17	3.88	4.35	4.88	5.49	5.97
82	148.252083	-20.021789	2.76	2.80	2.90	2.98	3.18	3.89	4.35	4.89	5.50	5.97
83	148.251245	-20.025777	2.76	2.80	2.90	2.99	3.19	3.91	4.39	4.93	5.54	6.02
84	148.248982	-20.030165	2.76	2.80	2.90	3.00	3.21	3.94	4.44	4.98	5.61	6.08
85	148.245332	-20.033208	2.76	2.80	2.90	3.01	3.24	3.97	4.48	5.03	5.68	6.15
86	148.242842	-20.037255	2.76	2.80	2.91	3.02	3.26	4.03	4.54	5.09	5.75	6.23
87	148.243873	-20.040647	2.76	2.80	2.91	3.02	3.27	4.03	4.57	5.10	5.79	6.25
88	148.244798	-20.044245	2.76	2.80	2.91	3.02	3.28	4.05	4.58	5.12	5.82	6.27
89	148.249032	-20.046574	2.76	2.80	2.90	3.01	3.26	4.01	4.54	5.09	5.79	6.23
90	148.253496	-20.048272	2.76	2.80	2.90	3.00	3.24	3.97	4.52	5.07	5.73	6.19
91	148.257679	-20.050278	2.76	2.80	2.90	2.99	3.21	3.96	4.49	5.08	5.69	6.18
92	148.261930	-20.052620	2.76	2.80	2.90	2.99	3.21	3.95	4.47	5.05	5.64	6.16
93	148.266185	-20.054795	2.76	2.80	2.90	2.99	3.20	3.94	4.46	5.04	5.61	6.16
94	148.269755	-20.058061	2.76	2.80	2.90	2.99	3.20	3.92	4.44	5.01	5.57	6.15
95	148.272686	-20.061626	2.76	2.80	2.90	2.98	3.20	3.93	4.45	5.00	5.55	6.18
96	148.273958	-20.066064	2.76	2.80	2.90	2.99	3.21	3.95	4.47	5.01	5.59	6.22
97	148.277575	-20.069358	2.76	2.80	2.90	2.99	3.21	3.95	4.46	4.99	5.59	6.23
98	148.281505	-20.072299	2.76	2.80	2.90	2.98	3.20	3.94	4.46	4.96	5.58	6.25
99	148.285512	-20.075047	2.76	2.80	2.90	2.98	3.19	3.92	4.46	4.95	5.58	6.26
100	148.290102	-20.076880	2.76	2.80	2.90	2.98	3.17	3.90	4.45	4.91	5.56	6.27
101	148.294498	-20.078324	2.76	2.80	2.90	2.97	3.16	3.88	4.43	4.88	5.54	6.27
102	148.299196	-20.077609	2.76	2.80	2.90	2.97	3.14	3.80	4.36	4.78	5.41	6.19
103	148.300325	-20.081981	2.76	2.80	2.90	2.97	3.16	3.92	4.46	4.90	5.59	6.35
104	148.292584	-20.087326	2.76	2.80	2.91	2.99	3.21	4.02	4.61	5.07	5.81	6.52
105	148.289298	-20.090879	2.77	2.81	2.91	3.00	3.25	4.08	4.70	5.15	5.92	6.62
106	148.290225	-20.095212	2.77	2.81	2.91	3.00	3.25	4.09	4.73	5.18	5.97	6.68
107	148.293279	-20.099028	2.77	2.81	2.91	3.00	3.25	4.08	4.71	5.17	5.99	6.73
108	148.297255	-20.101326	2.77	2.81	2.91	3.00	3.23	4.08	4.68	5.16	5.99	6.75
109	148.302049	-20.101573	2.77	2.81	2.91	2.99	3.21	4.05	4.62	5.09	5.92	6.71
110	148.306507	-20.101082	2.76	2.81	2.91	2.99	3.18	3.99	4.56	5.01	5.83	6.65
111	148.310592	-20.099318	2.77	2.81	2.91	2.98	3.16	3.95	4.52	4.95	5.76	6.58
112	148.315271	-20.098604	2.77	2.81	2.91	2.98	3.15	3.91	4.45	4.87	5.67	6.51
113	148.316742	-20.106603	2.77	2.81	2.92	3.00	3.21	4.07	4.66	5.12	6.04	6.79
114	148.316380	-20.110729	2.77	2.81	2.92	3.00	3.21	4.09	4.68	5.14	6.08	6.84
115	148.319501	-20.114494	2.77	2.81	2.92	3.00	3.20	4.09	4.67	5.13	6.11	6.87
116	148.323564	-20.117222	2.77	2.81	2.92	3.00	3.19	4.07	4.65	5.12	6.11	6.87

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	2.77	2.82	2.92	2.99	3.19	4.06	4.65	5.13	6.13	6.89
118	148.329841	-20.123745	2.78	2.82	2.92	2.99	3.18	4.05	4.66	5.14	6.16	6.92
119	148.333052	-20.127385	2.78	2.82	2.92	2.99	3.19	4.08	4.69	5.20	6.24	6.99
120	148.336234	-20.130719	2.78	2.82	2.92	2.99	3.19	4.07	4.70	5.22	6.26	7.02
121	148.340377	-20.132311	2.78	2.82	2.92	2.99	3.18	4.07	4.70	5.23	6.27	7.03
122	148.344376	-20.134624	2.78	2.82	2.92	2.99	3.18	4.07	4.73	5.23	6.27	7.05
123	148.348920	-20.136182	2.78	2.82	2.92	3.00	3.18	4.07	4.75	5.24	6.27	7.06
124	148.353846	-20.136606	2.78	2.82	2.92	3.00	3.17	4.06	4.74	5.23	6.23	7.04
125	148.358463	-20.137963	2.78	2.82	2.93	2.99	3.17	4.04	4.70	5.21	6.20	7.01
126	148.363418	-20.138398	2.78	2.82	2.93	2.99	3.16	4.03	4.67	5.20	6.18	7.01
127	148.368134	-20.139890	2.78	2.82	2.93	2.99	3.15	4.02	4.65	5.19	6.15	7.00
128	148.372841	-20.141138	2.78	2.83	2.93	2.99	3.15	4.02	4.63	5.18	6.12	7.01
129	148.377743	-20.141775	2.79	2.83	2.93	2.99	3.14	4.01	4.60	5.18	6.09	7.00
130	148.382452	-20.141302	2.79	2.83	2.93	2.99	3.13	3.98	4.56	5.17	6.04	6.96
131	148.386864	-20.139825	2.79	2.83	2.93	2.99	3.12	3.95	4.52	5.15	5.99	6.91
132	148.390878	-20.137479	2.79	2.83	2.93	2.98	3.11	3.92	4.47	5.11	5.94	6.84
133	148.394081	-20.134107	2.79	2.83	2.93	2.98	3.10	3.88	4.41	5.05	5.87	6.74
134	148.398548	-20.132091	2.79	2.83	2.93	2.98	3.10	3.85	4.38	5.03	5.84	6.70
135	148.402767	-20.129617	2.79	2.83	2.93	2.98	3.10	3.81	4.34	4.98	5.78	6.62
136	148.406698	-20.126630	2.79	2.83	2.93	2.98	3.09	3.77	4.29	4.94	5.72	6.55
137	148.410754	-20.123973	2.79	2.83	2.93	2.98	3.09	3.72	4.26	4.90	5.66	6.49
138	148.414721	-20.120973	2.79	2.83	2.93	2.98	3.08	3.67	4.21	4.83	5.61	6.40
139	148.418583	-20.119000	2.79	2.83	2.93	2.98	3.08	3.63	4.18	4.78	5.57	6.35
140	148.423541	-20.118958	2.79	2.83	2.93	2.98	3.07	3.61	4.16	4.78	5.57	6.35
141	148.428185	-20.119954	2.79	2.83	2.93	2.98	3.07	3.59	4.16	4.78	5.57	6.36
142	148.432311	-20.120008	2.79	2.83	2.94	2.98	3.07	3.57	4.15	4.77	5.57	6.35
143	148.435300	-20.116110	2.79	2.83	2.93	2.98	3.06	3.53	4.10	4.69	5.49	6.24
144	148.435935	-20.111416	2.79	2.83	2.93	2.97	3.05	3.51	4.07	4.63	5.42	6.16
145	148.433214	-20.107398	2.78	2.82	2.93	2.97	3.05	3.50	4.06	4.59	5.37	6.10
146	148.429848	-20.103813	2.78	2.82	2.93	2.97	3.05	3.49	4.04	4.54	5.31	6.04
147	148.431249	-20.099813	2.78	2.82	2.92	2.96	3.04	3.46	4.02	4.48	5.23	5.96
148	148.435336	-20.098275	2.78	2.82	2.92	2.96	3.04	3.45	4.00	4.46	5.20	5.92
149	148.436763	-20.093754	2.78	2.82	2.92	2.96	3.03	3.41	3.97	4.40	5.13	5.84
150	148.435056	-20.089252	2.77	2.81	2.92	2.96	3.03	3.39	3.93	4.34	5.03	5.76
151	148.435796	-20.084412	2.77	2.81	2.91	2.96	3.03	3.36	3.88	4.27	4.94	5.67
152	148.436087	-20.079434	2.77	2.81	2.91	2.95	3.02	3.34	3.85	4.20	4.85	5.59
153	148.437662	-20.074881	2.77	2.81	2.91	2.95	3.02	3.32	3.80	4.12	4.76	5.48
154	148.439836	-20.070904	2.76	2.80	2.91	2.95	3.02	3.32	3.81	4.13	4.78	5.44
155	148.439573	-20.066377	2.76	2.80	2.91	2.95	3.01	3.28	3.75	4.03	4.68	5.33

Peak Surge plus Tide Level Average Recurrence Interval Tables

ID	Longitude	Latitude	5	10	50	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	2.76	2.80	2.90	2.94	3.01	3.27	3.73	3.99	4.59	5.27
157	148.432583	-20.062790	2.76	2.80	2.90	2.94	3.01	3.30	3.73	4.02	4.59	5.31
158	148.432001	-20.057986	2.76	2.80	2.90	2.94	3.01	3.30	3.70	3.98	4.51	5.22
159	148.434670	-20.053987	2.75	2.79	2.90	2.94	3.00	3.29	3.67	3.95	4.47	5.13
160	148.438544	-20.051181	2.75	2.79	2.89	2.93	2.99	3.26	3.64	3.90	4.40	5.04
161	148.442261	-20.047880	2.75	2.79	2.89	2.93	2.99	3.22	3.58	3.83	4.29	4.91
162	148.442424	-20.043005	2.75	2.79	2.89	2.93	2.99	3.21	3.56	3.81	4.30	4.88
163	148.443219	-20.038793	2.75	2.79	2.89	2.93	2.98	3.19	3.53	3.77	4.27	4.83
164	148.441517	-20.035168	2.74	2.78	2.88	2.93	2.98	3.18	3.50	3.74	4.23	4.78

Appendix B Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

Table B-1 Current climate 2017 tropical cyclone peak significant wave height (m) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	3.16	3.62	4.01	4.27	4.50	4.74	4.97
2	148.086644	-19.883904	2.97	3.38	3.75	4.01	4.20	4.45	4.67
3	148.086750	-19.888545	2.89	3.32	3.68	3.92	4.13	4.35	4.59
4	148.089981	-19.891699	2.94	3.42	3.78	4.03	4.25	4.47	4.70
5	148.091008	-19.896035	2.81	3.28	3.63	3.86	4.08	4.30	4.53
6	148.093536	-19.900072	2.80	3.29	3.65	3.89	4.12	4.32	4.56
7	148.094558	-19.904839	2.75	3.23	3.59	3.83	4.06	4.26	4.49
8	148.098229	-19.907849	2.77	3.27	3.64	3.89	4.11	4.32	4.55
9	148.098545	-19.912567	2.64	3.08	3.45	3.68	3.91	4.11	4.35
10	148.100573	-19.916953	2.59	3.04	3.42	3.66	3.88	4.10	4.34
11	148.103183	-19.921165	2.54	3.01	3.41	3.65	3.87	4.11	4.33
12	148.104466	-19.925655	2.41	2.83	3.22	3.47	3.67	3.93	4.14
13	148.108624	-19.927620	2.40	2.82	3.22	3.48	3.68	3.95	4.20
14	148.113182	-19.929278	2.38	2.83	3.23	3.47	3.68	3.93	4.20
15	148.117375	-19.929729	2.45	2.91	3.31	3.55	3.76	4.01	4.29
16	148.121854	-19.931592	2.49	2.93	3.34	3.57	3.79	4.03	4.31
17	148.125345	-19.933461	2.48	2.96	3.38	3.60	3.83	4.10	4.38
18	148.127812	-19.934900	2.41	2.88	3.30	3.51	3.74	4.02	4.31
19	148.131995	-19.936612	2.34	2.89	3.32	3.53	3.76	4.06	4.33
20	148.136880	-19.937041	2.30	2.77	3.20	3.40	3.63	3.93	4.21
21	148.140824	-19.937192	2.37	2.91	3.35	3.55	3.78	4.09	4.36
22	148.145755	-19.937202	2.37	2.92	3.34	3.55	3.77	4.07	4.35
23	148.150433	-19.937100	2.35	2.98	3.45	3.66	3.90	4.20	4.47
24	148.155285	-19.937381	2.33	2.98	3.45	3.67	3.90	4.21	4.48
25	148.159885	-19.937060	2.34	2.99	3.44	3.66	3.89	4.19	4.47
26	148.164842	-19.937020	2.36	3.03	3.47	3.69	3.91	4.22	4.51
27	148.169661	-19.936777	2.28	2.96	3.42	3.63	3.85	4.16	4.45
28	148.174386	-19.936171	2.30	2.96	3.43	3.64	3.86	4.18	4.46
29	148.178875	-19.934357	2.41	3.04	3.53	3.74	3.97	4.30	4.58
30	148.183291	-19.932014	2.51	3.08	3.58	3.82	4.05	4.41	4.66
31	148.187708	-19.929671	2.57	3.07	3.57	3.80	4.04	4.38	4.65
32	148.192125	-19.927329	2.60	2.91	3.29	3.50	3.70	3.98	4.30
33	148.191727	-19.923601	2.71	3.07	3.46	3.70	3.91	4.19	4.52
34	148.194813	-19.920579	3.04	3.64	4.06	4.32	4.54	4.82	5.13
35	148.197788	-19.923268	2.87	3.36	3.75	4.02	4.25	4.51	4.84
36	148.202372	-19.923354	3.13	3.81	4.24	4.51	4.76	5.03	5.33
37	148.205450	-19.926615	2.96	3.53	3.93	4.22	4.46	4.71	5.03
38	148.209140	-19.929434	2.98	3.49	3.87	4.16	4.38	4.64	4.95

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	2.99	3.42	3.77	4.04	4.26	4.50	4.80
40	148.215627	-19.936786	3.02	3.46	3.81	4.08	4.29	4.54	4.84
41	148.214572	-19.940165	2.77	3.08	3.42	3.67	3.86	4.10	4.40
42	148.212471	-19.944188	2.51	2.81	3.16	3.39	3.60	3.84	4.12
43	148.216694	-19.943252	2.77	3.10	3.45	3.68	3.90	4.13	4.42
44	148.218362	-19.945221	2.71	3.06	3.41	3.64	3.85	4.09	4.39
45	148.220269	-19.947553	2.64	3.07	3.44	3.68	3.91	4.16	4.44
46	148.225065	-19.948444	2.83	3.28	3.65	3.90	4.12	4.35	4.67
47	148.228945	-19.951074	2.88	3.33	3.69	3.95	4.18	4.41	4.72
48	148.232270	-19.954427	2.91	3.38	3.74	4.00	4.23	4.44	4.75
49	148.233553	-19.959077	2.80	3.29	3.64	3.89	4.13	4.33	4.63
50	148.235969	-19.962224	2.75	3.25	3.61	3.86	4.11	4.31	4.61
51	148.239458	-19.964269	2.84	3.48	3.87	4.11	4.36	4.58	4.88
52	148.235834	-19.966574	2.43	2.79	3.14	3.39	3.63	3.84	4.13
53	148.237823	-19.967997	2.56	3.00	3.35	3.58	3.82	4.04	4.33
54	148.241742	-19.969955	2.62	3.23	3.61	3.84	4.07	4.32	4.61
55	148.240437	-19.974113	2.37	2.88	3.25	3.47	3.68	3.95	4.23
56	148.244870	-19.976017	2.32	2.86	3.25	3.45	3.68	3.94	4.25
57	148.249720	-19.976634	2.35	2.93	3.32	3.52	3.73	4.00	4.32
58	148.254453	-19.975668	2.42	2.95	3.37	3.60	3.81	4.07	4.42
59	148.258300	-19.973152	2.41	2.97	3.49	3.81	4.03	4.31	4.65
60	148.261678	-19.970722	3.14	3.98	4.49	4.82	5.09	5.31	5.69
61	148.262453	-19.974990	2.70	3.45	3.96	4.32	4.59	4.88	5.21
62	148.264217	-19.978552	2.74	3.54	4.08	4.39	4.67	4.87	5.28
63	148.267362	-19.982284	3.07	4.11	4.72	5.05	5.34	5.56	5.89
64	148.269158	-19.991273	2.78	3.62	4.15	4.47	4.75	4.95	5.30
65	148.270711	-19.995376	2.67	3.28	3.72	4.04	4.30	4.53	4.88
66	148.274978	-19.996242	2.90	3.81	4.40	4.74	5.03	5.24	5.64
67	148.271075	-19.998710	2.58	2.97	3.39	3.69	3.92	4.17	4.48
68	148.271444	-20.001189	2.61	3.01	3.42	3.71	3.95	4.17	4.49
69	148.274741	-20.002383	2.81	3.50	3.96	4.29	4.55	4.76	5.08
70	148.274049	-20.006756	2.63	3.49	4.01	4.33	4.61	4.83	5.09
71	148.269895	-20.008342	2.40	2.96	3.35	3.66	3.90	4.11	4.34
72	148.272333	-20.012494	2.45	3.27	3.75	4.05	4.29	4.54	4.82
73	148.272977	-20.017247	2.32	3.14	3.62	3.88	4.14	4.37	4.71
74	148.276768	-20.019229	2.36	3.34	3.96	4.27	4.56	4.81	5.18
75	148.274990	-20.022727	2.01	2.60	3.03	3.35	3.60	3.83	4.20
76	148.271586	-20.025926	1.76	2.33	2.79	3.05	3.31	3.57	3.82
77	148.267692	-20.028749	1.62	2.07	2.50	2.78	3.03	3.29	3.51

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	1.55	1.93	2.44	2.71	2.97	3.19	3.42
79	148.261368	-20.026508	1.41	1.72	2.24	2.47	2.73	2.96	3.20
80	148.259291	-20.024495	1.31	1.62	2.13	2.35	2.61	2.84	3.07
81	148.255971	-20.024299	1.39	1.72	2.28	2.52	2.78	3.05	3.27
82	148.252083	-20.021789	1.30	1.59	2.07	2.27	2.54	2.75	2.97
83	148.251245	-20.025777	1.51	1.88	2.44	2.71	2.99	3.28	3.43
84	148.248982	-20.030165	1.56	2.01	2.55	2.81	3.11	3.35	3.55
85	148.245332	-20.033208	1.57	2.04	2.59	2.85	3.13	3.41	3.59
86	148.242842	-20.037255	1.57	2.05	2.61	2.89	3.16	3.47	3.65
87	148.243873	-20.040647	1.55	2.07	2.65	2.94	3.21	3.57	3.77
88	148.244798	-20.044245	1.46	2.00	2.60	2.88	3.16	3.54	3.73
89	148.249032	-20.046574	1.50	2.04	2.70	3.02	3.29	3.71	3.90
90	148.253496	-20.048272	1.55	2.13	2.83	3.15	3.41	3.84	4.03
91	148.257679	-20.050278	1.63	2.21	2.87	3.18	3.46	3.84	4.06
92	148.261930	-20.052620	1.73	2.31	2.94	3.25	3.54	3.91	4.12
93	148.266185	-20.054795	1.75	2.33	2.99	3.34	3.64	4.03	4.22
94	148.269755	-20.058061	1.78	2.35	3.00	3.32	3.62	4.00	4.18
95	148.272686	-20.061626	1.78	2.43	3.16	3.50	3.80	4.19	4.38
96	148.273958	-20.066064	1.68	2.32	3.00	3.30	3.57	3.95	4.13
97	148.277575	-20.069358	1.74	2.51	3.26	3.56	3.80	4.21	4.42
98	148.281505	-20.072299	1.79	2.63	3.40	3.71	3.92	4.35	4.59
99	148.285512	-20.075047	1.77	2.61	3.30	3.63	3.82	4.16	4.48
100	148.290102	-20.076880	1.73	2.60	3.27	3.61	3.79	4.11	4.45
101	148.294498	-20.078324	1.73	2.48	3.11	3.40	3.57	3.87	4.23
102	148.299196	-20.077609	1.99	2.81	3.36	3.66	3.91	4.18	4.57
103	148.300325	-20.081981	1.80	2.62	3.25	3.55	3.83	4.11	4.44
104	148.292584	-20.087326	1.58	2.10	2.66	2.93	3.22	3.48	3.70
105	148.289298	-20.090879	1.58	2.13	2.71	3.01	3.26	3.59	3.80
106	148.290225	-20.095212	1.59	2.26	2.88	3.18	3.38	3.76	3.97
107	148.293279	-20.099028	1.58	2.29	2.91	3.22	3.40	3.78	4.04
108	148.297255	-20.101326	1.55	2.24	2.89	3.22	3.39	3.75	4.04
109	148.302049	-20.101573	1.62	2.39	3.01	3.33	3.49	3.83	4.14
110	148.306507	-20.101082	1.55	2.36	2.96	3.23	3.39	3.70	4.03
111	148.310592	-20.099318	1.63	2.51	3.19	3.49	3.64	3.96	4.32
112	148.315271	-20.098604	1.83	2.76	3.40	3.73	3.91	4.27	4.64
113	148.316742	-20.106603	1.70	2.46	3.05	3.34	3.56	3.92	4.20
114	148.316380	-20.110729	1.61	2.39	3.02	3.32	3.53	3.91	4.17
115	148.319501	-20.114494	1.57	2.35	2.98	3.32	3.49	3.89	4.18
116	148.323564	-20.117222	1.60	2.41	3.03	3.37	3.53	3.93	4.22

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	1.60	2.44	3.04	3.38	3.53	3.93	4.22
118	148.329841	-20.123745	1.55	2.37	2.96	3.28	3.44	3.83	4.12
119	148.333052	-20.127385	1.51	2.29	2.90	3.23	3.39	3.79	4.06
120	148.336234	-20.130719	1.48	2.24	2.84	3.17	3.31	3.72	3.99
121	148.340377	-20.132311	1.49	2.25	2.86	3.21	3.34	3.73	4.01
122	148.344376	-20.134624	1.47	2.22	2.83	3.17	3.30	3.68	3.96
123	148.348920	-20.136182	1.45	2.21	2.80	3.14	3.26	3.64	3.92
124	148.353846	-20.136606	1.45	2.20	2.81	3.14	3.26	3.63	3.92
125	148.358463	-20.137963	1.42	2.16	2.76	3.09	3.21	3.58	3.86
126	148.363418	-20.138398	1.43	2.16	2.75	3.08	3.20	3.57	3.86
127	148.368134	-20.139890	1.41	2.12	2.70	3.03	3.17	3.52	3.81
128	148.372841	-20.141138	1.38	2.08	2.67	2.99	3.15	3.47	3.78
129	148.377743	-20.141775	1.35	2.03	2.64	2.96	3.13	3.43	3.75
130	148.382452	-20.141302	1.33	1.99	2.60	2.92	3.07	3.38	3.70
131	148.386864	-20.139825	1.34	2.00	2.60	2.91	3.07	3.37	3.69
132	148.390878	-20.137479	1.37	2.03	2.62	2.91	3.05	3.38	3.68
133	148.394081	-20.134107	1.39	2.06	2.65	2.94	3.08	3.43	3.72
134	148.398548	-20.132091	1.38	2.05	2.64	2.93	3.07	3.41	3.71
135	148.402767	-20.129617	1.38	2.04	2.64	2.93	3.06	3.41	3.69
136	148.406698	-20.126630	1.37	2.03	2.65	2.93	3.07	3.41	3.69
137	148.410754	-20.123973	1.36	2.02	2.64	2.92	3.06	3.39	3.66
138	148.414721	-20.120973	1.34	2.00	2.62	2.91	3.05	3.39	3.65
139	148.418583	-20.119000	1.32	1.98	2.59	2.88	3.02	3.36	3.61
140	148.423541	-20.118958	1.28	1.90	2.51	2.79	2.95	3.28	3.51
141	148.428185	-20.119954	1.23	1.80	2.41	2.70	2.86	3.17	3.40
142	148.432311	-20.120008	1.17	1.71	2.32	2.59	2.74	3.05	3.27
143	148.435300	-20.116110	1.14	1.65	2.25	2.52	2.64	2.96	3.17
144	148.435935	-20.111416	1.14	1.64	2.19	2.45	2.62	2.94	3.13
145	148.433214	-20.107398	1.20	1.75	2.32	2.58	2.73	3.04	3.24
146	148.429848	-20.103813	1.27	1.87	2.49	2.74	2.87	3.17	3.39
147	148.431249	-20.099813	1.23	1.81	2.41	2.70	2.92	3.21	3.39
148	148.435336	-20.098275	1.09	1.58	2.15	2.44	2.66	2.95	3.17
149	148.436763	-20.093754	1.09	1.55	2.10	2.39	2.61	2.89	3.14
150	148.435056	-20.089252	1.17	1.68	2.27	2.58	2.80	3.08	3.32
151	148.435796	-20.084412	1.16	1.67	2.27	2.59	2.81	3.09	3.33
152	148.436087	-20.079434	1.19	1.72	2.31	2.65	2.88	3.16	3.40
153	148.437662	-20.074881	1.16	1.65	2.26	2.62	2.83	3.13	3.35
154	148.439836	-20.070904	1.13	1.58	2.11	2.39	2.60	2.88	3.10
155	148.439573	-20.066377	1.33	1.77	2.23	2.48	2.69	2.97	3.25

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	1.42	1.94	2.45	2.69	2.89	3.20	3.47
157	148.432583	-20.062790	1.50	2.16	2.80	3.10	3.35	3.66	3.91
158	148.432001	-20.057986	1.58	2.23	2.81	3.05	3.20	3.57	3.76
159	148.434670	-20.053987	1.58	2.21	2.83	3.09	3.24	3.56	3.76
160	148.438544	-20.051181	1.51	2.07	2.63	2.88	3.05	3.36	3.56
161	148.442261	-20.047880	1.37	1.86	2.36	2.67	2.89	3.20	3.41
162	148.442424	-20.043005	1.24	1.64	2.29	2.72	2.98	3.28	3.55
163	148.443219	-20.038793	1.15	1.53	2.14	2.52	2.80	3.09	3.35
164	148.441517	-20.035168	1.19	1.63	2.22	2.62	2.91	3.24	3.48

Table B-2 Current climate 2050 tropical cyclone peak significant wave height (m) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	3.74	3.96	4.34	4.58	4.84	5.11	5.33
2	148.086644	-19.883904	3.49	3.70	4.06	4.30	4.53	4.81	5.03
3	148.086750	-19.888545	3.44	3.63	3.98	4.21	4.46	4.71	4.94
4	148.089981	-19.891699	3.53	3.73	4.10	4.31	4.59	4.83	5.06
5	148.091008	-19.896035	3.39	3.57	3.93	4.15	4.42	4.65	4.89
6	148.093536	-19.900072	3.40	3.60	3.95	4.18	4.46	4.68	4.91
7	148.094558	-19.904839	3.34	3.54	3.89	4.13	4.39	4.62	4.85
8	148.098229	-19.907849	3.38	3.58	3.93	4.20	4.45	4.68	4.92
9	148.098545	-19.912567	3.20	3.38	3.74	3.99	4.24	4.47	4.71
10	148.100573	-19.916953	3.14	3.33	3.72	3.98	4.23	4.46	4.70
11	148.103183	-19.921165	3.09	3.31	3.69	3.96	4.21	4.47	4.69
12	148.104466	-19.925655	2.91	3.12	3.49	3.77	3.99	4.28	4.50
13	148.108624	-19.927620	2.91	3.13	3.52	3.80	4.02	4.31	4.57
14	148.113182	-19.929278	2.91	3.14	3.51	3.77	4.01	4.29	4.56
15	148.117375	-19.929729	3.00	3.23	3.59	3.85	4.09	4.36	4.65
16	148.121854	-19.931592	3.03	3.24	3.61	3.87	4.12	4.39	4.68
17	148.125345	-19.933461	3.04	3.26	3.66	3.91	4.17	4.46	4.74
18	148.127812	-19.934900	2.96	3.18	3.59	3.83	4.09	4.39	4.67
19	148.131995	-19.936612	2.92	3.17	3.61	3.84	4.12	4.43	4.70
20	148.136880	-19.937041	2.82	3.07	3.49	3.71	3.98	4.31	4.57
21	148.140824	-19.937192	2.94	3.19	3.63	3.86	4.13	4.47	4.72
22	148.145755	-19.937202	2.96	3.21	3.63	3.87	4.13	4.45	4.71
23	148.150433	-19.937100	3.00	3.28	3.72	3.98	4.25	4.58	4.84
24	148.155285	-19.937381	2.98	3.28	3.74	3.98	4.24	4.60	4.85
25	148.159885	-19.937060	3.01	3.29	3.73	3.97	4.23	4.58	4.84
26	148.164842	-19.937020	3.04	3.32	3.76	4.00	4.26	4.62	4.87
27	148.169661	-19.936777	2.95	3.25	3.70	3.94	4.19	4.56	4.81
28	148.174386	-19.936171	2.96	3.26	3.72	3.95	4.19	4.58	4.83
29	148.178875	-19.934357	3.05	3.35	3.81	4.05	4.30	4.70	4.94
30	148.183291	-19.932014	3.09	3.41	3.88	4.14	4.39	4.81	5.04
31	148.187708	-19.929671	3.11	3.41	3.87	4.14	4.37	4.79	5.02
32	148.192125	-19.927329	3.00	3.23	3.57	3.80	4.03	4.37	4.66
33	148.191727	-19.923601	3.14	3.39	3.75	3.98	4.23	4.58	4.90
34	148.194813	-19.920579	3.71	3.98	4.35	4.61	4.89	5.20	5.51
35	148.197788	-19.923268	3.42	3.69	4.04	4.30	4.59	4.89	5.21
36	148.202372	-19.923354	3.89	4.16	4.55	4.83	5.12	5.41	5.71
37	148.205450	-19.926615	3.60	3.88	4.24	4.52	4.82	5.07	5.40
38	148.209140	-19.929434	3.56	3.84	4.18	4.45	4.74	4.99	5.33

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	3.51	3.75	4.08	4.35	4.62	4.85	5.18
40	148.215627	-19.936786	3.56	3.79	4.12	4.39	4.66	4.90	5.21
41	148.214572	-19.940165	3.18	3.40	3.71	3.97	4.22	4.46	4.78
42	148.212471	-19.944188	2.90	3.12	3.44	3.69	3.96	4.21	4.49
43	148.216694	-19.943252	3.20	3.41	3.74	3.98	4.26	4.49	4.80
44	148.218362	-19.945221	3.16	3.38	3.70	3.95	4.22	4.45	4.76
45	148.220269	-19.947553	3.14	3.39	3.73	3.98	4.26	4.52	4.82
46	148.225065	-19.948444	3.36	3.61	3.94	4.19	4.47	4.72	5.04
47	148.228945	-19.951074	3.42	3.66	3.99	4.25	4.53	4.77	5.09
48	148.232270	-19.954427	3.47	3.70	4.03	4.29	4.60	4.81	5.12
49	148.233553	-19.959077	3.37	3.60	3.93	4.18	4.49	4.71	5.00
50	148.235969	-19.962224	3.33	3.56	3.91	4.16	4.46	4.69	4.99
51	148.239458	-19.964269	3.55	3.79	4.16	4.41	4.72	4.97	5.25
52	148.235834	-19.966574	2.88	3.12	3.44	3.69	3.98	4.20	4.50
53	148.237823	-19.967997	3.08	3.31	3.64	3.89	4.16	4.41	4.70
54	148.241742	-19.969955	3.29	3.53	3.90	4.14	4.42	4.70	4.98
55	148.240437	-19.974113	2.94	3.17	3.53	3.77	4.03	4.33	4.60
56	148.244870	-19.976017	2.90	3.16	3.54	3.76	4.02	4.33	4.61
57	148.249720	-19.976634	2.95	3.22	3.61	3.80	4.06	4.38	4.69
58	148.254453	-19.975668	2.99	3.28	3.68	3.89	4.14	4.45	4.80
59	148.258300	-19.973152	3.00	3.34	3.81	4.10	4.35	4.67	5.01
60	148.261678	-19.970722	4.03	4.37	4.83	5.15	5.45	5.68	6.08
61	148.262453	-19.974990	3.52	3.85	4.33	4.64	4.97	5.23	5.59
62	148.264217	-19.978552	3.58	3.94	4.41	4.73	5.02	5.26	5.75
63	148.267362	-19.982284	4.12	4.53	5.06	5.38	5.70	5.95	6.28
64	148.269158	-19.991273	3.64	4.00	4.48	4.78	5.09	5.32	5.68
65	148.270711	-19.995376	3.31	3.63	4.03	4.34	4.63	4.88	5.26
66	148.274978	-19.996242	3.82	4.22	4.73	5.06	5.38	5.62	6.04
67	148.271075	-19.998710	3.07	3.31	3.70	3.98	4.27	4.52	4.86
68	148.271444	-20.001189	3.11	3.35	3.73	4.01	4.30	4.52	4.86
69	148.274741	-20.002383	3.56	3.86	4.30	4.60	4.91	5.12	5.46
70	148.274049	-20.006756	3.51	3.86	4.33	4.64	4.96	5.23	5.47
71	148.269895	-20.008342	3.04	3.27	3.66	3.94	4.25	4.48	4.72
72	148.272333	-20.012494	3.31	3.62	4.06	4.35	4.65	4.92	5.19
73	148.272977	-20.017247	3.15	3.48	3.92	4.19	4.48	4.75	5.08
74	148.276768	-20.019229	3.31	3.75	4.28	4.58	4.90	5.20	5.56
75	148.274990	-20.022727	2.63	2.95	3.34	3.63	3.92	4.19	4.56
76	148.271586	-20.025926	2.35	2.65	3.09	3.34	3.64	3.94	4.17
77	148.267692	-20.028749	2.12	2.37	2.79	3.07	3.36	3.68	3.86

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	1.97	2.21	2.72	2.99	3.30	3.54	3.77
79	148.261368	-20.026508	1.73	1.97	2.51	2.76	3.01	3.28	3.52
80	148.259291	-20.024495	1.61	1.86	2.40	2.64	2.88	3.15	3.38
81	148.255971	-20.024299	1.71	1.95	2.53	2.80	3.06	3.37	3.58
82	148.252083	-20.021789	1.60	1.84	2.33	2.57	2.83	3.09	3.30
83	148.251245	-20.025777	1.86	2.14	2.75	3.01	3.30	3.62	3.76
84	148.248982	-20.030165	1.99	2.28	2.85	3.11	3.44	3.69	3.88
85	148.245332	-20.033208	2.03	2.32	2.88	3.14	3.44	3.77	3.93
86	148.242842	-20.037255	2.07	2.37	2.91	3.19	3.49	3.83	3.99
87	148.243873	-20.040647	2.07	2.39	2.95	3.25	3.54	3.94	4.12
88	148.244798	-20.044245	1.96	2.29	2.88	3.19	3.48	3.90	4.08
89	148.249032	-20.046574	2.01	2.36	2.99	3.33	3.61	4.07	4.25
90	148.253496	-20.048272	2.10	2.48	3.12	3.46	3.73	4.21	4.41
91	148.257679	-20.050278	2.20	2.58	3.17	3.49	3.79	4.22	4.43
92	148.261930	-20.052620	2.32	2.67	3.25	3.57	3.88	4.29	4.48
93	148.266185	-20.054795	2.30	2.68	3.31	3.65	3.98	4.40	4.57
94	148.269755	-20.058061	2.34	2.71	3.31	3.65	3.96	4.38	4.54
95	148.272686	-20.061626	2.37	2.81	3.47	3.84	4.14	4.57	4.74
96	148.273958	-20.066064	2.29	2.70	3.29	3.60	3.91	4.30	4.50
97	148.277575	-20.069358	2.43	2.89	3.57	3.87	4.14	4.57	4.80
98	148.281505	-20.072299	2.53	3.02	3.71	4.02	4.26	4.72	4.96
99	148.285512	-20.075047	2.51	2.99	3.63	3.92	4.16	4.53	4.85
100	148.290102	-20.076880	2.50	2.97	3.59	3.90	4.12	4.49	4.82
101	148.294498	-20.078324	2.40	2.82	3.41	3.68	3.87	4.26	4.59
102	148.299196	-20.077609	2.76	3.18	3.67	3.96	4.24	4.57	4.96
103	148.300325	-20.081981	2.55	3.01	3.55	3.84	4.15	4.47	4.82
104	148.292584	-20.087326	2.09	2.44	2.94	3.26	3.53	3.84	4.05
105	148.289298	-20.090879	2.12	2.48	3.02	3.33	3.60	3.96	4.16
106	148.290225	-20.095212	2.21	2.61	3.18	3.49	3.71	4.11	4.34
107	148.293279	-20.099028	2.21	2.64	3.23	3.53	3.73	4.15	4.39
108	148.297255	-20.101326	2.15	2.61	3.21	3.51	3.73	4.13	4.39
109	148.302049	-20.101573	2.31	2.76	3.32	3.62	3.81	4.22	4.50
110	148.306507	-20.101082	2.27	2.73	3.26	3.53	3.70	4.08	4.38
111	148.310592	-20.099318	2.39	2.89	3.50	3.79	3.96	4.34	4.68
112	148.315271	-20.098604	2.65	3.16	3.70	4.04	4.25	4.67	5.01
113	148.316742	-20.106603	2.39	2.82	3.35	3.65	3.90	4.29	4.56
114	148.316380	-20.110729	2.31	2.77	3.34	3.62	3.86	4.27	4.53
115	148.319501	-20.114494	2.27	2.72	3.30	3.61	3.83	4.27	4.54
116	148.323564	-20.117222	2.32	2.78	3.34	3.66	3.86	4.31	4.58

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	2.34	2.81	3.35	3.67	3.86	4.31	4.58
118	148.329841	-20.123745	2.27	2.74	3.26	3.57	3.76	4.22	4.47
119	148.333052	-20.127385	2.21	2.67	3.20	3.53	3.72	4.17	4.40
120	148.336234	-20.130719	2.16	2.61	3.15	3.48	3.65	4.10	4.33
121	148.340377	-20.132311	2.17	2.62	3.17	3.50	3.65	4.12	4.35
122	148.344376	-20.134624	2.14	2.59	3.14	3.46	3.60	4.07	4.30
123	148.348920	-20.136182	2.12	2.57	3.11	3.42	3.57	4.02	4.26
124	148.353846	-20.136606	2.11	2.56	3.12	3.42	3.57	4.01	4.26
125	148.358463	-20.137963	2.07	2.52	3.07	3.37	3.52	3.96	4.20
126	148.363418	-20.138398	2.06	2.50	3.07	3.36	3.52	3.94	4.20
127	148.368134	-20.139890	2.03	2.46	3.03	3.32	3.49	3.89	4.15
128	148.372841	-20.141138	1.99	2.41	2.99	3.28	3.47	3.84	4.12
129	148.377743	-20.141775	1.94	2.37	2.96	3.25	3.45	3.79	4.08
130	148.382452	-20.141302	1.91	2.33	2.92	3.21	3.40	3.73	4.03
131	148.386864	-20.139825	1.91	2.33	2.91	3.20	3.39	3.73	4.03
132	148.390878	-20.137479	1.93	2.36	2.91	3.20	3.37	3.73	4.02
133	148.394081	-20.134107	1.96	2.40	2.94	3.24	3.40	3.78	4.06
134	148.398548	-20.132091	1.95	2.37	2.92	3.22	3.38	3.77	4.04
135	148.402767	-20.129617	1.95	2.37	2.92	3.21	3.37	3.76	4.03
136	148.406698	-20.126630	1.94	2.35	2.93	3.21	3.37	3.76	4.02
137	148.410754	-20.123973	1.93	2.33	2.92	3.19	3.35	3.74	3.99
138	148.414721	-20.120973	1.92	2.32	2.91	3.19	3.35	3.74	3.97
139	148.418583	-20.119000	1.89	2.29	2.89	3.16	3.32	3.71	3.93
140	148.423541	-20.118958	1.82	2.20	2.81	3.07	3.24	3.61	3.82
141	148.428185	-20.119954	1.74	2.09	2.71	2.96	3.14	3.50	3.70
142	148.432311	-20.120008	1.66	1.99	2.60	2.84	3.02	3.37	3.56
143	148.435300	-20.116110	1.60	1.91	2.50	2.77	2.92	3.28	3.47
144	148.435935	-20.111416	1.58	1.88	2.43	2.72	2.91	3.26	3.44
145	148.433214	-20.107398	1.67	2.00	2.55	2.84	3.02	3.36	3.55
146	148.429848	-20.103813	1.78	2.15	2.74	3.00	3.16	3.50	3.70
147	148.431249	-20.099813	1.70	2.08	2.71	2.95	3.22	3.52	3.70
148	148.435336	-20.098275	1.49	1.80	2.43	2.73	2.96	3.24	3.48
149	148.436763	-20.093754	1.47	1.77	2.36	2.69	2.86	3.19	3.45
150	148.435056	-20.089252	1.57	1.92	2.55	2.86	3.08	3.39	3.63
151	148.435796	-20.084412	1.56	1.91	2.54	2.88	3.09	3.40	3.64
152	148.436087	-20.079434	1.61	1.96	2.61	2.95	3.16	3.47	3.71
153	148.437662	-20.074881	1.58	1.92	2.56	2.90	3.11	3.44	3.66
154	148.439836	-20.070904	1.54	1.84	2.40	2.66	2.86	3.17	3.40
155	148.439573	-20.066377	1.74	2.03	2.49	2.75	2.96	3.27	3.56

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	1.89	2.21	2.73	2.98	3.16	3.53	3.80
157	148.432583	-20.062790	2.07	2.48	3.09	3.38	3.63	3.99	4.24
158	148.432001	-20.057986	2.14	2.54	3.08	3.33	3.49	3.92	4.08
159	148.434670	-20.053987	2.13	2.53	3.10	3.38	3.52	3.90	4.08
160	148.438544	-20.051181	2.00	2.35	2.89	3.15	3.34	3.69	3.87
161	148.442261	-20.047880	1.80	2.08	2.66	2.95	3.14	3.52	3.73
162	148.442424	-20.043005	1.56	1.89	2.58	2.99	3.25	3.60	3.87
163	148.443219	-20.038793	1.44	1.76	2.41	2.80	3.06	3.41	3.67
164	148.441517	-20.035168	1.52	1.85	2.49	2.91	3.19	3.56	3.81

Table B-3 Current climate 2100 tropical cyclone peak significant wave height (m) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	3.79	4.15	4.61	4.86	5.14	5.41	5.67
2	148.086644	-19.883904	3.55	3.89	4.33	4.58	4.83	5.11	5.37
3	148.086750	-19.888545	3.49	3.84	4.24	4.49	4.76	5.03	5.26
4	148.089981	-19.891699	3.59	3.93	4.36	4.60	4.89	5.15	5.39
5	148.091008	-19.896035	3.45	3.78	4.19	4.44	4.72	4.97	5.22
6	148.093536	-19.900072	3.46	3.80	4.21	4.47	4.75	5.00	5.25
7	148.094558	-19.904839	3.41	3.73	4.14	4.42	4.69	4.94	5.18
8	148.098229	-19.907849	3.44	3.78	4.19	4.48	4.75	5.01	5.25
9	148.098545	-19.912567	3.26	3.58	4.00	4.27	4.55	4.80	5.04
10	148.100573	-19.916953	3.21	3.54	3.97	4.26	4.53	4.79	5.03
11	148.103183	-19.921165	3.16	3.50	3.94	4.25	4.50	4.80	5.02
12	148.104466	-19.925655	2.99	3.31	3.75	4.05	4.28	4.59	4.83
13	148.108624	-19.927620	2.98	3.31	3.76	4.07	4.32	4.62	4.90
14	148.113182	-19.929278	2.99	3.32	3.76	4.04	4.31	4.61	4.89
15	148.117375	-19.929729	3.07	3.40	3.84	4.13	4.40	4.69	4.98
16	148.121854	-19.931592	3.09	3.42	3.86	4.15	4.42	4.71	5.01
17	148.125345	-19.933461	3.10	3.43	3.90	4.19	4.49	4.78	5.08
18	148.127812	-19.934900	3.00	3.35	3.83	4.11	4.41	4.71	5.00
19	148.131995	-19.936612	2.97	3.34	3.85	4.11	4.43	4.76	5.03
20	148.136880	-19.937041	2.87	3.25	3.73	3.99	4.26	4.63	4.90
21	148.140824	-19.937192	2.98	3.36	3.87	4.15	4.43	4.79	5.05
22	148.145755	-19.937202	2.99	3.37	3.87	4.15	4.43	4.78	5.05
23	148.150433	-19.937100	3.03	3.45	3.97	4.27	4.56	4.91	5.17
24	148.155285	-19.937381	3.02	3.45	3.98	4.27	4.55	4.92	5.19
25	148.159885	-19.937060	3.05	3.45	3.97	4.26	4.52	4.91	5.17
26	148.164842	-19.937020	3.08	3.48	4.01	4.28	4.56	4.95	5.21
27	148.169661	-19.936777	3.00	3.42	3.97	4.22	4.49	4.90	5.15
28	148.174386	-19.936171	3.02	3.42	3.98	4.22	4.50	4.91	5.16
29	148.178875	-19.934357	3.10	3.52	4.07	4.34	4.61	5.03	5.28
30	148.183291	-19.932014	3.14	3.58	4.15	4.43	4.69	5.14	5.38
31	148.187708	-19.929671	3.17	3.58	4.13	4.42	4.67	5.12	5.36
32	148.192125	-19.927329	3.11	3.43	3.83	4.09	4.31	4.70	5.01
33	148.191727	-19.923601	3.23	3.59	4.02	4.27	4.52	4.92	5.26
34	148.194813	-19.920579	3.75	4.15	4.63	4.90	5.17	5.53	5.86
35	148.197788	-19.923268	3.47	3.88	4.31	4.60	4.87	5.22	5.56
36	148.202372	-19.923354	3.89	4.34	4.82	5.13	5.41	5.75	6.06
37	148.205450	-19.926615	3.63	4.06	4.51	4.81	5.09	5.41	5.75
38	148.209140	-19.929434	3.61	4.02	4.45	4.75	5.02	5.33	5.68

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	3.56	3.92	4.34	4.64	4.92	5.20	5.53
40	148.215627	-19.936786	3.60	3.96	4.38	4.68	4.96	5.24	5.56
41	148.214572	-19.940165	3.28	3.57	3.97	4.25	4.53	4.80	5.12
42	148.212471	-19.944188	2.99	3.29	3.69	3.97	4.25	4.56	4.82
43	148.216694	-19.943252	3.28	3.58	3.99	4.27	4.55	4.84	5.15
44	148.218362	-19.945221	3.23	3.56	3.95	4.23	4.51	4.79	5.11
45	148.220269	-19.947553	3.18	3.56	3.98	4.28	4.56	4.87	5.15
46	148.225065	-19.948444	3.40	3.78	4.20	4.48	4.76	5.06	5.39
47	148.228945	-19.951074	3.45	3.84	4.26	4.54	4.82	5.10	5.44
48	148.232270	-19.954427	3.49	3.87	4.30	4.58	4.89	5.16	5.47
49	148.233553	-19.959077	3.40	3.78	4.20	4.47	4.78	5.06	5.34
50	148.235969	-19.962224	3.36	3.74	4.17	4.44	4.75	5.04	5.33
51	148.239458	-19.964269	3.56	3.98	4.42	4.70	5.01	5.32	5.60
52	148.235834	-19.966574	2.94	3.30	3.69	3.97	4.26	4.55	4.84
53	148.237823	-19.967997	3.12	3.48	3.90	4.17	4.46	4.75	5.04
54	148.241742	-19.969955	3.30	3.71	4.14	4.43	4.73	5.05	5.32
55	148.240437	-19.974113	2.97	3.35	3.78	4.05	4.34	4.66	4.93
56	148.244870	-19.976017	2.94	3.34	3.80	4.03	4.31	4.65	4.95
57	148.249720	-19.976634	2.99	3.40	3.86	4.09	4.34	4.71	5.02
58	148.254453	-19.975668	3.04	3.48	3.94	4.17	4.43	4.78	5.14
59	148.258300	-19.973152	3.05	3.55	4.10	4.37	4.60	5.00	5.37
60	148.261678	-19.970722	4.01	4.57	5.13	5.45	5.74	6.04	6.45
61	148.262453	-19.974990	3.47	4.06	4.63	4.94	5.25	5.57	5.94
62	148.264217	-19.978552	3.57	4.12	4.69	5.03	5.36	5.76	6.15
63	148.267362	-19.982284	4.02	4.69	5.34	5.68	6.01	6.29	6.64
64	148.269158	-19.991273	3.60	4.19	4.75	5.08	5.39	5.67	6.03
65	148.270711	-19.995376	3.33	3.81	4.31	4.63	4.91	5.23	5.62
66	148.274978	-19.996242	3.79	4.40	5.02	5.37	5.65	5.99	6.40
67	148.271075	-19.998710	3.11	3.51	3.97	4.28	4.57	4.85	5.21
68	148.271444	-20.001189	3.16	3.55	4.01	4.29	4.60	4.86	5.21
69	148.274741	-20.002383	3.57	4.05	4.58	4.87	5.21	5.47	5.81
70	148.274049	-20.006756	3.44	4.04	4.60	4.92	5.26	5.57	5.82
71	148.269895	-20.008342	3.06	3.46	3.92	4.21	4.55	4.81	5.07
72	148.272333	-20.012494	3.26	3.80	4.33	4.63	4.95	5.27	5.54
73	148.272977	-20.017247	3.11	3.64	4.18	4.48	4.77	5.09	5.42
74	148.276768	-20.019229	3.24	3.88	4.55	4.87	5.19	5.53	5.91
75	148.274990	-20.022727	2.64	3.12	3.61	3.91	4.19	4.53	4.90
76	148.271586	-20.025926	2.35	2.81	3.31	3.61	3.90	4.24	4.49
77	148.267692	-20.028749	2.14	2.53	3.01	3.34	3.65	3.98	4.17

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	1.96	2.33	2.93	3.25	3.60	3.84	4.08
79	148.261368	-20.026508	1.75	2.07	2.69	2.99	3.31	3.55	3.78
80	148.259291	-20.024495	1.64	1.96	2.57	2.86	3.17	3.43	3.64
81	148.255971	-20.024299	1.74	2.06	2.72	3.03	3.32	3.64	3.84
82	148.252083	-20.021789	1.64	1.94	2.52	2.80	3.09	3.38	3.57
83	148.251245	-20.025777	1.86	2.25	2.94	3.24	3.57	3.90	4.07
84	148.248982	-20.030165	1.97	2.41	3.07	3.36	3.72	4.00	4.19
85	148.245332	-20.033208	2.00	2.45	3.09	3.41	3.74	4.07	4.23
86	148.242842	-20.037255	2.01	2.48	3.11	3.46	3.78	4.13	4.30
87	148.243873	-20.040647	2.01	2.50	3.17	3.50	3.84	4.24	4.43
88	148.244798	-20.044245	1.92	2.42	3.11	3.45	3.80	4.19	4.39
89	148.249032	-20.046574	1.95	2.49	3.22	3.62	3.95	4.36	4.56
90	148.253496	-20.048272	2.05	2.59	3.35	3.75	4.09	4.51	4.73
91	148.257679	-20.050278	2.17	2.69	3.41	3.78	4.12	4.52	4.76
92	148.261930	-20.052620	2.29	2.80	3.48	3.84	4.20	4.59	4.81
93	148.266185	-20.054795	2.27	2.81	3.53	3.94	4.29	4.73	4.88
94	148.269755	-20.058061	2.30	2.85	3.54	3.94	4.27	4.71	4.85
95	148.272686	-20.061626	2.33	2.91	3.70	4.13	4.46	4.89	5.05
96	148.273958	-20.066064	2.24	2.78	3.54	3.90	4.22	4.62	4.83
97	148.277575	-20.069358	2.36	3.02	3.81	4.15	4.45	4.91	5.13
98	148.281505	-20.072299	2.44	3.14	3.95	4.29	4.57	5.05	5.30
99	148.285512	-20.075047	2.41	3.10	3.84	4.19	4.45	4.86	5.19
100	148.290102	-20.076880	2.37	3.08	3.79	4.16	4.42	4.82	5.16
101	148.294498	-20.078324	2.31	2.93	3.63	3.96	4.17	4.57	4.92
102	148.299196	-20.077609	2.71	3.32	3.91	4.24	4.53	4.91	5.31
103	148.300325	-20.081981	2.49	3.14	3.77	4.11	4.42	4.82	5.17
104	148.292584	-20.087326	2.08	2.56	3.17	3.51	3.82	4.16	4.38
105	148.289298	-20.090879	2.11	2.60	3.25	3.60	3.90	4.27	4.49
106	148.290225	-20.095212	2.18	2.74	3.40	3.74	4.02	4.42	4.67
107	148.293279	-20.099028	2.17	2.76	3.45	3.79	4.02	4.48	4.73
108	148.297255	-20.101326	2.12	2.71	3.41	3.77	4.02	4.46	4.72
109	148.302049	-20.101573	2.24	2.86	3.51	3.89	4.10	4.54	4.83
110	148.306507	-20.101082	2.19	2.82	3.47	3.80	3.99	4.39	4.70
111	148.310592	-20.099318	2.27	2.97	3.70	4.05	4.25	4.65	5.00
112	148.315271	-20.098604	2.57	3.26	3.94	4.32	4.55	5.01	5.35
113	148.316742	-20.106603	2.36	2.93	3.59	3.92	4.19	4.62	4.88
114	148.316380	-20.110729	2.26	2.87	3.56	3.89	4.15	4.60	4.85
115	148.319501	-20.114494	2.20	2.81	3.52	3.88	4.13	4.60	4.87
116	148.323564	-20.117222	2.25	2.87	3.56	3.92	4.16	4.64	4.91

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	2.26	2.90	3.57	3.92	4.15	4.64	4.90
118	148.329841	-20.123745	2.20	2.82	3.47	3.82	4.05	4.54	4.79
119	148.333052	-20.127385	2.14	2.75	3.41	3.79	4.01	4.49	4.73
120	148.336234	-20.130719	2.09	2.69	3.35	3.76	3.93	4.42	4.66
121	148.340377	-20.132311	2.09	2.70	3.37	3.78	3.94	4.44	4.68
122	148.344376	-20.134624	2.07	2.67	3.34	3.74	3.88	4.38	4.62
123	148.348920	-20.136182	2.06	2.65	3.32	3.69	3.85	4.33	4.58
124	148.353846	-20.136606	2.04	2.65	3.33	3.68	3.85	4.33	4.57
125	148.358463	-20.137963	2.01	2.60	3.27	3.62	3.79	4.26	4.51
126	148.363418	-20.138398	2.00	2.59	3.27	3.61	3.79	4.25	4.51
127	148.368134	-20.139890	1.97	2.55	3.23	3.57	3.75	4.19	4.46
128	148.372841	-20.141138	1.93	2.50	3.20	3.54	3.74	4.13	4.43
129	148.377743	-20.141775	1.89	2.45	3.16	3.50	3.72	4.08	4.40
130	148.382452	-20.141302	1.87	2.42	3.12	3.45	3.67	4.03	4.35
131	148.386864	-20.139825	1.87	2.41	3.11	3.45	3.66	4.02	4.34
132	148.390878	-20.137479	1.89	2.43	3.11	3.45	3.65	4.03	4.34
133	148.394081	-20.134107	1.92	2.45	3.14	3.49	3.67	4.07	4.37
134	148.398548	-20.132091	1.90	2.44	3.12	3.48	3.65	4.05	4.35
135	148.402767	-20.129617	1.89	2.44	3.12	3.47	3.64	4.05	4.33
136	148.406698	-20.126630	1.88	2.43	3.12	3.46	3.65	4.05	4.32
137	148.410754	-20.123973	1.86	2.41	3.11	3.43	3.63	4.03	4.29
138	148.414721	-20.120973	1.84	2.39	3.08	3.43	3.62	4.03	4.27
139	148.418583	-20.119000	1.81	2.35	3.04	3.40	3.59	3.99	4.22
140	148.423541	-20.118958	1.76	2.27	2.96	3.30	3.50	3.88	4.11
141	148.428185	-20.119954	1.68	2.17	2.86	3.19	3.40	3.76	3.98
142	148.432311	-20.120008	1.61	2.06	2.75	3.06	3.28	3.62	3.84
143	148.435300	-20.116110	1.58	2.00	2.68	2.96	3.20	3.55	3.76
144	148.435935	-20.111416	1.56	1.97	2.59	2.90	3.16	3.53	3.73
145	148.433214	-20.107398	1.65	2.08	2.73	3.02	3.29	3.66	3.85
146	148.429848	-20.103813	1.74	2.24	2.91	3.22	3.44	3.80	4.00
147	148.431249	-20.099813	1.66	2.14	2.87	3.15	3.49	3.83	4.00
148	148.435336	-20.098275	1.45	1.88	2.60	2.91	3.22	3.56	3.77
149	148.436763	-20.093754	1.42	1.85	2.50	2.89	3.12	3.48	3.73
150	148.435056	-20.089252	1.52	2.00	2.70	3.06	3.34	3.71	3.92
151	148.435796	-20.084412	1.51	1.99	2.70	3.07	3.35	3.72	3.93
152	148.436087	-20.079434	1.56	2.04	2.76	3.13	3.42	3.79	4.00
153	148.437662	-20.074881	1.53	1.99	2.72	3.09	3.37	3.77	3.95
154	148.439836	-20.070904	1.50	1.92	2.57	2.88	3.11	3.44	3.69
155	148.439573	-20.066377	1.74	2.12	2.66	2.96	3.21	3.55	3.86

Tropical Cyclone Peak Wave Height Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	1.88	2.32	2.93	3.22	3.40	3.83	4.11
157	148.432583	-20.062790	1.99	2.55	3.28	3.61	3.90	4.31	4.56
158	148.432001	-20.057986	2.09	2.64	3.28	3.58	3.77	4.22	4.40
159	148.434670	-20.053987	2.08	2.63	3.28	3.60	3.79	4.19	4.38
160	148.438544	-20.051181	1.98	2.45	3.07	3.38	3.60	4.00	4.17
161	148.442261	-20.047880	1.79	2.19	2.79	3.17	3.39	3.82	4.03
162	148.442424	-20.043005	1.53	1.94	2.72	3.21	3.50	3.91	4.17
163	148.443219	-20.038793	1.42	1.81	2.57	3.01	3.31	3.69	3.97
164	148.441517	-20.035168	1.50	1.92	2.65	3.12	3.45	3.85	4.12

Appendix C Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

Table C-1 Current climate 2017 tropical cyclone wave peak period (s) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	8.53	9.33	10.26	10.53	11.17	11.47	11.55
2	148.086644	-19.883904	8.46	9.30	10.25	10.51	11.15	11.40	11.51
3	148.086750	-19.888545	8.49	9.30	10.24	10.48	11.12	11.38	11.47
4	148.089981	-19.891699	8.51	9.31	10.25	10.51	11.18	11.35	11.45
5	148.091008	-19.896035	8.52	9.31	10.25	10.50	11.08	11.33	11.44
6	148.093536	-19.900072	8.51	9.29	10.22	10.44	10.89	11.32	11.42
7	148.094558	-19.904839	8.51	9.27	10.22	10.41	10.82	11.32	11.42
8	148.098229	-19.907849	8.51	9.28	10.21	10.39	10.74	11.27	11.39
9	148.098545	-19.912567	8.51	9.26	10.20	10.41	10.82	11.27	11.40
10	148.100573	-19.916953	8.47	9.22	10.13	10.35	10.67	11.24	11.38
11	148.103183	-19.921165	8.44	9.21	10.10	10.32	10.63	10.98	11.35
12	148.104466	-19.925655	8.44	9.17	10.05	10.29	10.52	10.86	11.34
13	148.108624	-19.927620	8.41	9.15	9.92	10.27	10.46	10.75	11.26
14	148.113182	-19.929278	8.43	9.18	9.89	10.27	10.48	10.81	11.32
15	148.117375	-19.929729	8.44	9.20	9.90	10.27	10.49	10.77	11.31
16	148.121854	-19.931592	8.49	9.19	9.90	10.25	10.48	10.73	11.31
17	148.125345	-19.933461	8.48	9.18	9.84	10.25	10.44	10.71	11.28
18	148.127812	-19.934900	8.49	9.18	9.87	10.24	10.42	10.72	11.28
19	148.131995	-19.936612	8.48	9.19	9.88	10.25	10.46	10.69	11.22
20	148.136880	-19.937041	8.52	9.21	9.97	10.27	10.45	10.77	11.28
21	148.140824	-19.937192	8.51	9.21	9.82	10.26	10.42	10.72	11.24
22	148.145755	-19.937202	8.53	9.22	9.96	10.27	10.43	10.80	11.31
23	148.150433	-19.937100	8.50	9.22	9.96	10.27	10.43	10.81	11.33
24	148.155285	-19.937381	8.47	9.22	9.94	10.28	10.44	10.90	11.35
25	148.159885	-19.937060	8.47	9.22	10.01	10.29	10.46	10.97	11.38
26	148.164842	-19.937020	8.45	9.22	10.02	10.30	10.47	10.97	11.39
27	148.169661	-19.936777	8.41	9.21	9.89	10.29	10.47	10.96	11.38
28	148.174386	-19.936171	8.42	9.21	9.91	10.29	10.47	10.85	11.38
29	148.178875	-19.934357	8.44	9.22	9.93	10.29	10.49	10.92	11.38
30	148.183291	-19.932014	8.47	9.22	10.02	10.31	10.53	11.16	11.38
31	148.187708	-19.929671	8.46	9.21	10.10	10.31	10.53	11.22	11.36
32	148.192125	-19.927329	8.48	9.24	10.14	10.39	10.61	11.30	11.43
33	148.191727	-19.923601	8.50	9.25	10.14	10.38	10.63	11.29	11.41
34	148.194813	-19.920579	8.45	9.26	10.17	10.39	10.71	11.32	11.41
35	148.197788	-19.923268	8.47	9.27	10.20	10.38	10.71	11.29	11.43
36	148.202372	-19.923354	8.44	9.26	10.20	10.41	10.71	11.31	11.42
37	148.205450	-19.926615	8.45	9.28	10.21	10.40	10.82	11.31	11.44
38	148.209140	-19.929434	8.51	9.29	10.24	10.44	10.91	11.37	11.44

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	8.47	9.30	10.25	10.45	10.98	11.39	11.45
40	148.215627	-19.936786	8.47	9.30	10.26	10.45	10.96	11.39	11.45
41	148.214572	-19.940165	8.50	9.29	10.25	10.45	10.91	11.40	11.46
42	148.212471	-19.944188	8.45	9.26	10.19	10.43	10.72	11.31	11.42
43	148.216694	-19.943252	8.47	9.28	10.23	10.46	10.87	11.37	11.45
44	148.218362	-19.945221	8.47	9.29	10.24	10.48	10.92	11.38	11.47
45	148.220269	-19.947553	8.44	9.26	10.19	10.45	10.69	11.30	11.45
46	148.225065	-19.948444	8.47	9.29	10.24	10.46	10.82	11.37	11.46
47	148.228945	-19.951074	8.47	9.30	10.27	10.47	10.96	11.37	11.47
48	148.232270	-19.954427	8.41	9.28	10.25	10.48	10.93	11.36	11.46
49	148.233553	-19.959077	8.43	9.28	10.26	10.49	10.96	11.35	11.50
50	148.235969	-19.962224	8.42	9.28	10.25	10.49	10.88	11.34	11.48
51	148.239458	-19.964269	8.41	9.27	10.26	10.50	10.90	11.37	11.51
52	148.235834	-19.966574	8.44	9.27	10.23	10.49	10.82	11.33	11.51
53	148.237823	-19.967997	8.44	9.28	10.24	10.50	10.85	11.34	11.52
54	148.241742	-19.969955	8.42	9.28	10.22	10.49	10.75	11.35	11.50
55	148.240437	-19.974113	8.41	9.25	10.21	10.48	10.70	11.31	11.49
56	148.244870	-19.976017	8.41	9.25	10.20	10.45	10.71	11.30	11.52
57	148.249720	-19.976634	8.42	9.25	10.18	10.46	10.66	11.30	11.54
58	148.254453	-19.975668	8.43	9.25	10.18	10.44	10.69	11.30	11.54
59	148.258300	-19.973152	8.44	9.27	10.20	10.48	10.71	11.24	11.50
60	148.261678	-19.970722	8.44	9.29	10.31	10.52	11.11	11.42	11.55
61	148.262453	-19.974990	8.40	9.27	10.28	10.51	11.03	11.36	11.45
62	148.264217	-19.978552	8.39	9.27	10.29	10.57	11.04	11.37	11.50
63	148.267362	-19.982284	8.37	9.27	10.29	10.58	11.16	11.40	11.53
64	148.269158	-19.991273	8.39	9.26	10.30	10.58	11.03	11.41	11.54
65	148.270711	-19.995376	8.39	9.28	10.30	10.57	11.01	11.42	11.56
66	148.274978	-19.996242	8.39	9.26	10.28	10.57	11.04	11.38	11.54
67	148.271075	-19.998710	8.41	9.28	10.30	10.55	11.08	11.38	11.49
68	148.271444	-20.001189	8.40	9.27	10.30	10.55	10.98	11.40	11.48
69	148.274741	-20.002383	8.40	9.27	10.30	10.55	10.97	11.39	11.53
70	148.274049	-20.006756	8.36	9.24	10.27	10.54	10.99	11.34	11.45
71	148.269895	-20.008342	8.34	9.23	10.26	10.52	10.89	11.33	11.46
72	148.272333	-20.012494	8.35	9.23	10.25	10.49	10.81	11.30	11.43
73	148.272977	-20.017247	8.33	9.23	10.22	10.51	10.69	11.30	11.44
74	148.276768	-20.019229	8.33	9.22	10.22	10.48	10.66	11.28	11.42
75	148.274990	-20.022727	8.34	9.22	10.22	10.46	10.65	11.31	11.42
76	148.271586	-20.025926	8.32	9.19	10.18	10.41	10.63	11.31	11.35
77	148.267692	-20.028749	5.76	8.60	10.10	10.33	10.49	11.05	11.31

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	4.85	5.61	6.82	8.51	9.34	10.17	10.33
79	148.261368	-20.026508	4.48	5.27	5.92	6.30	6.70	8.73	9.36
80	148.259291	-20.024495	4.42	5.27	5.90	6.21	6.57	6.94	8.17
81	148.255971	-20.024299	4.28	5.25	6.00	6.53	6.64	6.94	7.42
82	148.252083	-20.021789	4.27	4.84	5.41	5.73	6.04	6.55	7.08
83	148.251245	-20.025777	4.15	4.59	6.47	6.68	7.06	7.35	7.57
84	148.248982	-20.030165	4.53	5.09	5.93	6.48	6.74	7.32	7.57
85	148.245332	-20.033208	4.62	5.20	5.74	6.16	6.62	7.18	7.41
86	148.242842	-20.037255	4.85	5.60	6.19	6.48	6.77	7.36	7.69
87	148.243873	-20.040647	4.84	5.64	6.31	6.66	6.89	7.37	7.72
88	148.244798	-20.044245	4.83	5.56	6.19	6.58	6.81	7.23	7.80
89	148.249032	-20.046574	4.85	5.56	6.16	6.59	6.80	7.21	8.13
90	148.253496	-20.048272	4.92	5.77	6.50	6.87	7.23	7.96	9.24
91	148.257679	-20.050278	5.11	5.97	6.88	7.77	9.17	9.95	10.21
92	148.261930	-20.052620	5.25	6.16	7.74	9.20	9.62	10.22	10.29
93	148.266185	-20.054795	5.01	5.85	6.62	7.07	7.55	9.17	9.73
94	148.269755	-20.058061	5.05	5.91	6.69	7.21	7.54	9.12	9.73
95	148.272686	-20.061626	5.05	5.98	6.76	7.33	7.66	9.15	9.86
96	148.273958	-20.066064	5.21	6.03	7.02	7.66	9.16	10.12	10.27
97	148.277575	-20.069358	5.39	6.65	9.05	9.38	10.17	10.27	10.37
98	148.281505	-20.072299	7.30	8.35	9.37	10.12	10.25	10.36	10.42
99	148.285512	-20.075047	7.97	8.71	9.51	10.17	10.29	10.44	10.92
100	148.290102	-20.076880	8.23	9.03	9.67	10.25	10.34	10.71	11.05
101	148.294498	-20.078324	8.24	9.07	9.75	10.27	10.35	10.87	11.24
102	148.299196	-20.077609	8.11	9.05	10.04	10.31	10.45	10.83	11.26
103	148.300325	-20.081981	7.52	8.61	9.87	10.30	10.47	10.76	11.22
104	148.292584	-20.087326	5.17	6.01	7.13	8.51	9.25	10.24	10.39
105	148.289298	-20.090879	5.01	6.07	7.37	9.10	9.38	10.25	10.34
106	148.290225	-20.095212	5.81	6.82	9.18	9.44	10.18	10.34	10.47
107	148.293279	-20.099028	6.89	8.26	9.28	9.63	10.21	10.32	10.42
108	148.297255	-20.101326	7.30	8.30	9.27	9.60	10.16	10.29	10.36
109	148.302049	-20.101573	7.65	8.50	9.45	10.16	10.28	10.43	10.81
110	148.306507	-20.101082	7.98	8.67	9.50	10.21	10.29	10.56	11.10
111	148.310592	-20.099318	7.93	8.69	9.50	10.21	10.31	10.56	11.13
112	148.315271	-20.098604	7.44	8.59	9.57	10.23	10.35	10.64	11.04
113	148.316742	-20.106603	6.73	8.36	9.45	10.14	10.35	10.47	10.68
114	148.316380	-20.110729	6.25	7.53	9.32	9.85	10.29	10.39	10.49
115	148.319501	-20.114494	6.09	7.27	9.26	9.53	10.20	10.29	10.38
116	148.323564	-20.117222	6.65	8.28	9.38	9.87	10.26	10.34	10.44

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	6.69	8.34	9.39	9.92	10.27	10.35	10.44
118	148.329841	-20.123745	6.56	8.29	9.37	9.87	10.29	10.36	10.42
119	148.333052	-20.127385	6.36	8.25	9.36	9.81	10.25	10.36	10.42
120	148.336234	-20.130719	6.31	8.32	9.37	9.77	10.24	10.35	10.42
121	148.340377	-20.132311	6.30	8.37	9.37	9.76	10.23	10.34	10.41
122	148.344376	-20.134624	6.39	8.38	9.38	9.73	10.24	10.33	10.42
123	148.348920	-20.136182	6.31	8.39	9.37	9.74	10.25	10.35	10.56
124	148.353846	-20.136606	6.23	8.38	9.37	9.80	10.24	10.35	10.56
125	148.358463	-20.137963	6.11	8.39	9.38	9.84	10.26	10.38	10.70
126	148.363418	-20.138398	6.04	8.41	9.38	9.90	10.30	10.38	10.72
127	148.368134	-20.139890	6.01	8.43	9.40	10.00	10.30	10.43	10.84
128	148.372841	-20.141138	6.02	8.47	9.42	10.10	10.29	10.45	10.88
129	148.377743	-20.141775	5.92	8.46	9.41	10.07	10.28	10.44	10.87
130	148.382452	-20.141302	5.70	8.43	9.41	10.05	10.27	10.44	10.87
131	148.386864	-20.139825	5.50	8.41	9.40	10.08	10.30	10.53	10.99
132	148.390878	-20.137479	5.40	8.41	9.41	10.11	10.29	10.55	11.00
133	148.394081	-20.134107	5.33	8.40	9.41	10.12	10.32	10.60	11.00
134	148.398548	-20.132091	5.08	8.39	9.41	10.13	10.33	10.68	11.09
135	148.402767	-20.129617	4.95	8.38	9.41	10.12	10.33	10.68	11.08
136	148.406698	-20.126630	4.86	8.36	9.42	10.14	10.33	10.72	11.09
137	148.410754	-20.123973	4.77	8.37	9.43	10.17	10.34	10.81	11.23
138	148.414721	-20.120973	4.62	8.38	9.44	10.20	10.35	10.85	11.24
139	148.418583	-20.119000	4.52	8.37	9.44	10.21	10.35	10.86	11.21
140	148.423541	-20.118958	4.43	8.34	9.44	10.21	10.35	10.84	11.25
141	148.428185	-20.119954	4.29	8.30	9.40	10.17	10.35	10.70	11.14
142	148.432311	-20.120008	3.93	8.00	9.37	10.12	10.32	10.54	11.03
143	148.435300	-20.116110	3.94	6.11	9.33	10.07	10.27	10.49	11.13
144	148.435935	-20.111416	4.15	6.02	9.34	10.05	10.28	10.57	11.16
145	148.433214	-20.107398	4.31	7.67	9.37	10.09	10.31	10.71	11.24
146	148.429848	-20.103813	4.61	8.32	9.41	10.13	10.35	10.94	11.31
147	148.431249	-20.099813	4.46	7.50	9.35	10.03	10.28	10.83	11.27
148	148.435336	-20.098275	4.40	5.96	9.30	9.73	10.20	10.43	10.86
149	148.436763	-20.093754	4.48	6.12	9.31	9.76	10.18	10.41	10.97
150	148.435056	-20.089252	4.78	7.33	9.34	9.82	10.24	10.43	10.91
151	148.435796	-20.084412	4.79	6.61	9.33	9.83	10.21	10.42	10.90
152	148.436087	-20.079434	4.82	6.61	9.35	9.94	10.26	10.42	10.87
153	148.437662	-20.074881	4.84	6.52	9.36	9.94	10.26	10.44	10.92
154	148.439836	-20.070904	4.90	6.56	9.39	10.07	10.28	10.48	11.05
155	148.439573	-20.066377	5.37	7.99	9.48	10.14	10.34	10.69	11.23

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	5.37	8.18	9.51	10.18	10.39	10.89	11.30
157	148.432583	-20.062790	5.37	8.22	9.49	10.20	10.39	10.97	11.32
158	148.432001	-20.057986	5.96	8.46	9.58	10.26	10.40	10.81	11.34
159	148.434670	-20.053987	6.05	8.64	9.59	10.25	10.38	11.11	11.35
160	148.438544	-20.051181	5.95	8.44	9.50	10.20	10.36	11.05	11.31
161	148.442261	-20.047880	4.89	6.86	9.28	9.88	10.26	10.49	10.96
162	148.442424	-20.043005	4.80	5.73	9.10	9.35	10.04	10.21	10.49
163	148.443219	-20.038793	4.79	5.68	9.05	9.35	9.87	10.18	10.47
164	148.441517	-20.035168	4.91	5.97	9.13	9.41	9.97	10.22	10.50

Table C-2 Current climate 2050 tropical cyclone wave peak period (s) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	9.28	9.86	10.51	11.15	11.42	11.66	11.79
2	148.086644	-19.883904	9.26	9.75	10.47	11.17	11.39	11.60	11.73
3	148.086750	-19.888545	9.27	9.73	10.46	11.03	11.37	11.56	11.67
4	148.089981	-19.891699	9.27	9.74	10.46	11.06	11.39	11.54	11.64
5	148.091008	-19.896035	9.27	9.72	10.45	10.98	11.36	11.53	11.62
6	148.093536	-19.900072	9.26	9.66	10.41	10.88	11.36	11.51	11.60
7	148.094558	-19.904839	9.25	9.64	10.38	10.86	11.33	11.49	11.60
8	148.098229	-19.907849	9.25	9.60	10.38	10.75	11.30	11.46	11.59
9	148.098545	-19.912567	9.23	9.55	10.36	10.74	11.30	11.43	11.54
10	148.100573	-19.916953	9.17	9.48	10.30	10.61	11.28	11.40	11.54
11	148.103183	-19.921165	9.16	9.43	10.28	10.52	11.25	11.33	11.52
12	148.104466	-19.925655	9.09	9.38	10.25	10.48	11.19	11.33	11.50
13	148.108624	-19.927620	9.09	9.35	10.21	10.42	11.11	11.31	11.43
14	148.113182	-19.929278	9.08	9.37	10.21	10.42	11.11	11.34	11.46
15	148.117375	-19.929729	9.13	9.40	10.21	10.42	11.13	11.34	11.47
16	148.121854	-19.931592	9.16	9.40	10.22	10.41	11.10	11.32	11.45
17	148.125345	-19.933461	9.16	9.40	10.20	10.40	10.96	11.31	11.42
18	148.127812	-19.934900	9.15	9.39	10.20	10.37	10.83	11.31	11.42
19	148.131995	-19.936612	9.16	9.40	10.21	10.38	10.79	11.28	11.43
20	148.136880	-19.937041	9.19	9.41	10.23	10.42	10.85	11.27	11.42
21	148.140824	-19.937192	9.19	9.40	10.22	10.40	10.82	11.28	11.42
22	148.145755	-19.937202	9.19	9.42	10.23	10.42	10.93	11.31	11.47
23	148.150433	-19.937100	9.18	9.42	10.22	10.42	10.89	11.32	11.47
24	148.155285	-19.937381	9.18	9.40	10.23	10.44	10.95	11.35	11.48
25	148.159885	-19.937060	9.20	9.40	10.24	10.45	11.00	11.38	11.51
26	148.164842	-19.937020	9.20	9.39	10.24	10.45	11.00	11.40	11.52
27	148.169661	-19.936777	9.19	9.39	10.24	10.44	11.02	11.35	11.51
28	148.174386	-19.936171	9.20	9.40	10.24	10.44	10.99	11.36	11.53
29	148.178875	-19.934357	9.20	9.41	10.25	10.45	11.07	11.40	11.53
30	148.183291	-19.932014	9.20	9.42	10.27	10.49	11.09	11.41	11.54
31	148.187708	-19.929671	9.20	9.42	10.30	10.51	11.15	11.44	11.53
32	148.192125	-19.927329	9.23	9.48	10.34	10.66	11.26	11.48	11.58
33	148.191727	-19.923601	9.24	9.50	10.33	10.69	11.26	11.45	11.57
34	148.194813	-19.920579	9.23	9.53	10.35	10.71	11.28	11.49	11.55
35	148.197788	-19.923268	9.24	9.56	10.37	10.69	11.27	11.48	11.59
36	148.202372	-19.923354	9.23	9.56	10.36	10.76	11.27	11.49	11.57
37	148.205450	-19.926615	9.24	9.59	10.39	10.81	11.32	11.52	11.59
38	148.209140	-19.929434	9.24	9.64	10.42	10.90	11.36	11.53	11.61

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	9.25	9.66	10.46	10.95	11.38	11.53	11.63
40	148.215627	-19.936786	9.25	9.66	10.46	10.98	11.40	11.56	11.63
41	148.214572	-19.940165	9.25	9.62	10.41	10.82	11.35	11.52	11.61
42	148.212471	-19.944188	9.22	9.53	10.36	10.73	11.30	11.47	11.57
43	148.216694	-19.943252	9.24	9.61	10.42	10.90	11.38	11.51	11.59
44	148.218362	-19.945221	9.24	9.63	10.41	10.94	11.35	11.51	11.61
45	148.220269	-19.947553	9.22	9.55	10.37	10.79	11.32	11.49	11.59
46	148.225065	-19.948444	9.23	9.64	10.41	10.85	11.37	11.52	11.63
47	148.228945	-19.951074	9.23	9.71	10.46	10.87	11.40	11.55	11.64
48	148.232270	-19.954427	9.23	9.68	10.46	10.93	11.42	11.54	11.62
49	148.233553	-19.959077	9.22	9.66	10.47	10.92	11.42	11.55	11.64
50	148.235969	-19.962224	9.21	9.65	10.46	10.90	11.36	11.56	11.64
51	148.239458	-19.964269	9.23	9.69	10.48	10.91	11.38	11.58	11.64
52	148.235834	-19.966574	9.21	9.64	10.43	10.92	11.36	11.55	11.64
53	148.237823	-19.967997	9.21	9.65	10.46	10.94	11.37	11.59	11.70
54	148.241742	-19.969955	9.20	9.62	10.43	10.96	11.35	11.58	11.69
55	148.240437	-19.974113	9.20	9.53	10.39	10.85	11.33	11.56	11.68
56	148.244870	-19.976017	9.20	9.50	10.40	10.78	11.30	11.53	11.68
57	148.249720	-19.976634	9.20	9.50	10.39	10.74	11.28	11.53	11.72
58	148.254453	-19.975668	9.19	9.50	10.39	10.73	11.27	11.57	11.74
59	148.258300	-19.973152	9.20	9.57	10.41	10.91	11.33	11.59	11.77
60	148.261678	-19.970722	9.21	9.70	10.56	11.12	11.45	11.61	11.76
61	148.262453	-19.974990	9.18	9.64	10.53	11.09	11.40	11.57	11.70
62	148.264217	-19.978552	9.18	9.68	10.51	11.12	11.43	11.61	11.74
63	148.267362	-19.982284	9.17	9.64	10.55	11.18	11.44	11.63	11.76
64	148.269158	-19.991273	9.19	9.63	10.55	11.18	11.45	11.62	11.78
65	148.270711	-19.995376	9.20	9.65	10.55	11.14	11.45	11.64	11.79
66	148.274978	-19.996242	9.19	9.62	10.51	11.11	11.43	11.61	11.78
67	148.271075	-19.998710	9.20	9.65	10.53	11.16	11.45	11.61	11.69
68	148.271444	-20.001189	9.20	9.62	10.52	11.15	11.44	11.60	11.68
69	148.274741	-20.002383	9.19	9.62	10.51	11.19	11.44	11.58	11.72
70	148.274049	-20.006756	9.16	9.53	10.46	11.13	11.43	11.54	11.64
71	148.269895	-20.008342	9.11	9.50	10.42	10.97	11.38	11.51	11.68
72	148.272333	-20.012494	9.15	9.51	10.46	11.04	11.40	11.55	11.61
73	148.272977	-20.017247	9.14	9.51	10.44	11.00	11.35	11.53	11.61
74	148.276768	-20.019229	9.14	9.50	10.43	10.92	11.34	11.51	11.59
75	148.274990	-20.022727	9.14	9.52	10.44	10.92	11.32	11.52	11.57
76	148.271586	-20.025926	9.09	9.43	10.38	10.73	11.29	11.46	11.52
77	148.267692	-20.028749	8.37	9.26	10.30	10.50	11.13	11.40	11.47

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	5.58	6.01	7.36	9.26	10.11	10.37	10.76
79	148.261368	-20.026508	5.10	5.60	6.19	6.58	7.01	8.95	9.32
80	148.259291	-20.024495	4.98	5.50	6.14	6.55	6.71	7.17	7.82
81	148.255971	-20.024299	4.87	5.64	6.52	6.61	6.89	7.29	7.43
82	148.252083	-20.021789	4.71	5.13	5.78	6.04	6.43	6.94	7.23
83	148.251245	-20.025777	4.55	4.99	6.62	7.09	7.35	7.51	7.66
84	148.248982	-20.030165	5.03	5.50	6.33	6.63	6.96	7.37	7.58
85	148.245332	-20.033208	5.16	5.60	6.23	6.59	6.92	7.36	7.43
86	148.242842	-20.037255	5.50	5.81	6.52	6.77	7.27	7.51	7.71
87	148.243873	-20.040647	5.58	5.99	6.62	6.98	7.33	7.73	8.53
88	148.244798	-20.044245	5.53	5.94	6.55	6.81	7.09	7.57	8.33
89	148.249032	-20.046574	5.53	5.94	6.55	6.83	7.10	7.69	8.76
90	148.253496	-20.048272	5.62	6.03	6.76	7.27	7.44	8.87	9.62
91	148.257679	-20.050278	5.83	6.36	7.35	8.38	9.25	10.20	10.49
92	148.261930	-20.052620	6.05	6.67	8.37	9.26	9.97	10.31	10.56
93	148.266185	-20.054795	5.73	6.10	6.88	7.40	8.09	9.74	10.23
94	148.269755	-20.058061	5.85	6.14	6.96	7.45	7.93	9.58	10.18
95	148.272686	-20.061626	5.88	6.20	7.06	7.52	8.07	9.76	10.16
96	148.273958	-20.066064	5.96	6.54	7.47	8.25	9.40	10.22	10.47
97	148.277575	-20.069358	6.12	6.89	9.16	9.61	10.22	10.46	10.73
98	148.281505	-20.072299	7.90	8.91	9.71	10.22	10.35	10.78	11.16
99	148.285512	-20.075047	8.47	9.19	10.09	10.27	10.40	11.04	11.29
100	148.290102	-20.076880	8.61	9.25	10.17	10.35	10.55	11.23	11.33
101	148.294498	-20.078324	8.95	9.29	10.23	10.40	10.69	11.34	11.41
102	148.299196	-20.077609	8.55	9.28	10.25	10.48	10.89	11.31	11.40
103	148.300325	-20.081981	8.34	9.21	10.24	10.44	10.91	11.30	11.40
104	148.292584	-20.087326	5.96	6.54	7.41	9.11	9.61	10.48	10.69
105	148.289298	-20.090879	5.96	6.59	7.55	9.19	9.87	10.48	10.69
106	148.290225	-20.095212	6.69	7.41	9.28	10.10	10.28	10.60	10.98
107	148.293279	-20.099028	7.53	8.48	9.52	10.15	10.28	10.52	10.75
108	148.297255	-20.101326	8.05	8.69	9.51	10.14	10.27	10.45	10.67
109	148.302049	-20.101573	8.39	9.13	9.99	10.26	10.43	11.18	11.31
110	148.306507	-20.101082	8.54	9.22	10.10	10.30	10.42	11.28	11.38
111	148.310592	-20.099318	8.54	9.21	10.10	10.30	10.41	11.29	11.38
112	148.315271	-20.098604	8.35	9.17	10.14	10.33	10.56	11.29	11.37
113	148.316742	-20.106603	7.41	8.91	10.07	10.28	10.46	11.03	11.23
114	148.316380	-20.110729	6.82	8.35	9.56	10.20	10.34	10.70	11.13
115	148.319501	-20.114494	6.72	8.21	9.38	10.11	10.26	10.42	10.82
116	148.323564	-20.117222	7.32	8.62	9.70	10.20	10.31	10.47	10.71

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	7.53	8.70	9.73	10.21	10.33	10.50	10.87
118	148.329841	-20.123745	7.26	8.68	9.66	10.22	10.32	10.52	10.77
119	148.333052	-20.127385	6.90	8.63	9.60	10.20	10.30	10.48	10.75
120	148.336234	-20.130719	7.46	8.72	9.70	10.21	10.31	10.49	10.65
121	148.340377	-20.132311	7.79	8.82	9.75	10.22	10.31	10.52	10.83
122	148.344376	-20.134624	8.19	8.90	9.78	10.21	10.32	10.53	10.87
123	148.348920	-20.136182	8.17	8.95	9.80	10.21	10.35	10.58	11.09
124	148.353846	-20.136606	7.95	8.85	9.77	10.21	10.34	10.56	11.09
125	148.358463	-20.137963	7.66	8.87	9.72	10.22	10.35	10.63	11.09
126	148.363418	-20.138398	7.88	8.90	9.76	10.23	10.37	10.69	11.19
127	148.368134	-20.139890	8.18	8.99	9.81	10.23	10.40	10.77	11.27
128	148.372841	-20.141138	8.23	9.04	9.88	10.22	10.41	10.83	11.34
129	148.377743	-20.141775	8.22	9.06	9.93	10.23	10.42	11.15	11.36
130	148.382452	-20.141302	8.18	9.06	9.84	10.23	10.39	11.14	11.36
131	148.386864	-20.139825	8.20	9.06	9.82	10.22	10.41	11.02	11.36
132	148.390878	-20.137479	8.17	9.05	9.90	10.25	10.41	11.19	11.37
133	148.394081	-20.134107	7.55	9.01	9.87	10.24	10.41	11.28	11.39
134	148.398548	-20.132091	7.00	8.95	9.85	10.26	10.41	11.28	11.39
135	148.402767	-20.129617	6.88	9.02	9.97	10.28	10.46	11.28	11.39
136	148.406698	-20.126630	6.77	9.04	10.02	10.32	10.50	11.33	11.41
137	148.410754	-20.123973	5.80	8.93	9.98	10.32	10.50	11.30	11.38
138	148.414721	-20.120973	6.90	9.04	9.99	10.33	10.51	11.33	11.43
139	148.418583	-20.119000	7.01	9.04	9.97	10.33	10.55	11.33	11.43
140	148.423541	-20.118958	6.26	9.00	9.92	10.32	10.53	11.33	11.43
141	148.428185	-20.119954	5.07	8.76	9.74	10.29	10.47	11.23	11.37
142	148.432311	-20.120008	4.87	8.58	9.71	10.27	10.47	11.15	11.35
143	148.435300	-20.116110	4.86	8.44	9.67	10.25	10.42	10.92	11.37
144	148.435935	-20.111416	4.97	8.44	9.67	10.23	10.43	11.05	11.39
145	148.433214	-20.107398	5.26	8.55	9.72	10.23	10.40	11.15	11.40
146	148.429848	-20.103813	5.85	9.03	9.88	10.29	10.57	11.39	11.53
147	148.431249	-20.099813	5.47	8.63	9.70	10.22	10.41	11.28	11.44
148	148.435336	-20.098275	5.33	8.39	9.57	10.12	10.33	10.70	11.22
149	148.436763	-20.093754	5.38	8.40	9.59	10.12	10.34	10.88	11.29
150	148.435056	-20.089252	5.53	8.44	9.65	10.16	10.36	10.96	11.30
151	148.435796	-20.084412	5.49	8.41	9.64	10.15	10.33	10.87	11.29
152	148.436087	-20.079434	5.60	8.44	9.67	10.19	10.37	10.81	11.24
153	148.437662	-20.074881	5.89	8.39	9.70	10.20	10.38	10.82	11.36
154	148.439836	-20.070904	5.99	8.49	9.76	10.21	10.43	10.91	11.38
155	148.439573	-20.066377	6.31	9.01	10.03	10.33	10.58	11.28	11.41

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	6.56	9.02	10.04	10.34	10.64	11.33	11.44
157	148.432583	-20.062790	6.35	9.03	10.03	10.35	10.68	11.37	11.48
158	148.432001	-20.057986	7.42	9.15	10.09	10.39	10.77	11.37	11.54
159	148.434670	-20.053987	8.16	9.16	10.11	10.37	10.77	11.41	11.57
160	148.438544	-20.051181	7.58	9.11	10.07	10.33	10.66	11.38	11.53
161	148.442261	-20.047880	5.93	8.30	9.52	10.16	10.40	11.00	11.25
162	148.442424	-20.043005	5.49	6.70	9.28	9.71	10.20	10.38	10.69
163	148.443219	-20.038793	5.45	6.65	9.27	9.72	10.17	10.36	10.70
164	148.441517	-20.035168	5.70	6.77	9.33	9.90	10.21	10.50	10.77

Table C-3 Current climate 2100 tropical cyclone wave peak period (s) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	9.19	10.09	10.76	11.35	11.58	12.03	12.27
2	148.086644	-19.883904	9.15	10.05	10.71	11.35	11.54	11.79	12.12
3	148.086750	-19.888545	9.16	10.04	10.65	11.32	11.51	11.78	12.13
4	148.089981	-19.891699	9.16	10.04	10.65	11.31	11.51	11.78	12.10
5	148.091008	-19.896035	9.16	10.03	10.65	11.30	11.51	11.76	12.12
6	148.093536	-19.900072	9.15	9.91	10.57	11.26	11.48	11.71	11.99
7	148.094558	-19.904839	9.15	9.84	10.53	11.22	11.45	11.69	11.99
8	148.098229	-19.907849	9.16	9.80	10.53	11.16	11.42	11.63	11.90
9	148.098545	-19.912567	9.14	9.67	10.48	11.19	11.42	11.56	11.88
10	148.100573	-19.916953	9.08	9.55	10.38	10.89	11.35	11.54	11.83
11	148.103183	-19.921165	9.10	9.54	10.35	10.78	11.30	11.51	11.80
12	148.104466	-19.925655	9.07	9.43	10.33	10.71	11.30	11.46	11.77
13	148.108624	-19.927620	9.06	9.40	10.28	10.59	11.27	11.44	11.59
14	148.113182	-19.929278	9.08	9.44	10.27	10.51	11.29	11.43	11.65
15	148.117375	-19.929729	9.10	9.47	10.28	10.51	11.30	11.42	11.61
16	148.121854	-19.931592	9.14	9.48	10.28	10.52	11.28	11.42	11.59
17	148.125345	-19.933461	9.13	9.46	10.28	10.53	11.27	11.43	11.56
18	148.127812	-19.934900	9.13	9.44	10.28	10.52	11.26	11.40	11.56
19	148.131995	-19.936612	9.15	9.45	10.29	10.50	11.27	11.40	11.56
20	148.136880	-19.937041	9.18	9.51	10.31	10.57	11.27	11.40	11.56
21	148.140824	-19.937192	9.16	9.51	10.29	10.54	11.24	11.39	11.58
22	148.145755	-19.937202	9.16	9.52	10.32	10.63	11.27	11.41	11.60
23	148.150433	-19.937100	9.15	9.52	10.32	10.62	11.26	11.41	11.62
24	148.155285	-19.937381	9.14	9.51	10.33	10.64	11.26	11.43	11.64
25	148.159885	-19.937060	9.13	9.52	10.34	10.68	11.27	11.46	11.69
26	148.164842	-19.937020	9.11	9.52	10.34	10.70	11.28	11.48	11.70
27	148.169661	-19.936777	9.11	9.51	10.34	10.69	11.28	11.46	11.68
28	148.174386	-19.936171	9.13	9.51	10.35	10.68	11.31	11.49	11.72
29	148.178875	-19.934357	9.14	9.53	10.37	10.69	11.32	11.53	11.72
30	148.183291	-19.932014	9.15	9.52	10.37	10.77	11.33	11.53	11.73
31	148.187708	-19.929671	9.16	9.54	10.38	10.85	11.34	11.55	11.71
32	148.192125	-19.927329	9.16	9.63	10.46	11.15	11.42	11.61	11.79
33	148.191727	-19.923601	9.17	9.68	10.45	11.17	11.41	11.58	11.78
34	148.194813	-19.920579	9.13	9.70	10.46	11.13	11.43	11.61	11.82
35	148.197788	-19.923268	9.14	9.76	10.49	11.20	11.44	11.64	11.88
36	148.202372	-19.923354	9.11	9.74	10.49	11.20	11.43	11.67	11.85
37	148.205450	-19.926615	9.14	9.85	10.56	11.24	11.46	11.70	11.88
38	148.209140	-19.929434	9.16	9.93	10.61	11.27	11.49	11.73	11.90

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	9.16	9.93	10.65	11.31	11.54	11.72	11.93
40	148.215627	-19.936786	9.16	9.92	10.64	11.33	11.55	11.73	11.92
41	148.214572	-19.940165	9.16	9.91	10.55	11.27	11.51	11.69	11.98
42	148.212471	-19.944188	9.14	9.70	10.46	11.25	11.45	11.62	11.77
43	148.216694	-19.943252	9.15	9.79	10.55	11.29	11.51	11.67	11.89
44	148.218362	-19.945221	9.16	9.83	10.55	11.32	11.50	11.67	11.90
45	148.220269	-19.947553	9.14	9.72	10.47	11.23	11.46	11.64	11.87
46	148.225065	-19.948444	9.16	9.87	10.53	11.29	11.50	11.68	11.93
47	148.228945	-19.951074	9.16	9.94	10.60	11.30	11.55	11.72	11.91
48	148.232270	-19.954427	9.13	9.91	10.65	11.32	11.56	11.67	11.98
49	148.233553	-19.959077	9.15	9.92	10.62	11.32	11.57	11.72	12.00
50	148.235969	-19.962224	9.13	9.89	10.60	11.30	11.53	11.71	11.93
51	148.239458	-19.964269	9.14	9.96	10.67	11.32	11.54	11.71	11.93
52	148.235834	-19.966574	9.15	9.79	10.58	11.32	11.53	11.71	11.94
53	148.237823	-19.967997	9.15	9.80	10.59	11.30	11.54	11.77	11.97
54	148.241742	-19.969955	9.14	9.80	10.57	11.31	11.50	11.76	12.08
55	148.240437	-19.974113	9.13	9.70	10.52	11.25	11.49	11.74	12.04
56	148.244870	-19.976017	9.11	9.71	10.52	11.20	11.49	11.69	12.05
57	148.249720	-19.976634	9.12	9.70	10.53	11.19	11.47	11.68	11.98
58	148.254453	-19.975668	9.13	9.69	10.54	11.24	11.48	11.75	12.05
59	148.258300	-19.973152	9.13	9.90	10.57	11.27	11.51	11.80	12.10
60	148.261678	-19.970722	9.14	10.01	10.82	11.37	11.61	11.86	12.23
61	148.262453	-19.974990	9.12	9.89	10.78	11.35	11.57	11.81	12.08
62	148.264217	-19.978552	9.12	9.90	10.73	11.35	11.57	11.86	12.21
63	148.267362	-19.982284	9.11	9.84	10.83	11.39	11.59	11.91	12.26
64	148.269158	-19.991273	9.12	9.88	10.78	11.41	11.59	11.87	12.16
65	148.270711	-19.995376	9.13	9.89	10.79	11.38	11.59	11.90	12.18
66	148.274978	-19.996242	9.12	9.86	10.75	11.36	11.56	11.86	12.29
67	148.271075	-19.998710	9.15	9.86	10.80	11.38	11.61	11.89	12.15
68	148.271444	-20.001189	9.14	9.80	10.75	11.36	11.58	11.87	12.16
69	148.274741	-20.002383	9.13	9.83	10.75	11.37	11.58	11.84	12.25
70	148.274049	-20.006756	8.94	9.62	10.62	11.32	11.54	11.76	12.04
71	148.269895	-20.008342	8.71	9.52	10.54	11.30	11.51	11.73	12.15
72	148.272333	-20.012494	9.08	9.65	10.61	11.33	11.53	11.72	11.96
73	148.272977	-20.017247	9.07	9.65	10.59	11.32	11.51	11.70	11.98
74	148.276768	-20.019229	9.06	9.66	10.56	11.28	11.48	11.68	11.97
75	148.274990	-20.022727	9.05	9.67	10.61	11.27	11.48	11.66	11.88
76	148.271586	-20.025926	9.02	9.57	10.48	11.19	11.42	11.59	11.71
77	148.267692	-20.028749	8.25	9.26	10.37	10.75	11.38	11.50	11.65

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	5.39	6.15	7.46	9.27	10.20	10.59	11.19
79	148.261368	-20.026508	4.97	5.72	6.54	6.73	7.21	8.93	9.62
80	148.259291	-20.024495	4.92	5.62	6.52	6.64	6.97	7.33	7.82
81	148.255971	-20.024299	4.84	5.74	6.59	6.74	7.27	7.39	7.76
82	148.252083	-20.021789	4.66	5.26	6.01	6.53	6.77	7.24	7.36
83	148.251245	-20.025777	4.52	5.01	6.74	7.31	7.47	7.86	8.13
84	148.248982	-20.030165	5.02	5.59	6.56	6.86	7.33	7.51	8.26
85	148.245332	-20.033208	5.17	5.68	6.41	6.66	7.08	7.44	7.75
86	148.242842	-20.037255	5.39	5.95	6.58	7.00	7.33	7.64	8.07
87	148.243873	-20.040647	5.44	6.11	6.76	7.28	7.44	7.92	8.42
88	148.244798	-20.044245	5.39	6.07	6.70	7.05	7.32	7.68	8.52
89	148.249032	-20.046574	5.38	6.04	6.69	7.02	7.33	7.60	8.52
90	148.253496	-20.048272	5.42	6.16	6.95	7.33	7.57	8.52	9.65
91	148.257679	-20.050278	5.69	6.43	7.38	7.90	9.23	10.20	10.60
92	148.261930	-20.052620	5.97	6.72	8.00	9.32	10.15	10.35	10.82
93	148.266185	-20.054795	5.53	6.21	7.25	7.56	8.25	9.92	10.24
94	148.269755	-20.058061	5.60	6.26	7.26	7.56	8.10	9.49	10.20
95	148.272686	-20.061626	5.61	6.31	7.32	7.65	8.13	9.43	10.21
96	148.273958	-20.066064	5.66	6.44	7.48	8.07	9.31	10.26	10.58
97	148.277575	-20.069358	6.02	6.90	9.17	10.10	10.27	10.51	11.08
98	148.281505	-20.072299	7.58	8.46	10.09	10.28	10.43	11.18	11.33
99	148.285512	-20.075047	8.30	9.18	10.16	10.34	10.57	11.23	11.39
100	148.290102	-20.076880	8.49	9.26	10.25	10.44	10.99	11.35	11.46
101	148.294498	-20.078324	8.64	9.31	10.30	10.51	11.15	11.43	11.52
102	148.299196	-20.077609	8.31	9.24	10.32	10.58	11.25	11.44	11.50
103	148.300325	-20.081981	7.75	9.14	10.27	10.49	11.21	11.39	11.50
104	148.292584	-20.087326	5.74	6.57	7.42	8.39	9.41	10.34	10.73
105	148.289298	-20.090879	5.87	6.64	7.57	9.25	10.02	10.57	11.16
106	148.290225	-20.095212	6.57	7.36	9.31	10.18	10.32	10.93	11.28
107	148.293279	-20.099028	7.38	8.28	9.64	10.21	10.32	10.62	11.17
108	148.297255	-20.101326	7.54	8.53	9.77	10.22	10.33	10.47	10.86
109	148.302049	-20.101573	8.25	9.03	10.17	10.33	10.52	11.26	11.37
110	148.306507	-20.101082	8.40	9.19	10.22	10.37	10.61	11.39	11.48
111	148.310592	-20.099318	8.37	9.20	10.21	10.37	10.60	11.35	11.47
112	148.315271	-20.098604	7.83	9.16	10.23	10.42	11.01	11.41	11.45
113	148.316742	-20.106603	6.92	8.40	10.11	10.33	10.56	11.29	11.41
114	148.316380	-20.110729	6.74	7.55	9.71	10.25	10.36	10.94	11.31
115	148.319501	-20.114494	6.66	7.41	9.45	10.19	10.30	10.50	11.04
116	148.323564	-20.117222	6.82	8.34	9.84	10.25	10.37	10.70	11.09

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	6.84	8.41	9.95	10.27	10.40	10.84	11.24
118	148.329841	-20.123745	6.80	8.38	9.87	10.28	10.40	10.77	11.19
119	148.333052	-20.127385	6.73	8.35	9.83	10.26	10.35	10.49	10.71
120	148.336234	-20.130719	6.69	8.45	9.97	10.28	10.37	10.60	11.03
121	148.340377	-20.132311	6.73	8.55	10.04	10.29	10.41	10.81	11.22
122	148.344376	-20.134624	6.77	8.73	10.05	10.29	10.40	10.84	11.17
123	148.348920	-20.136182	6.76	8.79	10.09	10.29	10.39	10.86	11.18
124	148.353846	-20.136606	6.72	8.64	10.04	10.27	10.38	10.78	11.20
125	148.358463	-20.137963	6.68	8.77	10.08	10.31	10.45	10.99	11.33
126	148.363418	-20.138398	6.57	8.81	10.07	10.31	10.45	11.06	11.32
127	148.368134	-20.139890	6.51	8.89	10.09	10.32	10.47	11.20	11.37
128	148.372841	-20.141138	6.40	8.95	10.11	10.32	10.51	11.31	11.48
129	148.377743	-20.141775	6.25	8.87	10.09	10.30	10.49	11.30	11.47
130	148.382452	-20.141302	6.16	8.90	10.09	10.30	10.50	11.30	11.47
131	148.386864	-20.139825	6.01	8.84	10.10	10.30	10.56	11.31	11.46
132	148.390878	-20.137479	5.88	8.81	10.09	10.31	10.61	11.36	11.49
133	148.394081	-20.134107	5.67	8.62	10.08	10.31	10.62	11.35	11.50
134	148.398548	-20.132091	5.53	8.56	10.09	10.33	10.65	11.36	11.50
135	148.402767	-20.129617	5.45	8.57	10.13	10.34	10.77	11.45	11.54
136	148.406698	-20.126630	5.35	8.51	10.14	10.35	10.79	11.43	11.52
137	148.410754	-20.123973	5.25	8.54	10.14	10.36	10.80	11.42	11.52
138	148.414721	-20.120973	5.14	8.62	10.14	10.37	10.84	11.44	11.51
139	148.418583	-20.119000	5.13	8.64	10.14	10.38	10.93	11.45	11.53
140	148.423541	-20.118958	4.98	8.63	10.14	10.39	10.84	11.45	11.56
141	148.428185	-20.119954	4.82	8.47	10.10	10.35	10.77	11.38	11.51
142	148.432311	-20.120008	4.63	8.24	10.04	10.33	10.70	11.27	11.51
143	148.435300	-20.116110	4.60	7.79	9.92	10.33	10.65	11.27	11.52
144	148.435935	-20.111416	4.76	7.07	9.88	10.31	10.58	11.26	11.49
145	148.433214	-20.107398	4.90	8.34	10.04	10.33	10.64	11.34	11.52
146	148.429848	-20.103813	5.25	8.52	10.06	10.33	10.80	11.44	11.66
147	148.431249	-20.099813	5.23	8.33	9.95	10.29	10.63	11.38	11.58
148	148.435336	-20.098275	4.98	6.80	9.71	10.23	10.44	11.23	11.46
149	148.436763	-20.093754	5.18	7.07	9.77	10.23	10.43	11.21	11.45
150	148.435056	-20.089252	5.35	7.97	9.85	10.25	10.46	11.23	11.43
151	148.435796	-20.084412	5.36	7.61	9.83	10.24	10.47	11.23	11.43
152	148.436087	-20.079434	5.41	7.57	9.90	10.26	10.56	11.22	11.42
153	148.437662	-20.074881	5.43	7.62	9.91	10.27	10.55	11.27	11.51
154	148.439836	-20.070904	5.57	7.81	10.02	10.31	10.61	11.35	11.55
155	148.439573	-20.066377	5.93	8.55	10.13	10.38	11.01	11.41	11.60

Tropical Cyclone Wave Peak Period Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	6.01	8.62	10.15	10.43	11.14	11.47	11.66
157	148.432583	-20.062790	5.98	8.66	10.14	10.42	11.15	11.52	11.68
158	148.432001	-20.057986	6.55	9.13	10.19	10.54	11.23	11.57	11.75
159	148.434670	-20.053987	6.71	9.18	10.18	10.53	11.23	11.57	11.75
160	148.438544	-20.051181	6.59	9.06	10.10	10.44	11.16	11.58	11.81
161	148.442261	-20.047880	5.43	7.25	9.69	10.24	10.55	11.25	11.34
162	148.442424	-20.043005	5.34	6.54	9.34	10.04	10.27	10.78	11.11
163	148.443219	-20.038793	5.37	6.43	9.33	10.03	10.24	10.81	11.19
164	148.441517	-20.035168	5.47	6.69	9.41	10.07	10.27	11.03	11.24

Appendix D Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

Table D-1 Current climate 2017 sustained peak total level (mAHD) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	2.38	2.48	2.65	2.85	3.14	3.72	3.88
2	148.086644	-19.883904	2.37	2.47	2.67	2.91	3.29	3.82	4.03
3	148.086750	-19.888545	2.37	2.48	2.70	2.96	3.35	3.91	4.14
4	148.089981	-19.891699	2.38	2.48	2.70	2.98	3.36	3.92	4.17
5	148.091008	-19.896035	2.37	2.48	2.70	3.01	3.39	3.93	4.22
6	148.093536	-19.900072	2.38	2.48	2.70	3.02	3.37	3.93	4.25
7	148.094558	-19.904839	2.37	2.48	2.74	3.08	3.44	3.99	4.36
8	148.098229	-19.907849	2.37	2.48	2.75	3.08	3.43	3.98	4.37
9	148.098545	-19.912567	2.36	2.48	2.80	3.14	3.52	4.04	4.49
10	148.100573	-19.916953	2.37	2.48	2.80	3.15	3.51	4.05	4.51
11	148.103183	-19.921165	2.36	2.48	2.82	3.18	3.53	4.05	4.57
12	148.104466	-19.925655	2.36	2.47	2.82	3.19	3.53	4.06	4.60
13	148.108624	-19.927620	2.35	2.47	2.82	3.19	3.50	4.04	4.59
14	148.113182	-19.929278	2.35	2.47	2.81	3.17	3.47	4.02	4.59
15	148.117375	-19.929729	2.36	2.48	2.79	3.14	3.43	4.00	4.54
16	148.121854	-19.931592	2.36	2.47	2.78	3.13	3.43	3.97	4.51
17	148.125345	-19.933461	2.36	2.48	2.79	3.15	3.45	3.97	4.53
18	148.127812	-19.934900	2.36	2.47	2.79	3.16	3.45	3.97	4.53
19	148.131995	-19.936612	2.35	2.47	2.78	3.15	3.44	3.94	4.51
20	148.136880	-19.937041	2.35	2.46	2.74	3.12	3.41	3.89	4.46
21	148.140824	-19.937192	2.36	2.47	2.75	3.12	3.40	3.89	4.45
22	148.145755	-19.937202	2.36	2.47	2.74	3.09	3.36	3.86	4.42
23	148.150433	-19.937100	2.35	2.47	2.73	3.08	3.35	3.83	4.38
24	148.155285	-19.937381	2.35	2.47	2.72	3.07	3.34	3.82	4.36
25	148.159885	-19.937060	2.35	2.47	2.72	3.06	3.31	3.80	4.34
26	148.164842	-19.937020	2.35	2.47	2.71	3.04	3.30	3.78	4.31
27	148.169661	-19.936777	2.34	2.46	2.68	3.01	3.26	3.75	4.26
28	148.174386	-19.936171	2.35	2.46	2.67	2.99	3.23	3.71	4.24
29	148.178875	-19.934357	2.35	2.47	2.67	2.96	3.21	3.68	4.21
30	148.183291	-19.932014	2.36	2.47	2.65	2.90	3.16	3.63	4.14
31	148.187708	-19.929671	2.36	2.46	2.64	2.87	3.13	3.60	4.11
32	148.192125	-19.927329	2.36	2.45	2.60	2.82	3.05	3.53	4.01
33	148.191727	-19.923601	2.37	2.46	2.62	2.82	3.04	3.53	3.96
34	148.194813	-19.920579	2.39	2.49	2.64	2.82	3.06	3.52	3.95
35	148.197788	-19.923268	2.37	2.47	2.62	2.82	3.06	3.50	3.99
36	148.202372	-19.923354	2.38	2.49	2.66	2.84	3.09	3.52	4.01
37	148.205450	-19.926615	2.37	2.48	2.65	2.84	3.10	3.52	4.03
38	148.209140	-19.929434	2.38	2.48	2.65	2.85	3.11	3.52	4.06

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	2.39	2.49	2.66	2.85	3.13	3.53	4.08
40	148.215627	-19.936786	2.39	2.49	2.66	2.86	3.13	3.52	4.10
41	148.214572	-19.940165	2.37	2.46	2.65	2.88	3.13	3.53	4.14
42	148.212471	-19.944188	2.35	2.45	2.66	2.92	3.16	3.56	4.19
43	148.216694	-19.943252	2.37	2.47	2.66	2.89	3.14	3.54	4.15
44	148.218362	-19.945221	2.37	2.47	2.66	2.89	3.15	3.53	4.17
45	148.220269	-19.947553	2.37	2.47	2.67	2.93	3.18	3.55	4.19
46	148.225065	-19.948444	2.38	2.48	2.69	2.92	3.20	3.56	4.18
47	148.228945	-19.951074	2.38	2.49	2.70	2.94	3.23	3.58	4.20
48	148.232270	-19.954427	2.38	2.49	2.70	2.95	3.24	3.60	4.21
49	148.233553	-19.959077	2.38	2.49	2.71	2.99	3.29	3.65	4.25
50	148.235969	-19.962224	2.37	2.49	2.71	3.01	3.29	3.65	4.26
51	148.239458	-19.964269	2.38	2.50	2.72	3.02	3.30	3.65	4.28
52	148.235834	-19.966574	2.37	2.47	2.71	3.02	3.33	3.67	4.30
53	148.237823	-19.967997	2.37	2.48	2.71	3.04	3.34	3.68	4.30
54	148.241742	-19.969955	2.38	2.49	2.71	3.04	3.31	3.67	4.30
55	148.240437	-19.974113	2.36	2.48	2.72	3.07	3.36	3.70	4.36
56	148.244870	-19.976017	2.36	2.48	2.71	3.04	3.33	3.68	4.33
57	148.249720	-19.976634	2.36	2.48	2.71	3.00	3.29	3.66	4.28
58	148.254453	-19.975668	2.36	2.48	2.69	2.96	3.25	3.63	4.23
59	148.258300	-19.973152	2.36	2.47	2.66	2.92	3.16	3.53	4.14
60	148.261678	-19.970722	2.40	2.53	2.70	2.93	3.19	3.55	4.12
61	148.262453	-19.974990	2.38	2.50	2.71	2.97	3.27	3.60	4.16
62	148.264217	-19.978552	2.38	2.51	2.73	3.01	3.32	3.67	4.20
63	148.267362	-19.982284	2.41	2.54	2.78	3.08	3.40	3.74	4.24
64	148.269158	-19.991273	2.39	2.53	2.80	3.12	3.47	3.83	4.33
65	148.270711	-19.995376	2.39	2.51	2.76	3.08	3.43	3.80	4.30
66	148.274978	-19.996242	2.41	2.54	2.78	3.10	3.43	3.79	4.30
67	148.271075	-19.998710	2.39	2.50	2.75	3.07	3.44	3.81	4.30
68	148.271444	-20.001189	2.40	2.51	2.79	3.11	3.48	3.86	4.34
69	148.274741	-20.002383	2.41	2.54	2.81	3.12	3.48	3.85	4.36
70	148.274049	-20.006756	2.40	2.54	2.82	3.16	3.52	3.92	4.40
71	148.269895	-20.008342	2.38	2.51	2.81	3.17	3.51	3.93	4.41
72	148.272333	-20.012494	2.38	2.53	2.84	3.19	3.53	3.96	4.46
73	148.272977	-20.017247	2.39	2.53	2.83	3.19	3.54	3.97	4.49
74	148.276768	-20.019229	2.39	2.54	2.83	3.18	3.53	3.95	4.50
75	148.274990	-20.022727	2.40	2.53	2.87	3.24	3.64	4.07	4.63
76	148.271586	-20.025926	2.37	2.51	2.85	3.24	3.65	4.10	4.65
77	148.267692	-20.028749	2.30	2.49	2.90	3.32	3.74	4.19	4.75

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	2.27	2.39	2.82	3.32	3.75	4.26	4.80
79	148.261368	-20.026508	2.26	2.38	2.78	3.23	3.66	4.20	4.75
80	148.259291	-20.024495	2.26	2.37	2.80	3.24	3.67	4.15	4.71
81	148.255971	-20.024299	2.25	2.38	2.84	3.27	3.70	4.20	4.73
82	148.252083	-20.021789	2.25	2.36	2.83	3.23	3.67	4.18	4.72
83	148.251245	-20.025777	2.26	2.37	2.89	3.31	3.77	4.26	4.79
84	148.248982	-20.030165	2.27	2.40	2.90	3.35	3.81	4.30	4.84
85	148.245332	-20.033208	2.28	2.41	2.92	3.38	3.86	4.36	4.89
86	148.242842	-20.037255	2.29	2.43	2.97	3.43	3.90	4.45	4.97
87	148.243873	-20.040647	2.29	2.43	2.97	3.46	3.91	4.50	4.99
88	148.244798	-20.044245	2.29	2.43	2.97	3.46	3.91	4.54	5.00
89	148.249032	-20.046574	2.28	2.42	2.94	3.44	3.91	4.50	4.99
90	148.253496	-20.048272	2.28	2.43	2.94	3.42	3.92	4.48	5.03
91	148.257679	-20.050278	2.29	2.43	2.93	3.43	3.98	4.52	5.06
92	148.261930	-20.052620	2.30	2.43	2.95	3.48	3.98	4.49	5.05
93	148.266185	-20.054795	2.29	2.42	2.90	3.40	3.87	4.42	5.03
94	148.269755	-20.058061	2.29	2.42	2.89	3.40	3.85	4.40	5.01
95	148.272686	-20.061626	2.29	2.43	2.91	3.42	3.86	4.41	5.05
96	148.273958	-20.066064	2.29	2.43	2.93	3.45	3.93	4.48	5.10
97	148.277575	-20.069358	2.30	2.46	3.02	3.52	3.96	4.50	5.14
98	148.281505	-20.072299	2.36	2.52	3.04	3.54	3.94	4.49	5.16
99	148.285512	-20.075047	2.38	2.53	3.03	3.53	3.92	4.48	5.18
100	148.290102	-20.076880	2.38	2.54	3.02	3.52	3.89	4.46	5.19
101	148.294498	-20.078324	2.38	2.53	3.01	3.48	3.86	4.43	5.19
102	148.299196	-20.077609	2.39	2.55	2.97	3.41	3.80	4.33	5.14
103	148.300325	-20.081981	2.36	2.53	3.04	3.51	3.90	4.49	5.26
104	148.292584	-20.087326	2.30	2.43	2.99	3.54	3.94	4.61	5.34
105	148.289298	-20.090879	2.30	2.45	3.06	3.64	4.03	4.70	5.42
106	148.290225	-20.095212	2.32	2.48	3.14	3.67	4.09	4.76	5.50
107	148.293279	-20.099028	2.35	2.53	3.14	3.66	4.10	4.77	5.54
108	148.297255	-20.101326	2.36	2.52	3.12	3.64	4.09	4.77	5.55
109	148.302049	-20.101573	2.37	2.53	3.11	3.63	4.07	4.73	5.55
110	148.306507	-20.101082	2.37	2.53	3.08	3.58	4.01	4.64	5.50
111	148.310592	-20.099318	2.38	2.54	3.06	3.56	3.98	4.61	5.46
112	148.315271	-20.098604	2.37	2.54	3.04	3.53	3.93	4.56	5.41
113	148.316742	-20.106603	2.36	2.54	3.14	3.64	4.08	4.79	5.65
114	148.316380	-20.110729	2.34	2.51	3.14	3.66	4.10	4.83	5.68
115	148.319501	-20.114494	2.33	2.50	3.13	3.67	4.11	4.84	5.70
116	148.323564	-20.117222	2.35	2.53	3.14	3.70	4.11	4.85	5.71

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	2.35	2.54	3.15	3.72	4.12	4.88	5.73
118	148.329841	-20.123745	2.34	2.53	3.14	3.74	4.15	4.91	5.75
119	148.333052	-20.127385	2.34	2.53	3.17	3.78	4.17	4.99	5.81
120	148.336234	-20.130719	2.33	2.53	3.18	3.78	4.17	5.01	5.83
121	148.340377	-20.132311	2.33	2.53	3.18	3.78	4.16	5.02	5.84
122	148.344376	-20.134624	2.33	2.53	3.17	3.77	4.16	5.03	5.83
123	148.348920	-20.136182	2.34	2.53	3.17	3.75	4.16	5.03	5.84
124	148.353846	-20.136606	2.34	2.53	3.17	3.73	4.16	5.01	5.81
125	148.358463	-20.137963	2.33	2.53	3.17	3.71	4.17	4.99	5.79
126	148.363418	-20.138398	2.33	2.53	3.16	3.70	4.18	4.98	5.79
127	148.368134	-20.139890	2.33	2.52	3.14	3.69	4.19	4.96	5.78
128	148.372841	-20.141138	2.33	2.52	3.13	3.69	4.20	4.94	5.79
129	148.377743	-20.141775	2.32	2.51	3.09	3.67	4.20	4.91	5.78
130	148.382452	-20.141302	2.32	2.51	3.06	3.64	4.16	4.86	5.75
131	148.386864	-20.139825	2.31	2.51	3.01	3.61	4.14	4.81	5.71
132	148.390878	-20.137479	2.31	2.51	2.97	3.58	4.10	4.76	5.65
133	148.394081	-20.134107	2.31	2.50	2.94	3.53	4.04	4.69	5.55
134	148.398548	-20.132091	2.30	2.50	2.92	3.51	4.03	4.68	5.54
135	148.402767	-20.129617	2.30	2.50	2.88	3.46	3.98	4.63	5.47
136	148.406698	-20.126630	2.29	2.49	2.87	3.41	3.93	4.59	5.41
137	148.410754	-20.123973	2.29	2.49	2.83	3.39	3.88	4.58	5.36
138	148.414721	-20.120973	2.29	2.49	2.80	3.36	3.82	4.53	5.29
139	148.418583	-20.119000	2.28	2.48	2.78	3.34	3.77	4.50	5.24
140	148.423541	-20.118958	2.28	2.48	2.76	3.32	3.77	4.51	5.23
141	148.428185	-20.119954	2.28	2.47	2.73	3.30	3.77	4.53	5.24
142	148.432311	-20.120008	2.27	2.46	2.72	3.28	3.76	4.52	5.22
143	148.435300	-20.116110	2.27	2.40	2.70	3.22	3.68	4.45	5.12
144	148.435935	-20.111416	2.26	2.38	2.68	3.17	3.62	4.37	5.05
145	148.433214	-20.107398	2.27	2.44	2.68	3.17	3.59	4.30	5.01
146	148.429848	-20.103813	2.28	2.46	2.69	3.16	3.56	4.24	4.97
147	148.431249	-20.099813	2.26	2.42	2.68	3.13	3.52	4.16	4.90
148	148.435336	-20.098275	2.26	2.37	2.66	3.08	3.47	4.11	4.83
149	148.436763	-20.093754	2.26	2.37	2.64	3.05	3.42	4.05	4.77
150	148.435056	-20.089252	2.27	2.41	2.64	3.04	3.38	3.99	4.69
151	148.435796	-20.084412	2.26	2.39	2.63	3.01	3.33	3.93	4.62
152	148.436087	-20.079434	2.26	2.38	2.62	2.98	3.29	3.87	4.55
153	148.437662	-20.074881	2.26	2.37	2.60	2.93	3.23	3.80	4.46
154	148.439836	-20.070904	2.26	2.37	2.59	2.92	3.19	3.80	4.42
155	148.439573	-20.066377	2.28	2.42	2.59	2.86	3.14	3.72	4.33

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	2.28	2.43	2.60	2.85	3.15	3.68	4.30
157	148.432583	-20.062790	2.28	2.45	2.63	2.90	3.19	3.71	4.36
158	148.432001	-20.057986	2.30	2.45	2.62	2.87	3.17	3.65	4.27
159	148.434670	-20.053987	2.30	2.46	2.62	2.85	3.15	3.63	4.20
160	148.438544	-20.051181	2.29	2.43	2.60	2.82	3.11	3.56	4.12
161	148.442261	-20.047880	2.25	2.37	2.56	2.74	3.04	3.44	3.98
162	148.442424	-20.043005	2.24	2.32	2.55	2.72	3.03	3.43	3.94
163	148.443219	-20.038793	2.24	2.31	2.54	2.67	2.98	3.39	3.89
164	148.441517	-20.035168	2.24	2.33	2.54	2.67	2.99	3.38	3.86

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

Table D-2 Future climate 2050 sustained peak total water level (mAHD) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	2.84	2.94	3.19	3.47	3.80	4.42	4.58
2	148.086644	-19.883904	2.83	2.93	3.26	3.55	3.96	4.56	4.74
3	148.086750	-19.888545	2.84	2.94	3.31	3.63	4.04	4.65	4.90
4	148.089981	-19.891699	2.84	2.95	3.32	3.64	4.05	4.67	4.93
5	148.091008	-19.896035	2.84	2.95	3.33	3.66	4.07	4.68	5.00
6	148.093536	-19.900072	2.84	2.95	3.33	3.67	4.07	4.68	5.02
7	148.094558	-19.904839	2.84	2.96	3.39	3.73	4.15	4.74	5.15
8	148.098229	-19.907849	2.84	2.96	3.39	3.73	4.15	4.73	5.16
9	148.098545	-19.912567	2.83	2.96	3.43	3.81	4.23	4.79	5.29
10	148.100573	-19.916953	2.84	2.95	3.43	3.81	4.23	4.80	5.32
11	148.103183	-19.921165	2.83	2.96	3.46	3.85	4.24	4.82	5.37
12	148.104466	-19.925655	2.82	2.95	3.47	3.87	4.25	4.84	5.42
13	148.108624	-19.927620	2.82	2.95	3.49	3.86	4.22	4.81	5.41
14	148.113182	-19.929278	2.82	2.95	3.48	3.85	4.20	4.79	5.39
15	148.117375	-19.929729	2.83	2.95	3.44	3.82	4.16	4.77	5.35
16	148.121854	-19.931592	2.83	2.94	3.42	3.81	4.13	4.76	5.30
17	148.125345	-19.933461	2.83	2.95	3.44	3.83	4.14	4.77	5.31
18	148.127812	-19.934900	2.82	2.94	3.44	3.83	4.14	4.77	5.31
19	148.131995	-19.936612	2.82	2.94	3.42	3.83	4.13	4.75	5.28
20	148.136880	-19.937041	2.82	2.93	3.38	3.80	4.08	4.69	5.22
21	148.140824	-19.937192	2.82	2.93	3.38	3.80	4.08	4.69	5.22
22	148.145755	-19.937202	2.82	2.93	3.36	3.77	4.06	4.65	5.17
23	148.150433	-19.937100	2.82	2.93	3.35	3.75	4.04	4.63	5.14
24	148.155285	-19.937381	2.82	2.93	3.34	3.73	4.02	4.61	5.11
25	148.159885	-19.937060	2.82	2.92	3.33	3.71	4.00	4.59	5.08
26	148.164842	-19.937020	2.82	2.92	3.32	3.69	4.00	4.58	5.05
27	148.169661	-19.936777	2.82	2.92	3.29	3.65	3.97	4.52	5.01
28	148.174386	-19.936171	2.82	2.92	3.27	3.63	3.94	4.49	4.98
29	148.178875	-19.934357	2.82	2.92	3.25	3.61	3.92	4.45	4.95
30	148.183291	-19.932014	2.82	2.92	3.21	3.57	3.86	4.38	4.88
31	148.187708	-19.929671	2.82	2.92	3.20	3.53	3.81	4.35	4.83
32	148.192125	-19.927329	2.82	2.90	3.14	3.44	3.70	4.23	4.73
33	148.191727	-19.923601	2.83	2.91	3.13	3.42	3.68	4.23	4.68
34	148.194813	-19.920579	2.86	2.94	3.15	3.41	3.71	4.23	4.67
35	148.197788	-19.923268	2.83	2.92	3.15	3.41	3.72	4.23	4.71
36	148.202372	-19.923354	2.86	2.95	3.19	3.44	3.74	4.25	4.73
37	148.205450	-19.926615	2.84	2.94	3.19	3.44	3.76	4.24	4.75
38	148.209140	-19.929434	2.84	2.94	3.20	3.46	3.78	4.23	4.78

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	2.85	2.94	3.21	3.49	3.81	4.24	4.82
40	148.215627	-19.936786	2.85	2.94	3.21	3.49	3.80	4.23	4.84
41	148.214572	-19.940165	2.82	2.92	3.22	3.51	3.82	4.24	4.87
42	148.212471	-19.944188	2.81	2.90	3.25	3.55	3.88	4.28	4.93
43	148.216694	-19.943252	2.83	2.93	3.24	3.52	3.84	4.24	4.89
44	148.218362	-19.945221	2.83	2.92	3.24	3.53	3.84	4.24	4.91
45	148.220269	-19.947553	2.83	2.93	3.25	3.55	3.87	4.27	4.93
46	148.225065	-19.948444	2.84	2.94	3.26	3.56	3.87	4.27	4.93
47	148.228945	-19.951074	2.85	2.95	3.27	3.57	3.91	4.30	4.95
48	148.232270	-19.954427	2.85	2.95	3.28	3.58	3.93	4.33	4.96
49	148.233553	-19.959077	2.85	2.95	3.31	3.62	4.01	4.38	5.00
50	148.235969	-19.962224	2.84	2.95	3.32	3.64	4.02	4.38	5.01
51	148.239458	-19.964269	2.86	2.97	3.33	3.66	4.03	4.38	5.03
52	148.235834	-19.966574	2.83	2.93	3.32	3.67	4.05	4.41	5.06
53	148.237823	-19.967997	2.84	2.94	3.33	3.69	4.06	4.42	5.07
54	148.241742	-19.969955	2.85	2.95	3.33	3.69	4.03	4.39	5.05
55	148.240437	-19.974113	2.83	2.94	3.35	3.73	4.06	4.44	5.12
56	148.244870	-19.976017	2.83	2.93	3.33	3.70	4.02	4.41	5.08
57	148.249720	-19.976634	2.83	2.93	3.30	3.65	3.96	4.39	5.04
58	148.254453	-19.975668	2.83	2.93	3.28	3.61	3.91	4.36	4.99
59	148.258300	-19.973152	2.83	2.93	3.24	3.55	3.83	4.23	4.89
60	148.261678	-19.970722	2.88	2.98	3.26	3.55	3.85	4.23	4.87
61	148.262453	-19.974990	2.86	2.97	3.29	3.61	3.94	4.28	4.92
62	148.264217	-19.978552	2.86	2.98	3.33	3.66	4.01	4.35	4.95
63	148.267362	-19.982284	2.90	3.01	3.38	3.73	4.08	4.43	5.00
64	148.269158	-19.991273	2.88	3.00	3.43	3.81	4.18	4.59	5.09
65	148.270711	-19.995376	2.86	2.98	3.38	3.77	4.14	4.55	5.05
66	148.274978	-19.996242	2.90	3.01	3.39	3.76	4.14	4.52	5.06
67	148.271075	-19.998710	2.86	2.97	3.37	3.76	4.14	4.57	5.06
68	148.271444	-20.001189	2.86	2.98	3.41	3.80	4.18	4.61	5.12
69	148.274741	-20.002383	2.89	3.00	3.42	3.82	4.18	4.62	5.11
70	148.274049	-20.006756	2.88	3.00	3.44	3.85	4.24	4.67	5.18
71	148.269895	-20.008342	2.86	2.98	3.43	3.85	4.24	4.68	5.20
72	148.272333	-20.012494	2.87	2.99	3.47	3.88	4.28	4.73	5.24
73	148.272977	-20.017247	2.87	3.00	3.47	3.90	4.29	4.75	5.27
74	148.276768	-20.019229	2.88	3.01	3.48	3.89	4.30	4.74	5.27
75	148.274990	-20.022727	2.88	3.01	3.52	3.99	4.39	4.89	5.43
76	148.271586	-20.025926	2.85	2.98	3.53	3.98	4.40	4.91	5.45
77	148.267692	-20.028749	2.82	2.99	3.59	4.05	4.52	5.04	5.56

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	2.73	2.89	3.54	4.06	4.55	5.10	5.63
79	148.261368	-20.026508	2.71	2.87	3.49	3.95	4.42	5.04	5.56
80	148.259291	-20.024495	2.71	2.87	3.51	3.95	4.40	4.98	5.51
81	148.255971	-20.024299	2.71	2.88	3.57	3.97	4.45	5.03	5.54
82	148.252083	-20.021789	2.70	2.87	3.53	3.95	4.42	5.00	5.53
83	148.251245	-20.025777	2.70	2.88	3.59	4.03	4.52	5.10	5.61
84	148.248982	-20.030165	2.73	2.92	3.60	4.06	4.56	5.17	5.66
85	148.245332	-20.033208	2.75	2.94	3.63	4.12	4.61	5.24	5.72
86	148.242842	-20.037255	2.76	2.96	3.68	4.18	4.68	5.32	5.82
87	148.243873	-20.040647	2.77	2.96	3.69	4.20	4.70	5.38	5.87
88	148.244798	-20.044245	2.76	2.96	3.69	4.20	4.70	5.40	5.88
89	148.249032	-20.046574	2.76	2.95	3.68	4.17	4.69	5.39	5.87
90	148.253496	-20.048272	2.76	2.96	3.68	4.17	4.70	5.39	5.88
91	148.257679	-20.050278	2.76	2.97	3.68	4.20	4.78	5.38	5.92
92	148.261930	-20.052620	2.77	2.97	3.71	4.23	4.79	5.35	5.90
93	148.266185	-20.054795	2.76	2.95	3.64	4.14	4.70	5.30	5.89
94	148.269755	-20.058061	2.77	2.95	3.62	4.14	4.67	5.26	5.88
95	148.272686	-20.061626	2.77	2.96	3.63	4.14	4.67	5.26	5.91
96	148.273958	-20.066064	2.77	2.97	3.65	4.18	4.74	5.30	5.96
97	148.277575	-20.069358	2.78	2.99	3.74	4.24	4.76	5.33	6.00
98	148.281505	-20.072299	2.84	3.06	3.77	4.27	4.74	5.34	6.04
99	148.285512	-20.075047	2.86	3.07	3.76	4.28	4.71	5.35	6.05
100	148.290102	-20.076880	2.86	3.06	3.75	4.28	4.68	5.33	6.05
101	148.294498	-20.078324	2.87	3.04	3.73	4.24	4.64	5.30	6.04
102	148.299196	-20.077609	2.87	3.03	3.67	4.19	4.57	5.20	5.98
103	148.300325	-20.081981	2.85	3.06	3.77	4.26	4.69	5.37	6.13
104	148.292584	-20.087326	2.77	2.97	3.74	4.31	4.77	5.48	6.22
105	148.289298	-20.090879	2.78	2.99	3.80	4.39	4.87	5.59	6.31
106	148.290225	-20.095212	2.81	3.03	3.88	4.45	4.91	5.65	6.39
107	148.293279	-20.099028	2.84	3.07	3.89	4.44	4.90	5.66	6.43
108	148.297255	-20.101326	2.85	3.06	3.87	4.43	4.88	5.66	6.45
109	148.302049	-20.101573	2.86	3.08	3.87	4.40	4.83	5.64	6.45
110	148.306507	-20.101082	2.86	3.06	3.84	4.34	4.76	5.56	6.39
111	148.310592	-20.099318	2.86	3.05	3.81	4.31	4.73	5.52	6.34
112	148.315271	-20.098604	2.87	3.05	3.78	4.29	4.69	5.46	6.29
113	148.316742	-20.106603	2.84	3.08	3.93	4.42	4.86	5.75	6.54
114	148.316380	-20.110729	2.82	3.05	3.91	4.44	4.87	5.78	6.58
115	148.319501	-20.114494	2.81	3.04	3.91	4.43	4.87	5.80	6.59
116	148.323564	-20.117222	2.83	3.06	3.92	4.44	4.87	5.81	6.59

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	2.84	3.06	3.92	4.45	4.90	5.84	6.62
118	148.329841	-20.123745	2.83	3.05	3.91	4.48	4.92	5.87	6.64
119	148.333052	-20.127385	2.81	3.06	3.92	4.53	4.96	5.94	6.71
120	148.336234	-20.130719	2.83	3.05	3.92	4.54	4.97	5.96	6.73
121	148.340377	-20.132311	2.84	3.05	3.91	4.54	4.97	5.97	6.75
122	148.344376	-20.134624	2.85	3.06	3.91	4.54	4.98	5.98	6.75
123	148.348920	-20.136182	2.85	3.05	3.90	4.53	4.99	5.98	6.76
124	148.353846	-20.136606	2.84	3.03	3.88	4.50	4.99	5.95	6.74
125	148.358463	-20.137963	2.83	3.02	3.86	4.48	4.98	5.92	6.71
126	148.363418	-20.138398	2.83	3.01	3.84	4.48	4.98	5.90	6.71
127	148.368134	-20.139890	2.84	3.01	3.83	4.45	4.97	5.88	6.71
128	148.372841	-20.141138	2.84	3.01	3.85	4.44	4.95	5.85	6.71
129	148.377743	-20.141775	2.83	3.00	3.84	4.41	4.96	5.83	6.71
130	148.382452	-20.141302	2.83	3.00	3.81	4.37	4.95	5.78	6.67
131	148.386864	-20.139825	2.83	3.00	3.77	4.33	4.93	5.72	6.62
132	148.390878	-20.137479	2.83	3.00	3.73	4.29	4.90	5.66	6.56
133	148.394081	-20.134107	2.81	2.99	3.69	4.24	4.83	5.59	6.46
134	148.398548	-20.132091	2.79	2.98	3.66	4.21	4.82	5.57	6.43
135	148.402767	-20.129617	2.79	2.98	3.62	4.17	4.78	5.52	6.35
136	148.406698	-20.126630	2.78	2.97	3.58	4.13	4.72	5.49	6.28
137	148.410754	-20.123973	2.75	2.96	3.55	4.10	4.68	5.45	6.22
138	148.414721	-20.120973	2.78	2.96	3.51	4.07	4.61	5.40	6.15
139	148.418583	-20.119000	2.78	2.95	3.47	4.03	4.57	5.37	6.10
140	148.423541	-20.118958	2.76	2.95	3.45	4.01	4.57	5.37	6.09
141	148.428185	-20.119954	2.73	2.93	3.43	4.00	4.57	5.37	6.09
142	148.432311	-20.120008	2.72	2.92	3.41	3.97	4.56	5.36	6.08
143	148.435300	-20.116110	2.71	2.91	3.35	3.91	4.47	5.27	5.97
144	148.435935	-20.111416	2.71	2.89	3.32	3.88	4.40	5.21	5.89
145	148.433214	-20.107398	2.72	2.90	3.32	3.87	4.36	5.15	5.85
146	148.429848	-20.103813	2.74	2.93	3.32	3.87	4.33	5.10	5.81
147	148.431249	-20.099813	2.72	2.90	3.29	3.84	4.28	5.02	5.73
148	148.435336	-20.098275	2.70	2.87	3.25	3.80	4.23	4.95	5.67
149	148.436763	-20.093754	2.70	2.87	3.22	3.76	4.17	4.87	5.59
150	148.435056	-20.089252	2.71	2.88	3.23	3.74	4.13	4.78	5.52
151	148.435796	-20.084412	2.70	2.87	3.21	3.71	4.07	4.70	5.43
152	148.436087	-20.079434	2.70	2.87	3.20	3.69	4.01	4.64	5.36
153	148.437662	-20.074881	2.71	2.86	3.16	3.64	3.93	4.56	5.26
154	148.439836	-20.070904	2.71	2.86	3.15	3.63	3.90	4.57	5.21
155	148.439573	-20.066377	2.73	2.88	3.11	3.57	3.81	4.49	5.11

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	2.73	2.89	3.13	3.56	3.80	4.43	5.07
157	148.432583	-20.062790	2.74	2.91	3.18	3.60	3.86	4.46	5.13
158	148.432001	-20.057986	2.78	2.91	3.17	3.57	3.82	4.38	5.04
159	148.434670	-20.053987	2.80	2.91	3.16	3.55	3.81	4.34	4.96
160	148.438544	-20.051181	2.76	2.89	3.13	3.49	3.76	4.27	4.86
161	148.442261	-20.047880	2.70	2.84	3.07	3.42	3.66	4.13	4.72
162	148.442424	-20.043005	2.68	2.78	3.05	3.38	3.64	4.12	4.67
163	148.443219	-20.038793	2.67	2.77	3.03	3.33	3.61	4.08	4.62
164	148.441517	-20.035168	2.68	2.78	3.03	3.32	3.60	4.05	4.58

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

Table D-3 Future climate 2100 sustained peak total water level (mAHD) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	3.24	3.37	3.71	4.04	4.40	5.07	5.26
2	148.086644	-19.883904	3.23	3.37	3.79	4.14	4.58	5.24	5.44
3	148.086750	-19.888545	3.24	3.39	3.87	4.24	4.66	5.34	5.62
4	148.089981	-19.891699	3.25	3.40	3.88	4.26	4.68	5.35	5.66
5	148.091008	-19.896035	3.24	3.40	3.90	4.29	4.71	5.37	5.74
6	148.093536	-19.900072	3.24	3.39	3.91	4.29	4.71	5.37	5.76
7	148.094558	-19.904839	3.24	3.39	3.95	4.36	4.79	5.43	5.90
8	148.098229	-19.907849	3.24	3.39	3.95	4.37	4.79	5.42	5.91
9	148.098545	-19.912567	3.24	3.40	4.00	4.45	4.88	5.48	6.05
10	148.100573	-19.916953	3.24	3.40	3.99	4.45	4.87	5.49	6.08
11	148.103183	-19.921165	3.24	3.41	4.00	4.48	4.89	5.52	6.13
12	148.104466	-19.925655	3.23	3.41	4.03	4.50	4.91	5.54	6.18
13	148.108624	-19.927620	3.23	3.40	4.03	4.49	4.89	5.52	6.17
14	148.113182	-19.929278	3.23	3.40	4.03	4.48	4.87	5.50	6.15
15	148.117375	-19.929729	3.24	3.40	4.01	4.45	4.83	5.47	6.09
16	148.121854	-19.931592	3.24	3.39	3.99	4.43	4.80	5.45	6.04
17	148.125345	-19.933461	3.24	3.39	4.00	4.45	4.81	5.46	6.05
18	148.127812	-19.934900	3.23	3.39	4.00	4.47	4.82	5.46	6.05
19	148.131995	-19.936612	3.23	3.38	4.00	4.46	4.80	5.45	6.01
20	148.136880	-19.937041	3.22	3.37	3.96	4.41	4.74	5.41	5.93
21	148.140824	-19.937192	3.23	3.38	3.96	4.41	4.74	5.41	5.92
22	148.145755	-19.937202	3.23	3.37	3.94	4.38	4.70	5.36	5.88
23	148.150433	-19.937100	3.23	3.37	3.92	4.37	4.68	5.34	5.84
24	148.155285	-19.937381	3.23	3.37	3.91	4.35	4.66	5.32	5.81
25	148.159885	-19.937060	3.23	3.37	3.89	4.33	4.64	5.30	5.78
26	148.164842	-19.937020	3.23	3.36	3.88	4.31	4.65	5.27	5.75
27	148.169661	-19.936777	3.22	3.35	3.84	4.26	4.60	5.20	5.70
28	148.174386	-19.936171	3.22	3.35	3.82	4.23	4.57	5.16	5.68
29	148.178875	-19.934357	3.23	3.35	3.80	4.20	4.54	5.12	5.64
30	148.183291	-19.932014	3.23	3.34	3.76	4.16	4.48	5.05	5.58
31	148.187708	-19.929671	3.23	3.34	3.74	4.12	4.44	5.01	5.53
32	148.192125	-19.927329	3.22	3.33	3.68	4.05	4.34	4.89	5.42
33	148.191727	-19.923601	3.23	3.34	3.67	4.04	4.31	4.88	5.37
34	148.194813	-19.920579	3.26	3.37	3.68	4.02	4.33	4.88	5.35
35	148.197788	-19.923268	3.23	3.35	3.70	4.03	4.36	4.88	5.40
36	148.202372	-19.923354	3.26	3.38	3.73	4.05	4.37	4.91	5.42
37	148.205450	-19.926615	3.24	3.37	3.73	4.05	4.38	4.89	5.44
38	148.209140	-19.929434	3.24	3.37	3.74	4.05	4.39	4.89	5.47

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	3.25	3.38	3.76	4.09	4.43	4.89	5.51
40	148.215627	-19.936786	3.25	3.37	3.76	4.09	4.43	4.88	5.53
41	148.214572	-19.940165	3.23	3.36	3.76	4.11	4.45	4.89	5.57
42	148.212471	-19.944188	3.21	3.34	3.79	4.16	4.49	4.93	5.62
43	148.216694	-19.943252	3.24	3.36	3.78	4.13	4.47	4.89	5.58
44	148.218362	-19.945221	3.24	3.36	3.78	4.13	4.47	4.89	5.61
45	148.220269	-19.947553	3.24	3.36	3.81	4.16	4.50	4.92	5.63
46	148.225065	-19.948444	3.25	3.38	3.82	4.15	4.51	4.93	5.63
47	148.228945	-19.951074	3.25	3.40	3.84	4.18	4.56	4.96	5.65
48	148.232270	-19.954427	3.25	3.40	3.85	4.21	4.59	4.99	5.66
49	148.233553	-19.959077	3.25	3.41	3.86	4.25	4.66	5.05	5.71
50	148.235969	-19.962224	3.25	3.40	3.86	4.26	4.66	5.05	5.72
51	148.239458	-19.964269	3.26	3.42	3.88	4.28	4.67	5.06	5.73
52	148.235834	-19.966574	3.24	3.38	3.87	4.28	4.70	5.09	5.77
53	148.237823	-19.967997	3.25	3.39	3.88	4.31	4.71	5.10	5.78
54	148.241742	-19.969955	3.26	3.40	3.88	4.32	4.69	5.07	5.77
55	148.240437	-19.974113	3.24	3.39	3.91	4.36	4.75	5.13	5.83
56	148.244870	-19.976017	3.24	3.38	3.88	4.33	4.70	5.11	5.80
57	148.249720	-19.976634	3.24	3.38	3.85	4.27	4.64	5.08	5.74
58	148.254453	-19.975668	3.24	3.38	3.83	4.23	4.58	5.02	5.69
59	148.258300	-19.973152	3.23	3.38	3.78	4.15	4.47	4.87	5.59
60	148.261678	-19.970722	3.28	3.43	3.82	4.12	4.48	4.87	5.58
61	148.262453	-19.974990	3.26	3.41	3.84	4.22	4.59	4.94	5.62
62	148.264217	-19.978552	3.27	3.42	3.89	4.27	4.65	5.02	5.67
63	148.267362	-19.982284	3.30	3.45	3.95	4.34	4.74	5.09	5.71
64	148.269158	-19.991273	3.28	3.45	4.00	4.43	4.83	5.27	5.81
65	148.270711	-19.995376	3.27	3.43	3.96	4.39	4.79	5.24	5.78
66	148.274978	-19.996242	3.30	3.46	3.97	4.39	4.79	5.21	5.78
67	148.271075	-19.998710	3.27	3.42	3.95	4.39	4.80	5.25	5.79
68	148.271444	-20.001189	3.27	3.43	3.99	4.43	4.85	5.30	5.85
69	148.274741	-20.002383	3.29	3.45	4.00	4.44	4.86	5.30	5.85
70	148.274049	-20.006756	3.28	3.44	4.02	4.49	4.91	5.37	5.91
71	148.269895	-20.008342	3.25	3.42	4.01	4.49	4.91	5.38	5.95
72	148.272333	-20.012494	3.28	3.45	4.05	4.53	4.96	5.43	5.98
73	148.272977	-20.017247	3.28	3.44	4.05	4.53	4.96	5.46	6.02
74	148.276768	-20.019229	3.28	3.45	4.05	4.52	4.97	5.45	6.02
75	148.274990	-20.022727	3.28	3.48	4.13	4.64	5.09	5.63	6.18
76	148.271586	-20.025926	3.26	3.45	4.13	4.64	5.10	5.66	6.20
77	148.267692	-20.028749	3.23	3.46	4.18	4.70	5.23	5.79	6.32

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	3.14	3.36	4.12	4.69	5.26	5.87	6.41
79	148.261368	-20.026508	3.12	3.34	4.08	4.58	5.13	5.79	6.33
80	148.259291	-20.024495	3.12	3.33	4.08	4.57	5.12	5.74	6.26
81	148.255971	-20.024299	3.12	3.35	4.12	4.60	5.17	5.79	6.30
82	148.252083	-20.021789	3.11	3.34	4.10	4.58	5.15	5.79	6.28
83	148.251245	-20.025777	3.12	3.35	4.16	4.67	5.24	5.88	6.38
84	148.248982	-20.030165	3.15	3.40	4.19	4.71	5.29	5.94	6.45
85	148.245332	-20.033208	3.17	3.43	4.22	4.75	5.33	6.01	6.50
86	148.242842	-20.037255	3.18	3.47	4.28	4.83	5.40	6.09	6.60
87	148.243873	-20.040647	3.19	3.48	4.30	4.87	5.42	6.14	6.64
88	148.244798	-20.044245	3.18	3.48	4.31	4.86	5.43	6.16	6.66
89	148.249032	-20.046574	3.18	3.46	4.27	4.84	5.40	6.13	6.62
90	148.253496	-20.048272	3.17	3.46	4.25	4.83	5.41	6.13	6.65
91	148.257679	-20.050278	3.18	3.44	4.25	4.82	5.49	6.16	6.68
92	148.261930	-20.052620	3.19	3.45	4.27	4.86	5.51	6.12	6.67
93	148.266185	-20.054795	3.17	3.43	4.23	4.78	5.41	6.08	6.65
94	148.269755	-20.058061	3.17	3.43	4.22	4.77	5.38	6.02	6.64
95	148.272686	-20.061626	3.17	3.43	4.23	4.78	5.37	6.01	6.68
96	148.273958	-20.066064	3.17	3.44	4.25	4.81	5.43	6.07	6.73
97	148.277575	-20.069358	3.19	3.47	4.34	4.91	5.46	6.10	6.78
98	148.281505	-20.072299	3.24	3.52	4.38	4.92	5.45	6.13	6.82
99	148.285512	-20.075047	3.26	3.54	4.36	4.92	5.43	6.12	6.83
100	148.290102	-20.076880	3.26	3.53	4.34	4.92	5.41	6.11	6.84
101	148.294498	-20.078324	3.26	3.51	4.30	4.89	5.38	6.07	6.83
102	148.299196	-20.077609	3.27	3.50	4.24	4.83	5.30	5.97	6.76
103	148.300325	-20.081981	3.24	3.52	4.35	4.92	5.41	6.14	6.92
104	148.292584	-20.087326	3.18	3.44	4.31	4.95	5.47	6.27	7.01
105	148.289298	-20.090879	3.19	3.48	4.38	5.08	5.58	6.39	7.13
106	148.290225	-20.095212	3.21	3.52	4.46	5.16	5.63	6.47	7.21
107	148.293279	-20.099028	3.24	3.55	4.47	5.14	5.62	6.48	7.26
108	148.297255	-20.101326	3.24	3.54	4.47	5.11	5.61	6.47	7.26
109	148.302049	-20.101573	3.26	3.55	4.46	5.07	5.56	6.45	7.26
110	148.306507	-20.101082	3.26	3.52	4.41	5.01	5.47	6.35	7.20
111	148.310592	-20.099318	3.26	3.51	4.38	4.97	5.43	6.29	7.14
112	148.315271	-20.098604	3.25	3.51	4.35	4.92	5.39	6.23	7.09
113	148.316742	-20.106603	3.23	3.52	4.49	5.11	5.60	6.57	7.34
114	148.316380	-20.110729	3.22	3.49	4.49	5.12	5.60	6.59	7.38
115	148.319501	-20.114494	3.21	3.47	4.47	5.11	5.59	6.60	7.40
116	148.323564	-20.117222	3.22	3.50	4.47	5.09	5.58	6.61	7.41

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	3.22	3.50	4.47	5.09	5.59	6.64	7.44
118	148.329841	-20.123745	3.21	3.49	4.46	5.10	5.60	6.66	7.46
119	148.333052	-20.127385	3.21	3.50	4.47	5.12	5.65	6.72	7.50
120	148.336234	-20.130719	3.20	3.49	4.47	5.13	5.67	6.74	7.54
121	148.340377	-20.132311	3.20	3.49	4.47	5.14	5.68	6.77	7.56
122	148.344376	-20.134624	3.21	3.49	4.47	5.16	5.68	6.76	7.57
123	148.348920	-20.136182	3.21	3.49	4.47	5.18	5.69	6.76	7.59
124	148.353846	-20.136606	3.21	3.48	4.46	5.17	5.67	6.72	7.56
125	148.358463	-20.137963	3.20	3.48	4.44	5.13	5.66	6.69	7.54
126	148.363418	-20.138398	3.20	3.47	4.43	5.10	5.65	6.68	7.53
127	148.368134	-20.139890	3.19	3.46	4.42	5.08	5.63	6.65	7.53
128	148.372841	-20.141138	3.19	3.46	4.41	5.05	5.63	6.63	7.53
129	148.377743	-20.141775	3.18	3.44	4.40	5.02	5.62	6.59	7.52
130	148.382452	-20.141302	3.17	3.43	4.37	4.98	5.61	6.53	7.48
131	148.386864	-20.139825	3.17	3.42	4.34	4.94	5.59	6.48	7.43
132	148.390878	-20.137479	3.16	3.41	4.31	4.89	5.55	6.44	7.37
133	148.394081	-20.134107	3.15	3.40	4.27	4.83	5.49	6.37	7.26
134	148.398548	-20.132091	3.15	3.39	4.24	4.80	5.48	6.34	7.23
135	148.402767	-20.129617	3.15	3.39	4.20	4.76	5.43	6.28	7.15
136	148.406698	-20.126630	3.14	3.38	4.16	4.71	5.39	6.22	7.07
137	148.410754	-20.123973	3.14	3.38	4.11	4.68	5.35	6.17	7.01
138	148.414721	-20.120973	3.13	3.37	4.06	4.63	5.28	6.11	6.92
139	148.418583	-20.119000	3.13	3.36	4.02	4.59	5.23	6.07	6.87
140	148.423541	-20.118958	3.12	3.36	3.99	4.57	5.22	6.06	6.86
141	148.428185	-20.119954	3.12	3.34	3.96	4.56	5.21	6.05	6.86
142	148.432311	-20.120008	3.11	3.33	3.94	4.54	5.20	6.03	6.84
143	148.435300	-20.116110	3.11	3.30	3.89	4.49	5.11	5.95	6.73
144	148.435935	-20.111416	3.10	3.27	3.86	4.45	5.04	5.88	6.64
145	148.433214	-20.107398	3.11	3.31	3.87	4.45	5.01	5.85	6.59
146	148.429848	-20.103813	3.12	3.33	3.86	4.45	4.97	5.79	6.55
147	148.431249	-20.099813	3.11	3.31	3.83	4.41	4.92	5.72	6.47
148	148.435336	-20.098275	3.09	3.24	3.79	4.38	4.87	5.66	6.41
149	148.436763	-20.093754	3.10	3.24	3.75	4.35	4.80	5.59	6.33
150	148.435056	-20.089252	3.10	3.28	3.74	4.32	4.75	5.51	6.25
151	148.435796	-20.084412	3.10	3.26	3.71	4.27	4.68	5.42	6.16
152	148.436087	-20.079434	3.10	3.26	3.70	4.25	4.62	5.33	6.08
153	148.437662	-20.074881	3.10	3.25	3.67	4.20	4.54	5.23	5.98
154	148.439836	-20.070904	3.10	3.25	3.67	4.19	4.54	5.24	5.93
155	148.439573	-20.066377	3.12	3.28	3.64	4.14	4.46	5.15	5.83

Recommended Sustained Peak Total Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	3.12	3.30	3.65	4.14	4.44	5.08	5.79
157	148.432583	-20.062790	3.12	3.32	3.70	4.16	4.50	5.11	5.85
158	148.432001	-20.057986	3.15	3.33	3.70	4.13	4.46	5.03	5.76
159	148.434670	-20.053987	3.15	3.33	3.69	4.11	4.42	4.99	5.67
160	148.438544	-20.051181	3.13	3.30	3.65	4.06	4.37	4.91	5.57
161	148.442261	-20.047880	3.09	3.22	3.58	3.98	4.26	4.77	5.41
162	148.442424	-20.043005	3.07	3.19	3.54	3.95	4.23	4.76	5.37
163	148.443219	-20.038793	3.07	3.17	3.51	3.91	4.18	4.73	5.32
164	148.441517	-20.035168	3.07	3.19	3.52	3.89	4.16	4.70	5.28

Appendix E Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

Table E-1 Current climate 2017 coastal zone total water level (mAHD) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	3.05	3.26	3.55	3.81	4.18	4.82	5.02
2	148.086644	-19.883904	3.01	3.23	3.55	3.84	4.30	4.88	5.13
3	148.086750	-19.888545	3.01	3.23	3.57	3.88	4.35	4.96	5.22
4	148.089981	-19.891699	3.02	3.25	3.58	3.91	4.38	4.99	5.27
5	148.091008	-19.896035	3.00	3.22	3.56	3.92	4.38	4.97	5.30
6	148.093536	-19.900072	3.00	3.22	3.56	3.93	4.35	4.97	5.33
7	148.094558	-19.904839	2.99	3.22	3.60	3.98	4.40	5.02	5.43
8	148.098229	-19.907849	2.99	3.22	3.61	3.98	4.39	5.02	5.45
9	148.098545	-19.912567	2.97	3.20	3.64	4.02	4.46	5.05	5.54
10	148.100573	-19.916953	2.97	3.19	3.63	4.03	4.44	5.05	5.56
11	148.103183	-19.921165	2.96	3.19	3.64	4.05	4.45	5.03	5.61
12	148.104466	-19.925655	2.93	3.16	3.62	4.04	4.42	5.01	5.62
13	148.108624	-19.927620	2.93	3.15	3.61	4.04	4.39	4.98	5.61
14	148.113182	-19.929278	2.93	3.16	3.59	4.01	4.36	4.97	5.61
15	148.117375	-19.929729	2.94	3.17	3.59	4.00	4.33	4.95	5.58
16	148.121854	-19.931592	2.95	3.17	3.57	3.99	4.33	4.92	5.55
17	148.125345	-19.933461	2.95	3.18	3.58	4.01	4.35	4.93	5.57
18	148.127812	-19.934900	2.94	3.16	3.58	4.01	4.34	4.92	5.57
19	148.131995	-19.936612	2.93	3.16	3.58	4.00	4.34	4.89	5.54
20	148.136880	-19.937041	2.92	3.14	3.53	3.96	4.29	4.83	5.48
21	148.140824	-19.937192	2.93	3.17	3.55	3.98	4.30	4.85	5.49
22	148.145755	-19.937202	2.93	3.17	3.54	3.95	4.26	4.82	5.46
23	148.150433	-19.937100	2.93	3.18	3.55	3.95	4.26	4.81	5.44
24	148.155285	-19.937381	2.92	3.17	3.54	3.94	4.25	4.81	5.42
25	148.159885	-19.937060	2.92	3.18	3.54	3.93	4.22	4.79	5.40
26	148.164842	-19.937020	2.92	3.18	3.53	3.92	4.22	4.78	5.38
27	148.169661	-19.936777	2.91	3.16	3.49	3.88	4.17	4.74	5.33
28	148.174386	-19.936171	2.91	3.16	3.48	3.86	4.14	4.69	5.30
29	148.178875	-19.934357	2.93	3.18	3.49	3.83	4.13	4.68	5.29
30	148.183291	-19.932014	2.95	3.18	3.49	3.79	4.10	4.67	5.22
31	148.187708	-19.929671	2.96	3.18	3.49	3.76	4.07	4.64	5.19
32	148.192125	-19.927329	2.97	3.15	3.42	3.68	3.95	4.53	5.05
33	148.191727	-19.923601	2.99	3.18	3.45	3.70	3.97	4.55	5.03
34	148.194813	-19.920579	3.04	3.27	3.55	3.78	4.07	4.62	5.10
35	148.197788	-19.923268	3.00	3.22	3.50	3.73	4.04	4.56	5.10
36	148.202372	-19.923354	3.04	3.29	3.59	3.82	4.12	4.65	5.17
37	148.205450	-19.926615	3.02	3.25	3.54	3.78	4.11	4.60	5.16
38	148.209140	-19.929434	3.03	3.25	3.54	3.79	4.12	4.60	5.18

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	3.03	3.25	3.54	3.78	4.13	4.60	5.19
40	148.215627	-19.936786	3.04	3.25	3.55	3.79	4.13	4.59	5.21
41	148.214572	-19.940165	2.99	3.18	3.49	3.76	4.08	4.56	5.20
42	148.212471	-19.944188	2.94	3.13	3.46	3.77	4.06	4.54	5.21
43	148.216694	-19.943252	3.00	3.20	3.50	3.78	4.09	4.56	5.21
44	148.218362	-19.945221	2.99	3.18	3.49	3.77	4.10	4.55	5.23
45	148.220269	-19.947553	2.97	3.19	3.51	3.81	4.12	4.57	5.25
46	148.225065	-19.948444	3.01	3.22	3.55	3.83	4.17	4.61	5.28
47	148.228945	-19.951074	3.02	3.24	3.57	3.86	4.22	4.64	5.30
48	148.232270	-19.954427	3.02	3.24	3.57	3.87	4.24	4.66	5.31
49	148.233553	-19.959077	3.00	3.23	3.57	3.91	4.27	4.69	5.34
50	148.235969	-19.962224	2.99	3.23	3.57	3.92	4.27	4.69	5.35
51	148.239458	-19.964269	3.01	3.26	3.62	3.96	4.30	4.73	5.40
52	148.235834	-19.966574	2.95	3.15	3.51	3.88	4.24	4.65	5.34
53	148.237823	-19.967997	2.97	3.19	3.54	3.92	4.28	4.69	5.36
54	148.241742	-19.969955	2.98	3.23	3.57	3.95	4.27	4.71	5.39
55	148.240437	-19.974113	2.93	3.17	3.54	3.93	4.27	4.70	5.40
56	148.244870	-19.976017	2.92	3.17	3.53	3.90	4.24	4.67	5.38
57	148.249720	-19.976634	2.93	3.18	3.53	3.87	4.20	4.66	5.34
58	148.254453	-19.975668	2.94	3.18	3.52	3.84	4.17	4.64	5.30
59	148.258300	-19.973152	2.94	3.18	3.51	3.82	4.11	4.56	5.24
60	148.261678	-19.970722	3.06	3.34	3.67	3.95	4.30	4.71	5.34
61	148.262453	-19.974990	2.99	3.26	3.61	3.93	4.31	4.71	5.32
62	148.264217	-19.978552	2.99	3.28	3.65	3.99	4.38	4.78	5.36
63	148.267362	-19.982284	3.05	3.37	3.76	4.13	4.54	4.92	5.48
64	148.269158	-19.991273	3.01	3.31	3.73	4.11	4.53	4.96	5.51
65	148.270711	-19.995376	2.99	3.25	3.64	4.02	4.44	4.87	5.43
66	148.274978	-19.996242	3.04	3.34	3.73	4.12	4.53	4.94	5.51
67	148.271075	-19.998710	2.99	3.21	3.59	3.97	4.41	4.84	5.38
68	148.271444	-20.001189	3.00	3.22	3.63	4.01	4.44	4.89	5.42
69	148.274741	-20.002383	3.03	3.30	3.71	4.08	4.52	4.95	5.51
70	148.274049	-20.006756	3.00	3.30	3.73	4.13	4.56	5.02	5.55
71	148.269895	-20.008342	2.95	3.21	3.64	4.06	4.46	4.95	5.47
72	148.272333	-20.012494	2.96	3.27	3.72	4.12	4.52	5.02	5.57
73	148.272977	-20.017247	2.95	3.25	3.69	4.11	4.50	5.01	5.59
74	148.276768	-20.019229	2.95	3.28	3.73	4.14	4.53	5.04	5.65
75	148.274990	-20.022727	2.92	3.19	3.66	4.08	4.54	5.05	5.67
76	148.271586	-20.025926	2.86	3.13	3.60	4.04	4.51	5.04	5.63
77	148.267692	-20.028749	2.63	3.03	3.61	4.08	4.55	5.07	5.69

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	2.54	2.73	3.29	3.93	4.46	5.06	5.64
79	148.261368	-20.026508	2.49	2.68	3.18	3.66	4.15	4.86	5.49
80	148.259291	-20.024495	2.48	2.67	3.18	3.66	4.14	4.66	5.35
81	148.255971	-20.024299	2.48	2.68	3.24	3.72	4.19	4.73	5.33
82	148.252083	-20.021789	2.47	2.63	3.17	3.61	4.10	4.66	5.26
83	148.251245	-20.025777	2.48	2.65	3.34	3.80	4.31	4.85	5.41
84	148.248982	-20.030165	2.52	2.72	3.32	3.83	4.34	4.90	5.47
85	148.245332	-20.033208	2.54	2.74	3.33	3.84	4.37	4.95	5.51
86	148.242842	-20.037255	2.56	2.78	3.41	3.92	4.44	5.06	5.62
87	148.243873	-20.040647	2.56	2.79	3.43	3.96	4.46	5.12	5.65
88	148.244798	-20.044245	2.54	2.78	3.41	3.96	4.45	5.14	5.67
89	148.249032	-20.046574	2.54	2.77	3.39	3.95	4.45	5.12	5.70
90	148.253496	-20.048272	2.55	2.80	3.42	3.96	4.51	5.17	5.85
91	148.257679	-20.050278	2.58	2.82	3.45	4.05	4.74	5.38	5.97
92	148.261930	-20.052620	2.60	2.85	3.54	4.22	4.78	5.39	5.97
93	148.266185	-20.054795	2.58	2.82	3.41	3.97	4.51	5.24	5.91
94	148.269755	-20.058061	2.59	2.83	3.41	3.98	4.49	5.21	5.89
95	148.272686	-20.061626	2.59	2.84	3.44	4.03	4.52	5.24	5.96
96	148.273958	-20.066064	2.59	2.84	3.46	4.07	4.69	5.37	6.02
97	148.277575	-20.069358	2.61	2.92	3.74	4.30	4.84	5.43	6.10
98	148.281505	-20.072299	2.79	3.12	3.80	4.40	4.84	5.45	6.14
99	148.285512	-20.075047	2.84	3.16	3.79	4.39	4.81	5.42	6.20
100	148.290102	-20.076880	2.86	3.19	3.80	4.38	4.78	5.42	6.22
101	148.294498	-20.078324	2.86	3.16	3.77	4.32	4.72	5.37	6.21
102	148.299196	-20.077609	2.90	3.22	3.79	4.28	4.71	5.31	6.20
103	148.300325	-20.081981	2.81	3.14	3.83	4.37	4.80	5.45	6.30
104	148.292584	-20.087326	2.59	2.82	3.51	4.18	4.68	5.45	6.22
105	148.289298	-20.090879	2.57	2.84	3.59	4.33	4.78	5.56	6.31
106	148.290225	-20.095212	2.64	2.93	3.83	4.41	4.92	5.65	6.42
107	148.293279	-20.099028	2.73	3.08	3.84	4.42	4.93	5.66	6.46
108	148.297255	-20.101326	2.76	3.07	3.82	4.40	4.92	5.65	6.47
109	148.302049	-20.101573	2.80	3.11	3.83	4.44	4.92	5.63	6.52
110	148.306507	-20.101082	2.81	3.12	3.80	4.39	4.85	5.54	6.48
111	148.310592	-20.099318	2.82	3.14	3.81	4.40	4.85	5.54	6.48
112	148.315271	-20.098604	2.82	3.17	3.82	4.40	4.83	5.53	6.46
113	148.316742	-20.106603	2.75	3.12	3.87	4.46	4.94	5.71	6.62
114	148.316380	-20.110729	2.69	3.02	3.86	4.46	4.96	5.74	6.63
115	148.319501	-20.114494	2.67	2.99	3.84	4.44	4.95	5.74	6.64
116	148.323564	-20.117222	2.72	3.10	3.86	4.50	4.96	5.75	6.66

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	2.72	3.11	3.87	4.52	4.97	5.78	6.68
118	148.329841	-20.123745	2.70	3.09	3.85	4.53	4.99	5.81	6.69
119	148.333052	-20.127385	2.68	3.08	3.87	4.55	5.01	5.88	6.74
120	148.336234	-20.130719	2.67	3.08	3.87	4.55	4.99	5.89	6.74
121	148.340377	-20.132311	2.67	3.09	3.88	4.56	4.98	5.90	6.76
122	148.344376	-20.134624	2.68	3.09	3.87	4.54	4.98	5.91	6.75
123	148.348920	-20.136182	2.67	3.08	3.87	4.51	4.98	5.90	6.76
124	148.353846	-20.136606	2.67	3.08	3.87	4.50	4.98	5.88	6.73
125	148.358463	-20.137963	2.66	3.07	3.86	4.47	4.98	5.86	6.72
126	148.363418	-20.138398	2.65	3.07	3.85	4.47	5.00	5.85	6.72
127	148.368134	-20.139890	2.64	3.06	3.82	4.46	5.00	5.82	6.72
128	148.372841	-20.141138	2.64	3.06	3.81	4.46	5.01	5.80	6.73
129	148.377743	-20.141775	2.63	3.05	3.77	4.43	5.00	5.77	6.71
130	148.382452	-20.141302	2.61	3.03	3.73	4.39	4.96	5.71	6.67
131	148.386864	-20.139825	2.59	3.03	3.68	4.37	4.94	5.67	6.65
132	148.390878	-20.137479	2.59	3.04	3.65	4.34	4.90	5.62	6.58
133	148.394081	-20.134107	2.59	3.04	3.62	4.30	4.84	5.56	6.49
134	148.398548	-20.132091	2.56	3.03	3.60	4.27	4.83	5.55	6.48
135	148.402767	-20.129617	2.55	3.02	3.56	4.22	4.77	5.50	6.41
136	148.406698	-20.126630	2.54	3.02	3.54	4.18	4.73	5.47	6.35
137	148.410754	-20.123973	2.54	3.01	3.51	4.16	4.67	5.46	6.31
138	148.414721	-20.120973	2.52	3.01	3.48	4.13	4.61	5.41	6.24
139	148.418583	-20.119000	2.51	3.00	3.45	4.10	4.57	5.37	6.18
140	148.423541	-20.118958	2.50	2.99	3.42	4.08	4.55	5.38	6.16
141	148.428185	-20.119954	2.49	2.97	3.38	4.03	4.55	5.37	6.15
142	148.432311	-20.120008	2.46	2.92	3.35	4.00	4.52	5.34	6.10
143	148.435300	-20.116110	2.46	2.75	3.32	3.92	4.42	5.25	6.00
144	148.435935	-20.111416	2.46	2.72	3.29	3.87	4.36	5.17	5.92
145	148.433214	-20.107398	2.48	2.88	3.31	3.89	4.35	5.12	5.91
146	148.429848	-20.103813	2.51	2.97	3.35	3.90	4.34	5.10	5.89
147	148.431249	-20.099813	2.48	2.87	3.32	3.86	4.30	5.02	5.82
148	148.435336	-20.098275	2.46	2.70	3.26	3.75	4.21	4.90	5.69
149	148.436763	-20.093754	2.46	2.71	3.23	3.72	4.15	4.83	5.63
150	148.435056	-20.089252	2.50	2.83	3.26	3.74	4.14	4.80	5.57
151	148.435796	-20.084412	2.49	2.76	3.25	3.70	4.09	4.74	5.49
152	148.436087	-20.079434	2.49	2.76	3.25	3.70	4.06	4.69	5.43
153	148.437662	-20.074881	2.49	2.74	3.23	3.64	3.99	4.62	5.34
154	148.439836	-20.070904	2.49	2.73	3.20	3.61	3.92	4.58	5.28
155	148.439573	-20.066377	2.55	2.89	3.22	3.56	3.89	4.54	5.23

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	2.56	2.93	3.26	3.59	3.93	4.54	5.23
157	148.432583	-20.062790	2.57	2.98	3.33	3.70	4.03	4.64	5.35
158	148.432001	-20.057986	2.63	3.01	3.33	3.66	3.99	4.55	5.24
159	148.434670	-20.053987	2.64	3.02	3.34	3.65	3.98	4.55	5.17
160	148.438544	-20.051181	2.61	2.97	3.28	3.58	3.91	4.46	5.06
161	148.442261	-20.047880	2.50	2.78	3.19	3.46	3.81	4.27	4.88
162	148.442424	-20.043005	2.48	2.65	3.16	3.40	3.79	4.25	4.82
163	148.443219	-20.038793	2.46	2.62	3.12	3.33	3.71	4.18	4.74
164	148.441517	-20.035168	2.48	2.66	3.14	3.35	3.74	4.20	4.72

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

Table E-2 Future climate 2050 coastal zone total water level (mAHD) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	3.63	3.80	4.15	4.53	4.91	5.59	5.78
2	148.086644	-19.883904	3.60	3.76	4.19	4.57	5.03	5.68	5.90
3	148.086750	-19.888545	3.60	3.76	4.23	4.63	5.10	5.76	6.04
4	148.089981	-19.891699	3.61	3.78	4.25	4.66	5.13	5.79	6.09
5	148.091008	-19.896035	3.59	3.76	4.25	4.65	5.13	5.78	6.13
6	148.093536	-19.900072	3.60	3.76	4.25	4.65	5.14	5.79	6.16
7	148.094558	-19.904839	3.59	3.76	4.30	4.71	5.20	5.83	6.27
8	148.098229	-19.907849	3.59	3.76	4.30	4.70	5.20	5.83	6.30
9	148.098545	-19.912567	3.56	3.73	4.32	4.75	5.26	5.86	6.40
10	148.100573	-19.916953	3.55	3.72	4.31	4.75	5.25	5.86	6.42
11	148.103183	-19.921165	3.54	3.72	4.33	4.77	5.26	5.88	6.47
12	148.104466	-19.925655	3.51	3.68	4.32	4.77	5.23	5.87	6.49
13	148.108624	-19.927620	3.51	3.68	4.33	4.76	5.21	5.85	6.49
14	148.113182	-19.929278	3.51	3.68	4.32	4.74	5.18	5.83	6.48
15	148.117375	-19.929729	3.53	3.70	4.30	4.72	5.15	5.82	6.44
16	148.121854	-19.931592	3.53	3.69	4.28	4.71	5.13	5.81	6.40
17	148.125345	-19.933461	3.53	3.70	4.30	4.74	5.13	5.83	6.41
18	148.127812	-19.934900	3.52	3.68	4.29	4.73	5.11	5.82	6.40
19	148.131995	-19.936612	3.51	3.68	4.28	4.73	5.10	5.80	6.37
20	148.136880	-19.937041	3.50	3.66	4.23	4.69	5.04	5.72	6.30
21	148.140824	-19.937192	3.52	3.67	4.24	4.70	5.05	5.75	6.31
22	148.145755	-19.937202	3.52	3.67	4.22	4.68	5.04	5.71	6.27
23	148.150433	-19.937100	3.53	3.68	4.22	4.67	5.04	5.70	6.25
24	148.155285	-19.937381	3.52	3.68	4.22	4.65	5.02	5.69	6.23
25	148.159885	-19.937060	3.53	3.68	4.20	4.63	5.00	5.67	6.20
26	148.164842	-19.937020	3.53	3.68	4.19	4.62	5.00	5.66	6.18
27	148.169661	-19.936777	3.51	3.66	4.16	4.57	4.97	5.60	6.12
28	148.174386	-19.936171	3.52	3.66	4.14	4.55	4.94	5.56	6.10
29	148.178875	-19.934357	3.53	3.68	4.13	4.54	4.94	5.54	6.08
30	148.183291	-19.932014	3.54	3.69	4.11	4.51	4.89	5.49	6.02
31	148.187708	-19.929671	3.54	3.68	4.10	4.48	4.84	5.45	5.98
32	148.192125	-19.927329	3.52	3.65	4.00	4.36	4.70	5.30	5.83
33	148.191727	-19.923601	3.55	3.68	4.01	4.36	4.70	5.31	5.82
34	148.194813	-19.920579	3.64	3.78	4.10	4.43	4.81	5.39	5.87
35	148.197788	-19.923268	3.59	3.73	4.07	4.39	4.79	5.35	5.88
36	148.202372	-19.923354	3.66	3.81	4.17	4.49	4.87	5.44	5.95
37	148.205450	-19.926615	3.62	3.77	4.13	4.46	4.86	5.38	5.94
38	148.209140	-19.929434	3.61	3.77	4.14	4.48	4.87	5.37	5.97

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	3.62	3.77	4.15	4.50	4.89	5.36	5.99
40	148.215627	-19.936786	3.62	3.77	4.15	4.51	4.89	5.36	6.01
41	148.214572	-19.940165	3.55	3.70	4.10	4.46	4.85	5.32	5.99
42	148.212471	-19.944188	3.50	3.65	4.09	4.47	4.87	5.32	6.01
43	148.216694	-19.943252	3.56	3.71	4.13	4.48	4.88	5.32	6.01
44	148.218362	-19.945221	3.56	3.70	4.12	4.49	4.87	5.31	6.03
45	148.220269	-19.947553	3.55	3.70	4.14	4.51	4.90	5.35	6.06
46	148.225065	-19.948444	3.59	3.74	4.17	4.54	4.93	5.37	6.08
47	148.228945	-19.951074	3.60	3.77	4.19	4.56	4.98	5.42	6.11
48	148.232270	-19.954427	3.61	3.77	4.21	4.58	5.02	5.45	6.12
49	148.233553	-19.959077	3.59	3.76	4.23	4.61	5.08	5.49	6.15
50	148.235969	-19.962224	3.59	3.76	4.23	4.62	5.08	5.49	6.16
51	148.239458	-19.964269	3.63	3.80	4.27	4.67	5.12	5.53	6.21
52	148.235834	-19.966574	3.52	3.69	4.17	4.60	5.05	5.46	6.15
53	148.237823	-19.967997	3.55	3.72	4.21	4.64	5.08	5.49	6.19
54	148.241742	-19.969955	3.59	3.75	4.24	4.67	5.08	5.50	6.21
55	148.240437	-19.974113	3.53	3.69	4.21	4.66	5.07	5.50	6.22
56	148.244870	-19.976017	3.52	3.68	4.20	4.62	5.02	5.48	6.19
57	148.249720	-19.976634	3.53	3.69	4.17	4.58	4.97	5.46	6.16
58	148.254453	-19.975668	3.53	3.69	4.16	4.54	4.93	5.44	6.12
59	148.258300	-19.973152	3.53	3.70	4.14	4.52	4.87	5.33	6.05
60	148.261678	-19.970722	3.70	3.88	4.28	4.67	5.04	5.45	6.15
61	148.262453	-19.974990	3.62	3.80	4.26	4.66	5.07	5.45	6.14
62	148.264217	-19.978552	3.63	3.83	4.30	4.73	5.14	5.53	6.20
63	148.267362	-19.982284	3.72	3.91	4.43	4.88	5.29	5.69	6.30
64	148.269158	-19.991273	3.66	3.85	4.41	4.89	5.32	5.78	6.33
65	148.270711	-19.995376	3.60	3.79	4.32	4.79	5.23	5.68	6.25
66	148.274978	-19.996242	3.69	3.88	4.40	4.87	5.31	5.74	6.34
67	148.271075	-19.998710	3.57	3.75	4.27	4.75	5.18	5.66	6.20
68	148.271444	-20.001189	3.58	3.76	4.31	4.79	5.23	5.70	6.25
69	148.274741	-20.002383	3.65	3.84	4.39	4.88	5.30	5.78	6.33
70	148.274049	-20.006756	3.64	3.83	4.40	4.91	5.36	5.84	6.38
71	148.269895	-20.008342	3.56	3.74	4.31	4.81	5.28	5.76	6.32
72	148.272333	-20.012494	3.61	3.79	4.40	4.90	5.37	5.86	6.41
73	148.272977	-20.017247	3.59	3.78	4.39	4.89	5.35	5.87	6.43
74	148.276768	-20.019229	3.62	3.82	4.43	4.92	5.40	5.90	6.48
75	148.274990	-20.022727	3.53	3.73	4.36	4.91	5.38	5.93	6.52
76	148.271586	-20.025926	3.46	3.66	4.34	4.85	5.35	5.92	6.49
77	148.267692	-20.028749	3.36	3.62	4.35	4.87	5.43	6.01	6.56

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	3.08	3.28	4.07	4.77	5.36	5.97	6.56
79	148.261368	-20.026508	3.01	3.22	3.93	4.43	4.95	5.76	6.34
80	148.259291	-20.024495	2.99	3.20	3.93	4.42	4.91	5.54	6.14
81	148.255971	-20.024299	2.99	3.23	4.03	4.46	4.98	5.62	6.16
82	148.252083	-20.021789	2.96	3.18	3.92	4.37	4.90	5.54	6.11
83	148.251245	-20.025777	2.98	3.20	4.08	4.57	5.11	5.73	6.26
84	148.248982	-20.030165	3.05	3.29	4.07	4.58	5.13	5.79	6.32
85	148.245332	-20.033208	3.07	3.31	4.10	4.64	5.18	5.87	6.38
86	148.242842	-20.037255	3.11	3.35	4.18	4.71	5.28	5.97	6.50
87	148.243873	-20.040647	3.12	3.37	4.20	4.76	5.31	6.05	6.64
88	148.244798	-20.044245	3.11	3.36	4.18	4.73	5.28	6.07	6.62
89	148.249032	-20.046574	3.10	3.36	4.18	4.72	5.28	6.07	6.66
90	148.253496	-20.048272	3.12	3.37	4.21	4.76	5.33	6.19	6.77
91	148.257679	-20.050278	3.15	3.42	4.26	4.89	5.58	6.31	6.89
92	148.261930	-20.052620	3.18	3.45	4.38	5.00	5.66	6.29	6.89
93	148.266185	-20.054795	3.15	3.39	4.19	4.77	5.42	6.21	6.86
94	148.269755	-20.058061	3.16	3.40	4.18	4.77	5.37	6.14	6.84
95	148.272686	-20.061626	3.17	3.42	4.21	4.80	5.40	6.18	6.89
96	148.273958	-20.066064	3.17	3.45	4.25	4.87	5.56	6.24	6.94
97	148.277575	-20.069358	3.20	3.51	4.51	5.07	5.68	6.32	7.04
98	148.281505	-20.072299	3.40	3.75	4.59	5.18	5.69	6.38	7.14
99	148.285512	-20.075047	3.46	3.77	4.61	5.17	5.65	6.38	7.15
100	148.290102	-20.076880	3.46	3.76	4.60	5.18	5.62	6.38	7.15
101	148.294498	-20.078324	3.48	3.73	4.56	5.12	5.57	6.34	7.12
102	148.299196	-20.077609	3.49	3.76	4.53	5.11	5.56	6.26	7.11
103	148.300325	-20.081981	3.44	3.76	4.63	5.17	5.68	6.43	7.23
104	148.292584	-20.087326	3.15	3.42	4.30	5.04	5.57	6.39	7.17
105	148.289298	-20.090879	3.16	3.45	4.38	5.13	5.69	6.51	7.27
106	148.290225	-20.095212	3.25	3.56	4.61	5.28	5.79	6.60	7.41
107	148.293279	-20.099028	3.33	3.68	4.64	5.29	5.78	6.61	7.43
108	148.297255	-20.101326	3.37	3.68	4.63	5.27	5.76	6.60	7.44
109	148.302049	-20.101573	3.43	3.75	4.67	5.26	5.73	6.66	7.51
110	148.306507	-20.101082	3.43	3.73	4.64	5.19	5.65	6.57	7.44
111	148.310592	-20.099318	3.44	3.74	4.65	5.20	5.64	6.56	7.43
112	148.315271	-20.098604	3.47	3.77	4.64	5.20	5.65	6.53	7.42
113	148.316742	-20.106603	3.35	3.74	4.74	5.29	5.78	6.76	7.60
114	148.316380	-20.110729	3.28	3.67	4.69	5.30	5.77	6.75	7.62
115	148.319501	-20.114494	3.26	3.64	4.66	5.28	5.76	6.75	7.61
116	148.323564	-20.117222	3.32	3.69	4.70	5.30	5.77	6.77	7.61

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	3.35	3.70	4.71	5.32	5.79	6.80	7.65
118	148.329841	-20.123745	3.31	3.68	4.68	5.33	5.80	6.82	7.65
119	148.333052	-20.127385	3.27	3.68	4.68	5.38	5.84	6.88	7.71
120	148.336234	-20.130719	3.31	3.67	4.68	5.38	5.84	6.90	7.71
121	148.340377	-20.132311	3.34	3.68	4.68	5.39	5.84	6.91	7.75
122	148.344376	-20.134624	3.38	3.69	4.68	5.38	5.85	6.92	7.75
123	148.348920	-20.136182	3.38	3.68	4.66	5.37	5.85	6.92	7.77
124	148.353846	-20.136606	3.35	3.66	4.64	5.34	5.85	6.88	7.75
125	148.358463	-20.137963	3.32	3.64	4.61	5.31	5.84	6.85	7.71
126	148.363418	-20.138398	3.33	3.64	4.60	5.31	5.84	6.84	7.72
127	148.368134	-20.139890	3.36	3.64	4.59	5.28	5.83	6.82	7.72
128	148.372841	-20.141138	3.35	3.63	4.60	5.25	5.81	6.79	7.73
129	148.377743	-20.141775	3.34	3.62	4.59	5.22	5.81	6.79	7.72
130	148.382452	-20.141302	3.33	3.61	4.55	5.18	5.79	6.73	7.68
131	148.386864	-20.139825	3.33	3.61	4.51	5.14	5.78	6.66	7.63
132	148.390878	-20.137479	3.33	3.61	4.47	5.10	5.74	6.62	7.57
133	148.394081	-20.134107	3.28	3.60	4.43	5.05	5.68	6.56	7.47
134	148.398548	-20.132091	3.22	3.59	4.40	5.03	5.67	6.53	7.44
135	148.402767	-20.129617	3.21	3.59	4.37	4.98	5.62	6.49	7.36
136	148.406698	-20.126630	3.20	3.59	4.34	4.95	5.57	6.46	7.30
137	148.410754	-20.123973	3.11	3.57	4.30	4.92	5.53	6.42	7.23
138	148.414721	-20.120973	3.20	3.56	4.26	4.88	5.46	6.37	7.16
139	148.418583	-20.119000	3.21	3.56	4.22	4.84	5.42	6.33	7.10
140	148.423541	-20.118958	3.13	3.54	4.19	4.81	5.40	6.32	7.08
141	148.428185	-20.119954	3.02	3.49	4.14	4.78	5.39	6.30	7.06
142	148.432311	-20.120008	3.00	3.45	4.10	4.74	5.36	6.26	7.03
143	148.435300	-20.116110	2.99	3.42	4.03	4.67	5.25	6.14	6.91
144	148.435935	-20.111416	2.98	3.40	3.98	4.62	5.18	6.09	6.82
145	148.433214	-20.107398	3.02	3.44	4.00	4.63	5.16	6.06	6.80
146	148.429848	-20.103813	3.09	3.51	4.04	4.66	5.16	6.04	6.79
147	148.431249	-20.099813	3.03	3.45	4.00	4.61	5.10	5.96	6.70
148	148.435336	-20.098275	2.99	3.37	3.91	4.54	5.02	5.80	6.59
149	148.436763	-20.093754	2.99	3.36	3.88	4.50	4.94	5.73	6.52
150	148.435056	-20.089252	3.02	3.40	3.91	4.50	4.93	5.68	6.47
151	148.435796	-20.084412	3.01	3.39	3.89	4.47	4.87	5.59	6.39
152	148.436087	-20.079434	3.02	3.39	3.89	4.46	4.82	5.53	6.32
153	148.437662	-20.074881	3.04	3.37	3.85	4.40	4.74	5.45	6.22
154	148.439836	-20.070904	3.04	3.37	3.82	4.36	4.68	5.42	6.13
155	148.439573	-20.066377	3.10	3.45	3.81	4.32	4.62	5.39	6.06

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	3.13	3.48	3.86	4.34	4.64	5.37	6.06
157	148.432583	-20.062790	3.14	3.54	3.96	4.45	4.76	5.46	6.18
158	148.432001	-20.057986	3.26	3.56	3.96	4.41	4.71	5.38	6.07
159	148.434670	-20.053987	3.33	3.56	3.95	4.39	4.70	5.34	6.00
160	148.438544	-20.051181	3.24	3.50	3.88	4.30	4.62	5.23	5.86
161	148.442261	-20.047880	3.05	3.37	3.76	4.19	4.48	5.04	5.68
162	148.442424	-20.043005	2.98	3.18	3.71	4.12	4.46	4.99	5.60
163	148.443219	-20.038793	2.96	3.16	3.67	4.05	4.39	4.92	5.52
164	148.441517	-20.035168	2.99	3.18	3.68	4.07	4.41	4.93	5.51

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

Table E-3 Future climate 2100 coastal zone total water level (mAHD) Average Recurrence Interval (ARI) table

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
1	148.084491	-19.879768	4.03	4.28	4.73	5.15	5.56	6.31	6.55
2	148.086644	-19.883904	4.00	4.25	4.78	5.22	5.70	6.42	6.68
3	148.086750	-19.888545	4.00	4.26	4.84	5.30	5.77	6.51	6.85
4	148.089981	-19.891699	4.02	4.28	4.86	5.33	5.80	6.53	6.90
5	148.091008	-19.896035	3.99	4.26	4.87	5.34	5.81	6.53	6.96
6	148.093536	-19.900072	4.00	4.25	4.86	5.34	5.82	6.53	6.98
7	148.094558	-19.904839	3.99	4.23	4.89	5.41	5.89	6.58	7.10
8	148.098229	-19.907849	4.00	4.24	4.90	5.41	5.89	6.57	7.12
9	148.098545	-19.912567	3.97	4.21	4.93	5.47	5.95	6.60	7.23
10	148.100573	-19.916953	3.96	4.19	4.90	5.45	5.94	6.61	7.25
11	148.103183	-19.921165	3.96	4.20	4.91	5.47	5.95	6.64	7.30
12	148.104466	-19.925655	3.93	4.16	4.91	5.45	5.94	6.63	7.32
13	148.108624	-19.927620	3.92	4.16	4.91	5.44	5.93	6.60	7.30
14	148.113182	-19.929278	3.93	4.16	4.91	5.41	5.91	6.58	7.29
15	148.117375	-19.929729	3.94	4.17	4.90	5.39	5.87	6.56	7.24
16	148.121854	-19.931592	3.95	4.16	4.89	5.37	5.85	6.54	7.19
17	148.125345	-19.933461	3.95	4.16	4.89	5.40	5.87	6.57	7.20
18	148.127812	-19.934900	3.93	4.15	4.89	5.41	5.86	6.56	7.19
19	148.131995	-19.936612	3.93	4.15	4.89	5.40	5.85	6.55	7.16
20	148.136880	-19.937041	3.91	4.13	4.84	5.34	5.77	6.49	7.06
21	148.140824	-19.937192	3.93	4.15	4.86	5.36	5.78	6.51	7.07
22	148.145755	-19.937202	3.93	4.14	4.83	5.34	5.75	6.47	7.03
23	148.150433	-19.937100	3.93	4.15	4.83	5.34	5.74	6.45	7.01
24	148.155285	-19.937381	3.93	4.15	4.82	5.32	5.72	6.44	6.98
25	148.159885	-19.937060	3.93	4.15	4.80	5.30	5.70	6.42	6.95
26	148.164842	-19.937020	3.94	4.15	4.79	5.28	5.71	6.40	6.93
27	148.169661	-19.936777	3.92	4.13	4.75	5.23	5.66	6.33	6.87
28	148.174386	-19.936171	3.92	4.13	4.73	5.20	5.63	6.29	6.86
29	148.178875	-19.934357	3.94	4.14	4.72	5.19	5.61	6.26	6.83
30	148.183291	-19.932014	3.94	4.14	4.69	5.16	5.57	6.20	6.78
31	148.187708	-19.929671	3.95	4.14	4.67	5.13	5.53	6.17	6.73
32	148.192125	-19.927329	3.94	4.12	4.58	5.05	5.38	6.00	6.58
33	148.191727	-19.923601	3.96	4.15	4.59	5.06	5.38	6.02	6.56
34	148.194813	-19.920579	4.04	4.25	4.67	5.10	5.48	6.09	6.62
35	148.197788	-19.923268	3.99	4.20	4.66	5.09	5.47	6.06	6.64
36	148.202372	-19.923354	4.05	4.28	4.75	5.17	5.55	6.14	6.71
37	148.205450	-19.926615	4.01	4.25	4.72	5.14	5.52	6.09	6.70
38	148.209140	-19.929434	4.01	4.25	4.73	5.14	5.53	6.08	6.73

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
39	148.212143	-19.933431	4.02	4.25	4.74	5.17	5.56	6.07	6.75
40	148.215627	-19.936786	4.02	4.24	4.74	5.17	5.57	6.06	6.77
41	148.214572	-19.940165	3.96	4.18	4.69	5.13	5.53	6.02	6.77
42	148.212471	-19.944188	3.91	4.12	4.68	5.15	5.54	6.03	6.77
43	148.216694	-19.943252	3.97	4.18	4.71	5.16	5.55	6.02	6.78
44	148.218362	-19.945221	3.96	4.18	4.71	5.16	5.55	6.02	6.79
45	148.220269	-19.947553	3.96	4.18	4.74	5.18	5.58	6.06	6.82
46	148.225065	-19.948444	3.99	4.23	4.77	5.21	5.62	6.09	6.85
47	148.228945	-19.951074	4.00	4.26	4.81	5.25	5.68	6.13	6.87
48	148.232270	-19.954427	4.01	4.26	4.83	5.28	5.72	6.16	6.90
49	148.233553	-19.959077	4.00	4.26	4.82	5.31	5.78	6.21	6.93
50	148.235969	-19.962224	3.99	4.25	4.82	5.31	5.78	6.22	6.93
51	148.239458	-19.964269	4.02	4.30	4.87	5.36	5.81	6.25	6.98
52	148.235834	-19.966574	3.93	4.17	4.77	5.28	5.75	6.19	6.93
53	148.237823	-19.967997	3.96	4.20	4.80	5.33	5.79	6.23	6.96
54	148.241742	-19.969955	3.99	4.23	4.83	5.37	5.79	6.24	7.00
55	148.240437	-19.974113	3.93	4.17	4.82	5.36	5.81	6.25	7.01
56	148.244870	-19.976017	3.93	4.17	4.79	5.33	5.75	6.22	6.98
57	148.249720	-19.976634	3.93	4.17	4.77	5.27	5.70	6.20	6.93
58	148.254453	-19.975668	3.94	4.17	4.75	5.24	5.64	6.16	6.90
59	148.258300	-19.973152	3.94	4.20	4.73	5.19	5.56	6.04	6.83
60	148.261678	-19.970722	4.09	4.37	4.90	5.29	5.71	6.16	6.95
61	148.262453	-19.974990	4.01	4.29	4.87	5.33	5.76	6.17	6.92
62	148.264217	-19.978552	4.03	4.31	4.92	5.39	5.84	6.28	7.01
63	148.267362	-19.982284	4.11	4.40	5.05	5.54	5.99	6.41	7.11
64	148.269158	-19.991273	4.05	4.35	5.04	5.56	6.01	6.52	7.13
65	148.270711	-19.995376	4.01	4.28	4.94	5.47	5.92	6.44	7.05
66	148.274978	-19.996242	4.08	4.37	5.04	5.56	6.01	6.49	7.16
67	148.271075	-19.998710	3.98	4.24	4.90	5.43	5.89	6.40	7.02
68	148.271444	-20.001189	3.99	4.24	4.94	5.47	5.95	6.46	7.08
69	148.274741	-20.002383	4.05	4.32	5.02	5.55	6.03	6.53	7.16
70	148.274049	-20.006756	4.01	4.30	5.03	5.60	6.09	6.60	7.20
71	148.269895	-20.008342	3.92	4.20	4.93	5.52	5.99	6.51	7.16
72	148.272333	-20.012494	4.00	4.28	5.03	5.61	6.09	6.62	7.22
73	148.272977	-20.017247	3.98	4.26	5.01	5.59	6.07	6.62	7.25
74	148.276768	-20.019229	4.00	4.29	5.05	5.62	6.13	6.67	7.30
75	148.274990	-20.022727	3.94	4.23	5.02	5.63	6.13	6.73	7.35
76	148.271586	-20.025926	3.87	4.16	4.97	5.58	6.10	6.72	7.29
77	148.267692	-20.028749	3.77	4.11	4.98	5.57	6.19	6.81	7.37

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
78	148.263053	-20.029700	3.47	3.78	4.68	5.43	6.12	6.79	7.41
79	148.261368	-20.026508	3.41	3.70	4.55	5.09	5.71	6.54	7.15
80	148.259291	-20.024495	3.40	3.68	4.54	5.07	5.67	6.34	6.92
81	148.255971	-20.024299	3.41	3.72	4.60	5.12	5.76	6.42	6.97
82	148.252083	-20.021789	3.38	3.66	4.52	5.07	5.68	6.38	6.89
83	148.251245	-20.025777	3.39	3.68	4.67	5.26	5.86	6.57	7.10
84	148.248982	-20.030165	3.46	3.78	4.69	5.27	5.91	6.60	7.20
85	148.245332	-20.033208	3.49	3.82	4.72	5.30	5.93	6.67	7.20
86	148.242842	-20.037255	3.52	3.88	4.79	5.40	6.03	6.77	7.34
87	148.243873	-20.040647	3.53	3.91	4.83	5.47	6.06	6.86	7.42
88	148.244798	-20.044245	3.51	3.90	4.83	5.44	6.06	6.86	7.45
89	148.249032	-20.046574	3.51	3.88	4.80	5.43	6.05	6.83	7.43
90	148.253496	-20.048272	3.52	3.89	4.81	5.46	6.08	6.93	7.57
91	148.257679	-20.050278	3.55	3.91	4.86	5.50	6.31	7.12	7.71
92	148.261930	-20.052620	3.59	3.95	4.93	5.67	6.42	7.10	7.72
93	148.266185	-20.054795	3.54	3.89	4.84	5.45	6.17	7.03	7.65
94	148.269755	-20.058061	3.55	3.90	4.82	5.43	6.12	6.93	7.64
95	148.272686	-20.061626	3.55	3.91	4.86	5.47	6.13	6.93	7.69
96	148.273958	-20.066064	3.55	3.92	4.87	5.52	6.27	7.05	7.76
97	148.277575	-20.069358	3.60	4.00	5.13	5.82	6.42	7.13	7.89
98	148.281505	-20.072299	3.76	4.19	5.27	5.86	6.43	7.24	7.97
99	148.285512	-20.075047	3.83	4.25	5.24	5.86	6.42	7.22	7.97
100	148.290102	-20.076880	3.84	4.24	5.22	5.86	6.44	7.21	7.99
101	148.294498	-20.078324	3.84	4.21	5.17	5.81	6.39	7.15	7.96
102	148.299196	-20.077609	3.87	4.25	5.15	5.79	6.36	7.09	7.93
103	148.300325	-20.081981	3.78	4.23	5.23	5.86	6.45	7.25	8.08
104	148.292584	-20.087326	3.54	3.91	4.89	5.65	6.28	7.20	8.01
105	148.289298	-20.090879	3.57	3.95	4.98	5.86	6.46	7.36	8.18
106	148.290225	-20.095212	3.64	4.05	5.22	6.03	6.54	7.49	8.29
107	148.293279	-20.099028	3.72	4.16	5.26	6.02	6.54	7.48	8.33
108	148.297255	-20.101326	3.72	4.16	5.27	5.99	6.52	7.45	8.30
109	148.302049	-20.101573	3.81	4.22	5.30	5.97	6.50	7.51	8.36
110	148.306507	-20.101082	3.81	4.20	5.25	5.90	6.41	7.41	8.30
111	148.310592	-20.099318	3.82	4.21	5.25	5.90	6.39	7.37	8.28
112	148.315271	-20.098604	3.81	4.24	5.25	5.88	6.42	7.35	8.26
113	148.316742	-20.106603	3.70	4.15	5.34	6.01	6.55	7.64	8.46
114	148.316380	-20.110729	3.67	4.05	5.30	6.01	6.53	7.63	8.48
115	148.319501	-20.114494	3.65	4.02	5.26	6.00	6.52	7.59	8.48
116	148.323564	-20.117222	3.67	4.12	5.29	5.99	6.51	7.63	8.49

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
117	148.326986	-20.119827	3.67	4.13	5.30	5.99	6.53	7.67	8.53
118	148.329841	-20.123745	3.66	4.11	5.27	5.98	6.52	7.68	8.54
119	148.333052	-20.127385	3.64	4.11	5.28	6.01	6.57	7.70	8.53
120	148.336234	-20.130719	3.63	4.10	5.27	6.01	6.58	7.73	8.59
121	148.340377	-20.132311	3.63	4.11	5.29	6.02	6.59	7.77	8.63
122	148.344376	-20.134624	3.64	4.12	5.28	6.04	6.59	7.77	8.64
123	148.348920	-20.136182	3.64	4.12	5.29	6.06	6.59	7.76	8.64
124	148.353846	-20.136606	3.63	4.10	5.27	6.04	6.57	7.71	8.62
125	148.358463	-20.137963	3.62	4.10	5.25	6.00	6.55	7.70	8.60
126	148.363418	-20.138398	3.61	4.10	5.23	5.97	6.55	7.68	8.60
127	148.368134	-20.139890	3.60	4.09	5.22	5.94	6.53	7.67	8.59
128	148.372841	-20.141138	3.58	4.08	5.21	5.91	6.53	7.64	8.60
129	148.377743	-20.141775	3.56	4.06	5.19	5.88	6.52	7.60	8.59
130	148.382452	-20.141302	3.54	4.05	5.16	5.83	6.50	7.53	8.54
131	148.386864	-20.139825	3.53	4.03	5.13	5.78	6.49	7.49	8.49
132	148.390878	-20.137479	3.52	4.02	5.09	5.73	6.45	7.45	8.42
133	148.394081	-20.134107	3.50	3.99	5.06	5.68	6.39	7.38	8.32
134	148.398548	-20.132091	3.49	3.98	5.03	5.65	6.38	7.35	8.29
135	148.402767	-20.129617	3.48	3.98	4.99	5.61	6.34	7.30	8.21
136	148.406698	-20.126630	3.46	3.97	4.95	5.56	6.30	7.24	8.13
137	148.410754	-20.123973	3.45	3.97	4.90	5.53	6.25	7.18	8.06
138	148.414721	-20.120973	3.44	3.96	4.85	5.48	6.19	7.12	7.98
139	148.418583	-20.119000	3.43	3.95	4.80	5.44	6.15	7.08	7.91
140	148.423541	-20.118958	3.41	3.93	4.76	5.40	6.12	7.06	7.89
141	148.428185	-20.119954	3.40	3.89	4.72	5.38	6.09	7.03	7.87
142	148.432311	-20.120008	3.37	3.85	4.67	5.34	6.05	6.98	7.84
143	148.435300	-20.116110	3.36	3.79	4.60	5.28	5.95	6.89	7.72
144	148.435935	-20.111416	3.36	3.71	4.56	5.23	5.87	6.82	7.62
145	148.433214	-20.107398	3.39	3.84	4.60	5.24	5.86	6.80	7.59
146	148.429848	-20.103813	3.43	3.89	4.62	5.26	5.86	6.78	7.58
147	148.431249	-20.099813	3.41	3.85	4.57	5.22	5.79	6.70	7.49
148	148.435336	-20.098275	3.36	3.65	4.48	5.15	5.69	6.60	7.39
149	148.436763	-20.093754	3.37	3.67	4.43	5.11	5.62	6.51	7.30
150	148.435056	-20.089252	3.40	3.78	4.46	5.11	5.60	6.46	7.25
151	148.435796	-20.084412	3.39	3.74	4.42	5.07	5.53	6.37	7.16
152	148.436087	-20.079434	3.40	3.73	4.43	5.05	5.49	6.30	7.09
153	148.437662	-20.074881	3.39	3.73	4.39	4.99	5.40	6.20	6.99
154	148.439836	-20.070904	3.40	3.73	4.38	4.96	5.36	6.17	6.91
155	148.439573	-20.066377	3.46	3.83	4.37	4.93	5.33	6.10	6.84

Recommended Costal Zone Peak Water Level Average Recurrence Interval Tables

ID	Longitude	Latitude	100	200	500	1000	2000	5000	10000
156	148.437004	-20.062562	3.48	3.88	4.42	4.97	5.35	6.08	6.83
157	148.432583	-20.062790	3.50	3.93	4.51	5.04	5.48	6.17	6.95
158	148.432001	-20.057986	3.57	3.99	4.52	5.01	5.42	6.08	6.85
159	148.434670	-20.053987	3.58	3.99	4.51	4.99	5.39	6.04	6.76
160	148.438544	-20.051181	3.54	3.93	4.43	4.91	5.30	5.93	6.63
161	148.442261	-20.047880	3.41	3.70	4.29	4.78	5.11	5.74	6.42
162	148.442424	-20.043005	3.37	3.59	4.23	4.75	5.08	5.71	6.38
163	148.443219	-20.038793	3.35	3.55	4.18	4.68	5.00	5.64	6.31
164	148.441517	-20.035168	3.37	3.59	4.19	4.68	5.00	5.66	6.29

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