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CLIMATE CHANGE RISK TO AUSTRALIA'S BUILT ENVIRONMENT

A SECOND PASS NATIONAL ASSESSMENT

OCTOBER 2019

ANALYSIS POWERED BY
Climate Risk Engines

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Climate Change Risk to Australia's Built Environment: A Second Pass National Assessment
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WELCOME

Australia as a country has built a solid reputation for being forward thinking and pragmatic. Significant shifts in extreme weather events are already underway and have caused unprecedented natural disasters. The severity and frequency of these events will only increase in the future. To be ready, these risks must be faced head on. Indeed, given the scale of changes underway policy makers are not moving nearly fast enough to prevent significant disruption to our economy and society.

Climate Change Risks to Australia's Coast – A First Pass National Risk Assessment was released by the Australian Government Office of Climate Change and Energy Efficiency in 2009. The national risk assessment focussed on the risks to settlements and infrastructure, natural ecosystems, and industries in the coastal zone. That report found that between AUD $41-63 billion dollars worth of properties were at risk from coastal impacts.

In the ten years since that report, there have been improvements in the sophistication and detail of climate models as well as substantial increases in computing power. While XDI provides analysis to the public and private sector, the company is keen to ensure that stakeholders - communities, governments and business - are informed of the risks they face and are therefore equipped to plan for the current and future impacts of climate change. This XDI Second Pass Assessment considers a greater number of hazards, covers all municipal areas in Australia and seeks to provide a firm basis for continued awareness and policy development to secure Australia's resilience.

If governments and communities act on this information now, many of the projected losses can be averted. Acting in an orderly way with a strategic focus on those communities most at risk will ensure that adaptation is achieved at least cost. The analysis underpinning this report can be used to identify where action is necessary, what activities need to be undertaken and when.

We encourage all readers to consider the implications of the trends and results, and act to keep people safe from physical and financial harm.

ROHAN HAMDEN

CEO, XDI

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EXECUTIVE SUMMARY

Context

It has been ten years since the Australian Government's groundbreaking report *Climate Change Risk to Australia's Coast – A First National Pass Assessment* was released. In the time since that report, there have been major advances in science, data and computing. This XDI report, *Climate Change Risk to Australia's Built Environment – A Second Pass National Assessment* carries forward the same objective of informing governments, business and the public about the possible effects of climate change on the built environment, but with deeper analysis, across more hazards, and at a higher spatial resolution.

Scope

The analysis assesses climate risk to over 15 million addresses in 544 local government areas (LGAs) between 2020 and 2100, analysing data for five hazards across the entire nation. Asset vulnerability to hazards has also been assessed using a representative archetype to provide insights into failure modes and damage thresholds. This report summarises the findings and provides a first national benchmarking of extreme weather and climate risk across all LGAs, large and small.

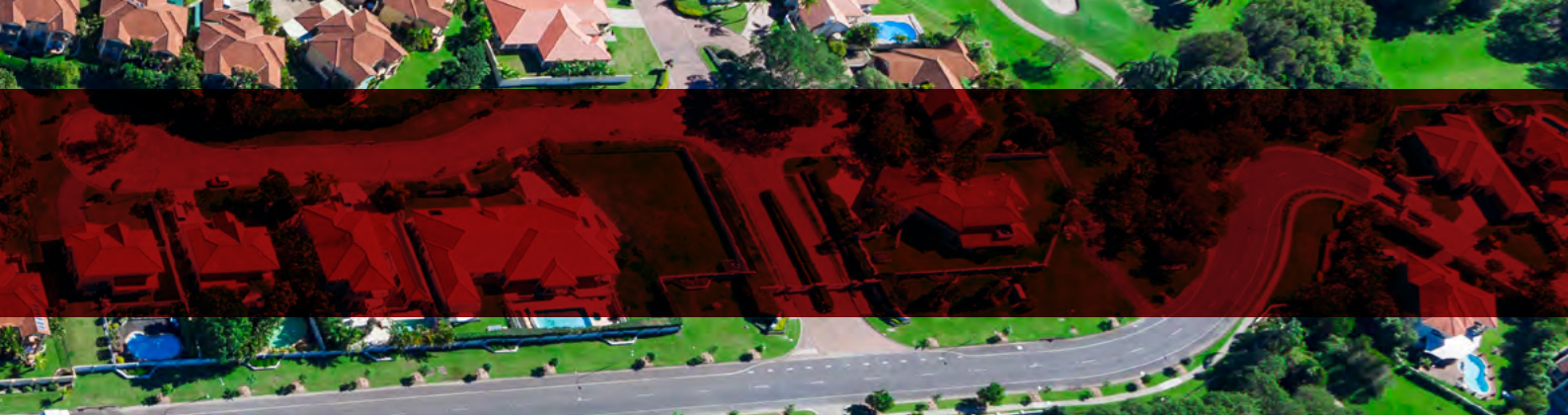
Approach

The underpinning data for this project has been generated by XDI's sister company, Climate Risk Pty Ltd, with a team that includes physicists, engineers, geologists, marine scientists and hydrologists. The team has used detailed mapping of floods, forests, elevations and soils to accurately pin-point at-risk properties, then applied local weather station data and downs-scaled climate projections to consider how different climate change models indicate that heat, precipitation, wind and fire weather may change in future.

Key Risk Metrics

The reporting uses four key metrics for quantifying climate change impacts to the built environment in each local government area:

- **Total Technical Insurance Premium (TTIP)**, which is the total annual cost of damage and assumes all hazards are insured.
- **Percentage of Value-at-Risk (VAR%)**, which is the TTIP as a percentage of the replacement cost of the property.
- **Number of High Risk Properties (HRP#)**, which are those properties where the VAR is greater than 1%, consistent with US Federal Emergency Management Agency (FEMA) definitions.
- **Percentage of High-Risk Properties (HRP%)**, which is the HRP# expressed as a percentage of all properties in the LGA.



Scale of Risk

- The scale of extreme weather and climate change related risk (since 1990 baseline) is already significant. Across Australia, the results find that there are 383,300 addresses in 2020 which would be classified as High Risk Properties.
- This number is projected to increase to 735,654 in 2100 for existing development only. This figure does not account for new development occurring in high hazard areas, or continued use of inadequate building standards, which unabated will substantially increase this number.

Direction of Risk

Based on the selection of climate change models used (Representative Concentration Pathway 8.5 with sea level rise of 1.6m), the national TTIP is projected to increase by 55% between 2020 and 2100. In the same time period, the number of HRP are projected to increase by 92%.

Causes of Risk

- Riverine flooding is a major driver of both TTIP and HRP#. Though flooding effects a smaller number of properties it generally causes severe financial impacts. Between 2020 and 2100, the TTIP from flooding is projected to increase by 29%. One in five LGAs will have TTIP double due to flood. (Not including pluvial flooding.)
- Risk from Coastal Inundation commences at a relatively low level but increases exponentially over the course of the century. The TTIP from coastal inundation is projected to increase by 111% between 2020 and 2100. (Not including coastal erosion.)
- Forest fire effects a large number of properties but has a low probability of causing damage. Overall the pre-conditions for fires to occur will increase due to climate change. The TTIP for forest fire is projected to increase by 54% between 2020 and 2100. Furthermore, areas that are not generally considered at risk from bushfires may become vulnerable in the future. (Not including grass fires.)
- Subsidence risk (caused by drought conditions) affects a large number of properties which are in clay soils, though damage is not catastrophic. Between 2020 and 2100, the TTIP from subsidence risk is projected to increase by 36%.
- Wind risk occurs in all locations, but buildings are designed differently to cope with local conditions. The climate change trends identified are relatively small compared to uncertainties, so major conclusions are not made. (Not including cyclone risk.)

Concentration of Risk

The impacts are not shared equally across Australia, and some of the risks are highly concentrated. Whilst risk from subsidence and bushfire is broadly distributed, risk from flooding and coastal inundation is highly concentrated, thus presenting an acute social and economic risk for affected local government areas.

Conclusions

XDI has released this report as a national reference to help business, government and the public to understand the scale of extreme weather risks and the general impact climate change may have on these risks. This can be used to plan for climate resilience and adaptation - with more property specific information about climate change and extreme hazards for state and local governments than any other analysis in the world so far.

With this information now at hand, it's incumbent upon decision makers in business and government to enact systems that make visible the future impacts of climate change, and to continue to instigate the plans and actions to build social, economic, infrastructure and environmental resilience.

Responding to these challenges will bring far more benefit than just at the local scale. There are significant changes underway in global financial markets to ensure the resilience of the economy. Publicly listed companies are now required to disclose their material climate risks in shareholder statements, while ratings agencies are accounting for climate change impacts at municipal scale when calculating sovereign debt risk. Action to address climate impacts will therefore improve the corporate and economic outlook and ensure improved financial ratings for these areas.

The future set out in these results is not inevitable. Australian carbon emissions may have increased in the ten years since the first climate risk assessment report, but at the same time low emission technologies have become an indelible part of Australia's economy. Similarly, Australia can assure the safety of its people and economy with an orderly, prudent and timely investment in national resilience. These results signpost the way.

Recommendations

On the basis of the insights provided by this analysis, XDI makes the following recommendations

1. **Establish Legal Requirements for Risk Disclosure:** Establish unambiguous legal requirements for purchasers, investors and tenants of built property and infrastructure to be advised of the full range of extreme weather and climate change risks that may affect the property over its full life time.
2. **Require Fit-for-Purpose Construction in High Hazard areas:** Ensure design standards and planning requirements for infrastructure and development match location specific hazards. All tiers of government seek to achieve full insurability by ensuring projected VARs of less than 1% of the replacement cost of the property over its design lifetime under worst-case climate change projections.
3. **Plan for Infrastructure System Resilience:** Federal and state governments require that all critical infrastructure - including water, power, transport and telecommunications - be assessed both at an asset level and at an interdependent system level. Establish an overarching standard risk tolerance (e.g. 1:500 year event tolerance) such that extreme weather event failures do not cause cascading failures across sectors.
4. **Develop Risk Based Insurance Pricing:** Financial regulators require that insurance industry products fairly reflect both site specific hazard probabilities and asset specific vulnerability, thus providing lower premiums for more resilient designs and materials, and a clear market signal that investment in resilience will be fairly rewarded by lower premiums.
5. **Adaptation for Highly Exposed Areas:** State and Federal governments implement support schemes to finance adaptation in areas at high risk. This can finance resilient construction, municipal works or relocation.

TOP TEN LOCAL GOVERNMENT AREAS (LGAs) BY HAZARD RISK

The tables below rank the top ten LGAs at risk from a cohort of all 266 LGAs in Australia with over 10,000 addresses. Areas with very low density show bias in results and therefore are not represented here but can be found in the benchmarking table in the body of the report, which covers all 544 LGAs.

ALL HAZARDS

Top 10 LGAs at Risk All Hazards - 2020				
RANK	TTIP$	VAR%	HRP#	HRP%
1	Gold Coast, Qld	Greater Shepparton, Vic	Gold Coast, Qld	Greater Shepparton, Vic
2	Brisbane, Qld	Wangaratta , Vic	Brisbane, Qld	Wangaratta , Vic
3	Sunshine Coast, Qld	Mid Murray, SA	Greater Shepparton, Vic	Murray, WA
4	Greater Shepparton, Vic	Murray, WA	Sunshine Coast, Qld	Maranoa, Qld
5	Central Coast, NSW	Gold Coast, Qld	Fraser Coast, Qld	Mid Murray, SA
6	Fraser Coast, Qld	Fraser Coast, Qld	Wangaratta , Vic	Federation , NSW
7	Moreton Bay, Qld	Tweed , NSW	Mandurah, WA	Horsham , Vic
8	Wangaratta , Vic	Maranoa, Qld	Bundaberg, Qld	Mandurah, WA
9	Tweed , NSW	Noosa, Qld	Tweed , NSW	Fraser Coast, Qld
10	Mackay, Qld	Douglas, Qld	Moreton Bay, Qld	Hinchinbrook, Qld

Top 10 LGAs at Risk All Hazards - 2100				
RANK	TTIP$	VAR%	HRP#	HRP%
1	Gold Coast, Qld	Greater Shepparton, Vic	Gold Coast, Qld	Greater Shepparton, Vic
2	Brisbane, Qld	Wangaratta, Vic	Brisbane, Qld	Murray, WA
3	Sunshine Coast, Qld	Mid Murray, SA	Sunshine Coast, Qld	Adelaide Hills, SA
4	Greater Shepparton, Vic	Murray, WA	Central Coast, NSW	Wangaratta , Vic
5	Central Coast, NSW	Gold Coast, Qld	Newcastle, NSW	Mundaring, WA
6	Moreton Bay, Qld	Tweed, NSW	Greater Shepparton, Vic	Mid Murray, SA
7	Fraser Coast, Qld	Fraser Coast, Qld	Fraser Coast, Qld	Maranoa, Qld
8	Tweed, NSW	Mandurah, WA	Moreton Bay, Qld	Noosa, Qld
9	Mackay, Qld	Douglas, Qld	Mandurah, WA	Narrabri, NSW
10	Mandurah, WA	Noosa, Qld	Tweed , NSW	Western Downs, Qld

RIVERINE FLOODING

Top 10 LGAs at Risk Riverine Flooding - 2020		
RANK	TTIP$	VAR%
1	Greater Shepparton , Vic	Greater Shepparton , Vic
2	Gold Coast , Qld	Wangaratta , Vic
3	Brisbane, Qld	Mid Murray , SA
4	Wangaratta , Vic	Maranoa , Qld
5	Port Phillip, Vic	Horsham , Vic
6	Mid Murray, SA	Federation , NSW
7	Sunshine Coast, Qld	Esperance , WA
8	Loga , Qld	Western Downs , Qld
9	Albury, NSW	Albury , NSW
10	Western Downs, Qld	Port Phillip, Vic

Top 10 LGAs at Risk `Riverine Flooding - 2100		
RANK	TTIP$	VAR%
1	Greater Shepparton, Vic	Greater Shepparton, Vic
2	Gold Coast, Qld	Wangaratta, Vic
3	Brisbane , Qld	Mid Murray, SA
4	Wangaratta, Vic	Horsham, Vic
5	Port Phillip, Vic	Murray, WA
6	Central Coast, NSW	Maranoa, Qld
7	Mid Murray, SA	Federation, NSW
8	Melbourne, Vic	Western Downs, Qld
9	Sunshine Coast, Qld	Port Phillip, Vic
10	Newcastle, NSW	Inverell, NSW

FOREST FIRE

Top 10 LGAs at Risk Forest Fire - 2020		
RANK	TTIP$	VAR%
1	Central Coast, NSW	Adelaide Hills, SA
2	Lake Macquarie, NSW	Mundaring, WA
3	Blue Mountains, NSW	Blue Mountains, NSW
4	Adelaide Hills, SA	Mitcham, SA
5	Gold Coast, Qld	Central Coast, NSW
6	Sunshine Coast, Qld	Byron , NSW
7	Shoalhaven, NSW	Hepburn, Vic
8	Yarra Ranges, Vic	Port Stephens , NSW
9	Mundaring, WA	Lake Macquarie, NSW
10	Logan, Qld	Burnside, SA

Top 10 LGAs at Risk Forest Fire - 2100		
RANK	TTIP$	VAR%
1	Central Coast, NSW	Adelaide Hills, SA
2	Lake Macquarie, NSW	Mundaring, WA
3	Blue Mountains, NSW	Blue Mountains, NSW
4	Adelaide Hills, SA	Mitcham, SA
5	Sunshine Coast, Qld	Hepburn, Vic
6	Yarra Ranges, Vic	Port Stephens , NSW
7	Shoalhaven, NSW	Central Coast, NSW
8	Gold Coast, Qld	Lake Macquarie, NSW
9	Mid-Coast, NSW	Byron, NSW
10	Port Stephens, NSW	Yarra Ranges, Vic

COASTAL INUNDATION

Top 10 LGAs at Risk Coastal Indundation - 2020		
RANK	TTIP$	VAR%
1	Gold Coast, Qld	Gold Coast, Qld
2	Sunshine Coast, Qld	Fraser Coast, Qld
3	Brisbane, Qld	Tweed , NSW
4	Fraser Coast, Qld	Murray, WA
5	Tweed , NSW	Mandurah, WA
6	Moreton Bay, Qld	Noosa, Qld
7	Mackay, Qld	Sunshine Coast, Qld
8	Mandurah, WA	Douglas, Qld
9	Redland, Qld	Mackay, Qld
10	Central Coast, NSW	Byron , NSW

Top 10 LGAs at Risk Coastal Indundation - 2100		
RANK	TTIP$	VAR%
1	Gold Coast, Qld	Murray, WA
2	Sunshine Coast, Qld	Tweed , NSW
3	Brisbane, Qld	Gold Coast, Qld
4	Moreton Bay, Qld	Fraser Coast, Qld
5	Tweed , NSW	Douglas, Qld
6	Fraser Coast, Qld	Mandurah, WA
7	Central Coast, NSW	Noosa, Qld
8	Mackay, Qld	Sunshine Coast, Qld
9	Mandurah, WA	Mackay, Qld
10	Redland, Qld	Byron , NSW

SUBSIDENCE

Top 10 LGAs at Risk Subsidence - 2020		
RANK	TTIP$	VAR%
1	Brisbane, Qld	Ku-ring-gai , NSW
2	Sydney, NSW	Willoughby, NSW
3	Central Coast, NSW	Lane Cove , NSW
4	Canterbury-Bankstown, NSW	Ryde, NSW
5	Northern Beaches , NSW	Mosman , NSW
6	Inner West , NSW	North Sydney , NSW
7	Unincorporated ACT, ACT	Hornsby , NSW
8	Melbourne, Vic	Burwood , NSW
9	Sutherland Shire, NSW	Strathfield , NSW
10	Parramatta, NSW	Inner West , NSW

Top 10 LGAs at Risk Subsidence - 2100		
RANK	TTIP$	VAR%
1	Brisbane, Qld	Tamworth Regional, NSW
2	Sydney, NSW	Tablelands, Qld
3	Unincorporated ACT, ACT	Campaspe, Vic
4	Moreton Bay, Qld	Perth, WA
5	Central Coast, NSW	Greater Shepparton, Vic
6	Stirling, WA	Barossa, SA
7	Northern Beaches , NSW	Mount Barker, SA
8	Canterbury-Bankstown , NSW	Isaac, Qld
9	Gold Coast, Qld	Hinchinbrook, Qld
10	Inner West , NSW	Vincent, WA

1.
INTRODUCTION

This XDI report details the impacts of climate change across communities in Australia for Coastal Inundation, Riverine Flooding, Forest Fire, Wind Damage and Subsidence. It is based upon analysis undertaken by our partner company, Climate Risk Pty Ltd, that has completed an address level assessment of dwellings across the country.

The results have been compiled by XDI at a municipal scale to provide a broad overview of the nature, scale and direction of the challenges facing all local governments in Australia.

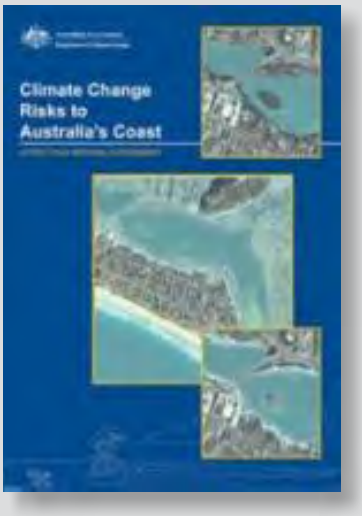
It is important to consider the results of this Second Pass Assessment with the Federal Government's First Pass Assessment completed 10 years ago. A summary of the first assessment is detailed below. That analysis focussed on coastal risks from sea level rise, and did not include the affects of storm surge in many areas. This XDI Second Pass Assessment builds on this work and provides a more comprehensive assessment, covering all of Australia, a greater number of assets and more hazards.

The scale of computation undertaken for this analysis is considerable. The analysis has tested nearly 15 million individual addresses against 77 billion spatial data points for soils, forests, floods, elevations and urbanisation. This has been combined with climate projections that model the atmosphere every 15 minutes for 100 years (3.5 million time steps) from which statistical data on changes to extremes has been extracted.

This study expands the assessment of climate risk to five hazards and incorporates substantially more detailed data sets than were available ten years ago. Higher detail, deeper resolution and more sophisticated computations provide more insight.

This analysis utilises the computational power of the Climate Risk Engines which have been utilised in climate risk assessment for governments and business since 2012. More information is available at ClimateRiskEngines.com.

CLIMATE CHANGE RISKS TO AUSTRALIA'S COAST - A FIRST PASS NATIONAL RISK ASSESSMENT - 2009



A SUMMARY

The 2009 first pass national assessment of Climate Change Risks to Australia's Coast was one of the key outcomes of the National Climate Change Adaptation Framework endorsed by the Council of Australian Governments (COAG) in 2007. The national risk assessment focussed on the risks to settlements and infrastructure, natural ecosystems and industries in the coastal zone.

The assessment provided an analysis of residential property at risk from erosion and inundation around the Australian coastline at the end of this century using a 1.1m sea level rise projection. Inundation risk was quantified using Geoscience Australia's National Exposure Information System (NEXIS) infrastructure database for each state, the Northern Territory and for key local government areas. The report suggests the replacement value (in 2008) of existing residential buildings at risk from inundation ranges from $41 billion to $63 billion.

STATE	RESIDENCES AT RISK	VALUE OF RESIDENCES AT RISK (AUD$BILLION)	RISKIEST LOCAL GOVTS
NSW	40,800-62,400	12.4 - 18.7	Lake Macquarie, Wyong, Gosford, Wollongong, Shoalhaven, Roockdale
QLD	35,900-56,900	10.5 - 16	Moreton Bay, Mackay, Gold Coast, Fraser Coast, Bundaberg, Sunshine Coast
VIC	27,600-44,600	6.5 - 10.3	Kingston, Hobsons Bay, Greater Geelong, Wellington, Port Phillip
SA	25,200-43000	4.4 - 7.4	Charles Sturt, Port Adelaide-Enfield
TAS	8,700-11,600	2.4 - 3.3	Clarence, Central Coast, Break O'Day, Waratah/Wynyard
NT	180	0.235 - 0.577	Litchfield, Darwin, Unincorporated
WA	18,700-28,900	4.9 - 7.7	Busselton, Mandurah, Rockingham, Bunbury

Source: *Climate Change Risk to Australia's Coast - A First Pass National Risk Assessment*, Australian Government Office of Climate Change and Energy Efficiency, 2009

An excerpt showing 2009 recommendations is appendixed in this report.

2.
NEW INDICATORS FOR CLIMATE CHANGE RELATED RISK

BEYOND EXPOSURE ANALYSIS

In the First Pass Risk Assessment, a key risk metric was the total value of property that would be exposed to risk under a 1.1m sea level rise scenario. While this is a useful first indicator, it does not accomodate the resilience of built structures, nor allow for adaptation. In updating this work, XDI adopted additional metrics to allow optics on vulnerability as well as exposure, that will enable us to see whether risks are being managed through improved design and building material choices in high risk areas.

There are four key indicators used to convey the risks of extreme weather and climate change to the built environment in this report. They are all informed by estimates of vulnerability as well as exposure and event probabilities. Each indicator tells a different story about the scale, speed, extent and intensity of risk. Taken together, they can be used to indicate the way forward for prudent, orderly and targeted adaptations.

2.1
TOTAL TECHNICAL INSURANCE PREMIUM (TTIP)

The Technical Insurance Premium (TIP) is defined here as the Annual Average Loss (AAL) per address (or group of addresses) for all hazard impacts. The TIP is based on the cost of damage to an asset, expressed in 2020 dollars with no discounting or adjustments for other transaction costs.

The Total TIP (TTIP) is the sum of all TIPs for all addresses in a given area, for example all addresses in a Local Government Area. As such, the TTIP is useful in drawing attention to those geographical areas which have the largest financial risk associated with climate change hazards.

TTIP can display bias towards areas with a larger number of properties such as high density city suburbs. However, as the same replacement value is used for each address, regardless of location, it is not biased by differences in property values. When assessing higher density areas, the Climate Risk Engines include a density modification to adjust for the lower percentage of total addresses being subject to flooding / inundation risk (ie: only a certain percentage of addresses are on the ground floor).

2.2
PERCENTAGE OF VALUE-AT-RISK (VAR%)

The Percentage of Value at Risk (VAR%) is the Technical Insurance Premium expressed as a percentage of a single asset's replacement cost, specified for a 1 year period with no discounting of the TIP or the asset replacement cost.

VAR% = TIP / asset replacement cost

The VAR% can also be applied to a portfolio of properties, in which case Average VAR% is the Total TIP divided by the total replacement value of all assets, making it a non-dimensional average for TIP.

The VAR% is an excellent way of overcoming the bias of the TTIP toward larger, more populous areas and thus allowing two quite different areas to be compared on an equal measure. Thus a small rural local government area can be compared to a large inner city area on a level basis. However, the VAR% can tend to draw attention to small communities where many or all of the addresses share the same risk, for example a large proportion of buildings are in a flood zone, or low lying near the coast, or exposed to clay soils.

Even though the VAR% for a given community may be very large when benchmarked against state peers, the actual quantum of risk may still be quite small - the TTIP will help inform that. However, even though this total may be small, it still indicates a major financial risk for that community and perhaps an affordability challenge in insurance and adaptation.

2.3.
NUMBER OF HIGH RISK PROPERTIES (HRP#)

In this analysis, an asset is classed as becoming "High Risk" if its VAR% for a given year exceeds 1%. This is based on the Federal Emergency Management Agency (FEMA) thresholds for government insurance schemes, which highlight properties in an (historic) 1-in-100 flood zone, also known as "Rating A Zones".

In principle, any High Risk Property can be insured, however the annual premium may be unaffordable for many. For example, a VAR% of 1% for a house that costs $500,000 to construct would be $5,000 per year, or 8% of the median salary in Australia.

The number of High Risk Properties is the sum of all results where the VAR% is above 1% in a given year.

2.4.
HIGH RISK PROPERTIES AS PERCENTAGE OF ALL ADDRESSES (HRP%)

The number of High Risk Properties can also be expressed as a percentage of all properties in a given area.

High Risk Properties are usually caused by substantial exposure to severely damaging hazards such as flooding or coastal inundation, as opposed to soil contraction - which may only cause minor damage, or forest fire, where the probabilities of loss remain small. This indicator is therefore useful to show where there are areas which have a concentration of acute risk to individual buildings.

3.
METHODS

METHODS USED FOR ANALYSIS

These results have been generated using purpose-built software running on an array of high-speed servers provided by Climate Risk Pty Ltd. The Climate Risk Engines (see 3.2 below) assess climate impacts by placing a standard modern dwelling at each address analysed. Using the design specifications and materials typical of a recent building, the Climate Risk Engines compute the threshold at which its various key components would fail if exposed to hazards such as flooding, subsidence and forest fires.

Using this information, the annual probability of damage caused by such events is calculated by gathering a range of data on forests, soils, floods, elevations, tides, and waves, then coupling this with long term data from local meteorological stations. Finally, the future probabilities of damage are calculated by extracting the changes in the statistical distribution of key parameters such as heat, precipitation, wind and humidity from global climate change models.

3.1
STRESS-TEST APPROACH

This analysis uses an IPCC greenhouse gas emission scenario that follows business-as-usual (RCP8.5), with climate modelling from CSIRO, UNSW, UQ, IPCC and NOAA used to indicate the impacts on weather parameters and sea levels (a full list of agencies accessed for data is provided in the appendix). Models come from a short list of those that are known to perform well in Australia. Specific models are selected to ‘stress test’ each hazard - thus a model which tends to predict a drier future is used to consider drought, and a model which predicts a wetter future is used to test flood risk. This selection process avoids masking risks or diluting impacts through averaging an ensemble of models, however results should be interpreted as a stress-test, not a mean projection. Specific models are listed below in 3.10: Scenario Run Data.

This analysis covers riverine flooding, coastal inundation, forest fires, wind gusts and subsidence of clay soils. It does not cover other hazards such as flash flooding (pluvial), coastal erosion, grass fires, land slip, cyclones, hail or heat impacts.

3.2
THE CLIMATE RISK ENGINES

The Climate Risk Engines are purpose built to compute hypothetical future risks to a modelled asset (synthesised with engineering data) that is designed to represent property and infrastructure. The system enables each such asset to be stress-tested against a wide range of extreme weather and extreme sea events typical of its location. A range of future-looking scenarios can be applied that are consistent with different greenhouse gas emission scenarios, atmospheric sensitivity and response, adaptation pathways, building standards and planning regimes.

The Climate Risk Engines combine engineering analysis with statistical analysis of historical weather and climate projections, and probabilistic methods for financial analysis of risk and value. It's important to note that these results apply to a synthetic 'Representative Asset' (see 3.3 below) under a range of future scenarios. The results cannot therefore be taken as representations of the actual future risks to, or value of, a real or planned property or infrastructure asset.

3.3
A REPRESENTATIVE ASSET

Initially the system creates a synthetic representation of an asset that is based on nominal industry archetypes, but may include some customisation by the user. This 'Representative Asset' could be selected and tailored to mimic a real asset at the same location – such as a house, road or phone tower – or be created as an entirely hypothetical asset being placed in that location.

3.4.
INCLUDED HAZARDS

Weather and climate change are not hazards in themselves. Rain is not a hazard, but flooding is. Drought is not a hazard, but contracting soils and moving foundations can be. Therefore, quite apart from weather data, the Climate Risk Engines analyse a range of hazards including riverine flooding, coastal inundation, forest wildfires, wind storms, ground subsidence in drought – other hazards are available, but not included in this study.

3.5.
MATHEMATICAL ANALYSIS

The extreme weather and climate risks to an asset will depend on its exposure and vulnerability to each hazard, as well as the current and future severity and frequency of the hazard that may alter with climate change. How each of these are handled by the Climate Risk Engines is discussed below.

3.6.
HAZARD EXPOSURE

To understand if the Representative Asset is exposed to a hazard or not, contextual information about each location is gathered by the Climate Risk Engines. This may include information about the soils, tree cover, topology, elevation, flood plains, local tides or waves. Contextual information may even extend to current or historical national design standards for buildings or infrastructure. Data is gathered on these contextual features from national and international sources selected on the basis of scientific methods used, accuracy, spatial resolution, completeness and the standing of the institution that has generated the information. The organisations from which data have been used are set out in the appendix of this document.

3.7.
VULNERABILITY ANALYSIS; DAMAGE AND FAILURE THRESHOLDS

Each asset is tested for its ability to withstand the hazards to which it is likely to be exposed each year. The system tests both failure thresholds and damage thresholds.

A damage threshold is breached when an asset is affected by a hazard such that it is broken or excessively weakened. Examples might be flood waters damaging an electrical control system, or a wind storm blowing the roof off a house.

A failure threshold is breached when an element of the asset prevents the asset from performing is function. For example, when the roof is blown off in a storm it is both damaged and it fails to protect its occupants from the weather. However, it is possible to have failure without damage, for example an electrical control system that exceeds its operating temperature in a heat wave may stop the asset working, but there will be no damage (when the temperature drops it will start working again).

3.8.
WEATHER DATA

To establish the precise probability that a hazard will exceed the coping threshold of an asset or element, information about the driving weather indicators may be needed, for example the likelihood of flooding is linked to the likelihood of extreme precipitation. The Climate Risk Engines have access to 100,000 national weather stations around the world. Internal algorithms are used to select which stations to use when testing an asset based on proximity, data quality, duration and completeness. In some cases, the Climate Risk Engines may use a combination of data from more than one station or gridded data sets made by national meteorological centres. More recently satellite data has become an important source of weather data and this too may be accessed for computations, however the problem of climate change influencing the weather data base-lines has to be handled very carefully.

3.9.
CLIMATE CHANGE MODELLING

Changes in the composition of the atmosphere due to greenhouse gas emissions will change how the atmosphere and oceans behave. Therefore, the historical weather station statistics need to be adjusted to allow for climate change.

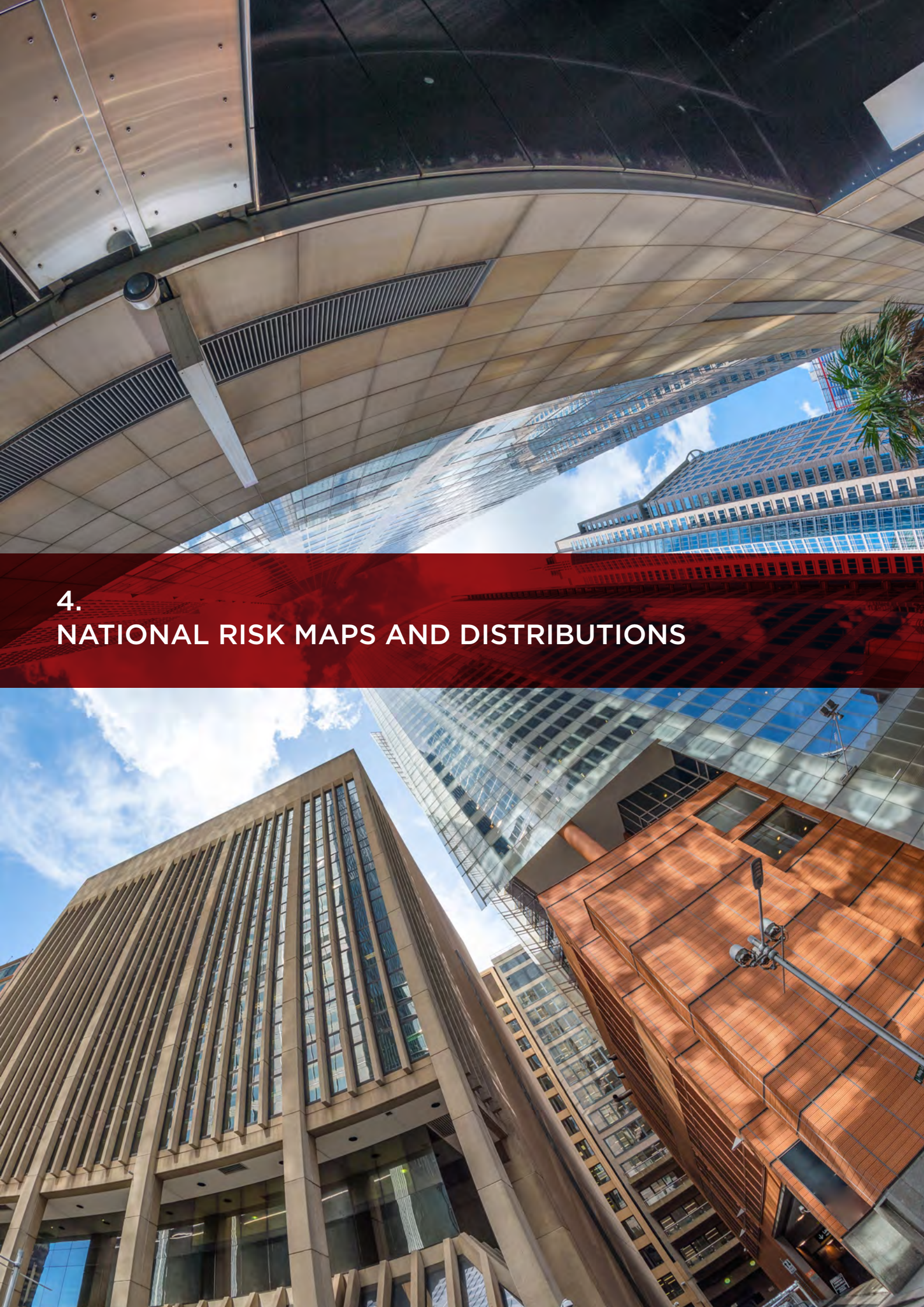
The Climate Risk Engines have access to a large number of data sets from the Coupled Model Inter-comparison Project (CMIP) in which participant organisations model the atmosphere under various Representative Concentration Scenarios (RCP). At a whole of atmosphere scale the General Circulation Models (GCMs) have a resolution down to about 100km^3.
With downscaling, Regional Climate Models (RCMs) include local topology and land surface information to provide weather parameters at higher spatial resolutions - between 5km^3 and 50km^3.

For some locations, users can select the GCM/RCM they wish to apply to the analysis of the Representative Asset, otherwise the Climate Risk Engines will select by default the most appropriate climate modelling to use based on: the models available in the region; the 'skill' of the model in capturing typical weather behaviour in a certain region; the range of parameters included or reported; the spatial resolution; and how the results of the model fit within the ensemble of other models for the region.

3.10.
SCENARIO RUN DATA

In this study data from CORDEX is used in conjunction with outputs from the University of NSW's NARCliM downscaled climate projections. Models are selected based on resolution, currency and relevance the hazard of interest. The model selected for each hazard is specified below.

SCENARIO & ASSET SETTINGS	
PARAMETER	**SETTING**
Representative Concentration Pathway	RCP 8.5 core baseline
Coastal Inundation (excl wave impacts & coastal erosion)	Sea Level Rise: 1.5m by 2100, Haigh et al. 2014 (sits between new IPCC range and NOAA upper estimates oF 2m and 2.5m).
Riverine Flooding Data	GCM: CORDEX-AUS MPI_CLMcom Ambiental & JBA international flood maps
Subsidence (Drought driven)	GCM: NARCliM_CSIROMK3
Extreme Wind	GCM: CODREX-AUS MPI_CLMcom
Forest Fire (excl grass fire)	GCM: CORDEX_AUS MPI_CLMcom
Building Specifications	Building Design Specifications I. V500 standard Wind rating II. 0.45m Floor Height III. Concrete Foundations IV. Sample year 2000 build date
Building Replacement Value	$314,000



4.
NATIONAL RISK MAPS AND DISTRIBUTIONS

4.1.
OVERVIEW

The information in this analysis has been published to support decision making by communities and governments to ensure that the Australian economy and society is resilient into the future.

The analysis underpinning this report can be used to identify where action is necessary, what activities to undertake and when they should be delivered.

Riverine Flooding - The analysis suggests that flood risk is already a major problem in many LGAs. In many areas the TTIP is dominated by a small number of properties that have very high annual average losses. In general the results suggest that flood risk is material for about 5% of addresses. The degree of risk then depends on the vulnerability of the property at that address.

Coastal Inundation - Similarly, coastal inundation has a high impact when it occurs. The total proportion of addresses at risk is starting at a low level but seem to be increasing exponentially through the century. Whilst this affects a small proportion of all addresses, the financial impacts can be severe.

Forest Fire - Forest Fire has a relatively low probability of causing damage to any individual property in a given year, but has broad scale implications due to the impact on properties and people. As forest fire events in recent years have shown, the increases in severity and duration of forest fire events is leading to longer fire seasons and loss of life and property. Looking forward, this analysis suggests that fire conditions will increase in many areas and more worrying still, penetrate into areas not normally associated with forest fire.

Subsidence - Subsidence is a problem for any construction on reactive soils, which are widely distributed across the country. While the amount of damage from subsidence can be modest and non-catastrophic for a single building, the probability of droughts combined with the large numbers of exposed properties makes this a potentially large source of damage and loss.

Wind - In this study we look at the change in the frequency of wind speeds capable of damaging buildings based on their design thresholds. Changes are found to be generally modest, and even decrease many areas but there remains considerable uncertainty in the model outputs. However, the results should not lead to complacency about wind and storm damage, as climate modelling does not yet capture small scale storm systems well, nor cyclone behaviour.

Heat - Heatwave hazard has not been included in this report - though it is modelled by the Climate Risk Engines - as it is not a direct cause of property damage. Instead, severe heat can cause human health impacts and disrupt electronic and electrical systems.

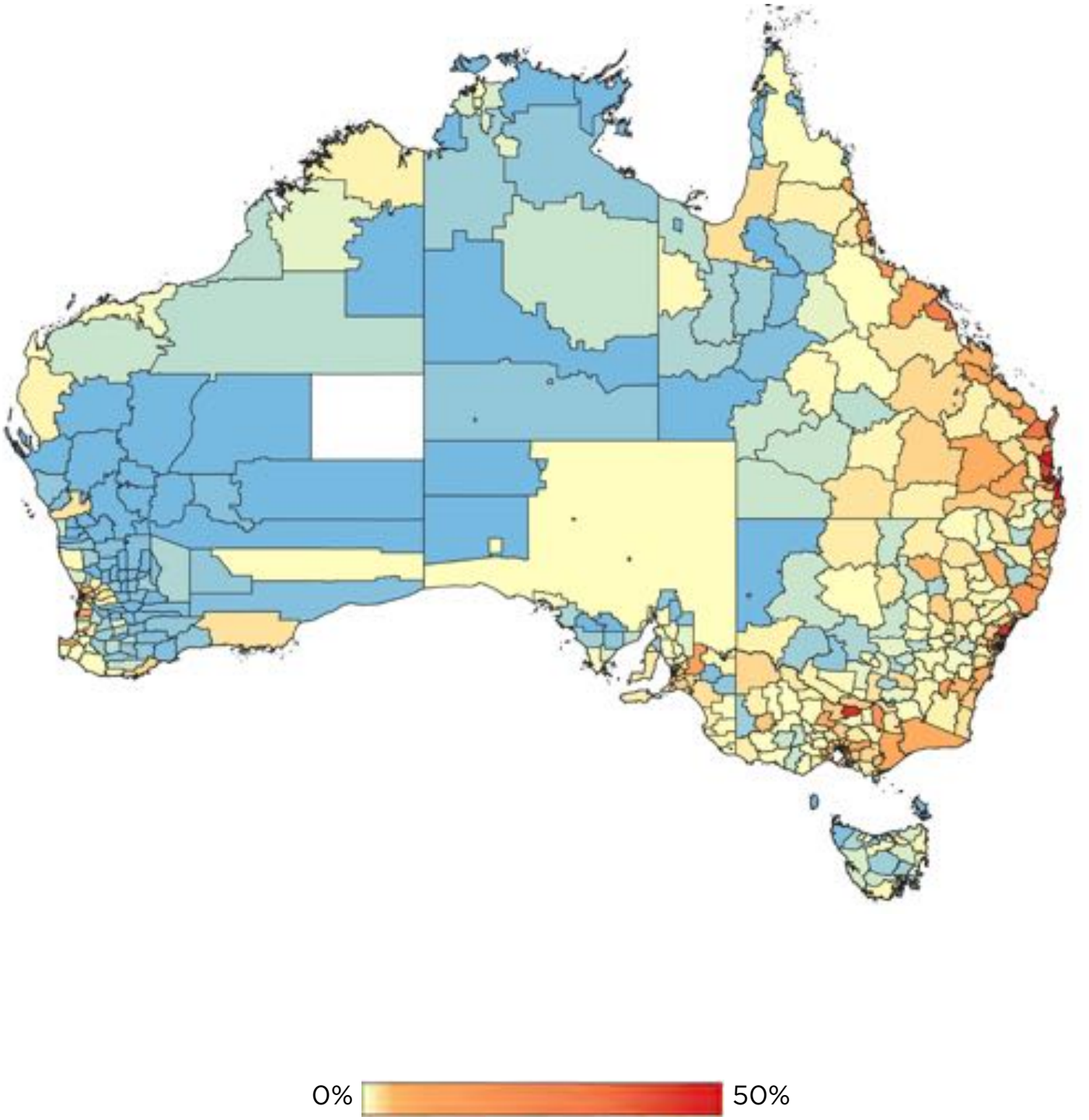
4.2.
NATIONAL RISK MAPS

The following series of Risk Maps show the major risk indicators plotted by LGA in 2100, overall and broken down to show individual hazards.

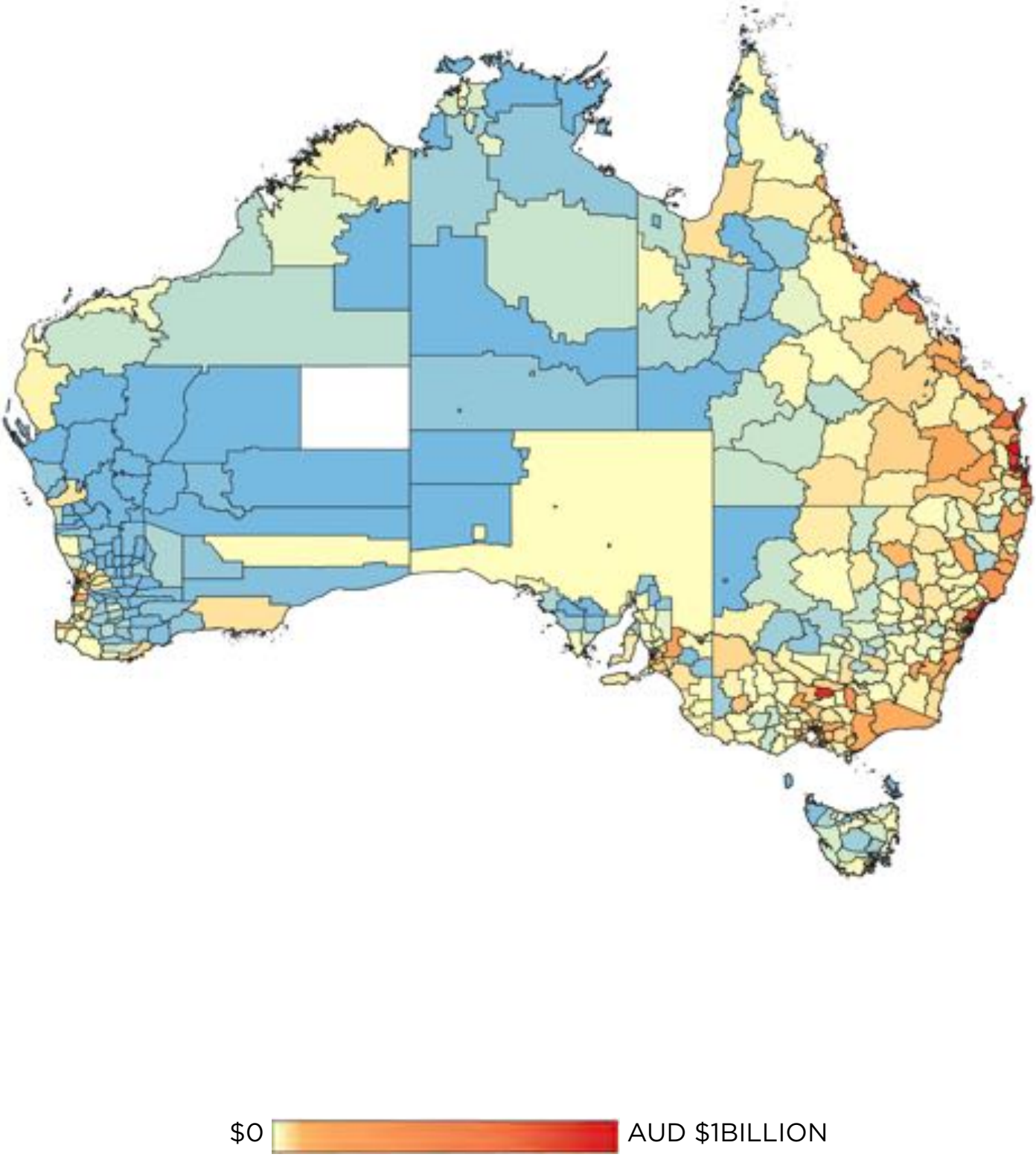
Note: different scales may apply for colour distributions from state to state. Please refer to the colour legend.

4.2.1.
ALL HAZARDS

HIGH RISK PROPERTIES AS PERCENTAGE OF ALL ADDRESSES, (HRP%) IN 2100

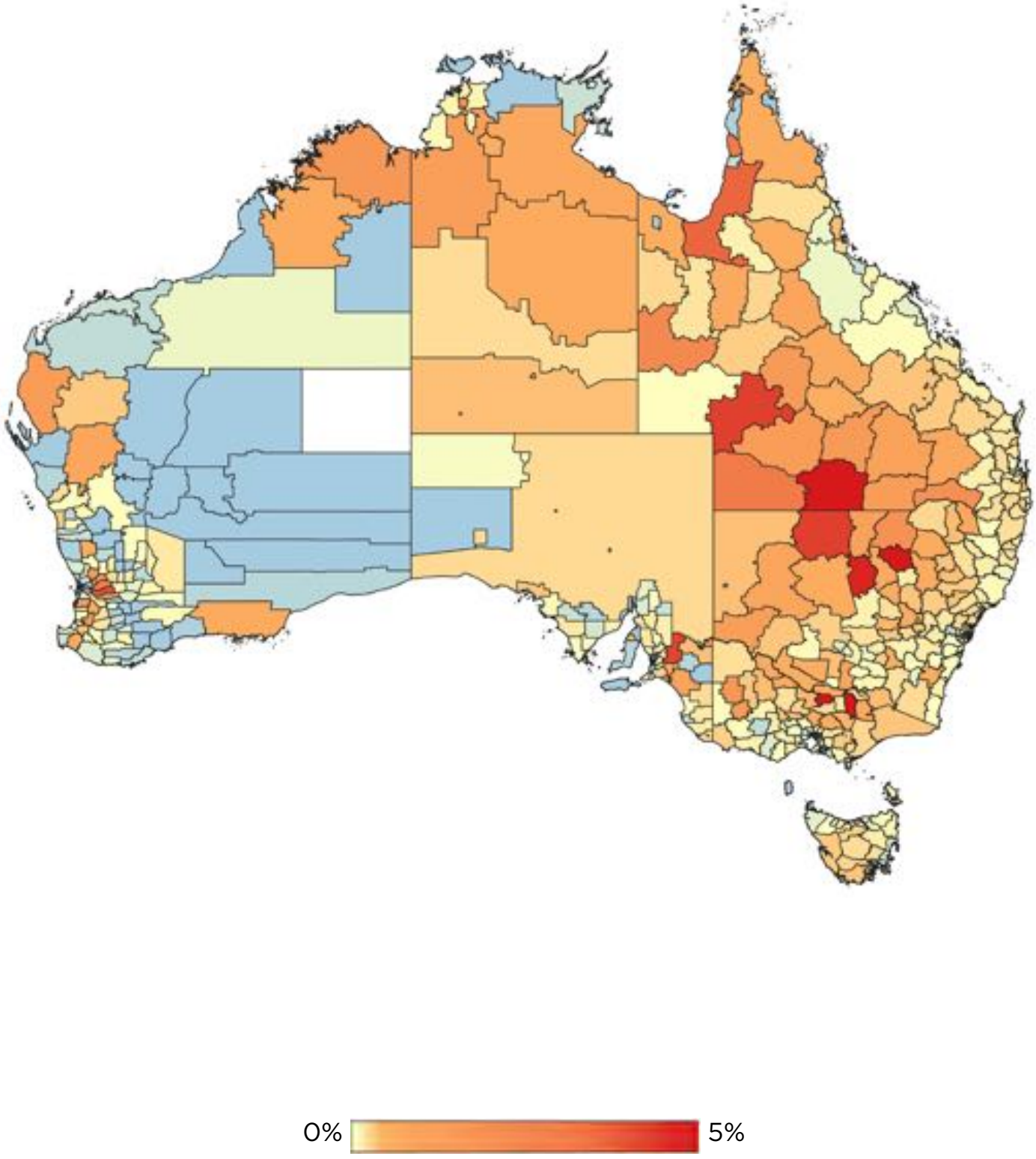


TOTAL TECHNICAL INSURANCE PREMIUM (TTIP) IN 2100

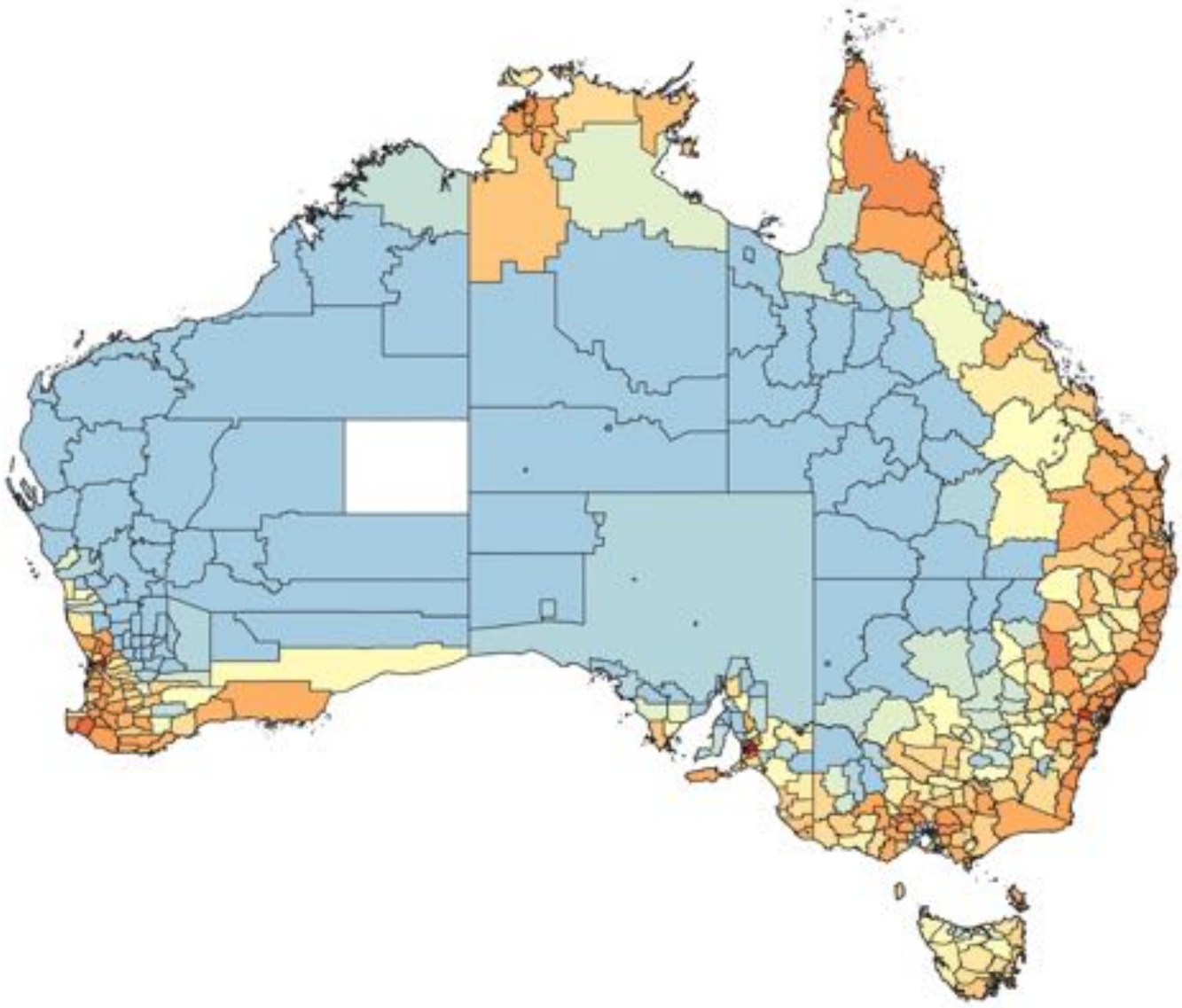


4.2.2.
PER HAZARD

HAZARD NATIONAL RISK MAPS VAR% - RIVERINE FLOODING VAR% IN 2100

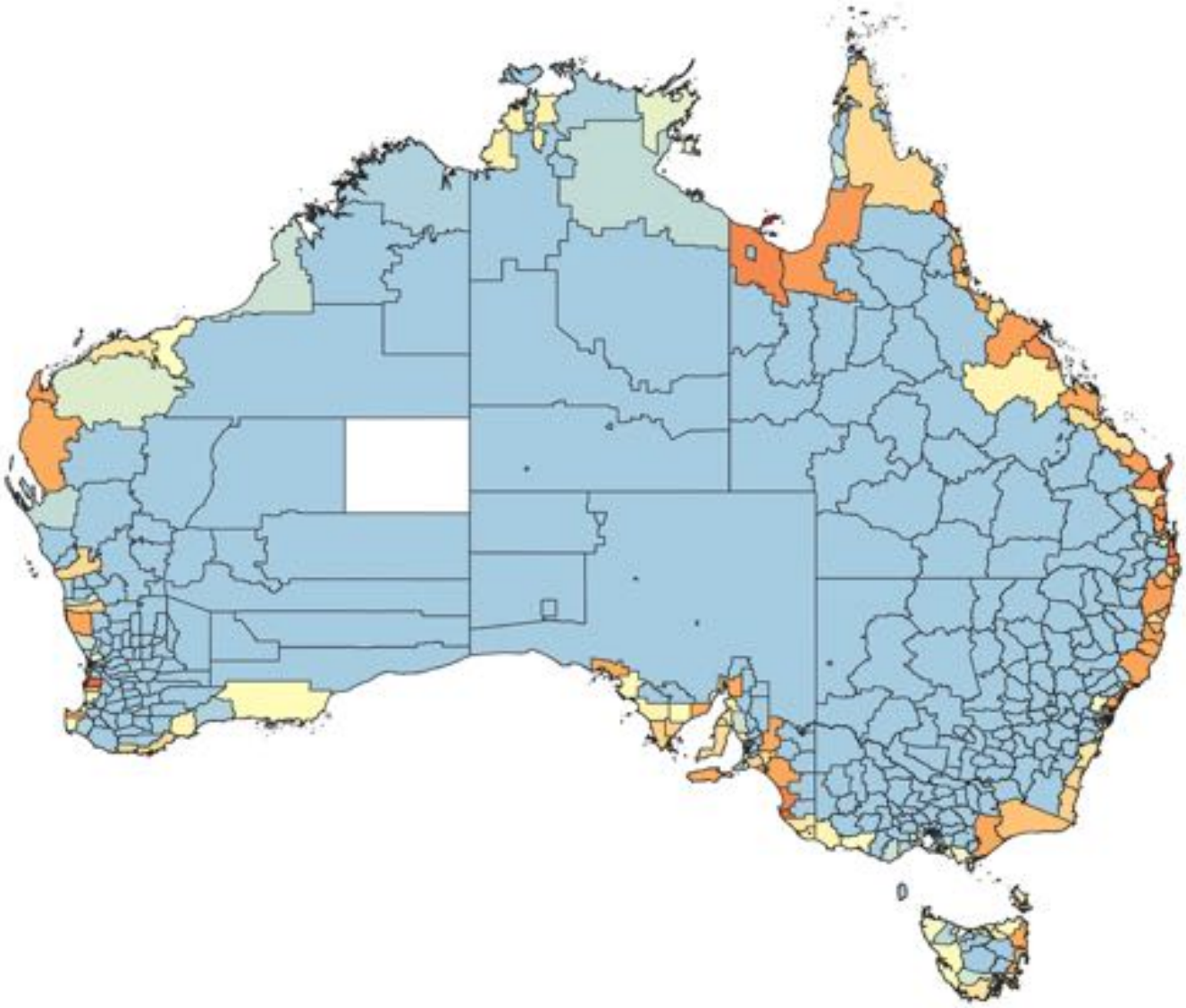


HAZARD NATIONAL RISK MAPS VAR% - FOREST FIRE VAR% IN 2100



0% 0.3%

HAZARD NATIONAL RISK MAPS VAR% - COASTAL INUNDATION VAR% IN 2100

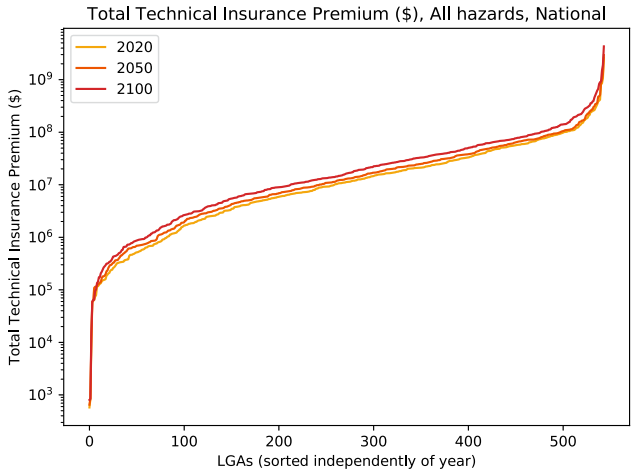


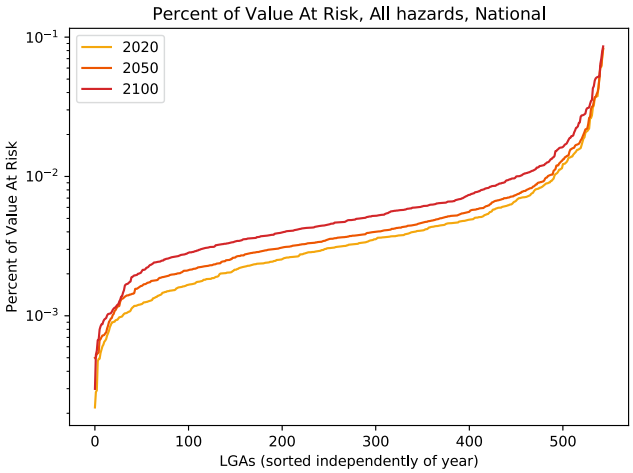
0% 5%

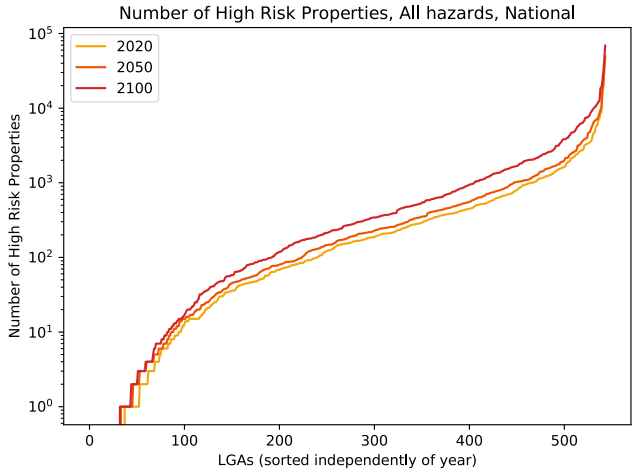
4.3
DISTRIBUTION

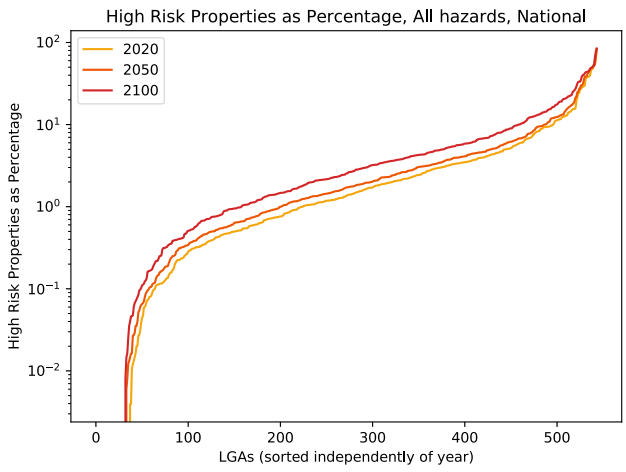
All local government areas in the country have been ordered from lowest to highest risk for each risk indicator (TTIP, VAR%, HRP#, HRP%). Coloured lines represent three time frames: 2020, 2050 and 2100. The results are presented on a logarithmic graph to better appreciate the differences across the cohort and between years.

DISTRIBUTION GRAPHS FOR ALL HAZARDS BY RISK INDICATOR









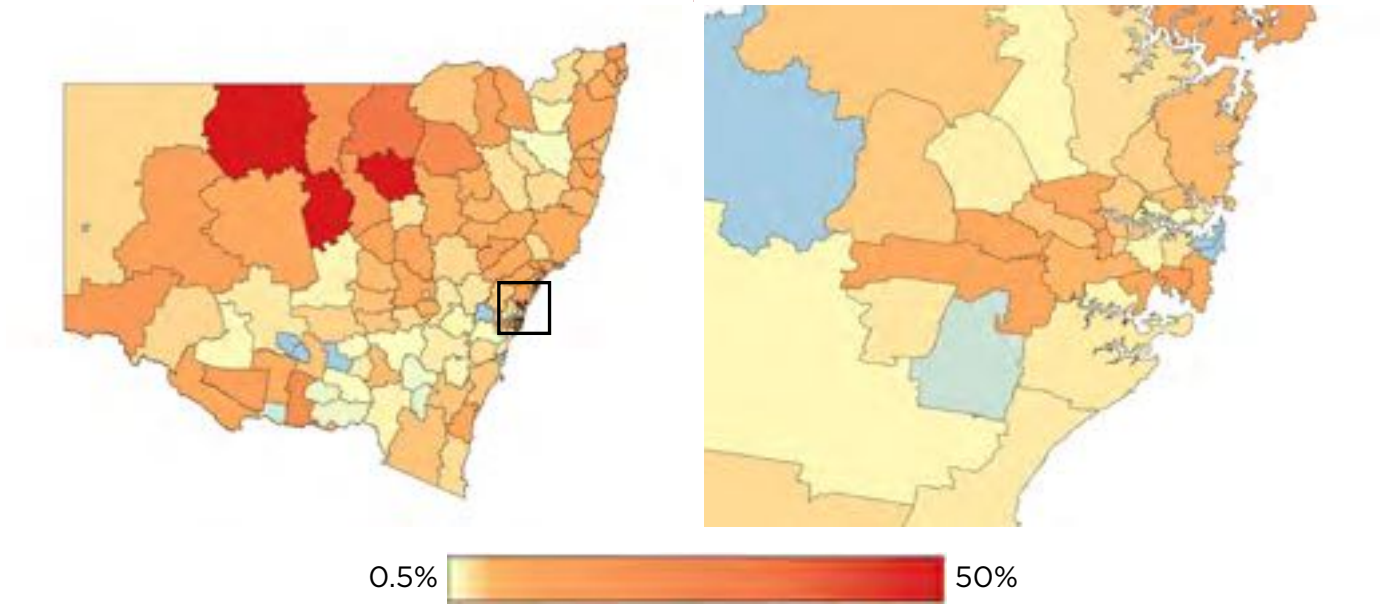
RISK MAPS AND DISTRIBUTIONS BY STATE

5. NEW SOUTH WALES & AUSTRALIAN CAPITAL TERRITORY RISK MAPS & DISTRIBUTIONS

5.1. RISK MAPS

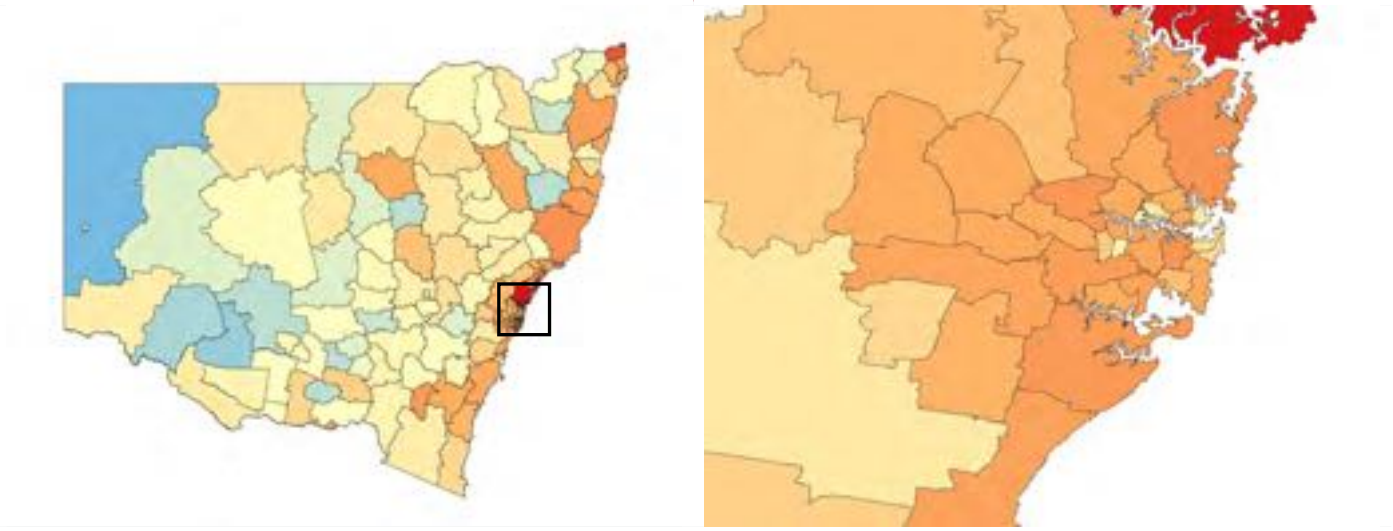
Note: different scales may apply for colour distributions from state to state. Please refer to the colour legend.

HRP% OF ALL ADDRESSES IN 2100 - FOCUS BOX OVER SYDNEY



0.5% 50%

TTIP IN 2100 - FOCUS BOX OVER SYDNEY



$0 AUD $800 million

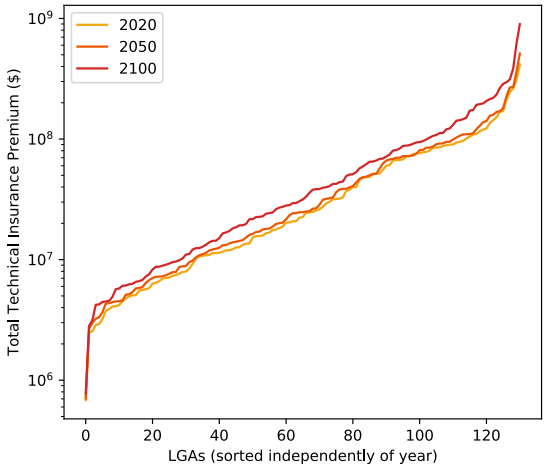
5.2
DISTRIBUTIONS

All local government areas in the country have been ordered from lowest to highest risk for each risk indicator (TTIP, VAR%, HRP#, HRP%). Coloured lines represent three time frames: 2020, 2050 and 2100. The results are presented on a logarithmic graph to better appreciate the differences across the cohort and between years.

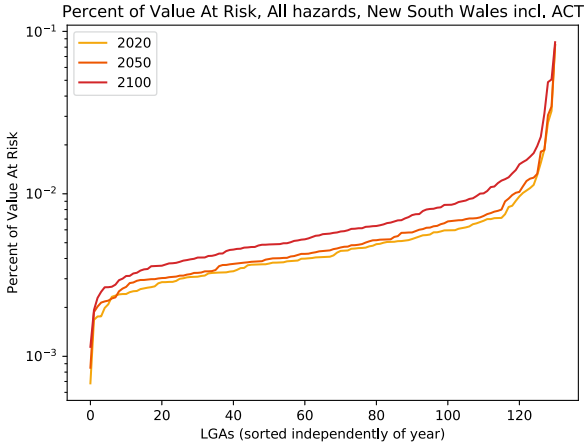
As these graphs cannot accommodate names of individual LGA's, specific ranking can be found in the benchmarking tables below.

DISTRIBUTION GRAPHS FOR ALL HAZARDS BY RISK INDICATOR

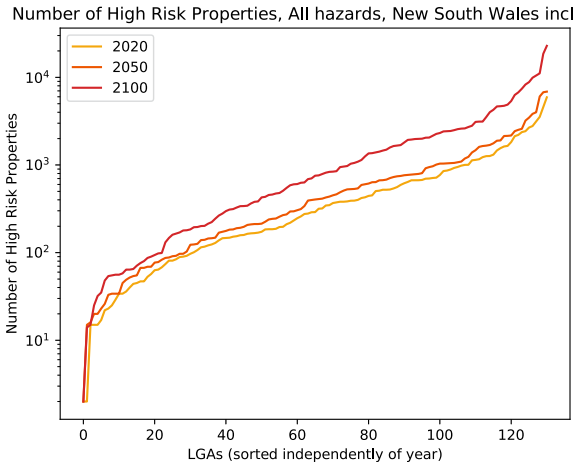
Total Technical Insurance Premium ($), All hazards, New South Wales incl. ACT



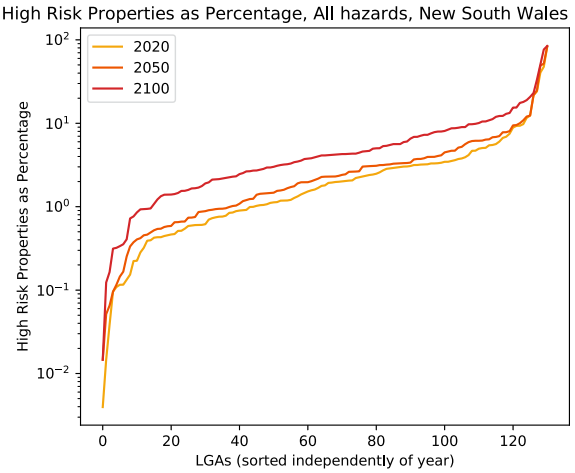
Percent of Value At Risk, All hazards, New South Wales incl. ACT



Number of High Risk Properties, All hazards, New South Wales incl. ACT



High Risk Properties as Percentage, All hazards, New South Wales incl. ACT

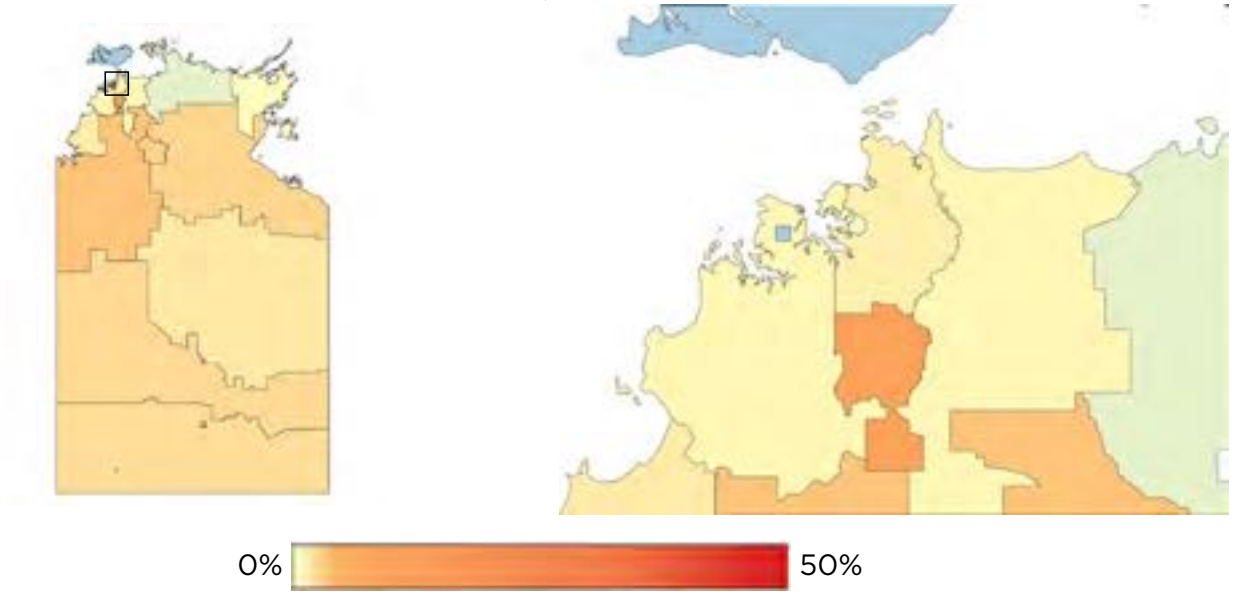


6.
NORTHERN TERRITORY RISK MAPS & DISTRIBUTIONS

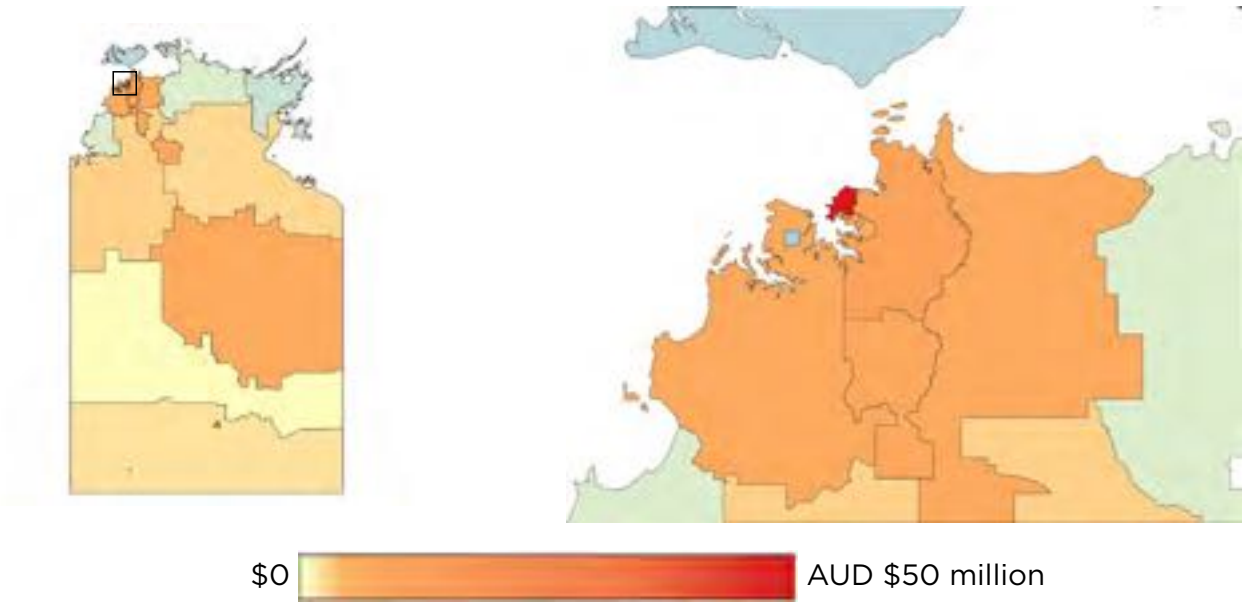
6.1.
RISK MAPS

Note: different scales may apply for colour distributions from state to state.
Please refer to the colour legend.

HRP% OF ALL ADDRESSES IN 2100 - FOCUS BOX OVER DARWIN



TTIP IN 2100 - FOCUS BOX OVER DARWIN

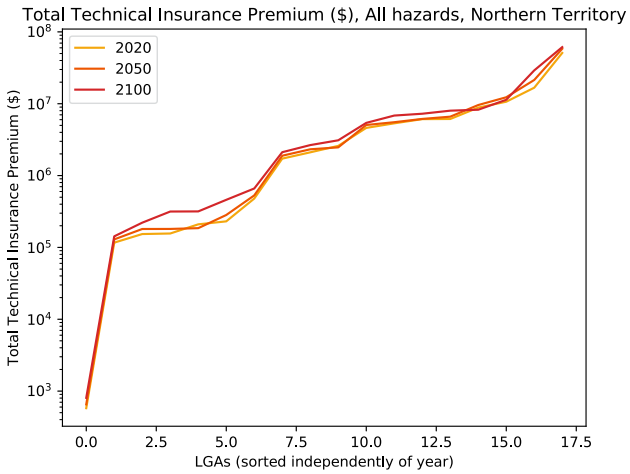


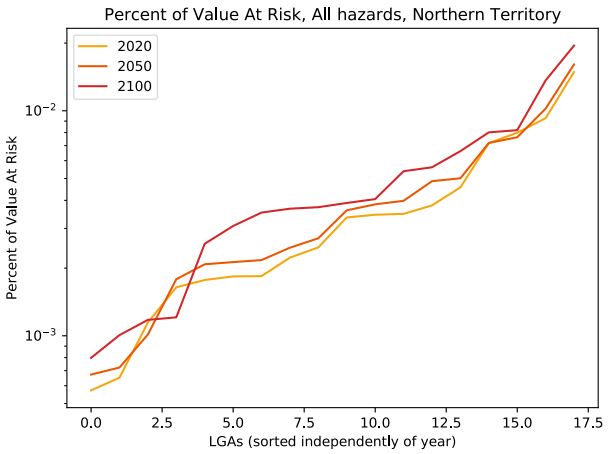
6.2
DISTRIBUTIONS

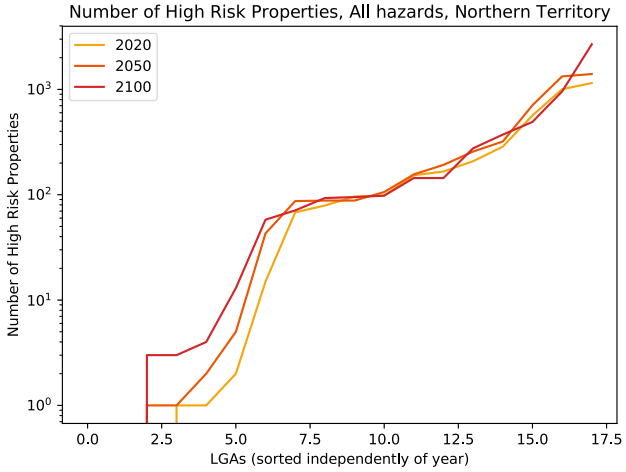
All local government areas in the country have been ordered from lowest to highest risk for each risk indicator (TTIP, VAR%, HRP#, HRP%). Coloured lines represent three time frames: 2020, 2050 and 2100. The results are presented on a logarithmic graph to better appreciate the differences across the cohort and between years.

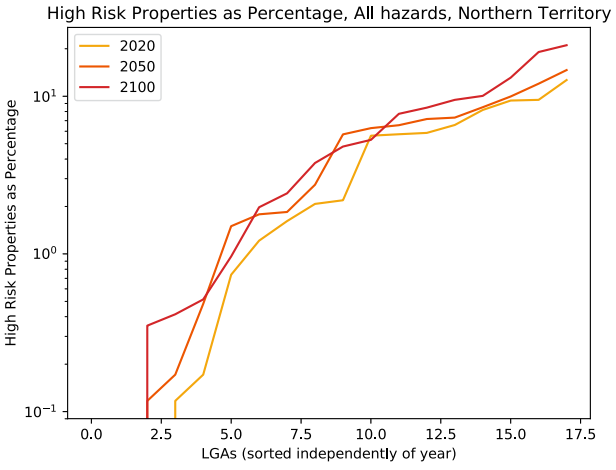
As these graphs cannot accommodate names of individual LGA's, specific ranking can be found in the benchmarking tables below.

DISTRIBUTION GRAPHS FOR ALL HAZARDS BY RISK INDICATOR







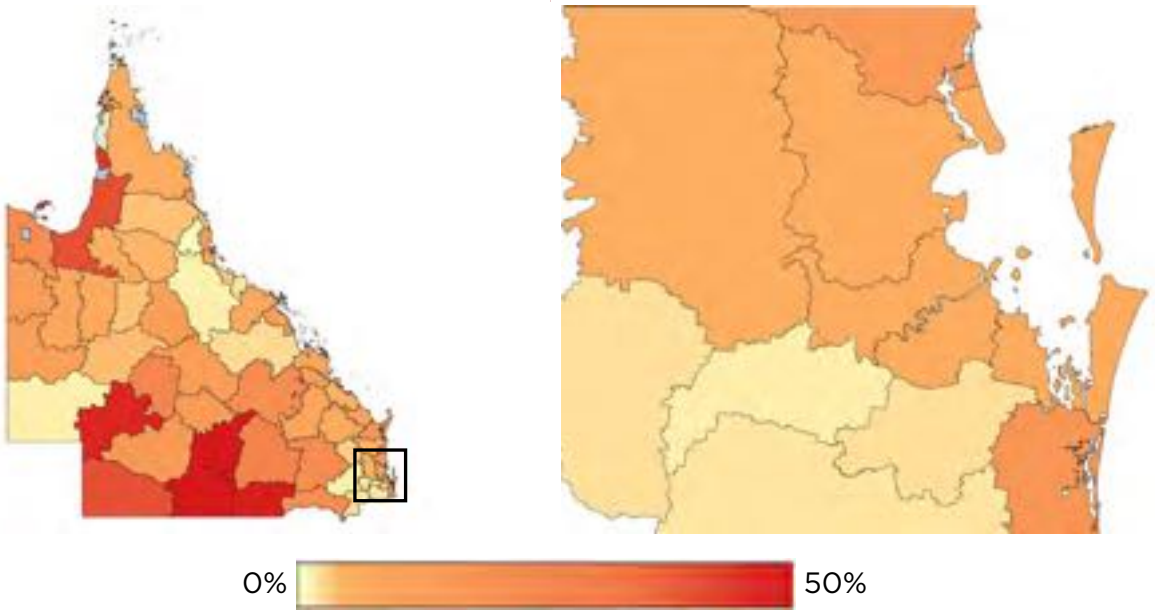


7.
QUEENSLAND RISK MAPS & DISTRIBUTIONS

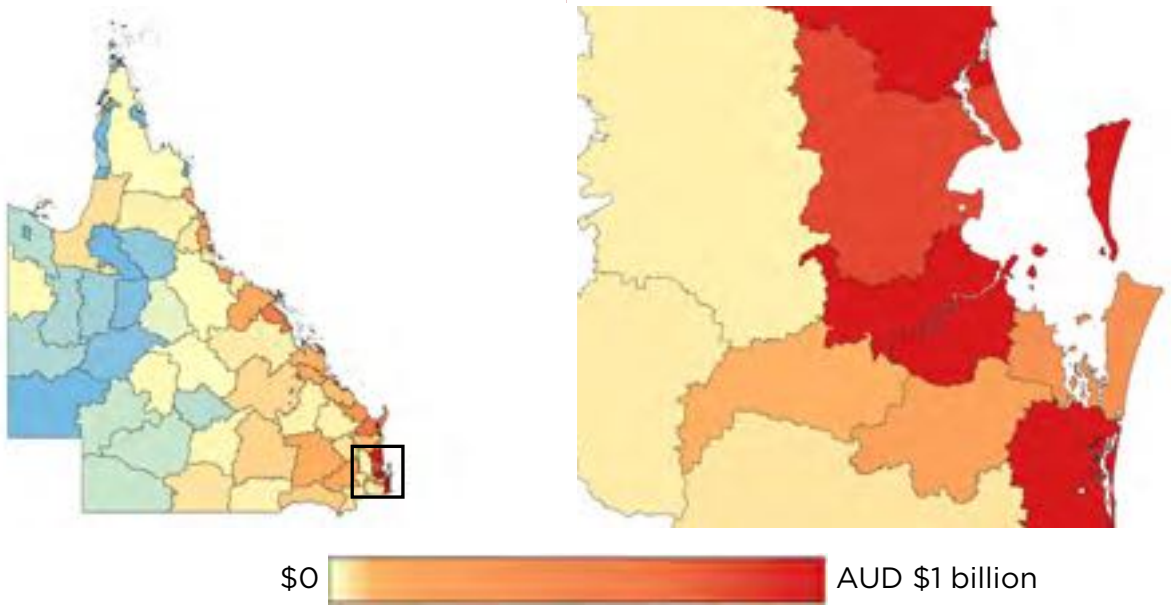
7.1.
RISK MAPS

Note: different scales may apply for colour distributions from state to state. Please refer to the colour legend.

HRP% OF ALL ADDRESSES IN 2100 - FOCUS BOX OVER BRISBANE



TTIP IN 2100 - FOCUS BOX OVER BRISBANE

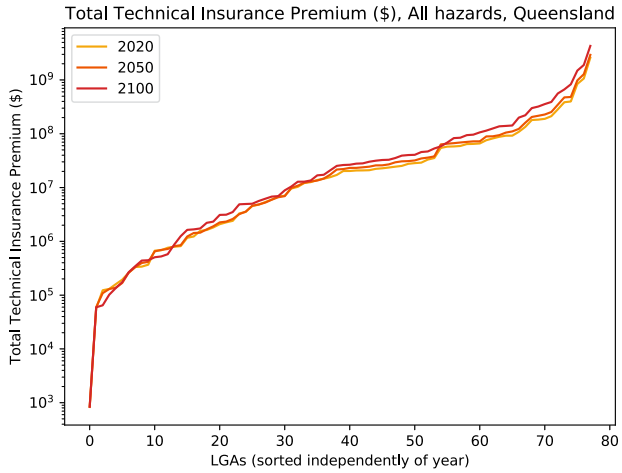


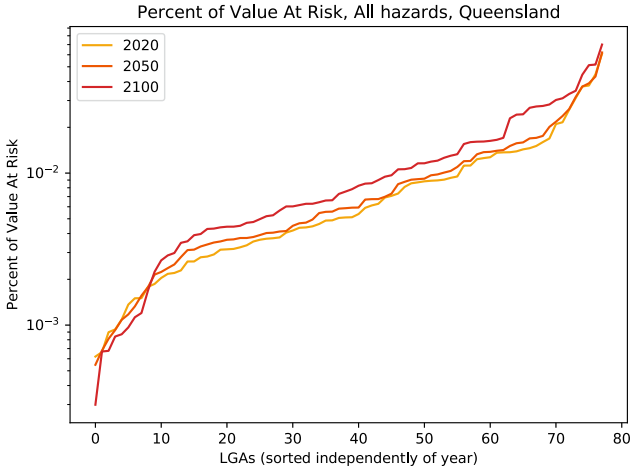
7.2.
DISTRIBUTIONS

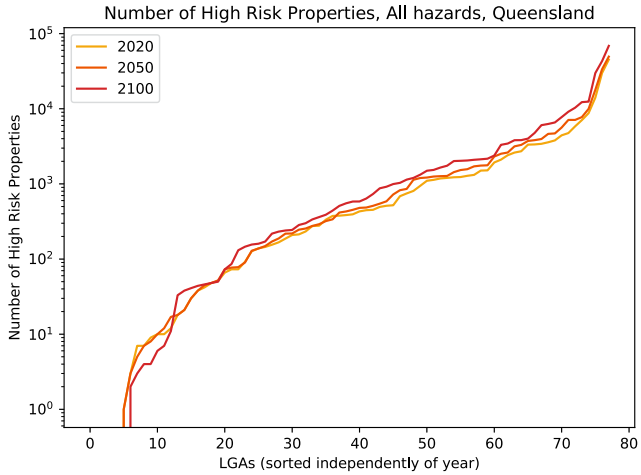
All local government areas in the country have been ordered from lowest to highest risk for each risk indicator (TTIP, VAR%, HRP#, HRP%). Coloured lines represent three time frames: 2020, 2050 and 2100. The results are presented on a logarithmic graph to better appreciate the differences across the cohort and between years.

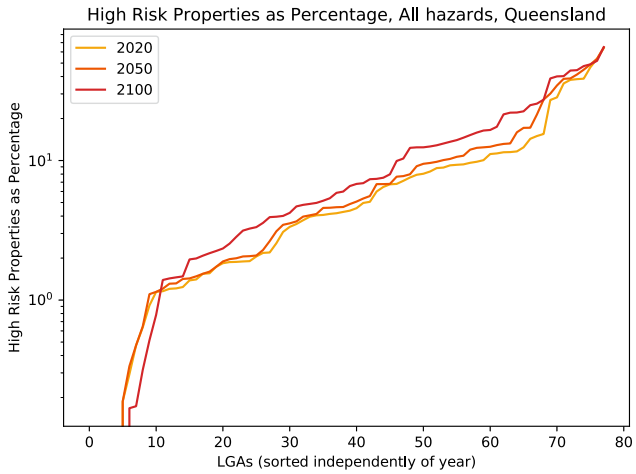
As these graphs cannot accommodate names of individual LGA's, specific ranking can be found in the benchmarking tables below.

DISTRIBUTION GRAPHS FOR ALL HAZARDS BY RISK INDICATOR







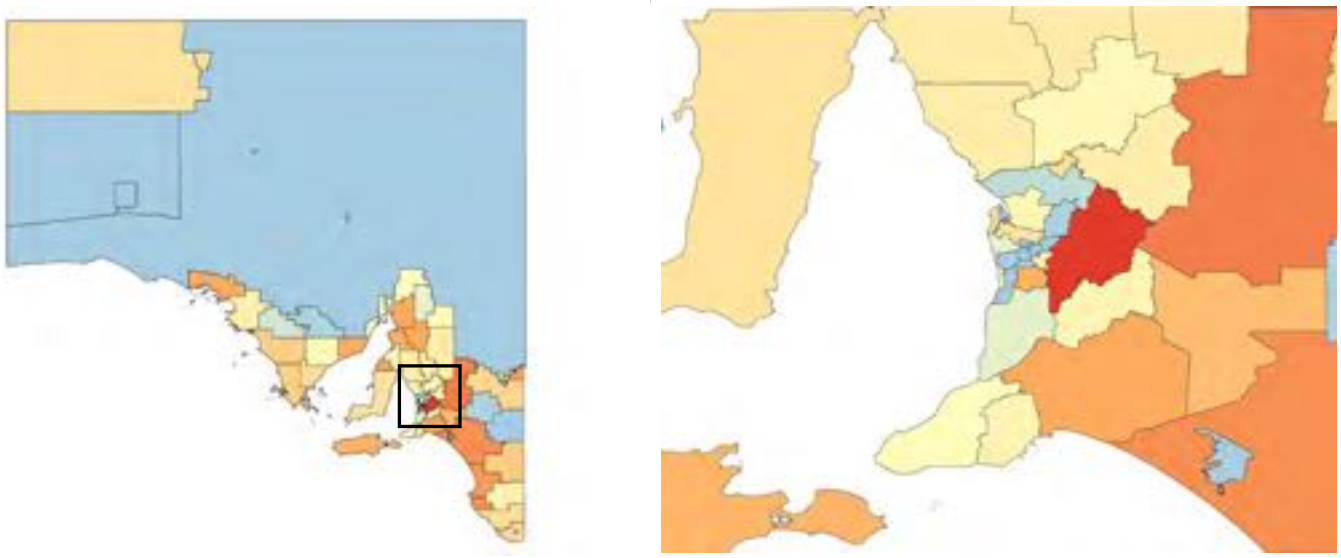


8.
SOUTH AUSTRALIAN RISK MAPS & DISTRIBUTIONS

8.1.
RISK MAPS

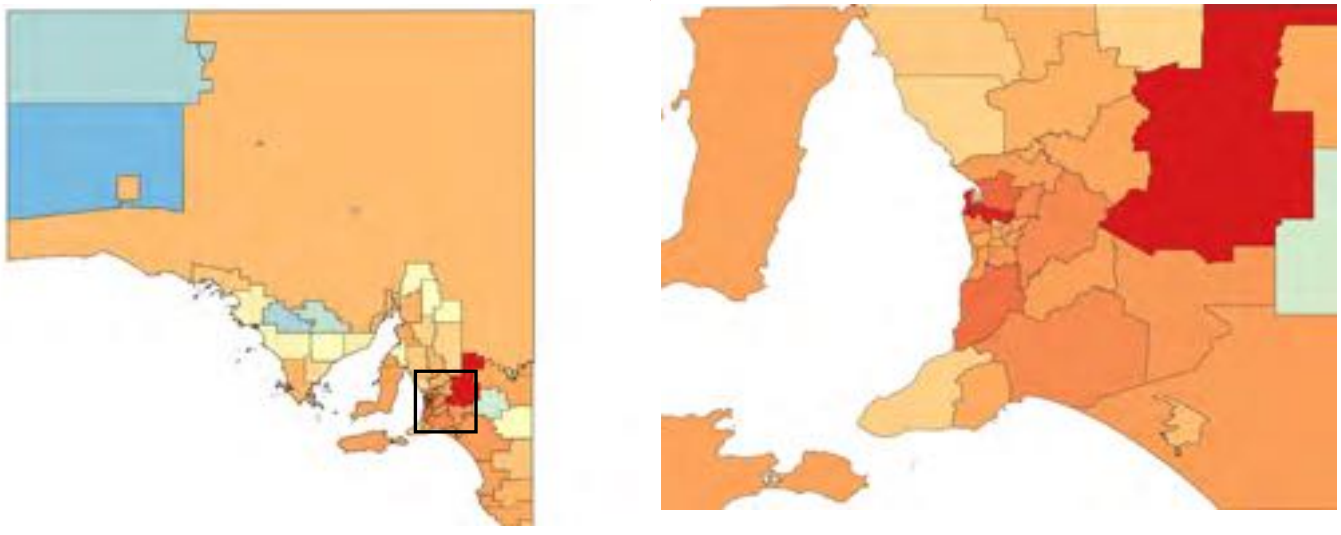
Note: different scales may apply for colour distributions from state to state. Please refer to the colour legend.

HRP% OF ALL ADDRESSES IN 2100 - FOCUS BOX OVER ADELAIDE



0% 50%

TTIP IN 2100 - FOCUS BOX OVER ADELAIDE



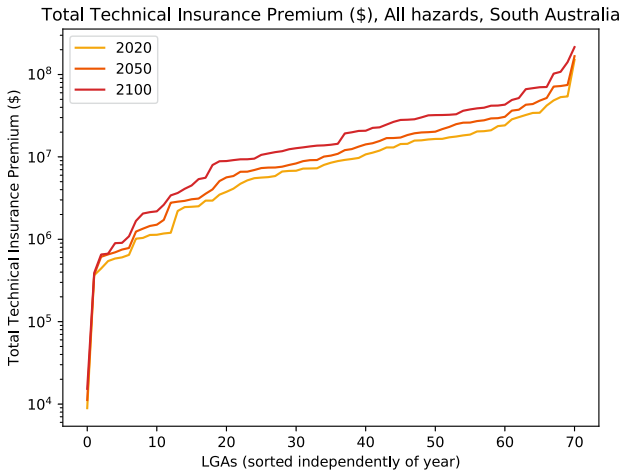
$0 AUD $100 million

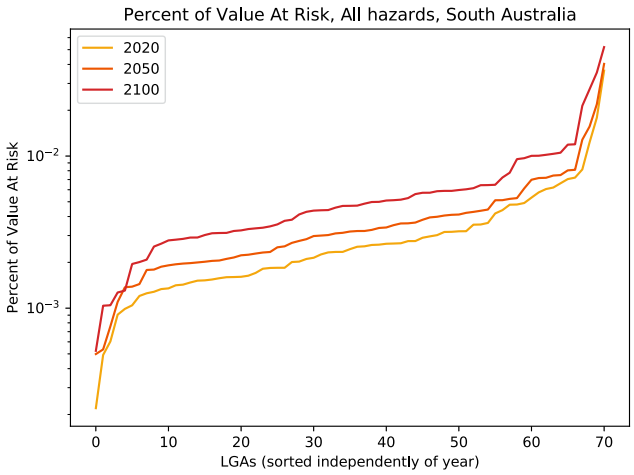
8.2.
DISTRIBUTIONS

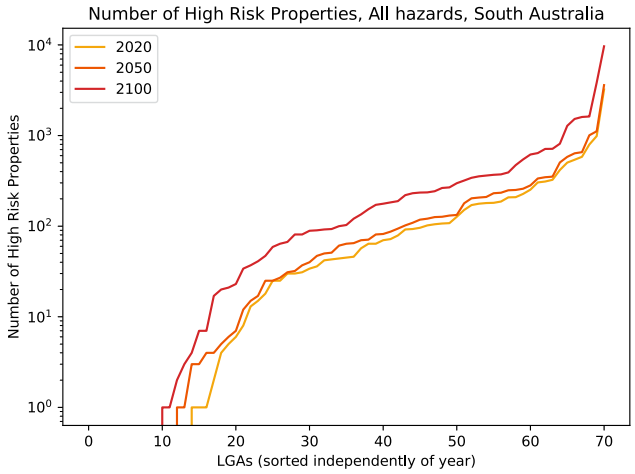
All local government areas in the country have been ordered from lowest to highest risk for each risk indicator (TTIP, VAR%, HRP#, HRP%). Coloured lines represent three time frames: 2020, 2050 and 2100. The results are presented on a logarithmic graph to better appreciate the differences across the cohort and between years.

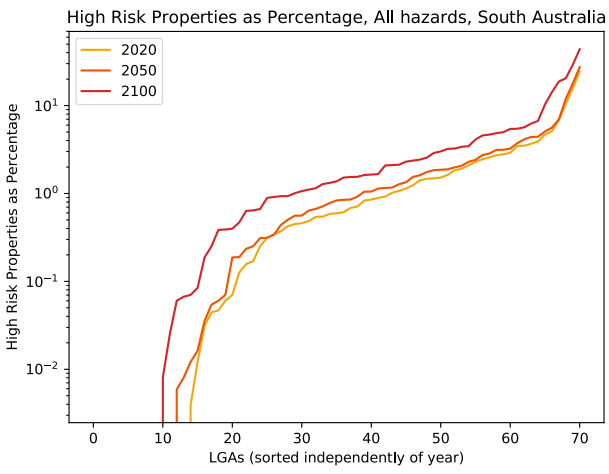
As these graphs cannot accommodate names of individual LGA's, specific ranking can be found in the benchmarking tables below.

DISTRIBUTION GRAPHS FOR ALL HAZARDS BY RISK INDICATOR







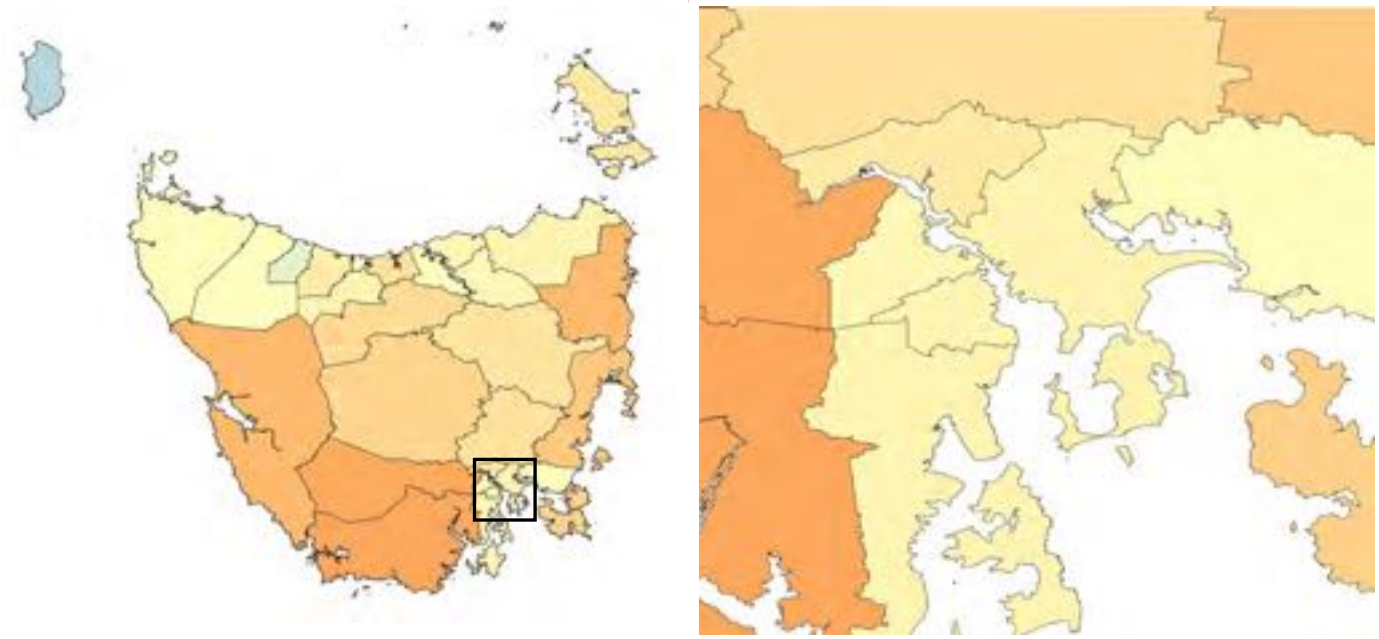


9.
TASMANIA RISK MAPS & DISTRIBUTIONS

9.1.
RISK MAPS

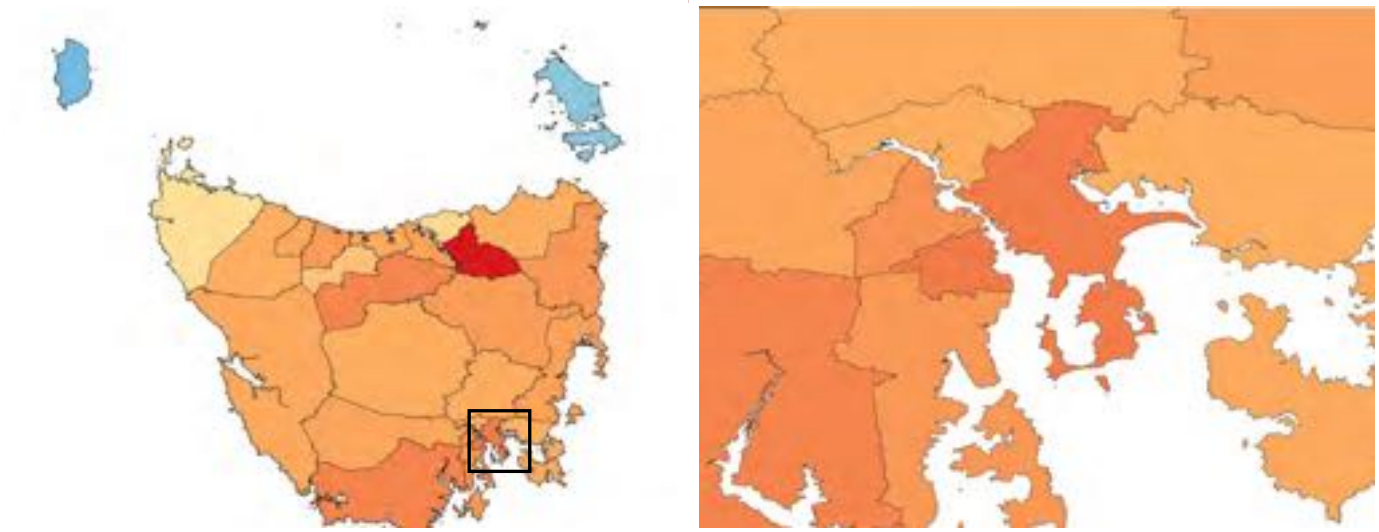
Note: different scales may apply for colour distributions from state to state. Please refer to the colour legend.

HRP% OF ALL ADDRESSES IN 2100 - FOCUS BOX OVER HOBART



0% 50%

TTIP IN 2100 - FOCUS BOX OVER HOBART



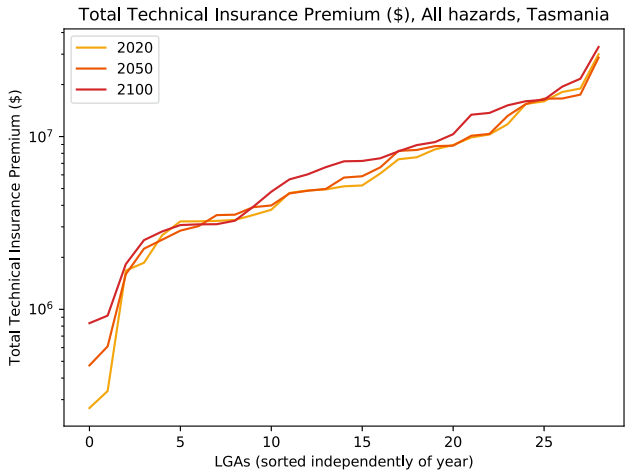
$0 $AUD $30 million

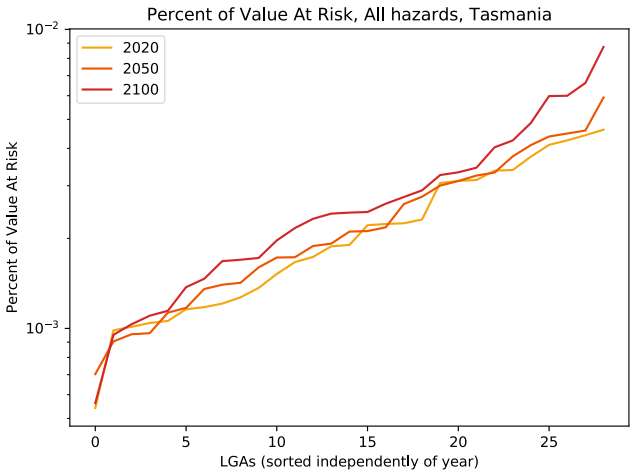
9.2.
DISTRIBUTIONS

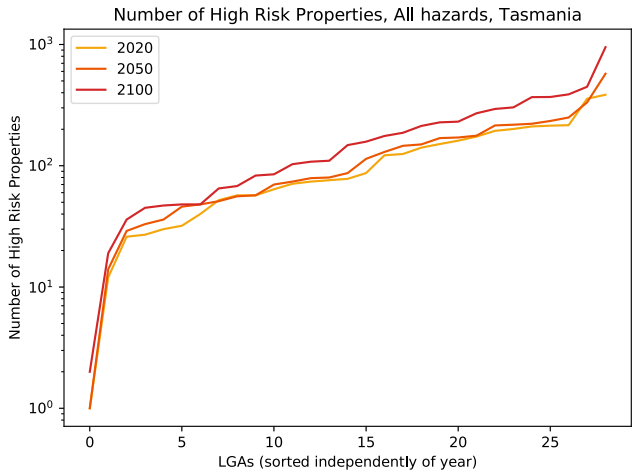
All local government areas in the country have been ordered from lowest to highest risk for each risk indicator (TTIP, VAR%, HRP#, HRP%). Coloured lines represent three time frames: 2020, 2050 and 2100. The results are presented on a logarithmic graph to better appreciate the differences across the cohort and between years.

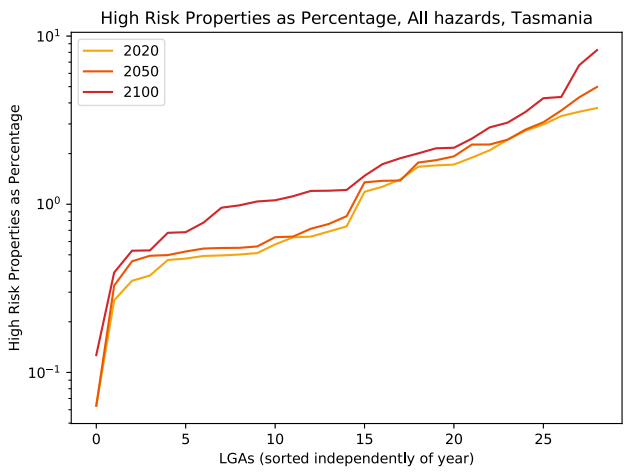
As these graphs cannot accommodate names of individual LGA's, specific ranking can be found in the benchmarking tables below.

DISTRIBUTION GRAPHS FOR ALL HAZARDS BY RISK INDICATOR







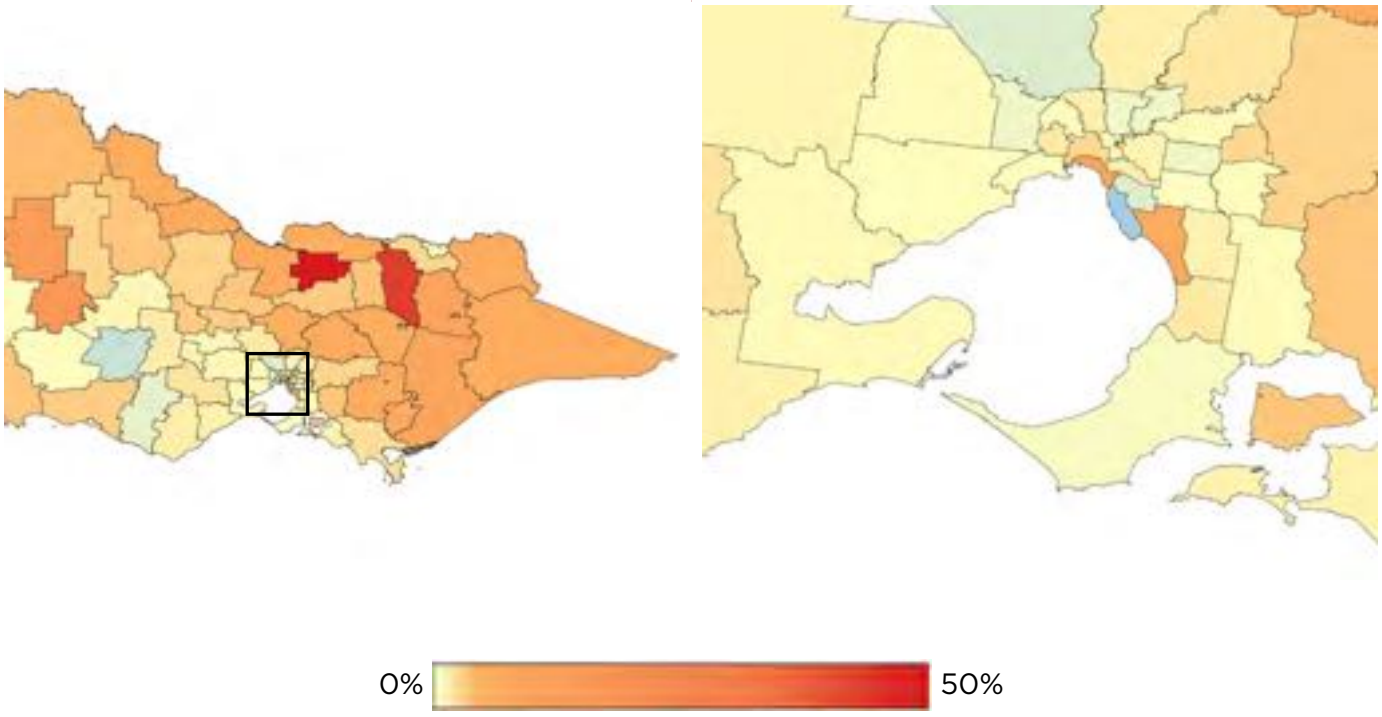


10.
VICTORIA RISK MAPS & DISTRIBUTIONS

10.1.
RISK MAPS

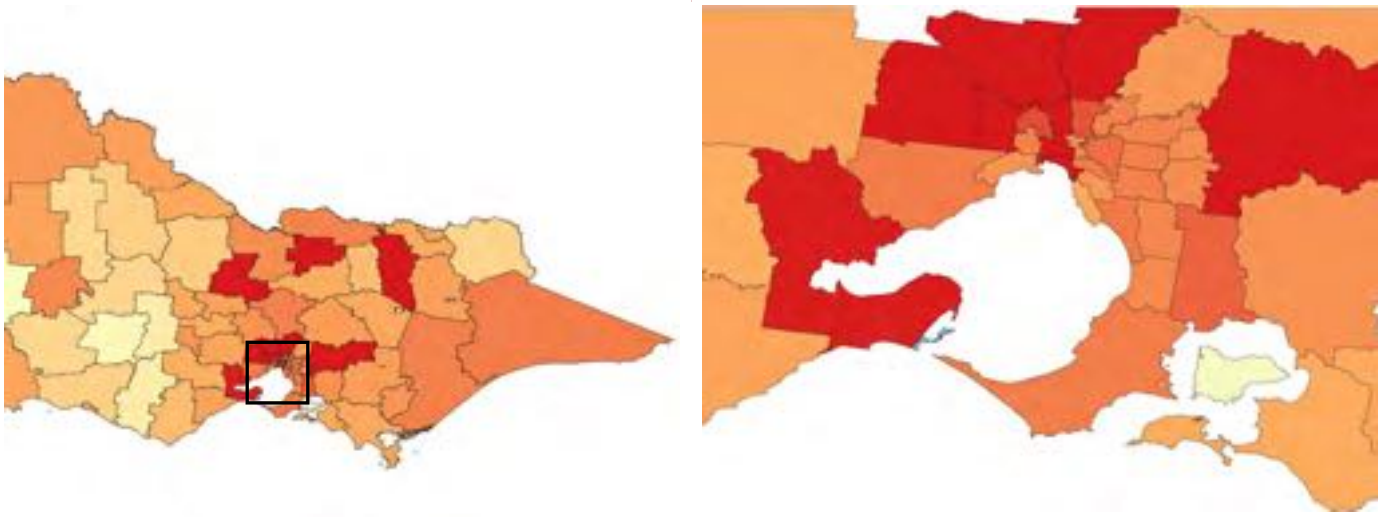
Note: different scales may apply for colour distributions from state to state. Please refer to the colour legend.

HRP% OF ALL ADDRESSES IN 2100 - FOCUS BOX OVER MELBOURNE



0% 50%

TTIP IN 2100 - FOCUS BOX OVER MELBOURNE



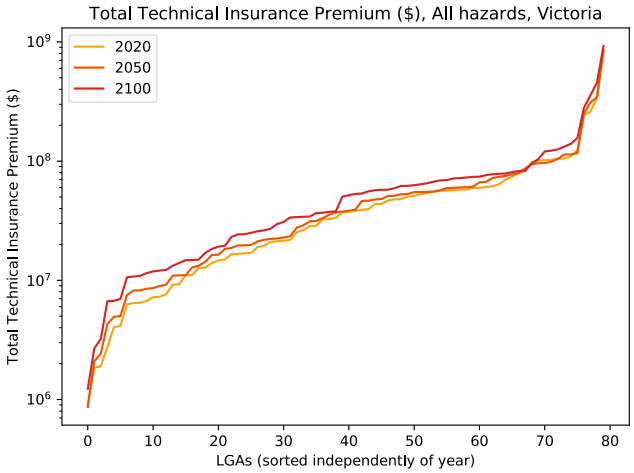
$0 AUD $100 Million

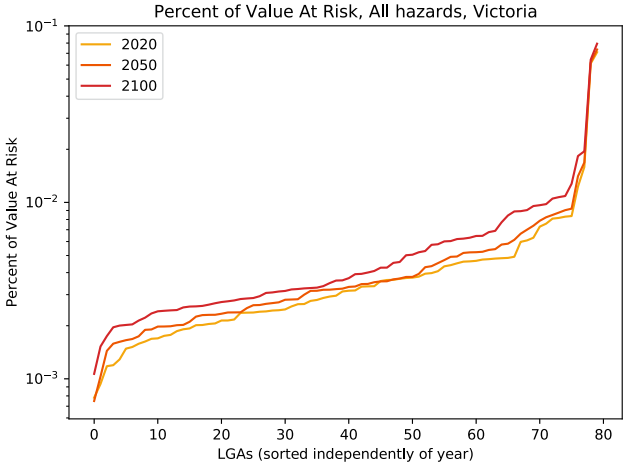
10.2.
DISTRIBUTIONS

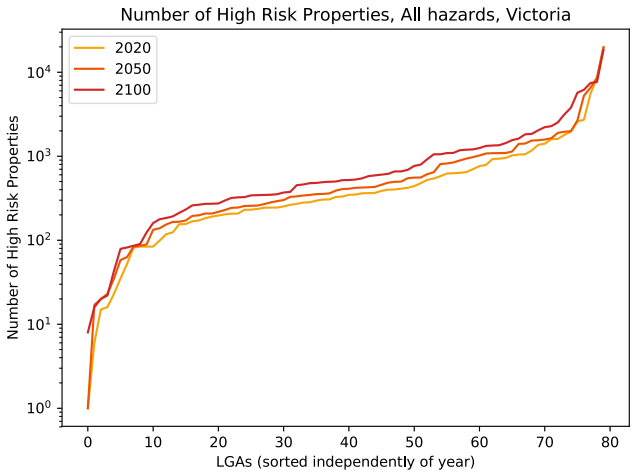
All local government areas in the country have been ordered from lowest to highest risk for each risk indicator (TTIP, VAR%, HRP#, HRP%). Coloured lines represent three time frames: 2020, 2050 and 2100. The results are presented on a logarithmic graph to better appreciate the differences across the cohort and between years.

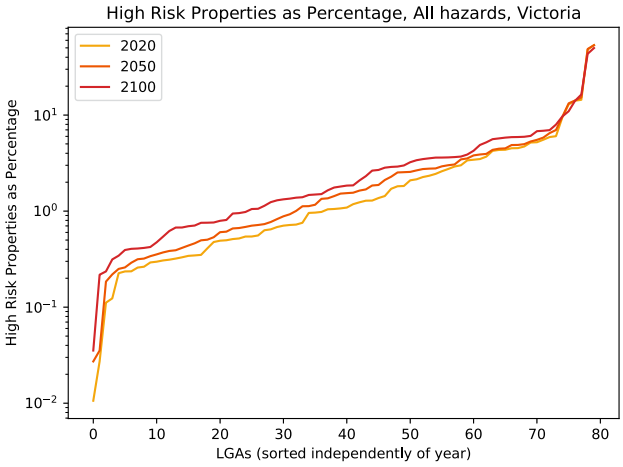
As these graphs cannot accommodate names of individual LGA's, specific ranking can be found in the benchmarking tables below.

DISTRIBUTION GRAPHS FOR ALL HAZARDS BY RISK INDICATOR







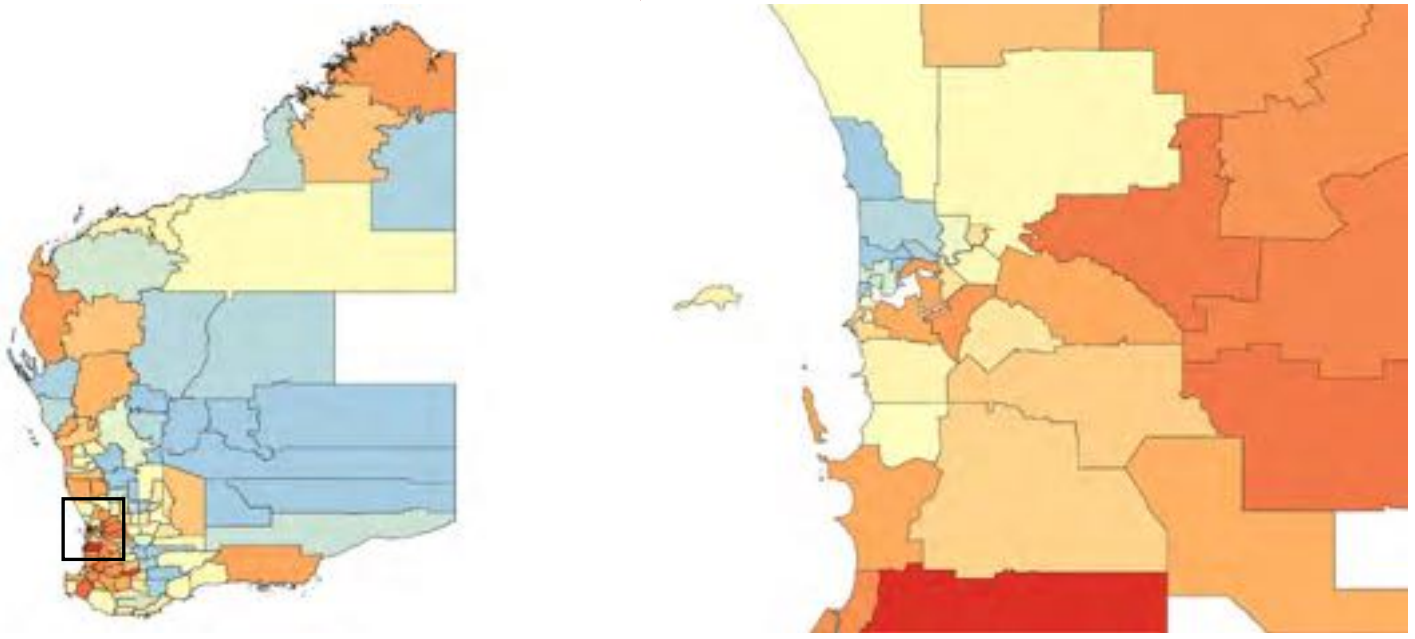


11.
WESTERN AUSTRALIA RISK MAPS & DISTRIBUTIONS

11.1.
RISK MAPS

Note: different scales may apply for colour distributions from state to state.
Please refer to the colour legend.

HRP% OF ALL ADDRESSES IN 2100 - FOCUS BOX OVER PERTH



0% 50%

TTIP IN 2100 - FOCUS BOX OVER PERTH

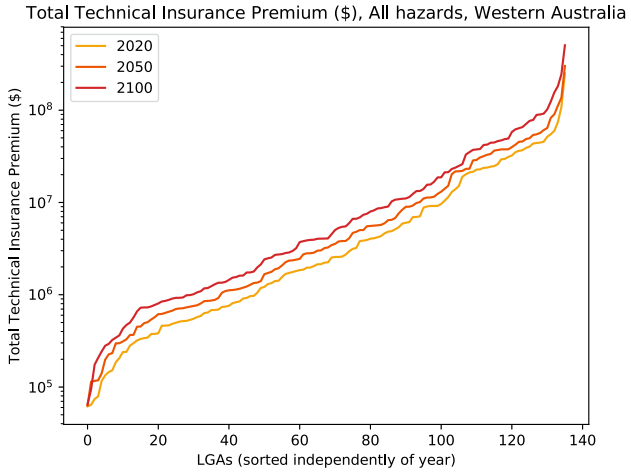
$0 AUD $100 Million

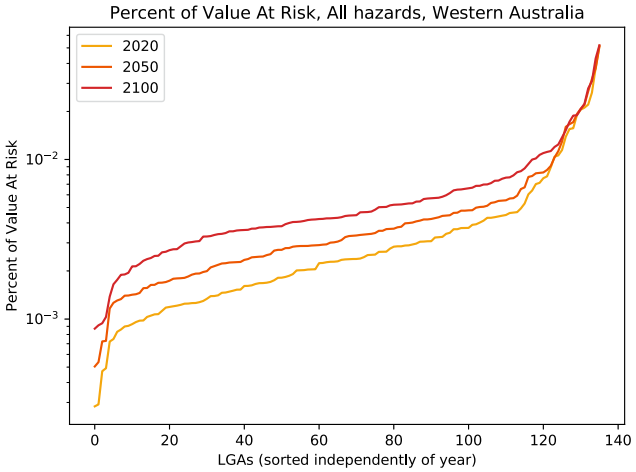
11.2.
DISTRIBUTIONS

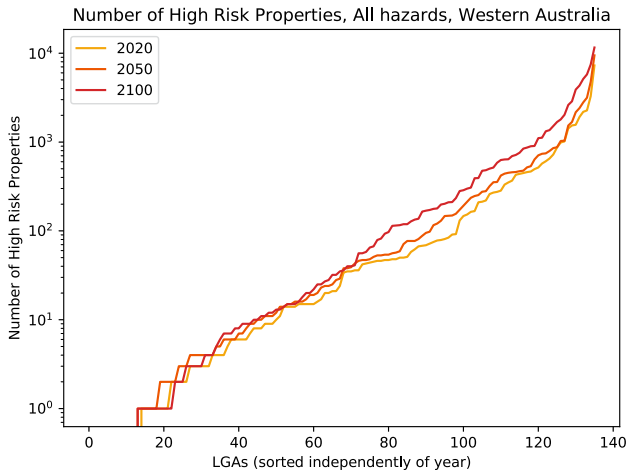
All local government areas in the country have been ordered from lowest to highest risk for each risk indicator (TTIP, VAR%, HRP#, HRP%). Coloured lines represent three time frames: 2020, 2050 and 2100. The results are presented on a logarithmic graph to better appreciate the differences across the cohort and between years.

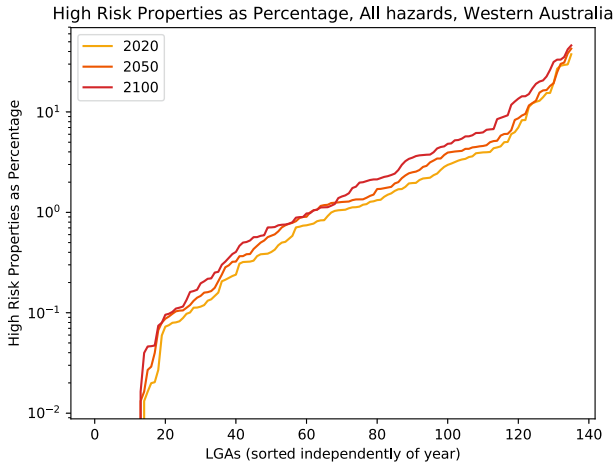
As these graphs cannot accommodate names of individual LGA's, specific ranking can be found in the benchmarking tables below.

DISTRIBUTION GRAPHS FOR ALL HAZARDS BY RISK INDICATOR









12.
BENCHMARKING OF LGAs NATIONALLY AND PER STATE

12.1. OVERVIEW

This section of the XDI report benchmarks all local government areas (LGAs) in Australia for each risk indicator in 2020 and 2100 for all hazards. The tables following show how each LGA ranks with respect to its national and state peers from 1 (highest risk) to 544 (lowest risk).

The tables provide three sets of results: 1) actual results per indicator 2) National Ranking from 1 (highest risk) to 544 (lowest risk) 3) Statewide Ranking from 1 (highest risk) to lowest risk (lowest risk ranking dependent on number of LGAs in the state).

Additional ranking is provided in brackets in the National Ranking columns for LGAs with over 10,000 addresses; this total cohort consists of 266 LGAs that represent 93% of properties in Australia.

The numbers of LGAs per state and territory are:

- ACT = 1
- QLD = 78
- NSW = 130
- NT = 18
- SA = 71
- TAS = 29
- VIC = 80
- WA = 136
- Other = 1
- Total LGAs = 544
- LGAs with over 10,000 addresses (ranking in brackets) = 266

KEY RISK METRICS

Total Technical Insurance Premium (TTIP), which is the total annual cost of damage and assumes all hazards are insured.

Percentage of Value-at-Risk (VAR%), which is the TTIP as a percentage of the replacement cost of the property.

Number of High Risk Properties (HRP#), which are those properties where the VAR is greater than 1%, consistent with US Federal Emergency Management Agency (FEMA) definitions.

Percentage of High-Risk Properties (HRP%), which is the HRP# expressed as a percentage of all properties in the LGA.

Notes:
Dollar figures in actual results are presented in Australian Dollars (2020).
Rank 1 is the highest risk and 544 is the lowest risk.
(brackets) indicates ranking in cohort of 266 LGAs with over 10,000 adresses
(-) indicates the council is not in the group of large LGAs.

MUNICIPAL LEVEL RISK ANALYSIS

The results presented in this report are based on analysis undertaken in each municipality. Such analysis has more numerical detail and higher spatial resolution than can be presented in this report.

Long form XDI Municipal Reports are available covering the following:

- Benchmarking of the Council with respect to each of the four Key Indicators (TTIP, VAR%, HRP#, HRP%) against national municipalities, state municipalities and peers of equivalent size.
- Benchmarking of the Council with respect to each of the five major hazards: riverine flooding; coastal inundation; forest fire; subsidence and wind across the key indicators against national municipalities, state municipalities and peers of equivalent size.
- Quantification of failure risks associated with extreme heat.
- Quantification of community heat stress risk arising from extreme heat.
- Spatial mapping of all four Key Indicators plus heat failure at suburb level and/or tiles, for six hazards and four time slices (1990, 2020, 2050 and 2100) comprising approximately 120 maps.
- Trend projections for each Key Indicator at annual resolution with hazard breakdowns.
- Reporting via .pdf, spreadsheet and on-line at Globe.xdi.

Optional Components

- XDI analysis of municipal owned assets such as council buildings, roads, water and waste water assets, parks and recreational facilities etc.
- Cross-Dependent analysis of Municipal owned assets and other critical infrastructure in the area including power, water, telecommunications, transport lines.
- Cost-benefit analysis of adaptation actions or pathways and impacts of these actions or pathways in Key Indicators.

Contact us at info@xdi.systems for more information

12.2. LGA RESULTS AND RANKING NATIONALLY AND PER STATE
ALL HAZARDS

	ACTUALS				ALL HAZARDS RANKING - NATIONAL BRACKETS = (LARGE LGAs)				ALL HAZARDS RANKING - STATE			
LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Adelaide, SA, 2020	$18.24	0.16%	0	0.00%	216 (198)	454 (232)	515 (259)	515 (265)	17	52	61	61
Adelaide, SA, 2100	$37.71	0.33%	0	0.00%	177 (170)	403 (195)	522 (265)	537 (264)	16	50	63	63
Adelaide Hills, SA, 2020	$42.02	0.61%	151	0.68%	125 (121)	108 (45)	277 (200)	361 (164)	5	9	20	34
Adelaide Hills, SA, 2100	$70.54	1.02%	9,663	43.78%	104 (103)	88 (38)	14 (14)	12 (3)	5	9	1	1
Albany, WA, 2020	$29.38	0.37%	260	1.03%	158 (150)	226 (108)	208 (163)	317 (140)	19	37	29	68
Albany, WA, 2100	$58.03	0.74%	502	2.00%	130 (128)	145 (66)	201 (171)	309 (154)	16	29	29	60
Albury, NSW, 2020	$87.79	0.83%	3,137	9.31%	54 (54)	69 (26)	23 (22)	58 (17)	23	14	4	10
Albury, NSW, 2100	$99.30	0.94%	1,496	4.44%	68 (68)	103 (49)	107 (101)	186 (93)	28	24	45	56
Alexandrina, SA, 2020	$34.34	0.48%	796	3.49%	141 (135)	150 (67)	94 (82)	143 (56)	6	13	3	9
Alexandrina, SA, 2100	$68.26	0.95%	1,526	6.69%	111 (109)	100 (46)	104 (98)	128 (63)	7	13	5	7
Alice Springs, NT, 2020	$16.72	0.38%	1,149	8.19%	226 (204)	214 (101)	68 (60)	66 (23)	2	6	1	4
Alice Springs, NT, 2100	$29.14	0.66%	2,678	19.08%	210 (196)	164 (74)	57 (57)	39 (14)	2	5	1	2
Alpine, VIC, 2020	$26.25	0.84%	1,409	14.09%	167 (-)	67 (-)	54 (-)	31 (-)	47	5	10	4
Alpine, VIC, 2100	$34.10	1.09%	1,095	10.95%	188 (-)	78 (-)	131 (-)	78 (-)	47	6	24	5
Anangu Pitjantjatjara, SA, 2020	$0.58	0.17%	25	2.29%	488 (-)	438 (-)	412 (-)	202 (-)	67	49	46	16
Anangu Pitjantjatjara, SA, 2100	$0.67	0.20%	23	2.11%	505 (-)	501 (-)	434 (-)	302 (-)	68	66	51	28
Ararat, VIC, 2020	$2.75	0.13%	16	0.24%	408 (-)	484 (-)	427 (-)	451 (-)	77	76	77	75
Ararat, VIC, 2100	$6.98	0.33%	16	0.24%	368 (-)	407 (-)	446 (-)	476 (-)	75	46	79	78
Armadale, WA, 2020	$19.02	0.15%	47	0.12%	210 (192)	468 (240)	372 (230)	475 (237)	30	100	57	106
Armadale, WA, 2100	$46.21	0.36%	1,322	3.24%	151 (148)	377 (183)	119 (110)	241 (120)	20	97	14	48
Armidale Regional, NSW, 2020	$15.65	0.24%	115	0.55%	238 (214)	371 (187)	298 (208)	381 (178)	79	124	97	107
Armidale Regional, NSW, 2100	$27.44	0.41%	201	0.95%	218 (202)	329 (158)	300 (219)	394 (204)	71	98	97	117
Ashburton, WA, 2020	$1.97	0.11%	7	0.12%	431 (-)	508 (-)	460 (-)	471 (-)	73	120	93	105
Ashburton, WA, 2100	$6.65	0.36%	15	0.26%	377 (-)	375 (-)	447 (-)	473 (-)	61	96	83	101
Augusta-Margaret River, WA, 2020	$9.17	0.24%	47	0.38%	295 (243)	364 (182)	370 (231)	421 (206)	38	66	56	89
Augusta-Margaret River, WA, 2100	$16.77	0.43%	93	0.76%	271 (232)	309 (149)	360 (236)	416 (216)	38	70	57	82
Alpine, VIC, 2020	$26.25	0.84%	1,409	14.09%	167 (-)	67 (-)	54 (-)	31 (-)	47	5	10	4
Aurukun, QLD, 2020	$0.12	0.06%	3	0.47%	534 (-)	535 (-)	477 (-)	401 (-)	76	78	72	71
Aurukun, QLD, 2100	$0.06	0.03%	2	0.32%	541 (-)	544 (-)	498 (-)	469 (-)	77	78	72	70
Ballarat, VIC, 2020	$32.68	0.17%	305	0.50%	146 (139)	439 (223)	191 (155)	394 (189)	43	70	44	59
Ballarat, VIC, 2100	$33.66	0.17%	795	1.29%	190 (182)	507 (255)	157 (141)	362 (185)	49	78	29	51
Ballina, NSW, 2020	$76.46	0.84%	1,465	5.08%	64 (63)	66 (24)	52 (46)	96 (37)	30	13	15	19
Ballina, NSW, 2100	$146.23	1.62%	2,417	8.38%	40 (40)	45 (18)	66 (66)	102 (47)	17	9	30	30
Balonne, QLD, 2020	$24.46	1.60%	2,613	53.59%	177 (-)	25 (-)	28 (-)	3 (-)	31	10	15	2
Balonne, QLD, 2100	$25.31	1.65%	2,386	48.93%	228 (-)	43 (-)	67 (-)	7 (-)	40	17	18	3
Balranald, NSW, 2020	$2.50	0.54%	47	3.16%	418 (-)	125 (-)	373 (-)	163 (-)	129	40	113	39
Balranald, NSW, 2100	$3.15	0.68%	48	3.23%	428 (-)	159 (-)	404 (-)	242 (-)	128	46	124	77

	ACTUALS				ALL HAZARDS RANKING - NATIONAL BRACKETS = (LARGE LGAs)				ALL HAZARDS RANKING - STATE			
LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Banana, QLD, 2020	$25.28	0.63%	1,133	8.83%	172 (162)	101 (40)	70 (62)	62 (20)	30	35	27	26
Banana, QLD, 2100	$26.58	0.66%	1,326	10.33%	222 (206)	166 (76)	118 (109)	82 (36)	38	43	29	31
Banyule, VIC, 2020	$56.46	0.28%	191	0.30%	95 (93)	320 (160)	243 (184)	441 (216)	26	45	61	70
Banyule, VIC, 2100	$53.08	0.26%	260	0.40%	139 (137)	462 (230)	277 (212)	454 (235)	39	62	64	74
Barcaldine, QLD, 2020	$12.63	0.88%	447	9.80%	260 (-)	63 (-)	145 (-)	49 (-)	44	28	37	20
Barcaldine, QLD, 2100	$12.87	0.90%	639	14.01%	300 (-)	109 (-)	175 (-)	60 (-)	45	35	37	23
Barcoo, QLD, 2020	$6.84	4.47%	187	38.32%	327 (-)	6 (-)	246 (-)	10 (-)	49	2	49	5
Barcoo, QLD, 2100	$6.80	4.44%	232	47.54%	372 (-)	11 (-)	285 (-)	8 (-)	50	4	50	4
Barkly, NT, 2020	$6.13	0.72%	153	5.62%	338 (-)	82 (-)	274 (-)	89 (-)	5	4	7	8
Barkly, NT, 2100	$6.85	0.80%	144	5.29%	371 (-)	130 (-)	333 (-)	161 (-)	7	4	6	8
Barossa, SA, 2020	$15.77	0.32%	96	0.61%	236 (212)	275 (133)	309 (211)	369 (169)	24	21	26	35
Barossa, SA, 2100	$28.27	0.57%	243	1.55%	213 (198)	217 (103)	280 (213)	335 (167)	25	25	24	33
Barunga West, SA, 2020	$2.46	0.23%	31	0.89%	420 (-)	383 (-)	403 (-)	332 (-)	57	40	42	30
Barunga West, SA, 2100	$3.65	0.33%	37	1.06%	422 (-)	400 (-)	419 (-)	380 (-)	58	49	49	41
Bass Coast, VIC, 2020	$13.96	0.12%	84	0.23%	248 (218)	498 (255)	323 (215)	453 (223)	61	77	72	76
Bass Coast, VIC, 2100	$34.33	0.29%	461	1.24%	187 (180)	435 (213)	213 (176)	364 (186)	46	54	47	52
Bassendean, WA, 2020	$12.98	0.46%	351	3.92%	256 (-)	165 (-)	177 (-)	127 (-)	33	25	24	27
Bassendean, WA, 2100	$18.70	0.67%	211	2.36%	261 (-)	160 (-)	296 (-)	280 (-)	36	35	39	52
Bathurst Regional, NSW, 2020	$26.14	0.34%	276	1.13%	168 (159)	253 (122)	202 (161)	301 (132)	60	90	68	81
Bathurst Regional, NSW, 2100	$35.84	0.47%	602	2.46%	184 (177)	287 (138)	184 (159)	274 (136)	63	88	71	91
Baw Baw, VIC, 2020	$28.67	0.30%	1,598	5.18%	161 (153)	302 (148)	46 (43)	94 (36)	45	42	9	11
Baw Baw, VIC, 2100	$55.70	0.57%	1,823	5.90%	135 (133)	216 (102)	89 (86)	141 (72)	37	27	13	13
Bayside, VIC, 2020	$16.61	0.09%	6	0.01%	227 (205)	521 (262)	464 (250)	505 (255)	57	79	79	80
Bayside, VIC, 2100	$27.10	0.15%	20	0.04%	219 (203)	513 (258)	439 (253)	508 (256)	52	79	78	80
Bayswater, WA, 2020	$23.86	0.18%	213	0.51%	180 (167)	426 (216)	227 (173)	391 (187)	23	86	31	82
Bayswater, WA, 2100	$61.98	0.47%	169	0.40%	123 (121)	278 (133)	321 (226)	455 (236)	15	62	46	96
Bega Valley, NSW, 2020	$22.53	0.26%	368	1.33%	187 (172)	342 (169)	171 (138)	274 (117)	65	117	60	74
Bega Valley, NSW, 2100	$42.48	0.49%	817	2.95%	159 (155)	268 (125)	155 (139)	255 (125)	56	80	62	83
Bellingen, NSW, 2020	$11.95	0.45%	233	2.73%	265 (-)	175 (-)	218 (-)	184 (-)	88	61	71	49
Bellingen, NSW, 2100	$19.28	0.72%	587	6.87%	257 (-)	148 (-)	186 (-)	121 (-)	83	42	72	40
Belmont, WA, 2020	$24.45	0.28%	466	1.70%	178 (166)	317 (157)	140 (117)	248 (105)	22	56	18	50
Belmont, WA, 2100	$49.26	0.57%	287	1.05%	146 (144)	219 (104)	264 (206)	384 (198)	17	45	36	74
Belyuen, NT, 2020	$0.00	0.18%	0	0.00%	544 (-)	422 (-)	517 (-)	509 (-)	18	12	16	17
Belyuen, NT, 2100	$0.00	0.26%	0	0.00%	544 (-)	468 (-)	519 (-)	514 (-)	18	14	17	18
Benalla, VIC, 2020	$9.27	0.33%	207	2.33%	291 (-)	261 (-)	236 (-)	200 (-)	66	38	58	27
Benalla, VIC, 2100	$13.97	0.50%	344	3.88%	287 (-)	260 (-)	242 (-)	210 (-)	66	31	54	21
Berri and Barmera, SA, 2020	$7.27	0.30%	72	0.92%	316 (-)	301 (-)	339 (-)	326 (-)	38	25	30	29
Berri and Barmera, SA, 2100	$9.36	0.38%	100	1.28%	336 (-)	355 (-)	352 (-)	363 (-)	48	44	37	38
Berrigan, NSW, 2020	$7.64	0.33%	107	1.46%	309 (-)	262 (-)	301 (-)	264 (-)	102	92	98	72
Berrigan, NSW, 2100	$10.22	0.44%	56	0.76%	331 (-)	300 (-)	397 (-)	413 (-)	101	93	121	121
Beverley, WA, 2020	$31.17	5.16%	724	37.57%	153 (-)	5 (-)	99 (-)	12 (-)	17	1	12	1

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LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Beverley, WA, 2100	$26.01	4.30%	640	33.21%	226 (-)	12 (-)	174 (-)	20 (-)	30	2	24	4
Blackall-Tambo, QLD, 2020	$5.38	0.69%	233	9.38%	354 (-)	92 (-)	217 (-)	55 (-)	51	34	46	22
Blackall-Tambo, QLD, 2100	$5.01	0.64%	362	14.58%	399 (-)	177 (-)	236 (-)	55 (-)	53	44	44	22
Blacktown, NSW, 2020	$96.65	0.21%	197	0.13%	45 (45)	397 (200)	239 (183)	467 (231)	17	126	74	123
Blacktown, NSW, 2100	$89.10	0.19%	2,803	1.90%	78 (78)	503 (254)	55 (55)	315 (158)	33	129	22	101
Bland, NSW, 2020	$6.62	0.40%	101	1.93%	332 (-)	201 (-)	304 (-)	229 (-)	108	69	99	65
Bland, NSW, 2100	$8.74	0.53%	179	3.42%	349 (-)	235 (-)	312 (-)	233 (-)	108	70	102	75
Blayney, NSW, 2020	$5.59	0.31%	81	1.40%	350 (-)	289 (-)	325 (-)	270 (-)	113	102	105	73
Blayney, NSW, 2100	$11.13	0.61%	310	5.37%	317 (-)	192 (-)	255 (-)	158 (-)	99	55	89	48
Blue Mountains, NSW, 2020	$46.04	0.31%	45	0.10%	118 (115)	286 (142)	378 (233)	482 (241)	48	100	115	127
Blue Mountains, NSW, 2100	$53.25	0.36%	58	0.12%	138 (136)	374 (182)	394 (244)	491 (249)	49	111	119	129
Boddington, WA, 2020	$4.89	1.15%	210	15.44%	364 (-)	45 (-)	230 (-)	27 (-)	50	11	32	8
Boddington, WA, 2100	$5.30	1.24%	307	22.57%	397 (-)	62 (-)	256 (-)	29 (-)	65	12	34	8
Bogan, NSW, 2020	$15.24	2.74%	717	40.51%	241 (-)	13 (-)	100 (-)	8 (-)	80	3	32	3
Bogan, NSW, 2100	$28.08	5.06%	1,356	76.61%	216 (-)	9 (-)	114 (-)	2 (-)	70	2	50	2
Boroondara, VIC, 2020	$70.00	0.24%	702	0.76%	72 (71)	362 (181)	102 (87)	346 (155)	16	54	21	47
Boroondara, VIC, 2100	$74.04	0.25%	1,055	1.14%	97 (96)	469 (235)	136 (122)	372 (192)	20	66	26	53
Botany Bay, NSW, 2020	$31.59	0.33%	391	1.27%	152 (145)	265 (128)	161 (131)	280 (120)	56	95	55	75
Botany Bay, NSW, 2100	$66.34	0.69%	4,738	15.42%	114 (112)	154 (70)	35 (35)	52 (21)	43	44	13	11
Boulia, QLD, 2020	$4.81	2.61%	73	12.44%	367 (-)	15 (-)	337 (-)	37 (-)	52	6	57	13
Boulia, QLD, 2100	$4.95	2.69%	73	12.44%	400 (-)	25 (-)	380 (-)	70 (-)	54	12	58	28
Bourke, NSW, 2020	$20.28	3.24%	1,652	82.72%	207 (-)	11 (-)	43 (-)	1 (-)	70	2	12	1
Bourke, NSW, 2100	$30.53	4.87%	1,687	84.48%	204 (-)	10 (-)	93 (-)	1 (-)	66	3	41	1
Boyup Brook, WA, 2020	$2.04	0.35%	44	2.35%	430 (-)	250 (-)	381 (-)	199 (-)	72	41	61	40
Boyup Brook, WA, 2100	$3.88	0.66%	116	6.19%	419 (-)	167 (-)	345 (-)	134 (-)	74	36	53	27
Break O'Day, TAS, 2020	$10.28	0.46%	194	2.73%	284 (-)	164 (-)	242 (-)	183 (-)	7	1	7	5
Break O'Day, TAS, 2100	$19.45	0.87%	303	4.27%	256 (-)	114 (-)	257 (-)	194 (-)	3	1	6	4
Brewarrina, NSW, 2020	$5.07	1.31%	121	9.77%	360 (-)	39 (-)	295 (-)	50 (-)	115	6	95	8
Brewarrina, NSW, 2100	$6.10	1.57%	223	18.01%	384 (-)	49 (-)	290 (-)	43 (-)	118	10	94	8
Bridgetown-Greenbushes, WA, 2020	$3.86	0.31%	84	2.10%	387 (-)	291 (-)	320 (-)	213 (-)	58	46	40	44
Bridgetown-Greenbushes, WA, 2100	$8.21	0.65%	179	4.48%	356 (-)	168 (-)	311 (-)	185 (-)	55	37	43	38
Brighton, TAS, 2020	$3.25	0.12%	30	0.35%	397 (-)	495 (-)	404 (-)	425 (-)	22	22	25	27
Brighton, TAS, 2100	$3.07	0.11%	148	1.73%	434 (-)	522 (-)	330 (-)	324 (-)	24	25	15	13
Brimbank, VIC, 2020	$105.17	0.37%	231	0.26%	38 (38)	222 (105)	219 (170)	447 (221)	7	30	55	73
Brimbank, VIC, 2100	$68.90	0.25%	370	0.41%	108 (107)	474 (238)	231 (185)	451 (232)	26	67	50	72
Brisbane, QLD, 2020	$1065.83	0.46%	29,919	4.07%	2 (2)	163 (75)	2 (2)	121 (49)	2	44	2	43
Brisbane, QLD, 2100	$1902.61	0.83%	43,095	5.87%	2 (2)	125 (57)	2 (2)	143 (73)	2	38	2	41
Broken Hill, NSW, 2020	$2.93	0.07%	2	0.01%	406 (265)	532 (265)	487 (255)	502 (252)	126	130	130	129
Broken Hill, NSW, 2100	$4.91	0.11%	2	0.01%	401 (264)	523 (261)	496 (260)	511 (259)	122	130	130	130
Brookton, WA, 2020	$2.59	0.76%	48	4.44%	411 (-)	76 (-)	369 (-)	111 (-)	64	16	55	22
Brookton, WA, 2100	$2.99	0.88%	40	3.70%	435 (-)	113 (-)	416 (-)	218 (-)	78	21	66	44
Broome, WA, 2020	$4.19	0.13%	14	0.13%	377 (260)	489 (251)	443 (248)	468 (232)	54	110	83	104
Broome, WA, 2100	$5.50	0.17%	18	0.17%	393 (262)	512 (257)	443 (254)	484 (247)	63	131	79	107

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Broomehill-Tambellup, WA, 2020	$1.85	0.45%	92	7.00%	436 (-)	171 (-)	312 (-)	72 (-)	76	26	38	16
Broomehill-Tambellup, WA, 2100	$2.87	0.70%	28	2.13%	436 (-)	152 (-)	429 (-)	297 (-)	79	32	72	56
Bruce Rock, WA, 2020	$1.05	0.24%	15	1.06%	460 (-)	367 (-)	439 (-)	310 (-)	88	68	80	65
Bruce Rock, WA, 2100	$1.53	0.35%	8	0.57%	469 (-)	389 (-)	468 (-)	436 (-)	95	101	96	90
Bulloo, QLD, 2020	$7.04	3.77%	278	46.64%	322 (-)	7 (-)	201 (-)	7 (-)	48	3	44	3
Bulloo, QLD, 2100	$6.20	3.31%	240	40.27%	383 (-)	15 (-)	281 (-)	15 (-)	51	6	49	7
Buloke, VIC, 2020	$7.29	0.47%	168	3.37%	315 (-)	158 (-)	259 (-)	150 (-)	69	20	64	21
Buloke, VIC, 2100	$10.60	0.68%	184	3.69%	326 (-)	158 (-)	307 (-)	219 (-)	74	18	68	22
Bunbury, WA, 2020	$25.97	0.37%	1,425	6.29%	169 (160)	236 (115)	53 (47)	80 (29)	20	39	8	17
Bunbury, WA, 2100	$48.59	0.68%	2,875	12.70%	148 (146)	156 (72)	54 (54)	68 (27)	18	33	7	17
Bundaberg, QLD, 2020	$183.32	0.93%	7,063	11.25%	19 (19)	56 (20)	8 (8)	44 (12)	9	24	5	17
Bundaberg, QLD, 2100	$321.03	1.63%	7,745	12.33%	16 (16)	44 (17)	18 (18)	72 (30)	9	18	8	30
Burdekin, QLD, 2020	$21.02	0.44%	334	2.18%	196 (180)	182 (84)	182 (148)	210 (87)	35	47	43	52
Burdekin, QLD, 2100	$30.24	0.63%	300	1.96%	205 (193)	184 (85)	258 (203)	314 (157)	35	45	46	63
Burke, QLD, 2020	$2.08	1.12%	66	11.13%	429 (-)	47 (-)	348 (-)	46 (-)	58	21	58	18
Burke, QLD, 2100	$5.63	3.03%	131	22.09%	391 (-)	19 (-)	339 (-)	31 (-)	52	8	56	14
Burnie, TAS, 2020	$4.87	0.13%	57	0.47%	365 (256)	487 (250)	359 (229)	404 (195)	17	21	20	25
Burnie, TAS, 2100	$9.29	0.24%	48	0.39%	338 (256)	479 (242)	406 (247)	458 (238)	10	16	24	28
Burnside, SA, 2020	$20.53	0.27%	0	0.00%	202 (185)	329 (165)	516 (264)	514 (264)	14	30	70	70
Burnside, SA, 2100	$39.56	0.51%	373	1.52%	168 (162)	253 (118)	229 (184)	338 (169)	14	30	15	35
Burwood, NSW, 2020	$20.36	0.33%	23	0.12%	204 (187)	267 (129)	415 (239)	474 (236)	69	96	123	125
Burwood, NSW, 2100	$22.87	0.37%	690	3.48%	240 (215)	370 (179)	169 (147)	231 (114)	77	110	67	74
Busselton, WA, 2020	$36.27	0.41%	608	2.17%	138 (133)	192 (90)	117 (102)	211 (88)	14	32	14	43
Busselton, WA, 2100	$89.01	1.01%	1,516	5.42%	79 (79)	89 (39)	105 (99)	157 (79)	9	18	12	32
Byron, NSW, 2020	$78.24	1.09%	1,262	5.49%	62 (61)	49 (17)	60 (53)	91 (33)	28	8	18	17
Byron, NSW, 2100	$142.00	1.97%	2,264	9.85%	43 (43)	33 (13)	70 (69)	87 (37)	19	6	32	22
Cabonne, NSW, 2020	$12.62	0.52%	289	3.73%	261 (-)	129 (-)	195 (-)	134 (-)	85	42	66	27
Cabonne, NSW, 2100	$21.65	0.89%	627	8.09%	246 (-)	111 (-)	179 (-)	104 (-)	81	28	69	31
Cairns, QLD, 2020	$108.71	0.33%	1,282	1.24%	34 (34)	258 (125)	58 (51)	283 (122)	12	55	22	64
Cairns, QLD, 2100	$199.83	0.62%	3,446	3.33%	30 (30)	190 (90)	48 (48)	237 (118)	12	47	16	53
Cambridge, WA, 2020	$4.32	0.09%	4	0.03%	375 (259)	522 (263)	475 (252)	498 (249)	53	126	100	118
Cambridge, WA, 2100	$13.29	0.29%	7	0.05%	296 (245)	441 (216)	473 (255)	504 (253)	43	113	100	119
Camden, NSW, 2020	$37.98	0.29%	185	0.45%	133 (128)	306 (151)	248 (187)	409 (199)	51	107	77	113
Camden, NSW, 2100	$43.96	0.34%	961	2.31%	156 (152)	397 (193)	141 (128)	282 (141)	54	117	57	92
Campaspe, VIC, 2020	$43.69	0.60%	1,054	4.52%	123 (119)	110 (46)	73 (65)	109 (42)	36	13	13	13
Campaspe, VIC, 2100	$65.21	0.89%	1,623	6.97%	116 (114)	110 (50)	99 (93)	118 (58)	28	13	14	8
Campbelltown, NSW, 2020	$66.93	0.28%	169	0.22%	75 (74)	319 (159)	258 (191)	455 (225)	37	112	81	121
Campbelltown, NSW, 2100	$74.31	0.31%	548	0.72%	96 (95)	418 (205)	192 (165)	420 (218)	39	120	73	122
Campbelltown, SA, 2020	$17.67	0.20%	0	0.00%	219 (200)	410 (210)	518 (266)	512 (263)	18	44	69	69

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Campbelltown, SA, 2100	$36.31	0.41%	7	0.02%	183 (176)	330 (159)	469 (257)	509 (257)	17	43	56	60
Canada Bay, NSW, 2020	$85.22	0.53%	1,003	1.95%	55 (55)	128 (55)	79 (69)	227 (96)	24	41	24	64
Canada Bay, NSW, 2100	$130.88	0.81%	2,158	4.19%	49 (49)	128 (59)	73 (72)	199 (99)	20	35	33	64
Canning, WA, 2020	$59.75	0.37%	2,269	4.35%	85 (83)	237 (116)	33 (31)	113 (44)	4	40	3	23
Canning, WA, 2100	$123.86	0.76%	7,465	14.33%	52 (52)	139 (64)	20 (20)	57 (23)	5	27	2	15
Canterbury-Bankstown, NSW, 2020	$170.69	0.31%	1,312	0.75%	21 (21)	288 (143)	57 (50)	347 (156)	6	101	16	98
Canterbury-Bankstown, NSW, 2100	$214.35	0.39%	8,821	5.01%	28 (28)	352 (172)	16 (16)	167 (84)	9	105	6	51
Capel, WA, 2020	$7.07	0.26%	270	3.17%	321 (-)	334 (-)	206 (-)	162 (-)	42	58	28	34
Capel, WA, 2100	$11.44	0.43%	299	3.51%	314 (-)	317 (-)	259 (-)	229 (-)	45	73	35	46
Cardinia, VIC, 2020	$39.13	0.24%	927	1.81%	130 (125)	357 (177)	87 (76)	239 (102)	38	52	18	32
Cardinia, VIC, 2100	$73.73	0.46%	1,845	3.61%	98 (97)	289 (139)	88 (85)	223 (109)	21	32	12	25
Carnamah, WA, 2020	$0.34	0.12%	3	0.32%	508 (-)	501 (-)	478 (-)	432 (-)	119	117	106	92
Carnamah, WA, 2100	$0.72	0.25%	3	0.32%	504 (-)	473 (-)	485 (-)	467 (-)	121	120	107	99
Carnarvon, WA, 2020	$22.86	2.05%	459	12.93%	184 (-)	20 (-)	141 (-)	33 (-)	25	6	19	10
Carnarvon, WA, 2100	$23.07	2.07%	482	13.58%	239 (-)	32 (-)	206 (-)	62 (-)	33	6	30	16
Carpentaria, QLD, 2020	$33.14	3.71%	807	28.37%	144 (-)	9 (-)	93 (-)	17 (-)	26	4	30	8
Carpentaria, QLD, 2100	$45.79	5.13%	1,141	40.11%	152 (-)	8 (-)	128 (-)	16 (-)	27	3	31	8
Carrathool, NSW, 2020	$4.20	0.56%	53	2.21%	376 (-)	121 (-)	360 (-)	206 (-)	120	37	112	57
Carrathool, NSW, 2100	$4.49	0.60%	55	2.29%	407 (-)	205 (-)	400 (-)	286 (-)	124	59	122	93
Casey, VIC, 2020	$73.78	0.17%	172	0.12%	69 (68)	441 (224)	256 (190)	470 (234)	15	71	63	77
Casey, VIC, 2100	$125.58	0.29%	1,055	0.76%	50 (50)	440 (215)	135 (123)	415 (215)	8	55	27	62
Cassowary Coast, QLD, 2020	$87.97	1.12%	2,411	9.63%	53 (53)	48 (16)	31 (29)	51 (13)	15	22	16	21
Cassowary Coast, QLD, 2100	$125.50	1.60%	3,314	13.24%	51 (51)	48 (19)	49 (49)	64 (25)	16	21	17	25
Ceduna, SA, 2020	$6.65	0.72%	108	3.68%	331 (-)	81 (-)	299 (-)	136 (-)	43	5	22	8
Ceduna, SA, 2100	$11.00	1.19%	183	6.23%	320 (-)	67 (-)	309 (-)	133 (-)	45	5	30	8
Central Coast, NSW, 2020	$416.32	0.65%	4,605	2.26%	5 (5)	97 (39)	13 (13)	204 (85)	1	24	2	56
Central Coast, NSW, 2100	$897.54	1.40%	22,885	11.21%	5 (5)	53 (21)	4 (4)	77 (32)	1	12	1	17
Central Coast, TAS, 2020	$8.93	0.22%	161	1.27%	299 (245)	384 (193)	267 (194)	281 (121)	9	12	9	13
Central Coast, TAS, 2100	$13.70	0.34%	187	1.48%	291 (243)	391 (190)	306 (222)	343 (173)	7	8	12	14
Central Darling, NSW, 2020	$5.69	1.01%	159	8.88%	347 (-)	53 (-)	268 (-)	61 (-)	112	10	85	11
Central Darling, NSW, 2100	$6.54	1.16%	214	11.96%	380 (-)	70 (-)	293 (-)	75 (-)	115	17	95	16
Central Desert, NT, 2020	$0.48	0.22%	15	2.19%	498 (-)	388 (-)	438 (-)	209 (-)	12	11	12	9
Central Desert, NT, 2100	$0.66	0.31%	58	8.47%	506 (-)	425 (-)	395 (-)	101 (-)	12	13	12	6
Central Goldfields, VIC, 2020	$14.97	0.48%	244	2.44%	243 (217)	153 (69)	215 (168)	193 (80)	59	18	53	26
Central Goldfields, VIC, 2100	$19.46	0.62%	348	3.48%	255 (224)	188 (88)	240 (193)	230 (113)	59	23	52	28
Central Highlands, TAS, 2020	$3.51	0.31%	87	2.42%	393 (-)	287 (-)	318 (-)	196 (-)	20	9	14	6
Central Highlands, TAS, 2100	$3.10	0.27%	103	2.86%	432 (-)	450 (-)	351 (-)	259 (-)	23	12	18	7
Central Highlands, QLD, 2020	$28.49	0.42%	1,930	8.90%	163 (155)	190 (88)	39 (37)	60 (19)	28	48	18	25
Central Highlands, QLD, 2100	$53.29	0.78%	4,778	22.04%	137 (135)	134 (62)	34 (34)	32 (11)	25	39	12	15
Cessnock, NSW, 2020	$48.31	0.46%	522	1.57%	113 (110)	161 (73)	130 (109)	255 (108)	46	56	46	70
Cessnock, NSW, 2100	$59.33	0.57%	2,601	7.83%	127 (125)	221 (105)	60 (60)	109 (52)	47	64	25	34
Chapman Valley, WA, 2020	$1.19	0.37%	51	5.03%	455 (-)	225 (-)	363 (-)	99 (-)	87	36	51	19
Chapman Valley, WA, 2100	$1.30	0.41%	58	5.72%	474 (-)	333 (-)	393 (-)	146 (-)	100	81	62	30

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Charles Sturt, SA, 2020	$32.28	0.15%	107	0.16%	148 (141)	463 (238)	300 (209)	463 (228)	8	57	23	49
Charles Sturt, SA, 2100	$66.40	0.31%	264	0.39%	113 (111)	421 (207)	276 (211)	459 (239)	8	54	23	52
Charters Towers, QLD, 2020	$9.59	0.29%	145	1.38%	289 (240)	305 (150)	283 (204)	271 (115)	47	60	52	63
Charters Towers, QLD, 2100	$12.84	0.39%	146	1.39%	301 (248)	350 (171)	332 (229)	354 (181)	46	63	55	67
Cherbourg, QLD, 2020	$0.34	0.20%	10	1.89%	509 (-)	403 (-)	448 (-)	233 (-)	70	68	68	55
Cherbourg, QLD, 2100	$0.58	0.35%	11	2.08%	509 (-)	388 (-)	460 (-)	306 (-)	66	65	66	61
Chittering, WA, 2020	$2.53	0.26%	50	1.64%	416 (-)	335 (-)	366 (-)	251 (-)	67	59	53	51
Chittering, WA, 2100	$4.06	0.42%	115	3.76%	413 (-)	323 (-)	346 (-)	214 (-)	69	76	54	41
Circular Head, TAS, 2020	$1.68	0.10%	26	0.49%	444 (-)	514 (-)	410 (-)	396 (-)	27	27	27	23
Circular Head, TAS, 2100	$1.83	0.11%	36	0.68%	458 (-)	525 (-)	420 (-)	426 (-)	27	26	27	24
Clare and Gilbert Valleys, SA, 2020	$6.79	0.26%	45	0.54%	328 (-)	341 (-)	379 (-)	385 (-)	41	33	36	39
Clare and Gilbert Valleys, SA, 2100	$13.80	0.53%	135	1.62%	289 (-)	239 (-)	336 (-)	331 (-)	37	28	34	32
Claremont, WA, 2020	$2.57	0.12%	0	0.00%	413 (-)	499 (-)	534 (-)	538 (-)	65	116	133	127
Claremont, WA, 2100	$7.35	0.34%	15	0.22%	363 (-)	395 (-)	450 (-)	478 (-)	58	103	81	104
Clarence, TAS, 2020	$18.11	0.19%	211	0.69%	217 (199)	416 (214)	228 (174)	360 (163)	3	16	5	16
Clarence, TAS, 2100	$16.33	0.17%	369	1.20%	273 (234)	509 (256)	233 (186)	368 (189)	4	21	4	16
Clarence Valley, NSW, 2020	$85.06	0.75%	1,827	5.05%	56 (56)	78 (31)	41 (39)	98 (39)	25	15	11	20
Clarence Valley, NSW, 2100	$192.09	1.69%	3,525	9.74%	33 (33)	42 (16)	47 (47)	88 (38)	13	8	18	23
Cleve, SA, 2020	$1.04	0.15%	8	0.37%	461 (-)	458 (-)	456 (-)	423 (-)	63	55	50	44
Cleve, SA, 2100	$2.18	0.32%	20	0.93%	452 (-)	411 (-)	440 (-)	399 (-)	61	51	53	44
Cloncurry, QLD, 2020	$4.55	0.37%	155	3.96%	373 (-)	229 (-)	271 (-)	126 (-)	53	52	51	45
Cloncurry, QLD, 2100	$4.88	0.40%	389	9.93%	402 (-)	344 (-)	224 (-)	86 (-)	55	62	43	32
Cobar, NSW, 2020	$8.41	0.63%	211	4.96%	305 (-)	100 (-)	229 (-)	102 (-)	99	25	73	21
Cobar, NSW, 2100	$11.03	0.83%	339	7.97%	319 (-)	124 (-)	247 (-)	106 (-)	100	33	86	32
Cockburn, WA, 2020	$43.57	0.23%	448	0.76%	124 (120)	372 (188)	144 (120)	345 (154)	10	70	20	75
Cockburn, WA, 2100	$89.86	0.48%	716	1.21%	77 (77)	274 (130)	164 (145)	367 (188)	8	61	22	68
Coffs Harbour, NSW, 2020	$66.67	0.45%	983	2.07%	76 (75)	173 (80)	82 (71)	218 (91)	38	60	25	58
Coffs Harbour, NSW, 2100	$120.48	0.81%	2,049	4.31%	56 (56)	129 (60)	78 (76)	191 (95)	22	36	35	59
Colac-Otway, VIC, 2020	$9.17	0.16%	197	1.07%	296 (244)	456 (234)	240 (182)	309 (136)	67	73	60	41
Colac-Otway, VIC, 2100	$14.93	0.26%	272	1.47%	279 (240)	466 (233)	270 (207)	344 (174)	63	64	61	46
Collie, WA, 2020	$44.58	2.62%	1,564	28.87%	120 (-)	14 (-)	47 (-)	16 (-)	8	3	6	4
Collie, WA, 2100	$37.96	2.23%	1,799	33.21%	175 (-)	30 (-)	91 (-)	21 (-)	25	5	10	5
Coober Pedy, SA, 2020	$0.37	0.05%	0	0.00%	507 (-)	539 (-)	519 (-)	508 (-)	70	70	68	68
Coober Pedy, SA, 2100	$0.39	0.05%	2	0.08%	520 (-)	543 (-)	495 (-)	498 (-)	70	71	59	56
Cook, QLD, 2020	$12.14	0.95%	275	6.75%	263 (-)	55 (-)	204 (-)	76 (-)	45	23	45	33
Cook, QLD, 2100	$13.55	1.06%	244	5.99%	292 (-)	82 (-)	278 (-)	138 (-)	44	31	48	40
Coolamon, NSW, 2020	$4.50	0.36%	17	0.43%	374 (-)	240 (-)	426 (-)	411 (-)	119	87	125	115
Coolamon, NSW, 2100	$4.25	0.34%	14	0.35%	409 (-)	393 (-)	452 (-)	462 (-)	126	116	129	124
Coolgardie, WA, 2020	$1.41	0.17%	0	0.00%	449 (-)	437 (-)	533 (-)	537 (-)	83	89	132	131
Coolgardie, WA, 2100	$2.73	0.33%	0	0.00%	441 (-)	402 (-)	532 (-)	518 (-)	82	105	128	125
Coomalie, NT, 2020	$6.11	1.49%	166	12.67%	341 (-)	31 (-)	263 (-)	35 (-)	6	1	6	1
Coomalie, NT, 2100	$8.01	1.95%	276	21.07%	357 (-)	35 (-)	268 (-)	34 (-)	5	1	5	1
Coonamble, NSW, 2020	$84.71	8.24%	1,557	47.53%	57 (-)	1 (-)	48 (-)	6 (-)	26	1	14	2
Coonamble, NSW, 2100	$88.16	8.58%	1,667	50.89%	80 (-)	1 (-)	95 (-)	5 (-)	34	1	42	3
Coorow, WA, 2020	$0.68	0.14%	6	0.39%	479 (-)	475 (-)	467 (-)	419 (-)	100	103	96	87
Coorow, WA, 2100	$2.53	0.52%	67	4.33%	446 (-)	246 (-)	385 (-)	188 (-)	84	55	60	39

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LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Copper Coast, SA, 2020	$16.56	0.35%	583	3.91%	229 (207)	246 (120)	119 (103)	129 (50)	20	19	4	7
Copper Coast, SA, 2100	$30.15	0.64%	813	5.45%	206 (194)	175 (78)	156 (140)	155 (78)	23	17	7	10
Corangamite, VIC, 2020	$4.05	0.12%	35	0.32%	384 (262)	500 (256)	396 (237)	435 (212)	76	78	75	67
Corangamite, VIC, 2100	$6.72	0.20%	43	0.39%	374 (260)	500 (253)	412 (248)	457 (237)	76	77	76	75
Corrigin, WA, 2020	$0.52	0.15%	15	1.32%	493 (-)	471 (-)	432 (-)	275 (-)	108	101	79	56
Corrigin, WA, 2100	$0.84	0.24%	4	0.35%	496 (-)	482 (-)	481 (-)	463 (-)	115	122	103	98
Cottesloe, WA, 2020	$1.42	0.09%	1	0.02%	448 (-)	525 (-)	498 (-)	500 (-)	82	128	120	120
Cottesloe, WA, 2100	$3.93	0.25%	2	0.04%	417 (-)	472 (-)	499 (-)	507 (-)	73	119	113	122
Cowra, NSW, 2020	$10.74	0.38%	185	2.04%	278 (-)	217 (-)	247 (-)	221 (-)	95	78	78	60
Cowra, NSW, 2100	$13.93	0.49%	298	3.29%	288 (-)	266 (-)	260 (-)	238 (-)	93	78	90	76
Cranbrook, WA, 2020	$1.34	0.29%	17	1.14%	450 (-)	316 (-)	425 (-)	298 (-)	84	55	74	61
Cranbrook, WA, 2100	$2.48	0.53%	22	1.48%	448 (-)	236 (-)	436 (-)	342 (-)	85	51	76	65
Croydon, QLD, 2020	$0.79	0.26%	73	7.56%	472 (-)	339 (-)	338 (-)	69 (-)	65	64	56	30
Croydon, QLD, 2100	$0.87	0.29%	48	4.97%	494 (-)	439 (-)	405 (-)	169 (-)	65	67	60	44
Cuballing, WA, 2020	$0.83	0.29%	20	2.21%	469 (-)	303 (-)	421 (-)	205 (-)	94	51	73	41
Cuballing, WA, 2100	$1.61	0.57%	14	1.55%	466 (-)	222 (-)	451 (-)	333 (-)	92	47	84	64
Cue, WA, 2020	$0.06	0.03%	0	0.00%	539 (-)	542 (-)	532 (-)	536 (-)	135	135	125	135
Cue, WA, 2100	$0.21	0.09%	0	0.00%	532 (-)	534 (-)	530 (-)	519 (-)	133	134	126	129
Cumberland, NSW, 2020	$77.65	0.25%	698	0.70%	63 (62)	351 (174)	104 (89)	359 (162)	29	120	35	100
Cumberland, NSW, 2100	$83.28	0.27%	4,265	4.28%	83 (82)	459 (228)	39 (39)	192 (96)	36	126	16	60
Cunderdin, WA, 2020	$1.81	0.39%	42	2.84%	439 (-)	209 (-)	387 (-)	180 (-)	77	35	63	37
Cunderdin, WA, 2100	$2.42	0.52%	36	2.43%	449 (-)	248 (-)	421 (-)	276 (-)	86	56	68	51
Dalwallinu, WA, 2020	$0.81	0.17%	0	0.00%	471 (-)	446 (-)	531 (-)	535 (-)	95	93	130	133
Dalwallinu, WA, 2100	$1.98	0.41%	0	0.00%	457 (-)	337 (-)	529 (-)	520 (-)	88	83	125	130
Dandaragan, WA, 2020	$8.79	0.70%	131	3.28%	302 (-)	89 (-)	287 (-)	158 (-)	41	18	37	33
Dandaragan, WA, 2100	$13.98	1.12%	210	5.26%	286 (-)	74 (-)	297 (-)	162 (-)	41	15	40	33
Dardanup, WA, 2020	$4.82	0.22%	167	2.43%	366 (-)	386 (-)	261 (-)	194 (-)	51	76	33	39
Dardanup, WA, 2100	$8.61	0.40%	392	5.71%	352 (-)	342 (-)	223 (-)	147 (-)	54	84	33	31
Darebin, VIC, 2020	$79.53	0.29%	296	0.34%	61 (60)	304 (149)	193 (156)	428 (210)	14	43	45	65
Darebin, VIC, 2100	$72.89	0.27%	353	0.41%	99 (98)	455 (225)	239 (192)	452 (233)	22	61	51	73
Darwin, NT, 2020	$50.94	0.34%	1,004	2.08%	109 (106)	256 (123)	78 (68)	217 (90)	1	9	2	10
Darwin, NT, 2100	$61.45	0.40%	956	1.98%	126 (124)	339 (164)	142 (129)	312 (156)	1	8	2	12
Denmark, WA, 2020	$5.39	0.33%	68	1.29%	353 (-)	270 (-)	344 (-)	276 (-)	48	44	47	57
Denmark, WA, 2100	$10.71	0.65%	119	2.26%	325 (-)	171 (-)	343 (-)	287 (-)	49	39	52	54
Derby-West Kimberley, WA, 2020	$9.05	0.78%	147	4.00%	298 (-)	75 (-)	281 (-)	123 (-)	40	15	36	24
Derby-West Kimberley, WA, 2100	$8.88	0.77%	137	3.72%	346 (-)	138 (-)	335 (-)	217 (-)	52	26	48	43
Derwent Valley, TAS, 2020	$6.12	0.34%	216	3.73%	340 (-)	255 (-)	224 (-)	132 (-)	13	7	3	1
Derwent Valley, TAS, 2100	$6.04	0.33%	388	6.70%	386 (-)	401 (-)	225 (-)	127 (-)	17	9	3	2
Devonport, TAS, 2020	$4.95	0.10%	76	0.48%	363 (255)	516 (260)	333 (221)	400 (193)	16	28	16	24
Devonport, TAS, 2100	$2.82	0.06%	85	0.53%	438 (266)	542 (266)	370 (238)	439 (226)	25	29	19	26
Diamantina, QLD, 2020	$0.33	0.22%	9	1.84%	512 (-)	391 (-)	454 (-)	236 (-)	71	67	69	58
Diamantina, QLD, 2100	$0.34	0.22%	7	1.43%	522 (-)	487 (-)	470 (-)	348 (-)	71	69	67	66
Donnybrook-Balingup, WA, 2020	$9.16	0.71%	573	14.01%	297 (-)	83 (-)	121 (-)	32 (-)	39	17	15	9
Donnybrook-Balingup, WA, 2100	$10.84	0.84%	843	20.62%	323 (-)	121 (-)	152 (-)	36 (-)	48	22	20	9

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Doomadgee, QLD, 2020	$0.16	0.14%	0	0.00%	527 (-)	479 (-)	520 (-)	522 (-)	74	73	78	78
Doomadgee, QLD, 2100	$0.10	0.09%	0	0.00%	537 (-)	537 (-)	518 (-)	516 (-)	75	74	78	74
Dorset, TAS, 2020	$3.23	0.19%	40	0.74%	398 (-)	415 (-)	388 (-)	349 (-)	23	15	23	15
Dorset, TAS, 2100	$7.22	0.43%	65	1.20%	366 (-)	321 (-)	388 (-)	369 (-)	14	6	22	17
Douglas, QLD, 2020	$59.32	1.43%	1,101	8.34%	88 (86)	33 (10)	72 (64)	63 (21)	21	13	28	27
Douglas, QLD, 2100	$114.48	2.76%	2,166	16.41%	57 (57)	22 (9)	72 (71)	48 (19)	17	10	19	19
Dowerin, WA, 2020	$0.63	0.23%	10	1.13%	485 (-)	382 (-)	449 (-)	302 (-)	103	74	86	62
Dowerin, WA, 2100	$0.99	0.35%	10	1.13%	485 (-)	384 (-)	461 (-)	373 (-)	108	99	92	70
Dumbleyung, WA, 2020	$0.68	0.24%	3	0.33%	481 (-)	363 (-)	479 (-)	430 (-)	101	65	109	91
Dumbleyung, WA, 2100	$1.55	0.55%	1	0.11%	468 (-)	231 (-)	503 (-)	494 (-)	94	49	117	113
Dundas, WA, 2020	$0.74	0.16%	3	0.21%	475 (-)	450 (-)	480 (-)	458 (-)	97	94	104	100
Dundas, WA, 2100	$1.74	0.38%	3	0.21%	460 (-)	356 (-)	491 (-)	480 (-)	90	87	106	105
Dungog, NSW, 2020	$10.16	0.49%	164	2.48%	285 (-)	144 (-)	265 (-)	191 (-)	97	51	84	51
Dungog, NSW, 2100	$9.52	0.46%	195	2.95%	335 (-)	290 (-)	303 (-)	254 (-)	104	89	99	82
East Arnhem, NT, 2020	$0.21	0.11%	1	0.17%	523 (-)	504 (-)	496 (-)	460 (-)	14	16	14	14
East Arnhem, NT, 2100	$0.22	0.12%	3	0.51%	531 (-)	519 (-)	493 (-)	442 (-)	16	15	15	14
East Fremantle, WA, 2020	$1.68	0.13%	35	0.83%	443 (-)	486 (-)	397 (-)	338 (-)	80	108	67	72
East Fremantle, WA, 2100	$4.04	0.31%	41	0.98%	415 (-)	427 (-)	413 (-)	390 (-)	71	109	65	76
East Gippsland, VIC, 2020	$60.68	0.48%	1,367	3.43%	83 (81)	147 (66)	55 (48)	148 (60)	19	15	11	20
East Gippsland, VIC, 2100	$122.43	0.98%	2,279	5.71%	54 (54)	95 (42)	69 (68)	148 (75)	9	9	9	16
East Pilbara, WA, 2020	$2.14	0.15%	48	1.06%	426 (-)	465 (-)	368 (-)	311 (-)	70	99	54	66
East Pilbara, WA, 2100	$5.98	0.42%	35	0.77%	387 (-)	326 (-)	423 (-)	412 (-)	62	78	69	81
Edward River, NSW, 2020	$10.66	0.55%	769	12.36%	281 (-)	123 (-)	96 (-)	38 (-)	96	39	31	6
Edward River, NSW, 2100	$18.16	0.93%	761	12.23%	265 (-)	105 (-)	160 (-)	74 (-)	86	25	64	15
Elliston, SA, 2020	$2.52	0.44%	93	5.11%	417 (-)	179 (-)	310 (-)	95 (-)	55	15	27	5
Elliston, SA, 2100	$3.41	0.60%	59	3.24%	424 (-)	203 (-)	392 (-)	240 (-)	59	21	46	19
Esperance, WA, 2020	$39.02	1.04%	990	8.29%	131 (126)	52 (18)	80 (70)	65 (22)	12	13	10	15
Esperance, WA, 2100	$42.34	1.13%	1,107	9.27%	160 (156)	73 (33)	130 (118)	92 (41)	23	14	16	19
Etheridge, QLD, 2020	$2.26	0.73%	42	4.28%	422 (-)	79 (-)	386 (-)	116 (-)	57	32	61	40
Etheridge, QLD, 2100	$2.32	0.76%	46	4.69%	450 (-)	140 (-)	409 (-)	178 (-)	59	40	61	47
Eurobodalla, NSW, 2020	$27.40	0.24%	381	1.05%	166 (158)	361 (180)	166 (135)	313 (138)	59	123	57	84
Eurobodalla, NSW, 2100	$71.59	0.63%	2,498	6.88%	101 (100)	183 (84)	63 (63)	120 (60)	40	53	27	39
Exmouth, WA, 2020	$1.96	0.24%	46	1.79%	432 (-)	356 (-)	376 (-)	241 (-)	74	64	58	48
Exmouth, WA, 2100	$11.05	1.37%	172	6.71%	318 (-)	54 (-)	317 (-)	126 (-)	46	11	45	24
Fairfield, NSW, 2020	$72.11	0.27%	889	1.04%	70 (69)	326 (164)	89 (78)	316 (139)	33	113	28	85
Fairfield, NSW, 2100	$96.13	0.36%	7,422	8.71%	70 (70)	379 (184)	22 (22)	99 (46)	29	113	8	29
Federation, NSW, 2020	$39.85	1.14%	2,431	21.73%	128 (123)	46 (15)	30 (28)	22 (6)	50	7	7	5
Federation, NSW, 2100	$44.38	1.26%	2,318	20.72%	155 (151)	60 (26)	68 (67)	35 (12)	53	14	31	6
Flinders, TAS, 2020	$0.34	0.11%	12	1.19%	511 (-)	509 (-)	445 (-)	292 (-)	28	25	28	14
Flinders, TAS, 2100	$0.92	0.29%	19	1.88%	489 (-)	438 (-)	442 (-)	316 (-)	28	11	28	12
Flinders, QLD, 2020	$10.31	1.25%	375	14.31%	283 (-)	41 (-)	170 (-)	30 (-)	46	19	42	12
Flinders, QLD, 2100	$8.88	1.08%	337	12.86%	347 (-)	79 (-)	248 (-)	67 (-)	48	30	45	26
Flinders Ranges, SA, 2020	$1.20	0.14%	13	0.49%	454 (-)	473 (-)	444 (-)	398 (-)	59	59	49	40
Flinders Ranges, SA, 2100	$2.63	0.31%	17	0.63%	445 (-)	419 (-)	444 (-)	432 (-)	60	53	54	49
Forbes, NSW, 2020	$12.65	0.66%	196	3.20%	258 (-)	96 (-)	241 (-)	161 (-)	84	23	75	38
Forbes, NSW, 2100	$12.79	0.67%	265	4.33%	302 (-)	161 (-)	274 (-)	189 (-)	95	47	92	57
Franklin Harbour, SA, 2020	$2.95	0.58%	42	2.58%	404 (-)	119 (-)	385 (-)	189 (-)	53	10	39	14

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LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Franklin Harbour, SA, 2100	$5.38	1.05%	81	4.97%	396 (-)	84 (-)	375 (-)	168 (-)	55	7	43	12
Frankston, VIC, 2020	$47.80	0.20%	366	0.49%	115 (112)	400 (202)	173 (140)	397 (191)	33	62	36	60
Frankston, VIC, 2100	$78.34	0.34%	1,341	1.80%	91 (90)	399 (194)	116 (107)	320 (161)	17	44	18	41
Fraser Coast, QLD, 2020	$398.61	1.69%	8,745	11.62%	6 (6)	24 (6)	5 (5)	41 (9)	4	9	4	14
Fraser Coast, QLD, 2100	$667.16	2.83%	12,458	16.56%	7 (7)	20 (7)	7 (7)	47 (18)	5	9	4	18
Fremantle, WA, 2020	$15.06	0.20%	368	1.55%	242 (216)	408 (208)	172 (139)	257 (109)	31	82	23	52
Fremantle, WA, 2100	$37.57	0.50%	628	2.64%	178 (171)	258 (120)	178 (154)	270 (133)	26	59	26	50
Gannawarra, VIC, 2020	$16.53	0.73%	400	5.53%	230 (-)	80 (-)	157 (-)	90 (-)	58	10	34	9
Gannawarra, VIC, 2100	$24.31	1.07%	491	6.79%	235 (-)	80 (-)	205 (-)	124 (-)	57	7	44	10
Gawler, SA, 2020	$11.26	0.25%	209	1.49%	273 (231)	344 (171)	232 (176)	262 (110)	30	34	13	22
Gawler, SA, 2100	$20.78	0.47%	342	2.43%	251 (221)	282 (136)	244 (197)	277 (138)	31	36	19	24
George Town, TAS, 2020	$1.86	0.12%	32	0.64%	435 (-)	502 (-)	402 (-)	366 (-)	26	23	24	18
George Town, TAS, 2100	$3.11	0.20%	48	0.95%	430 (-)	499 (-)	403 (-)	392 (-)	22	19	23	22
Georges River, NSW, 2020	$88.77	0.35%	317	0.39%	52 (52)	248 (121)	188 (152)	418 (205)	22	89	64	118
Georges River, NSW, 2100	$87.70	0.34%	1,253	1.55%	81 (80)	392 (191)	121 (111)	336 (168)	35	115	51	108
Gilgandra, NSW, 2020	$3.21	0.30%	40	1.18%	401 (-)	297 (-)	389 (-)	293 (-)	125	105	117	78
Gilgandra, NSW, 2100	$4.55	0.43%	90	2.66%	404 (-)	316 (-)	363 (-)	267 (-)	123	95	111	88
Gingin, WA, 2020	$4.09	0.23%	69	1.21%	381 (-)	381 (-)	343 (-)	287 (-)	55	73	46	59
Gingin, WA, 2100	$7.98	0.45%	56	0.98%	358 (-)	299 (-)	398 (-)	388 (-)	56	68	64	75
Gladstone, QLD, 2020	$54.62	0.41%	1,319	3.08%	99 (96)	200 (95)	56 (49)	165 (68)	24	49	21	49
Gladstone, QLD, 2100	$84.47	0.63%	2,095	4.89%	82 (81)	185 (86)	75 (74)	171 (86)	21	46	21	45
Glamorgan/Spring Bay, TAS, 2020	$7.59	0.38%	122	1.89%	311 (-)	221 (-)	294 (-)	232 (-)	11	5	13	8
Glamorgan/Spring Bay, TAS, 2100	$13.38	0.66%	228	3.54%	294 (-)	163 (-)	289 (-)	228 (-)	8	2	10	5
Glen Eira, VIC, 2020	$37.55	0.15%	208	0.26%	134 (129)	464 (239)	233 (179)	446 (220)	40	74	57	72
Glen Eira, VIC, 2100	$50.43	0.20%	271	0.34%	144 (142)	495 (250)	272 (209)	465 (241)	41	74	62	76
Glen Innes Severn, NSW, 2020	$3.89	0.20%	29	0.46%	386 (-)	411 (-)	408 (-)	405 (-)	123	127	121	111
Glen Innes Severn, NSW, 2100	$5.76	0.29%	87	1.39%	388 (-)	434 (-)	367 (-)	352 (-)	120	122	112	112
Glenelg, VIC, 2020	$18.95	0.44%	477	3.48%	212 (194)	178 (82)	139 (116)	144 (57)	54	24	29	19
Glenelg, VIC, 2100	$29.65	0.69%	500	3.65%	207 (195)	153 (69)	202 (172)	220 (108)	51	17	42	23
Glenorchy, TAS, 2020	$11.79	0.14%	141	0.51%	267 (228)	478 (245)	284 (205)	389 (185)	6	20	11	20
Glenorchy, TAS, 2100	$8.22	0.10%	271	0.98%	355 (259)	533 (265)	271 (208)	387 (201)	12	28	8	21
Gnowangerup, WA, 2020	$0.97	0.23%	3	0.22%	463 (-)	378 (-)	481 (-)	456 (-)	89	71	107	98
Gnowangerup, WA, 2100	$2.13	0.50%	1	0.07%	454 (-)	256 (-)	506 (-)	500 (-)	87	58	122	118
Gold Coast, QLD, 2020	$2598.97	2.10%	45,161	11.46%	1 (1)	19 (5)	1 (1)	43 (11)	1	8	1	16
Gold Coast, QLD, 2100	$4301.33	3.48%	68,796	17.46%	1 (1)	14 (5)	1 (1)	45 (17)	1	5	1	17
Golden Plains, VIC, 2020	$11.06	0.32%	203	1.82%	274 (232)	277 (134)	237 (180)	238 (101)	64	39	59	31
Golden Plains, VIC, 2100	$11.48	0.33%	232	2.09%	313 (251)	405 (196)	286 (215)	304 (151)	71	45	65	38
Goomalling, WA, 2020	$0.50	0.17%	16	1.71%	496 (-)	440 (-)	428 (-)	245 (-)	111	90	75	49
Goomalling, WA, 2100	$0.80	0.27%	13	1.39%	498 (-)	452 (-)	455 (-)	355 (-)	116	115	85	67
Goondiwindi, QLD, 2020	$64.86	2.16%	3,418	35.70%	78 (-)	17 (-)	18 (-)	13 (-)	19	7	11	7
Goondiwindi, QLD, 2100	$68.87	2.29%	2,051	21.42%	109 (-)	28 (-)	77 (-)	33 (-)	23	15	22	16

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LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Gosnells, WA, 2020	$35.09	0.20%	220	0.40%	140 (134)	401 (203)	222 (171)	416 (203)	15	78	30	86
Gosnells, WA, 2100	$76.60	0.45%	1,118	2.05%	94 (93)	298 (144)	129 (117)	307 (153)	11	67	15	59
Goulburn Mulwaree, NSW, 2020	$10.92	0.18%	84	0.43%	276 (234)	432 (219)	322 (216)	412 (201)	93	128	104	116
Goulburn Mulwaree, NSW, 2100	$16.51	0.27%	314	1.59%	272 (233)	458 (227)	254 (202)	332 (165)	89	125	88	106
Goyder, SA, 2020	$5.51	0.32%	46	0.83%	352 (-)	276 (-)	375 (-)	339 (-)	47	22	35	32
Goyder, SA, 2100	$8.86	0.51%	92	1.66%	348 (-)	254 (-)	362 (-)	327 (-)	52	31	39	30
Grant, SA, 2020	$6.76	0.32%	102	1.52%	329 (-)	274 (-)	303 (-)	260 (-)	42	20	25	21
Grant, SA, 2100	$12.39	0.59%	172	2.56%	306 (-)	209 (-)	318 (-)	271 (-)	42	24	32	23
Greater Bendigo, VIC, 2020	$101.83	0.46%	2,583	3.69%	40 (40)	162 (74)	29 (27)	135 (52)	9	21	5	18
Greater Bendigo, VIC, 2100	$132.17	0.60%	2,525	3.60%	48 (48)	200 (95)	62 (62)	224 (110)	7	25	8	26
Greater Dandenong, VIC, 2020	$51.13	0.20%	283	0.35%	107 (104)	409 (209)	198 (159)	426 (208)	30	64	46	63
Greater Dandenong, VIC, 2100	$82.63	0.33%	1,090	1.35%	86 (85)	410 (199)	133 (120)	358 (183)	14	47	25	49
Greater Geelong, VIC, 2020	$98.11	0.20%	634	0.41%	44 (44)	407 (207)	113 (98)	415 (202)	12	63	23	62
Greater Geelong, VIC, 2100	$103.97	0.21%	1,252	0.81%	64 (64)	492 (249)	122 (112)	407 (210)	11	73	20	59
Greater Geraldton, WA, 2020	$29.64	0.37%	867	3.41%	157 (149)	228 (110)	90 (79)	149 (61)	18	38	11	31
Greater Geraldton, WA, 2100	$41.97	0.53%	867	3.41%	162 (157)	241 (112)	150 (135)	234 (116)	24	53	19	47
Greater Hume Shire, NSW, 2020	$5.81	0.26%	64	0.92%	346 (-)	333 (-)	351 (-)	328 (-)	111	115	109	89
Greater Hume Shire, NSW, 2100	$8.90	0.41%	65	0.93%	345 (-)	338 (-)	386 (-)	400 (-)	107	101	116	120
Greater Shepparton, VIC, 2020	$826.86	7.10%	19,861	53.49%	4 (4)	2 (1)	3 (3)	4 (1)	1	1	1	1
Greater Shepparton, VIC, 2100	$924.13	7.93%	18,502	49.83%	4 (4)	2 (1)	6 (6)	6 (1)	1	1	1	1
Griffith, NSW, 2020	$13.55	0.25%	68	0.40%	252 (221)	350 (173)	345 (224)	417 (204)	82	119	108	117
Griffith, NSW, 2100	$16.82	0.31%	54	0.31%	270 (231)	420 (206)	401 (246)	470 (243)	88	121	123	127
Gundagai, NSW, 2020	$17.60	0.67%	392	4.68%	220 (-)	94 (-)	160 (-)	106 (-)	74	22	54	23
Gundagai, NSW, 2100	$19.73	0.75%	384	4.58%	254 (-)	141 (-)	226 (-)	182 (-)	82	39	81	55
Gunnedah, NSW, 2020	$13.59	0.52%	279	3.32%	251 (-)	130 (-)	200 (-)	155 (-)	81	43	67	33
Gunnedah, NSW, 2100	$22.55	0.86%	473	5.63%	243 (-)	118 (-)	211 (-)	152 (-)	79	31	76	46
Gwydir, NSW, 2020	$4.76	0.39%	129	3.30%	368 (-)	210 (-)	288 (-)	156 (-)	118	73	93	34
Gwydir, NSW, 2100	$9.07	0.74%	479	12.26%	341 (-)	143 (-)	208 (-)	73 (-)	106	41	75	14
Gympie, QLD, 2020	$58.17	0.51%	1,505	4.14%	89 (87)	134 (58)	51 (45)	120 (48)	22	40	20	42
Gympie, QLD, 2100	$83.08	0.73%	1,747	4.81%	84 (83)	146 (67)	92 (88)	176 (90)	22	41	25	46
Halls Creek, WA, 2020	$0.74	0.19%	1	0.08%	476 (-)	417 (-)	507 (-)	486 (-)	98	84	116	114
Halls Creek, WA, 2100	$0.75	0.19%	1	0.08%	501 (-)	505 (-)	512 (-)	499 (-)	118	129	121	117
Harvey, WA, 2020	$9.18	0.20%	284	1.97%	294 (242)	404 (205)	197 (158)	225 (95)	37	80	26	45
Harvey, WA, 2100	$21.22	0.47%	904	6.26%	249 (220)	284 (137)	147 (134)	132 (67)	35	63	17	26
Hawkesbury, NSW, 2020	$55.70	0.45%	950	2.40%	96 (94)	172 (79)	84 (73)	197 (82)	41	59	26	53
Hawkesbury, NSW, 2100	$68.94	0.55%	1,585	4.00%	107 (106)	229 (109)	101 (95)	205 (103)	41	67	44	68
Hay, NSW, 2020	$2.87	0.40%	90	3.92%	407 (-)	205 (-)	316 (-)	128 (-)	127	72	102	25
Hay, NSW, 2100	$2.82	0.39%	32	1.39%	439 (-)	349 (-)	427 (-)	353 (-)	129	104	126	113
Hepburn, VIC, 2020	$12.77	0.31%	84	0.65%	257 (225)	285 (141)	319 (214)	363 (166)	62	41	71	52
Hepburn, VIC, 2100	$14.77	0.36%	124	0.95%	281 (242)	373 (181)	341 (232)	393 (203)	65	41	71	57

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LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Hilltops, NSW, 2020	$13.27	0.29%	146	0.99%	253 (222)	312 (155)	282 (203)	322 (143)	83	109	91	88
Hilltops, NSW, 2100	$15.10	0.33%	180	1.22%	278 (239)	408 (198)	310 (224)	365 (187)	90	118	101	115
Hinchinbrook, QLD, 2020	$29.08	0.87%	1,226	11.49%	160 (152)	64 (22)	63 (56)	42 (10)	27	29	24	15
Hinchinbrook, QLD, 2100	$35.42	1.06%	734	6.88%	185 (178)	83 (36)	163 (144)	119 (59)	31	32	36	37
Hindmarsh, VIC, 2020	$20.99	1.59%	544	12.91%	197 (-)	26 (-)	124 (-)	34 (-)	52	3	27	5
Hindmarsh, VIC, 2100	$25.76	1.95%	592	14.05%	227 (-)	34 (-)	185 (-)	59 (-)	54	3	36	4
Hobart, TAS, 2020	$18.96	0.17%	201	0.58%	211 (193)	436 (222)	238 (181)	378 (175)	2	17	6	19
Hobart, TAS, 2100	$16.02	0.15%	368	1.06%	274 (235)	514 (259)	234 (188)	382 (197)	5	23	5	19
Hobsons Bay, VIC, 2020	$39.51	0.24%	245	0.48%	129 (124)	354 (175)	213 (167)	399 (192)	37	51	51	61
Hobsons Bay, VIC, 2100	$37.88	0.23%	319	0.62%	176 (169)	483 (244)	253 (201)	433 (223)	42	71	58	68
Holdfast Bay, SA, 2020	$13.02	0.16%	44	0.17%	255 (224)	455 (233)	382 (234)	461 (227)	28	53	37	48
Holdfast Bay, SA, 2100	$28.09	0.34%	231	0.89%	215 (200)	390 (189)	287 (216)	404 (208)	26	47	27	46
Hope Vale, QLD, 2020	$0.37	0.22%	1	0.19%	506 (-)	390 (-)	492 (-)	459 (-)	69	66	73	73
Hope Vale, QLD, 2100	$0.45	0.27%	0	0.00%	516 (-)	457 (-)	513 (-)	531 (-)	69	68	77	73
Hornsby, NSW, 2020	$108.30	0.48%	444	0.62%	35 (35)	151 (68)	146 (121)	368 (168)	14	52	50	101
Hornsby, NSW, 2100	$122.52	0.54%	1,951	2.71%	53 (53)	233 (110)	86 (83)	265 (130)	21	69	38	87
Horsham, VIC, 2020	$47.94	1.23%	1,793	14.41%	114 (111)	44 (14)	42 (40)	29 (7)	32	4	7	3
Horsham, VIC, 2100	$71.50	1.83%	2,036	16.36%	102 (101)	38 (14)	79 (77)	49 (20)	24	4	11	3
Hume, VIC, 2020	$123.67	0.38%	245	0.24%	28 (28)	215 (102)	214 (166)	450 (222)	5	29	52	74
Hume, VIC, 2100	$78.66	0.24%	326	0.31%	90 (89)	480 (243)	250 (199)	471 (244)	16	70	56	77
Hunters Hill, NSW, 2020	$11.61	0.49%	57	0.76%	268 (-)	141 (-)	357 (-)	344 (-)	89	50	111	97
Hunters Hill, NSW, 2100	$14.34	0.61%	147	1.96%	283 (-)	195 (-)	331 (-)	313 (-)	91	58	106	100
Huon Valley, TAS, 2020	$15.99	0.44%	385	3.34%	233 (209)	177 (81)	163 (132)	154 (64)	4	2	1	3
Huon Valley, TAS, 2100	$21.62	0.60%	950	8.25%	247 (219)	202 (96)	143 (130)	103 (48)	2	4	1	1
Indigo, VIC, 2020	$14.66	0.48%	421	4.35%	244 (-)	148 (-)	152 (-)	114 (-)	60	16	31	15
Indigo, VIC, 2100	$18.33	0.60%	274	2.83%	264 (-)	197 (-)	269 (-)	262 (-)	61	24	60	34
Inner West, NSW, 2020	$143.58	0.40%	670	0.59%	25 (25)	203 (96)	107 (93)	375 (174)	9	70	38	106
Inner West, NSW, 2100	$150.50	0.42%	1,934	1.69%	39 (39)	325 (156)	87 (84)	325 (164)	16	96	39	103
Inverell, NSW, 2020	$22.30	0.71%	670	6.68%	188 (173)	86 (33)	108 (92)	77 (27)	66	18	37	14
Inverell, NSW, 2100	$31.57	1.00%	1,056	10.53%	202 (191)	92 (40)	134 (121)	80 (34)	65	22	54	19
Ipswich, QLD, 2020	$57.71	0.18%	942	0.91%	90 (88)	429 (217)	85 (74)	329 (147)	23	70	29	69
Ipswich, QLD, 2100	$96.33	0.30%	1,498	1.45%	69 (69)	432 (212)	106 (100)	346 (176)	19	66	28	65
Irwin, WA, 2020	$5.13	0.49%	275	8.30%	359 (-)	140 (-)	203 (-)	64 (-)	49	22	27	14
Irwin, WA, 2100	$6.65	0.64%	281	8.48%	376 (-)	179 (-)	266 (-)	100 (-)	60	40	37	22
Isaac, QLD, 2020	$17.17	0.31%	209	1.20%	222 (202)	281 (138)	231 (175)	289 (126)	40	58	48	66
Isaac, QLD, 2100	$32.88	0.60%	441	2.54%	195 (186)	199 (94)	218 (179)	272 (134)	32	49	42	57
Jerramungup, WA, 2020	$1.22	0.31%	9	0.71%	453 (-)	296 (-)	453 (-)	357 (-)	86	49	88	79
Jerramungup, WA, 2100	$1.78	0.45%	9	0.71%	459 (-)	297 (-)	463 (-)	422 (-)	89	66	95	86

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Joondalup, WA, 2020	$21.16	0.10%	14	0.02%	194 (178)	517 (261)	442 (247)	499 (250)	28	123	84	119
Joondalup, WA, 2100	$65.64	0.30%	32	0.05%	115 (113)	428 (210)	428 (251)	505 (254)	13	110	71	120
Junee, NSW, 2020	$7.10	0.60%	89	2.35%	320 (-)	112 (-)	317 (-)	198 (-)	105	30	103	54
Junee, NSW, 2100	$7.25	0.61%	80	2.11%	365 (-)	194 (-)	376 (-)	301 (-)	112	57	113	99
Kalamunda, WA, 2020	$20.19	0.24%	58	0.21%	208 (190)	370 (186)	355 (228)	457 (226)	29	69	50	99
Kalamunda, WA, 2100	$44.62	0.52%	1,680	6.18%	153 (149)	243 (114)	94 (89)	135 (68)	21	54	11	28
Kalgoorlie/Boulder, WA, 2020	$6.03	0.10%	3	0.02%	342 (253)	510 (258)	482 (253)	501 (251)	46	121	108	121
Kalgoorlie/Boulder, WA, 2100	$13.32	0.23%	3	0.02%	295 (244)	485 (246)	489 (258)	510 (258)	42	123	108	123
Kangaroo Island, SA, 2020	$14.33	0.53%	180	2.10%	247 (-)	126 (-)	252 (-)	214 (-)	26	11	17	17
Kangaroo Island, SA, 2100	$31.96	1.19%	392	4.57%	200 (-)	69 (-)	222 (-)	183 (-)	22	6	14	15
Karoonda East Murray, SA, 2020	$0.54	0.10%	1	0.06%	491 (-)	511 (-)	493 (-)	491 (-)	68	66	56	52
Karoonda East Murray, SA, 2100	$1.09	0.21%	1	0.06%	481 (-)	494 (-)	501 (-)	503 (-)	65	64	60	59
Karratha, WA, 2020	$4.63	0.11%	164	1.19%	371 (258)	507 (257)	266 (193)	290 (127)	52	119	34	60
Karratha, WA, 2100	$15.65	0.36%	198	1.44%	275 (236)	372 (180)	301 (220)	347 (177)	39	95	42	66
Katanning, WA, 2020	$2.72	0.31%	75	2.65%	409 (-)	295 (-)	334 (-)	186 (-)	63	48	44	38
Katanning, WA, 2100	$5.03	0.57%	65	2.29%	398 (-)	225 (-)	387 (-)	285 (-)	66	48	61	53
Katherine, NT, 2020	$5.34	0.35%	286	5.86%	355 (-)	249 (-)	196 (-)	86 (-)	7	7	4	6
Katherine, NT, 2100	$8.26	0.54%	491	10.05%	354 (-)	234 (-)	204 (-)	85 (-)	4	7	3	4
Kellerberrin, WA, 2020	$1.56	0.39%	50	3.96%	447 (-)	208 (-)	365 (-)	125 (-)	81	34	52	26
Kellerberrin, WA, 2100	$1.61	0.41%	25	1.98%	467 (-)	334 (-)	433 (-)	311 (-)	93	82	75	61
Kempsey, NSW, 2020	$60.70	0.96%	1,131	5.63%	82 (80)	54 (19)	71 (63)	88 (32)	39	11	22	16
Kempsey, NSW, 2100	$112.17	1.78%	1,808	9.01%	59 (59)	39 (15)	90 (87)	93 (42)	24	7	40	25
Kent, WA, 2020	$0.38	0.21%	0	0.00%	503 (-)	399 (-)	528 (-)	534 (-)	116	77	136	125
Kent, WA, 2100	$1.06	0.57%	0	0.00%	482 (-)	220 (-)	520 (-)	526 (-)	105	46	129	135
Kentish, TAS, 2020	$2.68	0.23%	52	1.41%	410 (-)	377 (-)	362 (-)	268 (-)	25	11	22	12
Kentish, TAS, 2100	$2.51	0.22%	45	1.22%	447 (-)	490 (-)	410 (-)	366 (-)	26	18	26	15
Kiama, NSW, 2020	$11.33	0.26%	15	0.11%	272 (230)	338 (168)	433 (244)	479 (239)	92	116	126	126
Kiama, NSW, 2100	$9.89	0.23%	56	0.41%	332 (254)	486 (247)	399 (245)	453 (234)	102	128	120	123
Kimba, SA, 2020	$0.44	0.10%	1	0.07%	502 (-)	515 (-)	500 (-)	489 (-)	69	67	57	51
Kimba, SA, 2100	$0.90	0.20%	1	0.07%	492 (-)	497 (-)	508 (-)	501 (-)	67	65	61	57
King Island, TAS, 2020	$0.27	0.05%	1	0.06%	518 (-)	538 (-)	495 (-)	490 (-)	29	29	29	29
King Island, TAS, 2100	$0.83	0.17%	2	0.13%	497 (-)	511 (-)	494 (-)	490 (-)	29	22	29	29
Kingborough, TAS, 2020	$9.88	0.15%	78	0.38%	286 (237)	462 (237)	331 (219)	422 (207)	8	19	15	26
Kingborough, TAS, 2100	$8.92	0.14%	231	1.12%	343 (258)	516 (260)	288 (217)	376 (193)	11	24	9	18
Kingston, VIC, 2020	$63.99	0.22%	1,023	1.09%	80 (78)	392 (195)	75 (67)	306 (134)	17	58	15	40
Kingston, VIC, 2100	$120.54	0.41%	5,703	6.07%	55 (55)	332 (161)	30 (30)	136 (69)	10	36	5	11
Kingston, SA, 2020	$8.50	0.82%	227	6.84%	303 (-)	71 (-)	221 (-)	74 (-)	36	4	12	4
Kingston, SA, 2100	$28.62	2.75%	472	14.22%	211 (-)	23 (-)	212 (-)	58 (-)	24	3	13	5
Knox, VIC, 2020	$46.70	0.19%	236	0.31%	117 (114)	412 (211)	216 (169)	440 (215)	34	65	54	69
Knox, VIC, 2100	$67.29	0.28%	545	0.71%	112 (110)	447 (221)	193 (166)	424 (219)	27	58	38	64
Kojonup, WA, 2020	$2.24	0.33%	24	1.10%	423 (-)	266 (-)	414 (-)	305 (-)	68	43	69	64
Kojonup, WA, 2100	$5.45	0.79%	114	5.22%	394 (-)	132 (-)	347 (-)	163 (-)	64	24	55	34

	ACTUALS				ALL HAZARDS RANKING - NATIONAL BRACKETS = (LARGE LGAs)				ALL HAZARDS RANKING - STATE			
LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Kondinin, WA, 2020	$0.85	0.25%	21	1.96%	468 (-)	349 (-)	419 (-)	226 (-)	93	63	70	46
Kondinin, WA, 2100	$1.24	0.37%	12	1.12%	476 (-)	368 (-)	457 (-)	375 (-)	101	93	87	72
Koorda, WA, 2020	$0.33	0.17%	1	0.16%	513 (-)	443 (-)	506 (-)	462 (-)	121	92	122	101
Koorda, WA, 2100	$0.73	0.37%	0	0.00%	503 (-)	369 (-)	523 (-)	527 (-)	120	94	127	134
Kowanyama, QLD, 2020	$0.19	0.09%	0	0.00%	525 (-)	520 (-)	509 (-)	520 (-)	73	75	77	77
Kowanyama, QLD, 2100	$0.17	0.08%	0	0.00%	534 (-)	538 (-)	515 (-)	543 (-)	73	75	76	77
Ku-ring-gai, NSW, 2020	$89.88	0.51%	158	0.28%	51 (51)	131 (56)	269 (195)	444 (218)	21	44	86	120
Ku-ring-gai, NSW, 2100	$102.94	0.59%	1,996	3.57%	65 (65)	210 (100)	83 (80)	226 (112)	27	61	36	73
Kulin, WA, 2020	$0.59	0.18%	8	0.77%	487 (-)	428 (-)	457 (-)	342 (-)	104	87	92	74
Kulin, WA, 2100	$1.38	0.42%	0	0.00%	471 (-)	322 (-)	524 (-)	528 (-)	97	75	136	136
Kwinana, WA, 2020	$9.64	0.15%	62	0.31%	288 (239)	460 (236)	354 (227)	439 (214)	36	98	49	95
Kwinana, WA, 2100	$23.83	0.38%	119	0.59%	237 (213)	358 (174)	344 (233)	434 (224)	32	89	51	88
Kyogle, NSW, 2020	$7.45	0.37%	184	2.84%	312 (-)	234 (-)	249 (-)	179 (-)	103	85	79	48
Kyogle, NSW, 2100	$7.58	0.37%	244	3.77%	360 (-)	365 (-)	279 (-)	213 (-)	111	109	93	71
Lachlan, NSW, 2020	$4.95	0.41%	34	0.88%	362 (-)	194 (-)	401 (-)	333 (-)	117	64	119	92
Lachlan, NSW, 2100	$6.08	0.50%	64	1.66%	385 (-)	257 (-)	389 (-)	326 (-)	119	75	117	104
Lake Grace, WA, 2020	$1.31	0.28%	15	1.00%	451 (-)	323 (-)	435 (-)	320 (-)	85	57	76	69
Lake Grace, WA, 2100	$2.76	0.58%	12	0.80%	440 (-)	211 (-)	456 (-)	408 (-)	81	43	88	80
Lake Macquarie, NSW, 2020	$245.63	0.71%	2,674	2.43%	14 (14)	84 (32)	27 (26)	195 (81)	4	16	6	52
Lake Macquarie, NSW, 2100	$383.15	1.11%	9,912	9.00%	13 (13)	75 (34)	13 (13)	94 (43)	3	18	5	26
Lane Cove, NSW, 2020	$32.02	0.43%	36	0.15%	150 (143)	184 (85)	393 (236)	464 (229)	54	62	118	122
Lane Cove, NSW, 2100	$33.26	0.45%	364	1.55%	191 (183)	295 (142)	235 (189)	334 (166)	64	92	83	107
Latrobe, VIC, 2020	$37.02	0.26%	627	1.37%	136 (131)	343 (170)	114 (99)	272 (116)	41	49	24	35
Latrobe, VIC, 2100	$76.28	0.53%	3,146	6.86%	95 (94)	238 (111)	50 (50)	122 (61)	19	28	7	9
Latrobe, TAS, 2020	$5.15	0.22%	125	1.70%	358 (-)	387 (-)	291 (-)	247 (-)	15	13	12	10
Latrobe, TAS, 2100	$5.65	0.25%	158	2.15%	390 (-)	475 (-)	327 (-)	295 (-)	18	14	14	10
Launceston, TAS, 2020	$29.95	0.22%	214	0.50%	156 (148)	389 (194)	225 (172)	395 (190)	1	14	4	22
Launceston, TAS, 2100	$33.01	0.24%	448	1.04%	193 (184)	477 (240)	217 (178)	385 (199)	1	15	2	20
Laverton, WA, 2020	$0.15	0.07%	0	0.00%	531 (-)	530 (-)	527 (-)	533 (-)	130	131	135	134
Laverton, WA, 2100	$0.34	0.18%	0	0.00%	523 (-)	506 (-)	525 (-)	529 (-)	128	130	131	133
Leeton, NSW, 2020	$9.26	0.38%	25	0.32%	292 (-)	216 (-)	413 (-)	434 (-)	98	77	122	119
Leeton, NSW, 2100	$12.13	0.50%	25	0.32%	309 (-)	264 (-)	431 (-)	468 (-)	98	76	127	126
Leonora, WA, 2020	$0.46	0.10%	0	0.00%	500 (-)	518 (-)	526 (-)	532 (-)	114	124	134	129
Leonora, WA, 2100	$1.01	0.21%	0	0.00%	483 (-)	491 (-)	526 (-)	517 (-)	106	125	132	132
Light, SA, 2020	$7.99	0.26%	57	0.58%	306 (-)	340 (-)	356 (-)	376 (-)	37	32	34	37
Light, SA, 2100	$14.43	0.47%	89	0.91%	282 (-)	277 (-)	366 (-)	401 (-)	35	35	41	45
Lismore, NSW, 2020	$67.81	0.70%	2,133	6.90%	73 (72)	90 (36)	36 (34)	73 (26)	35	19	10	13
Lismore, NSW, 2100	$68.47	0.71%	1,646	5.32%	110 (108)	150 (68)	97 (91)	160 (81)	42	43	43	49
Litchfield, NT, 2020	$10.68	0.35%	566	5.74%	280 (-)	251 (-)	122 (-)	87 (-)	3	8	3	7
Litchfield, NT, 2100	$11.36	0.37%	372	3.77%	316 (-)	371 (-)	230 (-)	212 (-)	3	11	4	10
Lithgow, NSW, 2020	$15.84	0.37%	154	1.14%	235 (211)	227 (109)	273 (197)	300 (131)	77	81	87	80
Lithgow, NSW, 2100	$17.27	0.41%	343	2.53%	267 (229)	335 (162)	243 (195)	273 (135)	87	99	84	90
Liverpool, NSW, 2020	$93.51	0.31%	853	0.90%	47 (47)	282 (139)	92 (81)	331 (148)	19	99	30	91
Liverpool, NSW, 2100	$143.20	0.48%	8,284	8.73%	41 (41)	275 (131)	17 (17)	98 (45)	18	84	7	28

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LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Liverpool Plains, NSW, 2020	$12.18	0.60%	219	3.36%	262 (-)	113 (-)	223 (-)	151 (-)	86	31	72	32
Liverpool Plains, NSW, 2100	$18.57	0.91%	327	5.02%	263 (-)	106 (-)	249 (-)	166 (-)	85	26	87	50
Livingstone, QLD, 2020	$64.34	0.81%	1,515	5.99%	79 (77)	72 (28)	50 (44)	84 (30)	20	31	19	35
Livingstone, QLD, 2100	$94.33	1.19%	2,015	7.97%	73 (73)	68 (30)	82 (79)	105 (49)	20	27	24	33
Lockhart, NSW, 2020	$4.11	0.35%	34	0.91%	380 (-)	247 (-)	400 (-)	330 (-)	121	88	120	90
Lockhart, NSW, 2100	$4.23	0.36%	35	0.93%	410 (-)	378 (-)	422 (-)	397 (-)	127	112	125	119
Lockhart River, QLD, 2020	$0.13	0.11%	0	0.00%	533 (-)	506 (-)	510 (-)	518 (-)	75	74	75	76
Lockhart River, QLD, 2100	$0.13	0.11%	0	0.00%	536 (-)	524 (-)	517 (-)	542 (-)	74	72	74	78
Lockyer Valley, QLD, 2020	$22.29	0.31%	431	1.90%	189 (174)	284 (140)	149 (123)	231 (97)	34	59	38	54
Lockyer Valley, QLD, 2100	$31.60	0.44%	510	2.25%	201 (190)	301 (145)	199 (170)	289 (144)	34	57	41	59
Loddon, VIC, 2020	$7.62	0.41%	155	2.60%	310 (-)	197 (-)	272 (-)	187 (-)	68	26	66	25
Loddon, VIC, 2100	$12.07	0.65%	178	2.99%	310 (-)	174 (-)	313 (-)	252 (-)	69	20	69	31
Logan, QLD, 2020	$134.42	0.26%	3,583	2.19%	27 (27)	337 (167)	16 (16)	207 (86)	11	63	10	51
Logan, QLD, 2100	$221.12	0.43%	3,827	2.34%	25 (25)	310 (150)	44 (44)	281 (140)	11	60	14	58
Longreach, QLD, 2020	$14.59	1.36%	512	14.98%	245 (-)	38 (-)	133 (-)	28 (-)	42	17	34	11
Longreach, QLD, 2100	$17.29	1.61%	874	25.58%	266 (-)	46 (-)	149 (-)	26 (-)	42	19	35	11
Lower Eyre Peninsula, SA, 2020	$7.24	0.42%	105	1.91%	317 (-)	189 (-)	302 (-)	230 (-)	39	16	24	18
Lower Eyre Peninsula, SA, 2100	$13.40	0.78%	177	3.22%	293 (-)	135 (-)	314 (-)	244 (-)	39	14	31	20
Loxton Waikerie, SA, 2020	$15.89	0.49%	253	2.45%	234 (210)	143 (64)	211 (164)	192 (79)	23	12	11	15
Loxton Waikerie, SA, 2100	$19.89	0.61%	298	2.89%	253 (223)	191 (91)	261 (204)	257 (126)	33	19	21	22
MacDonnell, NT, 2020	$1.72	0.46%	79	6.57%	442 (-)	169 (-)	329 (-)	78 (-)	11	5	10	5
MacDonnell, NT, 2100	$2.12	0.56%	93	7.74%	455 (-)	228 (-)	361 (-)	110 (-)	11	6	10	7
Macedon Ranges, VIC, 2020	$38.22	0.45%	347	1.29%	132 (127)	170 (78)	180 (146)	277 (118)	39	23	40	36
Macedon Ranges, VIC, 2100	$33.90	0.40%	497	1.84%	189 (181)	341 (166)	203 (173)	318 (160)	48	37	43	40
Mackay, QLD, 2020	$284.62	1.23%	4,751	6.46%	10 (10)	42 (13)	12 (12)	79 (28)	6	20	7	34
Mackay, QLD, 2100	$561.76	2.44%	9,139	12.43%	9 (9)	26 (11)	15 (15)	71 (29)	6	13	7	29
Maitland, NSW, 2020	$51.79	0.39%	504	1.18%	104 (101)	211 (100)	135 (113)	294 (128)	42	74	48	79
Maitland, NSW, 2100	$65.12	0.49%	3,104	7.27%	117 (115)	271 (127)	53 (53)	116 (56)	44	82	21	37
Mallala, SA, 2020	$3.48	0.18%	36	0.60%	394 (-)	423 (-)	394 (-)	373 (-)	52	47	40	36
Mallala, SA, 2100	$8.91	0.47%	93	1.54%	344 (-)	283 (-)	359 (-)	337 (-)	51	37	38	34
Mandurah, WA, 2020	$251.12	1.39%	7,282	12.63%	13 (13)	35 (11)	7 (7)	36 (8)	1	10	1	11
Mandurah, WA, 2100	$504.93	2.79%	11,590	20.10%	10 (10)	21 (8)	9 (9)	38 (13)	1	4	1	10
Manjimup, WA, 2020	$5.89	0.25%	35	0.47%	344 (-)	347 (-)	395 (-)	402 (-)	47	62	66	84
Manjimup, WA, 2100	$12.38	0.53%	56	0.75%	307 (-)	237 (-)	396 (-)	418 (-)	44	52	63	83
Manningham, VIC, 2020	$53.97	0.29%	306	0.51%	101 (98)	310 (153)	190 (154)	390 (186)	28	44	43	58
Manningham, VIC, 2100	$57.63	0.31%	452	0.76%	131 (129)	426 (209)	216 (177)	417 (217)	34	53	48	63
Mansfield, VIC, 2020	$16.98	0.63%	387	4.51%	223 (-)	99 (-)	162 (-)	110 (-)	55	11	35	14
Mansfield, VIC, 2100	$24.35	0.90%	481	5.61%	233 (-)	107 (-)	207 (-)	153 (-)	56	12	45	17
Mapoon, QLD, 2020	$0.0008	0.07%	0	0.00%	543 (-)	533 (-)	511 (-)	523 (-)	78	77	74	75
Mapoon, QLD, 2100	$0.0008	0.07%	0	0.00%	543 (-)	541 (-)	516 (-)	541 (-)	78	77	73	76
Maralinga Tjarutja, SA, 2020	$0.01	0.06%	0	0.00%	542 (-)	536 (-)	514 (-)	510 (-)	71	69	67	67
Maralinga Tjarutja, SA, 2100	$0.02	0.10%	0	0.00%	542 (-)	528 (-)	543 (-)	535 (-)	71	70	70	70
Maranoa, QLD, 2020	$66.10	1.51%	3,796	27.16%	77 (76)	30 (8)	15 (15)	18 (4)	18	11	9	9
Maranoa, QLD, 2100	$58.34	1.33%	3,817	27.31%	129 (127)	57 (23)	45 (45)	24 (7)	24	23	15	10

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Mareeba, QLD, 2020	$20.34	0.44%	494	3.35%	205 (188)	181 (83)	138 (115)	153 (63)	38	46	35	48
Mareeba, QLD, 2100	$26.27	0.57%	584	3.96%	223 (207)	223 (106)	188 (161)	207 (104)	39	50	38	50
Maribyrnong, VIC, 2020	$55.18	0.34%	648	1.23%	97 (95)	257 (124)	111 (96)	284 (123)	27	36	22	38
Maribyrnong, VIC, 2100	$57.44	0.35%	923	1.76%	132 (130)	387 (188)	145 (132)	322 (163)	35	43	28	42
Marion, SA, 2020	$21.05	0.13%	0	0.00%	195 (179)	482 (247)	523 (258)	511 (259)	13	62	66	66
Marion, SA, 2100	$41.84	0.27%	0	0.00%	163 (158)	460 (229)	542 (264)	534 (262)	13	62	69	69
Maroondah, VIC, 2020	$43.81	0.24%	328	0.56%	122 (118)	368 (184)	185 (150)	379 (176)	35	56	42	54
Maroondah, VIC, 2100	$59.30	0.32%	1,553	2.64%	128 (126)	415 (203)	102 (96)	269 (132)	33	49	15	36
McKinlay, QLD, 2020	$3.31	0.91%	92	7.90%	395 (-)	58 (-)	311 (-)	68 (-)	55	25	55	29
McKinlay, QLD, 2100	$3.13	0.86%	86	7.39%	429 (-)	116 (-)	368 (-)	113 (-)	57	36	57	35
Meander Valley, TAS, 2020	$15.45	0.41%	357	2.98%	240 (215)	193 (91)	176 (143)	171 (71)	5	4	2	4
Meander Valley, TAS, 2100	$15.16	0.40%	294	2.45%	277 (238)	340 (165)	263 (205)	275 (137)	6	7	7	8
Meekatharra, WA, 2020	$0.08	0.03%	1	0.11%	537 (-)	543 (-)	503 (-)	477 (-)	133	136	121	108
Meekatharra, WA, 2100	$0.24	0.09%	1	0.11%	530 (-)	536 (-)	505 (-)	493 (-)	132	136	123	112
Melbourne, VIC, 2020	$259.12	0.36%	2,720	1.18%	12 (12)	243 (119)	26 (25)	295 (129)	3	35	4	39
Melbourne, VIC, 2100	$456.12	0.63%	6,178	2.68%	11 (11)	182 (83)	27 (27)	266 (131)	2	21	4	35
Melton, VIC, 2020	$101.16	0.40%	253	0.31%	42 (42)	206 (98)	210 (165)	438 (213)	11	27	50	68
Melton, VIC, 2100	$61.86	0.24%	617	0.76%	125 (123)	478 (241)	181 (156)	414 (214)	32	69	34	61
Melville, WA, 2020	$32.28	0.19%	1,913	3.56%	149 (142)	413 (212)	40 (38)	139 (54)	16	83	5	30
Melville, WA, 2100	$71.04	0.42%	2,614	4.86%	103 (102)	324 (155)	59 (59)	173 (88)	12	77	8	35
Menzies, WA, 2020	$0.38	0.08%	0	0.00%	505 (-)	528 (-)	541 (-)	531 (-)	118	130	128	123
Menzies, WA, 2100	$0.88	0.19%	0	0.00%	493 (-)	502 (-)	527 (-)	532 (-)	113	127	134	131
Merredin, WA, 2020	$2.57	0.29%	36	1.27%	414 (-)	308 (-)	392 (-)	279 (-)	66	52	65	58
Merredin, WA, 2100	$3.81	0.43%	16	0.57%	420 (-)	314 (-)	445 (-)	437 (-)	75	72	80	91
Mid Murray, SA, 2020	$150.76	3.64%	3,222	24.42%	24 (24)	10 (3)	22 (21)	20 (5)	1	1	1	1
Mid Murray, SA, 2100	$215.28	5.20%	3,842	29.12%	27 (27)	5 (3)	43 (43)	23 (6)	1	1	2	2
Mid-Coast, NSW, 2020	$135.77	0.58%	2,205	2.96%	26 (26)	117 (50)	34 (32)	174 (73)	10	34	9	45
Mid-Coast, NSW, 2100	$312.47	1.33%	4,886	6.55%	17 (17)	56 (22)	33 (33)	131 (66)	4	13	12	41
Mid-Western Regional, NSW, 2020	$30.10	0.51%	381	2.01%	155 (147)	135 (59)	167 (136)	222 (92)	57	46	58	61
Mid-Western Regional, NSW, 2100	$38.51	0.65%	606	3.20%	172 (166)	170 (77)	182 (157)	245 (122)	60	49	70	78
Mildura, VIC, 2020	$33.43	0.32%	763	2.26%	143 (137)	280 (137)	97 (84)	203 (84)	42	40	20	28
Mildura, VIC, 2100	$53.48	0.51%	1,433	4.25%	136 (134)	255 (119)	109 (103)	196 (98)	38	30	16	20
Mingenew, WA, 2020	$0.21	0.10%	4	0.58%	524 (-)	519 (-)	474 (-)	377 (-)	127	125	102	80
Mingenew, WA, 2100	$0.57	0.26%	4	0.58%	510 (-)	461 (-)	483 (-)	435 (-)	123	117	104	89
Mitcham, SA, 2020	$28.59	0.28%	4	0.01%	162 (154)	325 (163)	473 (251)	504 (254)	10	28	53	56
Mitcham, SA, 2100	$51.79	0.50%	1,604	4.86%	140 (138)	261 (121)	100 (94)	174 (89)	9	32	4	13
Mitchell, VIC, 2020	$57.46	0.76%	1,047	4.33%	93 (91)	77 (30)	74 (66)	115 (45)	24	9	14	16
Mitchell, VIC, 2100	$63.93	0.84%	1,179	4.88%	119 (117)	122 (55)	126 (115)	172 (87)	29	15	23	19
Moira, VIC, 2020	$52.66	0.81%	1,960	9.45%	103 (100)	73 (29)	38 (36)	53 (14)	29	8	6	6

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Moira, VIC, 2100	$62.76	0.96%	1,207	5.82%	121 (119)	99 (45)	123 (113)	145 (74)	30	10	21	15
Monash, VIC, 2020	$57.67	0.19%	281	0.29%	91 (89)	414 (213)	199 (160)	443 (217)	22	66	47	71
Monash, VIC, 2100	$77.59	0.26%	521	0.54%	93 (92)	467 (234)	196 (168)	438 (225)	18	65	40	69
Moonee Valley, VIC, 2020	$82.49	0.39%	362	0.54%	58 (57)	207 (99)	175 (142)	384 (181)	13	28	38	56
Moonee Valley, VIC, 2100	$56.99	0.27%	528	0.79%	134 (132)	453 (224)	195 (167)	409 (211)	36	60	39	60
Moora, WA, 2020	$6.12	1.06%	496	26.96%	339 (-)	50 (-)	137 (-)	19 (-)	45	12	17	5
Moora, WA, 2100	$3.95	0.68%	165	8.97%	416 (-)	157 (-)	323 (-)	95 (-)	72	34	47	20
Moorabool, VIC, 2020	$21.26	0.37%	124	0.68%	193 (177)	223 (106)	293 (207)	362 (165)	51	31	67	51
Moorabool, VIC, 2100	$14.77	0.26%	192	1.06%	280 (241)	465 (232)	304 (221)	381 (196)	64	63	67	54
Morawa, WA, 2020	$0.46	0.18%	9	1.12%	501 (-)	425 (-)	452 (-)	303 (-)	115	85	89	63
Morawa, WA, 2100	$0.77	0.31%	9	1.12%	500 (-)	424 (-)	465 (-)	374 (-)	117	108	94	71
Moree Plains, NSW, 2020	$11.39	0.41%	259	2.91%	270 (-)	196 (-)	209 (-)	175 (-)	90	66	69	46
Moree Plains, NSW, 2100	$14.32	0.51%	380	4.27%	284 (-)	252 (-)	227 (-)	193 (-)	92	74	82	61
Moreland, VIC, 2020	$109.66	0.36%	523	0.54%	33 (33)	241 (118)	128 (108)	383 (180)	6	34	28	55
Moreland, VIC, 2100	$83.06	0.28%	1,327	1.38%	85 (84)	449 (223)	117 (108)	356 (182)	13	59	19	48
Moreton Bay, QLD, 2020	$385.69	0.54%	5,837	2.55%	7 (7)	124 (53)	10 (10)	190 (78)	5	38	6	50
Moreton Bay, QLD, 2100	$831.08	1.16%	12,262	5.36%	6 (6)	72 (32)	8 (8)	159 (80)	4	29	5	42
Mornington, QLD, 2020	$0.76	0.38%	10	1.56%	473 (-)	218 (-)	450 (-)	256 (-)	66	50	67	60
Mornington, QLD, 2100	$10.44	5.17%	284	44.17%	328 (-)	7 (-)	265 (-)	11 (-)	47	2	47	6
Mornington Peninsula, VIC, 2020	$59.42	0.15%	441	0.35%	87 (85)	469 (241)	147 (122)	427 (209)	21	75	30	64
Mornington Peninsula, VIC, 2100	$80.91	0.20%	604	0.47%	88 (87)	496 (251)	183 (158)	446 (228)	15	75	35	70
Mosman, NSW, 2020	$24.85	0.42%	22	0.12%	173 (163)	191 (89)	417 (240)	473 (235)	62	63	124	124
Mosman, NSW, 2100	$27.00	0.45%	427	2.25%	220 (204)	294 (141)	220 (181)	288 (143)	72	91	80	94
Mosman Park, WA, 2020	$1.72	0.10%	6	0.11%	441 (-)	513 (-)	468 (-)	476 (-)	79	122	94	107
Mosman Park, WA, 2100	$4.52	0.27%	27	0.51%	405 (-)	454 (-)	430 (-)	444 (-)	67	116	73	93
Mount Alexander, VIC, 2020	$21.79	0.49%	411	2.91%	190 (175)	142 (63)	155 (128)	176 (74)	49	14	32	23
Mount Alexander, VIC, 2100	$23.12	0.52%	478	3.39%	238 (214)	245 (115)	209 (174)	236 (117)	58	29	46	29
Mount Barker, SA, 2020	$18.66	0.29%	92	0.45%	214 (196)	307 (152)	313 (212)	408 (198)	16	26	28	42
Mount Barker, SA, 2100	$38.84	0.60%	235	1.15%	171 (165)	196 (93)	283 (214)	371 (191)	15	20	26	39
Mount Gambier, SA, 2020	$1.18	0.02%	0	0.00%	456 (266)	544 (266)	524 (261)	517 (260)	60	71	71	71
Mount Gambier, SA, 2100	$5.58	0.10%	0	0.00%	392 (261)	527 (262)	541 (263)	533 (261)	54	69	71	71
Mount Isa, QLD, 2020	$13.84	0.36%	452	3.73%	250 (220)	238 (117)	142 (118)	133 (51)	43	53	36	46
Mount Isa, QLD, 2100	$16.87	0.44%	1,651	13.63%	269 (230)	302 (146)	96 (90)	61 (24)	43	58	26	24
Mount Magnet, WA, 2020	$0.13	0.05%	0	0.00%	532 (-)	540 (-)	529 (-)	530 (-)	131	133	127	124
Mount Magnet, WA, 2100	$0.28	0.10%	1	0.12%	528 (-)	530 (-)	510 (-)	492 (-)	131	133	115	111
Mount Marshall, WA, 2020	$0.64	0.25%	6	0.74%	484 (-)	345 (-)	463 (-)	348 (-)	102	61	97	76
Mount Marshall, WA, 2100	$1.18	0.47%	6	0.74%	478 (-)	288 (-)	475 (-)	419 (-)	102	65	101	84
Mount Remarkable, SA, 2020	$3.77	0.28%	64	1.47%	390 (-)	324 (-)	350 (-)	263 (-)	51	27	33	23
Mount Remarkable, SA, 2100	$13.71	1.00%	236	5.43%	290 (-)	91 (-)	282 (-)	156 (-)	38	10	25	11
Moyne, VIC, 2020	$7.20	0.21%	183	1.71%	319 (249)	395 (198)	250 (188)	246 (104)	70	60	62	33

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LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Moyne, VIC, 2100	$13.24	0.39%	346	3.23%	298 (246)	346 (168)	241 (194)	243 (121)	67	38	53	30
Mukinbudin, WA, 2020	$0.52	0.29%	6	1.05%	494 (-)	309 (-)	465 (-)	314 (-)	109	53	95	67
Mukinbudin, WA, 2100	$0.93	0.52%	10	1.75%	488 (-)	251 (-)	462 (-)	323 (-)	111	57	91	63
Mundaring, WA, 2020	$24.76	0.43%	153	0.84%	174 (164)	186 (87)	275 (198)	337 (151)	21	30	35	71
Mundaring, WA, 2100	$44.39	0.77%	5,769	31.50%	154 (150)	136 (63)	29 (29)	22 (5)	22	25	3	6
Murchison, WA, 2020	$0.06	0.89%	1	4.55%	540 (-)	61 (-)	501 (-)	108 (-)	136	14	117	21
Murchison, WA, 2100	$0.06	0.94%	1	4.55%	539 (-)	104 (-)	507 (-)	184 (-)	136	20	118	37
Murray, WA, 2020	$73.89	2.11%	3,279	29.42%	68 (67)	18 (4)	21 (20)	15 (3)	3	5	2	3
Murray, WA, 2100	$181.71	5.20%	5,130	46.03%	34 (34)	6 (4)	32 (32)	9 (2)	3	1	4	1
Murray Bridge, SA, 2020	$30.39	0.62%	541	3.47%	154 (146)	103 (41)	125 (105)	145 (58)	9	8	5	10
Murray Bridge, SA, 2100	$49.11	1.00%	641	4.11%	147 (145)	93 (41)	173 (151)	203 (102)	10	11	10	16
Murray River, NSW, 2020	$17.77	0.61%	560	6.03%	218 (-)	106 (-)	123 (-)	81 (-)	73	28	43	15
Murray River, NSW, 2100	$26.22	0.90%	703	7.57%	225 (-)	108 (-)	167 (-)	111 (-)	73	27	66	35
Murrindindi, VIC, 2020	$28.43	0.82%	578	5.21%	164 (156)	70 (27)	120 (104)	93 (35)	46	7	26	10
Murrindindi, VIC, 2100	$36.59	1.05%	659	5.94%	182 (175)	85 (37)	172 (150)	140 (71)	45	8	33	12
Murrumbidgee, NSW, 2020	$7.33	0.71%	247	7.50%	314 (-)	85 (-)	212 (-)	70 (-)	104	17	70	12
Murrumbidgee, NSW, 2100	$8.27	0.80%	196	5.95%	353 (-)	131 (-)	302 (-)	139 (-)	110	37	98	43
Murweh, QLD, 2020	$15.62	1.27%	394	10.06%	239 (-)	40 (-)	159 (-)	48 (-)	41	18	39	19
Murweh, QLD, 2100	$20.95	1.71%	2,031	51.86%	250 (-)	41 (-)	80 (-)	4 (-)	41	16	23	2
Muswellbrook, NSW, 2020	$15.67	0.48%	319	3.04%	237 (213)	154 (70)	187 (151)	168 (69)	78	53	63	42
Muswellbrook, NSW, 2100	$22.64	0.69%	1,365	12.99%	242 (217)	155 (71)	112 (105)	66 (26)	78	45	49	13
Nambucca, NSW, 2020	$20.82	0.51%	420	3.21%	200 (183)	137 (60)	153 (126)	160 (67)	68	47	52	37
Nambucca, NSW, 2100	$39.81	0.97%	1,420	10.84%	167 (161)	96 (43)	110 (104)	79 (33)	58	23	47	18
Nannup, WA, 2020	$10.46	1.55%	332	15.46%	282 (-)	28 (-)	183 (-)	26 (-)	35	9	25	7
Nannup, WA, 2100	$10.26	1.52%	758	35.31%	330 (-)	51 (-)	161 (-)	18 (-)	50	10	21	3
Napranum, QLD, 2020	$2.41	1.37%	38	6.80%	421 (-)	36 (-)	390 (-)	75 (-)	56	15	62	32
Napranum, QLD, 2100	$2.21	1.26%	38	6.80%	451 (-)	61 (-)	418 (-)	123 (-)	60	25	64	38
Naracoorte and Lucindale, SA, 2020	$8.90	0.36%	127	1.63%	300 (-)	242 (-)	289 (-)	252 (-)	35	17	21	20
Naracoorte and Lucindale, SA, 2100	$14.05	0.57%	103	1.32%	285 (-)	218 (-)	350 (-)	361 (-)	36	26	36	37
Narembeen, WA, 2020	$0.97	0.43%	43	6.02%	464 (-)	187 (-)	383 (-)	82 (-)	90	31	62	18
Narembeen, WA, 2100	$0.99	0.44%	15	2.10%	484 (-)	303 (-)	448 (-)	303 (-)	107	69	82	58
Narrabri, NSW, 2020	$20.85	0.60%	384	3.45%	199 (182)	111 (47)	165 (134)	147 (59)	67	29	56	31
Narrabri, NSW, 2100	$38.40	1.10%	2,565	23.06%	173 (167)	76 (35)	61 (61)	28 (9)	61	19	26	5
Narrandera, NSW, 2020	$7.03	0.47%	166	3.46%	323 (-)	157 (-)	264 (-)	146 (-)	106	54	83	30
Narrandera, NSW, 2100	$8.72	0.58%	202	4.21%	350 (-)	213 (-)	299 (-)	198 (-)	109	62	96	63
Narrogin, WA, 2020	$3.82	0.32%	9	0.24%	388 (-)	272 (-)	451 (-)	449 (-)	59	45	87	96
Narrogin, WA, 2100	$8.69	0.74%	40	1.07%	351 (-)	144 (-)	417 (-)	379 (-)	53	28	67	73
Narromine, NSW, 2020	$7.96	0.56%	173	3.79%	307 (-)	122 (-)	255 (-)	131 (-)	100	38	80	26
Narromine, NSW, 2100	$12.45	0.87%	460	10.07%	305 (-)	115 (-)	214 (-)	84 (-)	97	29	77	21
Nedlands, WA, 2020	$4.05	0.12%	8	0.08%	383 (261)	494 (254)	455 (249)	487 (243)	56	114	91	115
Nedlands, WA, 2100	$10.97	0.33%	32	0.30%	321 (252)	406 (197)	426 (250)	472 (245)	47	107	70	100
Newcastle, NSW, 2020	$115.96	0.38%	3,540	3.61%	31 (31)	220 (104)	17 (17)	138 (53)	12	80	3	28

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Newcastle, NSW, 2100	$194.48	0.63%	18,583	18.96%	32 (32)	181 (82)	5 (5)	41 (15)	12	52	2	7
Nillumbik, VIC, 2020	$32.45	0.37%	402	1.43%	147 (140)	230 (111)	156 (129)	265 (111)	44	32	33	34
Nillumbik, VIC, 2100	$37.51	0.43%	519	1.85%	179 (172)	320 (154)	197 (169)	317 (159)	43	35	41	39
Noosa, QLD, 2020	$189.58	1.46%	3,332	8.04%	18 (18)	32 (9)	20 (19)	67 (24)	8	12	13	28
Noosa, QLD, 2100	$356.65	2.74%	10,336	24.94%	14 (14)	24 (10)	12 (12)	27 (8)	8	11	6	12
North Burnett, QLD, 2020	$20.78	0.49%	686	5.06%	201 (184)	145 (65)	105 (90)	97 (38)	37	42	32	36
North Burnett, QLD, 2100	$28.17	0.66%	996	7.35%	214 (199)	162 (73)	139 (126)	114 (54)	36	42	33	36
North Sydney, NSW, 2020	$110.54	0.58%	675	1.11%	32 (32)	118 (51)	106 (91)	304 (133)	13	35	36	82
North Sydney, NSW, 2100	$108.15	0.57%	850	1.40%	60 (60)	224 (107)	151 (136)	350 (179)	25	65	59	111
Northam, WA, 2020	$54.88	2.21%	1,537	19.40%	98 (-)	16 (-)	49 (-)	23 (-)	5	4	7	6
Northam, WA, 2100	$47.06	1.89%	1,362	17.19%	149 (-)	36 (-)	113 (-)	46 (-)	19	7	13	12
Northampton, WA, 2020	$0.92	0.07%	6	0.15%	465 (-)	531 (-)	466 (-)	465 (-)	91	132	98	102
Northampton, WA, 2100	$2.83	0.22%	8	0.20%	437 (-)	489 (-)	466 (-)	481 (-)	80	124	97	106
Northern Areas, SA, 2020	$4.12	0.23%	70	1.24%	379 (-)	375 (-)	342 (-)	282 (-)	50	39	31	25
Northern Areas, SA, 2100	$9.14	0.52%	319	5.66%	340 (-)	250 (-)	252 (-)	149 (-)	50	29	20	9
Northern Beaches, NSW, 2020	$210.36	0.46%	1,229	0.85%	17 (17)	160 (72)	62 (55)	335 (149)	5	55	19	93
Northern Beaches, NSW, 2100	$287.24	0.63%	6,743	4.67%	20 (20)	180 (81)	23 (23)	180 (92)	6	51	9	53
Northern Grampians, VIC, 2020	$6.48	0.24%	82	0.96%	333 (-)	360 (-)	324 (-)	325 (-)	72	53	73	46
Northern Grampians, VIC, 2100	$12.21	0.45%	90	1.05%	308 (-)	293 (-)	364 (-)	383 (-)	68	33	72	55
Northern Midlands, TAS, 2020	$8.43	0.31%	151	1.72%	304 (-)	293 (-)	278 (-)	244 (-)	10	10	10	9
Northern Midlands, TAS, 2100	$7.19	0.26%	176	2.01%	367 (-)	464 (-)	316 (-)	308 (-)	15	13	13	11
Northern Peninsula Area, QLD, 2020	$0.68	0.19%	18	1.54%	480 (-)	418 (-)	423 (-)	258 (-)	67	69	65	61
Northern Peninsula Area, QLD, 2100	$0.44	0.12%	6	0.51%	517 (-)	520 (-)	476 (-)	443 (-)	70	71	68	69
Norwood Payneham St Peters, SA, 2020	$13.03	0.16%	0	0.00%	254 (223)	457 (235)	543 (263)	525 (262)	27	54	65	65
Norwood Payneham St Peters, SA, 2100	$26.63	0.32%	0	0.00%	221 (205)	414 (202)	540 (262)	530 (263)	27	52	68	68
Nungarin, WA, 2020	$0.48	0.31%	11	2.19%	497 (-)	292 (-)	447 (-)	208 (-)	112	47	85	42
Nungarin, WA, 2100	$0.86	0.54%	11	2.19%	495 (-)	232 (-)	458 (-)	291 (-)	114	50	90	55
Oberon, NSW, 2020	$5.54	0.38%	47	1.02%	351 (-)	213 (-)	371 (-)	318 (-)	114	76	114	86
Oberon, NSW, 2100	$6.79	0.47%	76	1.66%	373 (-)	279 (-)	379 (-)	328 (-)	113	85	114	105
Onkaparinga, SA, 2020	$53.18	0.18%	43	0.05%	102 (99)	421 (215)	384 (235)	493 (246)	3	46	38	53
Onkaparinga, SA, 2100	$102.56	0.36%	355	0.39%	66 (66)	383 (187)	238 (191)	460 (240)	4	46	18	53
Orange, NSW, 2020	$18.84	0.24%	148	0.60%	213 (195)	359 (179)	279 (201)	374 (173)	71	122	89	105
Orange, NSW, 2100	$38.04	0.49%	946	3.81%	174 (168)	269 (126)	144 (131)	211 (106)	62	81	58	70
Orroroo/Carrieton, SA, 2020	$1.02	0.18%	6	0.34%	462 (-)	420 (-)	462 (-)	429 (-)	64	45	51	45
Orroroo/Carrieton, SA, 2100	$1.67	0.30%	7	0.40%	464 (-)	429 (-)	474 (-)	456 (-)	64	56	55	51
Palm Island, QLD, 2020	$1.63	0.51%	21	2.05%	445 (-)	136 (-)	420 (-)	220 (-)	60	41	64	53
Palm Island, QLD, 2100	$3.11	0.97%	41	4.01%	431 (-)	98 (-)	415 (-)	204 (-)	58	33	63	49
Palmerston, NT, 2020	$8.83	0.16%	208	1.21%	301 (246)	447 (228)	235 (177)	285 (124)	4	15	5	12
Palmerston, NT, 2100	$5.42	0.10%	71	0.41%	395 (263)	531 (264)	382 (240)	450 (231)	8	17	11	15
Parkes, NSW, 2020	$11.36	0.37%	117	1.19%	271 (-)	233 (-)	297 (-)	291 (-)	91	84	96	77
Parkes, NSW, 2100	$13.27	0.43%	455	4.62%	297 (-)	313 (-)	215 (-)	181 (-)	94	94	78	54

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Paroo, QLD, 2020	$35.39	6.10%	1,182	63.93%	139 (-)	4 (-)	65 (-)	2 (-)	25	1	26	1
Paroo, QLD, 2100	$40.65	7.01%	1,202	65.01%	165 (-)	3 (-)	124 (-)	3 (-)	28	1	30	1
Parramatta, NSW, 2020	$167.85	0.41%	2,373	1.80%	22 (22)	199 (94)	32 (30)	240 (103)	7	68	8	66
Parramatta, NSW, 2100	$264.71	0.64%	10,478	7.96%	22 (22)	178 (80)	11 (11)	107 (50)	7	50	4	33
Penrith, NSW, 2020	$74.83	0.23%	619	0.60%	67 (66)	376 (190)	116 (101)	371 (171)	32	125	41	103
Penrith, NSW, 2100	$80.31	0.25%	4,005	3.90%	89 (88)	471 (237)	41 (41)	209 (105)	38	127	17	69
Peppermint Grove, WA, 2020	$0.38	0.14%	2	0.23%	504 (-)	476 (-)	488 (-)	452 (-)	117	104	114	97
Peppermint Grove, WA, 2100	$0.91	0.34%	4	0.46%	490 (-)	398 (-)	484 (-)	448 (-)	112	104	105	95
Perenjori, WA, 2020	$0.19	0.11%	0	0.00%	526 (-)	505 (-)	530 (-)	529 (-)	128	118	126	130
Perenjori, WA, 2100	$0.50	0.30%	0	0.00%	513 (-)	430 (-)	528 (-)	536 (-)	124	111	130	128
Perth, WA, 2020	$23.72	0.23%	45	0.14%	181 (168)	380 (192)	377 (232)	466 (230)	24	72	60	103
Perth, WA, 2100	$63.87	0.62%	3,897	11.79%	120 (118)	189 (89)	42 (42)	76 (31)	14	41	6	18
Peterborough, SA, 2020	$1.13	0.16%	1	0.04%	458 (-)	453 (-)	494 (-)	494 (-)	61	51	55	54
Peterborough, SA, 2100	$2.05	0.29%	21	0.93%	456 (-)	437 (-)	437 (-)	398 (-)	63	58	52	43
Pingelly, WA, 2020	$0.51	0.13%	1	0.08%	495 (-)	481 (-)	497 (-)	484 (-)	110	106	118	112
Pingelly, WA, 2100	$1.45	0.38%	2	0.16%	470 (-)	357 (-)	500 (-)	487 (-)	96	88	112	108
Plantagenet, WA, 2020	$3.92	0.29%	14	0.32%	385 (-)	315 (-)	440 (-)	436 (-)	57	54	81	94
Plantagenet, WA, 2100	$6.89	0.50%	11	0.25%	370 (-)	259 (-)	459 (-)	474 (-)	59	60	89	102
Playford, SA, 2020	$20.37	0.13%	15	0.03%	203 (186)	480 (246)	434 (246)	496 (248)	15	61	48	55
Playford, SA, 2100	$43.08	0.29%	90	0.19%	157 (153)	443 (218)	365 (237)	482 (246)	11	59	40	55
Pormpuraaw, QLD, 2020	$3.52	3.12%	139	38.61%	392 (-)	12 (-)	285 (-)	9 (-)	54	5	53	4
Pormpuraaw, QLD, 2100	$3.51	3.10%	160	44.44%	423 (-)	17 (-)	324 (-)	10 (-)	56	7	53	5
Port Adelaide Enfield, SA, 2020	$48.50	0.20%	417	0.55%	112 (109)	405 (206)	154 (127)	380 (177)	4	43	7	38
Port Adelaide Enfield, SA, 2100	$141.46	0.59%	1,624	2.13%	44 (44)	206 (97)	98 (92)	299 (150)	2	22	3	27
Port Augusta, SA, 2020	$5.68	0.18%	25	0.25%	348 (-)	427 (-)	411 (-)	448 (-)	45	48	45	47
Port Augusta, SA, 2100	$11.73	0.38%	64	0.64%	312 (-)	362 (-)	390 (-)	431 (-)	43	45	45	48
Port Hedland, WA, 2020	$2.96	0.09%	81	0.74%	403 (264)	527 (264)	326 (218)	351 (157)	62	129	41	77
Port Hedland, WA, 2100	$9.03	0.26%	128	1.17%	342 (257)	463 (231)	340 (231)	370 (190)	51	118	50	69
Port Lincoln, SA, 2020	$23.66	0.71%	311	2.91%	182 (169)	88 (35)	189 (153)	177 (75)	12	6	9	11
Port Lincoln, SA, 2100	$32.46	0.97%	369	3.45%	197 (188)	97 (44)	232 (187)	232 (115)	19	12	16	17
Port Macquarie-Hastings, NSW, 2020	$100.75	0.59%	1,627	2.97%	43 (43)	116 (49)	44 (41)	172 (72)	16	33	13	44
Port Macquarie-Hastings, NSW, 2100	$207.06	1.21%	2,714	4.96%	29 (29)	65 (28)	56 (56)	170 (85)	10	16	23	52
Port Phillip, VIC, 2020	$243.94	0.83%	5,524	5.90%	15 (15)	68 (25)	11 (11)	85 (31)	4	6	3	8
Port Phillip, VIC, 2100	$280.23	0.95%	7,445	7.95%	21 (21)	101 (47)	21 (21)	108 (51)	4	11	3	7
Port Pirie City and Dists, SA, 2020	$9.72	0.23%	187	1.41%	287 (238)	373 (189)	245 (186)	267 (113)	32	37	15	24
Port Pirie City and Dists, SA, 2100	$20.67	0.50%	618	4.68%	252 (222)	262 (122)	180 (155)	179 (91)	32	33	11	14
Port Stephens, NSW, 2020	$90.14	0.56%	2,784	5.45%	50 (50)	120 (52)	24 (23)	92 (34)	20	36	5	18
Port Stephens, NSW, 2100	$197.50	1.23%	5,369	10.50%	31 (31)	63 (27)	31 (31)	81 (35)	11	15	11	20
Prospect, SA, 2020	$4.72	0.13%	0	0.00%	370 (257)	485 (249)	542 (262)	526 (258)	49	63	64	64
Prospect, SA, 2100	$9.35	0.25%	0	0.00%	337 (255)	470 (236)	539 (261)	525 (265)	49	63	67	67
Pyrenees, VIC, 2020	$4.14	0.26%	52	1.04%	378 (-)	332 (-)	361 (-)	315 (-)	75	48	74	43

	ACTUALS				ALL HAZARDS RANKING - NATIONAL BRACKETS = (LARGE LGAs)				ALL HAZARDS RANKING - STATE			
LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Pyrenees, VIC, 2100	$6.67	0.43%	82	1.65%	375 (-)	319 (-)	372 (-)	329 (-)	77	34	74	43
Quairading, WA, 2020	$0.69	0.22%	8	0.82%	477 (-)	385 (-)	458 (-)	340 (-)	99	75	90	73
Quairading, WA, 2100	$1.09	0.35%	7	0.71%	480 (-)	385 (-)	472 (-)	421 (-)	104	100	99	85
Queanbeyan-Palerang Regional, NSW, 2020	$75.99	0.68%	1,144	3.22%	65 (64)	93 (38)	69 (61)	159 (66)	31	21	21	36
Queanbeyan-Palerang Regional, NSW, 2100	$91.45	0.82%	1,461	4.12%	76 (76)	126 (58)	108 (102)	201 (100)	32	34	46	66
Queenscliffe (B), VIC, 2020	$0.90	0.08%	1	0.03%	467 (-)	529 (-)	504 (-)	497 (-)	80	80	80	79
Queenscliffe (B), VIC, 2100	$1.23	0.11%	8	0.22%	477 (-)	526 (-)	467 (-)	479 (-)	80	80	80	79
Quilpie, QLD, 2020	$5.99	1.39%	213	15.50%	343 (-)	34 (-)	226 (-)	25 (-)	50	14	47	10
Quilpie, QLD, 2100	$6.94	1.61%	218	15.87%	369 (-)	47 (-)	292 (-)	50 (-)	49	20	51	20
Randwick, NSW, 2020	$80.37	0.31%	428	0.51%	60 (59)	290 (144)	151 (125)	387 (183)	27	103	51	108
Randwick, NSW, 2100	$93.60	0.36%	4,688	5.63%	74 (74)	381 (186)	36 (36)	150 (76)	31	114	14	44
Ravensthorpe, WA, 2020	$1.87	0.26%	2	0.09%	434 (-)	336 (-)	491 (-)	483 (-)	75	60	112	111
Ravensthorpe, WA, 2100	$2.70	0.38%	20	0.89%	442 (-)	353 (-)	441 (-)	405 (-)	83	86	77	79
Redland, QLD, 2020	$212.52	0.71%	3,355	3.51%	16 (16)	87 (34)	19 (18)	142 (55)	7	33	12	47
Redland, QLD, 2100	$390.39	1.30%	6,278	6.56%	12 (12)	58 (24)	26 (26)	130 (65)	7	24	10	39
Renmark Paringa, SA, 2020	$14.41	0.66%	325	4.68%	246 (-)	95 (-)	186 (-)	105 (-)	25	7	8	6
Renmark Paringa, SA, 2100	$22.51	1.03%	714	10.29%	244 (-)	87 (-)	165 (-)	83 (-)	30	8	8	6
Richmond, QLD, 2020	$1.57	0.45%	51	4.55%	446 (-)	174 (-)	364 (-)	107 (-)	61	45	59	38
Richmond, QLD, 2100	$1.25	0.36%	44	3.93%	475 (-)	382 (-)	411 (-)	208 (-)	64	64	62	51
Richmond Valley, NSW, 2020	$29.28	0.62%	711	4.69%	159 (151)	104 (42)	101 (86)	104 (41)	58	27	33	22
Richmond Valley, NSW, 2100	$40.66	0.85%	835	5.51%	164 (159)	119 (53)	154 (138)	154 (77)	57	32	61	47
Robe, SA, 2020	$16.29	1.79%	304	10.46%	232 (-)	23 (-)	192 (-)	47 (-)	22	2	10	3
Robe, SA, 2100	$32.25	3.54%	545	18.75%	198 (-)	13 (-)	194 (-)	42 (-)	20	2	12	4
Rockdale, NSW, 2020	$119.73	0.60%	1,266	1.98%	30 (30)	114 (48)	59 (52)	224 (94)	11	32	17	63
Rockdale, NSW, 2100	$172.22	0.86%	4,660	7.27%	36 (36)	117 (52)	37 (37)	115 (55)	15	30	15	36
Rockhampton, QLD, 2020	$92.23	0.61%	4,434	9.24%	48 (48)	105 (43)	14 (14)	59 (18)	13	36	8	24
Rockhampton, QLD, 2100	$142.56	0.95%	6,054	12.61%	42 (42)	102 (48)	28 (28)	69 (28)	13	34	11	27
Rockingham, WA, 2020	$108.14	0.53%	2,188	3.36%	36 (36)	127 (54)	35 (33)	152 (62)	2	21	4	32
Rockingham, WA, 2100	$244.56	1.20%	4,324	6.65%	23 (23)	66 (29)	38 (38)	129 (64)	2	13	5	25
Roper Gulf, NT, 2020	$2.59	0.80%	98	9.49%	412 (-)	74 (-)	306 (-)	52 (-)	9	3	8	2
Roper Gulf, NT, 2100	$2.66	0.82%	98	9.49%	444 (-)	127 (-)	355 (-)	91 (-)	10	3	8	5
Roxby Downs, SA, 2020	$0.65	0.09%	0	0.00%	483 (-)	524 (-)	522 (-)	524 (-)	65	68	63	63
Roxby Downs, SA, 2100	$0.90	0.13%	0	0.00%	491 (-)	518 (-)	538 (-)	524 (-)	66	68	66	66
Ryde, NSW, 2020	$94.73	0.46%	701	1.07%	46 (46)	167 (77)	103 (88)	308 (135)	18	57	34	83
Ryde, NSW, 2100	$106.22	0.52%	2,444	3.73%	63 (63)	249 (117)	64 (64)	216 (107)	26	73	28	72
Salisbury, SA, 2020	$54.21	0.24%	503	0.71%	100 (97)	355 (176)	136 (114)	356 (161)	2	36	6	33
Salisbury, SA, 2100	$107.91	0.49%	712	1.01%	61 (61)	272 (128)	166 (146)	386 (200)	3	34	9	42
Sandstone, WA, 2020	$0.24	0.13%	0	0.00%	520 (-)	488 (-)	539 (-)	528 (-)	125	109	131	136
Sandstone, WA, 2100	$0.36	0.19%	0	0.00%	521 (-)	504 (-)	531 (-)	515 (-)	127	128	135	126
Scenic Rim, QLD, 2020	$27.65	0.32%	520	1.87%	165 (157)	278 (135)	131 (111)	235 (99)	29	57	33	57
Scenic Rim, QLD, 2100	$39.25	0.45%	552	1.99%	170 (164)	296 (143)	191 (164)	310 (155)	30	56	40	62
Serpentine-Jarrahdale, WA, 2020	$6.96	0.17%	72	0.55%	325 (250)	442 (225)	340 (222)	382 (179)	43	91	45	81
Serpentine-Jarrahdale, WA, 2100	$15.56	0.38%	393	2.98%	276 (237)	361 (177)	221 (182)	253 (124)	40	91	32	49
Shark Bay, WA, 2020	$0.15	0.05%	1	0.10%	530 (-)	541 (-)	499 (-)	481 (-)	129	134	119	110
Shark Bay, WA, 2100	$0.29	0.09%	1	0.10%	527 (-)	535 (-)	509 (-)	496 (-)	130	135	120	115

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LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Shellharbour, NSW, 2020	$31.79	0.29%	152	0.43%	151 (144)	311 (154)	276 (199)	410 (200)	55	108	88	114
Shellharbour, NSW, 2100	$50.72	0.46%	755	2.14%	143 (141)	291 (140)	162 (143)	296 (148)	51	90	65	97
Shoalhaven, NSW, 2020	$60.21	0.25%	641	0.84%	84 (82)	348 (172)	112 (97)	336 (150)	40	118	40	94
Shoalhaven, NSW, 2100	$112.26	0.47%	3,129	4.12%	58 (58)	280 (134)	51 (51)	202 (101)	23	86	19	67
Singleton, NSW, 2020	$18.26	0.40%	290	1.99%	215 (197)	204 (97)	194 (157)	223 (93)	72	71	65	62
Singleton, NSW, 2100	$24.01	0.52%	1,034	7.09%	236 (212)	242 (113)	137 (124)	117 (57)	76	71	55	38
Snowy Monaro Regional, NSW, 2020	$10.88	0.18%	509	2.58%	277 (235)	433 (220)	134 (112)	188 (77)	94	129	47	50
Snowy Monaro Regional, NSW, 2100	$24.63	0.40%	840	4.26%	232 (211)	343 (167)	153 (137)	195 (97)	74	102	60	62
Snowy Valleys, NSW, 2020	$11.95	0.37%	167	1.61%	264 (226)	235 (114)	260 (192)	254 (107)	87	86	82	69
Snowy Valleys, NSW, 2100	$19.23	0.59%	184	1.77%	259 (226)	208 (99)	308 (223)	321 (162)	84	60	100	102
Somerset, QLD, 2020	$20.85	0.37%	747	4.19%	198 (181)	224 (107)	98 (85)	118 (47)	36	51	31	41
Somerset, QLD, 2100	$27.85	0.50%	918	5.15%	217 (201)	263 (123)	146 (133)	165 (83)	37	53	34	43
Sorell, TAS, 2020	$3.29	0.10%	27	0.27%	396 (263)	512 (259)	409 (238)	445 (219)	21	26	26	28
Sorell, TAS, 2100	$3.26	0.10%	68	0.68%	425 (265)	529 (263)	383 (241)	427 (221)	21	27	21	25
South Burnett, QLD, 2020	$22.83	0.23%	385	1.21%	185 (171)	379 (191)	164 (133)	286 (125)	33	65	40	65
South Burnett, QLD, 2100	$46.91	0.47%	1,033	3.25%	150 (147)	281 (135)	138 (125)	239 (119)	26	55	32	54
South Gippsland, VIC, 2020	$16.87	0.21%	264	1.05%	224 (203)	394 (197)	207 (162)	312 (137)	56	59	49	42
South Gippsland, VIC, 2100	$30.87	0.39%	580	2.31%	203 (192)	348 (170)	190 (163)	283 (142)	50	39	37	37
South Perth, WA, 2020	$44.05	0.47%	429	1.43%	121 (117)	156 (71)	150 (124)	266 (112)	9	23	22	54
South Perth, WA, 2100	$78.34	0.83%	2,026	6.75%	92 (91)	123 (56)	81 (78)	125 (62)	10	23	9	23
Southern Downs, QLD, 2020	$23.58	0.28%	378	1.40%	183 (170)	321 (161)	168 (137)	269 (114)	32	62	41	62
Southern Downs, QLD, 2100	$40.23	0.48%	583	2.17%	166 (160)	276 (132)	189 (162)	294 (147)	29	54	39	60
Southern Grampians, VIC, 2020	$6.45	0.18%	84	0.72%	334 (252)	434 (221)	321 (217)	355 (160)	73	69	70	49
Southern Grampians, VIC, 2100	$11.88	0.32%	79	0.67%	311 (250)	413 (201)	377 (239)	429 (222)	70	48	75	67
Southern Mallee, SA, 2020	$1.13	0.15%	0	0.00%	459 (-)	470 (-)	540 (-)	542 (-)	62	58	62	62
Southern Mallee, SA, 2100	$2.13	0.28%	0	0.00%	453 (-)	446 (-)	537 (-)	523 (-)	62	61	65	65
Southern Midlands, TAS, 2020	$3.77	0.31%	64	1.67%	389 (-)	283 (-)	352 (-)	250 (-)	19	8	19	11
Southern Midlands, TAS, 2100	$3.92	0.33%	83	2.17%	418 (-)	409 (-)	371 (-)	293 (-)	20	10	20	9
Stirling, WA, 2020	$51.50	0.12%	78	0.06%	106 (103)	491 (253)	332 (220)	492 (245)	6	111	43	117
Stirling, WA, 2100	$155.49	0.38%	134	0.10%	38 (38)	359 (175)	337 (230)	495 (250)	4	90	49	114
Stonnington, VIC, 2020	$59.69	0.24%	788	0.98%	86 (84)	369 (185)	95 (83)	323 (144)	20	57	19	44
Stonnington, VIC, 2100	$72.01	0.29%	1,196	1.49%	100 (99)	442 (217)	125 (114)	340 (171)	23	56	22	45
Strathbogie, VIC, 2020	$12.63	0.48%	230	2.74%	259 (-)	149 (-)	220 (-)	182 (-)	63	17	56	24
Strathbogie, VIC, 2100	$17.00	0.65%	297	3.54%	268 (-)	173 (-)	262 (-)	227 (-)	62	19	59	27
Strathfield, NSW, 2020	$50.99	0.70%	669	2.88%	108 (105)	91 (37)	109 (94)	178 (76)	44	20	39	47

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Strathfield, NSW, 2100	$57.18	0.78%	2,056	8.84%	133 (131)	133 (61)	76 (75)	96 (44)	48	38	34	27
Streaky Bay, SA, 2020	$2.48	0.26%	34	1.14%	419 (-)	331 (-)	399 (-)	299 (-)	56	31	41	26
Streaky Bay, SA, 2100	$4.10	0.44%	41	1.37%	411 (-)	307 (-)	414 (-)	357 (-)	57	41	48	36
Subiaco, WA, 2020	$6.95	0.15%	2	0.01%	326 (251)	472 (242)	490 (256)	503 (253)	44	102	110	122
Subiaco, WA, 2100	$18.69	0.39%	7	0.05%	262 (228)	347 (169)	471 (256)	506 (255)	37	85	98	121
Sunshine Coast, QLD, 2020	$843.81	1.37%	14,057	7.15%	3 (3)	37 (12)	4 (4)	71 (25)	3	16	3	31
Sunshine Coast, QLD, 2100	$1494.63	2.42%	29,909	15.22%	3 (3)	27 (12)	3 (3)	53 (22)	3	14	3	21
Surf Coast, VIC, 2020	$21.49	0.27%	331	1.28%	192 (176)	330 (166)	184 (149)	278 (119)	50	47	41	37
Surf Coast, VIC, 2100	$25.01	0.31%	342	1.33%	229 (209)	423 (208)	245 (196)	360 (184)	55	52	55	50
Sutherland Shire, NSW, 2020	$151.47	0.41%	864	0.73%	23 (23)	198 (93)	91 (80)	352 (158)	8	67	29	99
Sutherland Shire, NSW, 2100	$233.20	0.63%	2,616	2.21%	24 (24)	186 (87)	58 (58)	290 (145)	8	54	24	95
Swan, WA, 2020	$45.51	0.20%	653	0.92%	119 (116)	402 (204)	110 (95)	327 (146)	7	79	13	70
Swan, WA, 2100	$91.78	0.41%	637	0.90%	75 (75)	331 (160)	176 (152)	403 (207)	7	80	25	78
Swan Hill, VIC, 2020	$25.30	0.61%	623	4.71%	171 (161)	107 (44)	115 (100)	103 (40)	48	12	25	12
Swan Hill, VIC, 2100	$36.93	0.89%	688	5.20%	181 (174)	112 (51)	170 (148)	164 (82)	44	14	31	18
Sydney, NSW, 2020	$262.46	0.37%	1,163	0.51%	11 (11)	231 (112)	67 (59)	388 (184)	3	82	20	109
Sydney, NSW, 2100	$295.78	0.42%	6,295	2.77%	19 (19)	328 (157)	25 (25)	263 (129)	5	97	10	85
Tablelands, QLD, 2020	$20.32	0.32%	127	0.64%	206 (189)	271 (131)	290 (206)	365 (167)	39	56	54	70
Tablelands, QLD, 2100	$32.56	0.52%	156	0.78%	196 (187)	247 (116)	328 (227)	410 (212)	33	52	54	68
Tammin, WA, 2020	$0.30	0.24%	2	0.50%	516 (-)	365 (-)	489 (-)	393 (-)	123	67	111	83
Tammin, WA, 2100	$0.43	0.34%	2	0.50%	519 (-)	394 (-)	497 (-)	445 (-)	126	102	111	94
Tamworth Regional, NSW, 2020	$51.53	0.41%	926	2.30%	105 (102)	195 (92)	88 (77)	201 (83)	43	65	27	55
Tamworth Regional, NSW, 2100	$94.54	0.75%	1,141	2.84%	72 (72)	142 (65)	127 (116)	260 (128)	30	40	52	84
Tasman, TAS, 2020	$4.72	0.43%	74	2.09%	369 (-)	188 (-)	336 (-)	215 (-)	18	3	17	7
Tasman, TAS, 2100	$6.65	0.60%	108	3.06%	378 (-)	201 (-)	349 (-)	249 (-)	16	3	17	6
Tatiara, SA, 2020	$7.21	0.35%	181	2.79%	318 (-)	244 (-)	251 (-)	181 (-)	40	18	16	12
Tatiara, SA, 2100	$11.43	0.56%	220	3.40%	315 (-)	227 (-)	291 (-)	235 (-)	44	27	28	18
Tea Tree Gully, SA, 2020	$34.17	0.21%	2	0.00%	142 (136)	393 (196)	485 (254)	507 (257)	7	41	54	57
Tea Tree Gully, SA, 2100	$70.13	0.44%	34	0.07%	105 (104)	305 (148)	424 (249)	502 (252)	6	40	50	58
Temora, NSW, 2020	$6.43	0.39%	81	1.52%	335 (-)	212 (-)	327 (-)	259 (-)	109	75	106	71
Temora, NSW, 2100	$6.24	0.37%	71	1.34%	382 (-)	364 (-)	381 (-)	359 (-)	117	108	115	114
Tenterfield, NSW, 2020	$6.32	0.33%	124	2.05%	336 (-)	260 (-)	292 (-)	219 (-)	110	91	94	59
Tenterfield, NSW, 2100	$9.27	0.49%	160	2.65%	339 (-)	267 (-)	326 (-)	268 (-)	105	79	105	89
The Coorong, SA, 2020	$24.14	1.23%	987	15.77%	179 (-)	43 (-)	81 (-)	24 (-)	11	3	2	2
The Coorong, SA, 2100	$42.01	2.14%	1,281	20.47%	161 (-)	31 (-)	120 (-)	37 (-)	12	4	6	3
The Hills Shire, NSW, 2020	$67.08	0.29%	450	0.60%	74 (73)	314 (156)	143 (119)	372 (172)	36	111	49	104
The Hills Shire, NSW, 2100	$64.75	0.28%	1,091	1.46%	118 (116)	448 (222)	132 (119)	345 (175)	45	123	53	109
Three Springs, WA, 2020	$0.34	0.15%	3	0.42%	510 (-)	459 (-)	476 (-)	413 (-)	120	97	105	85
Three Springs, WA, 2100	$0.73	0.33%	5	0.71%	502 (-)	404 (-)	477 (-)	423 (-)	119	106	102	87
Tiwi Islands, NT, 2020	$0.12	0.07%	0	0.00%	536 (-)	534 (-)	512 (-)	519 (-)	17	17	17	16

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Tiwi Islands, NT, 2100	$0.14	0.08%	0	0.00%	535 (-)	539 (-)	514 (-)	513 (-)	17	18	18	17
Toodyay, WA, 2020	$21.50	1.90%	438	12.18%	191 (-)	21 (-)	148 (-)	39 (-)	27	7	21	12
Toodyay, WA, 2100	$21.26	1.88%	516	14.35%	248 (-)	37 (-)	198 (-)	56 (-)	34	8	28	14
Toowoomba, QLD, 2020	$92.16	0.28%	1,203	1.16%	49 (49)	318 (158)	64 (57)	296 (130)	14	61	25	67
Toowoomba, QLD, 2100	$139.96	0.43%	1,536	1.48%	45 (45)	315 (152)	103 (97)	341 (172)	14	61	27	64
Torres, QLD, 2020	$0.82	0.15%	30	1.73%	470 (-)	467 (-)	405 (-)	243 (-)	64	72	63	59
Torres, QLD, 2100	$0.52	0.10%	3	0.17%	511 (-)	532 (-)	488 (-)	483 (-)	67	73	71	71
Torres Strait Island, QLD, 2020	$0.06	0.15%	0	0.00%	541 (-)	466 (-)	513 (-)	516 (-)	77	71	76	74
Torres Strait Island, QLD, 2100	$0.06	0.17%	0	0.00%	540 (-)	510 (-)	521 (-)	539 (-)	76	70	75	75
Townsville, QLD, 2020	$180.31	0.51%	2,106	1.88%	20 (20)	132 (57)	37 (35)	234 (98)	10	39	17	56
Townsville, QLD, 2100	$300.06	0.85%	4,009	3.57%	18 (18)	120 (54)	40 (40)	225 (111)	10	37	13	52
Towong, VIC, 2020	$6.70	0.47%	271	6.02%	330 (-)	155 (-)	205 (-)	83 (-)	71	19	48	7
Towong, VIC, 2100	$10.89	0.77%	265	5.89%	322 (-)	137 (-)	275 (-)	142 (-)	72	16	63	14
Trayning, WA, 2020	$0.32	0.20%	0	0.00%	515 (-)	406 (-)	535 (-)	527 (-)	122	81	123	132
Trayning, WA, 2100	$0.66	0.42%	0	0.00%	507 (-)	327 (-)	533 (-)	538 (-)	122	79	133	124
Tumby Bay, SA, 2020	$2.95	0.27%	30	0.85%	405 (-)	327 (-)	407 (-)	334 (-)	54	29	43	31
Tumby Bay, SA, 2100	$7.97	0.72%	81	2.30%	359 (-)	147 (-)	374 (-)	284 (-)	53	15	42	26
Tweed, NSW, 2020	$308.45	1.55%	5,922	9.35%	9 (9)	29 (7)	9 (9)	56 (15)	2	5	1	9
Tweed, NSW, 2100	$620.95	3.12%	11,115	17.54%	8 (8)	16 (6)	10 (10)	44 (16)	2	4	3	9
Unincorp., Other Territories, 2020	$0.33	0.33%	0	0.00%	514 (-)	268 (-)	544 (-)	544 (-)	-	-	-	-
Unincorp., Other Territories, 2100	$0.43	0.44%	0	0.00%	518 (-)	308 (-)	544 (-)	544 (-)	-	-	-	-
Unincorporated ACT, 2020	$122.32	0.17%	522	0.22%	29 (29)	444 (226)	129 (110)	454 (224)	1	1	1	1
Unincorporated ACT, 2100	$219.07	0.30%	1,986	0.85%	26 (26)	431 (211)	84 (81)	406 (209)	1	1	1	1
Unincorporated, NSW, 2020	$0.68	0.46%	15	3.16%	478 (-)	168 (-)	437 (-)	164 (-)	130	58	128	40
Unincorporated, NSW, 2100	$0.78	0.52%	15	3.16%	499 (-)	244 (-)	449 (-)	246 (-)	130	72	128	79
Unincorporated, NT, 2020	$4.61	0.25%	96	1.62%	372 (-)	353 (-)	308 (-)	253 (-)	8	10	9	11
Unincorporated, NT, 2100	$7.26	0.39%	144	2.42%	364 (-)	351 (-)	334 (-)	278 (-)	6	9	7	11
Unincorporated, SA, 2020	$9.43	0.48%	171	2.72%	290 (-)	152 (-)	257 (-)	185 (-)	33	14	19	13
Unincorporated, SA, 2100	$12.75	0.65%	189	3.01%	303 (-)	172 (-)	305 (-)	250 (-)	41	16	29	21
Unincorporated, VIC, 2020	$1.84	0.25%	15	0.63%	437 (-)	352 (-)	431 (-)	367 (-)	79	50	78	53
Unincorporated, VIC, 2100	$2.69	0.36%	86	3.62%	443 (-)	376 (-)	369 (-)	222 (-)	79	42	73	24
Unley, SA, 2020	$11.94	0.16%	0	0.00%	266 (227)	448 (229)	538 (265)	541 (261)	29	50	58	59
Unley, SA, 2100	$24.68	0.34%	0	0.00%	231 (210)	396 (192)	536 (266)	522 (266)	28	48	64	64
Upper Gascoyne, WA, 2020	$0.12	0.46%	4	5.00%	535 (-)	159 (-)	472 (-)	100 (-)	132	24	103	20
Upper Gascoyne, WA, 2100	$0.09	0.37%	3	3.75%	538 (-)	363 (-)	486 (-)	215 (-)	135	92	110	42
Upper Hunter Shire, NSW, 2020	$16.58	0.51%	345	3.30%	228 (206)	138 (61)	181 (147)	157 (65)	76	48	62	35
Upper Hunter Shire, NSW, 2100	$21.67	0.66%	632	6.05%	245 (218)	165 (75)	177 (153)	137 (70)	80	48	68	42
Upper Lachlan Shire, NSW, 2020	$6.98	0.29%	138	1.78%	324 (-)	313 (-)	286 (-)	242 (-)	107	110	92	67
Upper Lachlan Shire, NSW, 2100	$9.64	0.40%	165	2.12%	333 (-)	345 (-)	322 (-)	300 (-)	103	103	104	98
Uralla, NSW, 2020	$3.75	0.33%	44	1.21%	391 (-)	264 (-)	380 (-)	288 (-)	124	94	116	76
Uralla, NSW, 2100	$6.31	0.55%	99	2.72%	381 (-)	230 (-)	353 (-)	264 (-)	116	68	108	86
Victor Harbor, SA, 2020	$9.20	0.21%	64	0.46%	293 (241)	396 (199)	349 (225)	406 (196)	34	42	32	41

	ACTUALS				ALL HAZARDS RANKING - NATIONAL BRACKETS = (LARGE LGAs)				ALL HAZARDS RANKING - STATE			
LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Victor Harbor, SA, 2100	$19.27	0.44%	154	1.11%	258 (225)	304 (147)	329 (228)	377 (194)	34	39	33	40
VIC Daly, NT, 2020	$2.11	0.93%	68	9.39%	428 (-)	57 (-)	346 (-)	54 (-)	10	2	11	3
VIC Daly, NT, 2100	$3.10	1.36%	95	13.12%	433 (-)	55 (-)	357 (-)	65 (-)	9	2	9	3
VIC Park, WA, 2020	$13.90	0.16%	20	0.07%	249 (219)	452 (231)	422 (242)	488 (244)	32	96	72	116
VIC Park, WA, 2100	$37.17	0.43%	585	2.13%	180 (173)	311 (151)	187 (160)	298 (149)	27	71	27	57
VIC Plains, WA, 2020	$0.55	0.18%	15	1.50%	490 (-)	435 (-)	436 (-)	261 (-)	106	88	77	53
VIC Plains, WA, 2100	$0.93	0.30%	9	0.90%	486 (-)	433 (-)	464 (-)	402 (-)	109	112	93	77
Vincent, WA, 2020	$11.42	0.14%	21	0.08%	269 (229)	477 (244)	418 (241)	485 (242)	34	105	71	113
Vincent, WA, 2100	$35.10	0.43%	25	0.10%	186 (179)	318 (153)	432 (252)	497 (251)	28	74	74	116
Wagait, NT, 2020	$0.23	0.18%	0	0.00%	522 (-)	431 (-)	508 (-)	521 (-)	13	14	18	18
Wagait, NT, 2100	$0.46	0.35%	4	0.96%	515 (-)	386 (-)	482 (-)	391 (-)	13	12	14	13
Wagga Wagga, NSW, 2020	$47.55	0.38%	400	1.00%	116 (113)	219 (103)	158 (130)	321 (142)	47	79	53	87
Wagga Wagga, NSW, 2100	$51.12	0.41%	433	1.08%	142 (140)	336 (163)	219 (180)	378 (195)	50	100	79	116
Wagin, WA, 2020	$2.14	0.34%	79	3.97%	427 (-)	252 (-)	330 (-)	124 (-)	71	42	42	25
Wagin, WA, 2100	$4.05	0.65%	79	3.97%	414 (-)	169 (-)	378 (-)	206 (-)	70	38	59	40
Wakefield, SA, 2020	$5.86	0.25%	79	1.07%	345 (-)	346 (-)	328 (-)	307 (-)	44	35	29	27
Wakefield, SA, 2100	$10.58	0.46%	121	1.64%	327 (-)	292 (-)	342 (-)	330 (-)	46	38	35	31
Walcha, NSW, 2020	$2.54	0.27%	92	3.03%	415 (-)	328 (-)	314 (-)	169 (-)	128	114	101	43
Walcha, NSW, 2100	$4.46	0.47%	94	3.09%	408 (-)	285 (-)	358 (-)	248 (-)	125	87	110	80
Walgett, NSW, 2020	$24.55	1.88%	1,005	24.08%	175 (-)	22 (-)	77 (-)	21 (-)	63	4	23	4
Walgett, NSW, 2100	$29.41	2.25%	1,393	33.38%	209 (-)	29 (-)	111 (-)	19 (-)	68	5	48	4
Walkerville, SA, 2020	$2.21	0.15%	0	0.00%	425 (-)	461 (-)	537 (-)	540 (-)	58	56	59	58
Walkerville, SA, 2100	$4.50	0.31%	0	0.00%	406 (-)	422 (-)	535 (-)	521 (-)	56	55	62	62
Wandering, WA, 2020	$0.57	0.44%	15	3.61%	489 (-)	180 (-)	430 (-)	137 (-)	105	28	78	29
Wandering, WA, 2100	$0.93	0.71%	20	4.82%	487 (-)	149 (-)	438 (-)	175 (-)	110	30	78	36
Wangaratta, VIC, 2020	$338.78	6.12%	8,492	48.13%	8 (8)	3 (2)	6 (6)	5 (2)	2	2	2	2
Wangaratta, VIC, 2100	$356.31	6.44%	7,659	43.41%	15 (15)	4 (2)	19 (19)	13 (4)	3	2	2	2
Wanneroo, WA, 2020	$36.83	0.13%	91	0.10%	137 (132)	483 (248)	315 (213)	480 (240)	13	107	39	109
Wanneroo, WA, 2100	$101.88	0.36%	475	0.53%	67 (67)	380 (185)	210 (175)	441 (227)	6	98	31	92
Waratah/Wynyard, TAS, 2020	$3.23	0.12%	57	0.64%	399 (-)	503 (-)	358 (-)	364 (-)	24	24	21	17
Waratah/Wynyard, TAS, 2100	$4.79	0.17%	47	0.53%	403 (-)	508 (-)	408 (-)	440 (-)	19	20	25	27
Waroona, WA, 2020	$3.21	0.30%	46	1.33%	400 (-)	300 (-)	374 (-)	273 (-)	60	50	59	55
Waroona, WA, 2100	$7.55	0.70%	202	5.86%	361 (-)	151 (-)	298 (-)	144 (-)	57	31	41	29
Warren, NSW, 2020	$4.09	0.62%	74	3.53%	382 (-)	102 (-)	335 (-)	141 (-)	122	26	107	29
Warren, NSW, 2100	$6.63	1.01%	279	13.29%	379 (-)	90 (-)	267 (-)	63 (-)	114	21	91	12
Warrnambool, VIC, 2020	$11.01	0.16%	156	0.72%	275 (233)	449 (230)	270 (196)	353 (159)	65	72	65	48
Warrnambool, VIC, 2100	$19.17	0.28%	324	1.50%	260 (227)	444 (219)	251 (200)	339 (170)	60	57	57	44
Warrumbungle Shire, NSW, 2020	$25.61	0.90%	375	4.16%	170 (-)	59 (-)	169 (-)	119 (-)	61	12	59	24
Warrumbungle Shire, NSW, 2100	$29.45	1.04%	508	5.63%	208 (-)	86 (-)	200 (-)	151 (-)	67	20	74	45
Wattle Range, SA, 2020	$10.73	0.30%	208	1.84%	279 (236)	298 (146)	234 (178)	237 (100)	31	24	14	19
Wattle Range, SA, 2100	$22.85	0.64%	268	2.37%	241 (216)	176 (79)	273 (210)	279 (139)	29	18	22	25
Waverley, NSW, 2020	$48.52	0.31%	2	0.00%	111 (108)	294 (145)	483 (257)	506 (256)	45	104	129	130
Waverley, NSW, 2100	$42.49	0.27%	170	0.34%	158 (154)	456 (226)	320 (225)	466 (242)	55	124	103	125

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LGA (STATE)	TTIP ($MILLION)	VAR%	HRP #	HRP%	TTIP	VAR%	HRP#	HRP%	TTIP	VAR%	HRP#	HRP%
Weddin, NSW, 2020	$5.06	0.51%	97	3.07%	361 (-)	133 (-)	307 (-)	166 (-)	116	45	100	41
Weddin, NSW, 2100	$5.69	0.58%	131	4.15%	389 (-)	215 (-)	338 (-)	200 (-)	121	63	107	65
Weipa, QLD, 2020	$0.67	0.09%	7	0.29%	482 (-)	526 (-)	461 (-)	442 (-)	68	76	70	72
Weipa, QLD, 2100	$0.51	0.07%	4	0.17%	512 (-)	540 (-)	480 (-)	485 (-)	68	76	69	72
Wellington, VIC, 2020	$56.53	0.46%	1170	3.00%	94 (92)	166 (76)	66 (58)	170 (70)	25	22	12	22
Wellington, VIC, 2100	$156.23	1.28%	3769	9.66%	37 (37)	59 (25)	46 (46)	90 (40)	5	5	6	6
Wentworth, NSW, 2020	$16.76	1.05%	593	11.63%	225 (-)	51 (-)	118 (-)	40 (-)	75	9	42	7
Wentworth, NSW, 2100	$24.31	1.52%	787	15.43%	234 (-)	52 (-)	158 (-)	51 (-)	75	11	63	10
West Arnhem, NT, 2020	$0.15	0.06%	1	0.12%	529 (-)	537 (-)	502 (-)	472 (-)	16	18	15	15
West Arnhem, NT, 2100	$0.32	0.12%	3	0.35%	526 (-)	521 (-)	487 (-)	464 (-)	15	16	16	16
West Arthur, WA, 2020	$1.76	0.60%	36	3.88%	440 (-)	109 (-)	391 (-)	130 (-)	78	20	64	28
West Arthur, WA, 2100	$3.19	1.10%	177	19.07%	427 (-)	77 (-)	315 (-)	40 (-)	77	16	44	11
West Coast, TAS, 2020	$5.21	0.34%	174	3.55%	356 (-)	254 (-)	254 (-)	140 (-)	14	6	8	2
West Coast, TAS, 2100	$7.49	0.49%	213	4.34%	362 (-)	270 (-)	294 (-)	187 (-)	13	5	11	3
West Daly, NT, 2020	$0.16	0.18%	2	0.74%	528 (-)	424 (-)	484 (-)	350 (-)	15	13	13	13
West Daly, NT, 2100	$0.32	0.37%	13	4.80%	525 (-)	366 (-)	453 (-)	177 (-)	14	10	13	9
West Tamar, TAS, 2020	$7.39	0.17%	71	0.50%	313 (248)	445 (227)	341 (223)	392 (188)	12	18	18	21
West Tamar, TAS, 2100	$10.32	0.23%	110	0.78%	329 (253)	484 (245)	348 (234)	411 (213)	9	17	16	23
West Torrens, SA, 2020	$16.52	0.14%	0	0.00%	231 (208)	474 (243)	536 (260)	539 (266)	21	60	60	60
West Torrens, SA, 2100	$32.94	0.28%	3	0.01%	194 (185)	445 (220)	492 (259)	512 (260)	18	60	58	61
West Wimmera, VIC, 2020	$1.91	0.19%	23	0.71%	433 (-)	419 (-)	416 (-)	358 (-)	78	67	76	50
West Wimmera, VIC, 2100	$3.22	0.31%	22	0.67%	426 (-)	416 (-)	435 (-)	428 (-)	78	50	77	66
Western Downs, QLD, 2020	$81.98	0.89%	2721	9.32%	59 (58)	60 (21)	25 (24)	57 (16)	16	26	14	23
Western Downs, QLD, 2100	$106.23	1.16%	6579	22.53%	62 (62)	71 (31)	24 (24)	30 (10)	18	28	9	13
Western Plains Regional, NSW, 2020	$37.16	0.37%	540	1.68%	135 (130)	232 (113)	126 (106)	249 (106)	52	83	44	68
Western Plains Regional, NSW, 2100	$61.94	0.61%	3127	9.73%	124 (122)	193 (92)	52 (52)	89 (39)	46	56	20	24
Westonia, WA, 2020	$0.91	0.40%	14	1.94%	466 (-)	202 (-)	441 (-)	228 (-)	92	33	82	47
Westonia, WA, 2100	$1.35	0.60%	13	1.80%	472 (-)	204 (-)	454 (-)	319 (-)	98	42	86	62
Whitehorse, VIC, 2020	$57.52	0.21%	99	0.11%	92 (90)	398 (201)	305 (210)	478 (238)	23	61	69	78
Whitehorse, VIC, 2100	$62.01	0.22%	376	0.42%	122 (120)	488 (248)	228 (183)	449 (230)	31	72	49	71
Whitsunday, QLD, 2020	$75.91	0.86%	1235	4.37%	66 (65)	65 (23)	61 (54)	112 (43)	17	30	23	39
Whitsunday, QLD, 2100	$137.67	1.55%	2127	7.53%	47 (47)	50 (20)	74 (73)	112 (53)	15	22	20	34
Whittlesea, VIC, 2020	$101.75	0.33%	935	0.96%	41 (41)	259 (126)	86 (75)	324 (145)	10	37	17	45
Whittlesea, VIC, 2100	$95.14	0.31%	1352	1.39%	71 (71)	417 (204)	115 (106)	351 (180)	12	51	17	47
Whyalla, SA, 2020	$5.61	0.13%	18	0.13%	349 (254)	490 (252)	424 (243)	469 (233)	46	64	47	50
Whyalla, SA, 2100	$13.05	0.29%	67	0.47%	299 (247)	436 (214)	384 (242)	447 (229)	40	57	44	50
Wickepin, WA, 2020	$0.47	0.16%	0	0.00%	499 (-)	451 (-)	525 (-)	543 (-)	113	95	129	128
Wickepin, WA, 2100	$1.35	0.47%	0	0.00%	473 (-)	286 (-)	534 (-)	540 (-)	99	64	124	127
Williams, WA, 2020	$2.23	0.64%	34	3.06%	424 (-)	98 (-)	398 (-)	167 (-)	69	19	68	35
Williams, WA, 2100	$3.73	1.07%	97	8.73%	421 (-)	81 (-)	356 (-)	97 (-)	76	17	56	21
Willoughby, NSW, 2020	$71.78	0.50%	348	0.76%	71 (70)	139 (62)	179 (145)	343 (153)	34	49	61	96
Willoughby, NSW, 2100	$81.02	0.56%	1978	4.32%	87 (86)	226 (108)	85 (82)	190 (94)	37	66	37	58
Wiluna, WA, 2020	$0.28	0.12%	0	0.00%	517 (-)	497 (-)	521 (-)	513 (-)	124	115	124	126
Wiluna, WA, 2100	$0.32	0.14%	1	0.13%	524 (-)	515 (-)	502 (-)	489 (-)	129	132	119	110

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Wingecarribee, NSW, 2020	$32.84	0.32%	147	0.45%	145 (138)	273 (132)	280 (202)	407 (197)	53	98	90	112
Wingecarribee, NSW, 2100	$49.32	0.49%	973	3.01%	145 (143)	273 (129)	140 (127)	251 (123)	52	83	56	81
Winton, QLD, 2020	$1.81	0.49%	48	4.05%	438 (-)	146 (-)	367 (-)	122 (-)	59	43	60	44
Winton, QLD, 2100	$1.64	0.44%	50	4.22%	465 (-)	306 (-)	402 (-)	197 (-)	63	59	59	48
Wodonga, VIC, 2020	$19.51	0.28%	953	4.24%	209 (191)	322 (162)	83 (72)	117 (46)	53	46	16	17
Wodonga, VIC, 2100	$26.24	0.37%	212	0.94%	224 (208)	367 (178)	295 (218)	395 (205)	53	40	66	58
Wollondilly, NSW, 2020	$24.53	0.33%	187	0.78%	176 (165)	269 (130)	244 (185)	341 (152)	64	97	76	95
Wollondilly, NSW, 2100	$28.32	0.38%	340	1.42%	212 (197)	360 (176)	246 (198)	349 (178)	69	107	85	110
Wollongong, NSW, 2020	$105.23	0.30%	525	0.47%	37 (37)	299 (147)	127 (107)	403 (194)	15	106	45	110
Wollongong, NSW, 2100	$173.98	0.50%	2432	2.18%	35 (35)	265 (124)	65 (65)	292 (146)	14	77	29	96
Wongan-Ballidu, WA, 2020	$0.53	0.12%	5	0.37%	492 (-)	492 (-)	469 (-)	424 (-)	107	112	99	90
Wongan-Ballidu, WA, 2100	$1.17	0.27%	3	0.22%	479 (-)	451 (-)	490 (-)	477 (-)	103	114	109	103
Woodanilling, WA, 2020	$0.76	0.43%	4	0.72%	474 (-)	183 (-)	471 (-)	354 (-)	96	29	101	78
Woodanilling, WA, 2100	$1.74	1.00%	234	42.09%	461 (-)	94 (-)	284 (-)	14 (-)	91	19	38	2
Woollahra, NSW, 2020	$40.10	0.33%	15	0.04%	127 (122)	263 (127)	429 (245)	495 (247)	49	93	127	128
Woollahra, NSW, 2100	$39.46	0.32%	64	0.16%	169 (163)	412 (200)	391 (243)	486 (248)	59	119	118	128
Woorabinda, QLD, 2020	$1.23	0.89%	167	37.87%	452 (-)	62 (-)	262 (-)	11 (-)	62	27	50	6
Woorabinda, QLD, 2100	$1.67	1.21%	171	38.78%	463 (-)	64 (-)	319 (-)	17 (-)	62	26	52	9
Wudinna, SA, 2020	$0.60	0.12%	5	0.31%	486 (-)	496 (-)	470 (-)	437 (-)	66	65	52	46
Wudinna, SA, 2100	$0.65	0.13%	4	0.25%	508 (-)	517 (-)	479 (-)	475 (-)	69	67	57	54
Wujal Wujal, QLD, 2020	$0.26	0.59%	7	4.96%	519 (-)	115 (-)	459 (-)	101 (-)	72	37	71	37
Wujal Wujal, QLD, 2100	$0.27	0.60%	4	2.84%	529 (-)	198 (-)	478 (-)	261 (-)	72	48	70	56
Wyalkatchem, WA, 2020	$0.24	0.12%	2	0.32%	521 (-)	493 (-)	486 (-)	433 (-)	126	113	113	93
Wyalkatchem, WA, 2100	$0.47	0.24%	1	0.16%	514 (-)	481 (-)	511 (-)	488 (-)	125	121	116	109

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Wyndham, VIC, 2020	$61.38	0.18%	364	0.33%	81 (79)	430 (218)	174 (141)	431 (211)	18	68	37	66
Wyndham, VIC, 2100	$69.33	0.20%	767	0.70%	106 (105)	498 (252)	159 (142)	425 (220)	25	76	30	65
Wyndham-East Kimberley, WA, 2020	$22.68	1.57%	517	11.22%	186 (-)	27 (-)	132 (-)	45 (-)	26	8	16	13
Wyndham-East Kimberley, WA, 2100	$24.92	1.72%	695	15.09%	230 (-)	40 (-)	168 (-)	54 (-)	31	9	23	13
Yalgoo, WA, 2020	$0.07	0.09%	1	0.38%	538 (-)	523 (-)	505 (-)	420 (-)	134	127	115	88
Yalgoo, WA, 2100	$0.17	0.21%	1	0.38%	533 (-)	493 (-)	504 (-)	461 (-)	134	126	114	97
Yankalilla, SA, 2020	$5.19	0.23%	30	0.42%	357 (-)	374 (-)	406 (-)	414 (-)	48	38	44	43
Yankalilla, SA, 2100	$9.52	0.43%	47	0.67%	334 (-)	312 (-)	407 (-)	430 (-)	47	42	47	47
Yarra, VIC, 2020	$50.31	0.24%	350	0.52%	110 (107)	366 (183)	178 (144)	386 (182)	31	55	39	57
Yarra, VIC, 2100	$51.74	0.24%	660	0.98%	141 (139)	476 (239)	171 (149)	389 (202)	40	68	32	56
Yarra Ranges, VIC, 2020	$104.80	0.43%	1608	2.09%	39 (39)	185 (86)	45 (42)	216 (89)	8	25	8	30
Yarra Ranges, VIC, 2100	$139.79	0.58%	2218	2.88%	46 (46)	212 (101)	71 (70)	258 (127)	6	26	10	33
Yarrabah, QLD, 2020	$1.17	0.35%	12	1.14%	457 (-)	245 (-)	446 (-)	297 (-)	63	54	66	68
Yarrabah, QLD, 2100	$1.74	0.53%	33	3.15%	462 (-)	240 (-)	425 (-)	247 (-)	61	51	65	55
Yarriambiack, VIC, 2020	$6.29	0.36%	118	2.14%	337 (-)	239 (-)	296 (-)	212 (-)	74	33	68	29
Yarriambiack, VIC, 2100	$10.77	0.62%	160	2.91%	324 (-)	187 (-)	325 (-)	256 (-)	73	22	70	32
Yass Valley, NSW, 2020	$7.90	0.24%	63	0.61%	308 (247)	358 (178)	353 (226)	370 (170)	101	121	110	102
Yass Valley, NSW, 2100	$12.46	0.38%	98	0.94%	304 (249)	354 (173)	354 (235)	396 (206)	96	106	109	118
Yilgarn, WA, 2020	$3.14	0.44%	67	2.97%	402 (-)	176 (-)	347 (-)	173 (-)	61	27	48	36
Yilgarn, WA, 2100	$4.07	0.58%	82	3.64%	412 (-)	214 (-)	373 (-)	221 (-)	68	44	58	45
York, WA, 2020	$40.27	3.76%	1016	29.77%	126 (-)	8 (-)	76 (-)	14 (-)	11	2	9	2
York, WA, 2100	$33.14	3.09%	897	26.28%	192 (-)	18 (-)	148 (-)	25 (-)	29	3	18	7
Yorke Peninsula, SA, 2020	$17.28	0.32%	177	1.02%	221 (201)	279 (136)	253 (189)	319 (141)	19	23	18	28
Yorke Peninsula, SA, 2100	$32.18	0.59%	362	2.08%	199 (189)	207 (98)	237 (190)	305 (152)	21	23	17	29

13. DISCUSSION

13.1. ACCURACY, UNCERTAINTY AND CONFIDENCE

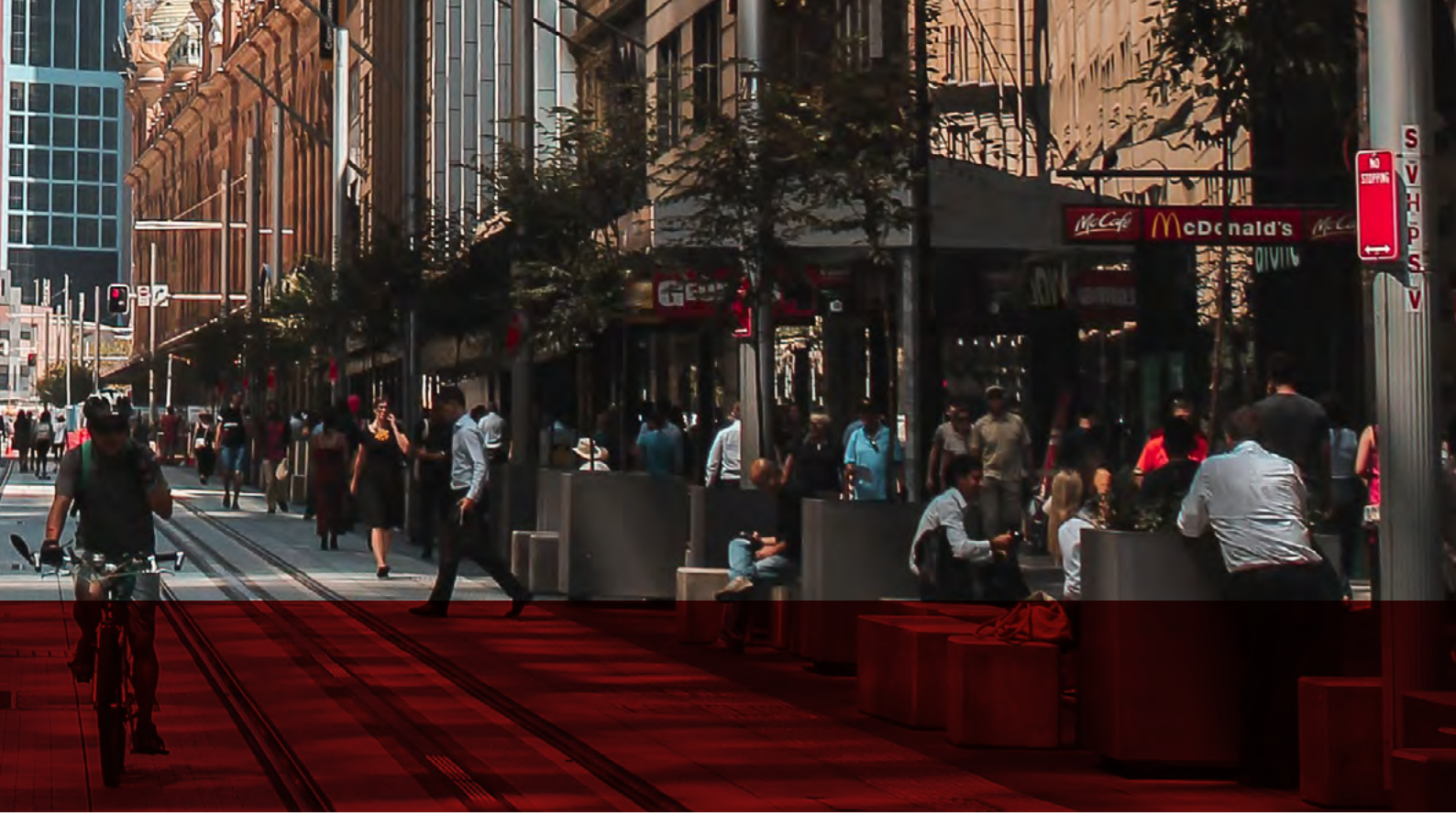
Karl Braganza, Head of Climate Monitoring at the Australian Bureau of Meteorology, once pointed out that the impact of greenhouse gas emissions on the climate is like hitting a glass vase with a hammer. We have a high degree of confidence that the vase will break, but there is considerable uncertainty on where the pieces will land. This study brings together vast amounts of data and computing power to make an informed attempt at understanding where some of these shards will land and how much damage they might cause.

The analysis has tested nearly 15 million individual addresses in 544 local government areas, against 77 billion spatial data points for soils, forests, floods, elevations and urbanisation, using climate output statistics from 3.5 million time-steps.

This section extracts insights from the analysis results and considers some of the limitations and boundaries therein.

13.2. COMPOUND CLIMATE MODELS INSTEAD OF ENSEMBLE

Though computing time and costs have precluded modelling a full ensemble of climate models for this report, the Climate Risk Engines can combine different models for different hazards in the same run. Therefore, different parts of an ensemble can be used to look at different issues, for example using a model that projects a drier future to consider drought, a wetter model to stress test flooding and so on. In all cases the system has used the business-as-usual emissions projection RCP 8.5. This analysis does not consider lower emission outcomes. Thus what is presented is a multi-model test but not an an ensemble test. This explores the boundaries of the climate impacts, but does not present the whole range of uncertainty associated with the ensemble for the emission pathway.



As discussed elsewhere in this XDI report the results show good correspondence where there is overlap with long term insured losses. This analysis does not use climate change models to indicate the exact future of each of the weather parameter and the consequent hazards, but only the direction and scale of change. Further, this is based on extracting general statistical trends.

13.3. WHICH ADDRESSES ARE EXPOSED TO WHAT HAZARD

This study harnesses very high resolution hazard and context data. Much of the satellite data has been used at a resolution of 30m square, with flood maps down to 5m square and additional spatial data processing techniques to add further exposure accuracy.

This provides reasonable confidence in results about which individual properties are potentially exposed to each hazard. This in turn provides strong insight into the number of properties in a given local government area exposed to extreme weather events, which is a precursor to knowing if climate change trends are relevant.

13.4. LGAS WITH A HIGH PERCENTAGES OF HIGH RISK PROPERTIES (HRP#)

The exact scale of annual losses associated properties significantly exposed to flooding and coastal inundation should be treated cautiously. The Climate Risk Engines will tend to limit flood type losses to 20% of property replacement cost per dwelling per event. However due to the severity of damage cause by such events, a high probability of impact can cause this small fraction of properties to dominate the loss characteristics of a local government area or suburb.

Though small changes in vulnerability can change the estimated losses, the key measure here is the number of addresses that are clearly at High Risk, as this provides insights into insurability and commercially acceptable levels of risk. Once an address breaches the High Risk threshold, the level above this threshold becomes a less important metric.

13.5.
LGAS WITH LARGE NUMBERS OF ADDRESSES WITH SMALL LOSSES

At the other end of the spectrum, soil contraction damage is an example where there may be a large number of properties with small amounts of individual damage but adding up to a significant cost across the LGA.

This study provides an estimate for the severity of drought that may cause damage based on European research - but these are very much first estimates as to the scale of the issue in Australia.

Forest fire risk has some similar characteristics with many buildings exposed, but low probabilities of damage each year. There is however much published data on insured losses from Forest Fire, which provides a good statistical basis for the probability of damage and loss.

LGAs which have problems with soil and forest fire may well show up with a large VAR% but a low HRP%. Addressing these risks will focus on the choice of building designs and materials to cope with either active soils or exposure to flame, embers and heat.

13.6.
LGAS WITH LARGE TTIP

State governments may want to pay particular attention to LGAs that show very large TTIP. Though this may be heavily affected by the fact that the LGA is large, it nevertheless indicates a major geographical concentration of vulnerability and the scale of damage that may occur if an extreme event were to occur.

This also indicates where municipal risk mitigation works may provide a good return on investment.

13.7.
LGAS WITH LARGE VAR%

XDI ranking of LGAs by VAR% is dominated by small communities typified by many addresses impacted by the same hazard such as a whole town built in a flood zone. Unlike the larger LGAs, these communities may suffer wider-spread devastation should an extreme event occur, but will not have the resources of a large city to draw upon to facilitate recovery.

Again, the investment in risk mitigation and resilience is likely to have a significant return on investment in such locations.

13.8.
LARGE INCREASES IN RISK

LGAs which show a significant increase in any of the major indicators are worthy of close attention and strong candidates for targeted adaptation investment. The TTIP is a first estimate and should be used with caution: As every building is different, each will have different thresholds for damage and different costs for repair. This analysis has sought to provide a fair starting estimate by using a standardised building placed at each address.

Statistics show however that not every building in a forest fire will burn down, equally, some walls crack severely in subsidence zones and some not at all. The Climate Risk Engines use data from insured losses in Australia over many years to help bias-correct the starting estimates for TTIP, however this data is not entirely representative as not all hazards are insured and not all properties have cover. As a result, there are areas where the Climate Risk Engines make assumptions of building vulnerability based on national and international empirical data. This analysis has used a low vulnerability dwelling to compute Technical Insurance Premiums including a moderately high floor level, high wind threshold and low vulnerability to subsidence.

With the starting TTIP estimated in place, the climate data informs the direction and scale of change in risk. Regardless of the accuracy of the initial TTIP estimate, the trend in climate impacts can be treated as its own insight. In the business-as-usual emission scenario (RCP 8.5) for the GCM used, the results can provide strong indicators of where and when impacts will be felt, and whether these will be a linear or - in some cases - exponential increase.

Some LGAs increase a little, some even decrease a little, but attention should paid to LGAs where the Total Technical Insurance Premium, the average VAR% or number of High Risk Properties increase substantially over the century.

13.9.
OTHER XDI INSIGHTS

There are further insights that may be gleaned from the XDI results and the underpinning data set that provides even greater detail for each LGA. Detailed LGA insights cover hazard breakdowns for TTIP and VAR% and spatial resolutions down to suburb level and even individual properties. Contact XDI to discuss access to this data.

14.
XDI POLICY RECOMMENDATIONS

1. **Establish Legal Requirements for Risk Disclosure:** Establish unambiguous legal requirements for purchasers, investors and tenants of built property and infrastructure to be advised of the full range of extreme weather and climate change risks that may affect the property over its full life time.

2. **Require Fit-for-Purpose Construction in High Hazard areas:** Ensure design standards and planning requirements for infrastructure and development match location specific hazards. All tiers of government seek to achieve full insurability by ensuring projected VARs of less than 1% of the replacement cost of the property over its design lifetime under worst-case climate change projections.

3. **Plan for Infrastructure System Resilience:** Federal and state governments require that all critical infrastructure - including water, power, transport and telecommunications - be assessed both at an asset level and at an interdependent system level. Establish an overarching standard risk tolerance (e.g. 1:500 year event tolerance) such that extreme weather event failures do not cause cascading failures across sectors.

4. **Develop Risk Based Insurance Pricing:** Financial regulators require that insurance industry products fairly reflect both site specific hazard probabilities and asset specific vulnerability, thus providing lower premiums for more resilient designs and materials, and a clear market signal that investment in resilience will be fairly rewarded by lower premiums.

5. **Adaptation for Highly Exposed Areas:** State and Federal governments implement support schemes to finance adaptation in areas at high risk. This can finance resilient construction, municipal works or relocation.

15.
APPENDICES

15.1.
AGENCIES USED FOR INPUTS TO CLIMATE RISK ENGINES

Abdus Salam International Centre for Theoretical Physics, Trieste, Italy

Adapt NSW, NSW Government Office of Environment and Heritage, Australia

Antarctic Climate and Ecosystems Cooperative Research Centre, Hobart, Australia

Australian Research Council Centre of Excellence for Climate System Science and Climate Change Research Centre, University of New South Wales, Sydney, Australia

School of Biological, Earth and Environmental Sciences, University of New South Wales, Sydney, Australia

Meteorological Service of Canada, Department of Environment and Climate Change, Canada

Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, Australia

Australian Bureau of Meteorology, Canberra, Australia

Department of Agriculture and Water Resources, Canberra, Australia

Australian Government Department of Environment, Canberra, Australia

Australian Institute of Criminology (AIC), Canberra, Australia

Australian Rainfall and Runoff (ARR), Geosciences Australia, Canberra, Australia

Australian Soil Resource Information System (ASRIS), CSIRO, Canberra, Australia

BHP Group Limited, Melbourne, Australia

British Oceanographic Data Centre, National Science and Research Council, UK

Bundaberg Regional Council, Australia

Bundesamt fur Seeschifffahrt und Hydrographie und Hydrographie, Germany

Bushfire Cooperative Research Centre, Melbourne, Australia

Canadian Centre for Climate Modelling and Analysis, Environment and Climate Change Canada, University of Victoria, Canada

Canadian Electrical Association

Canadian Meteorological and Oceanographic Society

Center for Climate Systems Research, Columbia University Earth Institute, New York, USA

Center for Marine Technology and Engineering, Technical University of Lisbon, Portugal

Center for Sustainability and the Global Environment, Nelson Institute for Env. Studies University of Wisconsin, USA

Centre for Australian Weather and Climate Research, a partnership between the Bureau of Meteorology and CSIRO, Melbourne, Australia

Centre for Environmental Risk Management of Bushfires, University Wollongong, Australia

Civil and Environmental Engineering, The University of Western Ontario, Canada

Climate and Atmospheric Science Branch, NSW Office of Environment and Heritage, Australia

Climate Change Research Centre, University of New South Wales, Sydney, Australia

Climate Disclosure Standards Board (CDSB), London UK

Climate Impacts Group, University of Washington, USA

Climate Research Division, Environment and Climate Change Canada, University of Victoria, Canada

Coastal and Marine Unit, Office of Environment and Heritage, Newcastle, Australia

College of Marine Science, University of South Florida, Australia

Commonwealth Bank of Australia (CBA)

Coordinated Regional Climate Downscaling Experiment (CORDEX), World Climate Research Programme

Crompton Risk Frontiers, Natural Hazards Research Centre, Macquarie University, Sydney, Australia

CSIRO Marine and Atmospheric Research, Canberra, Australia

Danish Meteorological Institute, Denmark

Department of Applied Statistics, Johannes Kepler University Linz

Department of Atmospheric & Hydrologic Sciences, St. Cloud State University

Department of Atmospheric and Environmental Sciences, State University of New York, Albany, USA

Department of Building Engineering, University of Manchester Institute of Science and Technology, UK

Department of Civil and Environmental Engineering, University of Western Ontario, Canada

Department of Civil Engineering, Institute of Science and Technology, Inonu University, Engineering Faculty, Malatya, Turkey

Department of Civil, Mining and Environmental, University of Wollongong, Australia

Department of Earth & Planetary Sciences, Rutgers Energy Institute and Institute of Earth, Ocean & Atmospheric Sciences, Rutgers University–New Brunswick, New Brunswick, USA

Department of Earth and Planetary Science, University of California, USA

Department of Forest and Natural Resources Management, State University of New York, Albany, USA

Department of Geographical Sciences, University of Maryland, USA

Department of Geosciences Oregon State University, USA

Department of Physics, University of Toronto, Canada

Department of Statistical Science, Duke University, USA

Earth System Dynamics

EIT Climate KIC, European Union

Encyclopaedia of Ocean Sciences

Environmental and Mining Engineering and the UWA Oceans Institute, The University of Western Australia, Perth, Australia

Environmental Finance

Environmental Hydraulics Institute, Universidad de Cantabria, Spain

Environmental Research Letters

European Bank for Reconstruction and Development

European Sea-Level Service, European Environment Agency

Faculty of Economics, University of Tokyo

Finnish Meteorological Institute

Fire and Biodiversity Consortium, Queensland, Australia

Geographic Information Science Center of

Excellence, South Dakota State University, USA

Global Hydrology Research Center (GHRC), NASA, USA

Global Land and Analysis Discovery (GLAD), University of Maryland, USA

Goddard Earth Sciences Technology and Research, Columbia, USA

Department of Planning, Transport and Infrastructure, Government of South Australia

Department of Fire and Emergency Services, Government of Western Australia

Hawkesbury Institute for the Environment, Western Sydney University

Hydrological Sciences Laboratory, Goddard Space Flight Center, Greenbelt, Maryland, USA

Hydrology and Water Resources Symposium, Sydney, Australia

Icelanic Coast Guard, Reykjavic, Iceland

Independent Hospital Pricing Authority, Australian Government

Institute for Atmospheric and Climate Science, ETH Zurich

Institute of Mathematics, School of Basic Sciences, Swiss Federal Institute of Technology

Bidston Observatory, Institute of Oceanographic Sciences, Birkenhead, Merseyside.

Instituto Espanol de Oceanografia, Spain

Intergovernmental Panel on Climate Change (IGCC)

International Center for Climate and Environment Sciences, China

Japan Meteorological Agency

Johannes Kepler University Linz, Austria

Lancaster Environment Centre, Lancaster University, UK

Manly Hydraulics Laboratory (MHL), NSW Government

Marine Environmental Data Section - Canada

McGill University, Montreal, Canada

NASA Land Use and Land Use Change Program, University of Maryland

National Academy of Sciences

National Center for Atmospheric Research, Boulder, Colorado

National Center for Biotechnology Information (NCBI), US National Library of Medicine

National Centers for Environmental Prediction (NCEP) NOAA, USA

National Centre for Atmospheric Science, University of Leeds, UK

National Oceanic and Atmospheric Administration, Center for Operational Oceanographic Products and Services, Silver Spring, MD, USA

Natural Resources Canada

NOAA Air Resources Laboratory, Silver Spring, Maryland, USA

Northeast Climate Adaptation Science Center, and Department of Geosciences, University of Massachusetts Amherst, USA

Northern Australian Fire Information, Charles Darwin University, Australia

Norwegian Mapping Authority Hydrographic Service

Norwegian Meteorological Institute

Ocean and Earth Science, National Oceanography Centre, University of Southampton, UK

Pacific Climate Impacts Consortium University of Victoria, Canada

Pacific Northwest Research Station, U.S. Forest Service.

Pattiaratchi School of Environmental Systems Engineering and UWA Oceans Institute, The

University of Western Australia

Proceedings of the National Academy of Sciences of the United States of America (PNAS)

Puertos del Estado - Spain

Queensland Fire and Emergency Services, Queensland Government, Australia

Research Institute for Water and Environment, University of Siegen, Denmarkl

Reseaux de reference des observations maregraphiques, France

Rijkswaterstaat - Netherlands

Risk Frontiers, Macquarie University, Australia

Royal Meteorological Society, UK

Satalia, Berlin

School of GeoSciences, The University of Edinburgh, UK

Solvay, Brussels, Belgium

Southern Research Station, U.S. Forest Service

Standards Catalogue, Standards Australia

Swedish Meteorological and Hydrological Institute

Sydney Coastal Councils, Australia

The Boundary Layer Wind Tunnel Laboratory, University of Western Ontario, Canada

The Ice Sheet Mass Balance Inter-comparison Exercise (IMBIE), ESA and NASA.

U.S. Department of Agriculture

U.S. Environmental Protection Agency, Office of Research and Development, Research Triangle Park, NC,USA

Jayantha Obeysekera South Florida Water Management District, West Palm Beach, USA

U.S. Geological Survey, Woods Hole, MA, USA Chris Zervas National Oceanic and Atmospheric Administration, Center for Operational Oceanographic Products and Services, Silver Spring, MD, USA

Universities Space Research Association, Columbia, Maryland, USA

USDA Natural Resources Conservation Service Water and Climate Center, Portland, USA

Water Desalination and Reuse Center, Biological and Environmental Sciences and Engineering Division, King Abdullah University of Science and Technology, UAE

Westpac Bank, Australia

World Meteorological Organization (WMO)

15.2. CLIMATE CHANGE RISKS TO AUSTRALIA'S COAST - A FIRST PASS NATIONAL RISK ASSESSMENT - 2009

RECOMMENDATIONS

1. Australia needs national standards and benchmarks to constrain future risk and address exposure of existing assets in the coastal zone.
2. Regional risk assessments need to be linked to regional disaster risk reduction strategies and dentify where there is a lack of adaptive capacity.
3. Regions and communities with very high or extreme risks from climate change need to develop strategies that identify the on-ground action needed to manage those risks i.e. where climate change risks can be accommodated, where protection is required, how planned retreat could be undertaken, and the costs and benefits of early or delayed action.
4. Building codes and engineering specifications for infrastructure in high-risk areas in the coastal zone need to be upgraded. There is an opportunity to explore performance based responses that maintain acceptable levels of risk over the life of the structure.
5. An audit of critical national and regional infrastructure in the coastal zone is required.
6. There is highlighted importance of having national science-based information, and reveals considerable with information and tools, such as inundation modelling, to address climate change.
7. Research is required in key areas of science where uncertainty currently hinders effective risk management would be of net benefit e.g. hydrodynamic inundation modelling, informed by both climate science and geomorphology.
8. A risk allocation framework is needed to help governments, businesses and communities understand and manage the risks they face. The insurance sector will be a key partner in these discussions.
9. There is a clear need to assess what is required to build the resilience of important ecosystems to climate change. This could involve identifying where horizontal or vertical movement might need to occur, ensuring that regional planning allows for such movement, and determining critical thresholds for sustainability or ecosystem service provision.
10. Communities need access to broad scale information and risk education to facilitate informed engagement in the difficult decisions that some communities will need to make in the medium-term.
11. There is a need to build the capacity of local government to ensure that they have the knowledge, tools, resources and skills to manage risk.
12. A new national agenda is needed to clarify roles and responsibilities of each level of government, identify priority actions, and facilitate collaboration across jurisdictions on policy and technical matters.

XDI CROSS DEPENDENCY INITIATIVE

www.xdi.systems

Climate Risk Engines

www.climateriskengines.com