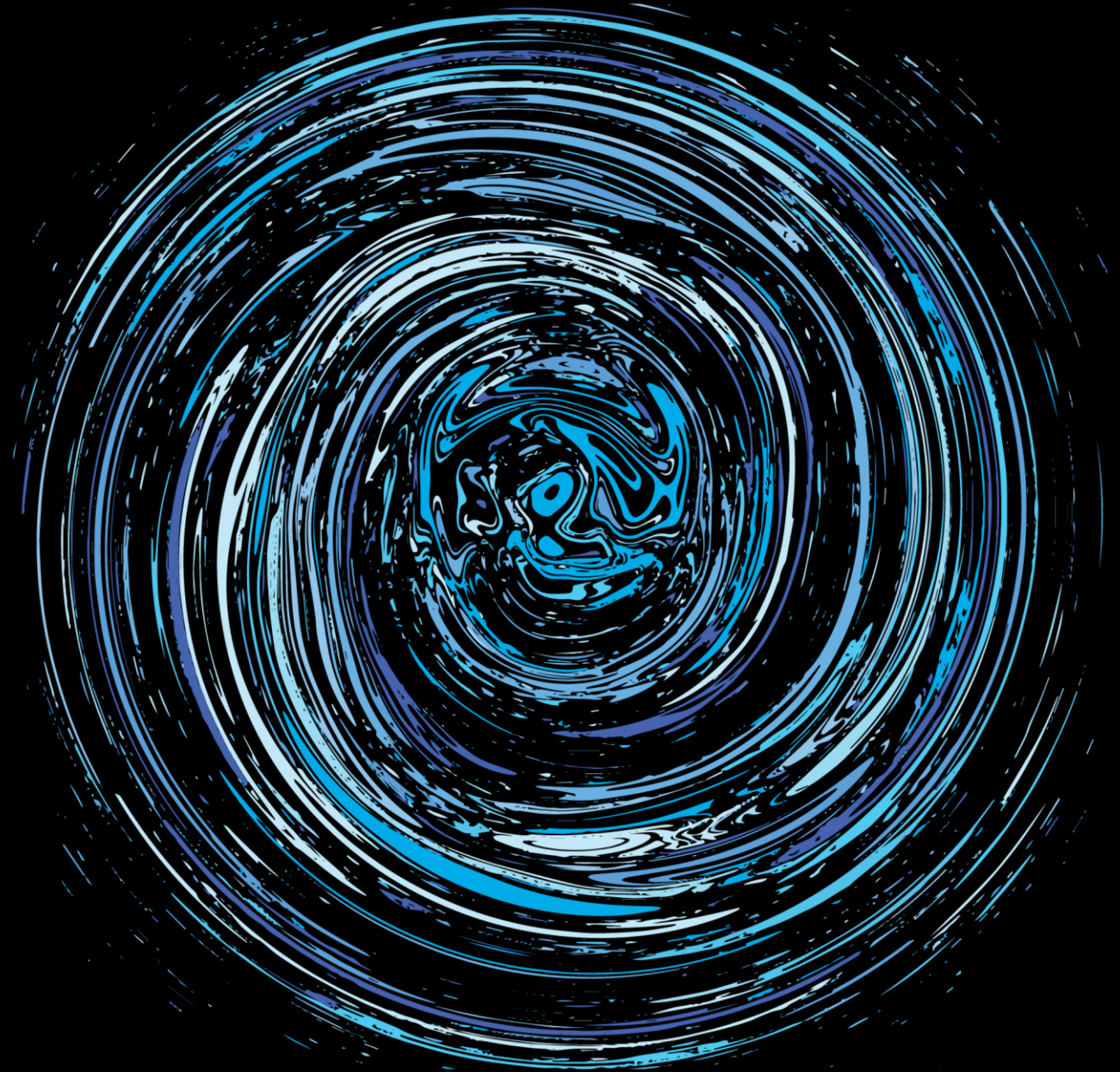




The social, financial and  
economic costs of the 2022  
South East Queensland Rainfall  
and Flooding Event

Queensland Reconstruction Authority  
June 2022

Deloitte  
Access **Economics**



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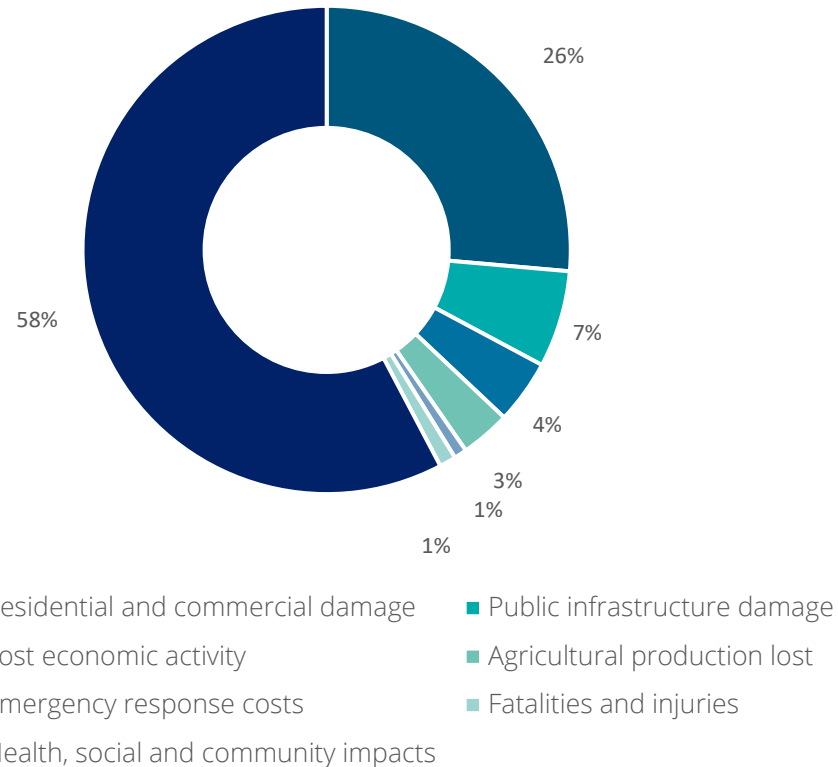
# Executive Summary

Noosa Lakes Resort 26 February 2022.  
Source: HLW 2022 Flood Impact Map

# Key findings.

## The 2022 SEQ Rainfall and Flooding event is estimated to have cost **\$7.7 billion in social, financial and economic impacts.**

Figure 1: Cost breakdown for the 2022 SEQ Rainfall and Flooding event



The 2022 South East Queensland (SEQ) Rainfall and Flooding event (the Event) had significant and far reaching social, financial and economic costs on the affected population. Overall, these floods caused a **total cost of \$7.7 billion to Queensland**, taking account both historical tangible costs and the NPV of lifelong health and social costs. These costs have been estimated based on data collected between March and May 2022.

The largest component of this was the intangible health and social costs associated with the event, with a total of \$4.5 billion. The tangible, economic costs amounted to approximately \$3.1 billion.

**Residential and commercial damage** represents the largest tangible financial cost of the 2022 SEQ rainfall and flooding event. Damage to property, contents and motor vehicles were significant, costing approximately \$2 billion. Notably, this figure is made up of estimates for both insured and uninsured losses.

**Public infrastructure damage** is another significant cost to SEQ, with extensive road and public infrastructure damage across the affected Local Government Areas (LGA). Overall, damage to public infrastructure has been estimated to be \$492 million.

**Lost economic activity** was significant across the affected areas as the floods and rainfall caused physical damage to businesses, as well as disrupted business operations due to road and public transport closures. This has been estimated to have cost small businesses a total of \$324 million.

**Agricultural production lost** has been estimated to have cost affected LGAs approximately \$254 million.

**Emergency response and clean-up costs** covered the costs of a range of operations and support run by the Queensland Reconstruction Authority (QRA), other government agencies and not-for-profit organisations. This included clean-up costs, temporary housing costs and emergency grants for affected households, costing approximately \$65 million in total.

**Fatalities and injuries** were estimated and monetised, resulting in an overall cost of \$84 million to affected persons and communities.

**Health, social and community impacts** were significant given the far-reaching and traumatic nature of this event. As such, the toll that the SEQ floods will have on mental health, disease and social issues are estimated to be long-lasting, and cost approximately \$4.4 billion.



# Background.

Gully erosion on access track to Ipswich Council Reserve. Land slip on access track  
Source: HLW 2022 Flood Impact Map





# This analysis.

The 2022 SEQ Rainfall and Flooding event (“the event”) had – and continues to have – wide-ranging impacts on individuals, businesses, communities and the economy. The impacts of the event are still being assessed, and compounded by successive weather events.

The purpose of this report is to estimate the social, financial and economics impacts of the flood using information collected to-date by QRA, in conjunction with other Queensland Government agencies.

The report will be used to understand the magnitude and type of social, financial and economic costs associated with the 2022 SEQ Rainfall and Flooding event. This is important for aligning the identified impacts to the appropriate lines of functional recovery, which will serve as a tool for evaluating existing disaster recovery planning and operations, as well as inform future disaster recovery and resilience policy planning (The State Recovery and Resilience Plan).

The impacts presented in this report are the social, financial and economic costs of the event and do not reflect the total impact the event had on Gross State Product.

The report presents:

- **CHAPTER 1 | Background:** Provides an overview of event details and the compounding impacts of natural disasters.
- **CHAPTER 2 | Overview of Approach:** Summarises the scope of analysis and the approach adopted in monetising the social and economic impact of the event.
- **CHAPTER 3 | Social, Financial and Economic Costs:** Presents the social, financial and economic costs of the event, broken down by damage category.
- **CHAPTER 4 | Regional Impacts:** Discusses how the scope and scale of impacts varies by region, with case studies for Gympie, Lockyer Valley and Ipswich presented.
- **Appendix | Technical Appendix:** Sets out the technical methodology, key assumptions, data sources and sensitivity analysis.

Figure 2: QRA Disaster Funding Activations Map, 2022 SEQ Rainfall and Flooding



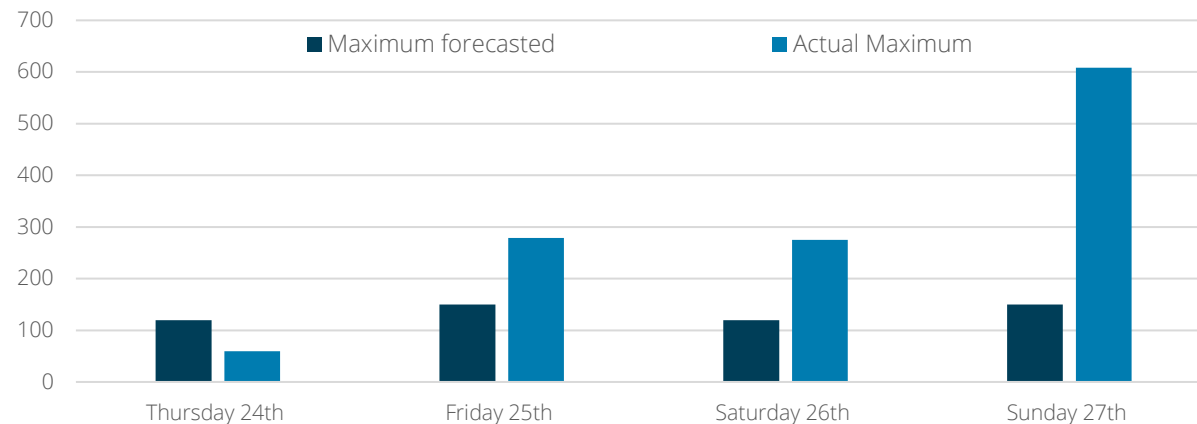
Source: QRA Disaster Funding Activations Map, 2022 SEQ Rainfall and Flooding.

# Event details.

From 22 February to 5 April 2022, South East Queensland (SEQ) experienced unprecedented heavy rainfalls and major flooding. The rainfall levels experienced in Brisbane significantly exceeded the Bureau of Meteorology's (BOM) forecasted maximum between 25 – 27 February. Due to the rapid escalation of the event, there was limited time to prepare. As a comparison, in the 2010-11 SEQ flooding event, before the river rose, Brisbane City Council had three days' notice to prepare and to assist residents to prepare for the event. <sup>1</sup>

23 LGAs were activated under the joint Commonwealth-State Disaster Recovery Funding Arrangements (DRFA) in the South East Queensland Rainfall and Flooding event. 21 of these LGAs were also activated for measures under DRFAs for other events within the 2021 – 2022 disaster season, with South and North Burnett, Gympie and Bundaberg LGAs being active under four events.<sup>2</sup> These disasters have had direct and indirect economic and social impacts on individuals, communities and businesses, with impacts compounding for those regions that were hit with a new disaster during recovery. Both the up-front costs and the longer term community impacts will depend in part on the resilience of the community to withstand, respond to and recover from disaster events.

**Chart 1: BOM forecasted and actual rainfall for Brisbane**



Source: BOM. Forecasted rainfall as against the actual average and actual maximum rainfall for Brisbane City

<sup>1</sup> Brisbane City Council (2022). Brisbane Flood Review

<sup>2</sup> QRA (2022).

<sup>3</sup> Brisbane City Council (2022). Brisbane Flood Review.

## Timeline of event<sup>3</sup>

### Thursday 24 February 2022

- Early warning alerts – severe weather warning and creek flooding

### Friday 25 February 2022

- Rainfall: 216mm (day average), Brisbane City
- Queensland Government requests drivers asked to avoid all non-essential travel

### Saturday 26 February 2022

- Rainfall: 195mm (average). Brisbane River Flood/Tide Peak: 1.81m (AM) 1.87m (PM)

### Sunday 27 February 2022

- Rainfall: 350mm (average). Brisbane River Flood/Tide Peak: 3.01m (AM) 3.41m (PM)
- QLD Premier declares disaster in Brisbane - urges SEQ residents to stay home.

### Monday 28 February 2022

- Rainfall: 9mm (average). Brisbane River Flood/Tide Peak: 3.85m (AM) 3.41m (PM)
- State and non-state SEQ schools were closed across 13 LGAs

### Tuesday 29 February 2022

- Rainfall: 1mm (average). Brisbane River Flood/Tide Peak: 3.85m (AM) 3.41m (PM)
- Morning high tide restricted clean-up efforts and movement in some areas

### Wednesday 30 February

- Day 1 of Recovery and Kerbside collection
- Mud Army 2.0 registrations open

### Thursday 3 March 2022

- QLD Premier makes media announcement for people to consider staying at home for the next 24-48 hours due to unstable weather conditions.
- Initial roll-out of 100 Mud Army 2.0 volunteers cancelled due to severe storm activity.

### Friday 4 March 2022

Planned deployment of Mud Army 2.0 postponed due to severe storm activity.

### Saturday 5 March 2022

- Mud Army 2.0 deployed
- QLD and Federal governments announce financial support package for small businesses, farmers, not for profits and sports/community clubs in SEQ.

### Sunday 6 March 2022

- ADF continue residual clean up works (continued until 24 March)

# Compounding impacts of natural disasters.

While the impacts of the SEQ Rainfall and Flooding event are estimated and presented in isolation in this report, it is important to consider these impacts in the context of more frequent natural disasters.

On 25 May 2022, BOM released a formal record of the event (Special Climate Statement 76). The statement outlined that “in recent decades, there has been a trend towards a greater proportion of high-intensity, short-duration rainfall events, especially across northern Australia”.<sup>1</sup> The long term impact of such flooding events is that insurance premiums will rise further for people living in flood prone designated areas.<sup>2</sup>

Recent research in Australia found that the consequences of one disaster in Australia **often erodes a community's ability to be resilient and respond to future disasters**. Similarly, when disasters hit a region multiple times, this can slow recovery due to already weakened support systems and increased vulnerability to future disasters. This was observed in the townships of Charlton and Creswick in Victoria, which flooded three times in the space of five months prior to the 2010-11 flooding event (Victoria). The earlier, but smaller, floods were said to have eroded community support systems, and contributed to community apathy towards the more destructive 2010-11 flooding event.<sup>3</sup>

The recent IPCC report articulates that global vulnerability to climate induced damage is expected to increase, as the frequency of multiple climate hazards occurring concurrently increases, which only compounds overall risk for communities. The IPCC highlighted the importance of adopting adaptation and resilience strategies to in reduce a country's exposure and vulnerability to these climate change relates impacts.<sup>4</sup>

This is increasingly important for a state like Queensland, which is extremely vulnerable to climate change damages and has recently experienced a number of intense natural disaster events. The latest update to the *Australian Business Roundtable for Disaster Resilience and Safer Communities* found that as a result of climate change, the cost of natural disasters is growing every year, and will reach \$39 billion per year by 2050. **Queensland is expected to incur the largest increase in natural disaster related costs as a result of climate change** and accounts for nearly 40% of the growing national cost.<sup>5</sup>

To lessen the impact on Queensland's economy and its people, **immediate and strategic investment in adaptation is essential**. A recent Deloitte Access Economics report found that by investing in adaption and resilience, Australia could avoid **\$380 billion in worsening economic costs** from climate change.<sup>6</sup>

The compounding impacts of recent natural disasters in Queensland are acute in some regions. These impacts have been discussed for Gympie, Lockyer Valley and Ipswich case studies on Page 23-24.

<sup>1</sup> The Bureau of Meteorology. (2022). Special Climate Statement 76 - Extreme rainfall and flooding in south-east Queensland and eastern New South Wales, February-March 2022.

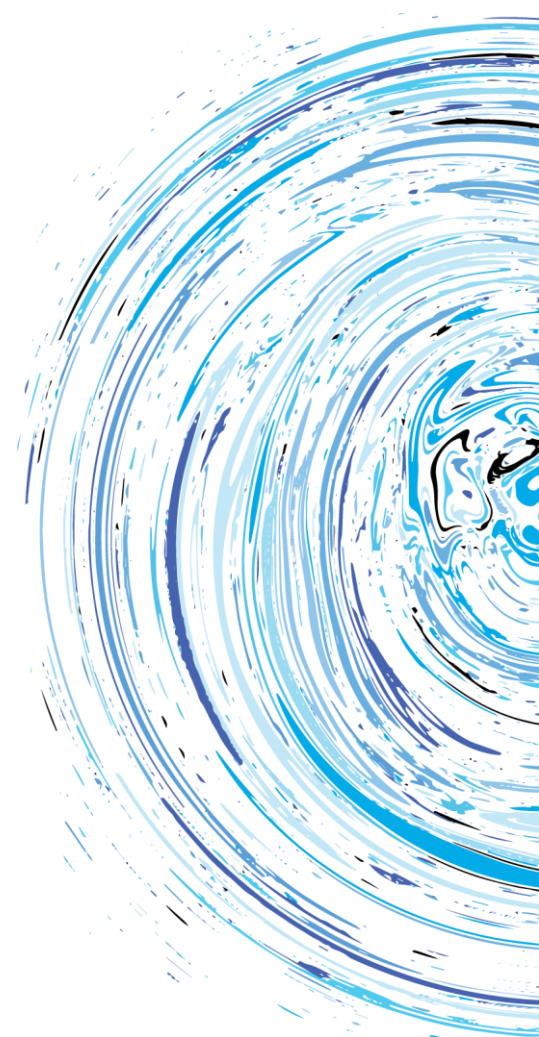
<sup>2</sup> Australian Housing and Urban Research Institute (AHURI). (2022). Brief: Floods and the future for housing insurance.

<sup>3</sup> Gissing, A. et al. (2021), *Compound natural disasters in Australia: a historical analysis*, Environmental Hazards 21(2): 159-173

<sup>4</sup> Intergovernmental Panel on Climate Change (2022), *Climate Change 2022: Impacts, Adaptation and Vulnerability*

<sup>5</sup> Deloitte Access Economics (2021), *Special Report: Update to the economic costs of natural disasters in Australia*. Australian Business Roundtable for Disaster Resilience and Safe Communities.

<sup>6</sup> Deloitte Access Economics (2022), *Economic reality check: Adapting Australia for climate-resilient growth*







# Overview of approach.

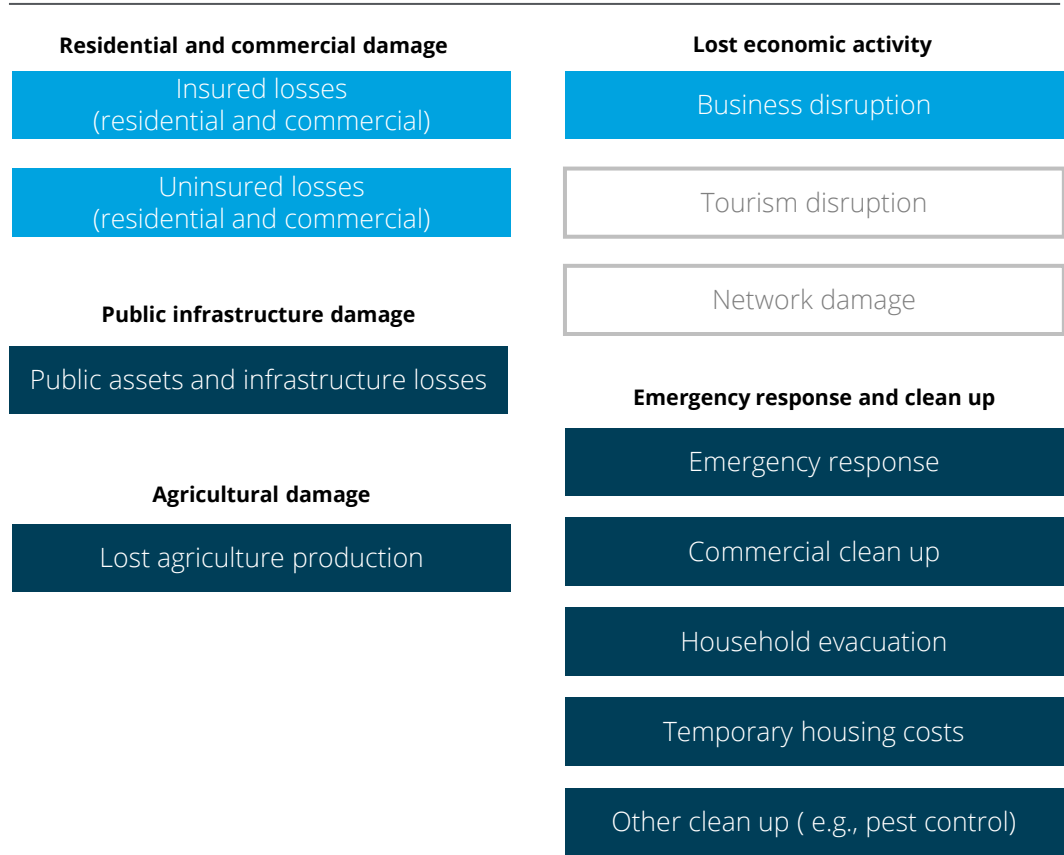
Sunshine Coast street.  
Source: HLW 2022 Flood Impact Map



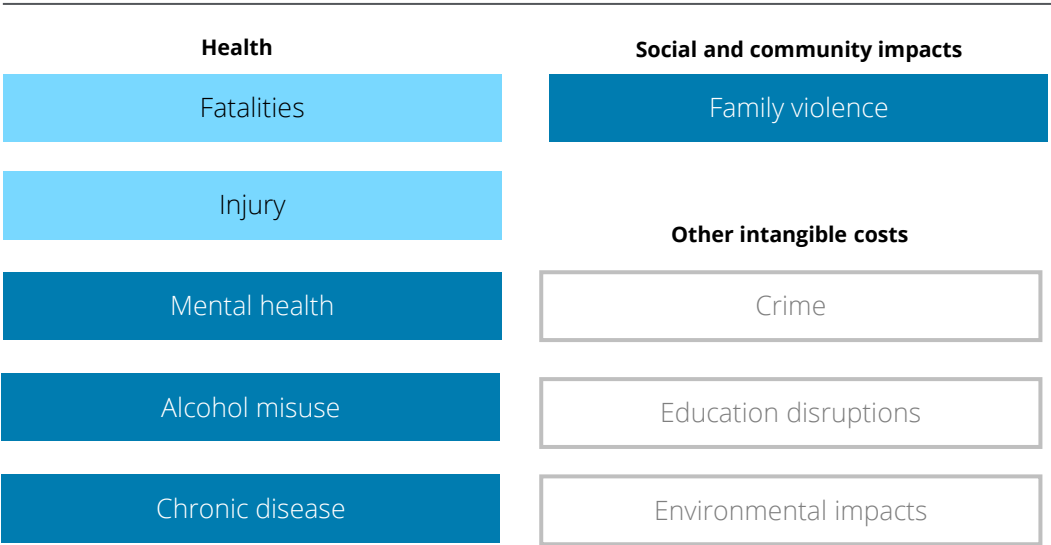
# Overview of Social, Financial and Economic Costs.

In order to estimate the social, financial and economic costs of the 2022 SEQ Rainfall and Flooding event, Deloitte Access Economics has utilised the following analytical framework to categorise and analyse the costs associated with the event. This framework has been used to estimate the cost of natural disasters across Australia, including the 2011 floods in Brisbane for QRA in the past. This framework identified two key types of costs – tangible and intangible. Within these overarching cost categories, specific costs that are relevant and significant have been identified.

## Tangible Costs



## Intangible Costs



### Key

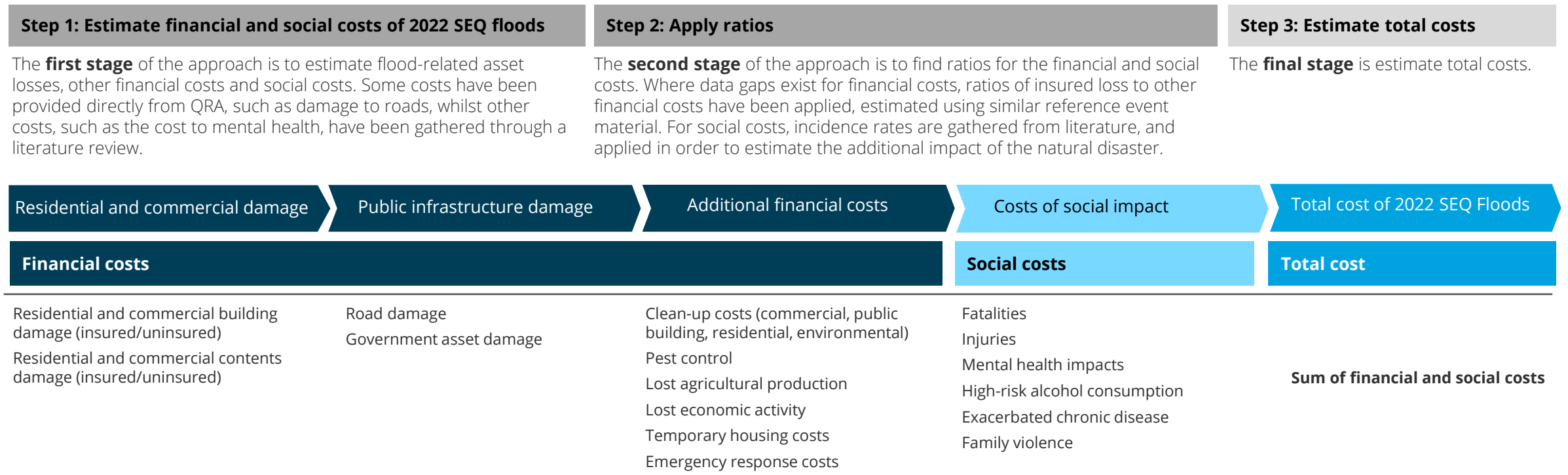
- Financial costs from private asset damage
- Other financial costs
- Death and injury
- Other social costs
- Items not included in cost estimates



# Approach.

To estimate the social, financial and economic costs associated with the 2022 SEQ Rainfall and Flooding event, the following methodology has been used. Largely, this methodology consists of three main steps; 1) estimating the cost associated with each cost category, 2) estimating any ratios or incidence rates, and then finally 3) summing the financial and social costs associated with the event. Notably, the financial costs consist of one-off costs, whilst an NPV calculation has been used for social costs given their tendency to impact affected populations for extended periods. Refer to the Technical Appendix further detail on the approach.

The data collection process ran between 20 April 2022 and 12 May 2022. A detailed summary of these sources are provided in the Technical Appendix.







# Social, Financial & Economic Costs.

# Summary of costs.

There are a large range of costs that are associated with the 2022 SEQ Rainfall and Flooding event. Some of these have been monetised, whilst others have been discussed qualitatively in this report. Table 1 presents a summary of the costs identified and estimated utilising the framework presented on Page 11.

Table 1 presents:

- **Type of cost:** whether the cost is tangible or intangible
- **Damage category:** the category the identified damage aligns with, based on the framework presented on Page 11
- **Magnitude of impact:** quantified estimation of the magnitude of the damage
- **Time of impact:** time of data collection for the impact, as well as the timelines for the impact
- **Cost:** the total estimated monetary cost associated with the damage category
- **Time of cost:** indicates whether the damage is a one-off cost, or if it will continue to have impacts into the future

Table 1: Summary of Costs

Type of cost	Damage category	Magnitude of impact	Time of impact	Cost	Time of cost
Tangible	<b>Residential and commercial damage</b>	<ul style="list-style-type: none"> <li>• Approximately 18,000 homes and businesses affected, with 10.9% classified as being severely damaged, and 15.1% classified as being moderately damaged.</li> <li>• As of April 13, 78,845 property related claims were made to the ICA</li> <li>• 11,797 motor vehicles related claims were made to the ICA</li> <li>• \$1.38 billion in insured losses according to the ICA</li> <li>• 46.8% ratio of insured to uninsured loss value has been estimated</li> </ul>	Data collected between March and May. Data collection is ongoing	\$2.0 b	Historical, one-off
Tangible	<b>Public infrastructure damage</b>	<ul style="list-style-type: none"> <li>• Around 1,718 km of state-controlled roads closed or restricted. Two roads remain closed for major repairs due to significant landslips</li> <li>• 19 Brisbane ferry terminals were damaged, with six requiring major repairs</li> <li>• The ferry fleet sustained damage, with one sinking</li> <li>• Estimated \$20 million in costs of repairs to ferry terminals</li> <li>• 20,000 households placed an Essential Services Hardship Assistance Grant claim for the loss of an essential service, such as power</li> <li>• 17 TAFE campuses were forced to close due to damage, with one campus estimating \$200k in repair costs</li> <li>• 3,050 repair work orders for social housing properties</li> </ul>	Data collected between March and May. Data collection is ongoing	\$492 m	Historical, one-off



# Summary of costs.

Table 1: Summary of Costs (cont.)

Type of cost	Damage category	Magnitude of impact	Time of impact	Cost	Time of cost
Tangible	<b>Lost economic activity</b>	<ul style="list-style-type: none"> <li>4,579 (97%) respondents to a DESBT Small Business Survey indicated they were impacted by the event</li> <li>Approximately 4,145 employees impacted by the event</li> <li>Of the respondents, 62% were forced to close for a period of time</li> <li>Over 3,000 grant applications were made for support for small businesses</li> </ul>	Data collected between March and May. Data collection and impact is ongoing	<b>\$324 m</b>	Historical, one-off
Tangible	<b>Agricultural damage</b>	<ul style="list-style-type: none"> <li>The Department of Agriculture and Fisheries has estimated the impact to agricultural production to be 30% of the total value of production</li> <li>17 LGAs, and 2,250 primary producers affected</li> </ul>	Value estimated for this financial year. Impact is ongoing	<b>\$254 m</b>	Historical, one-off
Tangible	<b>Emergency response and clean-up costs</b>	<ul style="list-style-type: none"> <li>Evacuation and temporary housing support cost approximately \$4 m</li> <li>Significant damage to the infrastructure and the environment within the affected LGAs also carries a large response and clean-up cost of \$42 m</li> <li>101,845 emergency response grant claims were made (equating to \$18 m in PHAS support)</li> </ul>	Data collected between March and May. Data collection is ongoing	<b>\$65 m</b>	Historical, one-off
Intangible	<b>Human, social and community impacts</b>	<ul style="list-style-type: none"> <li>Over 500,000 persons estimated to have been affected by the event in some way</li> <li>13 fatalities occurred, with almost 200 injuries estimated</li> <li>22,000 psychological first aid visits made across the LGAs</li> <li>Over 29,000 calls were made to the Community Recovery Hotline for support</li> <li>Over 17,000 contacts made at Community Recovery Hubs</li> <li>Cost of fatalities and physical injury estimated at \$84 m</li> <li>Cost of mental health impacts estimated at \$1.9 b</li> <li>Cost of alcohol misuse estimated at \$18 m</li> <li>Cost of chronic disease estimated at \$1.7 m</li> <li>Cost of family violence estimated at \$0.8 m</li> </ul>	Data collected between March and May. The impact to health and communities is ongoing	<b>\$4.5 b</b>	Fatalities and injuries are a one off-cost Health impacts are expected to impact affected populations over their lifetime (see Appendix)
Intangible	<b>Other social impacts</b>	<ul style="list-style-type: none"> <li>QBuild has created 2,971 repair work orders at Education facilities, with 198 being for significant damage</li> <li>State and non-state schools were closed across 13 LGAs on Monday 28 February</li> <li>Six SEQ schools were closed until the commencement of Term 2</li> <li>A total of 1,030 police personnel were deployed to assist flood affected areas</li> <li>A total of 10 persons on 14 charges were arrested in relation to anti-looting offences</li> <li>50 million tonnes of sediment was moved through catchments from rain and flood water</li> <li>An estimated 30,000 cubic metres of rubbish was dropped at council tips and recycling centres</li> </ul>	Data collected between March and May	–	While not costed, social impacts are likely to be long lasting
<b>Total</b>				<b>\$7.7b</b>	

Note: some numbers may not add due to rounding.

# Residential and Commercial Damage.

Rainfall and flood events have significant impacts on homes and properties. The damage of flood waters and debris carry high costs, and as such residential and commercial damage represents one of the highest costs associated with the 2022 SEQ Rainfall and Flooding event.

Across SEQ, approximately 18,000 homes and businesses were affected by the floods, with 10.9% classified as being severely damaged, and 15.1% classified as being moderately damaged. As such, as of April 13, the Insurance Council of Australia (ICA) reported a total of 97,329 claims, with 78,845 claims being property related. Overall, these claims amount to **\$1.4 billion in insured residential and commercial losses**.

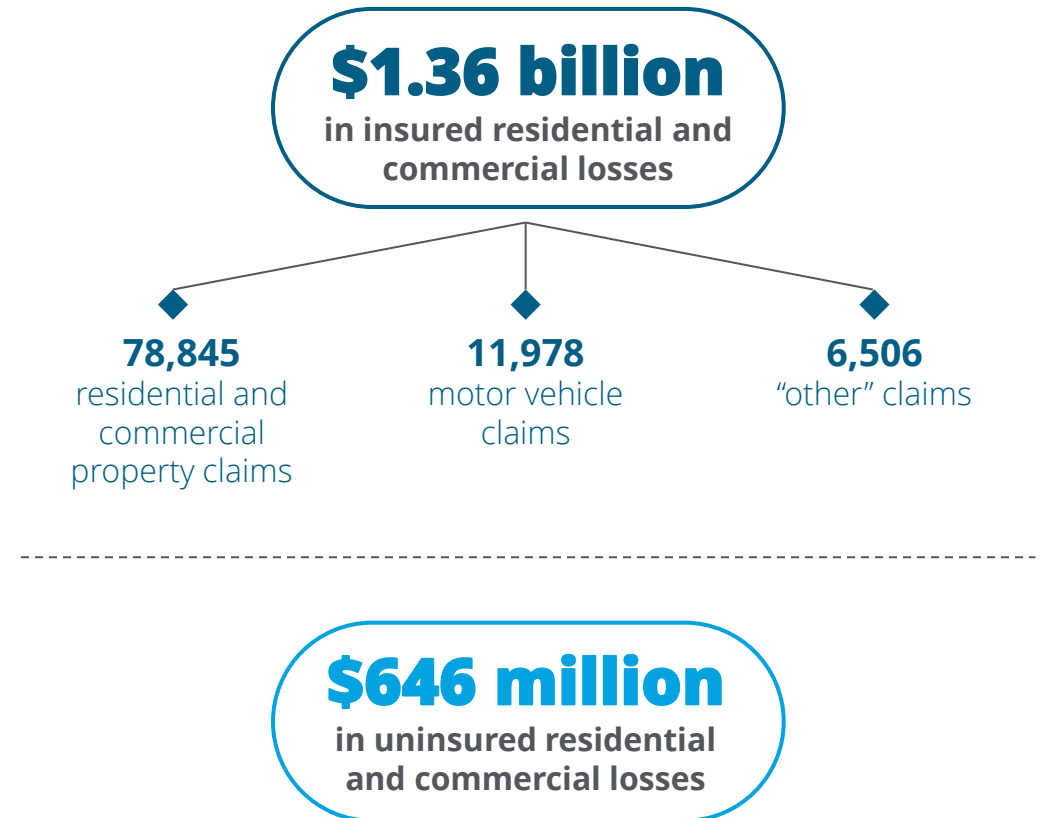
However, this insured value does not reflect the total value of losses sustained by the affected population. Many of the affected population are likely to be uninsured, or underinsured, meaning that the insured loss value undervalues the cost of the floods to residential and commercial properties.

The long term impact of flooding events of this magnitude is that insurance premiums will rise further for residents and businesses operating in flood prone areas.<sup>1</sup> A report by the ACCC in 2019 found that home contents and strata insurance is becoming increasingly unaffordable in Northern Australia.<sup>2</sup> The report found that home and contents insurance premiums in Northern Australia are, on average, more than double those in the rest of Australia. As a consequence, there are high rates of non-insurance and underinsurance in these areas. While SEQ is outside this report's definition of Northern Australia, it would be fair to assume that the rising costs of premiums in SEQ are likely to similarly result in higher proportions of non-insurance and underinsurance.

An estimated ratio of insured losses to uninsured losses developed by Deloitte Access Economics was applied to the total ICA data. This provided an estimated **total uninsured residential and commercial loss of \$646 million**. A sensitivity analysis on this assumption is provided in the technical appendix.

Combined, the **total estimate for residential and commercial damage is \$2 billion**.

Figure 3: Insured and uninsured loss



<sup>1</sup> AHURI. (2022). Brief: Floods and the future for housing insurance.

<sup>2</sup> ACCC (2019), High premiums leading to rise in uninsured homes in northern Australia.



# Public Infrastructure Damage.

Damage to public infrastructure assets across SEQ was extensive. Data on this damage category was relatively limited, with the financial costs of damage to infrastructure such as telecommunications, water and sewerage, currently unknown. However, using damage estimates for roads and some government assets, it is estimated that the **total public infrastructure damage is approximately \$492 million**. Notably, this is likely an underestimation due to the noted data limitations.

## Roads damaged

Heavy rainfalls and flood waters caused significant damage to state roads across the affected LGAs, with 1,718 km of state-controlled roads closed or restricted due to damage. Rain-induced landslips also caused widespread pavement damage and scouring around bridges and culverts. This required emergency works in order to repair these roads and enable them to be used again in a timely manner. Beyond the financial cost of repair, damaged roads also carry large flow-on effects as roads are essential for trade.

Road damage was only made worse due to the fact that SEQ has experienced 3 major disaster events in the past year, wearing away at many of the roads in the region. This has meant that large sections of SEQ's network have been closed on numerous occasions over the past year, only working to compound the flow-on effects to trade and business operations. As of early-May, two roads remained closed for major repairs within the Gold Coast hinterland due to significant landslips.

## Ferry terminals

A total of 19 Council owned ferry terminals were damaged in the floods, with six requiring major repairs. 16 of those terminals withstood substantial structural damage despite inundation and striking from debris. The fleet had varying degrees of damage, with 1 ferry sinking.<sup>1</sup> The current estimated cost of repairs is \$20 million across the terminal network as a whole. Had terminals not been reconstructed in a flood resilient form as part of the Flood Recovery Program, the damage (replacement cost) of these terminals is estimated to have been in the order of \$100 million to \$120 million.<sup>2</sup>

The extent of damages led to a suspension of all ferry services which has caused significant impacts to patron commute times and convenience and has put additional pressure on roads and other public transport systems in absorbing this demand. Some City Cat services recommenced at the end of May, however, some terminals remain closed due to ongoing repairs. Data on ferry patronage was not provided to Deloitte and therefore the cost of this disruption has not been included in the cost estimates.

<sup>1</sup> Brisbane City Council (2022), *2022 Brisbane Flood Review*.

<sup>2</sup> Information provided by Brisbane City Council. 8 June 2022. Numbers are in 2022 dollars.

<sup>3</sup> Koks, Elco, Raghav Pant, Scott Thacker, and Jim W. Hall (2019), *Understanding Business Disruption and economic losses due to electricity failures and flooding*.

<sup>4</sup> Queensland Rail (2022), *Sunshine Coast line update – Severe weather and freight train derailment*

<sup>5</sup> Data provided by Building Functional Recovery Group. Received 3 May 2022.

## Energy infrastructure

Energy infrastructure suffered extensive damage during the 2022 Rainfall and Flooding event, resulting in power outages across the affected LGAs.

It is estimated the total costs to energy infrastructure attributed to the flooding event are at least \$12 million. In total, over 180,000 customers lost power, and almost 20,000 households put in a Essential Services Hardship Assistance Grant claim, which is related to the loss of an essential service, such as power, for more than five days. This indicates that around 20,000 households were without power, or another essential service, for more than five days during the event. Many more would have been without power for a shorter time period.

The loss of power, in itself, incurs economic and social costs as affected households are forced to find other lodgings to wait out the power outage, or live without power for several days. Businesses impacted by the power outages would have also experienced significant costs, with the majority forced to close until power returned.<sup>3</sup>

## Other public infrastructure

Railways were not as severely damaged during this flooding event as in previous events. However, heavy rainfall and flooding caused water over the tracks in several locations across SEQ, and caused the derailment of a third-party freight train near Gympie. No serious injuries were sustained, but this incurred significant repair costs and disrupted travel along this line for an extended period.<sup>4</sup>

Further, rainfall and flooding across the regions also damaged and caused the closure of 17 TAFE campuses. Training in these campuses was suspended for up to two weeks, and many defaulted to online training. Those that did default to online, however, still incurred a cost given that students were unable to access essential equipment located on the campuses. While the financial costs of repair have not been fully accounted for at this stage, one TAFE campus has quoted \$200,000 in repair costs due to flooding and water damage.

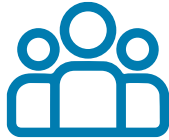
Finally, social housing was also impacted by the rainfall and floods, with QBuild reporting 3,050 repair work orders for social housing properties, where 32 of these related to significant damage. Not only does this carry an economic cost, but it also has social implications for persons displaced from these homes whilst repairs are undertaken.<sup>5</sup>

# Lost Economic Activity.

Figure 4: Lost Economic Activity



An estimated **\$324 million in damages** to small businesses



An estimated **4,145 workers** directly impacted due to forced closures.



**62%** of small business survey respondents **were closed for a period of time** due to the floods

A Noosa café owner submitted the following picture (right) to Healthy Land and Water, showing how flooding impacted many SEQ businesses.

The owner said that they had to close the café on Saturday and Sunday due to the rain. They were able to open on Monday to Thursday, but no one could access the café due to road closure. Subsequently, the café wasn't operating until the Friday (25 February), resulting in 6 days of lost trade.

Source: HLW 2022 Flood Impact Map



Natural disasters can be incredibly costly to small businesses in terms of lost economic activity. Not only did the 2022 SEQ Rainfall and Flooding event cause significant direct damage to small businesses' premises, stock and equipment, but the disruptions caused by road closures resulted in significant losses to businesses. Furthermore, small businesses are often more vulnerable to the costs of natural disasters than larger businesses, as they are often less adaptable and less likely to have insurance to cover disruptions.

As of 27 April 2022, 4,709 small businesses responded to the Small Business Survey, conducted by the Department of Employment, Small Business and Training (DESBT), with 4,579 (or 97%) of respondents indicating that they were impacted by the floods. 4,473 of these respondents also provided an estimated damage amount, resulting in **a total estimated damage total of \$324 million.**

Beyond monetary damage, many respondents indicated that they had workforce issues due to the flood. An estimated total of 4,145 employees directly impacted due to forced closures.

The damage sustained due to the floods, and the disruption caused, resulted in a significant number of business closures for extended periods. Of the survey respondents, 62% were closed for a period of time due to the floods. Over 60% were closed between 1 day to 2 weeks, and almost 40% were closed for over 2 weeks. 23 businesses had to permanently close.

Outside of closures, 82% of respondents indicated that the floods had impacted on their trading due to disruption or closure. The next largest impact noted among survey respondents was damage to equipment (37%) and damage to premises (35%).

A number of support grants were provided to businesses in order to assist emergency repairs and provide support for small businesses and primary producers. Over 3,000 grant applications were made, and as of 29 April 2022, the value approved was over \$18 million.

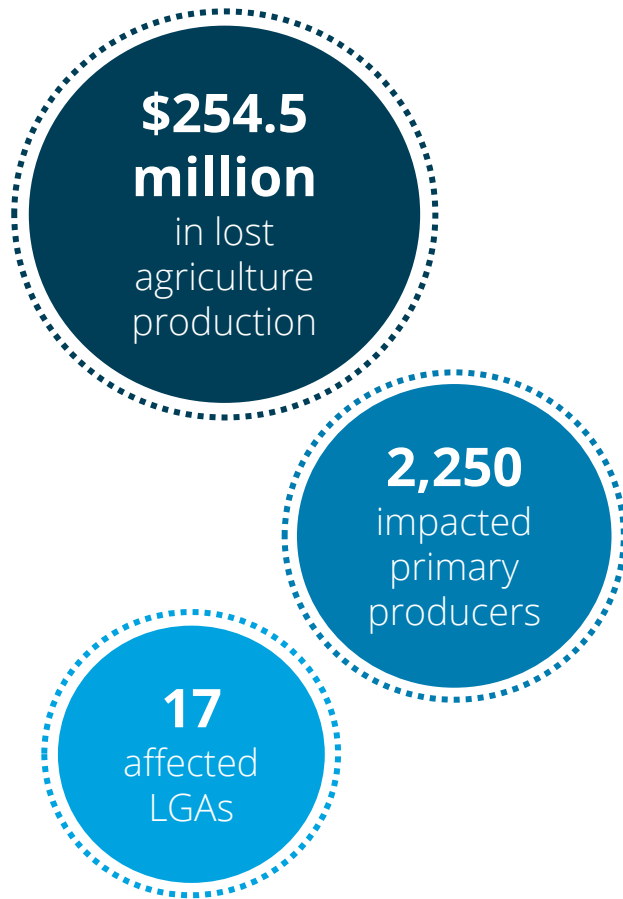
Notably, this does not capture all the costs and impacts experienced by businesses. Not all affected businesses will have responded to this survey at the time of this report, nor does it account for impacts to larger businesses. As such, it would be fair to assume this is an underestimate of the financial costs to businesses.

<sup>1</sup> Davlasheridze, Meri and Pinar C Geylani (2017), Small business vulnerability to floods and the effects of disaster loans *Small Business Economics* 49(4): 865-888



# Agricultural Damage.

Figure 5: Agriculture Damage



## Agriculture damage

The heavy rain and flash flooding significantly impacted the agriculture sector across 17 LGAs. The estimated 2,250 affected primary producers experienced a range of impacts, such as loss of fences, impacts to infrastructure and supply chains, lost cattle, devaluation of crops, increased freight costs and severe erosion and soil loss.<sup>1</sup>

The Department of Agriculture and Fisheries, industry groups and local governments estimate that the impact of the event is cumulatively around 30% percent of the total value of production – around **\$253.5 million** for this financial year.<sup>2</sup>

Many of the affected SEQ primary producers have been hit by multiple disasters in a short period of time and are struggling to recover from continued losses.

### Lockyer Valley Farmer Impacts

A Lockyer Valley Farmer submitted the following picture (right) to Healthy Land and Water, showing how flooding impacted many SEQ primary producers.

Around 500mm of flood water washed over the site and as a consequence the material applied was washed away and the area remained waterlogged, impacting pasture growth for the dairy herd.

Source: HLW 2022 Flood Impact Map



<sup>1</sup> Queensland Government Media statement (2022) Minister for Agricultural Industry Development and Fisheries and Minister for Rural Communities, The Honourable Mark Furner. Published 5 May 2022.

<sup>2</sup> Information and data provided by the Queensland Department of Agriculture and Fisheries. As at 6 May 2022.

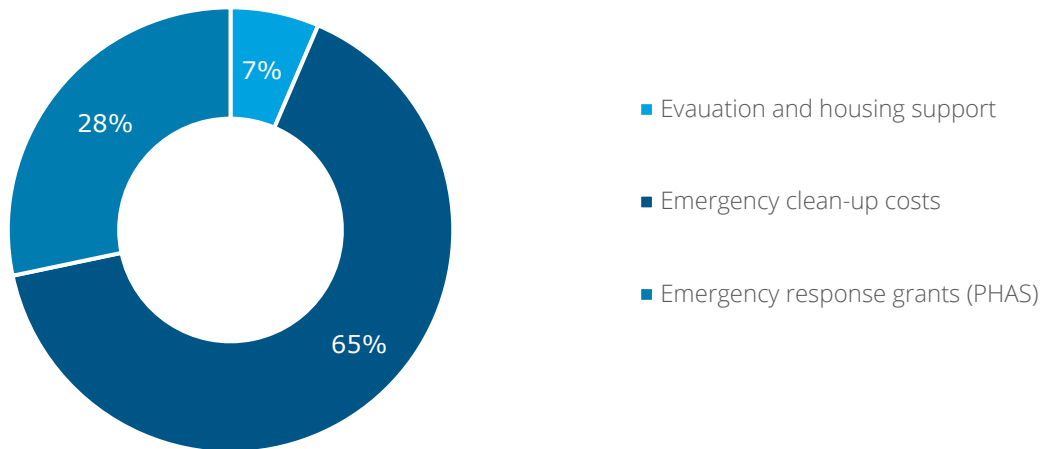
# Emergency Response and Clean-Up.

There are a large range of emergency response and clean-up costs associated with any natural disaster. The 2022 SEQ Rainfall and Flooding event occurred suddenly, and affected a wide area in a short period of time. As such, there were significant evacuation and emergency response costs associated with it.

The rainfall and flooding event also created significant clean-up costs, as it caused damage to residential, commercial and public buildings, as well as covering large areas of SEQ in mud and debris. Furthermore, the flood water caused significant damage to the environment, requiring large scale environmental clean-up efforts as well.

Overall, the costs associated with **emergency response and clean-up are estimated to be almost \$65 million.**

Figure 6: Emergency response and clean-up cost by cost type



## Evacuation and housing support

As flood waters spread across SEQ, many people needed to be evacuated and rescued from their homes. Further, the floods left many homes uninhabitable, resulting in a high need for housing support across the LGAs. Combined, this cost was estimated to be \$4 million.

## Emergency clean up-costs

The damage to property and contents, and the debris and mud spread across affected areas incurred clean-up costs. Not only did individual properties need to be cleaned, but large areas of roads and pathways were left unusable due to mud and debris. For example, sections of Brisbane's Riverwalk remained closed for weeks post the flooding event, disrupting pedestrians and cyclists who regularly use this. Given its high usage, a section of Coronation Drive was delegated for bike only use, creating additional traffic pressure on usually heavily congested road.

Beyond this, the floods also resulted in significant damage to the environment within SEQ. Riverine damage was extensive, resulting in the request for \$23 million to support riverine recovery. Emergency conservation and biodiversity initiatives have also been implemented, costing over \$4 million.

Emergency clean-up represented the largest of the emergency response and clean-up costs, with an estimated cost of \$42 million. This estimate includes residential and commercial clean-up costs focusing on clean-up, removal and disposal of flood-related debris and environmental clean-up costs.

## Emergency response grants (PHAS)

A number of financial assistance grants have been given out to the affected population in order to alleviate personal hardship and distress suffered as a result of the SEQ floods. These included grants to support households who were affected by the loss of essential services, such as power, as well as those directly affected by the floods. Across the LGAs, a total of 101,845 PHAS recovery grant claims were made, with the approved claims equating to \$18 million in support so far. This has assisted a total of 93,710 people affected by the flood.



# Human, Social and Community Impacts.

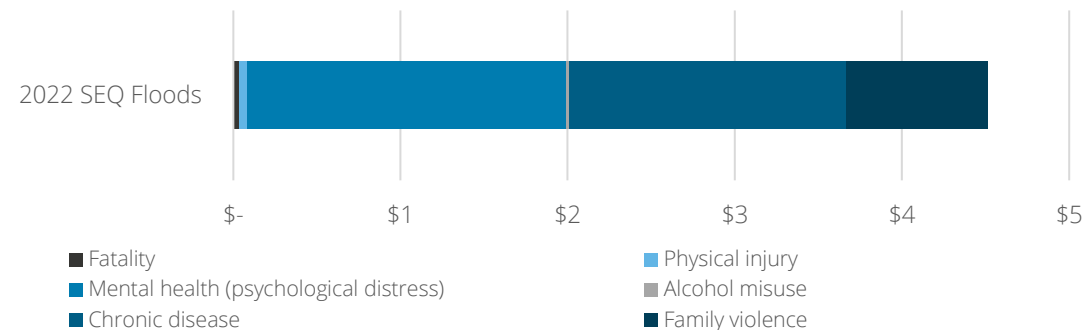
The 2022 SEQ Rainfall and Flooding event is estimated to have numerous direct and indirect health and social impacts on affected communities. Natural disasters can lead to fatalities and injuries, and the traumatic nature of these events can lead to long-standing impacts on mental and physical health (see Appendix for further detail on average life expectancy). Not all of these impacts can be monetised, however, given their intangible nature. As such only selected impacts have been monetised to estimate the total social cost.

With over 500,000 persons estimated to have been affected by the floods (according to ABS population data for suburbs activated for Personal Hardship Assistance) the social and health impacts are estimated to cost \$4.5 billion. As such, Deloitte Access Economics estimates that the social costs of this natural disaster are approximately 1.4 times the direct financial costs. Given that the affected population data used relates only to suburbs activated for Personal Hardship Assistance, Deloitte Access Economics recognises this may be a conservative estimate.

## Fatalities and injuries

During the event, 13 fatalities occurred and it has been estimated almost 200 injuries were suffered across the affected communities. The economic costs of these incidents have been estimated using the value of statistical life from the Office of Best Practice Regulation, which considers the lifetime cost of deaths and the effect of injuries on life quality. Applying this cost to the estimated prevalence of fatalities and injuries provides an approximate cost of \$84 million.

Figure 7: Social cost by peril type (\$bn)



## Alcohol misuse

Exposure to natural disasters can lead to risky levels of alcohol consumptions, which in turn can have significant negative impacts on the life of affected populations.

## Chronic disease

Natural disasters can exacerbate or induce chronic disease in affected populations. This can be caused by illness or injury sustained during the disaster, or from being separated from medicine due to road closures or other disruptions.<sup>1</sup> As such, this report has estimated the additional impact of natural disasters on diabetes, chronic obstructive pulmonary disease, and stroke.

## Family violence

The traumatic and high stress nature of natural disasters is correlated with an increase in domestic and family violence. Thus, this increase carries significant health and social costs for affected populations and communities.

## Mental health

During the rainfall and flooding event, over 22,000 psychological first aid visits were made across the LGAs to support affected populations in the aftermath of the event.

Natural disasters can have a heavy toll on mental health, often inducing grief, post traumatic stress disorder, anxiety and depression. The traumatic experience of the event and the loss of belongings, property, or loved ones, thus, has significant health and social costs associated with it.<sup>2</sup>

This report quantifies the impact of natural disasters on mental health as the estimated additional incidence of reported psychological distress across the affected population.

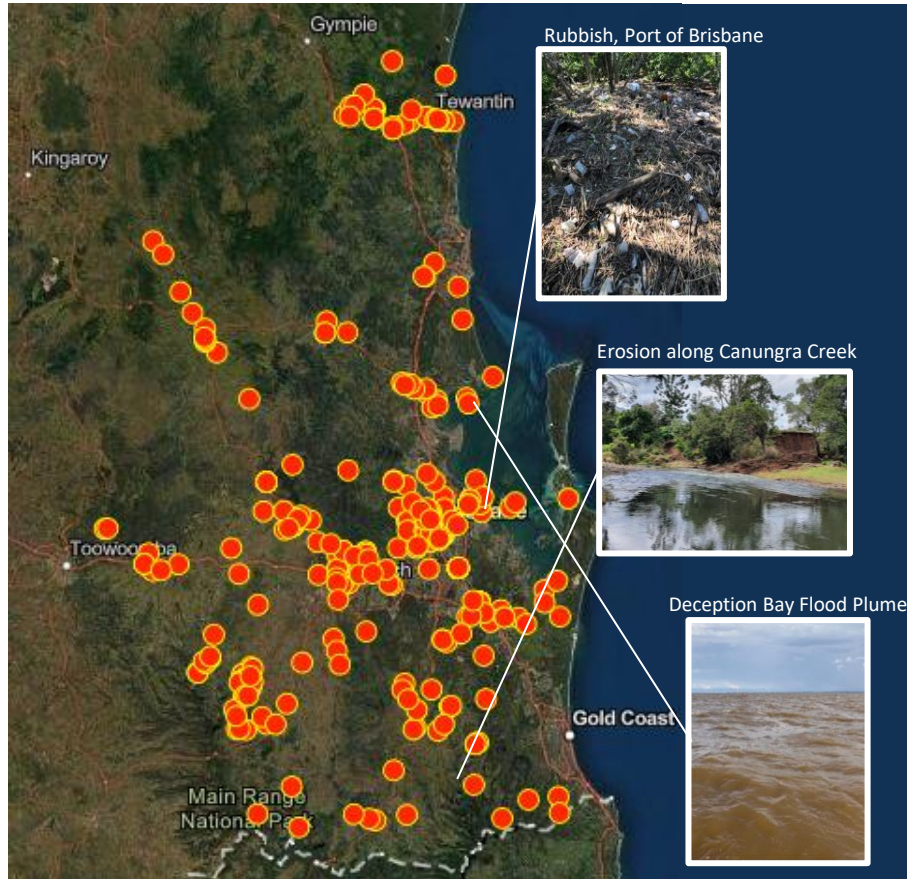
Overall, the health and social costs are significant with over 39,000 calls made to the Community Recovery hotline for recovery support, and over 17,000 contacts made at Community Recovery Hubs. Across the social and health impacts monetised, it is estimated that the **total health and social cost is approximately \$4.5 billion.**

<sup>1</sup> Miller, A. and Bonnie Arquilla (2012), *Chronic Disease and Natural Hazards: Impact of Disasters on Diabetic, Renal and Cardiac Patients* Prehospital and Disaster Medicine 23(2): 185-194

<sup>2</sup> Makwana, N. (2019), *Disaster and its impact on mental health: A narrative review*, Journal of Family Medicine and Primary Care

# Human, Social and Community Impacts.

## Healthy Land and Water impact tool – 2022 SEQ flooding



*Due to data limitations, these impacts were not monetised and included in the social, financial and economic cost estimates.*

### Education disruption

QBuild has created 2,971 repair work orders at Education facilities; 198 of these are for significant damage. A total of 613 Education facilities were impacted.<sup>1</sup>

On Monday 28 February, state and non-state SEQ schools were closed across 13 LGAs. Although the schooling system has the ability to quickly deliver at-home schooling after COVID-19 lockdowns, this still caused disruption to students' education. Further, 6 SEQ schools were closed until the commencement of Term 2.<sup>2</sup>

A 2020 OECD study revealed that students affected by school closures (due to COVID-19 lockdowns) may receive 3% lower income over their entire lifetimes – amounting to 1.5% lower annual GDP for the remainder of the century.<sup>3</sup> Although the school closures in the 2022 SEQ Floods were minor in comparison to the education disruption of the 2020 lockdowns, the research indicates that school closures carry a economic cost.<sup>3</sup>

### Crime

The Queensland Police Service commenced Operation Uniform Nash on 1 March 2022 with a focus on preventing and disrupting crime-related offences relating to the 2022 SEQ Rainfall and Flooding event. A total of 1,030 police personnel were deployed to provide assistance to flood affected areas, consisting of 9,270 patrol hours. By its closure on 10 March 2022, a total of 10 persons, on 14 charges, were arrested in relation to anti-looting offences.<sup>4</sup>

### Environmental damage

Heavy rainfalls and flood waters caused extensive degradation of waterways including riparian areas, riverine ecosystems, species habitat and productive agricultural lands. An estimated 50 million tonnes of sediment moved through catchments from rain and flood water, with 1-5 tonnes of sediment potentially impacting Moreton Bay. The nutrient concentrations in water have been found to be substantially higher than 2011 flood levels. The access water caused the further spread of invasive species including weeds, feral pigs and mosquito borne disease e.g. Japanese Encephalitis. The costs associated with pest and disease clean-up is captured on Page 19.<sup>5</sup>

The flow of water carried years' worth of landfill into Queensland water ways. Brisbane City Council estimated that 30,000 cubic metres of rubbish was dropped at council tips and recycling centres.<sup>6</sup>

<sup>1</sup> Data provided by Building Functional Recovery Group. Received 3 May 2022.

<sup>2</sup> Queensland Government Media Statement (2022). Minister for Education, Minister for Industrial Relations and Minister for Racing The Honourable Grace Grace. Published 27 February 2022.

<sup>3</sup> Hanushek, E. A., & Woessmann, L. (2020). The economic impacts of learning losses.

<sup>4</sup> Data provided Queensland Police Service. Received 6 May 2022.

<sup>5</sup> Data provided by the Queensland Department of Environment and Science. Received 11 May 2022.

<sup>6</sup> Adrian Schrinner Lord Mayor of Brisbane Statement (2022). <https://www.theguardian.com/australia-news/2022/mar/09/qld-and-nsw-floods-create-mountains-of-waste-and-spark-environmental-and-vermin-fears>





# Regional Impacts.

# Regional impacts.

## Overview

Recent AHURI research states that 66 per cent of people consider the impact of flooding as an important determinate as whether to move to a regional city. As such, the event may impact people's perception of liveability in moving to regional cities and towns within SEQ.<sup>1</sup>

The impact of the 2022 South East Queensland Rainfall and Flooding Event was significant for all SEQ regions, with the scope and scale of these impacts differing among the characteristics of each LGA. One approach to understanding these regional impacts is to distinguish between different types of regions:



### Built up residential areas



### Built up commercial areas



### Agriculture areas

Built up residential areas are densely populated, meaning that the majority of rainfall and flooding impacts relate to residential housing, public infrastructure and mental health impacts (driven by the density of population). In contrast, the impacts in built up commercial areas (i.e. CBDs) largely pertain to reduced economic activity, damaged commercial infrastructure, loss of stock and public infrastructure damage. There are some suburbs (e.g. Brisbane City) that can be categorised both as built up residential and commercial, while some LGAs encapsulate all three categories (e.g. Gympie is highly commercial in the centre, with residential pockets and agriculture areas surrounding the city.)

Agriculture areas, such as the Lockyer Valley, incurred significant impacts relating to the agriculture industry, which dominates the regional economy. The rainfall and flood impact largely related to losses in agriculture production and damage to agriculture infrastructure.

These impacts are discussed through case studies for Gympie, Ipswich and Lockyer Valley.

1. AHURI. (2022). Brief: Floods and the future for housing insurance.

2. <https://www.abc.net.au/news/2022-05-13/qld-wet-weather-heavy-rain-flash-flooding-bom-warning/101061852>

3. Gympie Regional Council (2022). Local Recovery Plan.

4. <https://gympietoday.com.au/rural/2022/03/10/bank-to-help-flooded-farmers/>

5. <https://www.abc.net.au/news/2022-03-28/gympie-flood-recovery-residents-homeless-amid-housing-shortage/100938470>

6. <https://www.couriermail.com.au/news/queensland/gympie/nolan-meats-say-gympie-flood-losses-could-be-15m/news-story/8e40d5c187cfddb6242062db9b426890>

7. <https://www.abc.net.au/news/2022-03-10/calls-to-relocate-gympie-cbd-after-latest-flood/100898230>

8. Gympie Regional Council (2022). Local Recovery Plan.

9. <https://www.brisbanetimes.com.au/national/queensland/greater-brisbane-asked-to-save-water-as-gympie-assesses-flood-damage-20220515-p5aleq.html>

## Gympie

The 2022 South East Queensland Rainfall and Flooding Event was the worst flooding event that Gympie has experienced in over a century. During the event, the Mary River reached 23m (the highest level since 1893) and floodwaters inundated 800 properties.<sup>2</sup>

On 26 February 2022, an evacuation order was made for the area of Gympie as life-threatening floods continued to inundate the region. During the event, Over 460 residents were accommodated across four evacuation centres.<sup>3</sup> Despite extensive recovery efforts, hundreds of residents and remained displaced a month after the floods, with some homeless.<sup>4</sup>

The impacts to the Gympie region are diverse and wide ranging. Primary producers suffered a loss of pasture, crops and topsoil as well as impacts on livestock and damage to stored inputs.<sup>5</sup> Nolan Meats, a family-owned company in the region, estimated that the cost of flood damage and stock loss hit at around \$15 million.<sup>6</sup>

Businesses in the Gympie CBD were also severely impacted, with water levels reaching the ceiling of some businesses. The event compounded the economic impacts of COVID-19 and recent natural disasters for businesses in the area. One Mary Street business owner indicated that they would not reopen after the event, after servicing the community for over 24 years.<sup>7</sup> When businesses close rather than recover, there are long-lasting community impacts that carry a significant cost to the region. In addition, several not for profit retail shops were inundated by floods (e.g. Little Haven Palliative Care Market Place, Neighbours Aid Gympie Op Shop, RSPCA Op Shop) with resultant revenue loss.

It has been observed within the community that the psychological distress and anxiety of the floods were compounded by mental health impacts of COVID and previous bushfires and drought in region.<sup>8</sup>

In the midst of recovery, Gympie has once again been hit by flooding. On Sunday, 15 May, Gympie was cut off after the town was inundated by floodwater and the Mary River reached 15.56 metres. This is the third major flooding event for the town in five months, with cumulative impacts being observed among local businesses and community groups.<sup>9</sup> As the region continues to be impacted by natural disasters, it loses its resilience to future stocks, extending recovery and compounding impacts to the region.



# Regional impacts.

## Ipswich

Ipswich is the fastest growing city in Queensland, but its residents endured significant damages in the 2022 SEQ Rainfall and Flooding event. Between February 25 and 28, Ipswich received 682mm of rain, and the 224mm recorded on February 26 was the highest daily total since 1974.<sup>1</sup> The onslaught caused the Bremer River to rise to 16.72m, eclipsed only by the respective 1974 and 2011 peaks of 20.7m and 19.4m.

Currently, Ipswich is characterised by a highly constrained housing market, with vacancy rates as low as 1% in some areas. This is largely due to the growing population, but is also related to the past Halloween Hailstorm in 2020, which impacted over 1,700 homes, displacing many residents and resulting in many of those homes still under repair to this day. As such, previous natural disasters have compounded the cost of this rainfall and flooding event and exacerbated the area's housing crisis.

The 2022 SEQ Rainfall and Flooding event affected the Ipswich area in a broad range of ways. Costs were widespread, with over 500 houses and over 300 businesses damaged.<sup>2</sup> In heavily affected areas, like Goodna, previous floods made some properties uninsurable, compounding the cost of the 2022 SEQ flooding for these residents. Not only were property physically damaged, but the event also had severe impacts on mental and physical health, businesses, and the environment. Specifically, some of the impacts noted in the local recovery plan include:

- Resupply access to essential food, medical supplies and fuel as a result of road and business closures
- Psychosocial impacts on community as a result of evacuations and requirement for temporary accommodation due to inundation
- Roughly 250-300 businesses impacted to varying degrees
- Flood debris moving through the river catchment impacted water quality
- 95 council-controlled roads were closed across Ipswich

<sup>1</sup> Bureau of Meteorology (BOM) (2022), Daily rainfall: Ipswich Alert [http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p\\_nccObsCode=136&p\\_display\\_type=dailyDataFile&p\\_startYear=&p\\_c=&p\\_stn\\_nm=040831](http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=&p_c=&p_stn_nm=040831)

<sup>2</sup> City of Ipswich (2022), Interim Local Recovery Plan: Flood Event February 2022

## Lockyer Valley

The Lockyer Valley is known as a 'food bowl' for its cultivation of various grains, vegetables and breeds of livestock. Its low-lying areas were significantly damaged during the 2022 SEQ floods. Gatton, a central town in the region, recorded its highest ever daily rainfall total of 302mm on February 26. Total rainfall between February 25 and 28 amounted to 531mm.<sup>3</sup>

Rainfall and floodwaters caused an estimated \$5 million in damage to critical roads in the area. Further, over 100 homes suffered damage, and the disruption had broad negative effects on primary producers. Waste and weeds washed onto produce has affected their quality, deceased livestock or been misplaced, and flood debris has damaged farm infrastructure like unpaved roads and fences.<sup>4</sup>

These are expected to have delayed consequences come harvest season that will exacerbate the long-term cost of flooding for the Lockyer Valley region. As an example, due to the rainfall and flooding event, lettuce crops were ruined across some farms, whilst other farmers weren't able to fertilise their crops. This has constrained lettuce supply in SEQ and drastically increased the cost of lettuce.<sup>5</sup>

The impacts of the floods on Lockyer Valley were varied, some of the impacts specifically noted in the local recovery plan include:

- Cumulative psychological impacts on the community, businesses and agricultural industry, due to COVID-19, bushfires, drought and major flooding events which have occurred in 2011, 2013, 2017 and now in 2022.
- Small businesses and primary producers sustained damage, disruptions and financial losses
- Damage to ecosystems within the creek catchments, as well as soil erosion and sediment build up
- 70% of the unsealed road network needs repair work
- Rail line was damaged, with lines disrupted

<sup>3</sup> Bureau of Meteorology (BOM) (2022), Daily rainfall: Gympie Alert [http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p\\_nccObsCode=136&p\\_display\\_type=dailyDataFile&p\\_startYear=&p\\_c=&p\\_stn\\_nm=040993](http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=&p_c=&p_stn_nm=040993)

<sup>4</sup> Lockyer Valley Regional Council (2022), February 2022 Flood Recovery Plan

<sup>5</sup> Read, Michael (2022), Tip of the iceberg: why lettuce could get even more pricey <https://www.afr.com/policy/economy/tip-of-the-iceberg-why-lettuce-could-get-even-more-pricey-20220509-p5ajos>



# Technical Appendix.

February 2022.  
HLW 2022 Flood Impact Map

Stream bank erosion - Cedar Creek.  
Source: HLW 2022 Flood Impact Map





# Technical Methodology.

## Overview

The methodology utilised in this paper is aligned to methodologies used by Deloitte Access Economics in previous costings of natural disasters. Specifically, the approach taken has drawn on the following reports:

- A **BTE 2001**<sup>1</sup> report which developed a framework for estimating the economic cost of natural disasters. This report has become a standard piece of literature to inform approaches and methodologies in costing natural disasters.
- **Deloitte Access Economics**<sup>2</sup> report commissioned by the Australian Business Roundtable to estimate the economic cost of the social impact of natural disasters. This report revised the BTE framework to enable the estimation of broader, longer-term social costs of natural disasters, including impacts on health and wellbeing.
- **Deloitte Access Economics**<sup>3</sup> report which utilised this established methodology and applied it to the Monsoon Trough in 2019. This report utilised a bottom-up approach to costing the disaster, whilst also applying the ratios developed in previous reports to fill in data gaps.

This approach has been refined and validated over time, and has now been applied to 2022 SEQ floods in order to estimate the tangible and intangible costs associated with the flood disaster. These are defined as follows:

- **Intangible costs** are the direct and indirect impacts that cannot be easily monetised. These can include the social costs associated with fatality, injury, and disease. These costs tend to persist over a person's lifetime.
- **Tangible costs** are the direct and indirect impacts that are easily monetised. These costs are often one-off costs that are associated with the natural disaster being investigated. These can include the financial costs associated with infrastructure damage, contents damage, business disruption and clean-up costs.

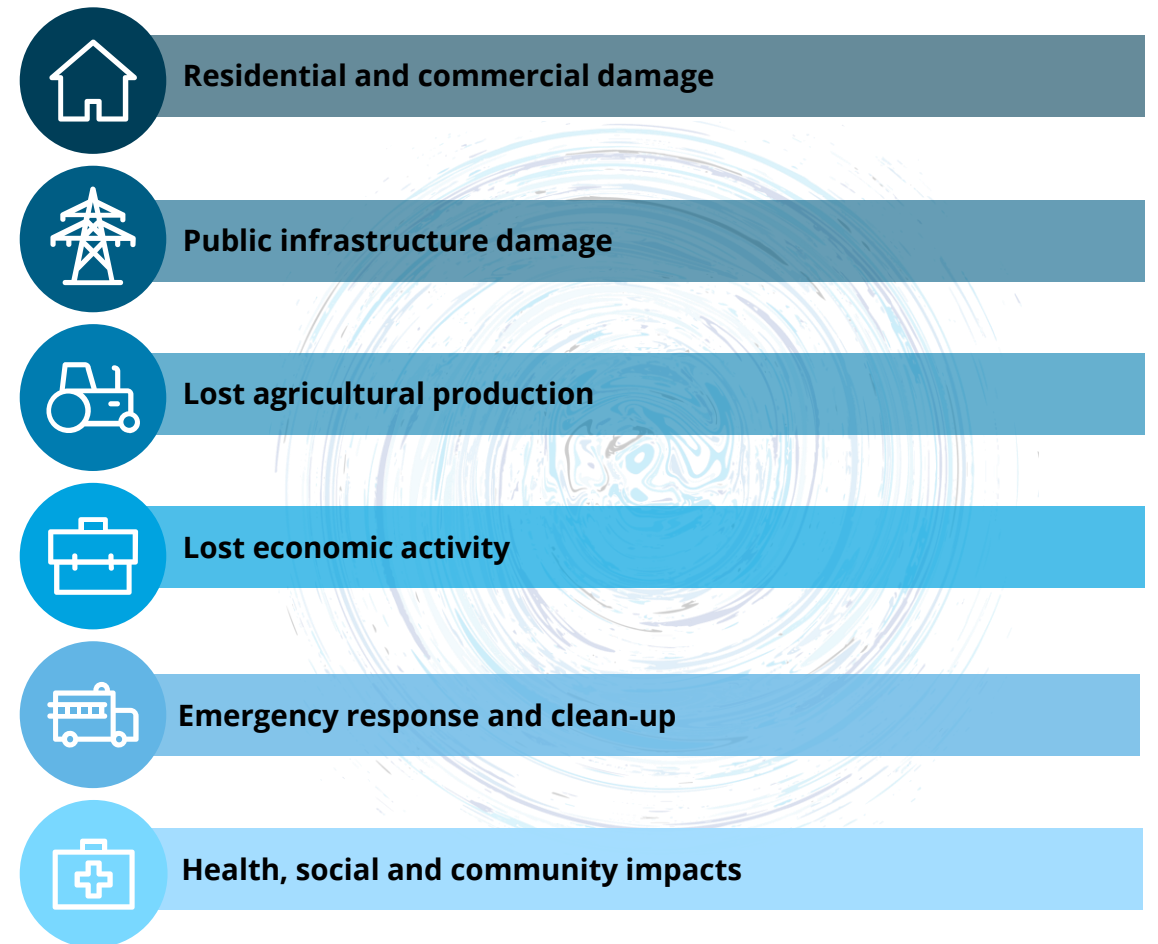
See Figure 8 for an overview of the costs included in this estimation.

<sup>1</sup> Bureau of Transport Economics (2001), *Economic costs of natural disasters in Australia*.

<sup>2</sup> Deloitte Access Economics (2016), *The economic cost of the social impact of natural disasters*.

<sup>3</sup> Deloitte Access Economics (2019), *The social and economic cost of the North and Far North Queensland Monsoon Trough*.

Figure 8: Monetised costs in this report



# Technical Methodology.

## Assumptions and methodology

### Population

This report has considered the social impact of the SEQ flooding event to 15 impacted LGAs. For each LGA, suburbs within have been identified as either being not affected, or partially, or fully activated for Personal Hardship Assistance. LGAs that have been fully activated have had ABS 2020 population data assumed to be equal to affected population. For LGA's that are only partially activated, ABS 2016 suburb data has been collected and a growth rate applied to estimate their 2020 population.

A small number of suburbs within the LGAs were identified as being partially activated. Given the relatively small population in these suburbs, and the lack of data on the proportion of population that was affected, it was assumed that the entire suburb should be included in the affected population.

### Estimating the incidence of social impacts

The incidence of social impacts included in this cost estimate was largely determined through a literature review. Through this literature review, the following social impacts were identified as having sufficient evidence to be quantified:

- Fatalities and physical injury
- Mental health issues
- Alcohol misuse
- Chronic disease
- Family violence

Notably, there was no published figures on injuries sustained in the 2022 SEQ floods. As such, injuries incurred during the 2011 floods was used as a proxy, scaled by the number of houses affected in each disaster.

Incidence rates were derived from literature, alongside the additional impact caused by the natural disaster. Evidence also suggests that the incidence of social impacts due to natural disasters drops off slowly after the event occurs. As such, the incidence rate is applied fully in the first year, and then drops by one-third every year, to 5% of the rate by the fourth year post-disaster. This reflects the spike in social impacts associated with the event, but also evidence that after this spike, most people will recover over the medium- to long- term. It is important to note, however, that not everyone will ever recover from a traumatic event, such as the floods, as such it is assumed that a small proportion of people will experience life-long impacts.

These life-long impacts are estimated using the average remaining life expectancy for the affected population, split by Adult Male (32), Adult Female (28.5), Child Male (72) and Child Female (76.5). This calculation utilised ABS life tables of remaining life expectancy at each age.

Beyond literature research, Household, Income and Labour Dynamics in Australia (HILDA) survey data was also utilised to find incidence rates for certain social impacts. This was derived from a 2017 difference-in-difference of HILDA data used in the DAE report commissioned for the ABR, and it was assumed that the impact of floods on these social impacts is unlikely to have changed significantly from when this analysis was last conducted. The incidence rates derived from this analysis was compared between those who experienced a natural disaster and those who did not to identify the additional incidence of those impacts caused by natural disasters.

### Estimating the unit cost of social impacts

A literature review was also utilised to identify the associated unit cost of each of the social impacts quantified. Each unit cost was indexed to 2022 dollars, and multiplied by the incidence of social impacts.

In some cases, a unit cost could not be found, however, the literature review was able to identify the proportion of the total costs for each outcome that could be attributed to each of the cost categories. This largely involved identifying studies that had investigated a larger population level, and the cost by each category identified was then divided by the total cost to determine the proportion. This proportion was then applied to the total costs of each outcome.



# Technical Methodology.

## Assumptions and methodology (cont.)

### Estimating the tangible costs

Most tangible costs have been estimated by local councils, government agencies and QRA, and then passed onto Deloitte Access Economics and included in this report. However, there were data gaps that remained that could not be filled through reported data, given how closely this report has followed the natural disaster event. As such, where primary data from the client could not be used to form the tangible financial costs, these costs were estimated using the methodology from *Building our Nation's Resilience to Natural Disasters*, which calculates a number of costs to insured losses ratios.

Given that total insured losses was able to be obtained from QRA, this report utilised previous ratios estimated for the 2010-11 floods and applied them to financial cost categories with data gaps. These ratios can be seen in Table 2.

Table 2: Tangible cost estimates for 2010-11 Queensland Floods

	% of total cost	\$m (2011)
Insured	47.9	\$1,266
Uninsured	22.4	\$593
Cat B	26.3	\$696
Agricultural production losses	0.0	\$0.04
Evacuated	0.0	\$0.09
Homeless	0.6	\$16
Homes – damaged	0.2	\$6
Commercial – damaged	0.0	\$1
Emergency response costs	2.5	\$65
<b>Total</b>	<b>100</b>	<b>\$2,644</b>

Source: Deloitte Access Economics, The Economic cost of the social impact of natural disasters (2016)

### Data limitations

This report largely draws upon information supplied by the QRA on the known impact of the disaster following the event. This data was, in turn, provided to QRA by several Functional Recovery Groups involved in response and recovery activities. This report was constructed in a relatively short-time frame after the event, and as such data is still being collected and the full impact is still being discovered (as an example, it can take up to three years for insurance claims to be collected on a particular disaster event).

As such, the social and economic cost estimate derived in this report is based on available data and information at the time of writing as at May 13 2022. This is likely a conservative estimate given data limitations, and as such, additional data is expected to most likely increase this estimate.

Furthermore, costs included in this report should not be considered as a 'total cost' assessment. Some of the costs estimated are temporary one-off costs, such as clean-up costs, whilst others are likely to have long-lasting impacts on affected populations, such as mental health and chronic disease. A cost-benefit analysis has not been undertaken to account for the timing and duration of identified impacts.

# Technical Methodology.

Data from Queensland Government agencies was requested in reference to the South East Queensland Rainfall and Flooding event only (22 February – 5 April 2022). The data collection process ran between 20 April 2022 and 12 May 2022. The specific dates of data provided to Deloitte Access Economics, is specified below.

## List of data sources

Type of cost	Damage category	Magnitude of impact	Source
Tangible	Residential and commercial damage	<ul style="list-style-type: none"> <li>Approximately 18,000 homes and businesses affected, with 10.9% classified as being severely damaged, and 15.1% classified as being moderately damaged.</li> </ul>	Department of Communities, Housing and Digital Economy. Received 21 April 2022.
		<ul style="list-style-type: none"> <li>As of April 13, 78,845 property related claims were made to the ICA</li> <li>11,797 motor vehicles related claims were made to the ICA</li> </ul>	Building Functional Recovery Group. Received 3 May 2022.
		<ul style="list-style-type: none"> <li>46.8% ratio of insured to uninsured loss value has been estimated</li> </ul>	DAE, The economic cost of the social impact of natural disasters.
Tangible	Public infrastructure damage	<ul style="list-style-type: none"> <li>Around 1,718km of state-controlled roads closed or restricted Two road remain closed for major repairs due to significant landslips</li> </ul>	Department of Transport and Main Roads. Received 5 May 2022. Update received 8 June 2022.
		<ul style="list-style-type: none"> <li>19 Brisbane ferry terminals were damaged, with six requiring major repairs</li> </ul>	Brisbane City Council (2022), 2022 Brisbane Flood Review.
		<ul style="list-style-type: none"> <li>The ferry fleet sustained damage, with one sinking</li> </ul>	Brisbane City Council. Received 7 June 2022.
		<ul style="list-style-type: none"> <li>Estimated \$20 million in costs of repairs to ferry terminals</li> </ul>	Department of Communities, Housing and Digital Economy. Received 29 April 2022.
		<ul style="list-style-type: none"> <li>20,000 households placed an Essential Services Hardship Assistance Grantclaim for the loss of an essential services, such as power</li> </ul>	Department of Communities, Housing and Digital Economy. Received 29 April 2022.
		<ul style="list-style-type: none"> <li>17 TAFE campuses were forced to close due to damage, with one campus estimating \$200k in repair costs</li> </ul>	Department of Employment, Small Businesses and Training. Received 29 April 2022.
		<ul style="list-style-type: none"> <li>3,050 repair work orders for social housing properties</li> </ul>	Building Functional Recovery Group. Received 3 May 2022.



# Technical Methodology.

## List of data sources

Type of cost	Damage category	Magnitude of impact	Source
Tangible	Lost economic activity	<ul style="list-style-type: none"> <li>4,579 (97%) respondents to a DESBT Small Business Survey indicated they were impacted by the flood and rainfall event</li> </ul>	Department of Employment, Small Businesses and Training. Received 29 April 2022.
		<ul style="list-style-type: none"> <li>Approximately 4,145 employees were not retained due to the event</li> <li>Of the respondents, 62% were forced to close for a period of time</li> </ul>	
		<ul style="list-style-type: none"> <li>Over 3,000 grant applications were made for support from small businesses</li> </ul>	Queensland Rural and Industry Development Authority. Received 4 May 2022.
Tangible	Agricultural damage	<ul style="list-style-type: none"> <li>The Department of Agriculture and Fisheries has estimated the impact to agricultural production to be 30% of the total value of production</li> </ul>	Department of Agriculture and Fisheries.  Queensland Government Media statement (2022), Minister for Agricultural Industry Development and Fisheries and Minister for Rural Communities, The Honourable Mark Furner. Published 5 May 2022.
		<ul style="list-style-type: none"> <li>Agriculture impacted across 17 LGAs, and 2,250 primary producers affected</li> </ul>	
Tangible	Emergency response and clean-up costs	<ul style="list-style-type: none"> <li>Evacuation and temporary housing support cost approximately \$4 million</li> </ul>	Queensland Reconstruction Authority. Received 11 May 2022.
		<ul style="list-style-type: none"> <li>Significant damage to the infrastructure within the affected LGAs also carry a large response and clean-up cost of \$40 m</li> </ul>	Queensland Reconstruction Authority. Received 11 May 2022.
		<ul style="list-style-type: none"> <li>Pest and disease clean-up costs as a result of the floods equal \$2 million</li> </ul>	Department of Environment and Science. Received 4 May 2022.
		<ul style="list-style-type: none"> <li>101,845 emergency response grant claims were made</li> </ul>	Department of Communities, Housing and Digital Economy. Received 21 April 2022.

# Technical Methodology.

## List of data sources

Type of cost	Damage category	Magnitude of impact	Source
Intangible	Human, social and community impacts	<ul style="list-style-type: none"> <li>Over 500,000 persons estimated to have been affected by the floods in some way</li> </ul>	Department of Communities, Housing and Digital Economy. Received 29 April 2022. ABS, ERP 2022
		<ul style="list-style-type: none"> <li>13 fatalities occurred, with almost 200 injuries estimated</li> </ul>	Miles, Janelle (2022), <i>Remembering those who died in Queensland's flood disaster</i> . <a href="https://www.abc.net.au/news/2022-03-12/remembering-those-who-died-in-queensland-floods/100898880">https://www.abc.net.au/news/2022-03-12/remembering-those-who-died-in-queensland-floods/100898880</a>
		<ul style="list-style-type: none"> <li>22,000 psychological first aid visits made across the LGAs</li> <li>Over 29,000 calls were made to the Community Recovery Hotline for support</li> <li>Over 17,000 contacts made at Community Recovery Hubs</li> </ul>	Department of Communities, Housing and Digital Economy. Received 29 April 2022.
Intangible	Other social impacts	<ul style="list-style-type: none"> <li>QBuild has created 2,971 repair work orders at Education facilities, with 198 being for significant damage</li> </ul>	Building Functional Recovery Group. Received 3 May 2022.
		<ul style="list-style-type: none"> <li>State and non-state schools were closed across 13 LGAs on Monday 28 February</li> </ul>	Queensland Government Media Statement (2022). Minister for Education, Minister for Industrial Relations and Minister for Racing The Honourable Grace Grace. Published 27 February 2022.
		<ul style="list-style-type: none"> <li>Six SEQ schools were closed until the commencement of Term 2</li> </ul>	
		<ul style="list-style-type: none"> <li>A total of 1,030 police personnel were deployed to assist flood affected areas</li> </ul>	Data provided Queensland Police Service. Received 6 May 2022.
		<ul style="list-style-type: none"> <li>A total of 10 persons on 14 charges were arrested in relation to anti-looting offences</li> </ul>	



# Technical Methodology.

## Sensitivity Analysis

### Social discount rate

In this report, a 7% discount rate was utilised to find the present value costs of lifelong health and social costs. This value was used as it is standard practice for infrastructure and financial cost analysis, however, many of the costs estimated in relation the SEQ 2022 Rainfall and Flooding event are social in nature. Social discount rates are typically lower given that they place higher value on future costs.<sup>1</sup> As such, we tested the sensitivity of the result using a 4% social discount rate.

In order to examine the reasonableness of assumptions regarding the social discount rate utilised, Table 3 represents the estimated health and social costs under a social discount rate of 4%. Lowering the social discount rate puts a greater weight on the future costs to health and society from the current disaster, and thus increases the present day value of those social costs. Whereas, the utilised rate of 7% puts relatively less weight on these future costs.

Under a scenario where the social discount rate of 4% is used, the health and social costs are estimated to be a total of \$5 billion. Comparatively, under the reported scenario utilising a social discount rate of 7%, the health and social costs are estimated to be \$4.5 billion.

As such, a lower social discount rate does not drastically affect the overall value of health and social costs. This is largely due to the assumptions utilised in estimating the health and social costs, which spread these costs such that the largest impact occurs in the first two years following the event, before the impacts diminish significantly over the lifetime of affected individuals (refer to Page 27).

### Ratio of insured to uninsured

The ratio utilised of insured losses to uninsured losses has been developed in the Australian Business Roundtable for Disaster Resilience and Safer Communities (2016) report<sup>2</sup>, but is originally sourced from BTE (2001) reports.<sup>3</sup> While a reasonable assumption, especially given that the reported ICA data for this event will be missing unprocessed insurance claims, we have decided to test the sensitivity of the resulting using a 24% rate. This is derived from a survey of households who registered their interest for the Resilient Homes Fund which asked whether or not they had flood cover or insurance.

Using this ratio, the total economic and social figure is impacted by \$0.3 billion, falling from \$7.7 billion to \$7.3 billion.

Table 3: Sensitivity Analysis, Social Discount Rate 4%

Type of cost	Damage category	Cost (\$ million)
Tangible	Financial costs	\$3,160
Intangible	Fatality	\$51
	Injury	\$74
	Mental health	\$2,195
	Alcohol misuse	\$21
	Chronic disease	\$1,770
	Family violence	\$958
<b>Total</b>		<b>\$8,229</b>

Table 4: Sensitivity Analysis, insured losses to uninsured losses 24%

Type of cost	Damage category	Cost (\$ million)
Tangible	Insured losses	\$1,379
	Uninsured losses	\$331
	Public infrastructure damage	\$492
	Lost economic activity	\$324
	Agricultural damage	\$254
	Emergency response and clean-up	\$61
Intangible	Health, social and community costs	\$3,128
<b>Total</b>		<b>\$7,356</b>



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