

Whew!

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Last week's floods in the north of Tasmania are reported to be the most significant in the state for 40 years. One woman is confirmed dead, whilst two men are still missing. The floods have left homes, businesses, farmland flooded and caused significant disruption to industry and transport. The impacted areas were mainly in the north region of Tasmania from Swansea in the East to Strahan in the West (see Figure 1 a): this Briefing Note only examines the flooding in Launceston.

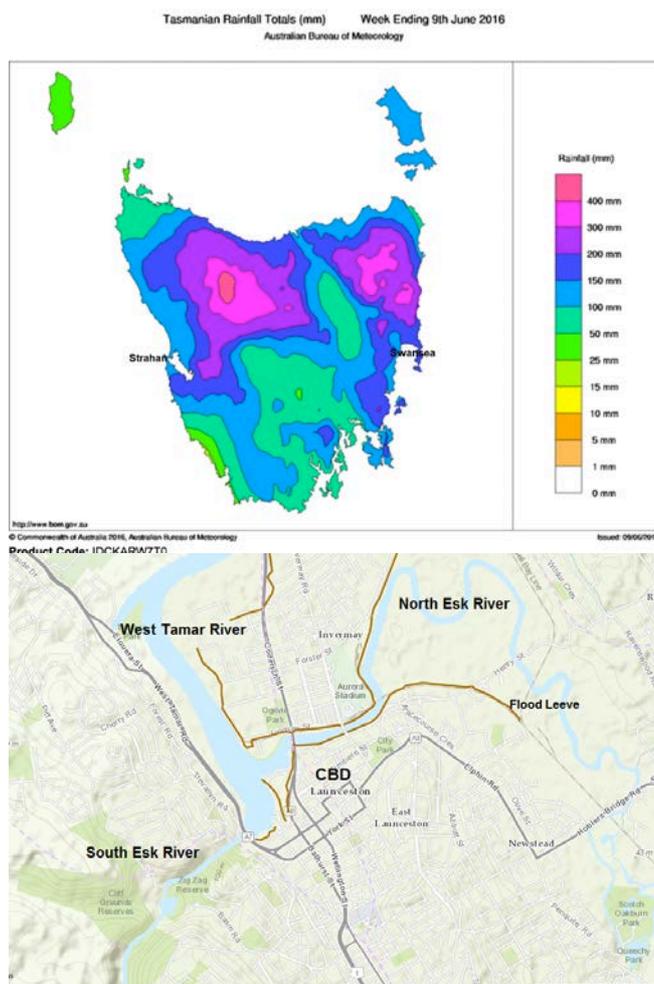


Figure 1 a) map of rainfall that impacted Northern Tasmania showing the main impacted areas and **b)** map of Launceston showing the confluence of the North Esk and South Esk Rivers with the West Tamar River estuary, central business district (CBD) and the current flood levees in brown.

Previous Launceston floods

Launceston, with 86,000 residents, has a long history of flooding (Figure 3a). A large part of its CBD and the northern suburb of Invermay lie on floodplains at the junction of the Tamar and the North and South Esk Rivers (Figure 1b).

Much of Invermay and some parts of Newstead (a suburb further east) have ground levels below the high tide mark. In other words, without the levees these areas would flood twice a day on the high tide. A flood in 1929 saw these areas inundated by more than three metres and 4,500 residents forced to evacuate¹ (Figure 2a). The town's economy fell by close to 30% and took over ten years to recover. The recovery was not helped by the Great Depression, which saw banks, that were already struggling, reluctant to lend.

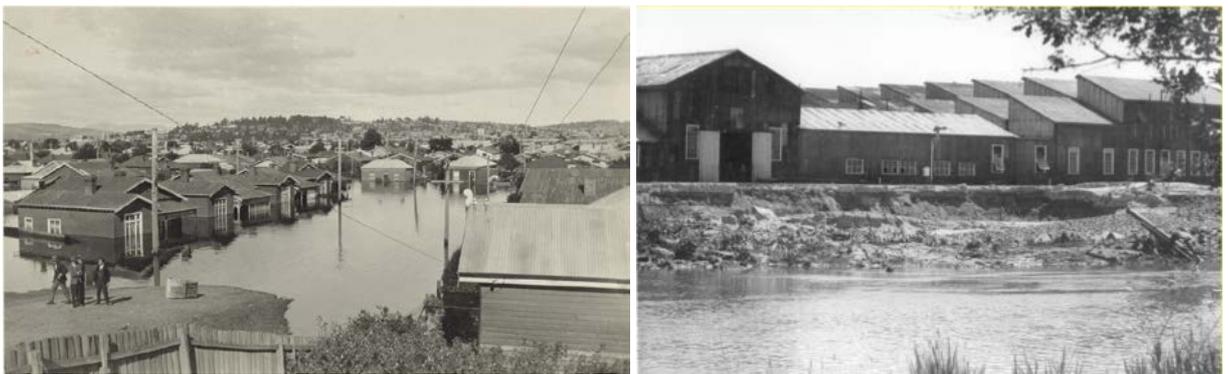


Figure 2 a) Flood waters in 1929 impacting Home Street in Invermay² and **b)** the collapsed riverbank at the Invermay Railyards during initial levee construction in 1965³.

Action plan

Following the 1929 event and the interruption of the world war, the Tasmanian State Government finally introduced the Launceston Flood Protection Act in 1955. The Launceston Flood Protection Authority was established with its main purpose to investigate flood risk in the Launceston area at the convergence of the North and South Esk Rivers and to prepare a mitigation scheme to protect low lying areas. By September 1959, estimated flood heights for a range of river flows and a design of a levee system to protect the low-lying areas of the CBD and Invermay from a Probable Maximum Flood

¹ http://www.bom.gov.au/tas/flood/flood_history/flood_history.shtml

² Tasmanian Archive and Heritage Office LPIC84/1/1

³ Fullard, A. 2013 *Launceston – A city on a floodplain protecting Launceston from a 1 in 200 ARI flood*. 53th Annual Floodplain Management Conference, Tweed Heads, Australia.

(PMF)⁴ had been established. Work commenced in the 1960s on the ten kilometre-long levee system and would take approximately ten years to complete. Progress was slow as the earth levees needed to be built in stages to ensure that the sediments were settled. Some of the early levees also collapsed, causing a change in the engineering approach, further delaying progress (Figure 2b).

Changes

The period between 1992 and 2008 saw a series of new studies reviewing the threat of flooding in Launceston and a reassessment of the protection offered by the city's levees. A new reduced recurrence interval for a given flood flow (Figure 3a) saw the estimated PMF increasing from 7,000 to 11,000 cubic meters per second. Community concerns grew as it became clear that they were not receiving the same level of protection as previously thought and definitely not at the level that would protect them from another flood event similar to that of 1929⁴.

In 2004, The Launceston City Council and the State Treasury commissioned Risk Frontiers to undertake a cost benefit analysis for various engineering options to improve the stability and integrity of the levees and raising their heights. Certain buy back options to reduce the exposure of residential buildings were also examined. When risk of levee failure was taken into account and in the absence of remedial works, the probability of a damaging flood over the next 50 years was estimated at around 40% with direct losses to residential, commercial and industrial buildings and contents around \$100 million. This figure ignores indirect economic losses to the community – business interruption and the regional net loss of jobs and people – and possible loss of life.

Subsequent to this work, the Launceston Flood Authority was established in 2008, under the Local Government Act 1933, as a single authority. Its main objectives were to:

⁴ Fullard, A. 2013 *Launceston – A city on a floodplain protecting Launceston from a 1 in 200 ARI flood*. 53th Annual Floodplain Management Conference, Tweed Heads, Australia.

- a) Design, construct and maintain the Invermay flood levees to increase resilience of flooding by withstanding a 1-in-200 ARI flood;
- b) Maintain all publically owned flood levees in the Launceston Flood Protection Scheme;
- c) Management of the sediments in the upper reaches of the Tamar River estuary including development of longer term strategies.

With funding from Federal, State and Local government, works began to rebuild the old levee system. That work was completed in September 2015. In total, \$58.5 million was spent with \$27.4 million allocated for levee construction and design and \$31.1 million on land acquisition and compensation. Figure 3a shows the timeline of major flooding and the expected ARI of given flow levels and figure 3b shows the layout of the completed protection works.

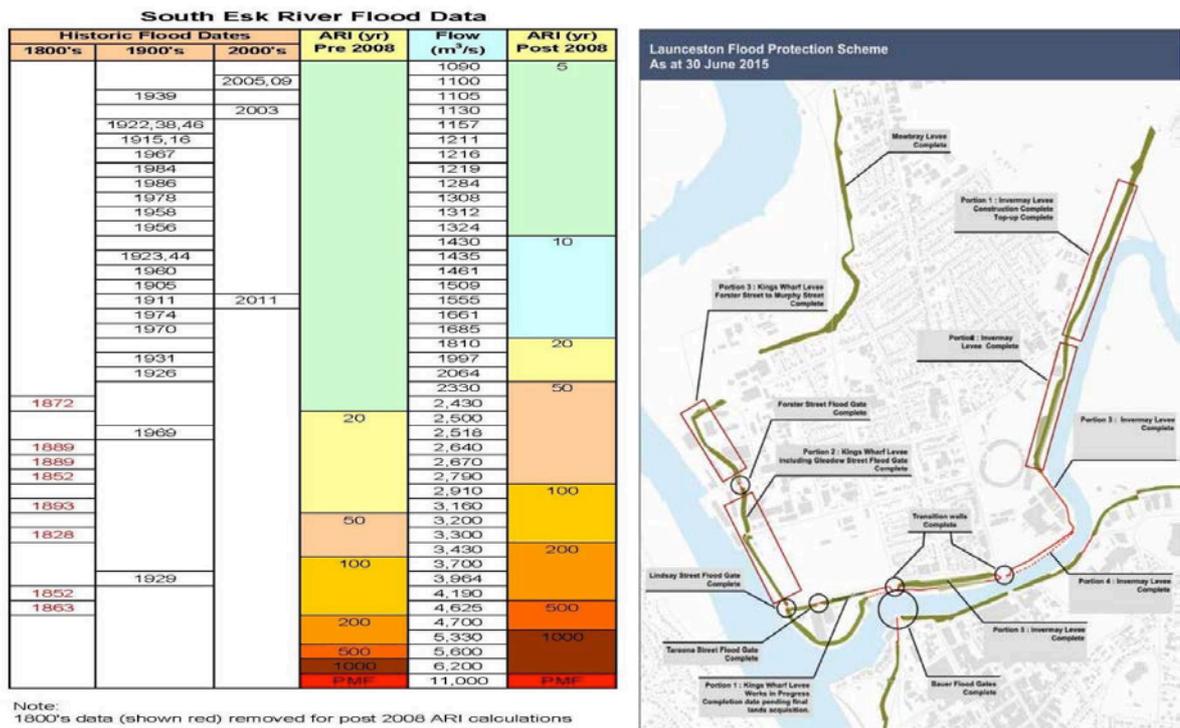


Figure 3 a) Annual Recurrence Intervals (ARI) before and after the 2008 review with recorded floods over 1000 cumecs and **b)** The Launceston Flood Protection Scheme as it stands as of June 30 2015.

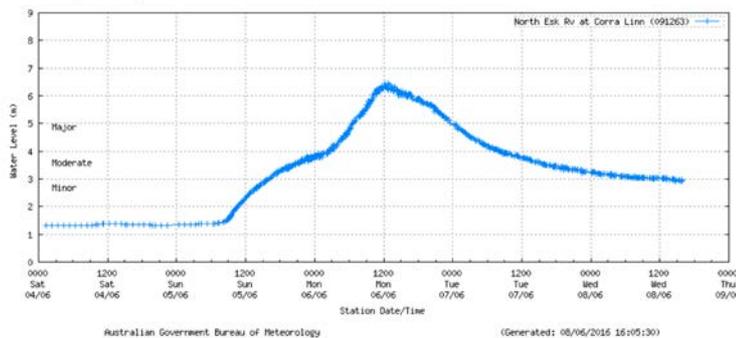
The June 2016 event

Between June 5 and June 8 the northern region of Tasmania experienced severe rainfall (Figure 1a). During the height of the storm the Mersey, Meander, Forth and North Esk experienced some of their highest flows since records began. The speed of the rise in water levels caught out many farmers before they could shift stock to higher ground. Flooding in Launceston had been forecast to exceed that of the 1929 flood, though water levels would eventually peak well below this mark. The Launceston Flood Authority reported the event as a one in 50 year event, with estimated flows of 2,500 cubic meters per second – well below the estimated 4,000 cubic meters in the 1929 flood.

One of the major factors limiting the impact to Launceston this time around was that the North Esk peaked more than 24 hours before the South Esk, with water levels in the North Esk dropping more than three meters by the time the South Esk peaked (Figures 4a and b). In 1929 both rivers peaked almost simultaneously. The outgoing tide also played a significant role in draining the river as the peak was reached.

Station details: Station Number: 091263 Name: North Esk Rv at Corra Linn Owner: BoM
Flood levels: Minor: 2.70 Moderate: 3.60 Major: 4.90

Data from the previous 4 days.



Station details: Station Number: 591037 Name: South Esk Rv at Trevallyn Pond (H)
Flood levels: Minor: 128.20 Moderate: 130.00 Major: 130.80

Data from the previous 4 days.

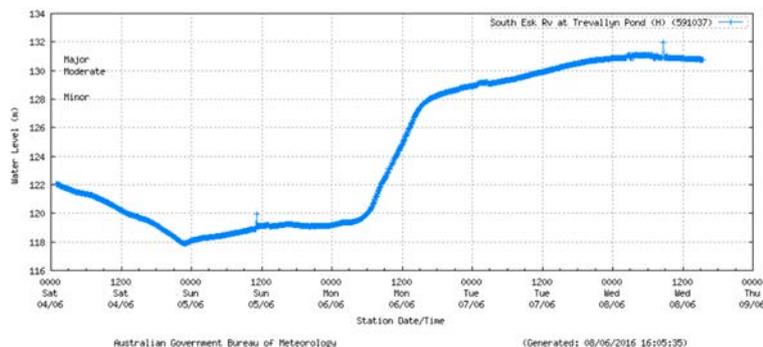


Figure 4 a) North Esk and b) South Esk gauge heights over the event.

Launceston Impacts

As the flood peaked on Wednesday morning (June 8), there was a sense of relief amongst the community with the knowledge that the improved levee system had protected the city from significant flooding.

As of June 13 it has been confirmed that there were 173 flooded structures, 52 of these residential buildings, with the majority located in Newstead. Interestingly, funds have been allocated in the 2015/16 financial accounts of the Flood Authority to provide protection for 29 low lying properties in Newstead. Significant losses to infrastructure, including damage to road surfaces and footpaths and parklands, have been reported, but there are no hard numbers to hand at this stage. Importantly, there had been no loss of life in the Launceston area.

Conclusion

Whilst it is too early to count the State-wide cost of this event, estimates from public officials put the cost in excess of \$100 million. This number might have been significantly more had the benefits from flood mitigation not been realised. However, it is also fair to say that Launceston's defenses were not truly tested by an extreme flood, which may have over-topped the levees.

The Productivity Commission has recommended that federal funding for natural disaster mitigation in Australia should increase to \$200 million a year and be matched by the states. Though the Prime Minister has reflected upon the importance of mitigation in the context of a changing climate, the Government has not yet responded to the recommendations of the Commission.