

**Submission
No 116**

INQUIRY INTO WATER AUGMENTATION

Organisation: Tweed Shire Council

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Your Reference:



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Upper House Inquiry into the Augmentation of Water Supply for Rural and Regional New South Wales

Thank you for the opportunity to provide our amended submission to the Upper House Inquiry into the Augmentation of Water Supply for Rural and Regional New South Wales. After consideration of the impact of the recent flooding, Council seeks to update its submission to the Inquiry. Herewith is the updated submission with the areas of update highlighted for your convenience.

Relevance to Tweed

As a Local Water Utility (LWU) Tweed Shire Council is responsible for the supply of water to the urban and industrial population of the shire. Operation of Council's water supply systems also entails meeting the water needs of relevant environmental licensing requirements.

Tweed Shire Council has undertaken studies into the secure yield of its existing water supply and the impact of climate change on its water supply. The studies showed that whilst the present secure yield is approximately 15,000 ML per annum this will decline to approximately 11,250ML per annum by 2030 with one degree warming.

Council has also undertaken demand studies. The demand studies show that through demand management measures Council has reduced the demand for water by approximately 20% from forecasts in 2009. The present demand for water is approximately 10,000 ML per annum and increasing at about 2% per annum.

The impact of increasing demand due to growth and reduction in secure yield due to climate change mean that Tweed Shire Council needs to augment its water supply by 2026. To address the requirement to augment the water supply Council has resolved to undertake the planning and land acquisition for the raising of Clarrie Hall Dam.

A further impact of climate change is the forecast rise in sea levels. This has an impact on the Tweed District Water supply in that overtopping of Bray Park Weir will cause the more frequent ingress of salt water into the fresh water weir pool from which Council draws its water supply.

It is therefore considered relevant for Council to provide a submission to the inquiry.

Terms of Reference

Terms of Reference Item a) investigate the requirement for a water equation (demand and supply out to the middle of this century) for rural and regional New South Wales.

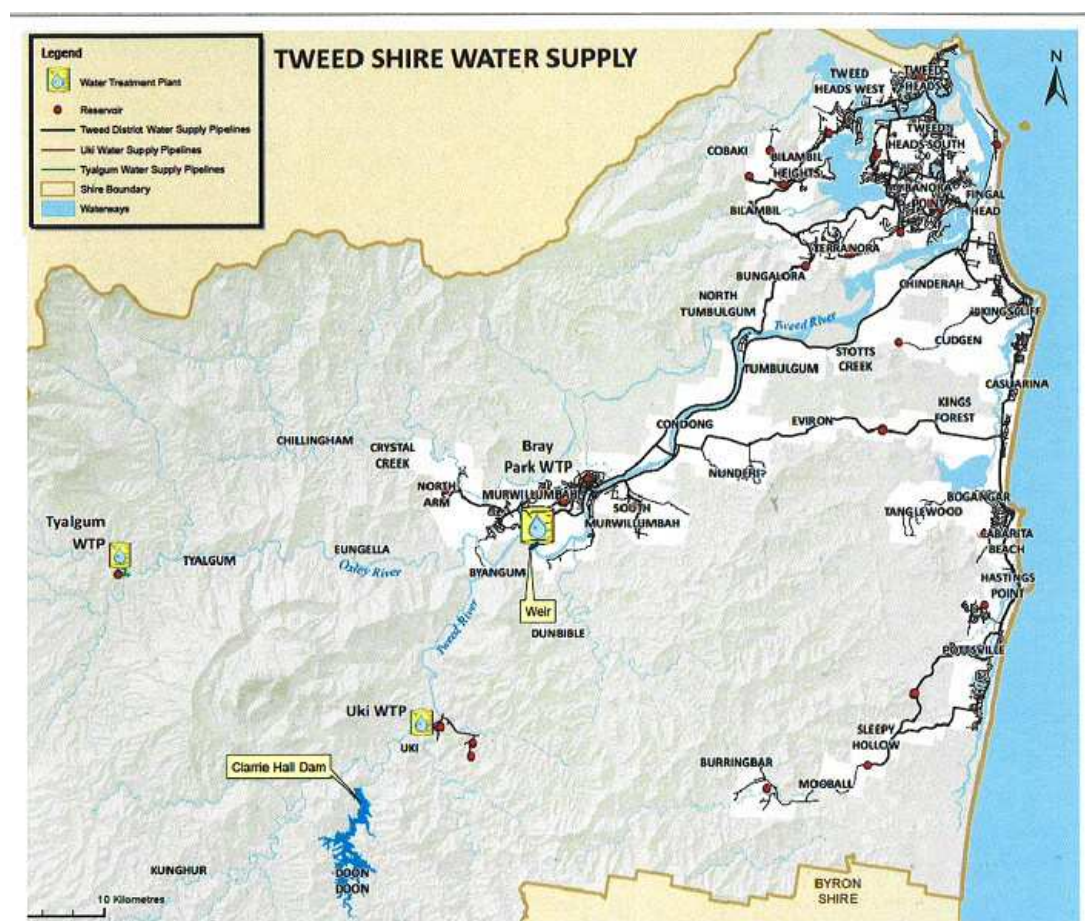
Background to the Tweed Water Supply System

There are three water supply networks in the Tweed Shire. Two small networks supply the rural villages of Tyalgum and Uki, while the major network supplies Tweed Heads and surrounds, the Tweed Coast and the Murwillumbah district.

Council operates three water storages, namely Clarrie Hall Dam, Bray Park Weir and Tyalgum Weir.

Water Storage	Useable Storage Volume (ML)
Clarrie Hall Dam	16,000
Bray Park Weir	640
Tyalgum Weir	7.5

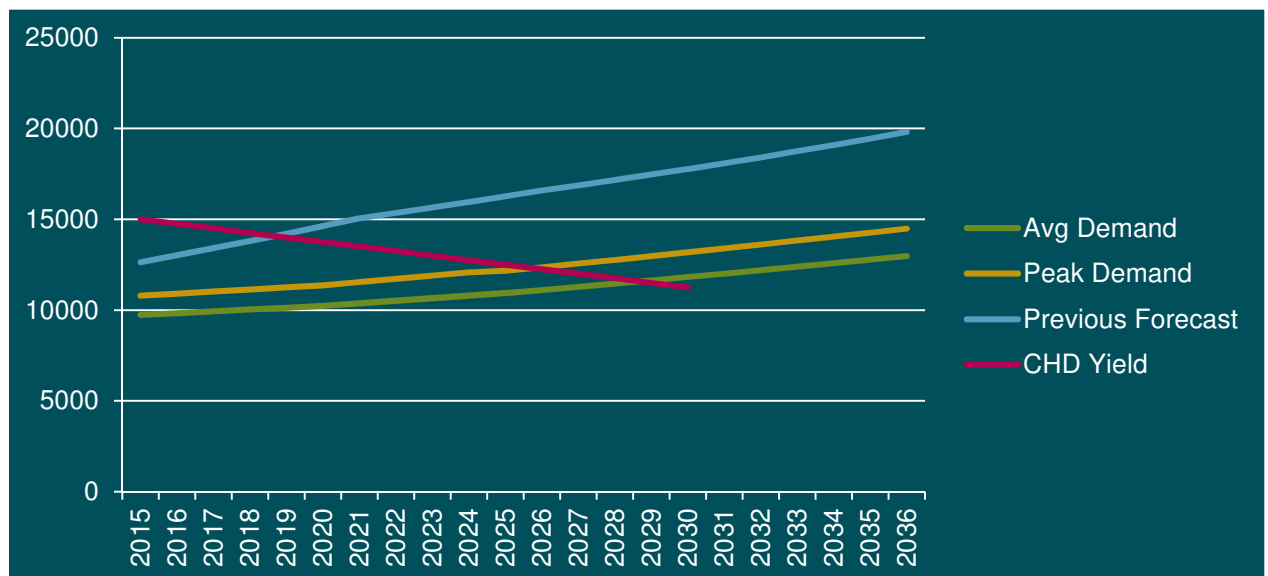
The major network (Tweed District Water Supply - TDWS) draws its water from the Tweed River, upstream of the Bray Park weir. The weir acts as a tidal barrage, preventing salt water from the estuary getting in to the fresh water supply. Flows into the weir are supplemented by releases from Clarrie Hall Dam situated on Doon Doon Creek - a tributary to the Tweed River.



Urban Water Services NSW undertook studies on behalf of Tweed Shire Council to determine the secure yield of its existing water supply and the impact of climate change on its water supply. The studies showed that whilst the present secure yield is approximately 15,000 ML per annum this will decline to approximately 11,250ML per annum by 2030 with one degree warming.

Hydrosphere has undertaken demand studies on behalf of Council. The demand studies show that through demand management measures Council has reduced the demand for water by approximately 20% from forecasts in 2009. The present demand for water is approximately 10,000 ML per annum and increasing at about 2% per annum. The studies also show an increasing demand for water

The outcomes of these two studies are presented graphically below.



It can be seen from the diagram that the peak demand for water exceeds secure yield from 2026, hence an augmentation to the water supply is required by 2026.

Options for the augmentation of the water supply have been assessed. In December 2015 Tweed Shire Council resolved, in part,

"Based on the information currently available, Council adopts the raising of the wall of the Clarrie Hall Dam as the preferred option for future water security and proceeds with the planning approval and land acquisitions phase for the project."

Council is proceeding with the planning approval and land acquisitions phase for the project.

Terms of Reference Item b) examine the suitability of existing New South Wales water storages and any future schemes for augmentation of water supply for New South Wales, including the potential for aquifer recharge

In considering the suitability of schemes for the augmentation of the TDWS Council considered. Initially Council considered:

- The raising of Clarrie Hall Dam
- A new dam at Byrrell Creek
- A new dam on the Oxley River
- Link to Rous Water
- Link to SEQ Water
- Desalination,
- Groundwater
- Indirect potable reuse
- Direct Potable reuse

Of these the following three options were shortlisted.

- The raising of Clarrie Hall Dam
- A new dam at Byrrell Creek
- Link to SEQ Water

Further investigation into these options provided Council with two more options. The five options considered before making the decision on a preferred option were

- The raising of Clarrie Hall Dam
- A new small dam at Byrrell Creek
- A new large dam at Byrrell Creek
- A new staged dam at Byrrell Creek
- Link to Gold Coast Water
- Link to SEQ Water

In December 2015 Tweed Shire Council resolved, in part,

"Based on the information currently available, Council adopts the raising of the wall of the Clarrie Hall Dam as the preferred option for future water security and proceeds with the planning approval and land acquisitions phase for the project."

Further risks to system capacity exist from climate change impacts. Changes to rainfall patterns and intensities potentially may adversely affect the yield of Clarrie Hall Dam. Climate Change induced sea level rise combined with climate change induced lower flows in the Tweed River will result in an increase in the frequency salt water ingress into Bray Park Weir. Without mitigation the entire Tweed District Water Supply will become increasingly affected by salinity. At this stage the mitigation measures required to address this have yet to be identified.

Terms of Reference Item c) review the NSW Government's response to the recommendations of the June 2013 report by the Standing Committee on State Development on the adequacy of water storages in New South Wales

Not all recommendations made by the Standing Committee are relevant to Council. For those that are Council generally agrees with the NSW Government response to the recommendations made. Where Council disagrees Council's position is provided below.

Recommendation 7

That the NSW Government review the environmental flow allocations for all valleys in New South Wales and make representations to the Commonwealth Government for it to review the environmental flow allocations for New South Wales valleys in relation to the Murray Darling Basin Plan.

The NSW Government's response was Note.

Council's position is that it would be advantageous to the operators of water supplies and the proponents of water supply augmentation that a specific set of guidelines be developed for the assessment of environmental flows.

Recommendation 8

That the NSW Government amend the principles of the *Water Management Act 2000* to ensure that the commercial water supply for towns and utilities and high security needs in regulated rivers are prioritised above environmental needs.

The NSW Government's response was that this was Not Supported.

Council's position is that certainty is required in the supply of water to towns and utilities and high security needs. Certainty can be achieved by legislative changes. Certainty is not achieved through the flexibility in the *Water Management Act 2000*

Recommendation 16

That the NSW Government commit to continuing an integrated water management and conservation policy, and that it foster responsible use of water in urban, industrial and agricultural settings.

The NSW Government's response was that this was Supported.

Although Council supports this recommendation it should be noted that the IPART Review of the Reporting and Compliance burdens on Local Government has provided recommendations "*that the Department of Primary Industries Water (DPI Water) undertake central water planning for Local Water Utilities (LWUs) to ensure that water supply and demand options are considered in the context of catchments, replacing the water planning LWUs currently undertake individually through Integrated Water Cycle Management Strategies.*"

Further it recommended "*that the NSW Government enable LWUs with sufficient capacity to be regulated under the Water Industry Competition Act 2006 as an alternative to their current regulation under the Best-Practice Management of Water Supply and Sewerage Framework and section 60 of the Local Government Act 1993.*"

Recommendation 18

That the NSW Government establish an Integrated Water Management Taskforce comprised of representatives of each of the key water user groups and government, with the following roles:

- to drive innovation in responsible water conservation, use and management, and
- to build collaborative relationships and promote the sharing of knowledge and expertise between and within water user groups across New South Wales.

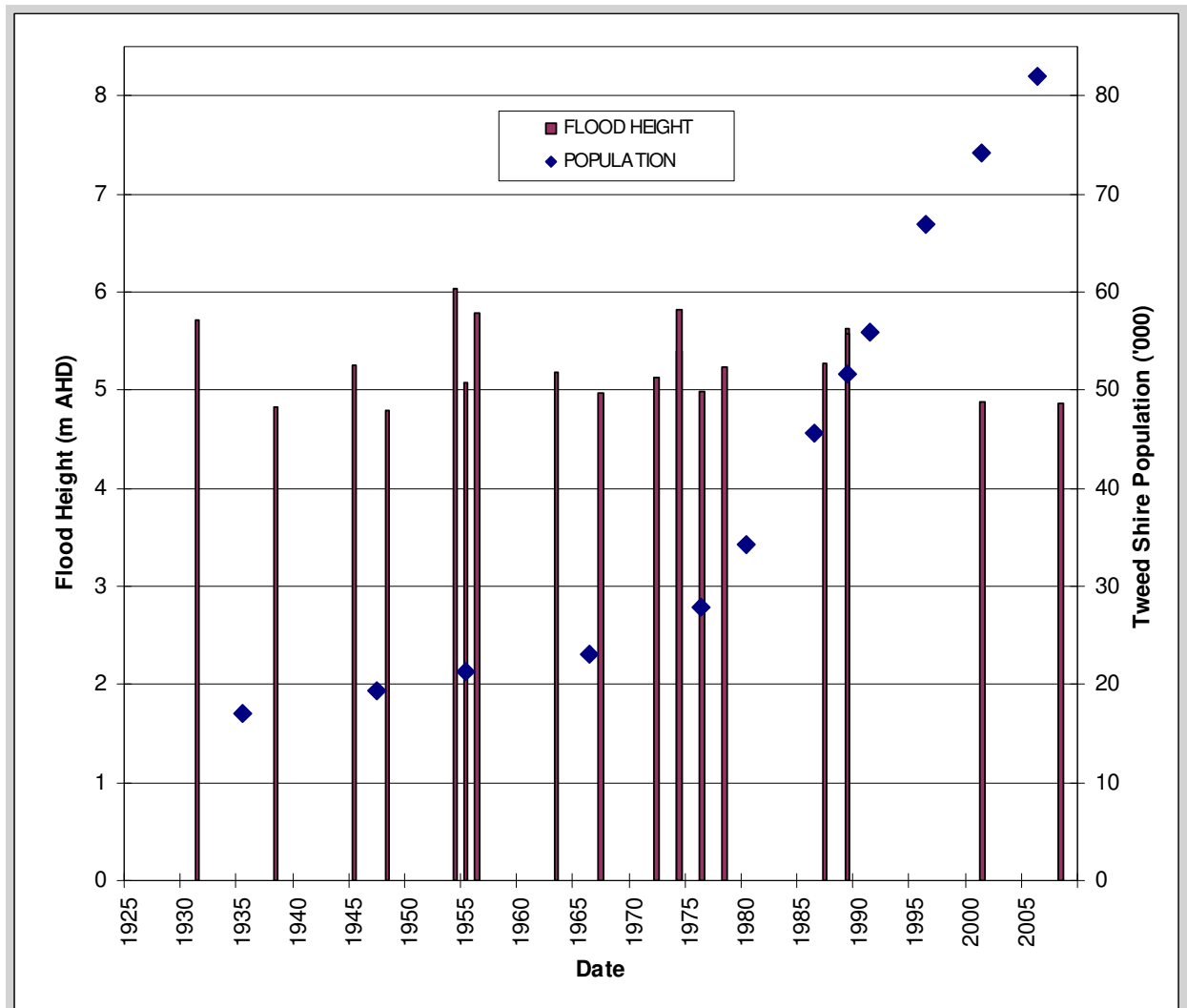
The NSW Government's response was Note.

The recommendation of IPART should be considered in conjunction with the NSW Government's response.

Terms of Reference Item d) examine the 50 year flood history in New South Wales, particularly in northern coastal New South Wales, including the financial and human cost

Major flooding is a relatively common occurrence on the NSW North Coast, compared with other natural disasters. In the last 50 years the Tweed Valley has experienced 11 flood events exceeding the major flood classification at Murwillumbah. Five of these occurred in the 1970's where flooding was prevalent across much of Eastern Australia. The flood of record for the Tweed Valley occurred very recently, in March 2017, exceeding previous records set in 1954. Flooding is known to be Australia's most costly natural disaster on average, with human/social costs vastly underestimated (source: Australian Business Roundtable).

One of the major issues that has contributed significantly to increasing costs of flood disasters is the population growth on the North Coast, much of which occurred in a period with few major floods (1990s-2000s), as demonstrated by the figure below. Large percentages of North Coast populations are naïve to the flood threat, are unaware of emergency procedures, live in areas that were zoned for habitation prior to good understanding of flood risk, place over-reliance on flood mitigation infrastructure, and undertake building modifications and uses without due consideration of flood risk. This greatly amplifies the costs of major floods when they do occur – by way of example, following the March 2017 floods in the Tweed Valley, Council removed 18,000T of flood damaged waste from urban areas.



Public infrastructure costs from the March 2017 Tweed flood were enormous. Estimates are provided as follows:

- Roads and bridges - \$23.5 million
- Flood mitigation - \$500,000
- Public Buildings > \$3.5 million
- Plant and equipment - \$6.9 million
- Recreation facilities - \$250,000

Attached is a report from Tweed Shire Council's June 2017 meeting summarising the impacts of the March 2017 flood event, for information.

Governments continue to promote through policies and funding allocations, such as the Natural Disaster Relief and Recovery Arrangements (NDRRA), practices that restore infrastructure to pre-disaster condition and standards, rather than creating more resilient infrastructure. Funding for disaster recovery outweighs funding for flood mitigation, by a factor of approximately 10:1 (source: Floodplain Management Australia).

Terms of Reference Item e) examine technologies available to mitigate flood damage, including diversion systems, and the scope of infrastructure needed to support water augmentation, by diversion, for rural and regional New South Wales

Following widespread flooding in the 1950s and 1970s, Tweed Shire Council, like many public authorities embarked on many large scale flood mitigation projects in an attempt to reduce the flood risk to its settlements by modifying flood behaviour. Such works included draining rural floodplains, constructing floodgates to limit tidal intrusion, urban and rural levee systems, pump stations, and re-routing and channelization of natural watercourses. While many of these works may have had demonstrable benefits in reducing flood risks to established urban areas, many of these had unforeseen negative impacts on the environment, such as increased acid sulphate soil runoff, obstruction of fish passage, weed growth, and increased sedimentation of waterways.

Recent floodplain risk management studies undertaken on behalf of Tweed Shire Council have confirmed that there are few new mitigation works that would have a benefit in reducing the costs of flood damages relative to their cost to implement. Rather, greater emphasis is placed on developing better development controls to promote more flood compatible land uses, while allowing natural floodplain processes to continue unhindered, as well as enhanced flood warning, emergency response planning and community flood awareness.

While options to provide cross border connection of water resources with South East Queensland (our direct neighbour to the north) have been explored by Council, these cannot be of a scale that would have significant effect on flood behaviour as:

- North Coast NSW is subject to seasonal rainfall, so there is not likely to be a need for redistribution of dam storages to augment water supplies during the normal flood season when storages are generally full;
- Historic flood patterns have suggested that major flooding coincides with:
 - La Nina conditions – that is a prolonged period of above average rainfall on the east coast, during which there are few water supply issues; or
 - the transition phase from El Nino conditions – that is, drought breaking rains, when dams will be operated to refill and retain as much water in storages as possible following a prolonged period of below average rainfall.
- Existing dams in the region are not designed as flood mitigation dams, and are operated to maximise water resources, not to provide storage for flood events;
- Existing and future dams can only control small percentages of the overall floodplain catchment. So even if they are designed for flood mitigation and control, and there is available storage, other floodplain tributaries can still cause flooding downstream. This was evident in South East Queensland during the 2011 Brisbane Flood, despite a general belief that the upstream dams had “solved” the flooding problem.

The Tweed catchment is not geographically compatible with diversion of water during wet seasons to the Murray-Darling Basin, and due to growth demands and potential climate change impacts on our own water supply security as detailed above, a diversion system to augment Western NSW water supply systems does not appear feasible or worth further investigation.

Terms of Reference Item f) examine social, economic and environmental aspects of water management practices in New South Wales and international jurisdictions, including the following case studies:

- i. Broken Hill town water supply/Menindee Lakes system**
- ii. South Western NSW water management practices**
- iii. North Western NSW water management practices**

No comment.

Terms of Reference Item g) the efficiency and sustainability of environmental water being managed by different State and Federal Government departments and agencies

In the undertaking of studies to augment the Tweed District Water Supply it has been found that there is no clear guidance available to proponents of water supply schemes on the requirement for environmental water. Further studies by Tweed Shire Council indicate that the impact of any future or raised water storage on environmental water is swamped by the impact of climate change induced reduced flows.

The absence of policy defining how the climate change reduced flows are to be assessed in any water supply augmentation creates uncertainty and inconsistent approaches to this matter.

Terms of Reference Item h) the management, appropriateness, efficiency and reporting of

- i. inter-valley transfers
- ii. conveyance and loss water
- iii. carryover
- iv. the management and reporting of the water market, and

See below on Cross Border Transfers

Terms of Reference Item i) any other related matter

Cross Border Transfers

There is a matter of cross border transfers of water. In the case of NSW and QLD significant benefits could be achieved by allowing the transfer of water between NSW and QLD.

Due to the nature of the respective catchments the Tweed Catchment responds quickly to rainfall events with rainfall events providing immediate increases on storage volumes. Catchments in SEQ respond slowly requiring longer sustained rainfall events to increase storage volumes. This results in the different catchments having different water availability at the same time.

Secure yield modelling by SEQ Water has demonstrated the benefits to both SEQ Water and Tweed Shire Council.

Cross border transfers would provide the advantages of

- Assisting in securing supply in the event of drought
- Assisting in securing supply in the event of water contamination or gross infrastructure failure
- Providing reduction in water prices as water could be sourced from the cheapest available source at any time - similar to the electricity market.

Cross border transfers between NSW and QLD are presently restricted by QLD legislation, specifically 360v of the Water Act 2000. Council considers that this legislation prevents the most efficient use of water resources in the Northern NSW and SEQ area.

Catchment Management

As a LWU and a Local Planning Authority, Council has limited powers to restrict or regulate existing land uses within the water storage catchment area and riparian zones.

A risk assessment using the Australian Drinking Water Guidelines (ADWG) highlights the greatest risks to the quality of Council's water supply arise from poor riparian zone management, inappropriate land uses, poorly maintained septic systems, and limited powers and resources to manage and regulate the water storage catchment area.

The catchment for Clarrie Hall Dam is approximately 60km² and is mainly rural in nature with some National Park, environmental and timbered areas. The catchment for Bray Park Weir is approximately 565km² and includes rural, village, environmental, timbered areas and National Park.

Thank you for the opportunity to make a submission to the Upper House Inquiry into the Augmentation of Water Supply for Rural and Regional New South Wales. If you have any queries in respect to this matter please contact Mr Rob Siebert, Council's Coordinator - Strategy & Business Management in the Water & Wastewater Unit on (02) 6670 2506 or rsiebert@tweed.nsw.gov.au.

Yours faithfully

David Oxenham
DIRECTOR ENGINEERING

Encl. March 2017 Flood Report - Item at Council's meeting held 15 June 2017

REPORTS FROM THE DIRECTOR ENGINEERING

17 [E-CM] March 2017 Flood

SUBMITTED BY: Roads and Stormwater



Supporting Community Life

LINKAGE TO INTEGRATED PLANNING AND REPORTING FRAMEWORK:

- 2 Supporting Community Life
 - 2.3 Provide well serviced neighbourhoods
 - 2.3.5 Ensure adequate stormwater drainage, flood management and evacuation systems are in place to protect people and property from flooding
-

SUMMARY OF REPORT:

This report is provided for the information of Council and the Community, summarising the events of the March 2017 flooding, its impacts and its repercussions for Council operations.

The report acknowledges the widespread and severe impacts of the flood on the broader community, but concentrates on damage to public assets and impacts on services.

RECOMMENDATION:

That Council receives and notes this report on the March 2017 Flood.

REPORT:

The Event

In late March 2017 Tropical Cyclone Debbie formed in the Coral Sea off North Queensland. On 28 March it crossed the Queensland Coast north of Mackay as a Category 4 system. Debbie weakened into a tropical low and turned south, causing widespread rainfall and flooding across Central and South East Queensland. Ex-Tropical Cyclone Debbie began to impact on the Northern Rivers early on the morning of Thursday 30 March, with heavy rain across the Tweed Valley.

Initial flood watches and warnings were issued by the Bureau of Meteorology (BoM) from Tuesday 28 March, indicating a high probability of moderate flooding at Murwillumbah and minor flooding at Chinderah. Initial forecasts suggested the Tweed Valley might receive 350mm over 30-31 March.

The Tweed Valley had received considerable rainfall only two weeks prior – many stations upstream of Murwillumbah recorded over 200mm on 15-16 March. This provided a heavily charged catchment with little or no available storage across the catchment to offset rainfall runoff.

Ex-Tropical Cyclone Debbie resulted in widespread and sustained heavy rainfall across the Rous, Oxley and Tweed Rivers throughout Thursday 30 March. Rainfall intensities peaked in the period between 11pm Thursday night and 2am Friday morning, after which the rainfall largely ceased.

The rainfall caused record peaks at many river gauges, including Uki, Chillingham, Murwillumbah and Tumbulgum. While there are localised variations, the intensity of the flooding in these areas was generally a 1% AEP (average exceedance probability) or 100 year ARI (average recurrence interval) flood, exceeding the previous 1954 benchmarks at Murwillumbah. Fortunately rainfall on the coastal catchments was generally moderate, and the system did not result in any appreciable storm surge or king tides. As such, the Lower Tweed and most Coastal Villages escaped significant flooding. The exceptions were the Burringbar and Crabbes Creek catchments which were badly flooded by intense rainfall on Thursday night, impacting the villages of Burringbar, Mooball, Crabbes Creek and Wooyung. Chinderah also experienced moderate flooding (a magnitude estimated at 30 year ARI), as the flood peak dissipated.

A summary of 24 hour rainfall totals, based on gauge averages, is provided in Figure 1 below.

Tweed Shire was declared a Natural Disaster Area by the Government on 31 March 2017.



Figure 1 – 24 hour rainfall summary (local gauge averages) 30-31 March 2017

Event Observations

It is readily apparent that the weather event that caused such significant flooding was unpredictable and extreme. At midday on Thursday, despite heavy rainfall as the main weather system approached, flood warnings were still for moderate flooding in Murwillumbah. However by late afternoon the major flood level of 4.8m was exceeded in Murwillumbah, with water entering South Murwillumbah across Alma Street and then South Murwillumbah Levee. While this can occur in relatively small flood events (the levee provides approximately 20% AEP or 5 year ARI protection), the rapid escalation of warnings on Thursday afternoon left many residents and business owners unprepared.

The rate of rise across the upper catchments was rapid, and quickly cut main roads and bridges from Thursday morning. The flood peaks then moved quickly down the valley. River level hydrographs are provided for key gauges below, including comparisons of recent flood events, and where available, modelled peak levels from flood studies. The rapid rise of the flood is notable, as is the final peak due to the last burst of rainfall. Chillingham gauge has not been included as there were data errors in the gauge readings. Tumbalum gauge also experienced data issues around the peak, but this has been corrected on the hydrograph below. A review of gauge performance is being conducted by the Office of Environment and Heritage (OEH).

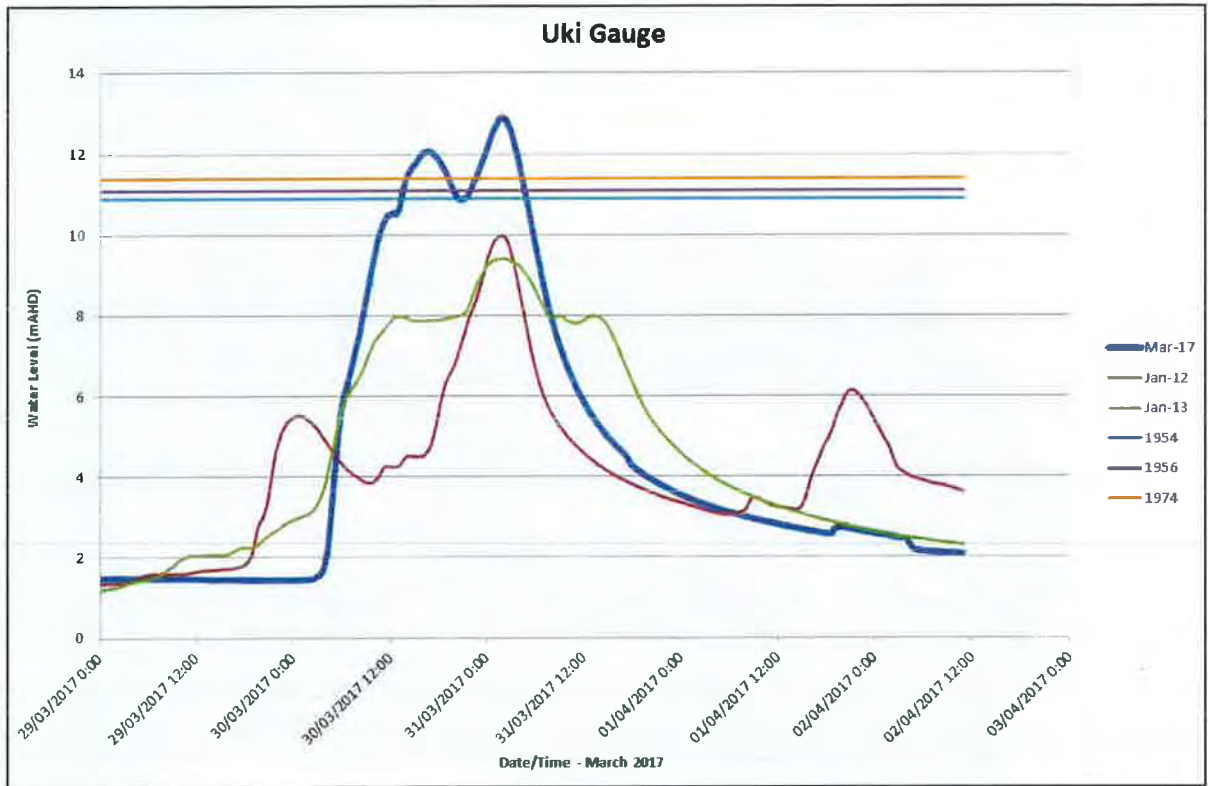


Figure 2 – River Gauge Readings at Uki

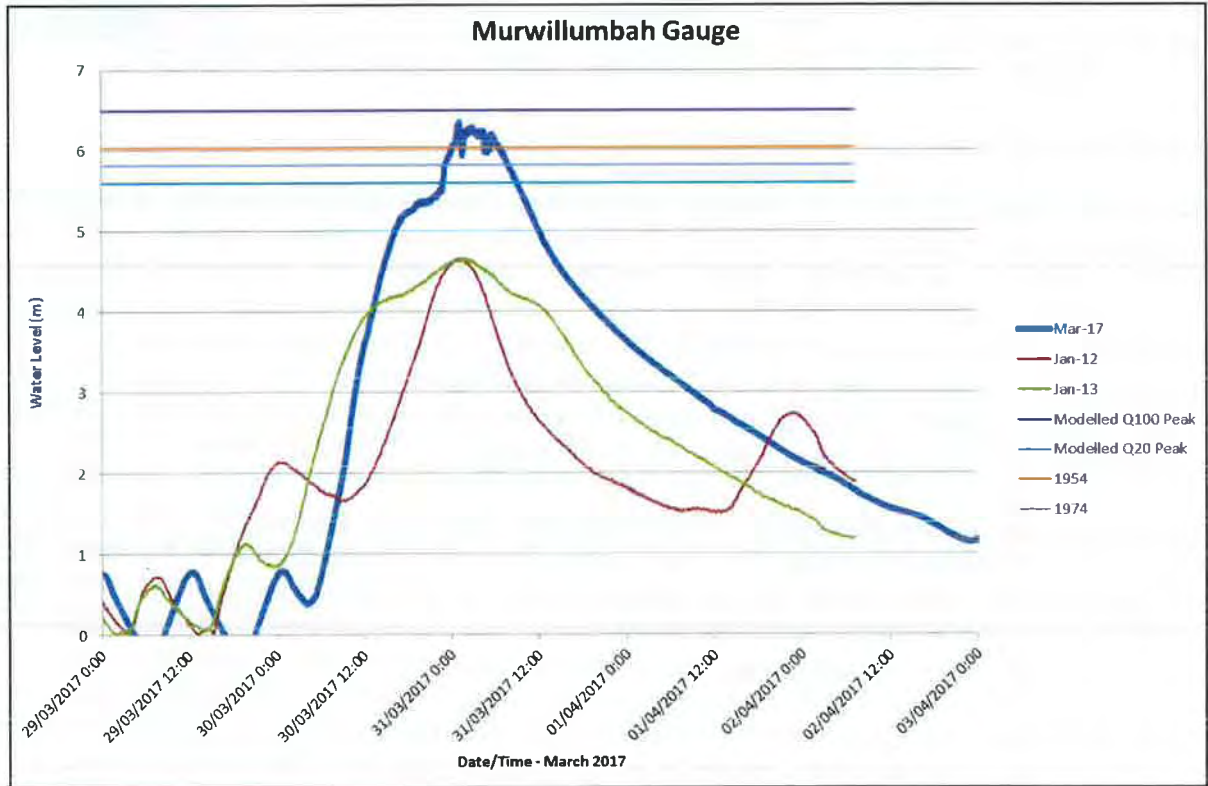


Figure 3 – River Gauge Readings at Murwillumbah (Bridge Gauge)

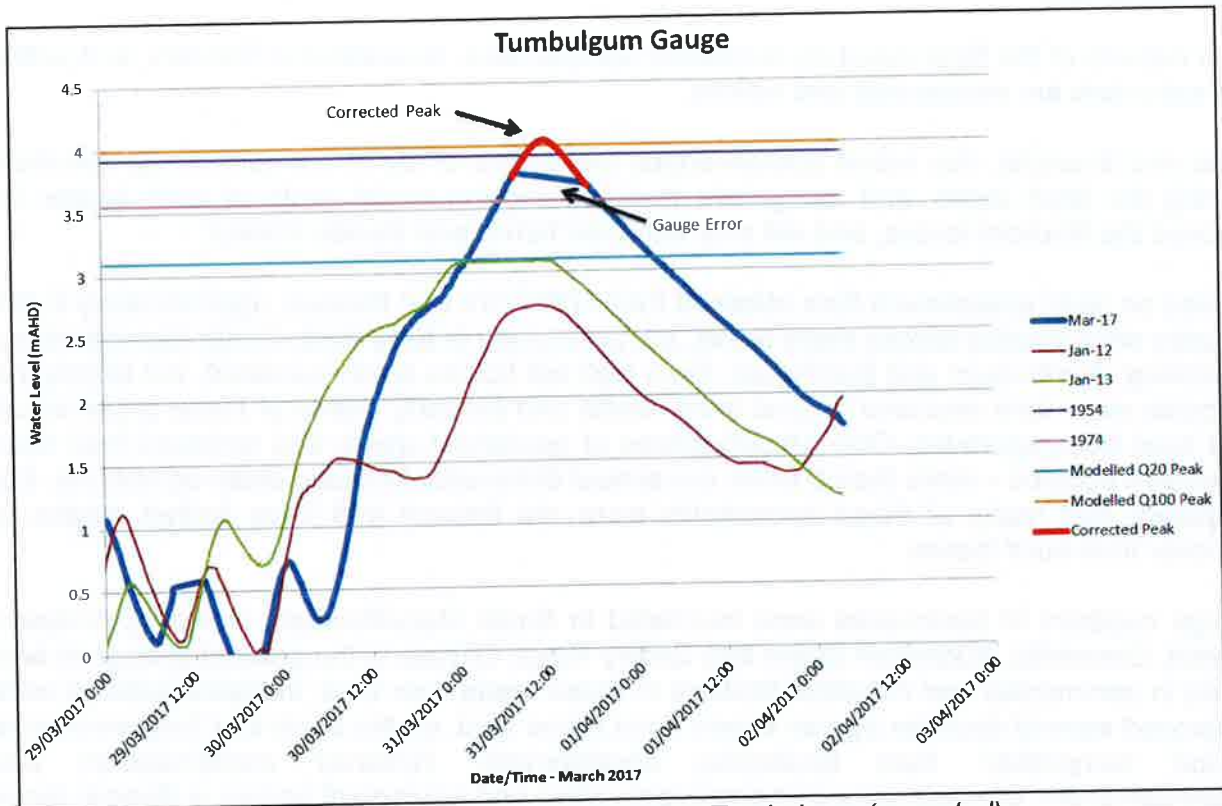


Figure 4 - River Gauge Readings at Tumbulgum (corrected)

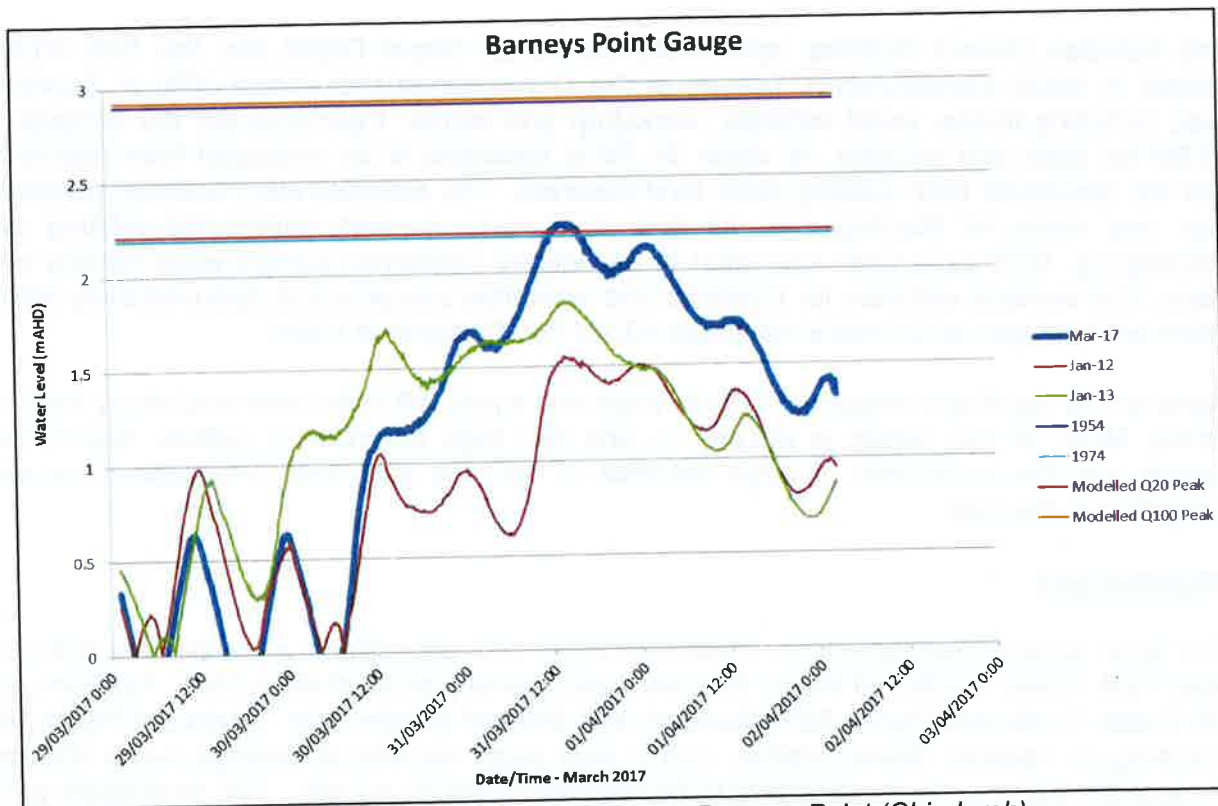


Figure 5 - River Gauge Readings at Barneys Point (Chinderah)

Event Impacts

The impacts of the flood event on residential communities, business and industry, and public infrastructure are widespread and severe.

First and foremost, this report acknowledges the deaths of six of our community members during the flood event, and recognises that the ongoing social costs of such losses far exceed the financial losses, and will stay with their family and friends forever.

Based on rapid assessment data obtained from NSW Fire and Rescue, approximately 2,100 houses were flooded across many areas, but particularly in Bray Park, South Murwillumbah, Condong, Tumbulgum and Burringbar. Even high set homes were inundated, but largely the impacts were from enclosed ground level rooms and property. Many of these areas would not have been approved. Over 18,000 tonnes of household waste was removed from flood impacted suburbs – more than 6 times our annual Shire-wide kerbside clean-up volume. It is apparent that many of these households were not insured and have limited means to recover from such losses.

Large numbers of businesses were inundated in South Murwillumbah, including Prospero Street, Greenhills, Buchanan Street and Quarry Road. Of note is the gradual change in land uses in commercial and industrial facilities in these areas over time. Industrial estates were approved several decades ago on known flood prone land, on the basis that they were more “flood compatible” than residential development. However modernisation and computerisation of many industrial processes, plant and equipment across a diverse range of businesses, including automotive, manufacturing, construction and food production, has increased the flood exposure of the South Murwillumbah industrial area significantly.

This includes Council facilities, specifically Buchanan Street Depot and the Bob Whittle Airfield in South Murwillumbah. Losses at the Depot comprised almost 30% of Council's fleet, including trucks, small vehicles, workshop and stores. Estimates put the damage at \$6.9M for plant and vehicles, of which \$4.7M is expected to be recouped from insurance and the remainder from existing plant fund reserves. The administration building sustained over one metre of flooding over its floor level, and requires substantial refitting and refurbishing. Staff have been relocated to the vacant Coolamon Centre while repairs take place. The damage estimate for buildings and workshop equipment is approximately \$800k which will form part of Council's maximum \$3.5M flood insurance claim.

There was a significant amount of debris, large and small, left in the river and along the river banks. Much of this debris is hazardous and has high potential to pollute. Submerged objects and the movement of large volumes of silt may also have implications on safe navigation in the river.

Infrastructure

The flood caused interruptions to significant water and wastewater infrastructure including Bray Park Water Treatment Plant, the raw water pump station at Bray Park, Tyalgum and Uki Water Treatment Plants, Murwillumbah and Mooball Wastewater Treatment Plants, the Tumbulgum Vacuum Sewer Station, and a very large number of sewage pump stations. Fortunately these services were able to be restored relatively quickly. The exceptions were: Tumbulgum Vacuum sewer system, taking 7 days to fully restore; River Street Wastewater Pump Station, taking 12 days to return to normal operation; and the Uki Water Treatment

Plant which was not operational for 3 weeks and water was tankered from Bray Park. The Uki Water Treatment Plant has not been fully restored. It has been decided to bring forward the proposed water quality upgrade works and combine them with the restoration works now required.

A permanent water main connection is still required on Tweed Valley Way at Blacks Drain along with scour protection works for short sections of the trunk water main between Condong and Tumbulgum.

The dam spillway at Clarrie Hall Dam, which was upgraded in 2014, experienced a flow depth of 3.05m at the peak of the event. This triggered a white alert, the first of 4 levels of alert. The maximum spillway discharge recorded during this event was 355m³ per second, which is slightly above the 1% AEP predicted discharge flow rate. The spillway is designed to cater for the PMF flow rate of 1368m³ per second.

Road infrastructure experienced the most damage of any public asset group, with current estimates to repair the road network at over \$23 million. Around 1500 road defects attributed to the flood were logged by engineering inspectors across 169 Council roads. A map showing the distribution of damage is provided below, along with a table summarising damage type and estimated costs. The most significant damages were the loss of the Byrrill Creek Road bridge on the Tweed River, which was torn from its piers, and severe bottom side slips on several roads including Clothiers Creek Road, Urliup Road, Cudgera Creek Road, Manns Road and Lone Pine Road. The Tweed Valley Way road formation was destroyed by flood overtopping at Blacks Drain at Greenhills, taking with it essential services. Several weeks were spent removing top side slips and causeway washouts to restore access to isolated rural communities throughout the valley. The Pacific Highway was closed for two days (1-2 April) and Tweed Valley Way was closed until 3 April. Conditions on the roadways remained hazardous well after the water receded due to large amounts of debris and silt deposits, as well as surface damage.

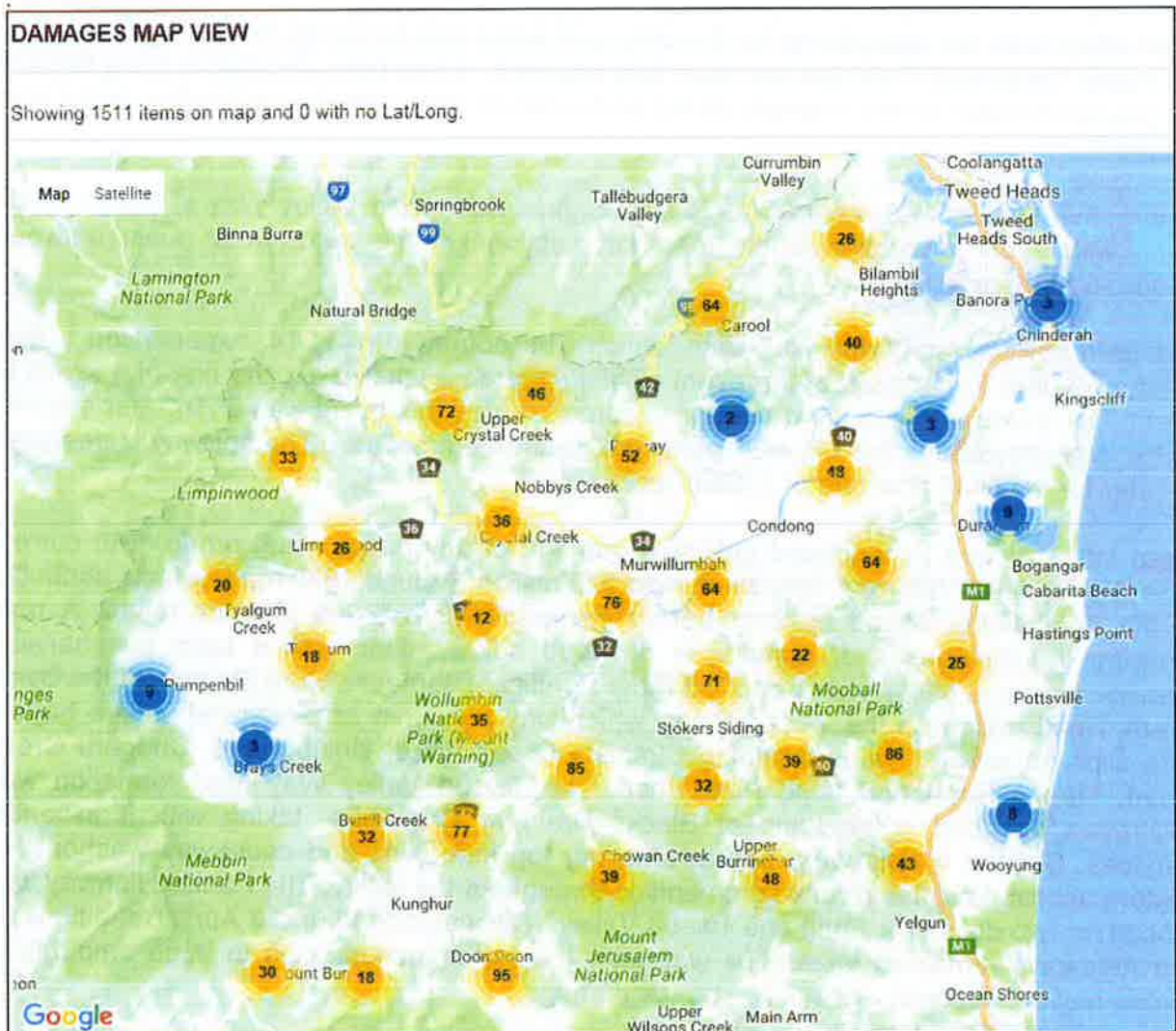


Figure 6 – Map View of Road Damages logged by Engineering Inspectors

MARCH 2017 FLOOD - PRELIMINARY ROAD REPAIR ESTIMATE			
ROADS	CAUSEWAYS	\$1,643,389	\$18,121,458
ROADS	EARTHWORKS/STRUCTURAL	\$12,228,669	
ROADS	PAVEMENT	\$3,381,794	
ROADS	FIXTURES	\$328,466	
ROADS	CLEANUP	\$539,140	
BRIDGES	NEW BRIDGE	\$3,162,000	\$5,183,400
BRIDGES	BRIDGE REPAIRS	\$2,021,400	
OTHER INFRASTRUCTURE		\$77,707	\$77,707
TOTAL		\$23,382,565	\$23,382,565

Figure 7 – Summary of Road Repair Estimates by Type

Council's flood mitigation infrastructure performed well throughout the event. The Murwillumbah Levee protecting the Central Business District had not been seriously tested since it was raised to its current crest height in the early 1990s. Minor overtopping of the levee occurred at the upstream earthen section adjacent to Murwillumbah High School, but

the levee maintained its integrity. The levee provides approximately 80 year ARI protection to the town and fortunately the river level at the bridge peaked slightly below forecast levels.

Flood pump stations at Lavender Creek and Wharf Street were operational throughout the event, however rainfall volumes from the local catchments exceeded their capacity and low level (but significant) flooding of homes and businesses in Main Street, Commercial Road, Brisbane Street, Wollumbin Street, Nullum Street and Condong Street occurred. The Lavender Creek Pump Station lost power early in the morning of 31 March, however this occurred after rainfall had ceased, and service was restored soon after.

East Murwillumbah Levee is designed at the 1% AEP level and experienced minor overtopping in the vicinity of Murwillumbah East Primary School. Dorothy Street levee was overtopped by about 300mm at the peak of the event, and combined with significant local catchment flooding around Brothers Leagues Club to fill this basin. The Leagues Club and several homes around William Street were impacted by this water. Peak water levels from this section of the Rous River appear to have exceeded 1% AEP levels in this event.

The South Murwillumbah levee was raised to its current level in the 1990s in conjunction with the Town Levee works, and provides approximately 5% AEP protection. It has successfully protected South Murwillumbah during various floods since, but was overwhelmed by the magnitude of this flood event. Overtopping initially occurred across Alma Street, and then various parts of the earthen levee. At its peak the levee was overtopped by around 2m of water. River flows caused major scour to the river side of the levee embankment. North of Colin Street, the levee formation breached when a large tree collapsed. Cost to repair the levee is estimated at \$500,000. Water flows through South Murwillumbah towards the storage basin behind the industrial estate caused significant damage to properties and eroded large sections of the railway embankment.

The Stotts Creek Resource Recovery Centre (SCRRC) was forced to open a new landfill cell specifically for the waste generated by the flood. The SCRRC is looking to process as much of the fill that has been deposited as possible and is actively chasing opportunities to reuse this material, however approximately 8,500 cubic metres of air space was used to deposit household waste.

Waterway assets along the Tweed River were badly damaged by the flood, particularly pontoons and boat ramps. The pontoons at Skinner Lowes Wharf, Murwillumbah and Condong Boat Ramp were dislodged and will require repair and replacement. Tumbulgum timber jetty was to be replaced and this will now be brought forward in the program as the structure was damaged. Most of the other waterways facilities required structural assessment and mostly minor repairs including silt removal from boat ramps. Fortunately coastal assets were largely unaffected.

Several recent riparian fencing and restoration projects, funded predominantly through the NSW Environmental Trust, were substantially impacted. Some of these sites have been repaired. While these recent sites were severely impacted, many other well-established riparian restoration project sites survived, demonstrating the value of well-maintained and robust riparian vegetation in maintaining stable river banks.

There was a significant amount of debris, large and small, left in the river and along the river banks. Contractors were employed for one week to clear as much as possible from the river banks and staff continue to collect debris from a boat.

Several Council buildings were impacted by flooding with various degrees of structural and non-functional damage caused to these assets, including treatments of mould growth and removal of asbestos containing material. Worst affected were the Print Makers in Bray Park, Nullum House (Knox Park) Murwillumbah, Condong Hall (Possums Preschool), and the Murwillumbah Visitor Information Centre, which has been temporarily relocated to the old railway station. A Council owned residential property at 341 Tweed Valley Way South Murwillumbah was completely inundated. Building repair costs and contents replacement are likely to exceed Council's insurance cap of \$3.5 million for the event.

Recreation Services sustained relatively minor damage to parks and sports fields, however some ancillary assets such as fencing, barbeques, amenities buildings and club houses were severely impacted. Bilambil Sports Complex was hit particularly hard - club houses were damaged, the carpark is no longer usable, and sports field fencing on both the east and west grounds were impacted. Total cost is estimated at over \$100,000. At Tumbulgun two barbeque facilities and tennis court fencing were damaged, at a cost of over \$20,000. Fifteen sports field amenity buildings were affected and the estimated cost to reinstate these buildings is \$133,000. These costs have been incorporated into Council's building report to the insurance assessor.

Effectiveness of Preparations

As described earlier, warnings for the flood event were in place several days prior, however in hindsight these warnings significantly under-estimated the magnitude of the flood that occurred. Council staff enacted their usual protocols of checking critical assets, confirming crew availability, dispersing plant and signage, and relocating high value items from low lying areas. In accordance with staff protocols, many staff left work to look after their families and their own properties by midday Thursday, when flood warnings were still for moderate flooding. However the weather system intensified in the evening and later through the night, leading to upgraded warnings for major flooding and peak levels that would see key facilities such as Buchanan Street depot inundated to depths not seen in living memory. Most businesses in the industrial area were similarly under-prepared for the magnitude of the flood.

There has been general community angst regarding the accuracy of BoM forecasts and warnings, and the NSW State Emergency Service (SES) response (including evacuations) around the March 2017 flood, particularly as these agencies are seen to be based "out of town". While there is a key role for local flood intelligence networks in enhancing and verifying warning and response processes during floods and other natural disaster events, the roles and responsibilities of BoM and SES are legislatively based. Undue involvement by Council or other agencies in these roles will increase the risk of conflicting information, poor coordination of resources and ultimately poor decision making. Council will be involved in various post-event debriefs with all of the relevant agencies in due course, to improve preparations for future flood events.

Impacts on Council Operations

Council was fortunate that telecommunications and electricity remained largely unaffected by the event, and allowed recovery efforts to commence immediately following the flood peak.

Impacts of plant losses were mitigated by engaging contractors, hiring equipment and vehicles, and assistance from neighbouring Councils, including Gold Coast, Ballina and Coffs Harbour.

The flood event hit at a time where the revised Community Strategic Plan and its supporting documents (Delivery Program and Operational Plan) were pending adoption. The disruption and cost of the flood will require adjustment of these plans. Similarly, Council's ability to complete the 2016/17 Delivery and Operational Plans has been negatively impacted.

Various capital works projects now need to be brought forward, such as the replacement of Byrrell Creek bridge. In order to accommodate this, other projects will need to be deferred. Similarly, programmed maintenance for a range of assets has been delayed or reallocated to reactive works.

A summary of proposed impacts is included in the Budget Section of this report.

Strategic Responses to the Flood

Council is fortunate to have a well advanced floodplain risk management process in place for the Tweed Valley and Coastal Creeks floodplains. Council has completed various flood studies and floodplain risk management studies across these areas over the last 13 years, at considerable expense and with assistance from the State Government. Observed flood behaviour in this event was generally in accordance with the outcomes of these studies, which is reassuring. The Office of Environment and Heritage (OEH) is commissioning a review of flood studies in the Tweed and Lismore areas using recorded information from the March 17 event.

These studies have helped to shape our flood related development controls, and many contemporary developments in badly affected regions escaped with minimal damage from the natural disaster. Examples including the Uki Hotel and the Murwillumbah IGA. These controls also provide Council with the framework to prevent an escalation of flood risk for future development, by setting rules for the rezoning of land and considering factors such as the cumulative impacts of filling, and designing evacuation capability into subdivision design in our major land release areas.

For those areas where there is residual flood risk due to historic settlement patterns, legacy land zonings, and lack of adequate building controls at the time of development, the Tweed Valley Floodplain Risk Management Study Plan (2014) and the Tweed Coastal Creeks Floodplain Risk Management Plan (2015) make a number of recommendations for priority actions. These have been extremely valuable in providing a coordinated and strategic approach to identifying projects for funding opportunities from higher levels of government in the flood aftermath.

For example, applications for the 2017-2018 round of OEH Floodplain Management Program grants closed on 27 April. Council officers were able to reference these plans in identifying the following projects for potential funding:

- Voluntary House Purchase in South Murwillumbah and Bray Park
- Voluntary House Purchase in Burringbar, Mooball and Crabbes Creek
- Voluntary House Raising in South Murwillumbah and Bray Park
- Voluntary House Raising in Burringbar and Mooball

- Flood Warning System to upgrade Tumbulgum Gauge for forecasting by the BoM
- Flood Warning System to install additional river and rainfall gauges upstream of Burringbar and Crabbes Creek.
- Flood study for South Murwillumbah basin to identify obstructions to flow, examine levee overtopping, and recommend floodway improvements

These applications were endorsed by the Floodplain Management Committee at its 28 April meeting. These projects have the potential to significantly reduce flood risk exposure for people and their properties, enhance warning times in flash flood catchments and remove obstructions to flood flow in the worst affected areas.

Council's Executive has also made representation to State and Federal Government about potential projects to reduce flood risk in other flood impacted areas (such as widening the voluntary house purchase and raising schemes to other suburbs such as Condong and Tumbulgum which were not subject to recommendations from the Floodplain Risk Management Plans) and for works that are generally not eligible under the OEH grant criteria (such as modifications to commercial and industrial land to reduce flood risk).

Regarding the latter, the impacts of the flood on the South Murwillumbah industrial estate were extensive, to the point where some businesses may not be able to fully recover. This will impact on the local economy and employment. This area is also important for the passage of large volumes of flood water from Greenhills to Condong, however many of these industrial developments obstruct flows with fill pads, buildings and fences. In an ideal situation, given the availability of flood free land in close proximity in South Murwillumbah along Quarry Road and Wardrop Valley Road, a scheme to relocate many of these businesses to remove their flood risk as well as improving flood behaviour in these floodways would be a sound investment. However there is a large upfront capital cost that Government could provide in order to invest in flood mitigation rather than flood recovery. Floodplain Management Australia (FMA) suggests that in Australia Governments invest only \$1 in preventative schemes for every \$10 spent on flood recovery. Generally this involves putting infrastructure and development back in the same high-risk situations.

Other Initiatives

Council staff responded in various innovative ways to the flood emergency, in order to work swiftly, compassionately and pragmatically to assist impacted individuals. Many will have ongoing benefits to the organisation for daily operations as well as enhancing our ability to connect with community. Examples include:

Social Media

During the flood event Council's Facebook page was deployed – our first official presence on social media. It was clear throughout the flood emergency that social media is integral to modern communication across a broad cross section of our population. Council's Facebook page was followed by 1786 people within a week of the flood, with 72,612 post engagements and 12,000 views of Council's videos. Social media (Facebook and Twitter) allowed Council to disseminate urgent and important information to the community for the first time. Social media also provided a platform to launch the Tweed Shire Mayoral Flood Appeal, particularly targeting Brisbane, Sydney, Melbourne and Canberra to capture people who had seen the floods on the news and wanted to assist in some way.

Data Collection

Council engineering staff employed new mobile solutions consisting of android devices connected to our asset management system to rapidly identify, photograph and catalogue around 1500 road and drainage defects across the Shire post-event. This will assist claims for Natural Disaster funding, but also enables upskilling of staff for wider application for non-flood customer work requests.

Building and Environment Inspections

The Building and Environmental Health Unit were some of the first responders to impacted communities at the start of the recovery phase, offering immediate and detailed assessment of residential and commercial building damages, at no charge. This prompt and professional action was widely praised and helped people prioritise works to get back into their homes and businesses.

Building surveyors undertook preliminary assessments to determine the extent of any structural damage and liaised directly with geotechnical experts on a priority basis which facilitated a rapid assessment where needed. For some elderly residents this provided important assurance that their home was safe to occupy. In other cases illegal structures were being built/repared in the flood zone before the mud had even been cleaned up.

Environmental Health Officers spoke with business owners in all impacted towns on the Monday and Tuesday with practical advice on food disposal, asbestos, hazardous waste and other challenges, at a time when these business owners felt completely overwhelmed. The team also provided technical advice on health impacts of sewage spills in Tumbulgum to the Water and Waste Water Unit and later with inquiries about health impacts of mould.

Support for Local Businesses

Council's Economic Development Unit provided critical support for flood impacted businesses in the immediate aftermath of the flood. The Business Facilitation officer established connections with the business community on the ground and via the newly opened social media channels, to assess their immediate needs. Officers alerted and briefed various Government Departments and communicated these contacts to those in need.

Skip bins were delivered to specific businesses who had an urgent need for removal of rotting food products. Officers also liaised with the FRNSW Hazardous Materials Response Unit to assist business in the industrial estates.

The face to face support was vitally important to businesses in the first two weeks of the recovery. It sent a clear message of 'Tweed Council's cares about you and we are here to help you through this'. This message was, and continues to be comforting to many business owners. Officers left business cards with direct contact details acting as a conduit from business into Council, taking a 'no wrong door' approach. This was appreciated, with many business owners taking up the offer of help.

The Economic Development Unit also worked strategically, preparing reports to assist in the activation of Category C funding for small business, organising Ministerial meetings with business owners and liaising with Government Departments and agencies to deploy on ground support mechanisms.

Emergency and Evacuation Support

Council provided a range of responses to assist the community during the establishment of the evacuation centres. Almost 100 people that were camping at Greenhills Caravan Park and elsewhere in Murwillumbah area were relocated to the Tweed Regional Gallery and Council allowed the use of the undercover car park and the facilities at the Artist in Residence Studio whilst the waters receded and alternative arrangements were made.

Council's Community and Cultural Services Unit produced a register of local services that were offering volunteer support, donations and could assist people during the flood. This list was then maintained on a daily basis and distributed online, to emergency services, and through the disaster recovery centre.

Officers undertook inspections of Council community halls, preschools, and other community buildings to assess the level of damage, and commence support for those services.

Establishment of Recovery Centre

The Community and Cultural Services Unit undertook initial assessments to identify a suitable site for the establishment of the Disaster Recovery Centre which the Office of Emergency Management set up following the closure of the official Evacuation Centres. The Murwillumbah Community Centre building was not inundated and a section of the building was well designed to meet the needs of the State and Commonwealth Government services that are established once a natural disaster is declared. The Information Technology Unit assisted with setting up the communications, hotline, and printers at the centre. The Community Development team recruited Disaster Recovery Centre staff, intake and administration officers, and security officers to manage the centre during the more than seven weeks of operation. The team also supported the centre on a roster during the first two weeks to ensure that someone with local knowledge assisted with referrals to local services.

The administration of the centre also involved monitoring the gaps in services that were identified at the centre, ensuring that the statistics and communications about the centre were monitored to inform responses locally and decisions about the centre's operational hours. From 6 April to 26 May 2017, over 1,761 people registered at the Disaster Recovery Centre.

Homelessness and Housing

One of the most significant issues arising for the community has been homelessness and housing. This has been exacerbated by the pre-existing high need for accommodation for people that are homeless and for affordable housing options in Tweed Shire. It has been difficult to ascertain the extent of the issue, and the data to identify how many people have been displaced by the floods is collected by the State Government through the Recovery Centres and by the Department of Housing. Caravan Parks were also inundated with Greenhills Caravan Park, Wooyung Caravan Park, and three caravan parks in Chinderah all sustaining extensive damage. It was estimated that of those registering at the recovery centre during the period of 6 April to 9 May, over 200 people were staying in temporary accommodation.

Mental Health

The care of the volunteers and service providers that have been supporting the local community for over six weeks at this time is of concern. To provide suitable support for the mental health and wellbeing of the community a hotline and service was established by the Primary Health Network locally. The Community Development team at Council also worked with the Red Cross to facilitate a number of workshops for volunteers to debrief and check on their wellbeing. Additional workshops will be facilitated if required.

Long Term Recovery Plan development

The Community and Cultural Services Unit has worked with the Disaster Recovery Coordinator to design a needs assessment to inform the long term recovery plan for the region. This included an online survey that the Southern Cross University is analysing and three focus groups on housing and homelessness; mental health and wellbeing; and community and neighbourhood centre services. This collaboration between Tweed Shire Council, Lismore City Council, Byron Shire Council, and NSW Health has also included the development of a shared data base for ongoing communications during the recovery phase.

OPTIONS:

This report is provided for information of Council.

CONCLUSION:

The flood of March 2017 was a historic event for the Tweed, with wide reaching and long term impacts. This report aims to document these impacts, to help the community to understand their susceptibility to natural hazards, and to hopefully assist preparations for events in the future.

COUNCIL IMPLICATIONS:

a. Policy:

Corporate Policy Not Applicable.

b. Budget/Long Term Financial Plan:

The March 2017 flood has significantly disrupted Council's ability to deliver many of the projects that were adopted in the 2016/2017 Delivery and Operational Plans and Organisational Key Performance Indicators (KPIs). Many projects will be deferred by necessity, due to resource changes and reduced capacity, others due to the need to set aside contingencies in the budget to cover as yet undetermined costs of the flood.

Projects to be deferred from 2016/2017 to 2017/2018 include:

- DCP-A5 Subdivision Manual update (KPI)
- Road and drainage upgrade, Gray Street Tumbulgum
- Kerb and guttering, Elizabeth Street Pottsville
- Road and drainage upgrade, Kirkwood Road and Philp Parade Tweed Heads South
- Kerb and guttering, Thomson Street Tweed Heads
- Drainage upgrade, Reynolds Street Murwillumbah

- Drainage upgrade, Nullum Street Murwillumbah
- Waterways repair projects including Foysters Jetty abutment; Sunset Boulevard revetment; and Mooball Creek log wall.

Further, as reported to Council in its consideration of the draft 2017/2021 Delivery Program and 2017/2018 Operational Plan in April 2017, ***changes may need to be made to Council's capital works program/significant projects and service levels that have been listed in the Draft Delivery Program.***

The impacts of the flood will flow on into next financial year and beyond. Some projects will need to be brought forward as they have become urgent due to flood damage (for example, replacement of Byrrill Creek Bridge), others will be deferred, and others will be re-scoped. These will be subject to future reports associated with Quarterly Budget Reviews and operational reporting as these impacts become known.

As the flood event was a Declared Natural Disaster, Council is eligible for financial assistance towards the restoration of essential public assets under Natural Disaster Relief and Recovery Arrangements (NDRRA). The majority of NDRRA funding is provided by the Commonwealth Government and administered by the States. In NSW, the Office of Emergency Management oversees the NDRRA which is implemented by NSW Public Works and Roads and Maritime Services.

NDRRA assistance is generally provided for road, stormwater drainage and flood mitigation assets. However other asset groups are ineligible, including recreation services, waterways and coastal assets, insured buildings and business undertakings such as water and wastewater, airfields and saleyards. Ordinary Council wages and plant and equipment costs are also ineligible, meaning that Council will have to rely on contractors to undertake most flood repair projects. Fortunately Council received a special exemption to cover the costs of the roadside clean-up of flood waste, which was considerable. Council officers are preparing initial applications for NDDRA to the relevant agencies.

c. Legal:
Not Applicable.

d. Communication/Engagement:
Inform - We will keep you informed.

The flood provides a good opportunity to reinforce to the community key messages around flood preparedness, awareness of individual flood risk, and town planning controls. Development of a flood related communications strategy, in conjunction with the SES will be a key consideration of the Floodplain Management Committee at its next meeting.

One key message is that while the March 2017 flood was the largest flood seen in many locations, it occurred from a relatively short duration storm event, and a far greater flood is possible.

Council Meeting Date: THURSDAY 15 JUNE 2017

UNDER SEPARATE COVER/FURTHER INFORMATION:

Nil.
