

Are you ready?



TWEED
SHIRE COUNCIL

IT'S STORM SEASON



Above: In both storms and floods, items not secured can end up as flying and floating debris.

Plan ahead to act on time

It's officially storm season, where electrical thunderstorms can roll through with wind, thunder, lightning and even hail on any given day. While the wettest of the season normally comes after the New Year, it can come anytime from October to May.

It's more than eight months since the flood

of 31 March 2017 – the largest seen in many locations across Tweed Shire. It's timely to remember that this flood occurred from a relatively short storm event and a far greater flood is possible.

The best safeguard against flood and storm is preparation. Plan now for you, your family and your

pets to limit your damages and losses in the event of a storm or flood hitting your area. Talk your plan through with your family and then put it on paper. And don't forget to identify dry places where you can store belongings and clean up your yard, making sure that any item that can be thrown around in a storm is put away or tied down.

We want to be a resilient and ready community. We want to make sure that new residents understand the reality of living here.
– Tumbulgum

EMERGENCY CONTACTS



Police – Fire – Ambulance 000
www.police.nsw.gov.au
www.fire.nsw.gov.au
www.ambulance.nsw.gov.au



State Emergency Services 132 500
Flood – storm – emergency
www.ses.nsw.gov.au

Bureau of Meteorology
www.bom.gov.au/nsw/forecasts/northernrivers.shtml

ABC Radio
www.abc.net.au

North Coast FM 94.5
P 1300 659 994
Gold Coast FM 91.7
P 1300 903 917

NSW road information
www.livetraffic.com.au

Local road information
www.myroadinfo.com.au

Tweed Shire Council
P (02) 6670 2400
P 1800 818 326 (after hours)

Identify your flood trigger

As a general guide for most of the Tweed Shire, if 300mm of rain falls within 24 hours you should expect significant flooding.

Remember, short bursts of much less rain can cause flash flooding, particularly in the Hinterland and low-lying residential areas of Tweed Heads. Also, if you live in the lower-lying areas of Tweed Heads, Chinderah and the Coastal Villages, it's important to understand that the worst flood will come when there is significant rain coupled with an ocean storm surge or king tide.

So, what's your flood trigger to:

- lift your property from any under-storey?
- move your vehicle?
- pick the kids up from school?
- evacuate/leave?

Different communities will have different flood triggers.

Even different people in the same community may have different flood triggers depending on their age, mobility, health, whether they have young children, the reliability of their vehicle and their factors.

During the March 2017 flood emergency, it was clear many residents had little understanding of how floods unfold in the shire or, even how they unfold in their neighbourhood.

New residents were more vulnerable due to their lack of local knowledge and flood experience.

Remember, every flood is different so you cannot rely solely on past experience.

To identify your flood triggers, check out the examples below to see if they might be relevant to your situation.

Flood trigger	Action
BoM releases a Moderate Flood Warning for Murwillumbah	Move possessions from under storey or ground floor to upper floor
When Tumbulgum Gauge reaches 1.8m AHD and it's still raining	Move vehicle to high ground
When it's been wet for days and 300mm is predicted tomorrow in the upper catchment	Move possessions from under storey or ground floor to upper floor or raise stock
When Moderate Flooding is predicted for Chinderah	Leave and stay with a friend or relative
When Major Flooding is predicted for Murwillumbah	Evacuate to a designated evacuation centre

If it's flooded, FORGET IT.

Caught off guard in March 2017

Cyclone Debbie crossed the Queensland Coast north of Mackay as a Category 4 system on 28 March 2017. Two days later after weakening to a tropical low and turning south, it brought heavy rain to northern New South Wales. In the weeks before, the Tweed had rain that caused 'below minor' flooding, which meant the ground was already soaked and could not absorb much of the additional rainfall.

The rapid rise of the flood was notable, as was the final peak from the last burst of rain. Within two hours on Thursday 30 March, the Bureau of Meteorology warnings went from 'minor to moderate' flooding to 'minor to major' flooding, then three hours later 'moderate to major' flooding. Many residents and businesses

were caught off guard, including Council. Six people lost their lives, hundreds were rendered homeless and thousands suffered significant property damage and loss.

This was such a swiftly changing flood – looking outside at what was actually happening was necessary. We had to make our own decisions. – Cudgen

The highest water levels since river gauging began more than 100 years ago were recorded on the Tweed River at Murwillumbah (6.3m Australian Height Datum) and Tumbulgum (4.0m AHD). Luckily, rainfall

on the coast was moderate and there was no significant ocean storm surge or king tide coinciding with the flood peak, therefore Tweed Heads and Chinderah were not as severely affected as upstream areas.

The Rous River catchment received some of the heaviest rainfall. Flood water heights in the lower Rous reached record levels with 7.5m AHD at Boat Harbour and 5.3m AHD at Kynnumboon.

Outside of the Tweed Valley, there was widespread flooding in the Burringbar, Mooball and Crabbes Creek areas after heavy rain.

The heaviest rain recorded in the Tweed in 24 hours fell at Couchy Creek, 747mm; Numinbah, 674mm; Chillingham, 663mm; and, Eungella, 638mm.

Make your plan

1. Know where to go

- a high and dry evacuation point close by that you can get to quickly
- a friend or relative outside the area

2. Know your risk

- look for the natural warning signs
- where past floods have come to on your property. Mark them for quick reference
- how long your neighbourhood and/or property was isolated for in the biggest flood
- your local roads; what goes under water and when
- can you protect your property with sandbags

3. Know who to call

- friend or family
- local SES
- 000 in a life-threatening situation

4. Know your plan

All residents need to have a Home Emergency Plan. A template to guide you can be found on the State Emergency Service website at www.seshomeemergencyplan.com.au. Also:

- talk with your neighbours, especially the long-term locals, for local knowledge of your area
- know when you need to leave to pick up children from school and what routes you need to take
- know where to find out where the local evacuation centre is located
- download these apps to your mobile device:
 - www.bom.gov.au/app/
 - m.tweed.nsw.gov.au
 - myroadinfo app
 - <http://m.livetraffic.rta.nsw.gov.au>

5. Get your kit together

At all times have:

- a battery-powered radio tuned to ABC North Coast FM 94.5 (your emergency channel)
- a battery-powered torch
- spare batteries
- containers for drinking water
- candles and waterproof matches
- a first aid kit
- a waterproof bag for valuables

If you are likely to be safe at home but cut off for days:

- food for several days
- medications

If your home is likely to be flooded and you need to leave:

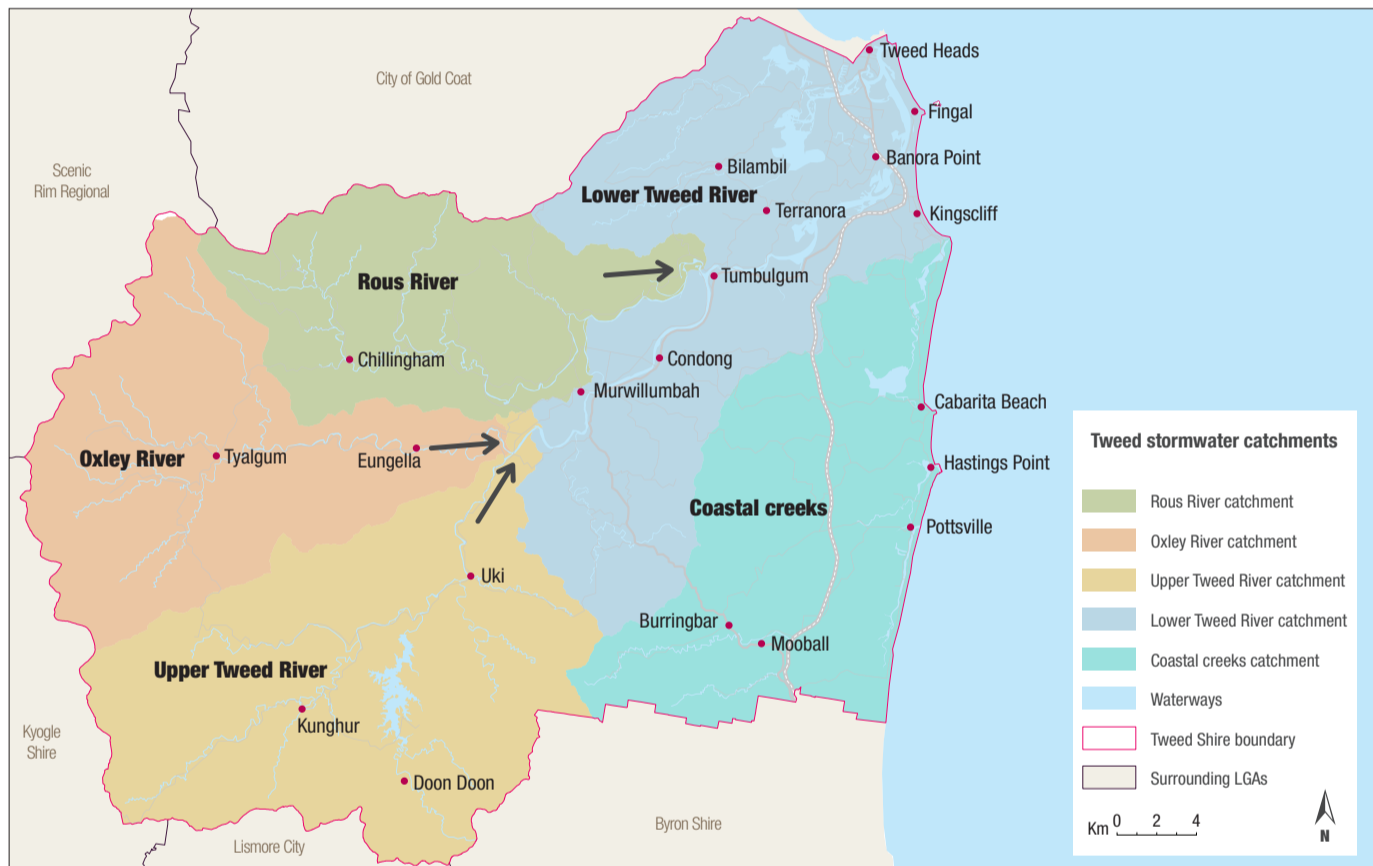
- cash (ATMs go down)
- important documents, including insurance policy, contact numbers/photos
- medications/scripts
- shoes/clothes

6. Check your insurance

The insurance industry in Australia defines flooding as: *The covering of normally dry land by water that has escaped or been released from the normal confines of:*

- any lake, or any river, creek or other natural watercourse, whether or not altered or modified; or
- any reservoir, canal, or dam.

All new home and contents insurance policies in Australia include flood cover, however many choose to opt out of flood cover, exclude flood from business policies or choose not to insure at all. Cover for stormwater will not generally extend to include flood events. Policy holders should understand the difference and upgrade their policy if flood cover is required. If an initial quote is too expensive, shop around. For more information, see <http://understandinsurance.com.au/types-of-insurance/flood-insurance>.



Above: The catchments of Tweed Shire.

Nature's signals are the first warnings

... we need to be masters of our own destiny. If you aren't on one of the seven hills you are in a floodplain. – Murwillumbah

As we are now in storm season, it's a good idea to understand what warnings you will get of a flood.

The first warnings of a flood you should look for are the natural warning signs. These signs would include rain for many hours; pooling and ponding water; rushing roadside gutters; dry watercourses running; livestock

moving to higher ground; rising creeks and rivers.

Then, there are official warnings. The Bureau of Meteorology issues flood warnings and flood watches, severe thunderstorm warnings and severe weather warnings, while NSW SES issues flood bulletins, evacuation warnings and evacuation orders.

The scope of the BoM's agreed flood-warning service does not include warnings for local overland and/or rapid onset creek flooding. This is particularly relevant for the Tweed Shire, given the multitude of creeks that run down its valleys.

The natural warning signs in your area may be your flood trigger. Residents should not wait for official warnings if the natural warning signs tell you to 'go'.

Again, the SES website at www.ses.nsw.gov.au has a lot of valuable information on warnings and what they mean. For those who want an in-depth understanding of flood behaviours in the shire, Council's Tweed Valley and Coastal Creeks flood studies and associated risk management plans can be found at www.tweed.nsw.gov.au/Flooding.

Historical river heights

There are a number of river gauges throughout Tweed Shire which measure the depth of the rivers at all times. Since records began, maximum heights of the rivers at gauge locations are:

Town/village	Metres	When
Uki	12.9	2017
Tyalgum	11.0	1989
Chillingham	6.8*	2017
Murwillumbah	6.3	2017
Tumbulgum	4.0	2017
Chinderah	2.9	1954
Tweed Heads	2.2	1954

*Chillingham Gauge has moved. New readings do not correlate with historic levels.

Building flood resilient homes

Council has adopted the 1% AEP (1:100 Annual Exceedance Probability) flood as the design standard for most kinds of residential buildings.

In new subdivisions, such as on the Tweed Coast or around Banora Point, this is the minimum level that each house block is required to be filled to. Floor levels in the habitable part of the dwelling (living rooms, bedrooms, kitchens etc) need to be built 0.5m above this level.

In areas where filling is not allowed or is impractical, raised pole houses are constructed. You will see these types of homes in South Tweed, Tumbulgum, Condong, South Murwillumbah and Chinderah. Again, the habitable floor level needs to be at least 0.5m above the 1% AEP flood level.

Areas below the habitable floor level need to be built to structurally sound flood standards. The floor plan for the under-storey shown on this page outlines the simple building techniques you can use to make your house more flood resilient and easier to dry and clean after a flood. This floor plan is for a house in Tumbulgum, which was cleaned and fully functional again by 3pm the day after the 31 March 2017 flood.

Note that the fully enclosed part of any under-floor area is limited to 50 square metres, including any stairway to the upper habitable storey. This restriction on complete enclosures means there are adequate openings (which can be slatted or decoratively screened for security) for flood flows to pass through each property with limited damage to that property.

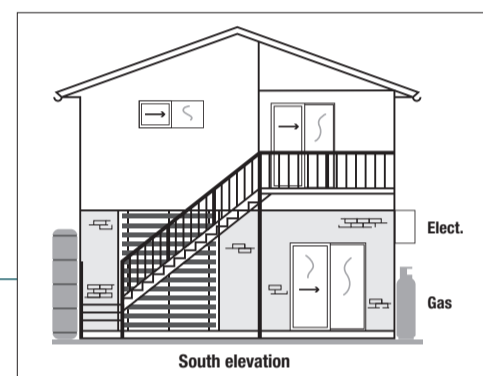
If you want to find out the flood levels that apply to your property, look at our online mapping at www.tweed.nsw.gov.au/Mapping and check your s149 planning certificate (you should have got one of these through the property purchase process with your solicitor) or contact Council.

Properties that comply with the building code are the most flood-resilient. Communities that comply with the building code are the most flood-resilient.

For more information on building in flood prone areas, see www.abcb.gov.au/Resources/Publications/Education-Training/Construction-of-Buildings-in-Flood-Hazard-Areas. For information on hazards to watch for when returning to a flood-damaged property and tips on how to clean up and salvage damaged items, see www.tweed.nsw.gov.au/Flooding.

Flood construction notes

1. Ground floor timber stud walls to be H3 treated and lined with cement sheeting screw fixed only with lower edge terminating 300mm above top of bottom plate to allow free draining of flood water with deep skirting to cover gap. At least one 20mm hole to be drilled in each noggin to allow frame to drain.
2. Slab for water tank and gas cylinders to be homogenous with ground slab to provide a flood anchorage base.
3. All general power outlets to be a minimum of 2.0m above ground slab.
4. All light switches to be a minimum of 1.5m above ground slab.
5. Electrical meter box to be positioned on external wall above known flood heights.
6. Habitable floor level to be at or above Council's minimum requirement for the area.



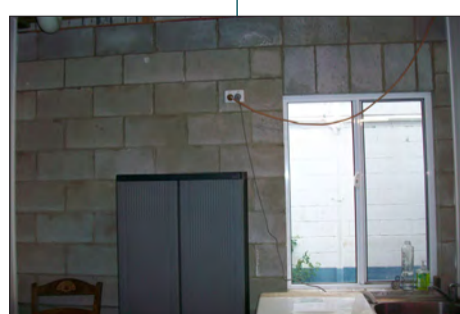
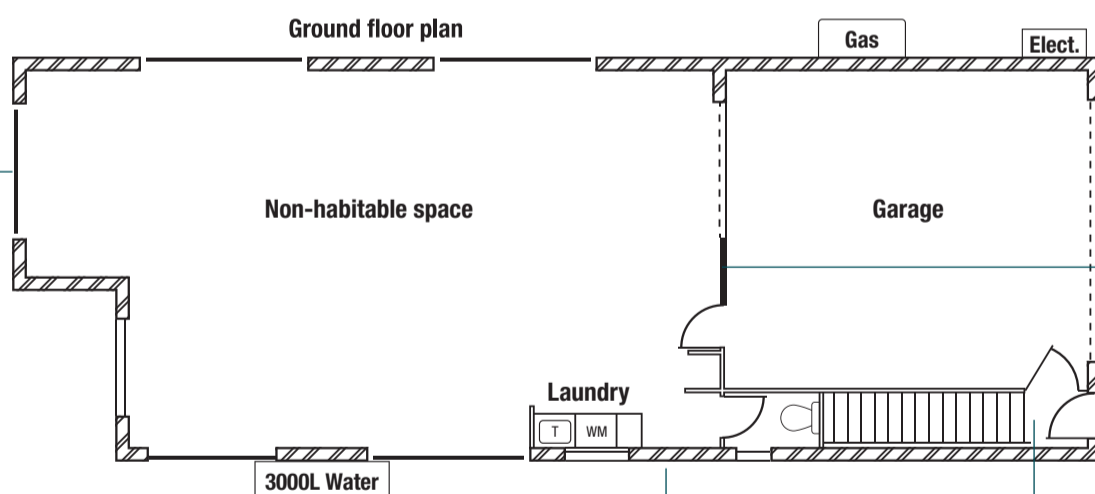
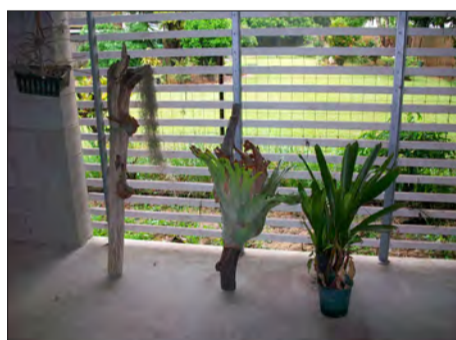
Water tank strapped down to slab, which is poured and reinforced into main slab.



Electrical meter elevated above flood level (access platform under not yet fitted). Gas cylinders on slab poured with main slab and chained down. Core-filled besser block ground wall for flood flow resistance and easy clean.



Secure flood openings with 65 per cent openness – H3 treated timber fixed to galvanised supports. Easy wash out under.



Power points at 2.0m above ground floor level and light switches at 1.2m high. Light and power circuits on the ground floor are on separate circuits from the upper level which allows the ground floor to be switched off as flooding approaches.



Stairs constructed using H3 treated timber and marine ply with lowest riser cover removable to allow underside of stair to be flushed easily. The wide internal stairs allow the easy move of belongings upstairs as the flood advances.



Removable skirting board allows framework to be flushed clean of silt. Timber framework below flood level is H3 treated timbers for water resistance and noggins above have holes drilled in them to allow the frame to easily drain. The wall lining is cement sheet for water resistance. White walls were easily cleaned the day after flood waters receded using a product like 30 Seconds and then pressure cleaned.



IT'S STORM SEASON

Tune in when it's happening

In an unfolding event, get up-to-date information by listening to the official emergency channel, ABC North Coast 94.5 FM or ABC Gold Coast 91.7 FM.

Your local radio station may have some information but is not an official emergency broadcaster.

Log on to:

- **Bureau of Meteorology (BoM) website** – this is the official weather watcher and forecaster and it issues severe thunderstorm warnings, severe weather warnings, flood watches and flood warnings. Go to www.bom.gov.au
- **NSW SES website** for flood bulletins, evacuation warnings and orders. The SES is the lead agency in emergencies. They tell you when to 'prepare to go' and 'to go', but don't expect them to be there to get you out because by that time it may be too late. Go to www.ses.nsw.gov.au

- **MyRoadInfo website for road closures** – all councils in the Northern Rivers Region put their roadworks and road closure information on this site. During an unfolding flood, the data can lag due to the need to verify information before publishing it or lack of access to certain areas. Go to www.myroadinfo.com.au

There are two reference gauges used by BoM and the SES for flood warnings, namely:

1. **Murwillumbah Gauge** (located in front of the Murwillumbah Civic Centre), and
2. **Barneys Point Gauge** (located on the old highway bridge abutment in Chinderah Village).



Above: Holstons Lane in South Murwillumbah shows the damage a flood can wreak on both residential houses and businesses.

Council mitigates flood risk

Council is responsible for floodplain risk management in the Tweed Valleys and Coastal Creek catchments and has prepared a range of studies and plans. These studies help shape our flood-related development controls, such as setting rules for the rezoning of land, considering the cumulative impact of filling, designing evacuation capabilities into subdivision design and major land releases.

Council also is responsible for ensuring compliance to current building standards and codes and providing suitable land to accommodate SES services.

Council is responsible for closing local roads (not the Pacific Highway). Roads are closed when there is water over them and they are deemed unsafe or when directed by the Police or SES. Council updates its information on the MyRoadInfo site as it becomes available.

The Tweed Shire flood levee system is owned and maintained by Council.

Flood modelling proved accurate

The March 2017 flood essentially did what Council's flood-modelling predicted it would do when this volume of rain falls within this period of time. The event approximated a 1% AEP (Annual Exceedance Probability) flood in many locations.

The observed flood behaviour was consistent with Council's floodplain risk management studies for the Tweed Valley and Coastal Creeks floodplains of the past 13 years. These studies will be reviewed using actual data from the March 2017 flood to ensure the modelling remains accurate.

The dam makes no difference

Clarrie Hall Dam is not a flood mitigation dam. As soon as Clarrie Hall Dam fills, water is released via the spillway. As such, it makes no material difference to any flood event.

Volunteer to help



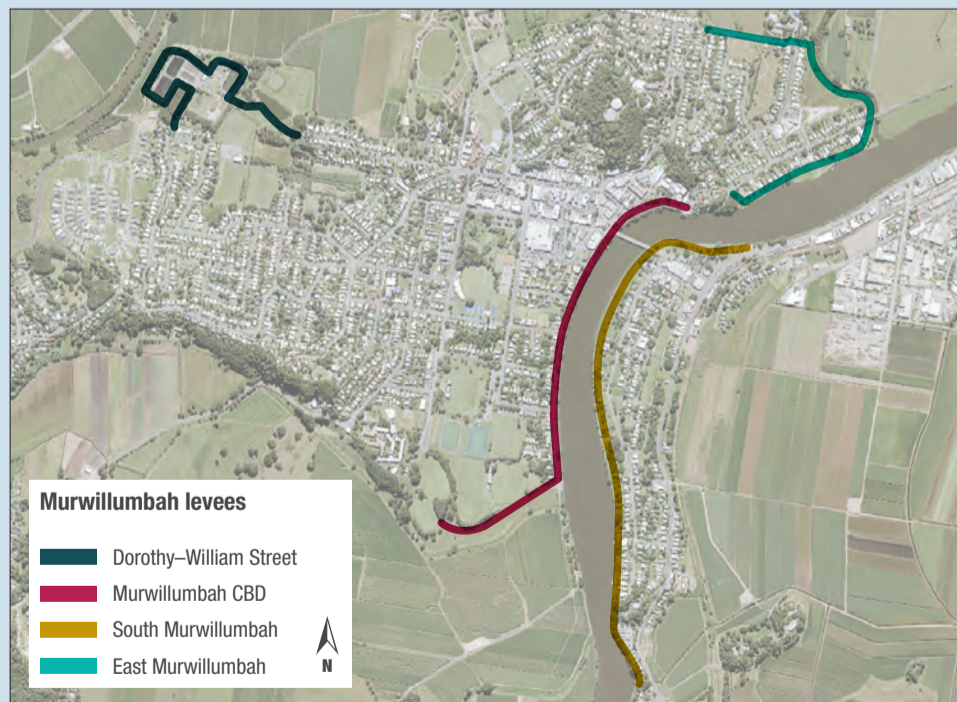
NSW SES has unveiled new opportunities for residents to volunteer to help build greater community resilience in severe weather, such as floods and storms.

The new initiative, 'Volunteering Reimagined', has been launched and allows more flexibility as well as different options for people to get involved with the Service. As part of this new initiative, SES has introduced three new categories of volunteering in addition to the existing core unit membership. These new categories are:

1. **Community Action Team (CAT) members** – A group of community members who come up with a local plan or set of actions that can help them prepare and respond to a flood or storm emergency. Several Tweed Shire communities have looked at developing a CAT for their area. These include: Chinderah/Fingal Head, Murwillumbah, Burringbar/Mooball, Tyalgum. More initial meetings are being planned
2. **Corporate volunteers** – Employees of a partner organisation or business who can volunteer their help in an emergency, and
3. **Spontaneous volunteers** – People who want to volunteer their help during and after an event with no ongoing commitment.

For more information on the different volunteering options or to join or initiate your own local CAT group, please go to www.ses.nsw.gov.au/get-involved/volunteer.

When do the levees overtop?



Levees should never be considered complete protection from flood. All of Tweed Shire's flood levees will eventually be overtopped when a big enough flood occurs.

While levees are designed to keep river water out, during a flood the drainage outlets will be closed and the levee will act as a dam to keep local rainwater in.

An important observation from the March 2017 flood is that had the intense rainfall on Thursday night continued for as little as four hours more into Friday morning, the Murwillumbah CBD Levee would have overtopped and completely filled the CBD area.

Murwillumbah CBD Levee overtops at 6.3m AHD on the Murwillumbah Gauge.
East Murwillumbah Levee overtops at



approximately 6.3m AHD on the Murwillumbah Gauge or less if flooding in the Rous River is heavier. **Dorothy/William Street Levee** overtops at roughly 6.3m AHD on the Murwillumbah Gauge or less if flooding in the Rous River is heavier. The **South Murwillumbah Levee** is much lower and begins to overtop at 4.8m on the Murwillumbah Gauge.

Tweed Heads South Levee begins to overtop at approximately 2.2m on the Barney's Point Gauge or Dry Dock Gauge.

While not levee protected areas, water will begin to flow over Riverside Drive in **Tumbulgum** when the Tumbulgum Gauge reaches about 2.4m and floodwaters will begin to enter **Chinderah**, over Chinderah Bay Drive, when the Barney's Point Gauge reaches about 1.6m.