

REPORT OF GENERAL MANAGER
POLICY AND RESOURCES COMMITTEE

TUESDAY, 8 SEPTEMBER 2015

GENERAL MANAGER

ITEMS TO BE DEALT WITH UNDER DELEGATED AUTHORITY

1. August 2015 - Flood Event	File 51860E
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PURPOSE:

To outline actions taken during the flood event of 25 - 30 August 2015 and what actions are going to/have been undertaken following the event.

RECOMMENDED that, in accordance with the Committee's delegated authority from Council, the Committee:

- a) Receive the report for information;
- b) Thank all staff involved in the response and recovery operations relating to the flooding event for their efforts and support;
- c) Acknowledge that the Natural Resources and Floodplain Management Committees will undertake a review of the flood event in the context of existing Estuary and Entrance Management Plans and if necessary recommend any further actions to Council; and
- d) Endorse actions to undertake an extensive community education campaign highlighting flooding risks and the dynamic nature of our various rivers, streams & lakes in the City.

OPTIONS

- 1. As recommended.
- 2. Council make alternate decisions.

DETAILS

This was a significant emergency response event impacting across all areas of the City. Whilst the initial weather event predictions were quite moderate (predicted rainfall) the situation escalated during the evening of Tuesday 25 August.

During the flood event, many staff responded to various aspects. Some of the issues are outlined below for information of Councillors.

Monitoring/closing/opening roads throughout the City.

Road crews from Northern, Central and Southern depots were initially deployed to monitor localised flooding initially and later stream flooding at Lake Conjola, Sussex Inlet, Sanctuary Point and other central area villages and roads impacted within the Shoalhaven River catchment and floodplain.

Appropriate road warning signs and road closures were effected as water levels impacted. Information was uploaded on Council's website and distributed to media and SES to keep the community informed.

Monitoring Lake and River levels - opening as per adopted protocols. Note: some public concerns and complaints received and the Entrance Management Plans are flagged for discussions at the next round of Natural Resource Committee meetings.

Background

The Natural Resources and Floodplain Unit monitors rainfall forecast, rainfall amount, status of entrances and water levels on a daily basis.

The Natural Resources Unit has developed floodplain risk management plans and entrance management plans under the guidance of Council's Natural Resources and Floodplain Management Committees. The committees comprise State Government agencies representatives (Office of Environment & Heritage, Fisheries, National Parks, Crown Lands, RMS, SES), community members, councillors and council staff. These plans have been on public exhibition and adopted by Council.

The floodplain risk management plans identified what actions could be undertaken to minimise the flood risk, often the plans identify land use zoning, flood planning controls (such as flood planning levels), flood emergency planning, and community education as the top priority actions.

The entrance plans clearly dictate the procedures to be followed to undertake mechanical entrance opening. They are all available on Council's website.

In addition, as part of Council's planning, flood emergency plans are also developed for the SES. These plans inform the SES operations in time of floods.

Overview of Event

East coast lows are intense low pressure systems off the eastern coast of Australia, they are one of the more dangerous weather systems to affect the NSW coast, they are associated with elevated ocean levels, very rough seas and prolonged heavy swells, gale storm force winds and heavy widespread rains.

On Monday 24 August the Bureau of Meteorology advised of a coming East Coast Low and forecast was for 50mm of rain on Monday and 150mm of rain Tuesday (with up to 200mm near Jervis Bay).

The recorded rainfall up to 5pm Tuesday 25 August was greater and caused widespread flooding in the Shoalhaven area.

- 349mm in 48hrs - Fishermans Paradise
- 292mm in 48hrs - Conjola Lake
- 244mm in 48hrs - Nowra

The table below gives an indication of the peak flood levels and approximate frequency associated with this event, as can be seen bigger floods could occur in the area with the 100 year flood predicted peak flood levels being higher than the flood levels experienced recently.

River	August 2015 peak	App ARI	100 year flood peak
Conjola	2.14m	20	2.4m
Shoalhaven River at Nowra	3.97m	Less than 10	6.3m
Shoalhaven heads	2.23m	Less than 10	3.3m
Sussex inlet	1.42m	20	2.05m

Entrance Management

A report provided in **Attachment 'A'** details Council staff actions in regard to the entrances at Lake Conjola and Shoalhaven Heads. Actions from staff followed the adopted policy of Council.

On Tuesday 25 August, at Conjola the entrance was naturally breached by floodwaters prior to 7:30am and prior to the trigger for mechanical entrance opening was reached. Despite that fact, the lake continued to rise and reached its peak at 7:30PM, 12 hours later.

On Wednesday 26 August, at approximately 12:30pm, the Shoalhaven River entrance was mechanically opened, the peak of the flood at the Heads occurred at approximately 13:45PM and reached 2.26m AHD (MHL gauge). The entrance was assessed from early Wednesday morning but could not be opened earlier that day as the heavy sea conditions associated with East Coast Lows were prevailing.

The entrance management plans recognise that under some conditions, the entrance may not be mechanically opened as it would be too unsafe for the machine operator or may increase the flood risk if the ocean conditions are higher than the lake or river flood levels.

Council has applied for State Government funding to review the flood model for the Shoalhaven River, as part of this exercise a review of the entrance management plan will also be undertaken.

Community awareness

During the flood planning process, public meetings, information brochures and community surveys are undertaken. The community is generally alerted to the fact that they need to prepare for a flood and have their own flood emergency plan in place. The

community is also reminded that the flood risk is still present and of the same amplitude regardless of the entrance being opened or closed.

Public meetings were conducted at Lake Conjola and Shoalhaven Heads after the June 2013 minor flood event to explain entrance opening procedures and flood risks.

Flood risk information is also provided on Council's website and through SES brochures.

Conclusion

In time of heavy rainfall, as experienced during this event, flooding of low lying areas in the Shoalhaven is inevitable and is not subject to entrance conditions.

Good planning and development controls such as raised flood levels minimised the flood risks to the community.

The level of community awareness of the flood risk needs to be improved. Council committed to undertake community education and awareness of flood risk in the Shoalhaven with potential funding from OEH to be confirmed.

Council will be hosting the Floodplain Management Australia Conference in May 2016 and it will be an opportunity to focus on flood management in the Shoalhaven and improve on the community, SES, Council and other State Government agencies understanding and response to floods.

Impact on Roads - Monitoring and responding to some land slips impacting roads.

Assessment for damage on Council road networking is continuing. Pavement repairs are required and in progress throughout the City, particularly on many roads in Lake Conjola and Sussex Inlet and The Wool Road, Jervis Bay Road and Island Point Road in the Basin area.

There has also been significant scouring and material loss from the unsealed road network, notability in the Kangaroo Valley areas like at Jack Corner Road, Walkers Land, Comerong Island Road, Merchants Road and in the southern area at River Road and Old Berrara Road.

Once the emergency response receded, crews have been attending to urgent safety works and pothole patching where possible. More permanent works will be undertaken once the full extent of damage and repairs needed are assessed. The initial Natural Disaster Assessment form was submitted on Friday 28 August to Ministry for Police & Emergency Services. The initial cost estimates relating to restoration of roads, parks, public buildings and other infrastructure was estimated at \$690,000. This amount is expected to increase as more damage is assessed and quantified. It is anticipated that it will take 2 weeks or more before a formal declaration as a Natural Disaster is made.

In addition, preliminary visual inspection of known landslip sites has been undertaken. A number a small slips (not currently impacting the road) have been identified on Wattamolla Road, Kangaroo Valley Road and Green Valley Road.

A summary of the more major slips identified is provided below:

Upper Kangaroo River Road

A down slope slip occurred approx. 2km west of the Scotts Road / Upper Kangaroo River Road intersection. This occurred at a similar location to a previous slip, which was addressed by moving the road away from the very steep embankment.

The stability of the embankment is a concern so the road has been closed at this location. This is preventing access to up to 3 properties who use this road as their only access. Only one of these residents is a Shoalhaven City Council ratepayer with the other properties located in the Wingecarribee Shire.

Further assessment will be required to determine how to address this problem. The residents have been kept informed and short to mid-term access options are being considered.

Bunkers Hill Road

Longitudinal cracks have appeared in a section of Bunkers Hill Road likely due to movement of the embankment. This section has been reduced to one way traffic and controls put in place to divert further stormwater runoff from entering the cracks.

The road will need to be rebuilt in this location following a geotechnical assessment and design.

Burrier Road

A section of the cut face (upstream embankment) collapsed onto the road near Grady's Retreat. Fallen material has been removed and further work will be required to remove loose material on the embankment.

A culvert has been damaged in this location that has caused some pavement slumping.

The road is open.

Foremans Road

A section of the road has slumped and a transverse crack has appeared creating a level difference (approx. 100mm) in the road. Maintenance work will be undertaken to fill the crack and transition the level difference.

Further assessment will be undertaken and further works considered. The road remains open.

Mt Scanzi Road

The high side embankment slipped in a number of locations depositing debris on the road. The most substantial was at the site of the slip that occurred following the June 13 rainfall events. The matting installed to stabilise the embankment at this time partly failed in this latest event.

Near this location the downstream embankment slumped at a stormwater pipe outlet causing the deformation in the road. Hazard markers have been placed to denote this area to traffic.

The road is open. Geotechnical assessment and design will be required before repairs are implemented.

Monitoring and responding to major water/flooding impacts on our sewer systems and pumping stations.

The flood event affected all of Council's 13 sewerage systems to some extent. In the worst hit areas, many yard gullies and internal drains were submerged with flood waters, which meant that the sewage could not drain away. Shoalhaven Water staff monitored and responded to all water and sewage alarms during the flooding event. Power outages were rectified quickly using Council's emergency generators. The emergency storm ponds at all the sewage treatment plants were inundated with stormwater and filled to capacity.

Two water mains were washed away during the flood and staff responded quickly to reinstate water to affected residents. One dairy farmer was provided with a 1000 litre water tank to keep his dairy operating until flood water receded and Shoalhaven water could repair the main.

Shoalhaven Water staff were in regular contact with the EPA and the NSW Food Authority during the flood event and both agencies were satisfied with the handling of the situation.

Monitoring of 2 landslips on coastline (Manyana & Bannisters) impacting on private residences. These require further detailed investigations.

In the midst of the storm on 25 August reports were received of two landslips, one in Sunset Strip, Manyana and one in Mitchell Parade, Mollymook Beach. Staff attended to carry out a preliminary assessment of the situation and gave advice to landowners to contact their insurance companies and seek their own geotechnical advice on the safety of their homes. SES was present during these initial inspections and gave the landowners advice in relation to evacuation. The landslips occurred in locations that have been previously identified as being subject to coastal cliff instability. Preliminary observations suggest that the sheer volume of rainfall was likely to have caused the landslips to occur on the private land and the material has slipped onto Council land behind the properties.

The landslip at Mollymook Beach may have affected the structural integrity of Council's sewer main at the rear of the house and investigations are continuing to ascertain the level of risk and any mitigation measures that may be required. Any remedial actions would need to be coordinated with any work proposed by the landowner following their own geotechnical investigations.

The landslip at Manyana is potentially more serious and at least three houses are at risk due to the current landslip with the potential for further land movement as the current slip face does not appear to be stable in its current condition. The owners are pursuing their own geotechnical advice and subject to this advice some form of coordinated approach, that may include the Council land, may be required to restore the stability of the land. There is no immediate risk to sewer infrastructure in this location as the houses are serviced by individual pump systems and there is no Council stormwater drainage in the immediate vicinity.

There have been further reports of more minor landslips both at Manyana and Mollymook Beach and these are currently being investigated.

Photos of the two major slips are shown in **Attachment 'B'**.

Active presence in the Emergency Operations Centre (EOC).

The EOC was activated late on Tuesday 25 August with minimal staff and agency involvement to assist the SES, the primary combat agency at that point. Council's Director Assets & Works attended and remained until late that evening. Early Wednesday morning staff attending included Engineering, Transport, Communications, Shoalwater and Media. The Local Emergency Operations Controller (LEOCON) (Police) & Local Emergency Management Officer (LEMO) (Council staff member) were present plus agency staff representing Welfare, Primary Industries and 'Power'. Regular briefings were conducted by SES. The EOC LEOCON oversees & directs emergency response and provides assistance to SES and agencies.

Responding to numerous public and media enquiries.

Council began providing the media with regular road updates from approximately 10am on Tuesday 25 August.

This full list of road closures and areas with water over the road was also placed on both Council's website and Facebook page. Links were also sent from Council's twitter account.

This was updated on a near to hourly basis over the ensuing days.

The media was provided with road closure updates every one to two hours from Tuesday through Thursday with updates becoming more sporadic after this period.

Throughout the peak of the flood event Council posted nearly 80 separate updates on Facebook in order to keep both the media and community informed. These updates concerned a wide range of issues taking place at the time.

It became quite apparent early within the flood event that the media were sourcing the majority of their information from our Facebook page making this the main communication platform throughout.

Local media including the ABC and 2ST were both telling their listeners to follow Council's Facebook page for the most up to date information while other outlets had informed Council staff that they would take their information from the page.

At the height of the event Council was receiving inquiries from all of the major national media television outlets (Nine, ABC News 24, Seven and Ten) along with the local media.

It was apparent that the major media outlets were also staying abreast of the event through Council's social media channels among other platforms.

With more and more people turning to the Facebook page, Council received an additional 1,200 'likes' on Wednesday 26 August (going from 2,100 to 3,300).

The constant influx of 'likes' was a clear demonstration that the community were also coming to the social media page in order to be kept up to date with the flood event.

Further key statistics highlight the amount of traffic the Facebook was receiving.

On 26 August Council's posts:

- Were shared over 1,300 separate times;
- Received over 4,100 'likes'; and
- Received over 2,130 individual comments.

Further to this, in the three days at the height of the flood event over 180,000 individual people had viewed Council's posts.

One individual post was shared 655 times, was seen by 81,000 people and received over 3,300 individual comments and 'likes'.

These statistics demonstrate a huge leap in normal traffic.

In addition to this, Council's website saw a 300 percent increase in traffic over the week with 67,000 page views across the week.

The key information placed on Council's Facebook page included road closures and storm water warnings. Flood and weather warnings were also being placed on the Council website throughout.

Throughout the flood event, Council staff were also monitoring local social media and media sites and addressing any concerns, rumours or popular questions through our own channels.

These issues included the incorrect rumour that the Shoalhaven River Bridge was closing, rain forecasts, river height forecasts, weather warnings, evacuation centre information and road closures.

Council liaised closely with the SES and other emergency service organisations throughout the event in providing timely and important information to the community regarding these issues.

During the height of the flood event Council distributed 13 media releases highlighting the major issues taking place at that time.

Media Releases became more important in the aftermath of the event when the community and media were looking for information on the damage and clean up.

Council provided a number of 'event overview' releases both on the Wednesday night and Thursday, Friday of the event in an attempt to bring the media/community completely up to date with the events and clean up procedure.

These releases were undertaken in consultation with the SES and provided information on:

- SES call out statistics;
- River heights;
- Received rainfall;
- Lake and River opening timelines;
- Road closures;
- Road patching details;
- Welfare assistance;
- Parks and Reserves closures;
- Natural Disaster recognition update;
- Water quality;
- Free flood waste disposal;
- Mayor's Relief Fund; and
- Large bin placement.

This information was also relayed through the organisation's social media pages.

In the days following the event Council has continued to keep the media/community well informed of the continuing clean-up activities.

Further to this, Council hosted a media briefing with representatives from the South Coast Register, ABC and 2ST present to receive an overview on the timeline and decisions undertaken throughout the flood event.

This was a valuable method of highlighting the reasoning and timing behind the mechanical opening of Shoalhaven Heads and answer questions on the natural opening of Lake Conjola.

Council has received a lot of media interest in the days following the event as the community deals with the clean-up and aftermath of the flood.

In the coming weeks Council plans to distribute a 'flood themed' CCB newsletter further explaining the process behind the opening of the area's rivers and an update on the clean-up.

Council will also develop a short video outlining the event to be placed on social media.

Recovery and clean up stage.

Damage to assets and facilities is still being assessed but early estimates of \$690,000 plus indicate significant works are required. Application for Natural Disaster Funding was submitted on Friday 28 August. It may take up to two weeks to be assessed. The most urgent works will be prioritised.

Waste

Disposal of waste has been accommodated with the advertising of free waste disposal at Waste Depots that have been opened additional days and extended hours. Over the first three days (Friday-Sunday) 291 visits (depositing 77 tonnes of waste) was recorded from Lake Conjola alone.

On Monday 31 August steps were initiated to have large skip bins located at key locations in Shoalhaven Heads, Sussex Inlet, Lake Conjola and Sanctuary Point. Those bins were placed on Monday and Tuesday (1/9/15) with media advertising. Over the 10 day period from Friday 28 August there has been some roadside waste deposits and staff have responded to clean-up.

- Free disposal of flood damage goods at Council's 10 waste facilities.
- Facilities at Berry, Sussex Inlet and Lake Conjola had extended opening times to every day between 9am and 4pm for the whole week.
- A number of 'Skip' bins were placed in convenient locations to allow residents to tip damaged goods for free without having to visit a waste facility. Bins were located at:
 - o Lake Conjola Entrance Road, Lake Conjola;
 - o The Park Dr, Sanctuary Point;
 - o Hay Ave, Shoalhaven Heads; and
 - o End of Nielson Lane, Sussex Inlet.

These initiatives have been well utilised by residents, with the following flood waste (including green waste) received at the waste facilities (between Friday 28 August and Tuesday 1 September):

Waste Facility	No of Transactions	Tonnes of Waste
Bendalong	9	3
Berry	67	20
Callala	15	5
Huskisson	427	139
Kangaroo Valley	0	0
Kioloa	0	0
Lake Conjola	329	99
Sussex Inlet	381	115
Ulladulla	45	12
West Nowra	71	50
Total	1,344	443

In the first day of operation, the skip bins were emptied and replaced 10 times.

In addition to the above, residents also have access to Council's kerb side collection service for bulky goods. There is a fee associated with this service, but the free vouchers all properties receive each year can be used for this service. This an existing and ongoing service provided by Council.

Council has a policy, *No Charge Tipping of Storm Damaged Materials at Waste Depots (POL12/298)*, which provides a criteria for free green waste only tipping following a storm event. This policy will be reviewed to consider the initiatives put in place following the

latest flooding event. This review will need to take into account the amount of financial support for waste disposal offered by Council in these situations, noting a residents' insurance could cover these costs and other funding sources available to residents. An 'easy to measure' threshold needs to be identified that will trigger the support, so that staff can have systems and resources in place to react effectively and efficiently.

The staff have worked long hours and done an excellent job.

During Tuesday 25 August senior staff and key operational staff met on two occasions (mid-morning & late afternoon) to review the impacts on Council operations and to agree on any further actions necessary.

The EOC was not activated until close of business on Tuesday and Director Assets & Works was in attendance until late that evening before making inspections in the Shoalhaven Heads area.

All steps were taken to protect community assets and mitigate flooding impacts on public and private property under the prevailing weather conditions and at the same time keep the media and public informed.

It is significant that there were no reported significant incidents or injuries as a result of the flooding event.

The LEMC has set up a Recovery Committee to ensure that necessary recovery actions are in place.

The Mayor's Relief Fund Committee has been activated and an 'Appeal' launched to assist residents in most need.

The EOC has scheduled a formal debrief to review the event and implement any changes as necessary.

Council staff have scheduled a formal debrief to review its internal response and actions with any identified changes/improvements to be recorded and actioned for future events.

We will be pursuing declaration as a Natural Disaster and seeking whatever funding relief possible.

FINANCIAL IMPLICATIONS

Initial assessment of damage \$690,000. It is possible that not all costs to respond to the emergency or repair damage are recoverable from Natural Disaster Funding (assuming a declaration will be made).

COMMUNITY ENGAGEMENT

Community engagement was in the form of 'inform' during the flooding event and immediately following - this will be ongoing.

In any review of the Estuary and Entrance Management Plans community members of the relevant Committees will be involved and the general public consulted in any subsequent discussions.

It will also be important to continue a general information/education campaign to the broader community.

Council staff made an excellent presentation to the Shoalhaven Heads CCB meeting on 2 September explaining the Entrance Management Plan triggers for opening of Shoalhaven Heads and the flooding event. Over 50 members of the Community were present and there was considerable interest with discussion and questions.

R.D Pigg
GENERAL MANAGER

East Coast Low Report 25th-27th August 2015

Flood at Lake Conjola, Shoalhaven River and entrance management

The flood unit continually monitor rainfall forecasts and the status of lake and river entrances across the Shoalhaven area.

On Monday 24 August at 11:09AM, an email was sent by Ailsa Schofield, Council's senior floodplain engineer, to the Southern NRFMC members which include community members at Lake Conjola, Lake Tabourie and OEH, Crown Lands Fisheries, NPWS and SES representatives (D15/249868). The email advised that the Southern Shoalhaven is expected to receive up to 150mm of rain with a small patch expected to receive up to 200mm of rain. This information was based on the Bureau of Meteorology (BOM) rainfall forecast at that time .

The email also advised of the status of the entrances, and confirmed that Tabourie and Burrill Lake were opened and that *'Conjola Lake has minimal flow at high tide but mostly has no flow going into or out of the entrance area. The small amount of flow has maintained an area of the berm at a low level. It is therefore expected that should the Lake level increase this low point will naturally allow the Lake to flow to the ocean.'*

On Monday 24 August 2015 at 12:54PM, the BOM issued a flood watch for the South Coast (D15/249850) advising that 'A low pressure system is expected to form near the central parts of the NSW coast and bring heavy rain to the Illawarra and South Coast later during Monday and Tuesday.' 'At this stage there is a greater than 70% chance of flooding in the following river valleys from Tuesday onwards: 4. South Coast - local flash flooding'

Lake Conjola

The water level at Conjola before the rainfall event started was just below 0.6m and the MHL water level recorder (refer figure 1) confirmed a small tidal pulse indicative of a very low berm and minimal tidal exchange.

Council's Flood unit and SES have direct, continual access to Enviromon -a computer system designed to monitor 'on-time' rainfall and water levels from the BOM gauges. Council's Flood unit has set up a system of automatic warning with emails sent to Council and SES staff advising of rising water levels. A first alert email was received by SES and Flood unit on Tuesday 25 August at 2:00 AM advising the water level at Conjola started rising during the night and that the lake was at 0.8m (BOM gauge) (D15/249941). A second email alert was received at 5:01 AM on the same day advising the lake was at 1.02 m and still rising.

On Tuesday Morning, Southern Maintenance engineer, Reg Condie, advised the flood unit that visual observation at 7:30am of the entrance at Lake Conjola confirmed the entrance was flowing well out to the sea, at that time the lake level was at 1.2m (MHL gauge – refer table 1).

Council's interim entrance management policy for Lake Conjola specifies the trigger level for emergency opening is 1.2mAHD. As expected, the entrance had naturally broken out before the trigger level was reached due to the low berm level.

On Tuesday morning at 8:30am, Isabelle Ghetti rang SES and advised that the lake level was rising rapidly and that it was expected that due to the amount of rainfall received the lake would peak at about 2mAHD.

A media release was issued at 10:16am warning residents of the rapid rising waters and flood risks.

On Tuesday 25th August at 4:50 PM the catchment had received 350mm at Fisherman's Paradise (Refer Figure 2).

The lake continued to rise despite the entrance being opened and peaked at 7:30PM (exact peak level to be confirmed by survey).

Shoalhaven Heads

The Shoalhaven Heads entrance management policy adopted by Council governs the opening of the entrance at Shoalhaven Heads.

The entrance can only be opened under very strict conditions as not following the set protocols could result in more flooding, ineffective entrance opening and damage or injuries/death to operators.

The policy is endorsed by the State Government and was informed by the flood studies for the Shoalhaven River which follow state government guidelines.

The policy clearly states the limitations of entrance opening: *"aims to reduce, not eliminate, the impacts of flooding" "there may be circumstances (eg, closed roads, dangerous sea conditions) where, despite its best endeavours, Council cannot act to open the entrance of the river at the level indicated in this plan"*

The predicted flood levels at Nowra are used as triggers for preparations of the opening at Shoalhaven Heads, the policy states: *'When a Flood Watch notice is received from the Bureau of Meteorology (via the SES), Council's Site Supervisor and Flood Engineer will get things ready for an emergency opening if it becomes necessary (including putting machinery on standby and inspecting the site for sand build up).'*

At 4:30PM on Tuesday 25th August, the flood unit contacted the Bureau of Meteorology and asked if the Shoalhaven River had been looked at in terms of flood predictions as no flood watch nor flood warning had been issued at this stage despite the amount of rain received. The advice provided by the BOM was that the catchment had been modelled and that the predicted peak flood at Nowra/Terara was below the minor flood levels. No flood watch or flood warning needed to be issued at this stage. This advice was recorded in

an email sent to the GM and Director Assets and Works at 4:35PM. (D15/250360).

There was no flood watch or warning issued for the Shoalhaven River prior to 8:36PM Tuesday.

The policy also states that *'Immediately after a Flood Warning is received predicting a FLOOD LEVEL EXCEEDING 2.5 m AHD or greater at Nowra Bridge, machinery will be deployed to Shoalhaven Heads and excavation will commence, working from inland towards the Pacific Ocean but it is consideration of local conditions (river water level, ocean water level, including tide and other factors, and operator safety) that determine the most appropriate time to make the breach'*. The flood warning at 8:36PM issued by BOM predicted flood level at Nowra bridge of 2.5m AHD – according to the entrance management policy there was no action necessary- this advice was made available to the GM, Director Assets and Services and Jessica Zealand, Mike James and Graeme Philpott, Shoalhaven Heads Estuary Taskforce members at approximately 9 PM (D15/250444).

Flood warning updates were subsequently issued through the night by the BOM (Wednesday 26 August 12:58am; 3:00am, 4:58am) however entrance opening works can't be undertaken at night. At 4:45am on Wednesday morning, following discussion with senior floodplain engineer, Director Assets and Works took the decision to open the entrance, at first light (the entrance conditions were assessed for safety and given the high tide and big swells (refer figure 6) the site conditions were such that it was unsafe to have staff and machinery on site.

The conditions were reassessed as the tide dropped and at approximately 10am the decision was made to open the entrance where machinery was dispatched to the site (figures 7 and 8 show how the record tide and waves heights were more favourable at 10-11am than 6:30am).

The local conditions and access were very restrictive and the machinery had to drive through deep flood waters, the sand was very soft and the operator was very concerned. There was also concern about the rising floodwaters cutting off access to the operators on their way back.

The channel was excavated with the final breach to the ocean occurring on Wednesday 26 August at 12:35 PM (refer figure 3). Immediately following the opening the dug channel started flowing well indicating a successful opening.

In case Council is not able to open the entrance mechanically, Council maintains a dry notch (a low point in the dune system) at 2mAHD to facilitate natural break outs, the notch had been surveyed on 10 August. This survey showed the notch was at the required level. When arriving on site the river had already started to go through the notch and was a few meters away from the ocean (refer figure 4).

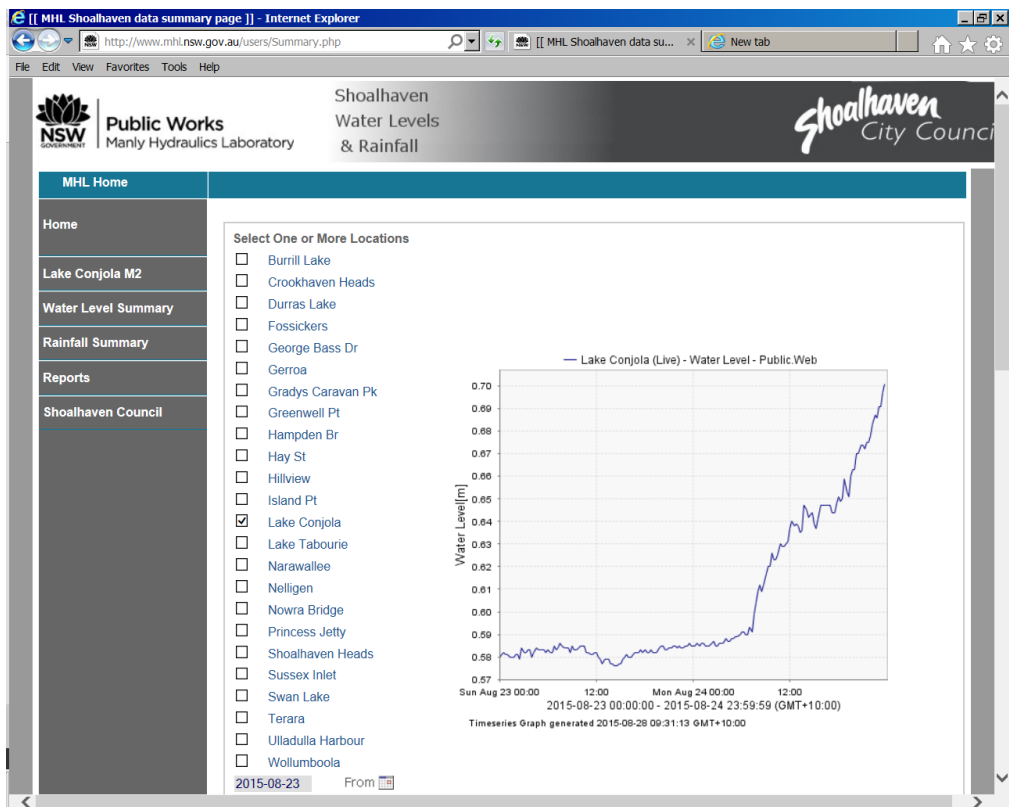


Figure 1- MHL - water level recorder at Conjola 23-24 August-showing lake levels prior to ECL and tidal influence

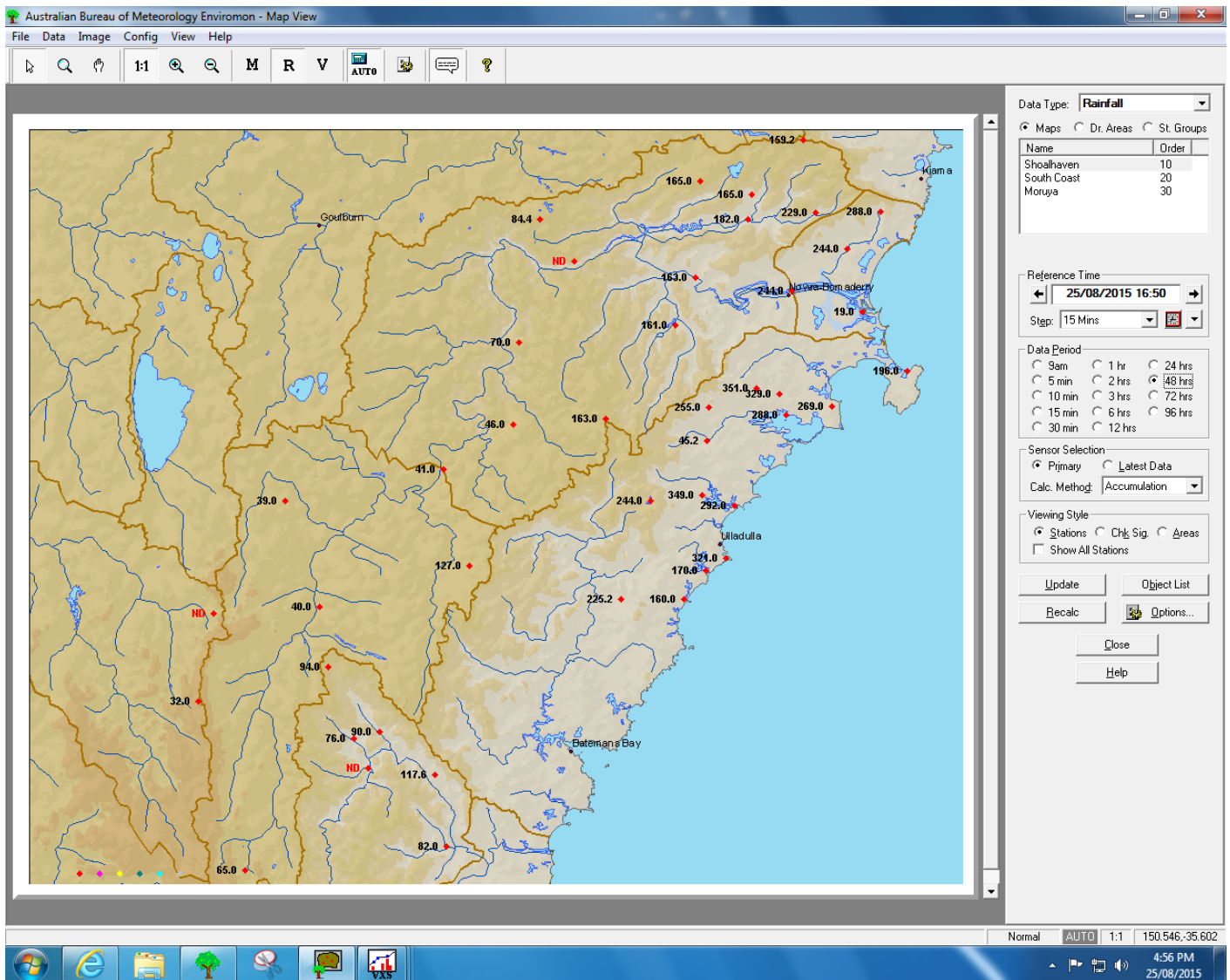


Figure 2 – 48 hours total rainfall at 16:50 pm on 25/08/2015

Lake Conjola

Use Ctrl-A & Ctrl-C to copy records to another application.

2015-08-25 06:00:00	1.049
2015-08-25 06:15:00	1.08
2015-08-25 06:30:00	1.104
2015-08-25 06:45:00	1.135
2015-08-25 07:00:00	1.159
2015-08-25 07:15:00	1.183
2015-08-25 07:30:00	1.202
2015-08-25 07:45:00	1.221
2015-08-25 08:00:00	1.237
2015-08-25 08:15:00	1.257
2015-08-25 08:30:00	1.268
2015-08-25 08:45:00	1.284
2015-08-25 09:00:00	1.296
2015-08-25 09:15:00	1.31
2015-08-25 09:30:00	1.322
2015-08-25 09:45:00	1.339
2015-08-25 10:00:00	1.35
2015-08-25 10:15:00	1.363
2015-08-25 10:30:00	1.375
2015-08-25 10:45:00	1.389
2015-08-25 11:00:00	1.401
2015-08-25 11:15:00	1.415
2015-08-25 11:30:00	1.427
2015-08-25 11:45:00	1.437
2015-08-25 12:00:00	1.45
2015-08-25 12:15:00	1.446

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Table 1- extract from MHL gauge record



Figure 3: Shoalhaven Heads opening – 25 August 12:35PM – time of breach



Figure 4: during the mechanical opening – 25 August 2015 – show ocean level not much lower than river level

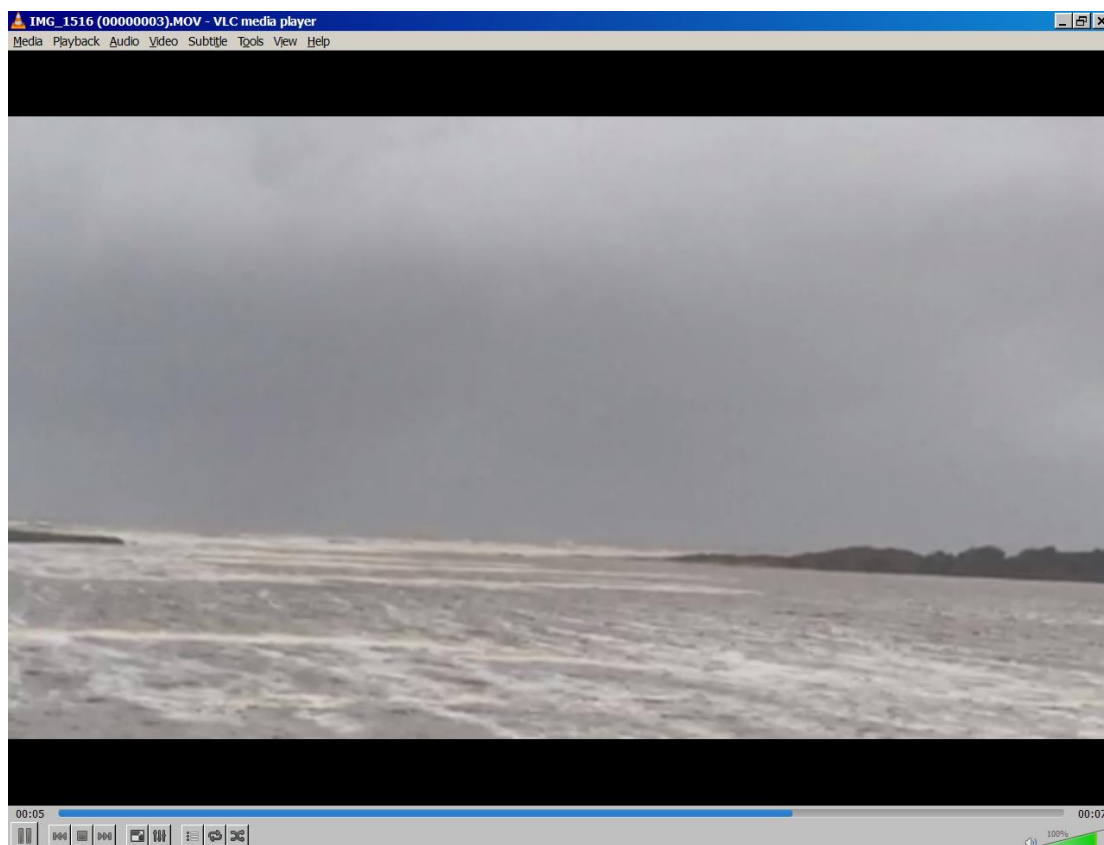


Figure 5 : entrance conditions at 6:30am at Sholahaven Heads showing high tide and swell

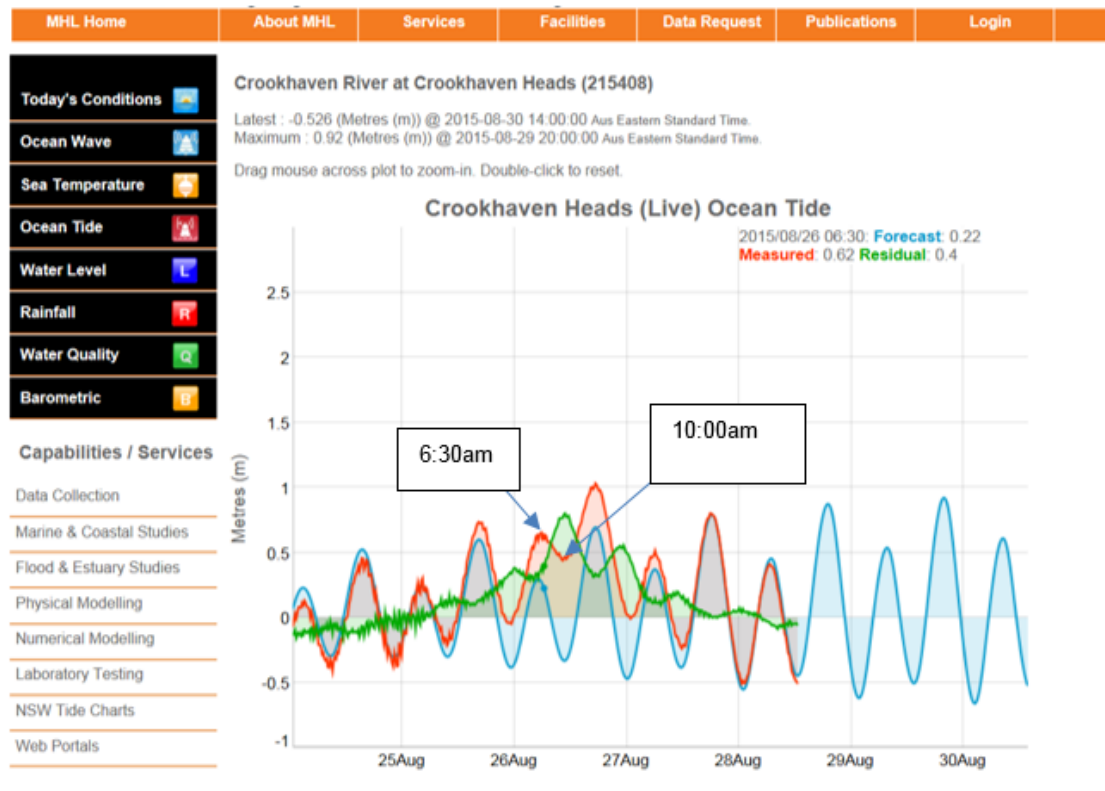


Figure 6: Crookhaven Heads Tide measurement 26/08/2015 -6:30am – 0.62m; 10:00am:0.47m also shows the elevated ocean level during the ECL event.

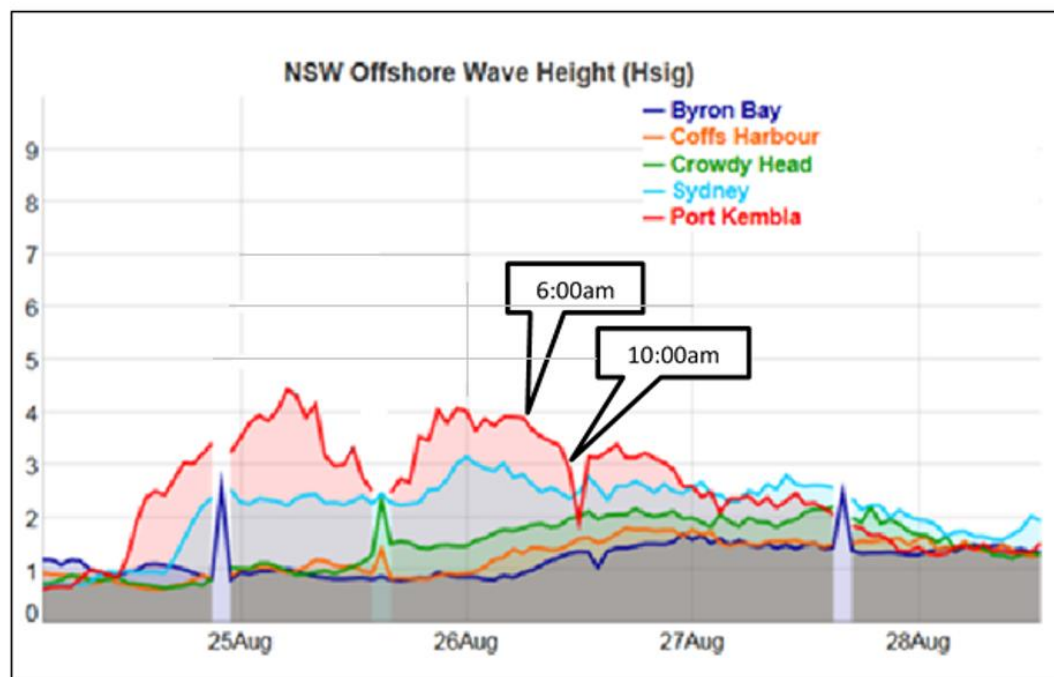


Figure 7: Recorded wave height at Port Kembla



Council Reference: 2235E (D15/271833)

Your Reference:

«Name»

«Address»

Dear Sir / Madam

Comments - Flooding - Failure to Open / Dredge Lake Conjola Entrance

I write in regard to your letter alleging that Council staff failed the residents at Lake Conjola during the last flood event on 25 August 2015.

This letter aims to provide factual information on a number of topics in order to explain Council's staff decisions and actions related to this event.

Weather forecast

The predicted rainfall forecast by the Bureau of Meteorology was below the actual rainfall amount that fell within the Lake Conjola area. The rainfall was very coastal and was much heavier in the Lake Conjola area than other neighbouring areas (such as Burrill and Tabourie lakes).

Fishermans Paradise received approximately 307mm in the 24 hours that preceded the peak of the flood within Conjola Lake. By comparison, the Burrill Lake area and Tabourie Lake area only received a little less than half of this amount (133mm and 144mm respectively). This amount of rain within the specific catchment is difficult to accurately predict as the Bureau of Meteorology models do not predict rainfall at such a fine scale, that is, for individual lake catchments.

Management of the entrance to the Lake

The management of the lake entrance is governed by the Lake Conjola Interim Entrance Management Policy. The Policy was adopted by Council on 24 September 2013.

The policy was developed by expert consultants in flood and coastal lake management and relied heavily on flood risk considerations. The development of the policy was also overseen by the Southern Natural Resources and Floodplain Management Committee which comprise State Government agencies' representatives, community members and Council staff. This committee of Council was also involved in the development of flood and flood risk management studies and plans.

In a flood situation, the policy endorses a mechanical emergency opening when the lake level is above 1.2mAHD. It is only when this level is reached that the lake should be opened mechanically. This is primarily because when and if the lake was to be opened earlier, there would be a high risk of the ocean entering the lake and potentially making the flooding impact worse. Noting that East Coast low weather patterns are associated with elevated ocean levels, very rough seas and prolonged heavy swells.

Water levels in Lake Conjola are recorded on a continuous basis by Manly Hydraulics Laboratory (MHL), Council and the Bureau of Meteorology. The water level data can be accessed on the MHL website and BOM websites:

<http://new.mhl.nsw.gov.au/users/Summary-WaterLevel-Shoalhaven>

and at:

http://www.bom.gov.au/cgi-bin/wrap_fwo.pl?IDN60144.html

Interrogation of this level data clearly shows that on Monday 24 August the water level, within the lake was approximately 0.6m m AHD. Given this level was well below the 1.2m adopted “trigger”, there was no reason for staff to undertake a mechanical opening at this time. On Tuesday 25 August (early morning) the lake was similarly below the trigger for mechanical opening, when the entrance naturally breached thereby avoiding the need for mechanical opening during this event.

Flood risk and management of the lake entrance

The 2013 Flood Risk Management Study and Plan demonstrates that the lake can flood from just catchment run-off or it can flood with just ocean inundation (when the entrance is open) or with a combination of both, as occurred in April 2013. So opening the entrance does not always mitigate flooding.

In the recent flood event, at 7:30am on Tuesday 25th August 2015 the entrance was already opened, however the peak of the flood did not occur until 7:30pm, some 12 hours later. The data illustrates that the opened entrance was not able to sufficiently drain the water run-off coming from the catchment and the lake level continued to rise despite the fact that the entrance was well opened.

Dredging and impact on flooding

The objectives and purpose of the upcoming dredging works at Lake Conjola have never been to mitigate the flood risk. The objectives of the dredging were three folds: reconnect the boat ramp at Cunjurong with the main body of the lake, better separate boat users from swimmers (by defining a navigation channel) and facilitate future entrance opening.

Dredging of the entrance channel for flood mitigation purposes was investigated as part of the floodplain risk management study and plan. This option was not retained as it only provides for relatively modest benefit in managing low-level flooding only and has very little to no benefits in major floods.

It is important for the community to understand that the flood risk will remain the same even after the dredging works have been completed.

Actions by staff before and during the event

A number of actions were undertaken by staff just before and during the event in an effort to implement entrance management procedures, manage risks and inform the community of the risks, these included:

- Site visit during the week prior to the flood event confirming a low point in the entrance berm overtopped by high tide and therefore below the trigger level for mechanical entrance opening.
- Site visit of the lake entrance on the morning of the 25th August confirming the entrance was opened before 7:30am and had breached naturally before the water level had reached its trigger for mechanical opening of 1.2m AHD.
- Continued monitoring of rainfall and water level before and during the event.
- Media release issued on Tuesday morning (at approximately 10:00 AM) informing community of upcoming flood and related risks.
- Continual liaison with SES to inform of predicted flood levels and flooded areas which culminated in the SES raising their own warning on 25 August at approximately 12:00PM.
- Monitoring of road flooding and installation of appropriate signage during the event.



Lake Conjola 25 August 2015 – photo showing heavy surf conditions from Westpac Life Saver Rescue Helicopters – Official site

What can we do to minimise flood damage and flood risk in future?

The frequency of the August 2015 flood event is estimated to be a less than a 5% Annual Exceedance Probability. That means every year the Lake Conjola community has a 5% chance of experiencing an event similar or of greater magnitude. The flood peak level reached approximately 2m AHD but we know that there could be bigger events affecting the community.

The Floodplain Risk Management Study and Plan clearly highlights that the best way to minimise damages and risk to the community are by adopting appropriate planning controls, emergency management and community education.

It is important that people are aware of the flood related development controls applying to their house. For example many houses in the Conjola area have been built with a habitable floor level above the 1% flood level. For these houses the rooms/garage below this level are not habitable and should also be built of flood compatible materials so that damages are minimised. Some people are unaware of the flood risks or original development approval conditions and may have inadvertently converted these areas into living room or bedrooms over the years or may have replaced tiles or concreted areas with carpets, all of these changes increase the damages and cost to residents when a flood occurs.

Council has also worked with the SES in the last few years and developed a flood emergency plan that provides a valuable tool to predict flood levels based on the amount of rainfall that has fallen in the catchment. This document also identifies which areas and houses will be effected by floods. The SES used this document during the August flood and it proved to be a valuable tool. Council staff, the SES and BOM have organised a debrief meeting to see if this document and its implementation could be improved in the future.

It is important that as a resident you listen and act on the flood warning and advice of SES. Council has dedicated webpages on the flood risks in the Shoalhaven and information on what to do in time of floods. This can be viewed at: <http://shoalhaven.nsw.gov.au/Environment/Flood-risk>

You can also access a large amount of information that will help you and your family be safe during a flood and you can develop your own home emergency plan on the SES website at: <http://www.floodsafe.com.au/>

I trust that the above information has demonstrated to you that Council staff have acted diligently, in accordance with Council's adopted policy and placed the safety of the community as its highest priority when planning for and responding to floods. Unfortunately flood risk in Lake Conjola is an ongoing issue and can't be avoided. By working together Council and the community can minimise the future impacts of floods on residents and improve future community resilience to this natural hazard.

If you need further information about this matter, please contact Isabelle Ghetti, Planning & Development Services Group on (02) 4429 3300. Please quote Council's reference 2235E (D15/271833).

Yours faithfully



Tim Fletcher
Director Planning & Development Services
 16 September 2015

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