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# Glenugie to Devils Pulpit hydrological mitigation report update - Maclean levee

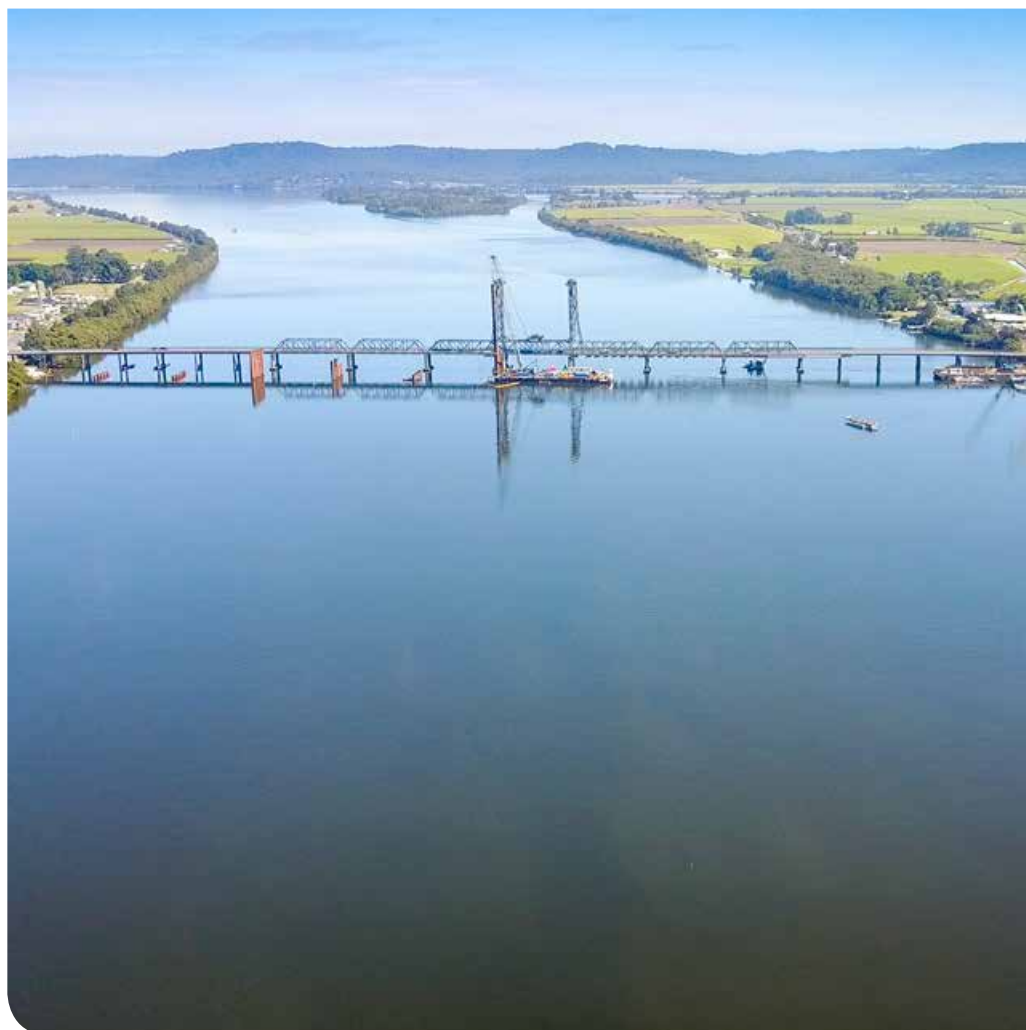
Woolgoolga to Ballina community update - October 2017

Roads and Maritime Services

**The Australian and NSW governments are jointly funding the \$4.36 billion Woolgoolga to Ballina Pacific Highway upgrade. Roads and Maritime Services Pacific Highway Project Office and Pacific Complete are working together to deliver the project.**

## In this update

- Investigating and assessing flooding
- Background
- Maclean levee
- Frequently asked questions
- Have your say
- Next steps



Panorama of Harwood bridge facing west



## Investigating and assessing flooding

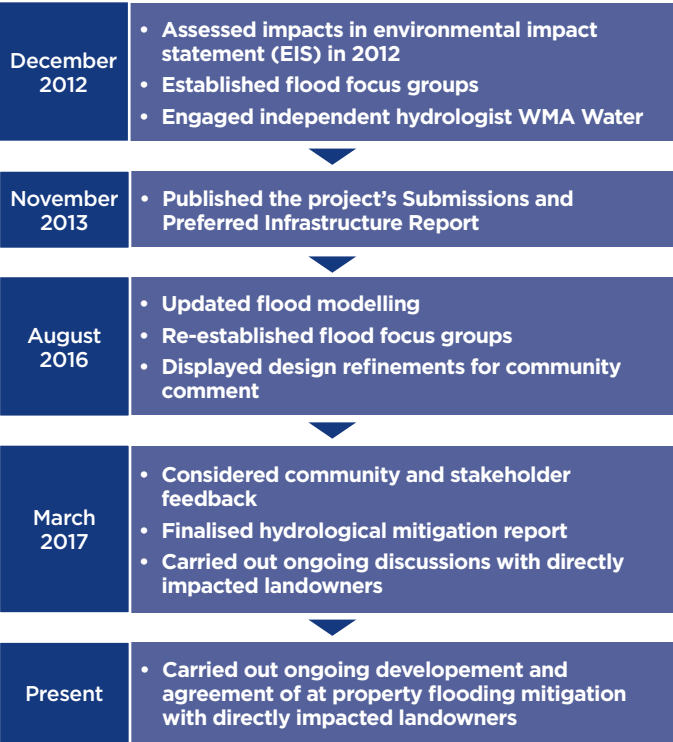
Roads and Maritime Services is committed to assessing potential flooding impacts related to the building and operation of the upgrade and addressing community and industry concerns about flooding. As part of this we have considered the following in our assessment:

- Different land uses
- Flood management objectives including potential increase in flood level, duration of flooding, velocity of water flow and direction of water flow
- River channel size and shape, rainfall, tidal movements, levee heights and land fall
- Landowner and key stakeholder feedback.

We have also calibrated the model against actual events which occurred in 1980, 1996, 2001 and 2013 and looked at over 170 different engineering options to further reduce the impacts of flooding from the project.

The hydrological mitigation report is the technical report which demonstrates how we have addressed the project's flood management objectives, assessed flooding and the steps we have taken to mitigate and manage impacts to meet the project's Conditions of Approval. A copy of this document is available on our website [rms.nsw.gov.au/W2B](https://rms.nsw.gov.au/W2B)

## Background



## Maclean levee

Maclean is located on the eastern bank of the Clarence River and is protected from flooding by the Maclean levee. Flooding over the town occurs when the levee is overtopped in specific large floods.

## Detailed levee investigations

Detailed investigations were carried out from late 2016 until recently to collect data to inform the Clarence River flood model and the flooding assessment. This included survey and mapping of about 3.8 kilometres of the Maclean levee system. The levee system built in 1975 has been developed over a long period of time and varies slightly in level. Over time there has also been some settlement which has meant there are some localised low points. This detailed survey identified where the low points are and what is needed to build them up to a minimum height.

## Our findings

The outcomes of the survey found the levee has low points of about 30 centimetres below what was previously thought particularly over an area of about 500 metres. We have provided a map to show the location. It is possible the change in levee heights is the result of a combination of settlement over time and erosion during previous flooding.

When we assessed the impacts of the project based on the 2012 model (used during the environmental assessment) and then against the 2017 survey data collected, the outcomes had changed in some cases.

## Reducing the flooding impact through design

We have reduced the predicted impact in the river at the Maclean levee from about 2.5 centimetres to about 1.5 centimetres by:

- Increasing waterway openings within the catchment
- Increasing the length of the new bridge over the Clarence River at Harwood to about 1.5 kilometres
- Designing the piers of the new bridge over the Clarence River at Harwood to line up with the existing bridge's piers.

With these refinements included, the project is still predicted to have departures from the objectives at a 20 year ARI event. This would mean a small increase in the river level would cause more floodwater to overtop the levee low points over a distance of about 500 metres.

To mitigate the predicted impact of the Woolgoolga to Ballina project, it is proposed to top up the low point of the levee by about 10 centimetres across a distance of about 500 metres. This section of the levee is made up of earth. Topping up this section would involve removing the top soil, bringing in more earth, compacting it and then replacing the grass. We have provided a picture of the section of the levee the project is proposing to top up.

The benefits of this approach include:

- Raising the levee's flood immunity from less than 20 year ARI to just above the 20 year ARI
- Removing any impact of the project and delivering a benefit (reduction in flooded area) to Maclean up to the 40 year ARI event, with no impact for the 50 and 100 year ARI events.

Clarence Valley Council is the lead agency responsible for flood management in the Clarence Valley. This work is proposed on the levee to improve the existing flood immunity and is being carried out in consultation with Council.



Temporary management solution for during construction

While we carry out the environmental assessment and finalise the detailed design for the levee top up, we've prepared a temporary management solution. In the event of a flood warning we will raise the levee along the lowest

section by about 10 centimetres with sand bags. This will provide the same level of protection as the permanent mitigation proposed. This temporary management solution was developed and agreed with both the NSW State Emergency Service and Clarence Valley Council.

Change in flood level impact		
ARI	2012 model	2017 survey data
5 year	No change from existing condition	No change from existing condition
20 year	No change from existing condition	Departure from objectives (>5cm)
50 year	Departure from objectives (>5cm)	Compliant impact (<5cm)
100 year	Compliant impact (<5cm)	Compliant impact (<5cm)

Change in duration of impact		
ARI	2012 model	2017 survey data
5 year	No change from existing condition	No change from existing condition
20 year	No change from existing condition	Departure from objectives (>5% increase)
50 year	Departure from objectives (>5% increase)	Compliant impact (<5% increase)
100 year	Compliant impact (<5% increase)	Compliant impact (<5% increase)



Piling work in the Clarence River and Yamba interchange



Figure 1 Maclean levee area to be topped up



Laying rock for new diversion roads near Iluka Road



## Frequently asked questions

### Will the project increase flooding?

The project will result in a minor compliant increase in the river levels at Maclean. The predicted increase is about 1.5 centimetres in the river.

### Why are Roads and Maritime not improving the flood immunity for Maclean further?

On balance the flood management objectives set in the project's Conditions of Approval have been met, and a reduction on the impacts originally identified during the environmental impact statement has been achieved.

The proposed topping up of the levee will comply with the project's flood management objectives. The Clarence River floodplain is highly sensitive and if the levee is raised more than necessary to offset the project, this will result in additional water being held in the river and may result in additional impacts up and downstream of Maclean.

### Why are you only raising one section of the levee?

The section of the levee proposed to be raised would provide Maclean with a 20 year ARI flood immunity (which is an improvement on the current flood immunity) and would provide compliance with the project's flood management objectives. No other sections will need to be raised to achieve these objectives. The functional design of the levee needs to be maintained, raising the levee would potentially change this.

### What about properties not protected by the levee?

Surveys to measure the ground and property flood heights have been carried out on properties outside of the levee system. The flood modelling predicts all other impacts outside of the levee will be compliant with the flood management objectives and be less than a five centimetre increase. For more information about the predicted impact at your property please see the Glenugie to Devils Pulpit hydrological mitigation report on Roads and Maritime's website [rms.nsw.gov.au](https://rms.nsw.gov.au).

Flood management objectives		
Objective	Houses and cane farm land	Grazing, forested and other rural lands
Flood levee	Less than 5 centimetre increase	Less than 25 centimetre increase
Flood duration	No more than 5 % increase	No more than 10 % increase
Flood velocity	<b>Houses:</b> low hazard for children that is less than 0.4 metres squared per second	Velocities to remain below 1 metre per second where currently below this figure An increase of not more than 20% where existing velocity is above 1 metre per second
	<b>Cane farms:</b> less than 1 metre per second where currently below this	An increase of not more than 20% where existing velocity is above 1 metre per second
Flood direction	No change to the direction of watercourses or the direction of flood flows except for directly around floodway openings like culverts and bridges and where flow has to be temporarily diverted for construction activities	

Where we have a **compliant impact**, this means we predict the impacts to be under or up to the above limits. A **departure from the objectives** means the predicted impact is more than the above limits.

### How do we measure flooding events?

All floods vary depending on rainfall intensity, the land form and the existing heights of the river system. Typical information collected and assessed relating to flooding includes floodplain ground levels, river channel bed levels, river flow estimates and average rainfall. This information is then calibrated against flood models.

Floods are measured on the likelihood of an event occurring over a period of time. A 100 year ARI flood has a one percent chance of occurrence in any one year. This probability is based on past flood events which are used to predict future events. A 20 year ARI flood has a five percent chance of occurrence in any one year.

### What is flood immunity?

Flood immunity refers to the level at which land is protected from a flood event, or the flood event for which the land will remain dry.



## Have your say

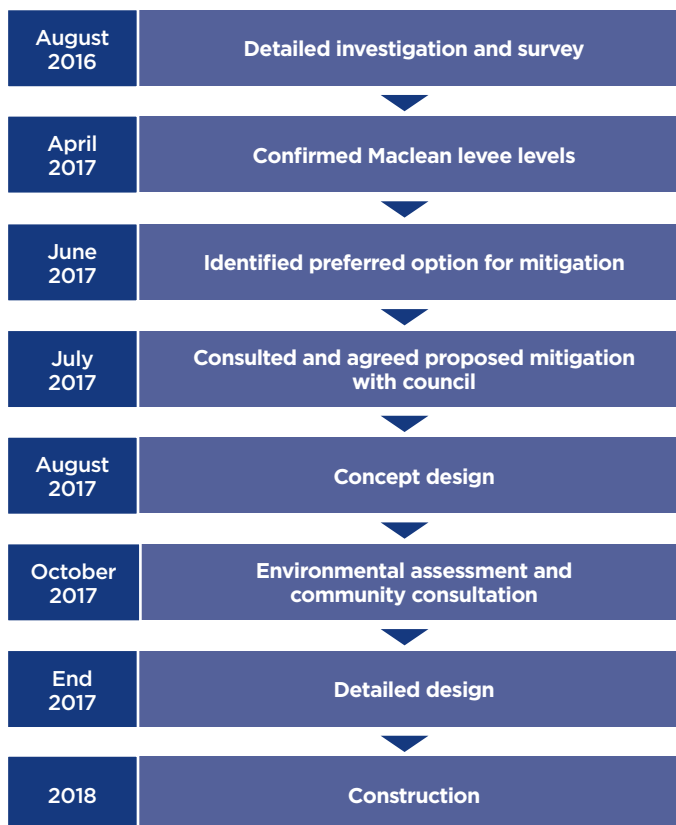
We value your feedback and welcome all comments on the proposed top of up localised areas of the Maclean levee. To have your say please complete the attached form and return it to us by 20 November 2017:

**Email:** W2B@pacificcomplete.com.au

**Post:** Woolgoolga to Ballina upgrade  
PO Box 546,  
Grafton NSW 2460

**Web:** Online survey at [rms.nsw.gov.au/W2B](https://rms.nsw.gov.au/W2B)

## Maclean levee next steps



## Meet the project team

To meet with the project team and discuss the proposal in person, drop in any time:

- 1pm – 3pm, Wednesday 1 November, Maclean Civic Centre, 50 River Street, Maclean
- 1pm – 3pm, Wednesday 8 November, Maclean Civic Centre, 50 River Street, Maclean
- 8am – 12pm, Saturday 11 November, Maclean Community Market, Centenary Drive, Main car park near Bowling Club, Maclean.

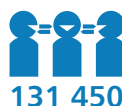
## Contact us:

- ☎ 1800 778 900 (toll free)
- @ W2B@pacificcomplete.com.au
- 🌐 [www.rms.nsw.gov.au/w2b](http://www.rms.nsw.gov.au/w2b)
- ✉ 21 Prince Street, Grafton NSW 2460



Laying geofabric for new diversion roads on Chatsworth Island

**We thank you for your patience during this important work.**



If you need help understanding the information, please contact the Translating and Interpreting Service on **131 450** and ask them to call us on **1800 918 759**



October 2017  
RMS 17.520

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Work travel	<input type="checkbox"/>	Leisure travel	<input type="checkbox"/>
It's where I live	<input type="checkbox"/>	Other (please specify)	<input type="checkbox"/>

Update in my letter box	<input type="checkbox"/>	Email invitation	<input type="checkbox"/>	Media article/advertisement	<input type="checkbox"/>
Roads and Maritime website	<input type="checkbox"/>	Word of mouth	<input type="checkbox"/>	SMS	<input type="checkbox"/>
Other (please specify)					

I generally support the proposed top up of localised areas of the Maclean levee ☐

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I do not generally support the proposed top up of localised areas of the Maclean levee ☐

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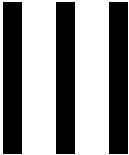


To mail this feedback form fold along the dotted line and seal with clear tape.  
Mail your completed form (no stamp required) to address below.

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