Roads & Maritime

Grafton Bridge project
Developing the new flood model

November 2016

The NSW Government is funding the additional crossing of the Clarence River at Grafton. An updated flood model for the Clarence River has been developed which incorporates the new bridge.

A key objective for the project is to minimise the flood impact of the new bridge and maintain the current level of flood immunity for Grafton and South Grafton. The project will carry out minor work to certain places along the existing levee system and a small amount of private property work.

A *Hydrological Mitigation Report (July 2016)* has been published which sets out the flood management objectives and how the project will specifically reduce the impact of the new bridge.

The new bridge will cause only a small increase of 3cm to flood water upstream. This is significantly lower than the 9 cm originally calculated during the environmental assessment, or EIS. This fact sheet outlines the work that has been done to assess the impact of the new bridge and the strategies that have been implemented to reduce its impact on the community.

Planning approval

The project received planning approval in December 2014. This approval stated flood mitigation measures had to be designed to maintain the current level of flood immunity. Since then, work has been carried out to design strategies that provide a neutral impact across the catchment.

Investigations

Detailed investigations were carried out in 2015 to collect data to inform the new flood model for the Clarence River that includes the new bridge. These investigations included:

Detailed levee surveys

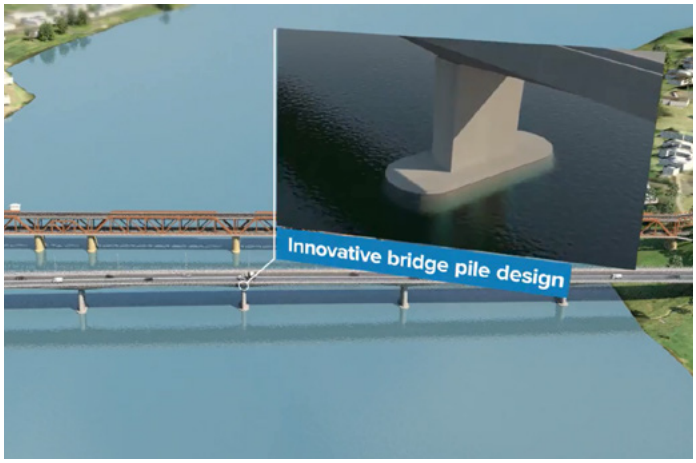
Surveying and mapping about 11 kilometres of the Grafton and South Grafton levee system was done. The levee system has been developed over a long period of time and is not at a consistent level. This detailed survey allowed us to find where the low points are and what is needed to bring them up to a minimum height.

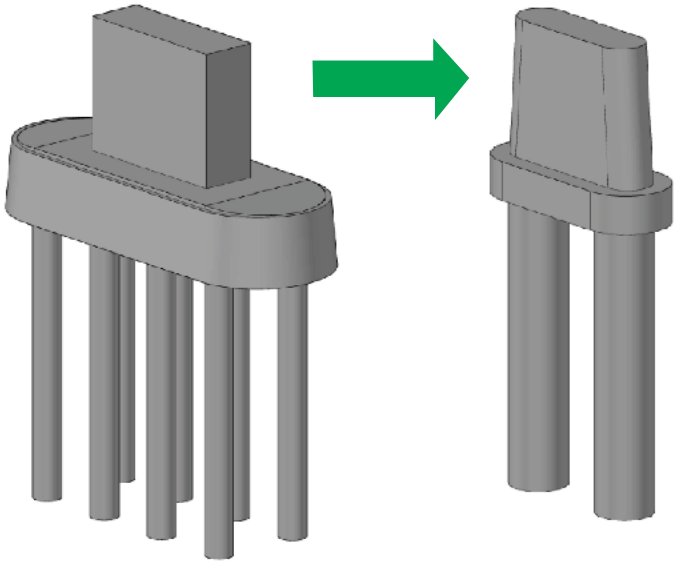
River bed (bathymetric) surveys

About 8.5 kilometres of the river bed were surveyed at 50 to 500 metre intervals to measure the depth of the river. This tells us how much water the river holds upstream of the new bridge. The last survey of this type was done in 1963. This new survey found the river is deeper in some areas, particularly around the existing bridge and the channel along the southern side of Susan Island. This means the river holds more water, and therefore any overtopping of the levees is lower than the estimations made during the environmental assessment.

Bridge design

A key criteria for the new bridge was to reduce the afflux (increase in water level) caused by the new structure. Through innovations in their bridge design our contractor, Fulton Hogan, has refined the pier design to enable water to flow around the piers more efficiently. This reduces the impact of the obstruction to the river level.





EIS Concept pier/pile design

Fulton Hogan Refined pier/pile design

How this has changed the flood impact

The reduction in flood impact has meant we don't need to raise the whole levee system upstream of the bridge and has substantially decreased the impact to property owners who have levees on their property. We have been consulting with property owners and businesses about the design and scope of the work. Work on the levee system is expected to start in the fourth quarter of 2016 and will be completed before any of the bridge piles are put into the river.

Clarence Valley Council is the lead agency responsible for flood management for the Clarence Valley. The Grafton Bridge project is carrying out this work on the levee to maintain the existing flood immunity and is done in consultation with Council.

PARAMETER	Concept design	Refined design
Increase in height of floodwater upstream of the new bridge	9 cm	3 cm
Length of levee work required to maintain flood immunity	11 km	5.7 km
Height of levee work required	Raised by 20 cm over entire length	5 to 25 cm at low points only
Number of land parcels impacted by levee work	174	101
Properties with remaining flood impacts	45	15

The above table contains the data from recent investigations and shows how refinements to the bridge design will substantially lower the impact on the community. Roads and Maritime Services is working hard to reduce the impact to properties even further.

How are floods measured?

The size of a particular flood will depend on how much rain has fallen over the catchment and doesn't necessarily mean the height of the flood water in the river.

Floods are measured on the likelihood of occurrence over a period of time. A one in 100 year event means there is a one per cent chance it will occur in any year. This probability is based on past flood events which are used to predict a future event.

A one in 20 year event means there is five per cent chance of it happening in any one year.

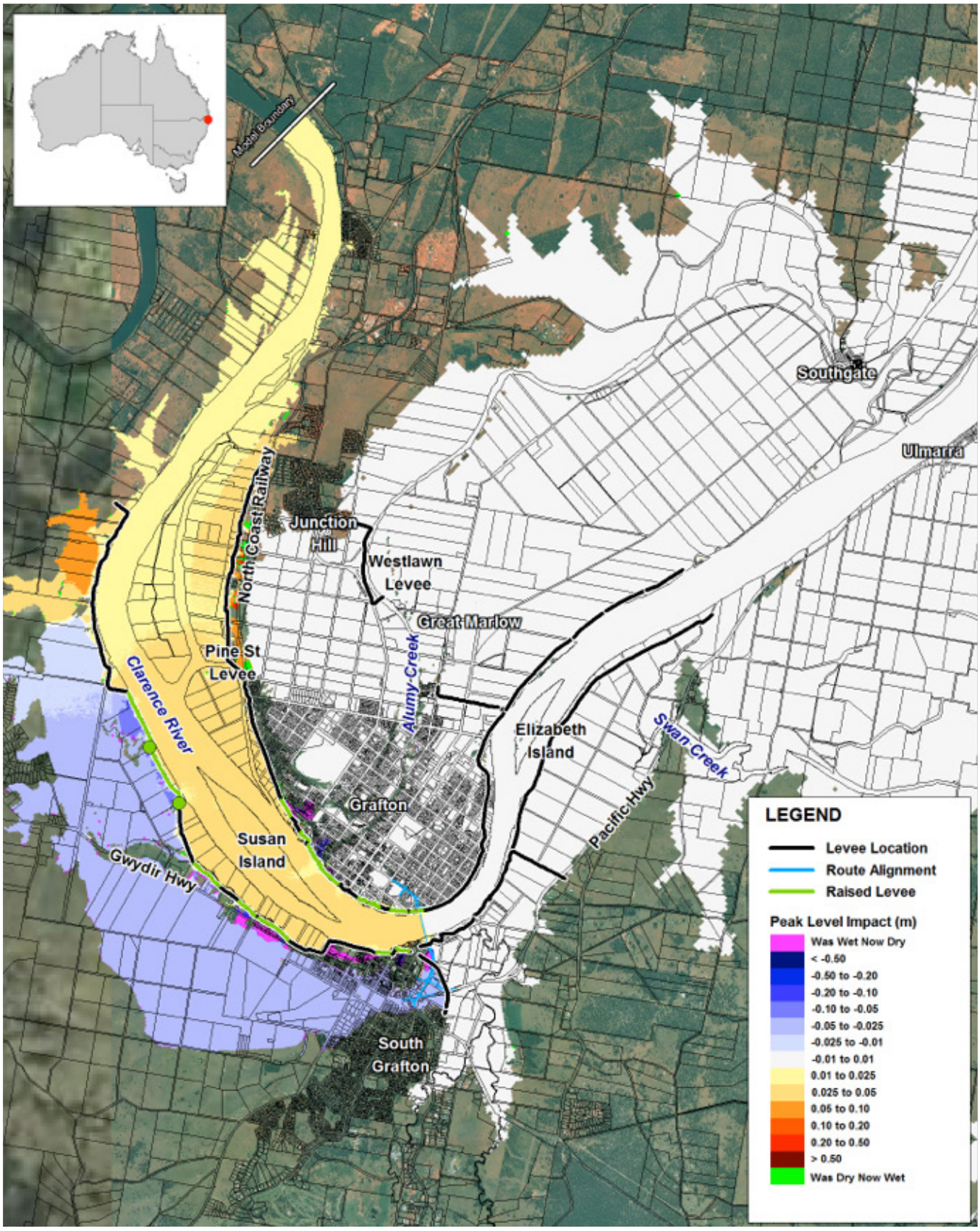
What is the existing flood immunity for Grafton?

The existing levee system around Grafton and South Grafton provides flood immunity for about a one in 20 year flood event. The most recent flood event in 2013 was calculated to be about a one in 25 year flood event. Targeted sandbagging of low spots across the levee system meant the levee did not overtop.

Although the river level was the highest ever recorded, the 2013 event was not the largest flood event recorded in Grafton. Historically there have been floods larger than the 2013 flood. These were in 1876, 1887, 1890, 1893, 1950 and 1954. The floodplain and levee system has been developed significantly since those events which is why the river height was higher in 2013.

The map below shows the locations where work will take place along the levee system as well as showing the impacts from a 1 in 100 year flood.

Figure 1: 100 year ARI flood level impact



Frequently asked questions

Will the new bridge increase flooding?

The new crossing will cause a minor obstruction in the river, increasing the upstream water level to about 3cm in a 1 in 100 year flood event. Levee work will be carried out to maintain the existing flood protection within Grafton and South Grafton.

Why are Roads and Maritime not improving the flood immunity for Grafton?

The project was approved with the condition that we maintain the current flood immunity. If the levees are raised more than necessary to offset the new bridge, additional water will be held in the river which may increase flood levels downstream. To substantially improve the flood immunity for Grafton is a significant piece of infrastructure which is outside the scope of this project.

Why are there gaps in the levee work?

We are only raising certain low sections of the levee upstream of the proposed bridge. Higher sections between these low sections do not need to be raised.

What about properties not protected by the levees?

Surveys to measure the ground and property floor heights have been carried out on properties outside of the levee system. We are discussing property adjustments with affected property owners to reduce the impact of the new bridge.

Was dredging considered?

Dredging was considered as an option to reduce the flood impact. However, to be effective, large amounts of the river would need to be dredged and dredging wasn't guaranteed to provide a long term solution.

Where can I get more flooding information?

Clarence Valley Council is the agency responsible for flood management. They provide detail mapping on their website:

http://spectrum.clarence.nsw.gov.au/cvc_mapping_link.html

This mapping will be updated once the detailed design of the bridge is complete.

The SES also has advice on how to prepare for a flood on their Flood Safe website:

www.floodsafe.com.au

For more information

For more information about the project please contact the project team by:

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More information is also available at
www.rms.nsw.gov.au/GraftonBridge