Option F – Millaquin Bend widening

Option F involves deepening, widening and regular maintenance dredging of a section of the left bank of the Burnett River by excavation and dredging to improve flood conveyance through a constricted part of the river.

Stage 2 of the Bundaberg flood protection study involves assessing 11 flood mitigation options, including those identified through consultation with the Bundaberg community in late 2015.

Option overview

Option F aims to increase conveyance within the Burnett River by reducing the flow constraint at Millaquin Bend. It would involve:

- deepening and widening of Burnett River through excavation and dredging activities, predicted to be 900,000 m$^3$ of cut
- Construction of an engineered rock revetment wall of 1.4 km length
- 10 m wide level terrace, with a batter slope at the edge down to -5 m AHD (1 in 20 slope)
- Possible acquisition of parts of properties (but not houses) along the eastern side of Mariner’s Way
- Removal of mangrove vegetation
- Regular maintenance dredging of this area.

Figure 1: Option layout

DISCLAIMER: Jacobs has implemented reasonable, current commercial and technical measures using the usual care and thoroughness of a professional firm in the creation of these maps from the spatial data, information and products provided to Jacobs by the Department of Infrastructure, Local Government and Planning (DILGP), Bundaberg Regional Council (BRC), GHD and other consultants, and data custodians including Department of Natural Resources and Mines (DNRMR) and data obtained from the Queensland Spatial Catalogue (QSpatial) under the Creative Commons Attribution 3.0 Australia licence. Jacobs has not independently verified the quality, content, accuracy or completeness of the Data. Jacobs is not responsible or liable for any costs, losses and/or damages suffered as a result of reliance on these maps. All information shown on these maps (including the nature, alignment and extent of any works) is preliminary and provided only for discussion purposes.

Note: The outcome depicted is a potential only of the implications associated with this option – and this outcome may not occur or eventuate.
Technical Discussion Paper

What would this option achieve?

Widening of Millaquin Bend would allow flood water to flow more easily through Bundaberg. This option:

- Avoids over-floor flooding for about 440 properties in Bundaberg in a 1% AEP flood event, of which about 150 are located in Bundaberg North, and 250 in Bundaberg East.
- Avoids over-floor flooding for up to 320 properties in Bundaberg North for flood events smaller than the 1% AEP flood event, such as the 1942 and 2010 flood events.
- Reduces flood levels in Bundaberg East by up to 0.6 m, and in Bundaberg North by up to 0.4 m in a 1% AEP event.

Some properties downstream of Millaquin Bend (less than five buildings) would experience increased flood levels due to the increased conveyance in the Burnett River.

In events more rare than the 1% AEP event, this option also decreases flood levels and eliminates above-floor flooding for buildings.

Widening of Millaquin bend does not have benefits for as many properties in more frequent flood events, with 40 properties avoiding over-floor flooding in a 5% AEP event, and only a few buildings in events more frequent than this.

Figure 2 shows the changes to flood levels for the 1% AEP flood event.

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1 1% AEP flood is the name given to a flood event which has a 1 in 100 or 1% chance of occurring in any year. It would be similar to the January 2013 flood.

2 5% AEP flood is the name given to a flood event which has a 1 in 20 or 5% chance of occurring in any year. It would be similar to the December 2010 flood.
Viability
A key step in the options assessment involves identifying issues that may mean construction or implementation of the option is not viable. These relate to matters such as:
- The likelihood of obtaining environmental approvals, due to unacceptable environmental impacts
- Significant or unaffordable costs of construction or ongoing maintenance
- Potential for unacceptable impacts on other areas.
An option is considered to be unviable where the assessment identifies one or more of these matters are ‘unlikely to be achieved’.

The assessment of Option F found that this option may be viable with modifications to reduce impacts to areas outside of the benefited area. Dredging and mangrove removal works may negatively impact the local environment, and there is no opportunity for staging.

Costs and benefits
Initial cost estimates indicate that construction of widening the Burnett River at Millaquin Bend would be in the order of $60 million. Ongoing, maintenance dredging would be required at a cost of about $3 million per year, bringing the total construction and maintenance costs to $95 million.
The preliminary flood damages assessment for this option suggests that the estimated reduction in flood damages (i.e. the tangible benefits) would be in the order of $30 million.

Summary of assessment against key criteria
Each option has been assessed against a set of 16 criteria. These criteria, if achieved by an option, indicate a strong link between the option and the overall objectives of the Bundaberg Flood Protection Study. The performance of this option against the 16 criteria is presented on the next page. These assessments will be used to derive an overall multi-criteria analysis score for this option. This score is then used in conjunction with other assessments to compare this option against the other options.
A summary of the performance of this option against the criteria as well as the costs, benefits and viability issues is presented below.
- This option reduces flood levels within Bundaberg through increased conveyance in the Burnett River.
- Approximately 440 properties would not be inundated in the 1% AEP flood event.
- Much of the benefit from this option occurs within Bundaberg East, meaning that the majority of benefits of this option would be lost if it was built in conjunction with another option that reduces damages in East Bundaberg (e.g. a levee).
- The costs for this option would be about three times the estimated monetary benefits.
## Evaluation criteria

<table>
<thead>
<tr>
<th>Objective</th>
<th>Criteria</th>
<th>How does it perform against the criteria?</th>
<th>Preliminary Score</th>
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| Reduce flood risk to life and reduced flood impacts on people | Improves people’s safety during flood events and people’s ability to evacuate | • Decreases flood levels in Bundaberg.  
• About 440 buildings would not be flooded in a 1% AEP event. | ✓                  |
| Reduce the occurrence of flood deaths and injury and improving people’s ability to plan for and recover after a flood | Reduces the impacts on people for very large / rare floods (larger than say Jan 2013 flood) | • Decreases flood levels and reduces over-floor flooding in very large / rare floods. | ✓                  |
| Increase people’s resilience to flooding by improving their preparation for flood events and ability to recover after flood events | • No change to people’s preparation.  
• Reduction in number of properties inundated would result in an increased ability to recover for those events. | | ✓ |
| Targets vulnerable community members or areas (e.g. elderly, poor) | • Does not specifically target more vulnerable areas. | | ✓ |
| Reduce flood risk to property | Reduces damages and costs to residential property caused by floods | • Moderate to high decrease in flood damages. | ✓ |
| Reducing flood damages and properties and improving the recovery of businesses after floods | Reduces damages and costs to business / industry / government caused by floods | • Moderate to high decrease in flood damages. | ✓ |
| Achieve a balanced investment approach that considers social, economic and environmental issues | Economic benefits (increased confidence leading to economic growth) for the broader region | • Increased economic confidence due to decreased frequency of flooding. | ✓ |
| Considering social, economic and environmental issues (independent of the improvements to flooding) | Environmental benefits: Terrestrial, aquatic, riverine benefits, effects upon heritage | • Dredging and mangrove removal works negatively impact the local environment. | ✗ |
| | Social Health benefits: Effects upon mental health, psychological issues, stress | • Reduced stress due to reduced frequency of flooding. | ✓ |
| | Community benefits: Effects upon “livability” of the area, urban amenity, social cohesion | • Dredging will have some minor noise and visual impacts. | ✗ |
| Long term reduction in flood risk and adaptable levels of protection | Adaptable flood performance with respect to climate change | • Limited ability to undertake further dredging to allow for the increased flood levels and sea level rises as a result of climate change. | ✗ |
| A focus on the long-term benefits and adaptability of options and also the impact on future development land | Long term benefits | • Dredging would need to re-occur over time to maintain the capacity of the widened bend.  
This has been included in cost estimate. | ✓ |
| | Decreases flood damage to areas of future development | • No decreased flood damage to areas identified as “emerging communities” or green fill urban residential land. | ✗ |
| | Staged benefits with staged construction / investment | • No opportunity for staging. | ✗ |

✓ Achieves the criteria  ❏ Partially achieves criteria or has no change to current status  ✗ Does not achieve the criteria
Technical Discussion Paper

Find out more about this option
Community consultation on the flood mitigation options and the findings of the options assessment will take place from 24 October to 20 November 2016. To find out more about the flood mitigation options and to provide your feedback:

Visit the website
www.qld.gov.au/bundabergfloodstudy
Interactive mapping is available on the website so that you can see how the flood mitigation options would change flooding in your area.

Contact the project team
Email: bundabergfloodprotection@jacobs.com
Telephone: 1800 994 015 (during business hours)

Next steps
The Bundaberg flood protection study is due to be completed later this year. Engagement on the 10-year action plan will occur in 2017. It is important to note that the flood mitigation options have not yet been considered by the State government and are not government policy. No commitment will be made on any of the options until the State government has consulted with the community and stakeholders on the 10-year action plan.
The Queensland Government will continue to engage with the Bundaberg community as the action plan develops.