Bundaberg flood protection study
Developing a 10-year action plan for flood mitigation in Bundaberg.

Option A – Burnett River conveyance improvement
Option A involves river dredging along the town reach, removing Harriet Island, widening Millaquin Bend and regular maintenance dredging.

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 A aims to increase the amount of flood flow conveyed within the Burnett River. This would help to reduce flood levels on the floodplain. It would involve:

- Dredging of the Burnett River within the town reach (to -6m Australian Height Datum (AHD))
- Dredging and excavation at Millaquin Bend
- Removal of Harriet Island (and dredging to -6m AHD)
- Regular ongoing maintenance dredging of these three areas.

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 (DNR&M) 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.
What would this option achieve?

Dredging the river and removing Harriet Island would keep more of the flood flow within the banks of the river. This option:

- Avoids over-floor flooding for about 470 properties in Bundaberg in a 1% AEP flood event, of which 160 are located in Bundaberg North, and 250 in Bundaberg East (with the remainder outside these two areas).
- Avoids over-floor flooding for up to 330 properties in Bundaberg North for flood events smaller than the 1% AEP flood event, such as the 1942 and 2010 flood events.
- Reduces peak flood levels upstream of Millaquin Bend by about 0.5 m to 0.8 m.

For smaller flood events (more frequent than the 1% AEP flood event) the dredging may increase flood levels in parts of Bundaberg North. These impacts would mainly affect agricultural land, although some residential properties could have increases of about 0.03 m (i.e. 30 mm).

As the river narrows at Millaquin Bend, additional water is pushed through this narrow point, causing flood levels in the river to rise. This would result in additional water breaking out at the end of Mariners Way, causing higher peak flood levels (up to 0.3 m) in Bundaberg North.

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

Figure 2: 1% AEP Flooding Afflux (m)

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.

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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 A found that this option is likely to have significant costs relating to construction and ongoing maintenance.

Costs and benefits
Initial cost estimates indicate that construction of this option would cost around $188 million. This assumes that Harriet Island is removed via a cost-neutral extraction agreement. Ongoing maintenance of dredging activities would be about $6 million per year.

The total cost of construction and ongoing maintenance for Option A has been estimated at $235 million. The estimated reduction in flood damages (i.e. the tangible benefits) would be in the order of $35 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 would result in more flow in the river and less flow on the floodplain. This would reduce flood levels in some urban areas.
- The increased flood flow in the river would result in some increased flood levels in Bundaberg North (up to 0.3 m) for smaller, more frequent flood events.
- Approximately 470 properties in the Bundaberg area would not be inundated in the 1% AEP flood event.
- Construction and ongoing maintenance of this option would cost around $235 million making it a moderate to high cost option.
- The cost of this option would be about five times the estimated monetary benefits.
- The option would require the treatment of dredged material and land-based disposal of dredge spoil due to the very low likelihood of at-sea disposal.
- It is expected that there would be difficulties in obtaining an environmental approval for such a large dredging program.
## Technical Discussion Paper

### Evaluation criteria

<table>
<thead>
<tr>
<th>Objective</th>
<th>Criteria</th>
<th>How does it perform against the criteria?</th>
<th>Preliminary Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce flood risk to life and reduced flood impacts on people</td>
<td>Improves people’s safety during flood events and people's ability to evacuate</td>
<td>• About 470 properties in Bundaberg area would be protected from flooded in a 1% AEP event. &lt;br&gt;• Flood levels would be higher for more frequent events and/or at the start of larger events. This may hinder evacuation.</td>
<td>✓</td>
</tr>
<tr>
<td>Reducing the occurrence of flood deaths and injury and improving people’s ability to plan for and recover after a flood</td>
<td>Reduces the impacts on people for very large / rare floods (larger than say Jan 2013 flood)</td>
<td>• Reduced number of dwellings and commercial properties affected by flooding in the 1% AEP event, especially in Bundaberg East.</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Increase people's resilience to flooding by improving their preparation for flood events and ability to recover after flood events</td>
<td>• No change to people’s preparation. &lt;br&gt;• Reduction in number of properties inundated would result in an increased ability to recover for those events.</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Targets vulnerable community members or areas (e.g. elderly, poor)</td>
<td>• Provides benefits to a wide area including vulnerable areas.</td>
<td>✓</td>
</tr>
<tr>
<td>Reduce flood risk to property</td>
<td>Reduces damages and costs to residential property caused by floods</td>
<td>• Moderate to high decrease in flood damages.</td>
<td>✓</td>
</tr>
<tr>
<td>Reducing flood damages and properties and improving the recovery of businesses after floods</td>
<td>Reduces damages and costs to business / industry / government caused by floods</td>
<td>• Moderate to high decrease in flood damages.</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Reduces the impacts on property for very large / rare floods (larger than say Jan 2013 flood)</td>
<td>• Would result in substantial decreases in flood damages for rarer flood events.</td>
<td>✓</td>
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<tr>
<td></td>
<td>Increase a property’s “flood resilience” (improving a property so it is less affected by a flood event and recovery after an event is faster)</td>
<td>• Resilience improved due to lower flood levels.</td>
<td>✓</td>
</tr>
<tr>
<td>Achieve a balanced investment approach that considers social, economic and environmental issues</td>
<td>Economic benefits (increased confidence leading to economic growth) for the broader region</td>
<td>• Increased economic confidence due to decreased frequency of flooding.</td>
<td>✓</td>
</tr>
<tr>
<td>Considering social, economic and environmental issues (independent of the improvements to flooding)</td>
<td>Environmental benefits: Terrestrial, aquatic, riverine benefits, effects upon heritage</td>
<td>• Dredging the river and removal of Harriett Island has no environmental benefits, and may cause moderate environmental harm.</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Social Health benefits: Effects upon mental health, psychological issues, stress</td>
<td>• Reduced stress for properties which have reduced flood depths.</td>
<td>✓</td>
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<td></td>
<td>Community benefits: Effects upon “livability” of the area, urban amenity, social cohesion</td>
<td>• Loss of Harriett Island may reduce the urban amenity of the area. &lt;br&gt;• Dredging will have some noise and visual impacts.</td>
<td>X</td>
</tr>
<tr>
<td>Long term reduction in flood risk and adaptable levels of protection</td>
<td>Adaptable flood performance with respect to climate change</td>
<td>• Limited ability to undertake further dredging to allow for the increased flood levels and sea level rises as a result of climate change.</td>
<td>✓</td>
</tr>
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<td>A focus on the long-term benefits and adaptability of options and also the impact on future development land</td>
<td>Long term benefits</td>
<td>• Dredging would need to re-occur over time to maintain the capacity of the Burnett River. This has been included in cost estimate.</td>
<td>✓</td>
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<td></td>
<td>Decreases flood damage to areas of future development</td>
<td>• Minor decrease in 1% AEP inundation extent in areas available for development.</td>
<td>✓</td>
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<td>Staged benefits with staged construction / investment</td>
<td>• Dredging could occur over time with the benefits realised gradually. &lt;br&gt;• Harriett Island to be removed over time using a sand extraction licence.</td>
<td>–</td>
</tr>
</tbody>
</table>

✓ Achieves the criteria  ☐ Partially achieves criteria or has no change to current status  X 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.