**Option D – Bundaberg East levee**

Option D includes construction of a levee along the south bank of the river to reduce flooding in Bundaberg East. It would require construction of two floodgates (with one large floodgate for Saltwater Creek).

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 D aims to protect Bundaberg East by constructing a levee on the river bank and across the Saltwater Creek floodplain. The levee would protect the Bundaberg East area from inundation from the Burnett River in the 1.5% AEP flood event.

It would involve:
- Construction of a levee generally following Quay Street and a section heading north towards the mill. The levee would be a combination of concrete wall and earth mound.
- A flood gate across Saltwater Creek, which would be closed during times of Burnett River floods.

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1 1.5% AEP flood is the name given to a flood event which has about a 1 in 70 or 1.5% chance of occurring in any year.
**Technical Discussion Paper**

**What would this option achieve?**

Building a levee would protect Bundaberg South and Bundaberg East from Burnett River flooding in events up to a 1.5% AEP flood event. This option:

- Avoids over-floor flooding for about 320 properties in Bundaberg in a 1% AEP flood event, all of which in are located in Bundaberg South and East.
- Avoids over-floor flooding for up to 440 properties in Bundaberg South and East for flood events smaller than the 1.5% AEP flood event, such as the 1942 and 2010 flood events.

Some localised flooding may occur if a flood event occurs in Saltwater/Bundaberg Creek when the floodgates are closed. Overtopping of the levee would pose a risk for the community within the levee in relation to emergency evacuation. In particular, evacuation may be hindered and become dangerous due to changes in flood behaviour, the velocity and depth of rising floodwater, and peoples’ response to the flood threat.

Changes to flood levels for the 1% AEP flood event are shown in Figure 2.

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**Figure 2 : 1% AEP Flood Afflux (m)**

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 (QSP) 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.

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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.
Technical Discussion Paper

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 D found that this option will be viable. Environmental impacts are likely to be low because of the urban nature of the levee route. Adverse impacts outside the benefitted area will be tolerable as the levee will prevent flood water from the river backing up into Bundaberg South rather than diverting flows.

Costs and benefits
Initial cost estimates indicate that construction of Option D would be approximately $30 to $35 million. Maintenance costs are approximately $500,000 per annum. The total cost of the project including ongoing operation and maintenance of the option is $38 million. Estimated reduction in flood damages (i.e. the tangible benefits) of this option is around $29 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 prevent floodwaters from the Burnett River backing up into Bundaberg South for events up to the 1.5% AEP flood event.
- This option would provide protection for about 440 properties up to the 1.5% AEP (70 year ARI) flood event.
- It would reduce flooding for about 320 properties in the 1% AEP flood event.
- A flood-gate structure would be required across Saltwater Creek to prevent Burnett River back-up flooding but allow local floods to pass.
- There is a risk that people inside the levee become complacent about flood risk and become less resilient during events which overtop the levee.
- Localised rainfall that causes flooding in Saltwater Creek may inundate properties to a greater amount if the event occurs concurrently with a Burnett River flood and the flood gate is shut.
- Construction and on-going maintenance of this option would be in the order of $38 million.
- The costs for this option are similar to the estimated monetary benefits.
## 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>
</table>
| Reduce flood risk to life and reduced flood impacts on people | Improves people’s safety during flood events and people’s ability to evacuate | • Approximately 440 properties Bundaberg South would not be flooded in the 2% AEP event, and around 320 in the 1% AEP event.  
• Evacuation would be required if the levee overtops.  
• Reduced safety due to levee or floodgate failure, but safe routes exist to higher ground to south and west. | ✔️ |
| Reducing 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) | • Levee begins to overtop in the 1.5% AEP flood event.  
• Minor increase in impacts for large events due to lack of preparedness when levee overtops. | ✗ |
| Increase people’s resilience to flooding by improving their preparation for flood events and ability to recover after flood events | • Reduction in number of properties inundated would result in an increased ability to recover for those events.  
• Reduced resilience due to complacency. Emergency management education relating to levee evacuation plan may enable community to be more prepared and therefore more resilient.  
• Levee and/or floodgates have a risk of overtopping or failure. | ✔️ |
| Targets vulnerable community members or areas (e.g. elderly, poor) | • Targets Bundaberg East (partially vulnerable community). | ✔️ |
| Reduce flood risk to property | Reduces damages and costs to residential property caused by floods | • 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 | • High decrease in flood damages. | ✔️ |
| | Reduces the impacts on property for very large / rare floods (larger than say Jan 2013 flood) | • Minor increase in impacts for large events due to lack of preparedness when levee overtops. | ✗ |
| | 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) | • The levee will prevent properties from being inundated for events up to the 1.5% AEP so partially meets criteria. | ✔️ |
| 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 investment due to lower flood risk. | ✔️ |
| Considering social, economic and environmental issues (independent of the improvements to flooding) | Environmental benefits: Terrestrial, aquatic, riverine benefits, effects upon heritage | • Possible impacts to heritage sites along route (e.g. pedestrian bridge over Saltwater Creek). | ✗ |
| | 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 | • The levee (in particular the concrete wall section) could negatively detract from the liveability and amenity of the area.  
• Construction of levees will have some noise impacts. | ✗ |
| Long term reduction in flood risk and adaptable levels of protection | Adaptable flood performance with respect to climate change | • Levees could be raised over time to increase protection for an increase in severity and frequency of flooding.  
• Concrete levee wall could be designed to be adaptable. | ✔️ |
| A focus on the long-term benefits and adaptability of options and also the impact on future development land | Long term benefits | • Benefits of the levee would be realised over the long term. | ✔️ |
| | 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 | • The levee could be the first stage of a higher levee. | ✔️ |

✔️ 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.