Community Driven Flood Risk Management Planning for Rural Toowoomba Townships

Rodney, Betts
Toowoomba Regional Council

Mark, Page
Engeny Water Management

Abstract:
The ultimate success of any Floodplain Risk Management Plan (FRMP) depends on the suitability and applicability of the outcomes for the community for which it is written and the flood risks they are exposed to. Toowoomba Regional Council (TRC) has recently undertaken a series of FRMPs for the townships of Yarraman, Cooyar, Crows Nest, Jondaryan, Quinalow, Maclagan and Oakey that showcase Australian leading best-practice application of community driven flood risk management planning. The FRMP project is part of TRC’s flood risk management journey that spans over four years and was recently awarded by Floodplain Management Australia (FMA) as the winner of the Flood Risk Management Project of the Year 2018.

The towns were specifically identified as requiring FRMPs through prior studies undertaken after the significant January 2011 flood event. Initially, flood modelling for the townships was updated through the TRC Flood Studies Project. This modelling consequently informed the Flood Risk Assessment, Planning Evaluation and Planning Scheme Amendment (FRAPESA) Project in 2016 which, through a focus upon vulnerability and tolerability of the communities in addition to flood risk, identified the townships with high concern that required individual FRMPs.

The adopted approach for the development of the FRMPs was consistent with industry best practice guidelines including Handbook 7 “Managing the Floodplain: a guide to best practice in flood risk management in Australia” (AIDR, 2017).

The FRMPs build upon the previous FRAPESA outcomes and therefore were developed based on extensive community engagement, consideration of multiple factors including critical infrastructure, community isolation, community vulnerability, community tolerability, flood hazard, flood emergency response classification, emergency evacuation potential, flood damage assessment, cost benefit analysis and community expectations.
A multi-criteria assessment procedure was applied to potential floodplain risk management measures, comprising of property modification measures, response modification measures and flood behaviour modification measures. A long list of measures were considered for applicability to the floodplain, from which a short list was then further qualitatively and/or quantitatively assessed.

Keywords: Flooding, risk, community, floodplain, mitigation

Introduction

Toowoomba Regional Council (TRC) has recently undertaken a series of FRMPs for seven regional townships that showcase Australian leading best-practice application of community driven flood risk management planning.

The towns, which include Yarraman, Cooyar, Crows Nest, Jondaryan, Quinalow, Maclagan and Oakey, were specifically identified as requiring FRMPs through prior studies undertaken after the significant January 2011 flood event experienced in the Toowoomba Region. Initially, flood modelling for the townships was updated through the TRC Flood Studies Project. This modelling consequently informed the FRAPESA Project in 2016 which, through a focus upon exposure, vulnerability and tolerability of the communities in addition to flood risk, identified the townships with high concern that required individual FRMPs.

Figure 1 provides an illustration of TRC’s flood risk management journey. The FRAPESA scope is shown as the yellow outline whilst the FRMP scope is shown in red.
Figure 1  TRC Flood Risk Management Journey

The Floodplain Risk Management Approach

The adopted approach for the development of the FRMPs was consistent with industry best practice guidelines including Handbook 7 “Managing the Floodplain: a guide to best practice in flood risk management in Australia” (AIDR, 2017). The flood studies for each township were also updated to be consistent with the latest Australian Rainfall and Runoff (ARR) 2016 guidelines (Ball J. et. Al., 2016) and rainfall intensities. The project stages and milestones are illustrated in Figure 2.
The FRMPs build upon the previous FRAPESA outcomes and therefore were developed based on extensive community engagement, consideration of multiple factors including critical infrastructure, community isolation, community vulnerability, community tolerability, flood hazard, flood emergency response classification, emergency evacuation potential, flood damage assessment, cost benefit analysis and community expectations. The stages of community consultation are presented in Figure 3. Final community engagement on the completed FRMPs is currently approved for commencement by the TRC Council. This engagement is expected to be undertaken in 2019 and the final outcomes will be then reported to Council for endorsement of the FRMPs as the basis for emergency management and future infrastructure planning.

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
<th>Stage 5</th>
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<tbody>
<tr>
<td>Feb to Aug 2017</td>
<td>Aug to Sept 2017</td>
<td>Sept to Nov 2017</td>
<td>Nov 2017 to Sept 2018</td>
<td>Sept to Dec 2018</td>
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<td><em>Complete data collection</em></td>
<td><em>Complete flood damages assessment</em></td>
<td><em>Prepare draft Floodplain Risk Management Options Analysis documents and draft FRMPs</em></td>
<td><em>Present draft FRMPs to Community</em></td>
<td><em>Present Final FRMPs to Council</em></td>
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<td><em>Update flood modelling</em></td>
<td><em>Identify and assess potential flood mitigation options and local emergency planning</em></td>
<td><em>Prepare final FRMPs (based on Community feedback)</em></td>
<td><em>Present FRMPs to Council</em></td>
<td><em>Present Final FRMPs to Council</em></td>
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<td><em>Conduct initial community consultation</em></td>
<td><em>Undertake option evaluation workshop with Council</em></td>
<td><em>Conduct second community consultation</em></td>
<td><em>Release final FRMPs to public exhibition and update based on consultation feedback</em></td>
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<td><em>Delivery of Stage 1 Report</em></td>
<td><em>Delivery of Stage 2 Report</em></td>
<td><em>Delivery of Stage 3 Report</em></td>
<td><em>Delivery of Stage 4 Report</em></td>
<td><em>Delivery of Stage 5 Report</em></td>
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*Figure 2  Project Stages*
The following key points were derived upon reflection on the community consultation and engagement experience undertaken thus far:

- Every community is different; invest in developing an understanding of the community in terms of current flood emergency response, level of resilience, demography, risks and expectations.
- Find effective ways to communicate and engage.
- Promote ownership of the community’s floodplain risk management plan throughout the development of the plan.

A snapshot of the profile of the townships for which FRMPs were undertaken is provided below:

- Average income is around ~$600/week below the Queensland and Australian averages
- ~40% of the population above 65 years of age or under 5 years of age
- ~30% of population is above 65 yrs (Qld and Aus average 15%)
- Home ownership rate is ~75%
- Specific flood risks include isolation, short warning times and additional impacts from overland flow flooding.
- There are no current flood emergency management plans in place for any of the townships
- From the outcomes of the community consultation, there is a preference to “live with” rather than resist flooding.
- Schools, child care, hospitals, aged care and evacuation centres in some communities are at risk from flooding.
Recommended Flood Risk Management Measures

The FRMPs feature recommendations including traditional flood behaviour modification measures and also focuses largely on response modification measures. These measures include land use planning, community flood awareness and flood emergency preparedness.

A multi-stage assessment procedure was applied to potential floodplain risk management measures, comprising of:

- Consideration of measures, in terms of applicability to flood risk and practicality in relation to effectiveness and implementation.
- Assessment and evaluation of measures inclusive of a flood damages assessment and cost benefit analysis.
- Peer review of both process and the outcomes.

The recommended floodplain risk management measures included property modification measures, response modification measures and flood behaviour modification measures. A long list of measures were considered for applicability to the floodplain, from which a short list was then further qualitatively and/or quantitatively assessed. The final recommended measures included those presented in Figure 4. The outcomes of these FRMPs will form the basis for emergency management and future infrastructure planning, ensuring a safer, stronger and more resilient Toowoomba region.

Figure 4 Recommended Flood Risk Management Measures
Conclusion

In summary, the combined FRAPESA and FRMP projects have equipped TRC with a strategy to increase the future flood resilience of seven regional high flood risk townships. The approach to the FRMPs included utilisation of the latest flood modelling procedures and series of community consultation in order to develop flood risk management measures that were suitable and applicable for the communities and their specific flood risks.

The resultant FRMPs are regarded as a tool requiring review and modification over time and are recommended to be reviewed periodically (i.e. every five years) in order to remain relevant in terms of understanding local flood risks and advances in floodplain management. Currently, the FRMPS are technically completed and supported by the TRC Council for final community engagement, likely to be undertaken in 2019.

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References