

Flood Warning Intelligence Projects

Project Brief Guidance

Introduction

This document provides a starting point for the preparation of a Technical Brief to support Council procurement of specialist services to undertake a Flood Warning Intelligence Project. The scope of flood warning intelligence projects can vary significantly depending on the current system complexity, community needs, flood behavior and if the project is focusing on a total flood warning system inclusive or a single component.

Given the importance of local context and potential variation in scope, a template project brief has not been developed. This guidance document aims to link to current best practice literature, examples, and other reference materials. Where required, both QRA and the Peer Review and Advisory Panel are available to provide advice and input.

Overview of Flood Warning Intelligence Systems

The Australian Institute for Disaster Resilience (AIDR), Manual 21: Flood Warning and the World Meteorological Organization technical manuals and guidelines should be referred to for a complete overview of total flood warning systems. Other relevant guidelines and references are provided in Table 1.

Flood forecasting and warning is a key component of flood risk management. When a system is built and operated well it can be an effective option in managing residual flood risk. The primary purpose of a flood forecasting and warning system is to provide timely, useful, and actionable information to end users including both the community and Local Disaster Management Group (LDMG) agencies. Flood intelligence information communicated should be easy to understand, communicate the risks and uncertainty, and empower the user to take informed action.

AIDR defines the total flood warning system as comprising the components outlined below in Figure 1. Each component of the total flood warning system needs to be operated effectively to ensure the success of the system. This reference highlights that the success of the total system goes well beyond the warning infrastructure network and associated predictions.

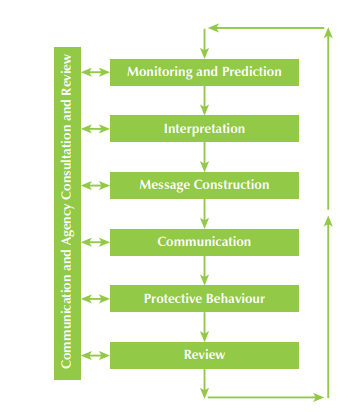


Figure 1: Components of a Total Flood Warning System (AIDR, 2009)

Current Guidelines and Reference Documents

Available guidelines and references that can be used to inform the delivery of the flood warning intelligence projects, include but not limited to those in Table 1. It will be important to provide the successful consultant copies of any Local Disaster Management Plans, Catchment Action Plans, Flood Studies, and Floodplain Risk Management Studies or Strategies.

Table 1: Current Guidelines and References

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| **Reference Documents** |
| Manual 21: Flood Warning (AIDR, 2009)  <https://knowledge.aidr.org.au/media/1964/manual-21-flood-warning.pdf> |
| Public Information and Warnings (AIDR, 2021)  <https://knowledge.aidr.org.au/media/9104/aidr_handbookcollection_publicinfoandwarnings_2021.pdf> |
| Australian Rainfall and Runoff (ARR) 2019 - all projects and chapters  <https://arr.ga.gov.au/arr-guideline> |
| Queensland Flood Risk Management Framework (QRA, 2021)  <https://www.qra.qld.gov.au/sites/default/files/2021-06/queensland_flood_risk_management_framework_2021_qfrmf_0.pdf> |
| Flood Classifications in Queensland: A best practice guide for local governments (QRA, 2020) <https://www.qra.qld.gov.au/sites/default/files/2020-06/flood_classifications_in_queensland_-_a_best_practice_guide_for_local_governments_-_may_2020.pdf> |
| Flood Communication Toolkit (QRA, 2022)  <https://www.qra.qld.gov.au/sites/default/files/2022-06/a_flood_communication_toolkit_january_2022.pdf> |
| Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (Handbook 7) (AIDR, 2017) and all supporting documents  <https://knowledge.aidr.org.au/media/3521/adr-handbook-7.pdf> |
| *Local Floodplain Management/Water related Strategies etc* |
| *Relevant Catchment Action Plans* |
| *Local Disaster Management Plans* |
| World Meteorological Organization Manuals and Guidelines including:  Manual on Flood Forecasting and Warning (WMO, 2011), WMO-No. 1072 <https://library.wmo.int/doc_num.php?explnum_id=4090>  Guidelines on Multi-hazard Impact based Forecast and Warning Services (WMA, 2015), WMO-No. 1150 <https://library.wmo.int/doc_num.php?explnum_id=7901> |
| Integrated Flood Management Tools Series: Flood Forecasting and Early Warning (Associated Programme on Flood Management [joint initiative of World Meteorological Organization and Global Water Partnership], 2013) <https://library.wmo.int/doc_num.php?explnum_id=4269> |

Scope Development

A total flood warning system review or system development should incorporate each component outlined in Figure 1 including building a thorough review process into the system. Where the flood intelligence project is focusing on one component of the system (such as monitoring and prediction), project scope should consider how the outputs of the project will be incorporated into the larger system.

Project Purpose

Council should consider the overall objectives of the flood intelligence project. What is the purpose of the project? What is the intended future use? Is this system an interim intelligence system, an update to an existing or a complete and final product? It will also be important to consider the current system complexity. It may not be reasonable to go from a paper-based system based primarily on officer knowledge to probabilistic hydraulic inundation forecasting. Additionally, the communities’ needs should be central to scope and system development. Some considerations when developing proposed scope include, but are not limited to, the following:

* What disaster management issues have been highlighted by previous flood events?
* Is the catchment flashy with limited warning time, or is there considerable warning time?
* Will the system comprise of only riverine or is there a need to also incorporate flash flooding, local creeks and coastal inundation?
* Is the community flood risk aware? Do they trust local authorities?
* Is the community tech savy or would they prefer to rely on low tech advice of flood warning options (i.e. radio)?
* Are there known gaps in knowledge?
* Will this system likely inform other local governments (i.e., downstream Councils)?
* Is there a current understanding of when particular actions need to be taken (e.g., road closures, evacuation, isolation etc.)
* Is there an understanding of how forecasts relate to impacts?
* Do there need to be updates to gauge flood classifications?

Current System Description

It will be essential to provide tenderers an understanding of the current system being used and existing issues. It is likely tenders will tailor their responses based on this understanding. The project brief should be thorough in providing a detailed description of the current flood warning intelligence system, known gaps and desired outcomes. This section should be as detailed as possible and describe each component from information provided by the Bureau to how this information is analysed and used in Council’s Flood Centre. Some information relevant in this section includes:

* Flood Warning Gauge Infrastructure within the catchment. Include information on any known issues with the infrastructure.
* Location and interaction of any dams in the catchment.
* System setup (this could be somewhere from a primarily threshold-based where alerts are based on a combination of real-time data (rainfall or river level threshold) and Council’s understanding of river behaviour and historic events, to inundation forecasting using a hydrologic and hydraulic forecasting model). This should include details on what components are outsourced and what components are completed and hosted by Council.
* Intelligence information available using the system (e.g., road closures, houses impacted, vulnerable community members impacted etc.).
* Communication method for both internal and external communication (e.g., is there a disaster dashboard? How is information fed in? etc.).
* What are the known limitations the current system including and any issues experienced during previous events.

Scope Considerations

Specific scope items for inclusion in a total flood warning system review or development may include:

* Data Collection and Review – this would aim to understand all data including spatial data, previous studies and modelling data. Best practice data collection for a total flood warning system would include community consultation.
* Site Visit
* Assessment of Flood Risk – where a Floodplain Risk Management Study has been completed, this will likely provide required information. Where a Floodplain Risk Management Study has not been completed, it may be necessary to consider the following items to inform system development:
  + Detailed description of flood behaviour across the study area including a summary of flood behaviour for design events or historic flood events
  + Community vulnerability analysis, which should consider population demographics, mobility and physical vulnerability, social and economic vulnerability and flood awareness and resilience
  + Flood emergency response classification including potential low and high flood islands as a minimum
  + Assessment of flood risk of evacuation routes and major roads in the study area, this may include either already identified evacuation routes
  + Assessment of flood risk of any significant use areas and vulnerable uses in the study area (i.e., town centres, aged care, hospitals etc.)
  + Any information relating to inundation extent should linked back to a gauge level to provide a reference
  + Description of flood risk to hot spot areas or for key suburbs areas across the study area.
* Review of Current System based on an understanding of flood risk and community profile
* Review of BoM Flood Classification at gauges (i.e., level triggers for minor, moderate and major flooding)
* Flood forecasting product development (e.g., anywhere from threshold-based alerting to inundation forecasting)
* Flood intelligence interpretation – this component focuses on linking the forecast (i.e., a water level or extent) to an expected impact (e.g., roads closed, houses inundated, power outages etc.).
* Message Construction and Communication
* Protective Action and Behavior
* System Review – continual improvement should be embedded in the total flood warning system. Community input is integral to the system review process.

Peer Review

Formal peer review is not required for Flood Warning Intelligence projects. However, if Councils would like advice from either QRA or the Technical Advisory Panel this is available.