

The logo for Synergy Solutions, featuring the company name in blue text next to a green circular graphic composed of several overlapping, swirling lines.

Synergy Solutions

Water | Civil | Environment

Synergy Solutions Pty Ltd

Water | Civil | Environment

P 0433 416 234

E [admin@synergys.com.au](mailto:admin@synergys.com.au)

W [www.synergys.com.au](http://www.synergys.com.au)

# Total Flood Warning Systems

A holistic and innovative approach to flood warning

**SYNERGY**

*"The interaction of elements that when combined produce a total effect that is greater than the sum of the individual elements"*

Synergy Solutions commends organisations working hard to understand and combat the threat faced by natural disasters including flooding.

Agencies are under increased pressure to protect communities and be at the front face of emergency management action. It has become essential to invest in reliable, experienced and capable consultants within this space to inform agencies of best practice direction, investment and system builds.

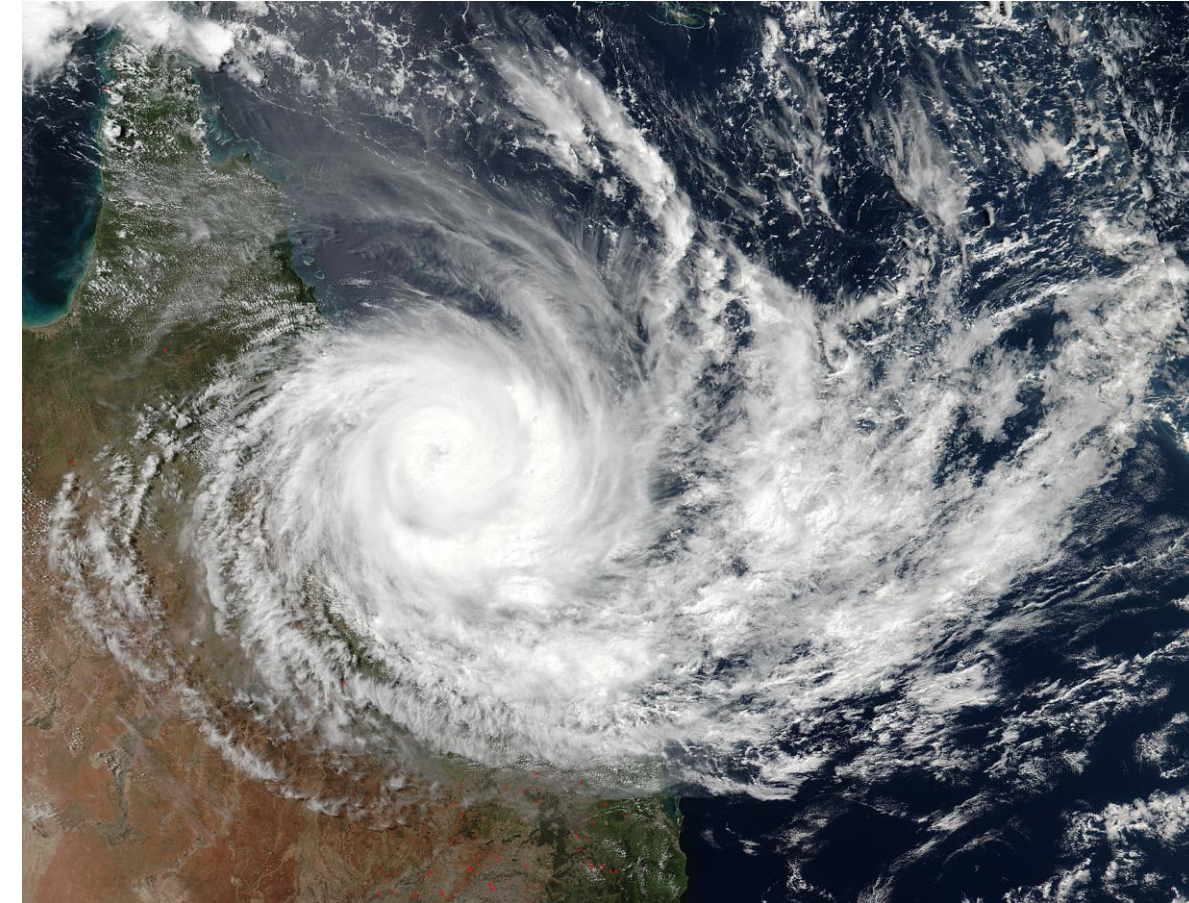
Synergy are unique in this space and excel beyond all others due to our experience and application within this space. Be wary of utilising consultants who are not fully abreast of both flood intelligence and emergency management requirements. Experience is absolutely essential in this field.

## Company Experience

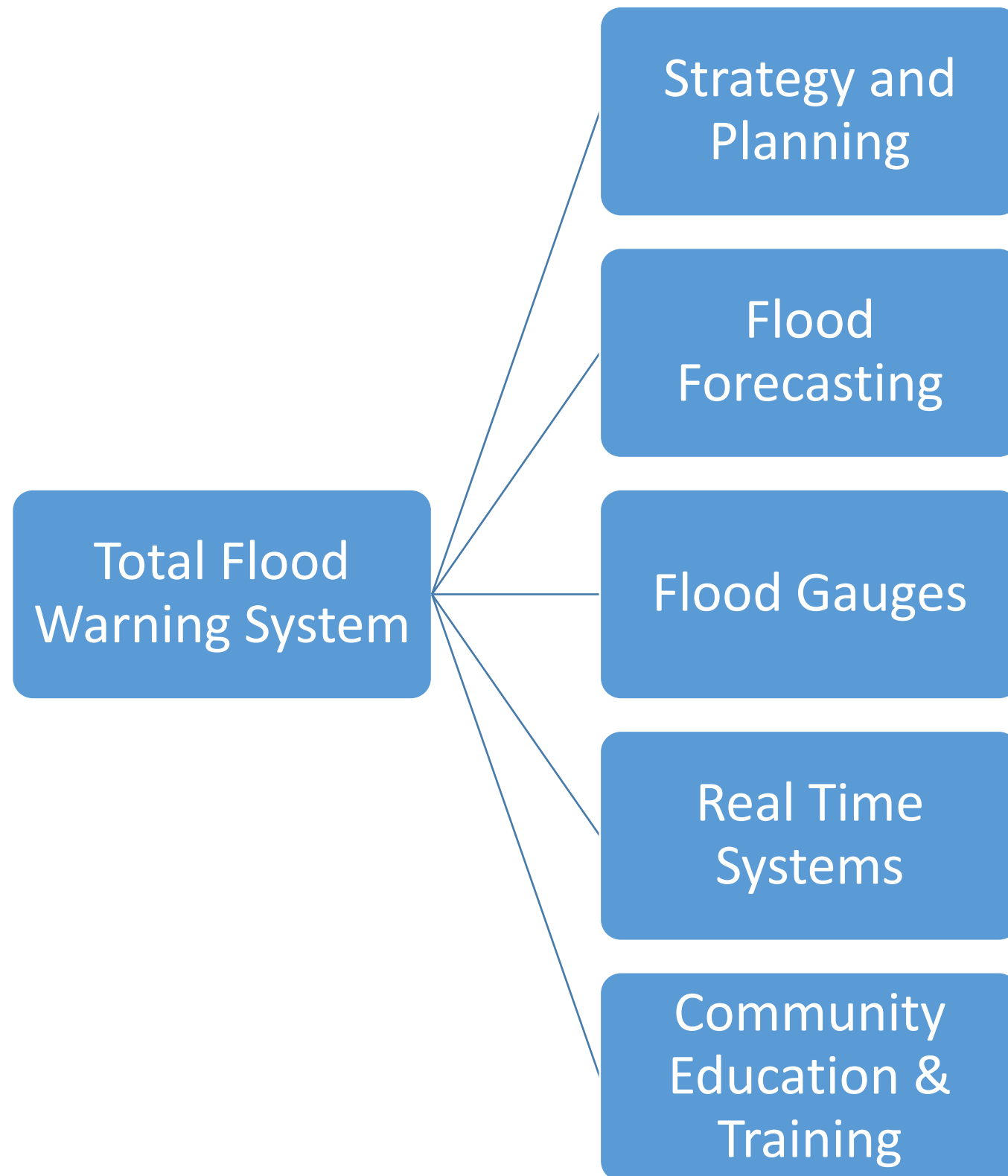
Synergy are leaders in the field and have undertaken:

- Development and operation of flood forecasting systems. This has included experience during the 2011 floods right up to ex TC Debbie
- Experience with BoM in developing and utilizing meteorological products in the STEPS and Rainfields arena
- Development of standard operating procedures and managing large teams during flood events
- High level directional and investment planning for Councils in the Total Flood Warning space
- Undertaken training for local and state government in the flood forecasting and operations space
- Adam is a well recognize national advocate in the flooding space particularly flash flood forecasting. He has previously been the Qld representative for the FLARE group and presented and trained at several conferences and organisations
- Adam remains on call at local governments for flood events and is a trained member and advisor of LDCC and LDMG environments
- Developed programs for flood gauge design, placement and renewal programs
- Experienced within the community consultation environment

By working with Synergy, you can feel assured you are working with the best.



# Total Flood Warning Systems Overview



## Total Flood Warning Systems

From the outset the ingrained approach and perspective on developing a total flood warning system is critical. The approach requires a strategic holistic intent that facilitates the use of multiple approaches to flood warning.

Historically, flood warning has centred around flood gauges. This approach is ill conceived, out of date and very risky for agencies managing flooding across many different events (flash flooding, riverine and overland flow etc).

Approaches must be interconnected and developed with an end user and goal in mind which extends from the strategy all the way to delivery.

In our experience, systems are often sold to agencies to deliver something they cannot or in isolation of other measures, opportunities and links to both flood intelligence, community aspirations and emergency management outcomes

Synergy understand Total Flood Warning. Our Director takes his experienced from local government and consultancies to develop a unique understanding to the problem and providing innovative and effective outcomes within this space.

Synergy are an unbiased provider. We seek the best outcomes for our clients no matter the software used, the consulting partners required. Our mantra is to diagnose the problem and provide a solution that best fits this problem. Whilst we also deliver and build systems, we also provide unbiased advice and assessment listing multiple options and avenues for our clients to pursue.

We have delivered results for a variety of clients including BoM, NSW SES, Office of Environment and Heritage, Gympie Regional Council, Byron Shire Council, Logan City Council and Shoalhaven Council.

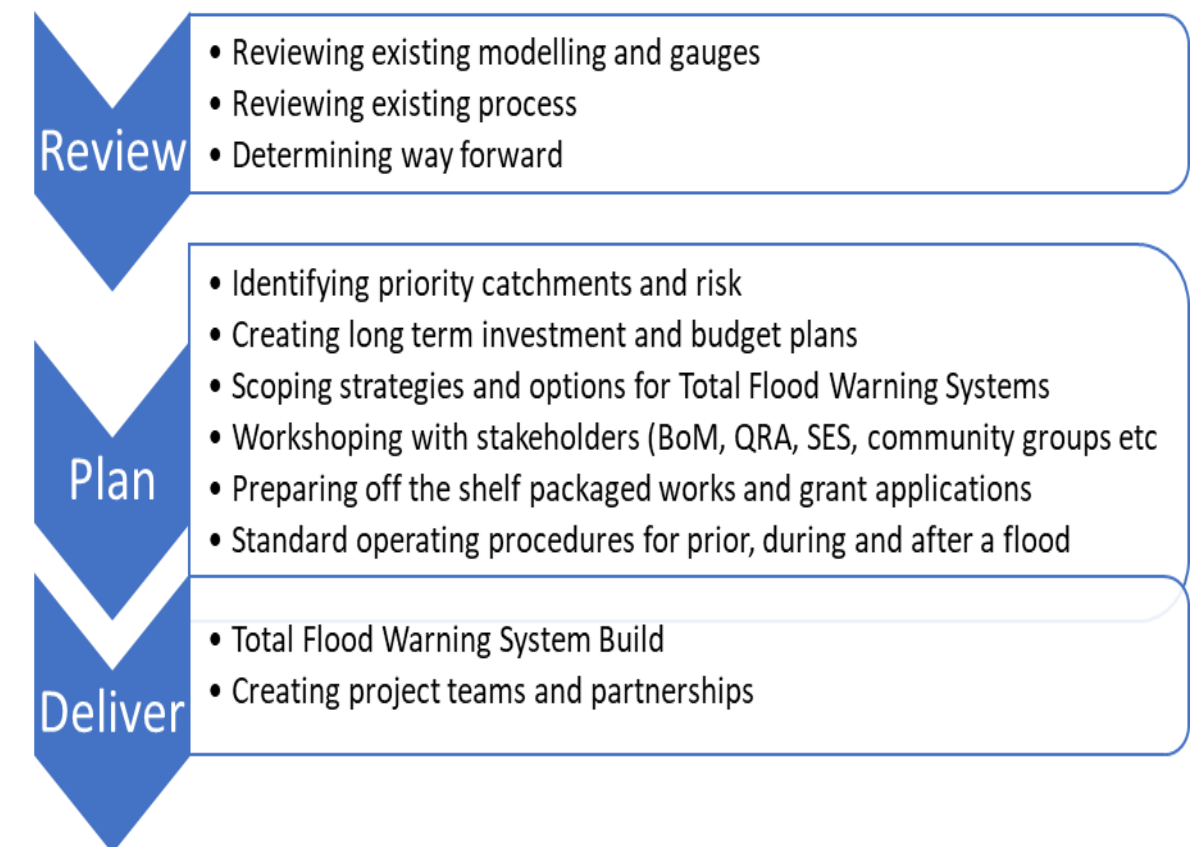
We are happy to provide contacts to back up our claims in this space. We are trusted and continue to be sought for our unique and niche skillset

One of the fundamental items often missed is the initial planning and strategy for a total flood warning system. We have found reactive solutions and “shiny items” sold by software providers that simply do not perform.

So why should you have a strategy in place for this? Read on:

- Everything else has a strategy and a plan doesn't it? We are talking about saving lives and infrastructure here, so why should it be any different?
- As technology develops, climate change impacts disasters and more people are put at risk by flooding, questions will continue to be asked of agencies as to why systems are not in place.
- Flood gauges, systems, flood models, forecasting products are intrinsically linked. Where one avenue is not thoughtfully considered it WILL affect another
- Operational flood models are vastly different to “planning” flood models. Synergy's experience is that most consultants do not understand and cannot build the required base flood models in this space. Understanding and highlighting the new requirements are critical
- Council will require in the future detailed and considered strategies and standard operating procedures in this space to cover risk.
- Strategies can help stage improvements, budgets and long term aspirations to protect communities
- Development of strategies WILL result in obtaining grant funding. Strategies can include development of grant funds that inevitably are consistently available.
- Other Council's are doing this NOW. It has become essential to progress in the flood intelligence and emergency management space.

A development of a total flood warning system can set the path for a long-term investment plan into total flood warning systems and should be the first thing considered before investing in other items. It will also save money by identifying obstacles and opportunities



## Overview

Flood forecasting has extended leaps and bounds in the last 5 years, some of this has been due to Synergy's presence in this space. Flood gauges as a method to forecast floods is archaic and exposing major issues with current practice.

## Riverine Flood Forecasting

Whilst the BoM generally forecast most riverine catchments there are issues including

- Flood levels are simply not enough. Collaborating with BoM outputs and improving intelligence is crucial
- Current methods of alerting can be improved for better community understanding

Extended forecast systems can provide flood surfaces, automated property inundation lists, bridge inundation etc. All in cooperation with BoM and ahead of time. Systems can be linked to external avenues such as messaging and disaster dashboards

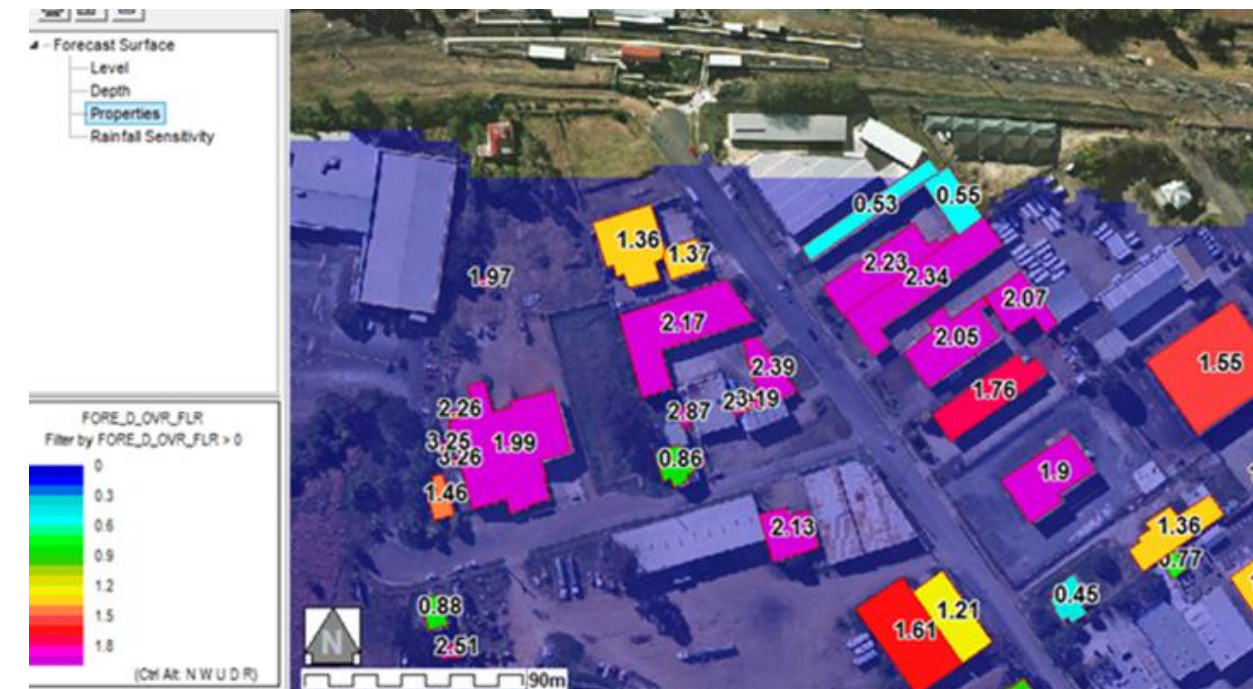
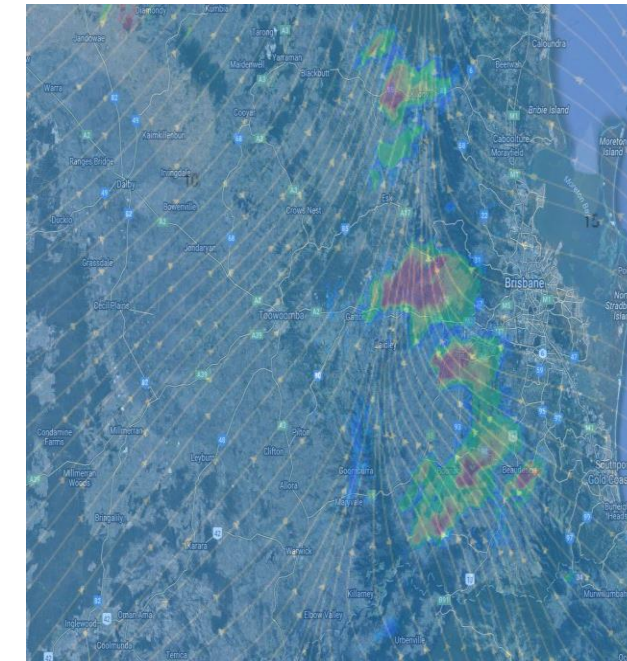
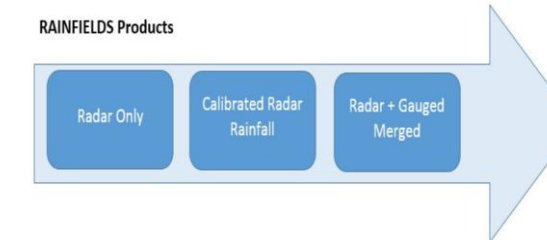
## Flash Flood Forecasting

Constantly we hear flash flood forecasting is not possible. It is. It has advanced and has exploded in capability in these sorts of catchments with fast flood models and new meteorological products such as STEPS and radar rainfall (to name a few). It is now a reality.

Overall flood forecasting systems give authorities and emergency management teams what they need most.....time. Managing floods changes dramatically with this type of technology.

## What can we provide?

- Review of existing systems and options/advice on ways forward in the forecasting space. This advice is delivered completely unbiased and is critical to understand the full market capability in this space (not just one type of software)
- Systems can include simple (precooked rainfall triggers) up to advanced forecasting
- Design, build and operation of user derived and fully automated live hydrological and/or hydraulic forecast systems
- Innovative approaches to the management of referable dams (i.e. forecasting rather than waiting for levels to be triggered)
- Links to disaster dashboards, apps and messaging. This can include evacuation components



## The changing nature and need of a flood gauge

Flood gauges historically have been an important component of the total flood warning system but are now being used well beyond their accepted contemporary forecasting practice. Flood gauges should now be strictly utilised in development of a real time monitoring system (i.e. not a forecasting system). Their role however is still aligned with the total warning system approach and forecasting system:

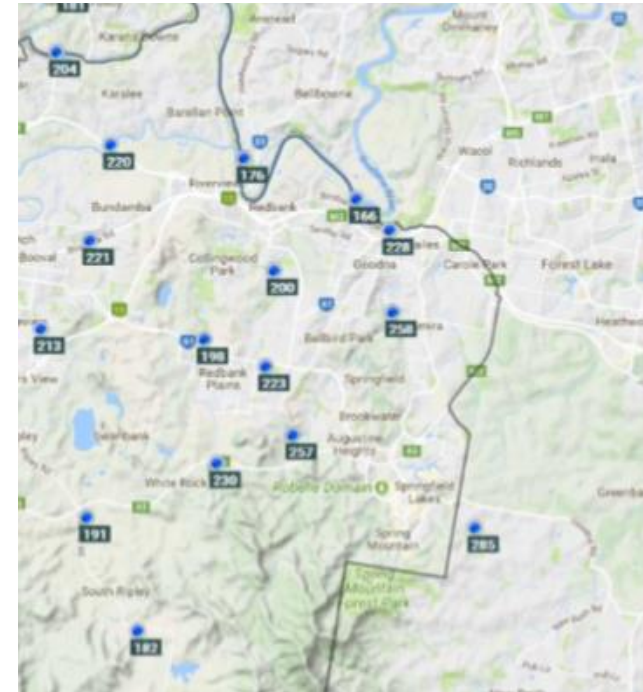
- Flood gauge locations are generally being placed in incorrectly when considering advancement in forecasting technology. Alignment with forecasting systems is extremely important
- The role of the flood gauge in calibration is important and even more important with flood forecasting. Calibrating historical flood models and radar rainfall is a development practice that requires intimate knowledge of rain gauge placement
- Water level gauges require real time consideration (bridges etc) but also in fine tuning forecast applications with rating curves and hydraulic grade changes through catchments
- Flood gauge investment should be considered with experienced professionals in this space (both forecasting and gauge installation specialists).

Overall there are a variety of systems and operational uses for gauges that are evolving as well as system smarts which can include road warning signs, forecast systems and different types (and costs) for flood gauge classifications

Flood gauge investment should always be considerate of overall holistic planning in the total flood warning space.

### What can we provide?

- Review of existing systems and options/advice on ways forward for flood gauges.
- Complimentary real time and forecast configurations for flood gauges
- Design and location siting for gauges
- Long term planning and investment programs and off the shelf grant applications



A flood forecasting system is now more important than a real time system. This is because insufficient lead times are not provided by current systems and gauges. Although this may be the case, the real time systems are still required because:

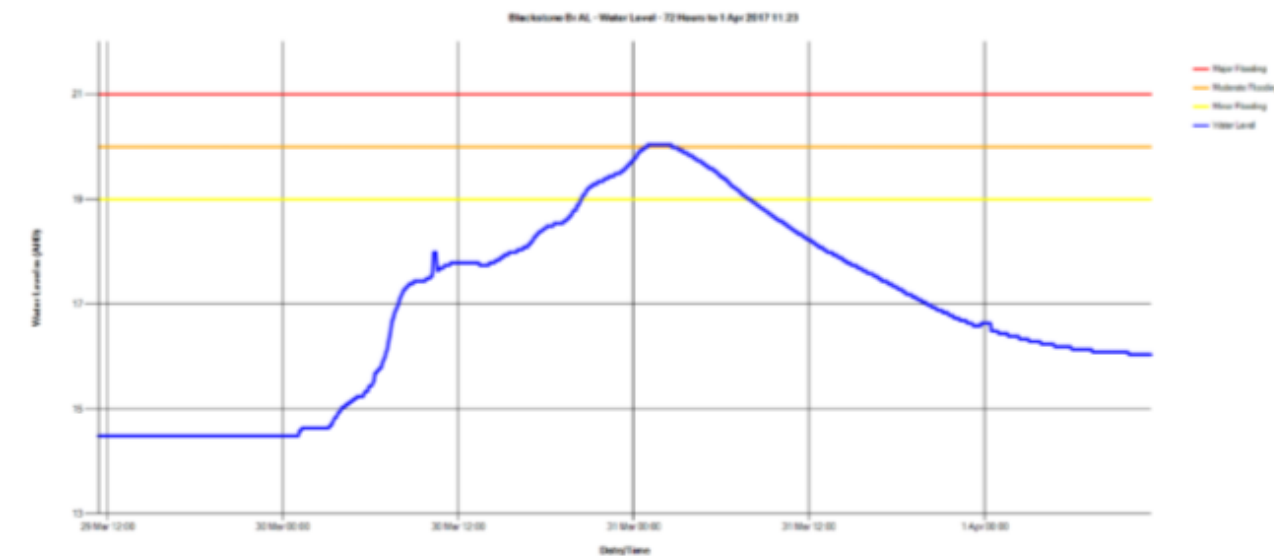
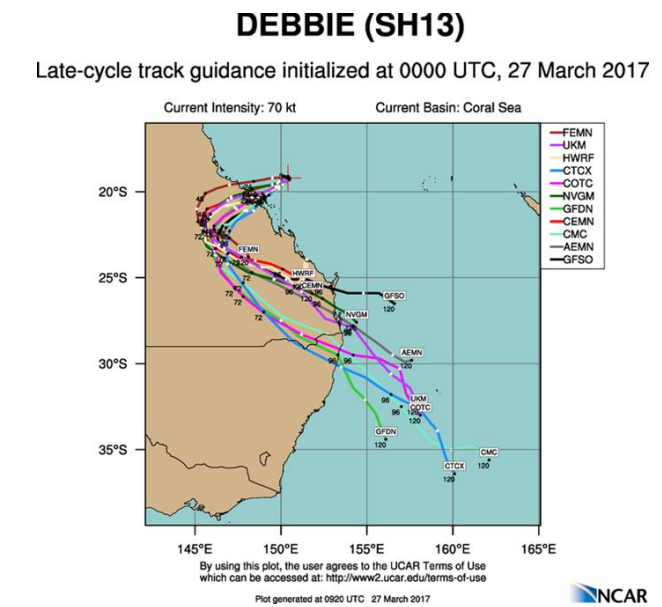
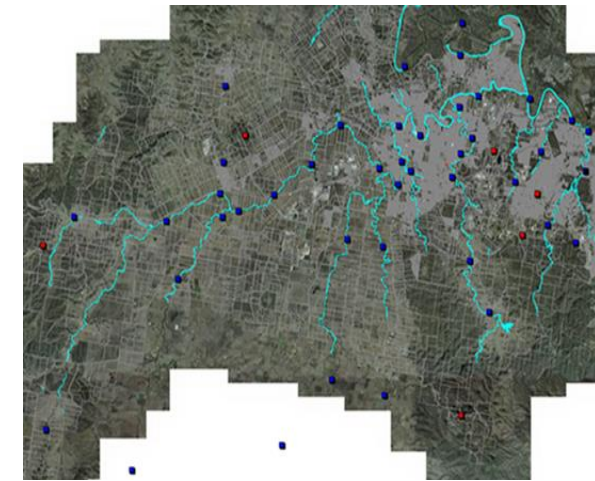
- Real time systems provide a mechanism for verifying forecast systems. Development of SOP's in this space is critical to ensure smooth functioning of combined systems
- Forecast systems do have limitations in some spaces and real time systems can help compliment these limitations
- Real time systems can be developed to provide high level forecasts that is useful
- Good dashboards and portals can provide good intelligence during events
- Systems can assist refinement and calibration of forecasting systems

Development of linked forecast and real time systems is seen as a progressive and necessary part of a total flood warning system.

Agencies should be extremely careful about being “sold” real time systems as the answer. They simply are not and are becoming outdated and obsolete if packaged by themselves. A real time system will not provide lead times required particularly on flash flood scenarios.

## What can we provide?

- Partnering with software providers to provide complimentary real time and forecasting systems
- Reviewing potential options and providing way forward reports in this space (unbiased)
- Configuring systems to perform better
- Provide rudimentary forecasting and flood intelligence improvements
- Linking to other systems



## Community Education

The alerting, messaging and community education space is complicated. Current issues can include:

- Insufficient lead time to respond
- Complicated, out of date and irrelevant warnings associated with flood levels and flood classifications (minor, moderate and major). These types of warnings are not effective and there are more aligned and informative ways.
- Lack of understanding of information, where to obtain information and what to do in a flood event
- A disconnection to agencies and a lack of understanding of flooding, the catchment and their level of risk
- Detailed analysis of Standard Operating Procedures and relationships to other authorities and groups

All of these issues can be resolved and improved through an effective total flood warning system.

## What can we provide?

Synergy are experts and have undertaken community consultation preparation and delivery of training and education programs. This can be undertaken separately or combined with a long term investment of a total flood warning system

Synergy have also training community members, flood engineers and emergency management professionals. We undertake:

- Development of community education and engagement plans both prior, during and after the project
- Training on floodplain management, modelling, weather and flood forecasting
- Peer reviews, scenarios-based exercises (both development and review)
- Support for agencies pre, during and post flood events





# More Information?

## Want to know more about Synergy?

Synergy and our director have been involved in a suite of this type of activity both during local government and consulting. Here is a snippet of what we have done

- Designed built and operated Australia's first flash forecast system. This is a nationally recognized and award winning system that has been proven in operation multiple times
- Trained and facilitated workshops for agencies such as Local Government (Gold Coast, Gympie, Byron), State Government (QFES, OEH, NSW SES)
- Our Director was the Qld representative on the BoM's Flash Flood Advisory Resource (FLARE). Adam has also presented at a variety of conferences on flood forecasting
- Our Director is a well-known and respected operator within this space and is connected with QRA, BoM, other councils and flood intelligence and emergency management professionals. References can be provided for both Synergy and Adam's work.

## Who do we partner with?

Lots of people!! We play nice!! Although Synergy undertake many activities themselves, we work with select consultancies to deliver major systems and coordinated total flood warning systems. This is dependant on the scope required and ranges from service, software and product based.

## More info

<https://www.engineersaustralia.org.au/Event/advancements-rainfall-predictions-and-flood-forecasting>

<http://synergys.com.au/flood-training/>

<http://synergys.com.au/wp-content/uploads/2018/07/Council-Wide-Flood-Mapping-1.pdf>

<http://synergys.com.au/wp-content/uploads/2018/12/A-Flood-Engineer-is-NOT-a-Flood-Forecaster.pdf>

[http://www.floods.org.au/client\\_images/1887844.pdf](http://www.floods.org.au/client_images/1887844.pdf)

<https://www.ipswichfirst.com.au/ipswich-at-forefront-of-efforts-to-better-predict-flash-flooding/>