

Building a BRIDGE

Toowoomba flood forecasting in FEWS and Guardian IMS

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Today

- JBP progress since we last met
- A need to rationalise
- New tools
- New Toowoomba System
- New FEWS public interface



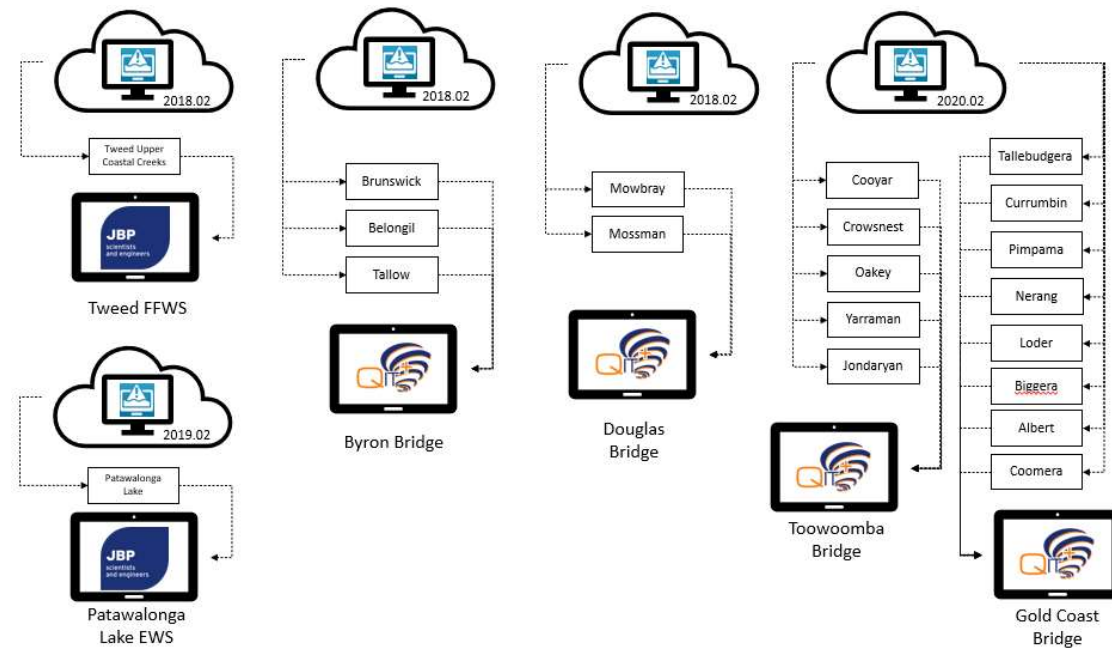
Progress since we first met

- 2019 FEWS User Days - Mossman Flash Flood Forecasting System
- 2020 FEWS User Days – Noosa Flash Flood Forecasting System
- More expansion:
 - More Flash Flood
 - More URBS
 - More Users
- Patawalonga Lake FFFS
- Douglas FFFS & BRIDGE
- Byron BRIDGE
- Tweed FFWS
- Toowoomba BRIDGE
- Gold Coast BRIDGE



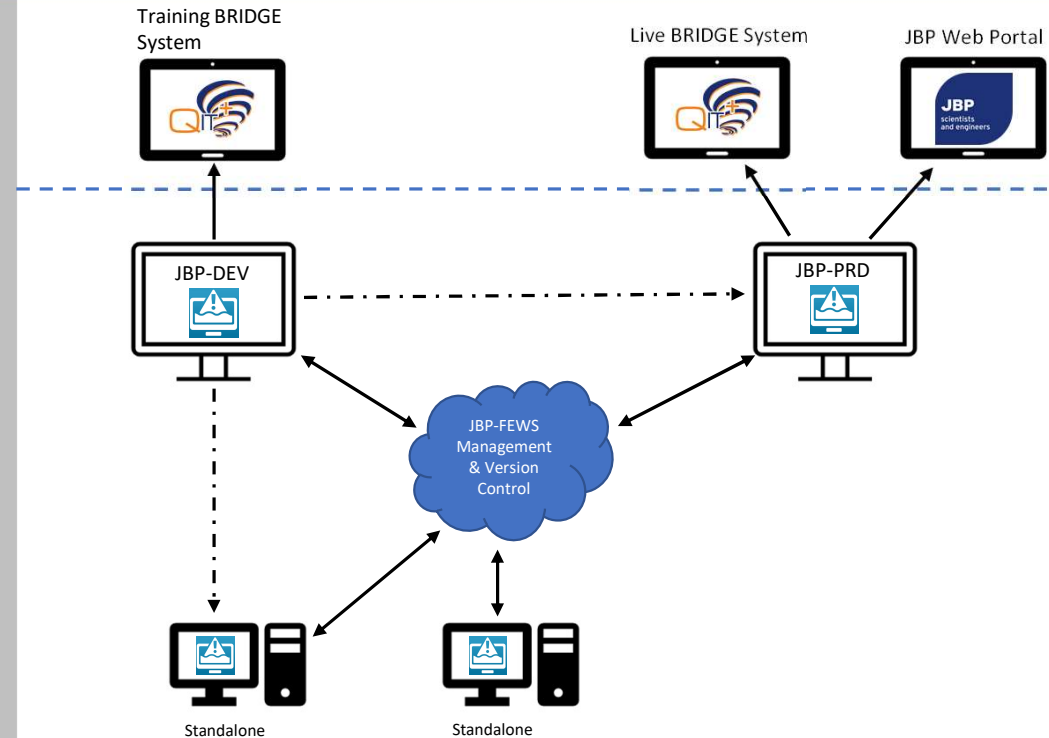
Current systems

- Douglas BRIDGE
 - 2 URBS models
 - Version 2018.02
- Byron BRIDGE
 - 3 URBS models
 - Version 2018.02
- Tweed FFWS
 - 1 URBS model
 - Version 2018.02
- Toowoomba BRIDGE
 - 5 URBS models
 - Version 2020.02
- Gold Coast BRIDGE
 - 8 URBS models
 - Version 2020.02
- Patawalonga Lake EWS
 - 1 URBS models
 - Version 2019.02



Centralised System Framework

- **Worries**
 - Things were getting messy
 - Updates were time consuming
 - Bigger clients get more attention
- **Centralised System**
 - Consistency between forecast catchments.
 - Added redundancy with the integration of DEV and PRD system.
 - Framework is in place for faster delivery and integration of new developments across multiple catchments.
- **Improving Previous Processes**
 - Configuring efficient modules and workflows to cater for larger data sets and additional catchments.
 - Improving FEWS config and model file structure so that new catchments can be added while minimising the number of changes to existing config files.
- **Transition to a National Level**
 - Original processes now import and process data across all of Australia, rather than select regions.
 - A lot of the data already exists in our system, allowing a Plug-and-Go approach.



Development of JBP-FEWS

- Moving on from our current set-up

- **How:**

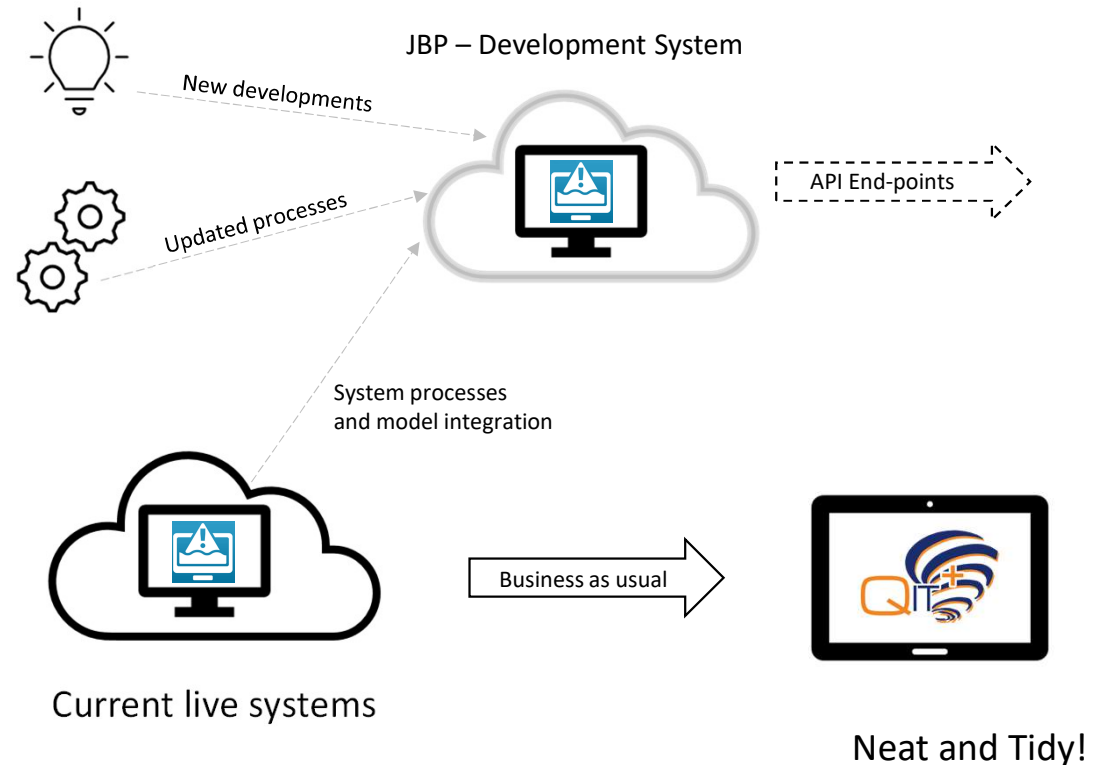
- New development configured to run in parallel with existing systems.
 - Existing systems are being reconfigured into the new development system using updated processes.

- **Why:**

- Consistency across systems is achieved.
 - When updates are required or new developments are implemented, all systems can be updated at once, reducing time required and methods when implementing.

- **FEWS Versioning & upgrading:**

- Previously this was not considered – a new system got a new FEWS.
 - Updates can now be made to all systems, with the development platform allowing a staged implementation and testing approach before transitioning to production.



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scientists
and engineers

JBA
risk
management

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consulting

Australian Flood Map: South East QLD



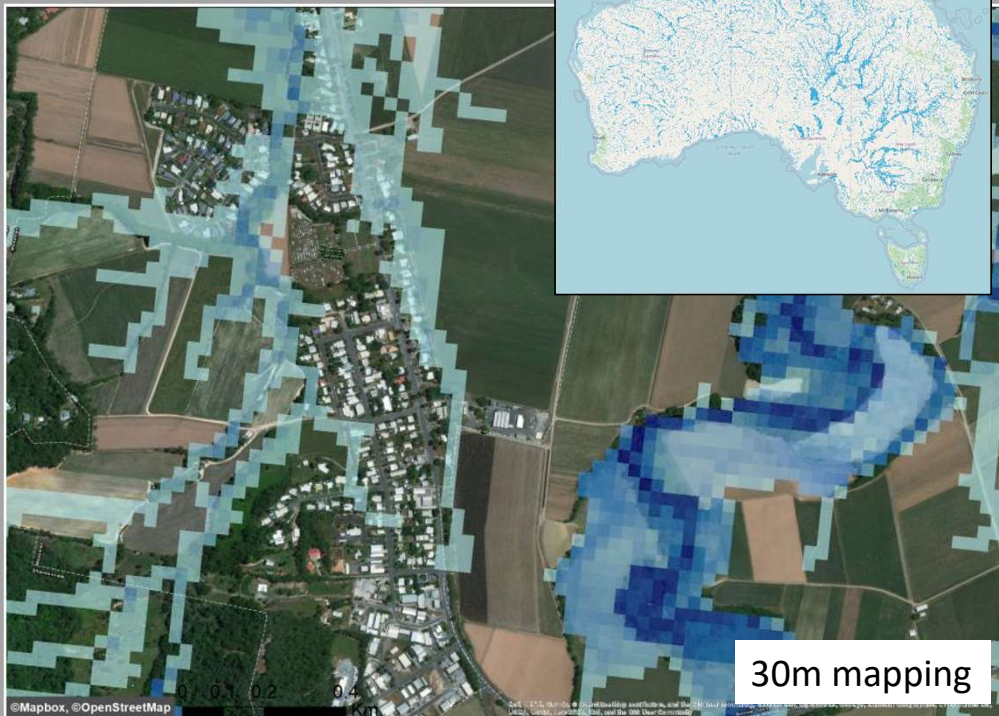
An aerial photograph of Gladstone, Australia, showing the city's layout, surrounding hills, and the ocean. Blue-shaded areas indicate flood zones, primarily along the coast and in low-lying inland areas. The JBP logo is in the top left corner.

JBP

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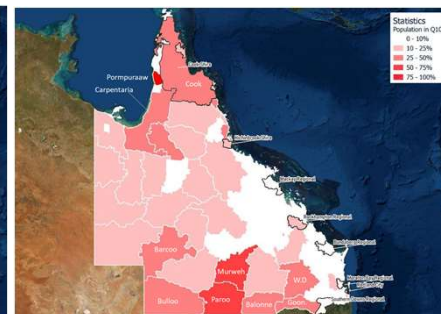
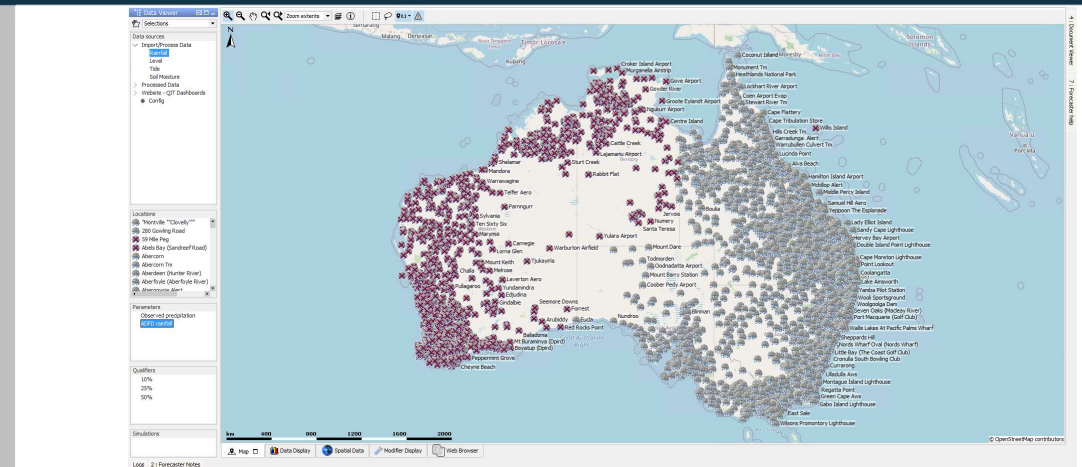
Australian Flood Map - Gladstone

Recent improvements



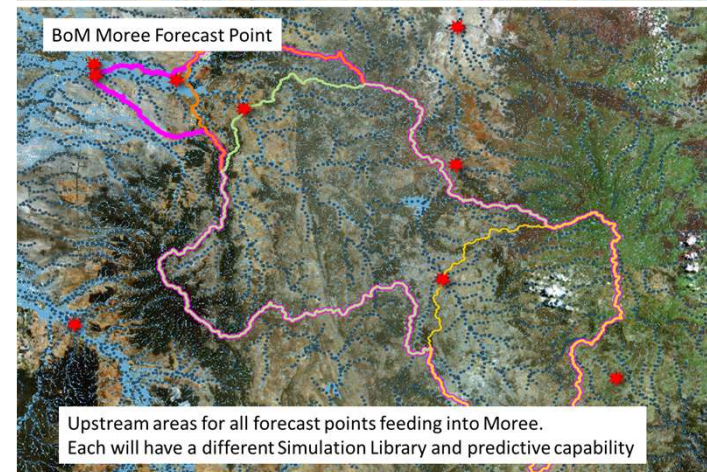
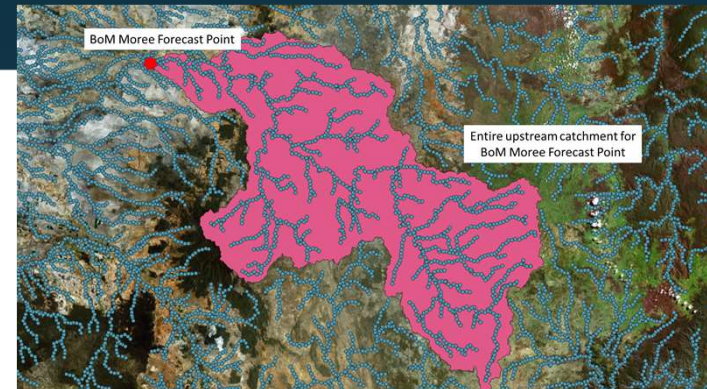
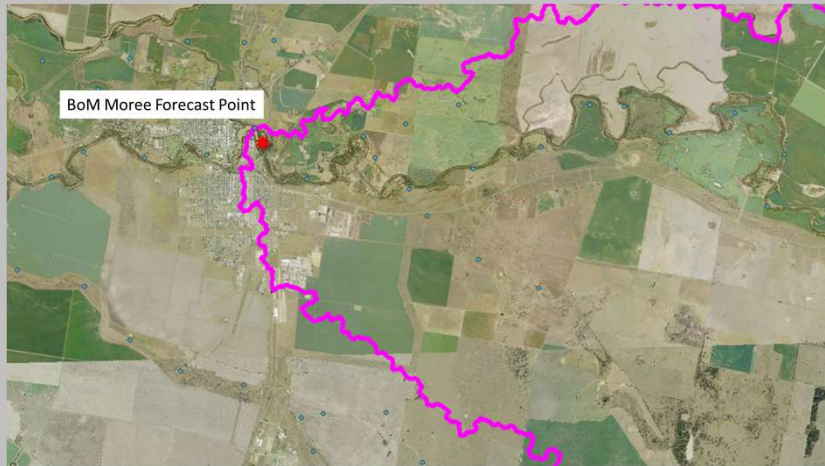
National level data

- To access greater datasets
 - We now access all BoM FTP station and gauge data as a base
 - ADFD forecasts
 - Microsoft Building Footprints



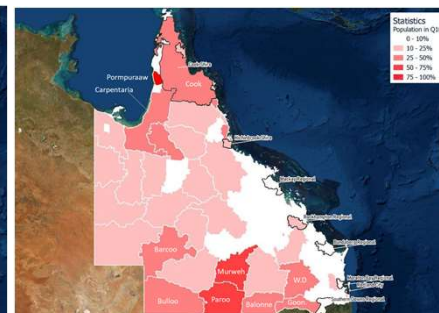
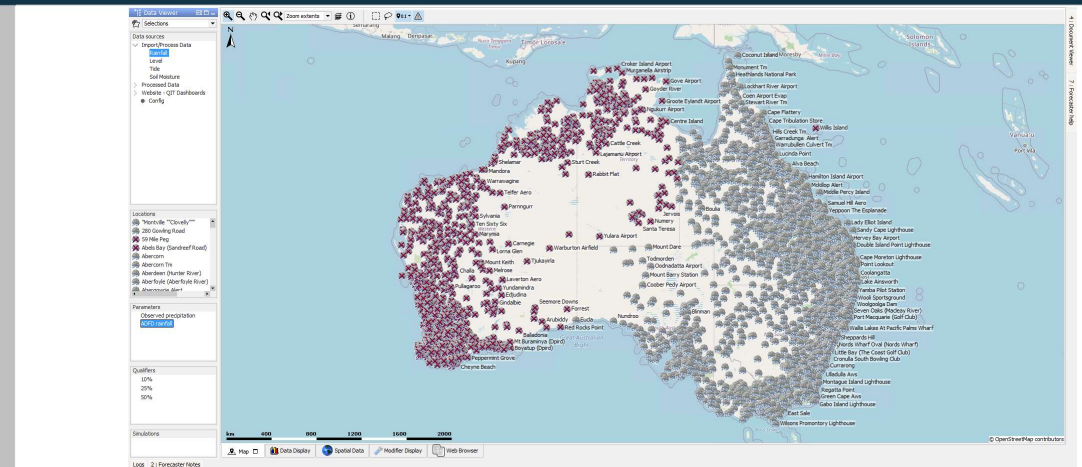
National level data

- Maps are being cut and assigned gauge triggers



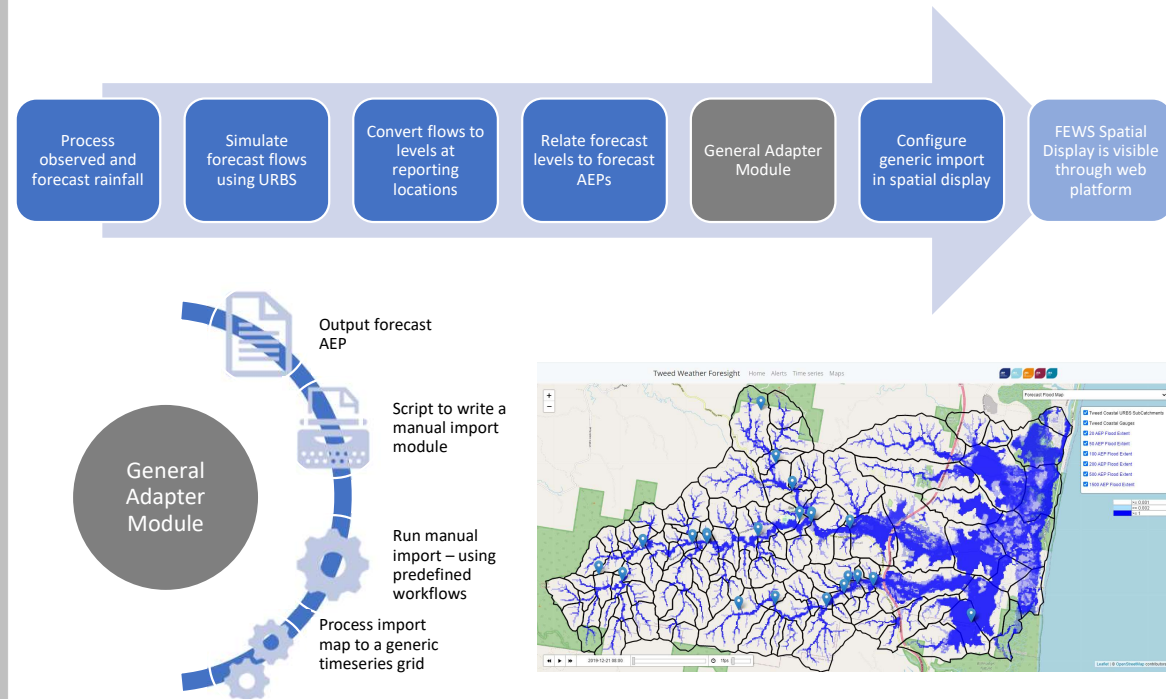
National level data

- To access greater datasets
 - We now access all BoM FTP station and gauge data as a base
 - ADFD forecasts
 - Microsoft Building Footprints
- Aim to produce forecast or real-time flood extents across Australia without traditional models.



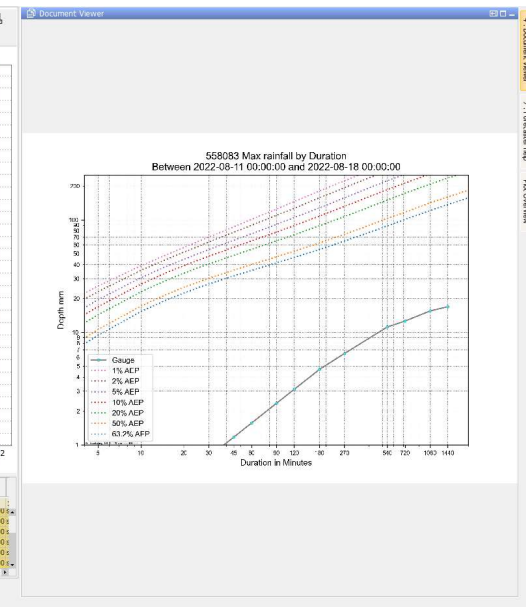
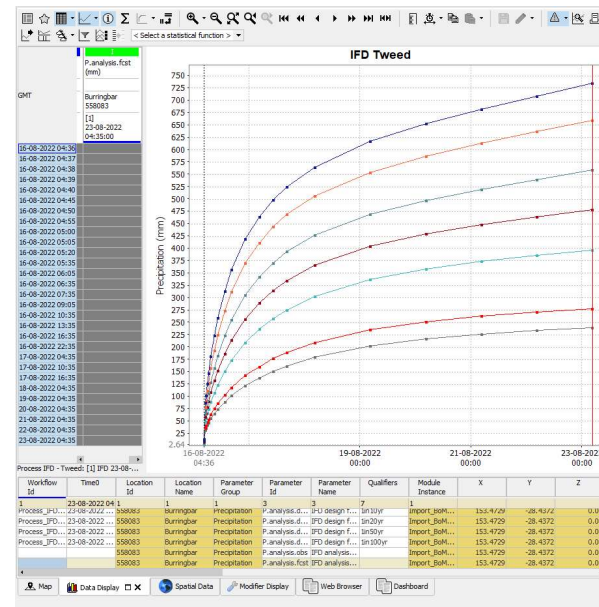
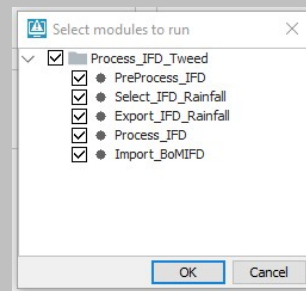
Real-time flood extents

- We want to see forecast flood extents within FEWS Spatial Display.
- Challenges:
 - How to configure the Spatial Display with a single grid, which is varying depending on the forecast.
- Approach
 - Create pre-configured batch workflows for each AEP extent
 - Post-process the imported grid to a “generic” grid, displaying a single time-series to present the most recent forecast flood extent.
 - Created an “empty” no-flood flood extent so the Spatial Display timeseries was never empty (errors occur).
 - Workflows now run from batch files
 - Need to schedule this workflow regularly enough so that flood extents do not continue to be displayed when there is no longer a flood.



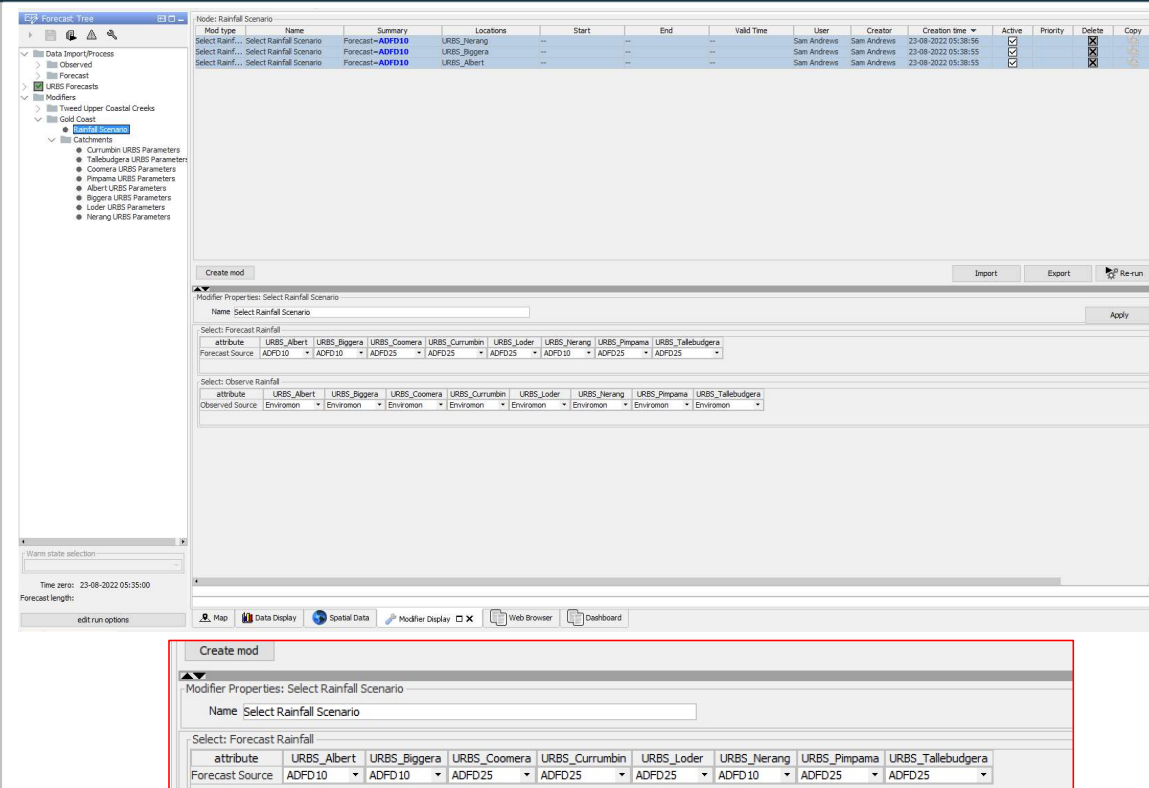
IFD Curves – Design, Observed and Forecast

- We wanted to see IFD plots in FEWS
- Approach:
 - Created a multi-step module
 - Processes rainfall timeseries
 - Runs an external python script
 - Brings the IFD picture back into Document Viewer
- Additional testing:
 - Trying to import the design and calculated IFD curves back into FEWS for viewing in the Plot Overview.



Modifiers – operational forecasting

- Background :
 - Our systems are always running
 - Closer to the event switch back to BoM!
 - While we are not operational forecasters, we are still watching on during events.
 - What if we see something we want to test?
- Approach
 - Best not to change config during a live event
 - Implementation of a modifier from the FEWS client.
 - Apply temporarily with a pre-defined expiry time (or can be removed by a user)
 - Modifiers can be configured to change:
 - Storage IWLs
 - Gauge network outages
 - ICOLL levels
 - URBS Matching
 - Baseflow, rating curves
 - What would a forecast 1% rainfall do to forecast flows/levels?
 We could investigate this using modifiers



The screenshot shows the 'Forecast Tree' on the left and the 'Modifier Properties: Select Rainfall Scenario' dialog on the right. The dialog is used to configure a modifier for a specific rainfall scenario.

Forecast Tree (Left Panel):

- Data Import/Process
 - Observed
 - Forecast
 - URBS Forecasts
 - Tweed Upper Coastal Creeks
 - Gold Coast
 - Urban Scenario
 - Currumbin URBS Parameters
 - Tallebudgera URBS Parameters
 - Coomera URBS Parameters
 - Pimpama URBS Parameters
 - Albert URBS Parameters
 - Biggera URBS Parameters
 - Loder URBS Parameters
 - Nerang URBS Parameters

Modifier Properties: Select Rainfall Scenario (Right Panel):

Table 1: Rainfall Scenarios

Mod type	Name	Summary	Locations	Start	End	Valid Time	User	Creator	Creation time	Active	Priority	Delete	Copy
Select Rainf...	Select Rainfall Scenario	Forecast+ADFD10	URBS_Nerang	--	--	--	Sam Andrews	Sam Andrews	23-08-2022 05:38:56	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Select Rainf...	Select Rainfall Scenario	Forecast+ADFD10	URBS_Biggera	--	--	--	Sam Andrews	Sam Andrews	23-08-2022 05:38:55	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Select Rainf...	Select Rainfall Scenario	Forecast+ADFD10	URBS_Albert	--	--	--	Sam Andrews	Sam Andrews	23-08-2022 05:38:55	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Modifier Properties: Select Rainfall Scenario

Name: Select Rainfall Scenario

Select: Forecast Rainfall

attribute	URBS_Albert	URBS_Biggera	URBS_Coomera	URBS_Currumbin	URBS_Loder	URBS_Nerang	URBS_Pimpama	URBS_Tallebudgera
Forecast Source	ADFD10	ADFD10	ADFD25	ADFD25	ADFD25	ADFD10	ADFD25	ADFD25

Select: Observe Rainfall

attribute	URBS_Albert	URBS_Biggera	URBS_Coomera	URBS_Currumbin	URBS_Loder	URBS_Nerang	URBS_Pimpama	URBS_Tallebudgera
Observed Source	Environon	Environon	Environon	Environon	Environon	Environon	Environon	Environon

Time zero: 23-08-2022 05:35:00
Forecast length:

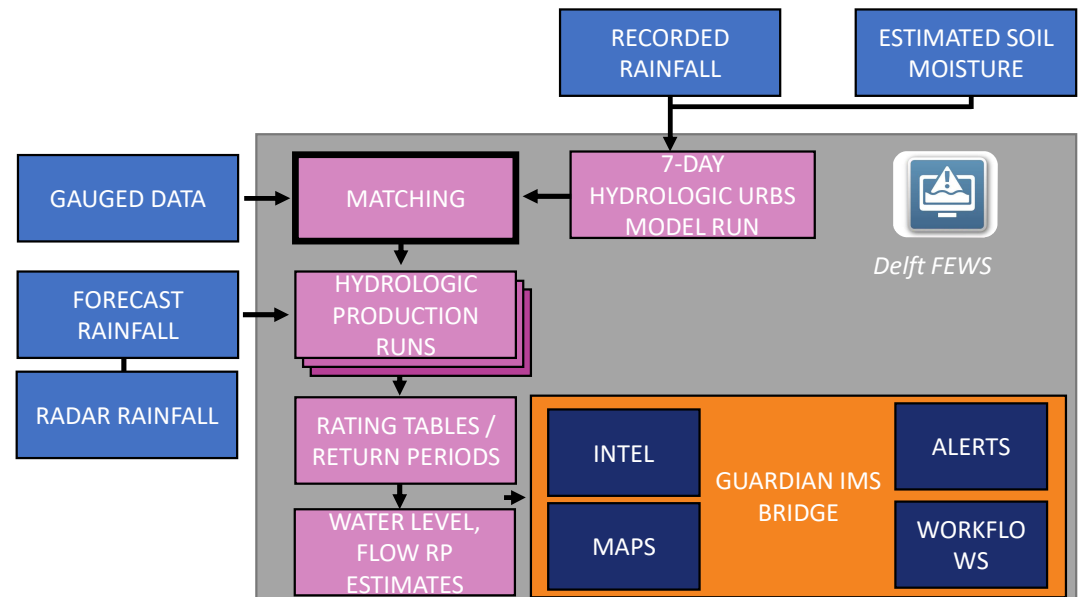
edit run options

Map Data Display Spatial Data Modifier Display Web Browser Dashboard

Toowoomba!

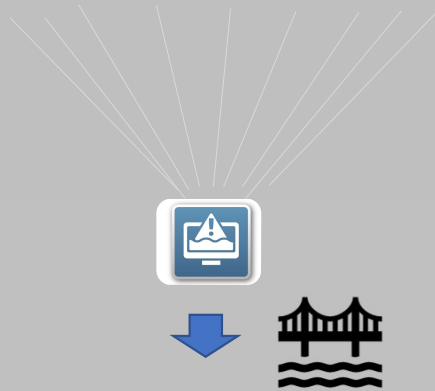
Approach:

- Clone DEV system
- Create Offline FEWS:
 - All ENVIROMON data supplied
 - AWRA-L data used
 - ADFD 10th percentile grids used
 - URBS models supplied
 - New mapping merged with Aus Flood Map
 - Triggers set
- Upload to DEV
- Upload to PRD
- Link with Guardian IMS

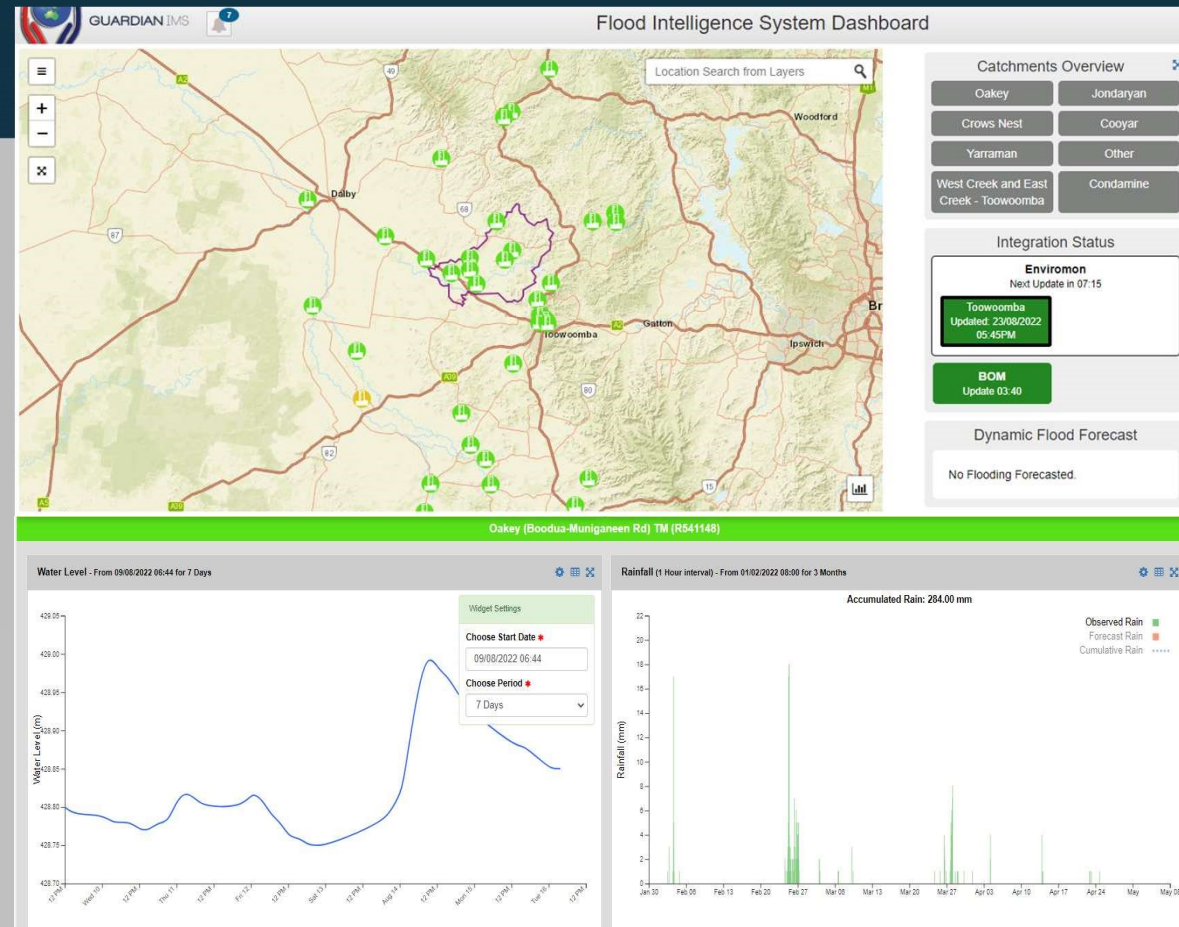


Toowoomba!

Rain: BoM ADFD t+7 day rainfall forecast
Wind: BoM ADFD and ACCESS-TC models
Infiltration: BoM AWRA-L
Rainfall: ENVIROMON & BoM FTP
Water levels: ENVIROMON & BoM FTP

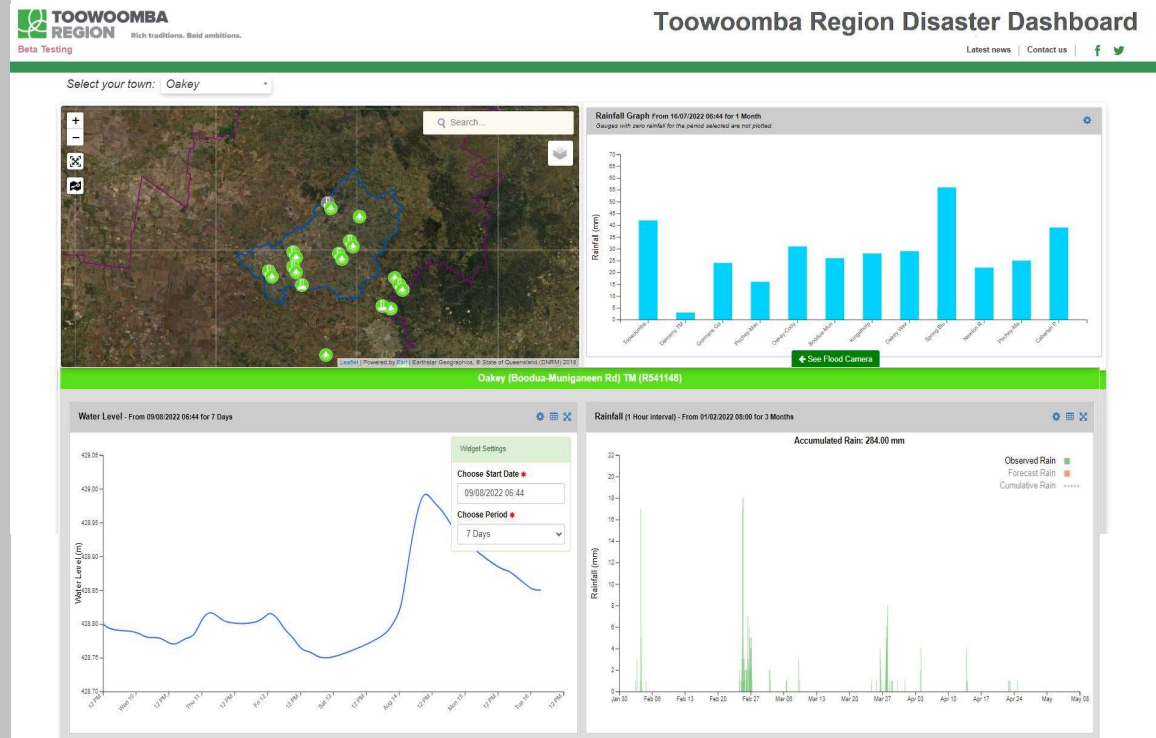


Guardian IMS



Toowoomba!

- Council uses Guardian IMS to
 - Perform health checks/heart beats on gauges
 - View IFDs
 - View live flood maps
 - Assign inter-agency tasks
 - Push data to public portals



Thank you!

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