From exercise to reality

2022 Delft-FEWS User Days

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SOURCE STORE SUPPLY

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Contents

- Background of Annual Flood Exercise
- Overview of 2021 Annual Flood Exercise
- From Exercise to Reality

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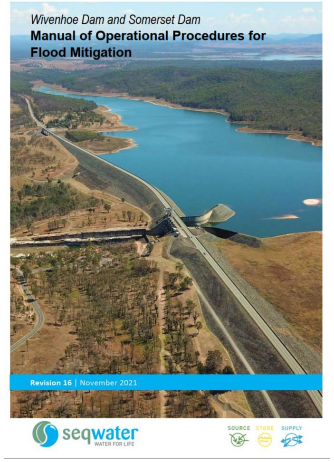
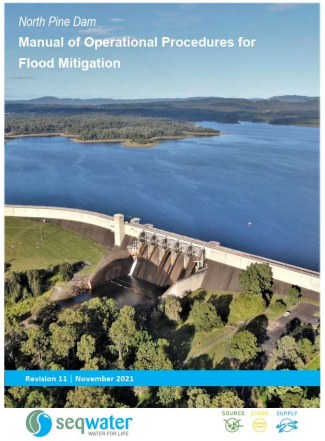
Background

- **Why we exercise**
  - **Compliance**: Required under the Manuals
  - **Continue Improvement**: Test processes and procedures
  - **Training**: Familiarisation of Manuals, procedures and new features
  - **Understanding**: Identify mis-interpretations of the Manuals
  - **Cooperation**: Interact with internal and external stakeholders

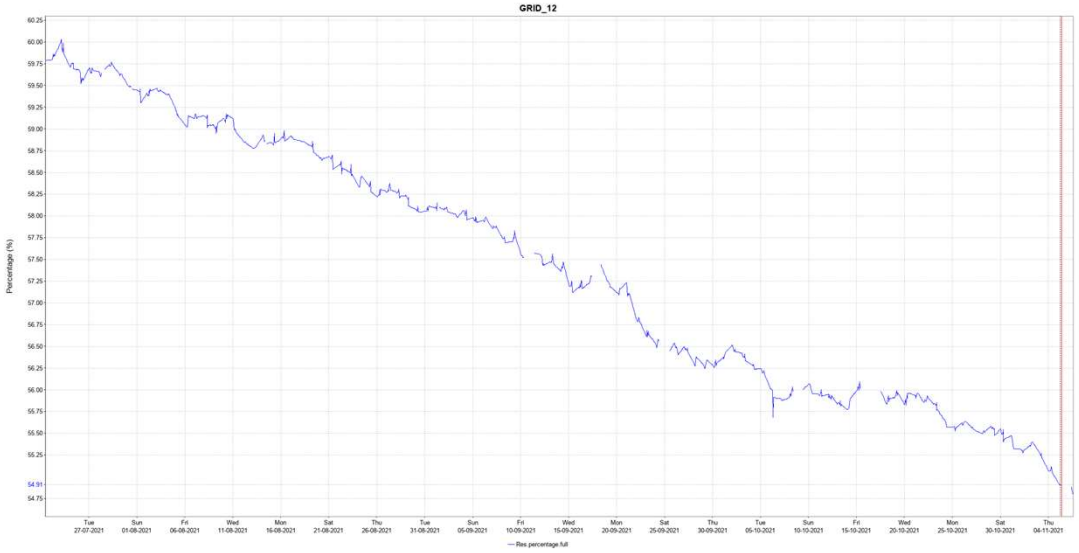
- **Goals of the 2021 Flood Exercise**
  - **Understand the new Flood Manuals**
  - Test the new features in the Flood Forecasting Systems
  - Exercise Emergency Action Plans (EAP)
  - Interaction with key stakeholders (comms team and dam operators)
  - Meet criteria required in the Manuals (WD Dam Safety Strategy)

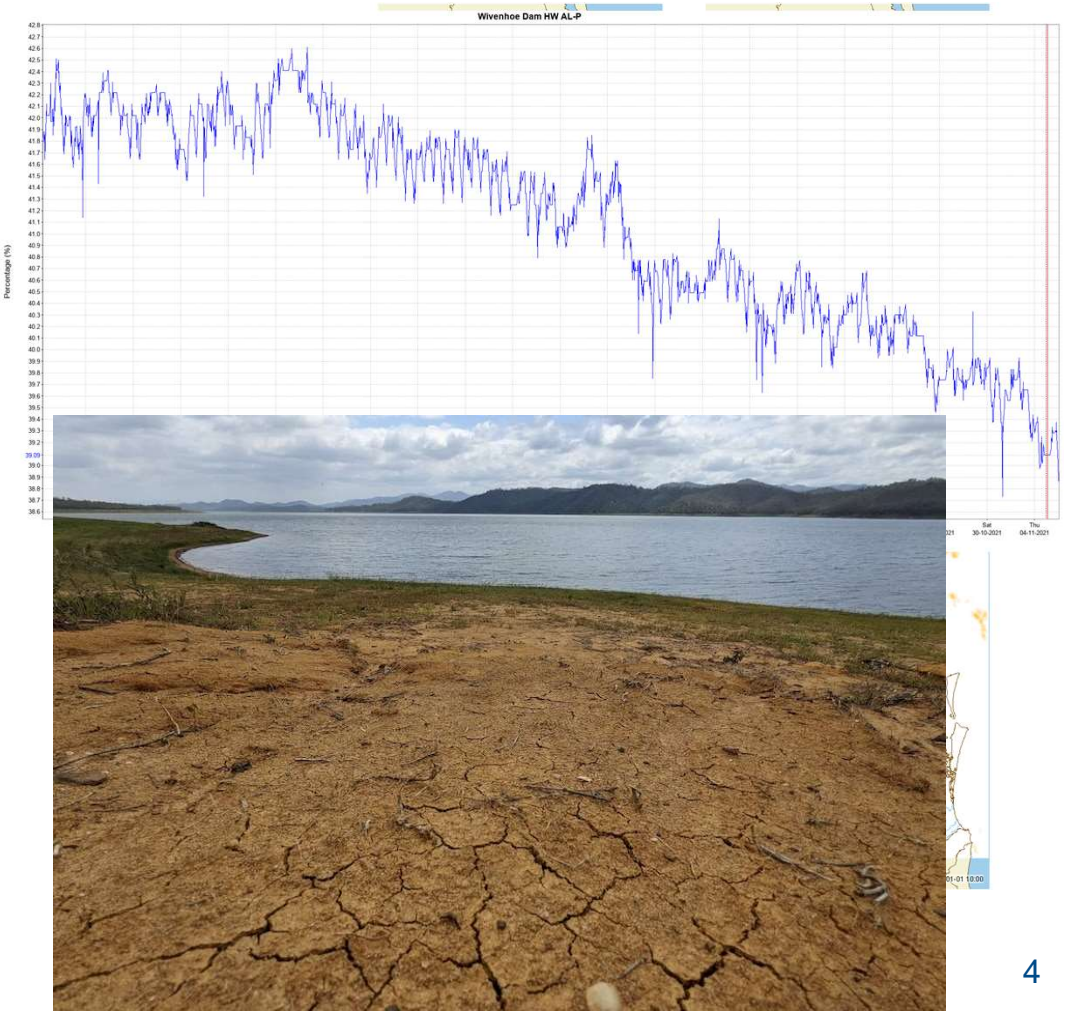




Exercise preparation

- **Event preparation**
  - Previous exercises: using synthetic storms to generate synthetic event data
  - No event occurred recently in SEQ

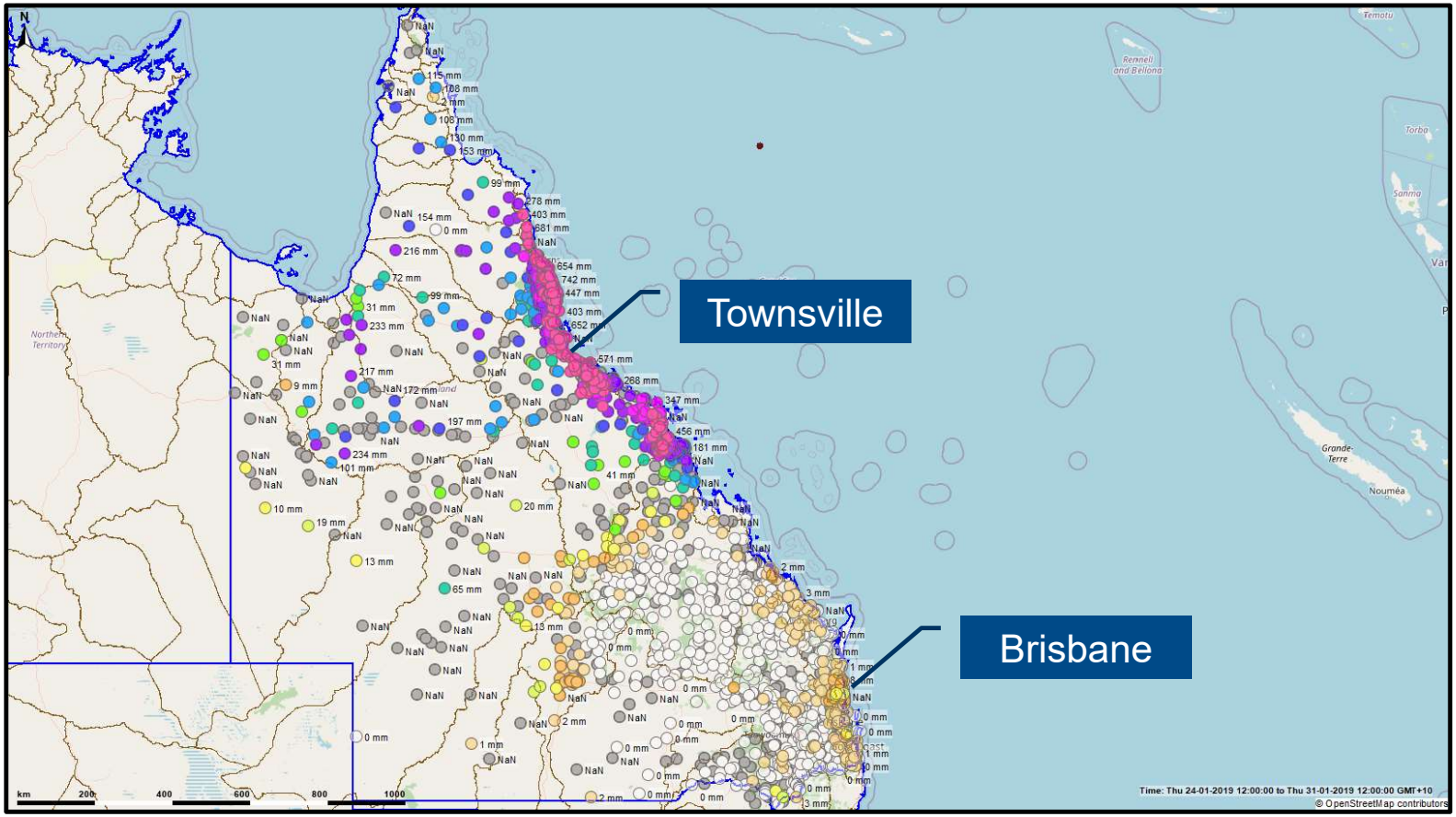




  - **but wait, how about the January 2019 Townsville flood event?!**

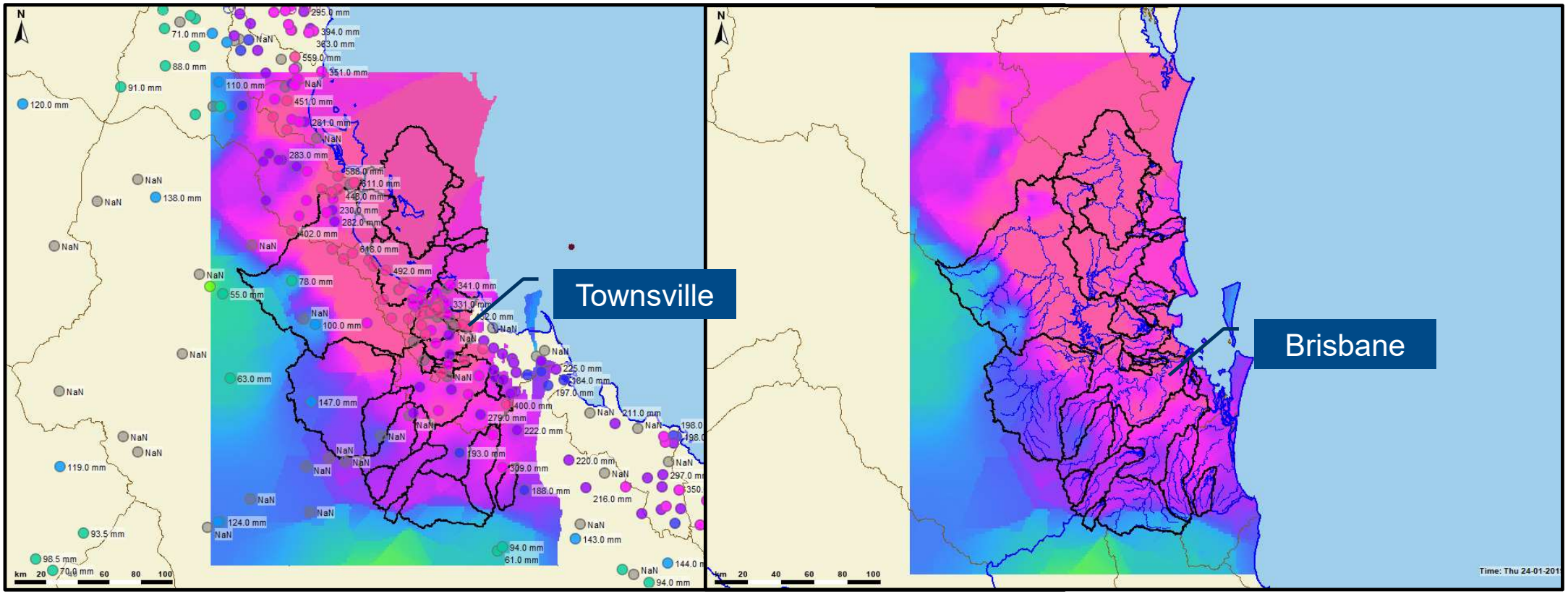
Exercise Data – Jan 2019

- 7 days rainfall total from 24 Jan 2019 to 31 Jan 2019



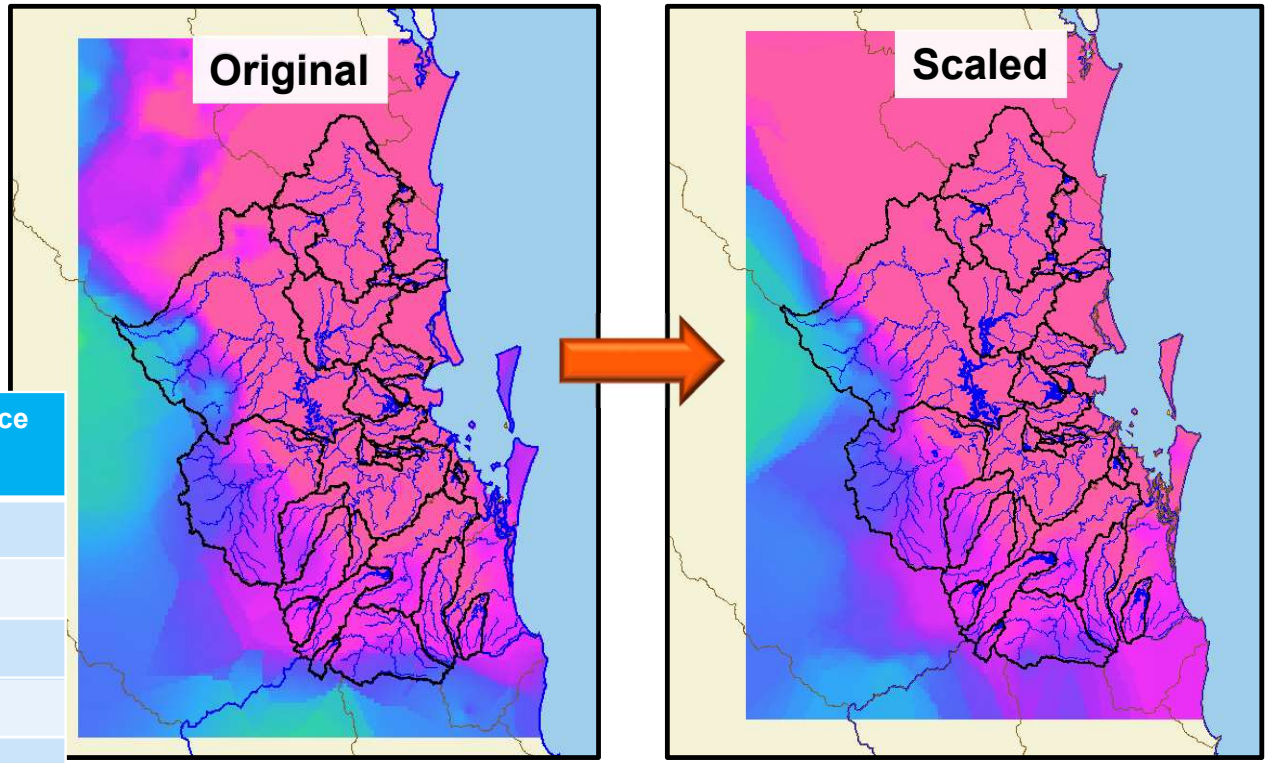
Rainfall relocation

- Relocate observe and forecast rainfall



Rainfall comparison – Grid (24/01/2019 to 31/01/2019)

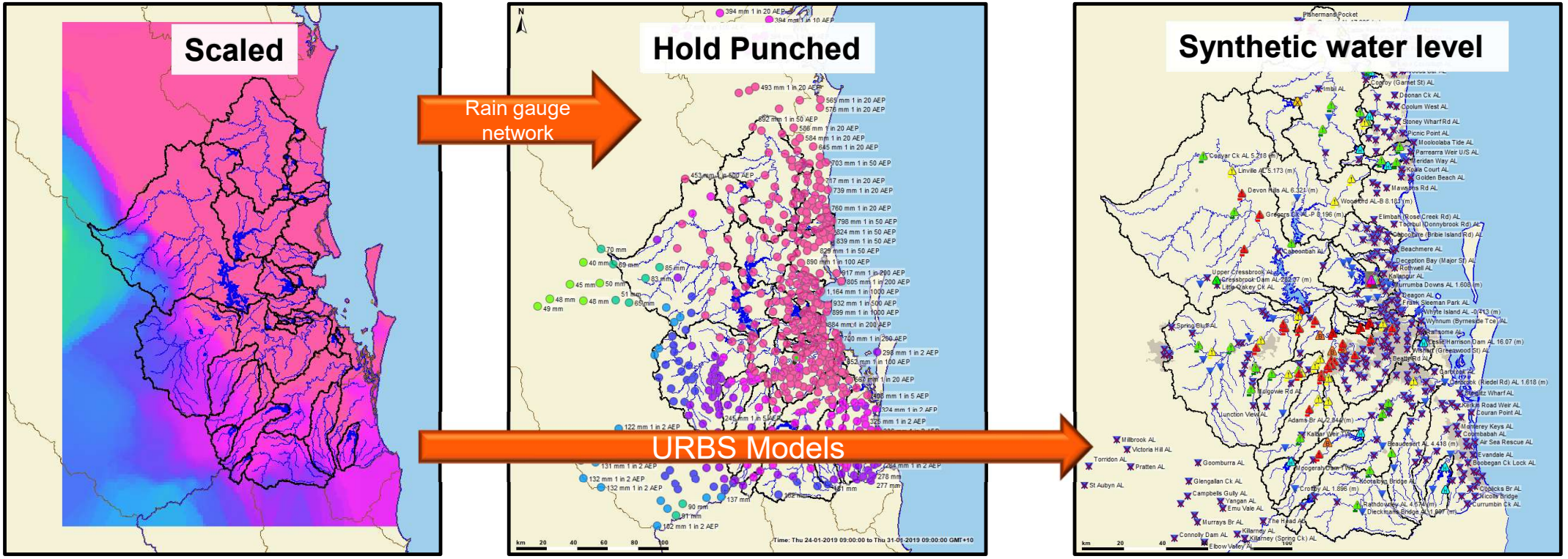
- Tweak rainfall input and model parameters to achieve the objectives
  - Dam Safety Strategy at WD
  - Gates clear of flow at NPD
  - A range of EAP notifications



Basin	Catchment	Original (mm)	Exercise (mm)	Difference (mm)
Brisbane River	Stanley	507	594	87
	Upper Brisbane	441	475	34
	Lockyer	266	263	-3
	Bremer	304	306	2
	Warrill	313	324	11
	Purga	399	402	3
	Lower Brisbane	501	563	62

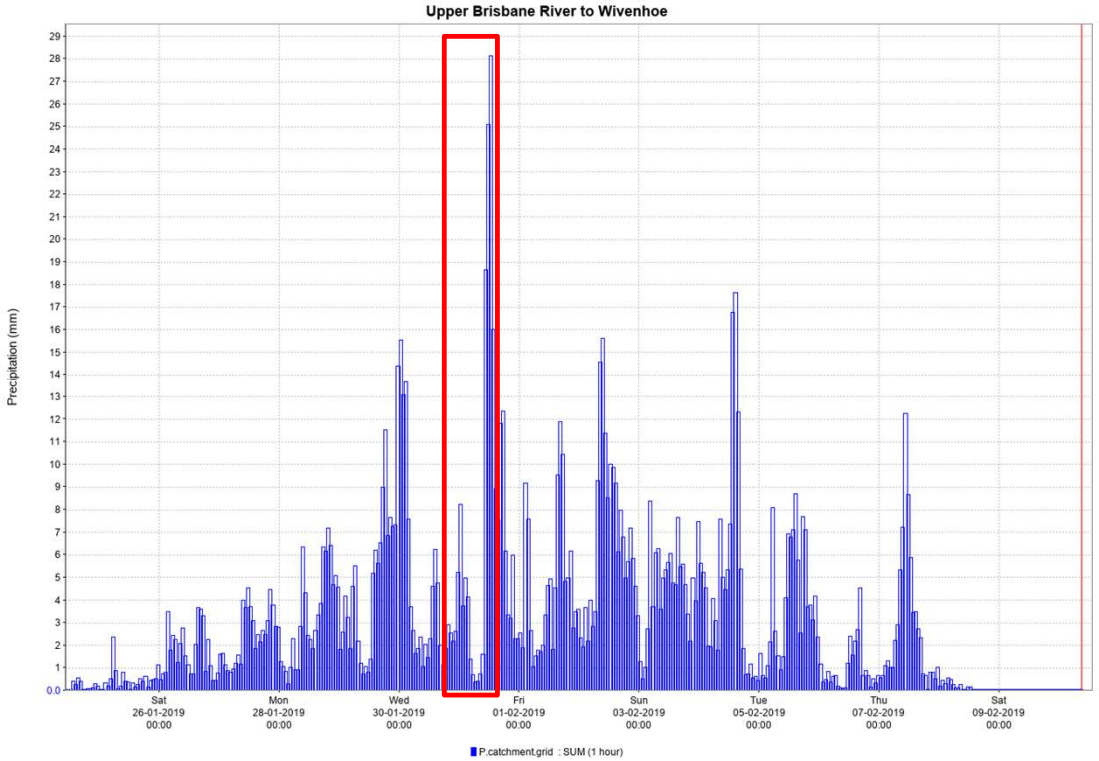
Synthetic rainfall and water level

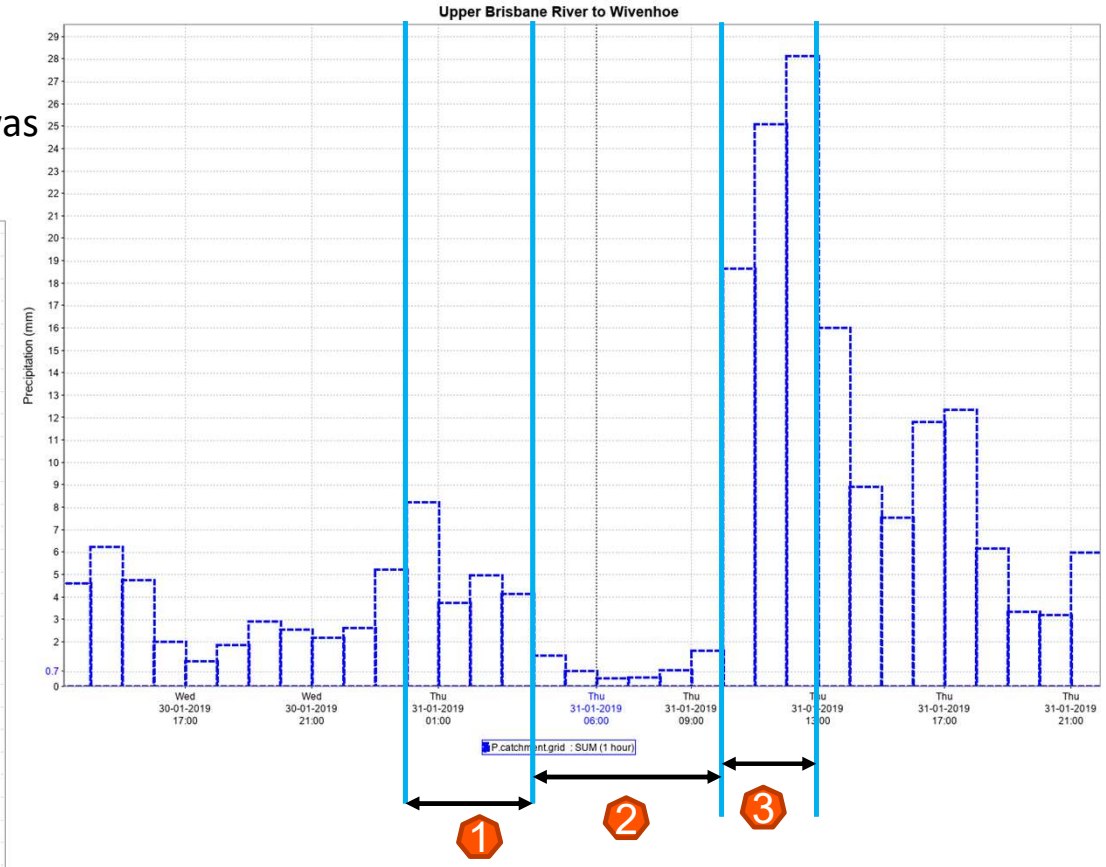
- Generate “observed” rainfall and water level data



Timing of key event triggers

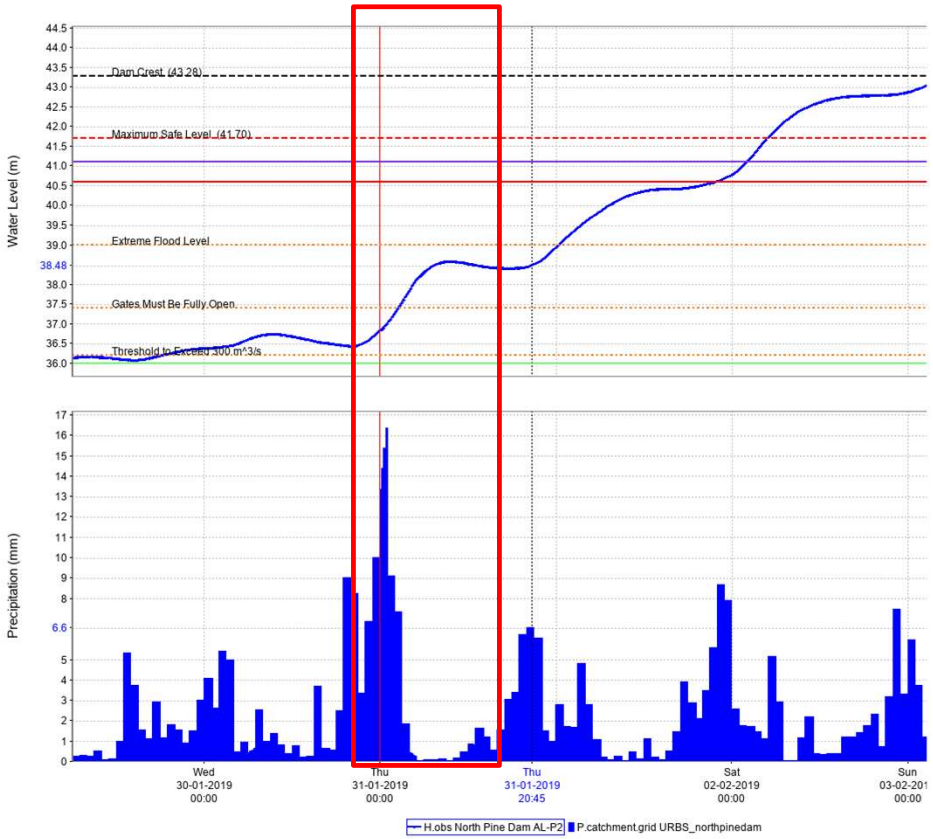
- Actual event was over 15 days
- Only have 7 hours to test people
- Unable to achieve everything in 7 hours, "*time jump*" was required

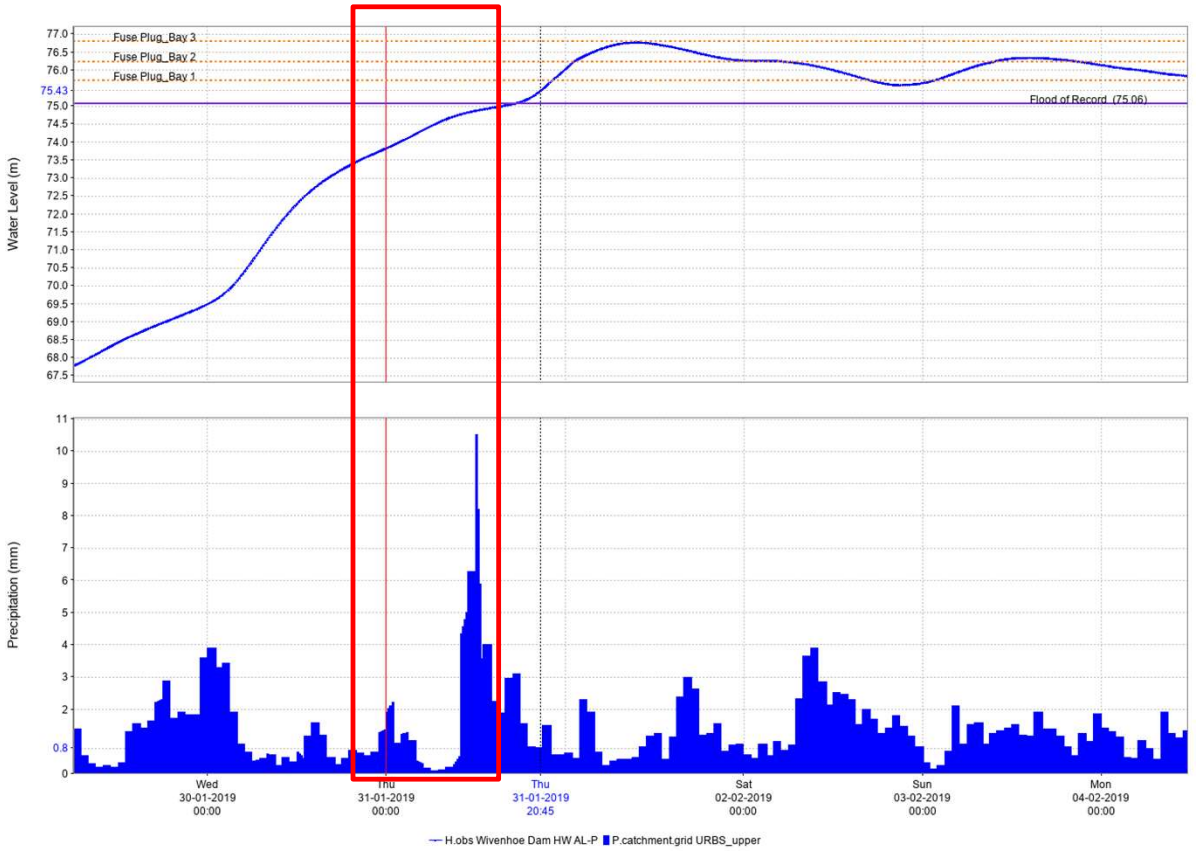




Timing of key event triggers – Gated Dams

- Separate major events at NPD and WD





Timing of key event triggers – Ungated Dams

- Emergency Action Plan notifications triggered through out the whole exercise period
- Initiate interactions with stakeholders

Additional Notification Notes:

Dam	Level	Description
Borumba	135.30	Impacts Crossing No. 6 – Bella Creek
Cedar Pocket	102.20	Impacts Road immediately downstream of the dam
Hinze	100.28	Flood of Record (as of 2011 - most recent dam upgrade)
	101.20	Dam overflow alone casuses a Minor Flood at Clearview
	104.00	Dam overflow alone causes a Major Flood at Clearview
Lake MacDonald	96.40	Impacts Lake MacDonald Drive
Sideling Creek	20.50	Release approx equiv to capacity of Young's Crossing

 # for situational awareness only. Not a formal EAP notification.

Bridge Threshold Crossings:

Bridge	Bridge Deck (m)	Current Level (m)	Current Flow (cumecs)
Colleges Crossing	2.67	-	4660.05
Burtons Bridge	4.80	-	4738.98
Kholo Bridge	4.82	-	5067.19
Mt Crosby Weir Bridge	12.35	-	4799.41
Fernvale Bridge	2000 (Flow Capacity)	Check model result (Lower Brisbane R)	
Youngs Crossing	2.66	-	2363.15
AJ Wyllie Bridge	1500 (Flow Capacity)	Check model result (Lower Pine R)	

Additional Links

Guide for Activation Level

Seqwater Dam Contacts

Bridge Closure Instructions

FEWS Generated Reports

Emergency Condition Level	ALERT			LEAN FORWARD		STAND UP		Water Level (m)		LDMGs		
Ungated Dams	First Overflow	Downstream Release Hazard	Additional Notification	Flood of Record	Additional Notification	Additional Notification	Dam Safety	Extrapolated data is used in this column. Blank space indicates no readings for the last 6 hours.	Trending indicator.			
Cedar Pocket Dam	101.07	101.37	102.20	102.90			104.50	101.22		GRC		
Lake MacDonald Dam	95.32	95.52	96.40	96.50*	97.29 #(FoR)		98.00	96.79		NSC	GRC	
Borumba Dam	135.01	135.11	135.30	141.02			143.50	135.77		GRC		
Baroon Pocket Dam	217.00	217.20		219.62			221.50	218.76		GRC	SCRC	
Cooloolabin Dam	293.00	293.90		296.48			296.60	293.93		SCRC		
Poona Dam	152.70	152.90		152.96			153.50	152.75		SCRC		
Wappa Dam	44.81	45.01		46.42			48.00	45.64		SCRC		
Ewen Maddock Dam	25.38	25.58		26.64			27.50	26.23		SCRC		
Sideling Creek Dam	20.37	20.50	20.50	21.79			23.00	23.38		BCC	MBRC	
Atkinson Dam	65.72	65.92		66.14			67.50	63.92		BCC	LVRC	SRC
Clarendon Dam	96.00	96.05		96.12			96.30	93.12		BCC	LVRC	SRC
Bill Gunn Dam	110.00	110.50		110.65			111.00	110.00		BCC	LVRC	SRC
Moogerah Dam	154.81	155.01		158.64			159.50	154.48		ICC	SRRC	
Lake Manchester	50.90	51.10		53.22			57.00	52.98		BCC	ICC	
Enoggera Dam	74.40	74.67		78.89			82.50	80.42		BCC		
Gold Creek Dam	92.75	92.90		96.56			99.00	96.36		BCC		
Leslie Harrison Dam	15.24	15.50		18.62			21.00	18.04		BCC	RCC	
Wyaralong Dam	63.60	63.70		65.33			69.00	64.80		LCC	SRRC	
Maroon Dam	207.14^	207.14		210.04			216.50	203.56		LCC	SRRC	
Bromelton Dam	44.50	44.80		44.53			45.00			LCC	SRRC	
Nindooinbah Dam	119.80	122.20		123.00			123.50	118.69		SRRC		
Little Nerang Dam	168.02	168.22		171.74			172.00	169.02		GCC		
Hinze Dam	94.50	94.80		100.28	101.20	104.00	106.00	94.82		GCC		

Exercise preparation

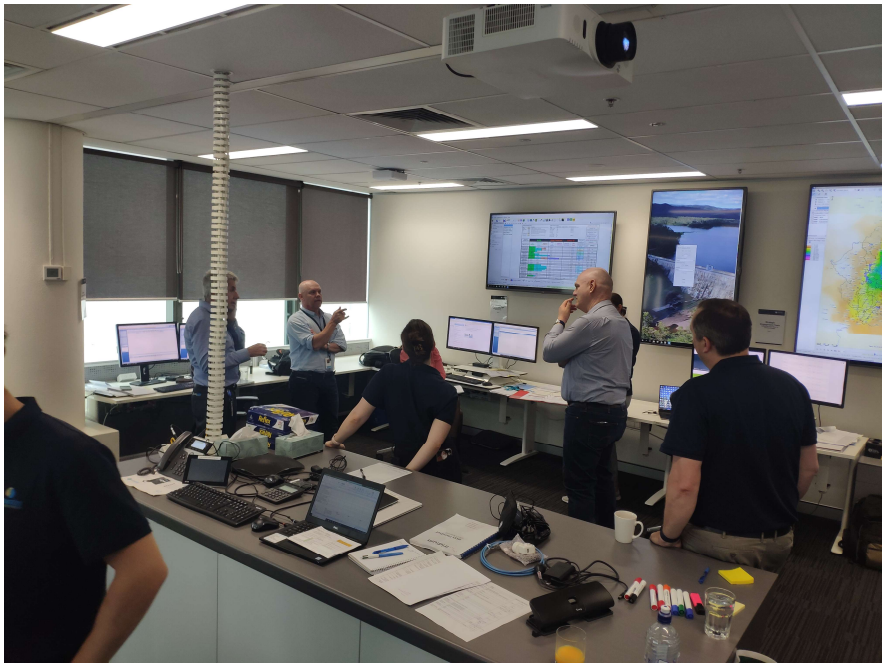
- Developing an exercise run sheet that aligns with rainfall timing
  - Determine exercise “rhythm”
  - Try to simulate reality as much as possible
- Document preparation
  - Introduction package:
    - weather briefing
    - current status of flood event
    - handover from the previous shift
  - Incomplete check lists from the previous shift
  - Last gate operation directives and situation report
  - Last talking points issued by the communications team to stakeholders
  - Technical presentation
  - Debriefing presentation

Exercise preparation

- Developing the stories to align with training goals
  - Role play Emergency Action Plan notifications to simulate real life conversations with Dam Safety Regulator and disaster management agencies
  - Creating questions using Microsoft Forms to initiate team members to dig deep into the system and other resources
    - Questions were worded to simulate information requests from a range of stakeholders
    - Participants could answer the questions by themselves or as a group
    - Resources needed to answer the questions included Delft-FEWS, the Flood Manuals, Emergency Action Plans and contact lists
    - Questions were developed to practice explaining Flood Operations concepts to a range of stakeholders
  - Work together with the Communication Team to develop real life questions
    - State Disaster Coordination Centre representation and Media questions

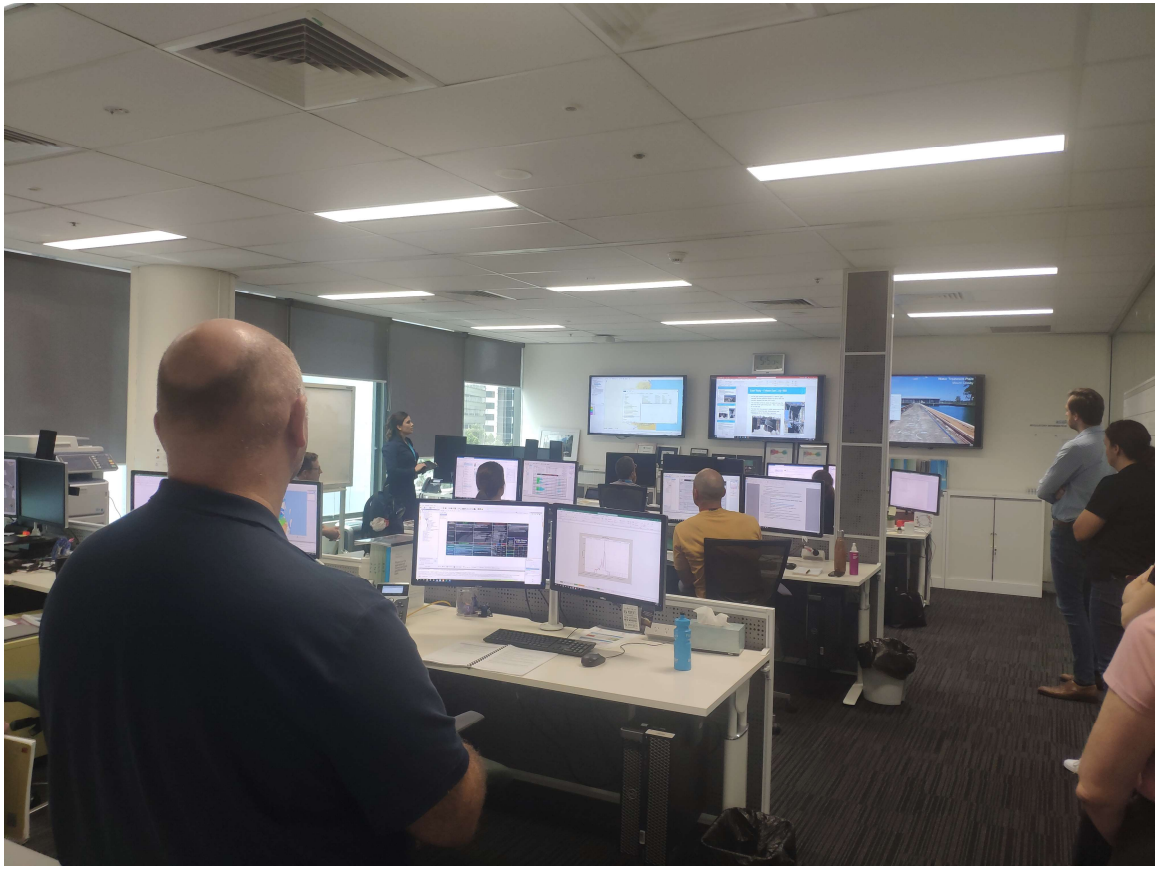
Exercise Format

- **Format**
  - 1 SFOE, 1 FOE, 3 FO, 2 Comms
  - Exercise facilitator, support and **subject matter experts**
  - 4 sessions
  - 7 hours no break
  - Dam operators and other stakeholders



Exercise

- **In-person interaction**
  - One on one conversation amongst team members regarding stakeholder notifications
  - Technical presentation covering radial gate failure mechanism including a case study
  - Conversation with the dam operators about lifting gates clear of flow
  - Getting external observers involved
  - Attempted to exercise with SDCC on Emergency Alert test issuance



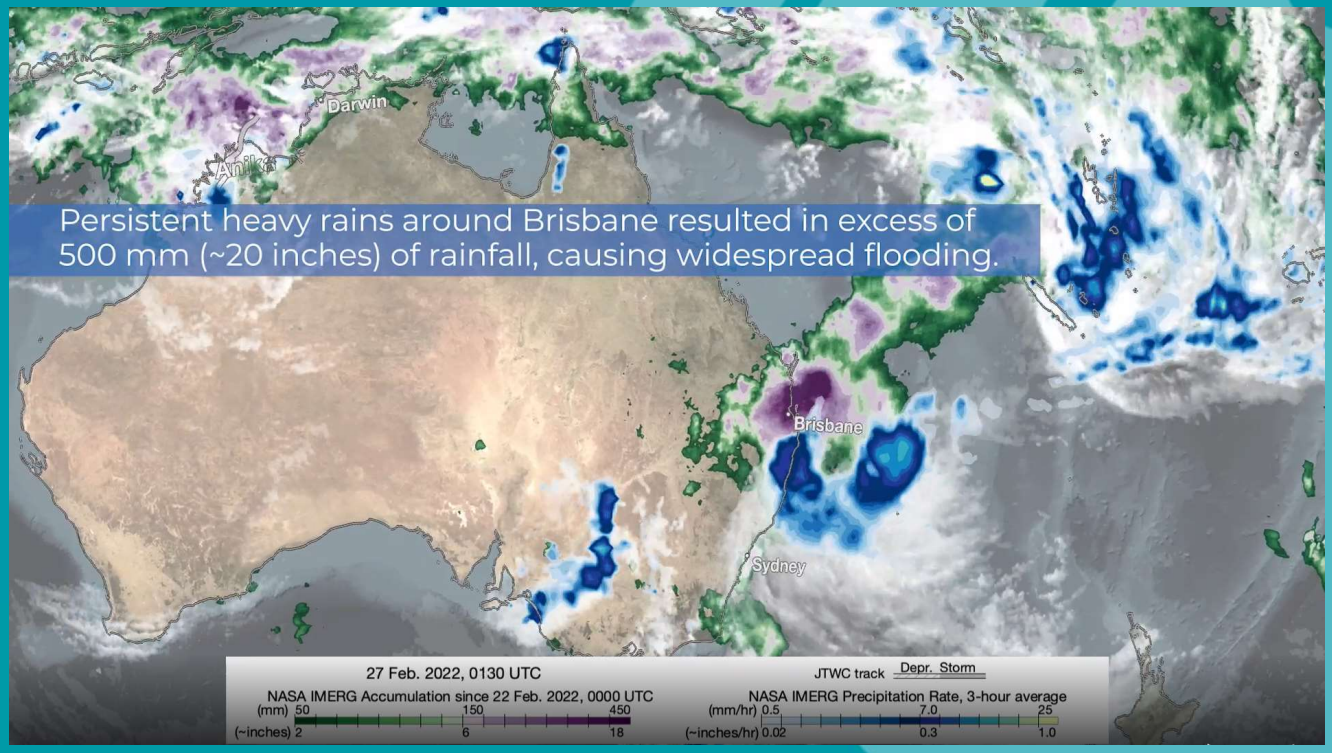
Exercise conclusion

- Comparing to the previous exercise
  - Based on real event and “real forecast”
  - Start in the middle of a flood event
  - Missing some mobilisation tasks
  - One-on-one interaction between exercise facilitators and participants

- Learnings and feedback
  - Improvements and corrective actions for the FFS Flood Forecasting System?
  - Great feedback on the exercise set up → busy but useful
  - Questions about the new Flood Manuals

- Suggestion
  - Exercising over a longer event period instead repeating a selected period

From Exercise to Reality



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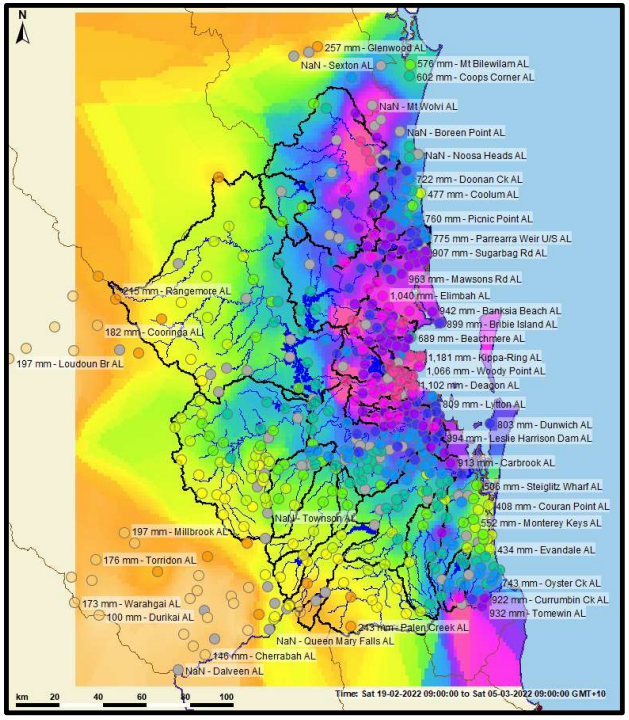
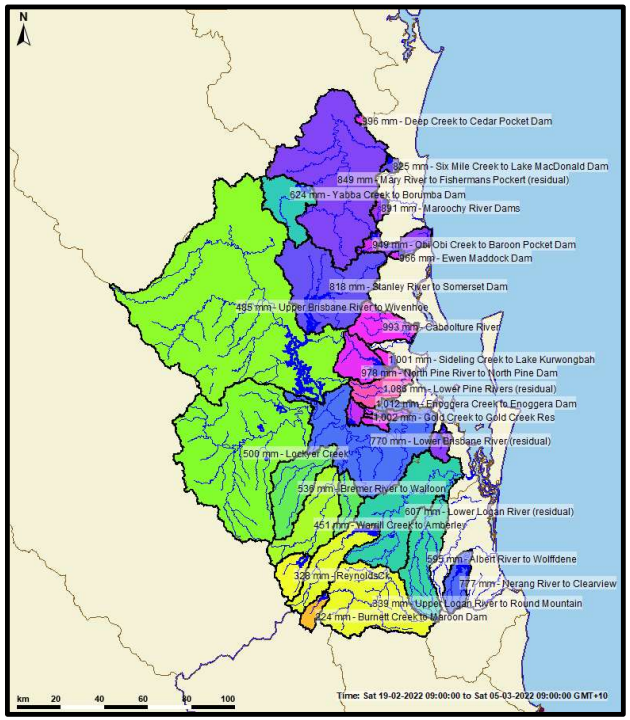
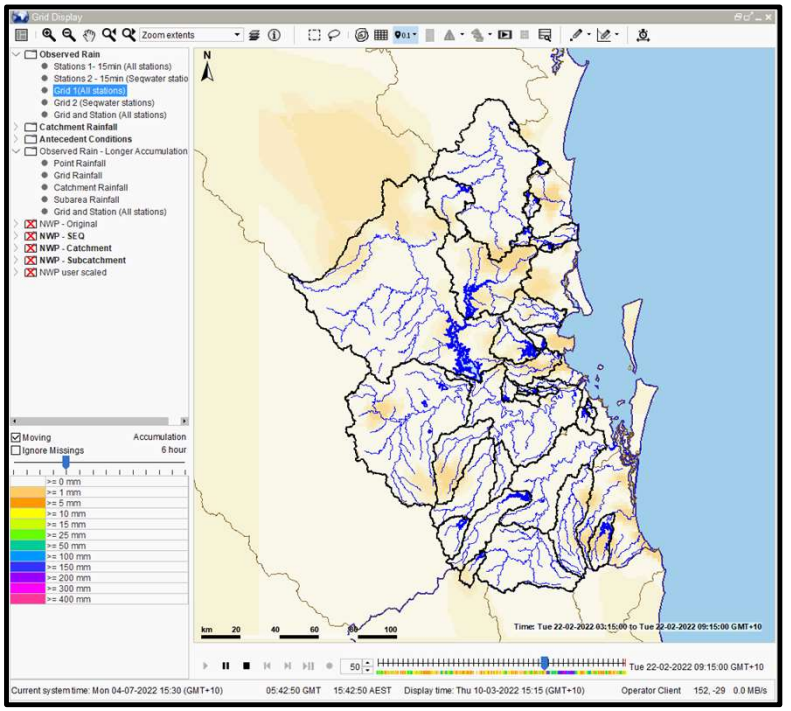
Ref: https://svs.gsfc.nasa.gov/14113

From Exercise to reality - Rainfall

- Three months later the team experienced the largest event since they joined the team
  - Rainfall

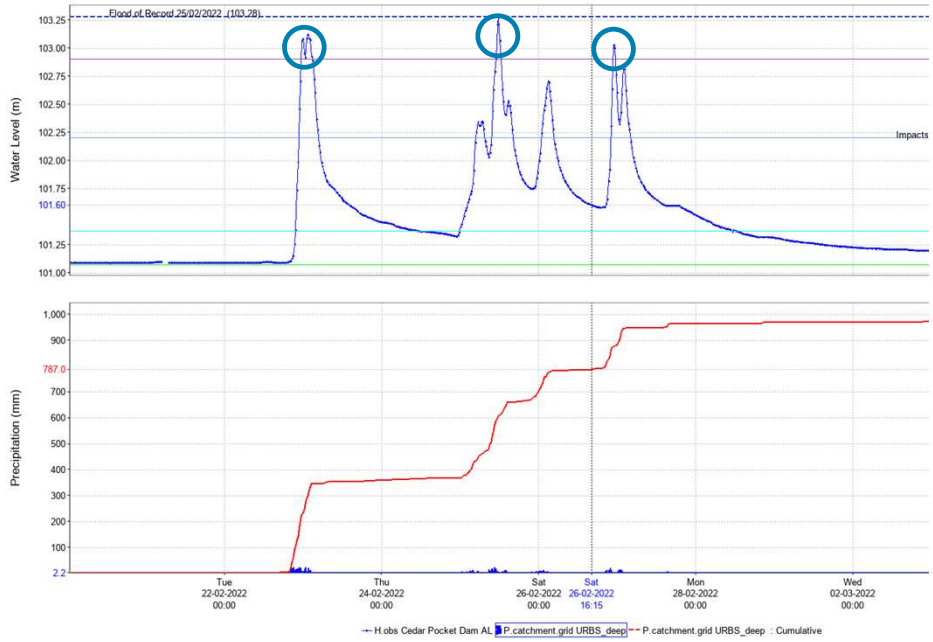


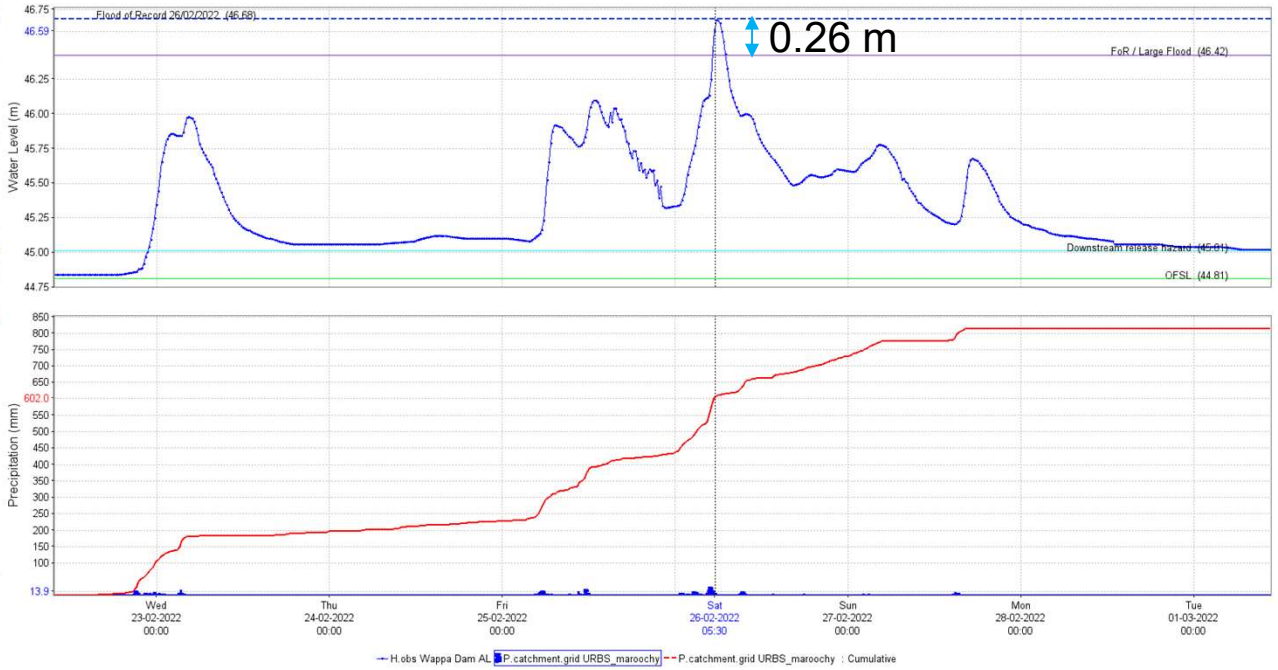




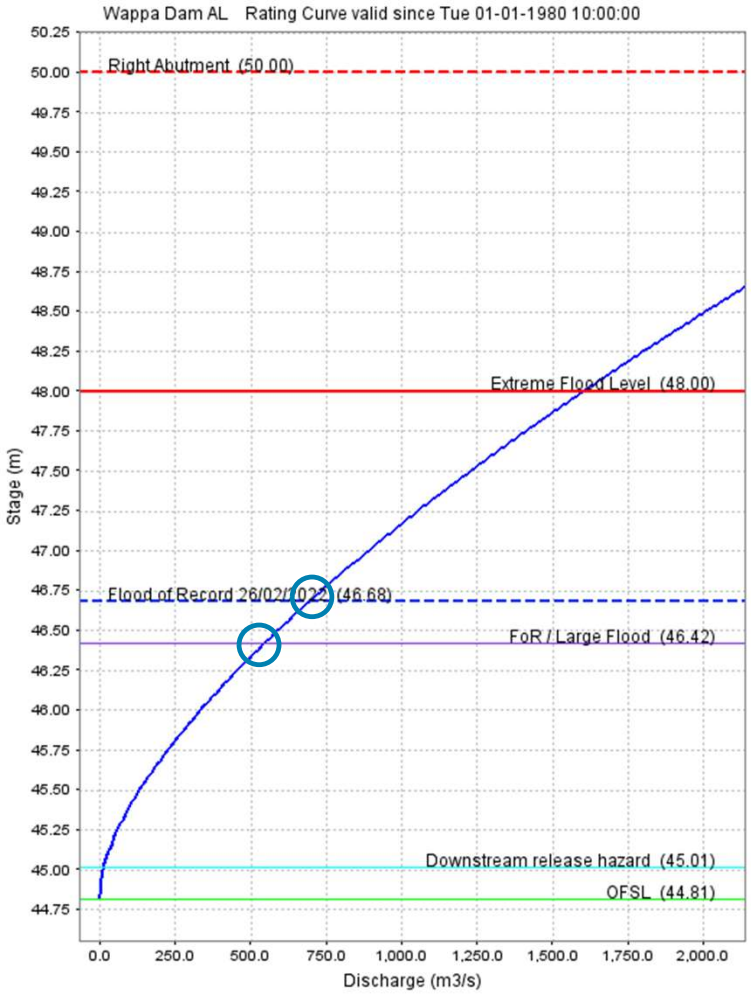
From Exercise to Reality - Ungated dams

- Three months later the team experienced the largest event since they joined the team
  - 10 ungated dams reached Flood of Record in the space of 3 days





From Exercise to Reality - Ungated dams



From Exercise to Reality - Gated dams

- **North Pine Dam**
  - First time lift gates clear of flow and move gates back into flow
  - Discussion with the operator during the exercise was useful to help to recap the key focus points
    - Potential hazards for operators safety in heavy rainfall
    - Refraction distorting interpretation to estimate depth of gate in the water
    - What to do after lift gate clear of water
    - Hydraulic impacts such as listen for noises, feel for vibration and look for turbulence

From Exercise to Reality - Gated dams

- Somerset Dam

From Exercise to Reality - Gated dams

- Wivenhoe Dam

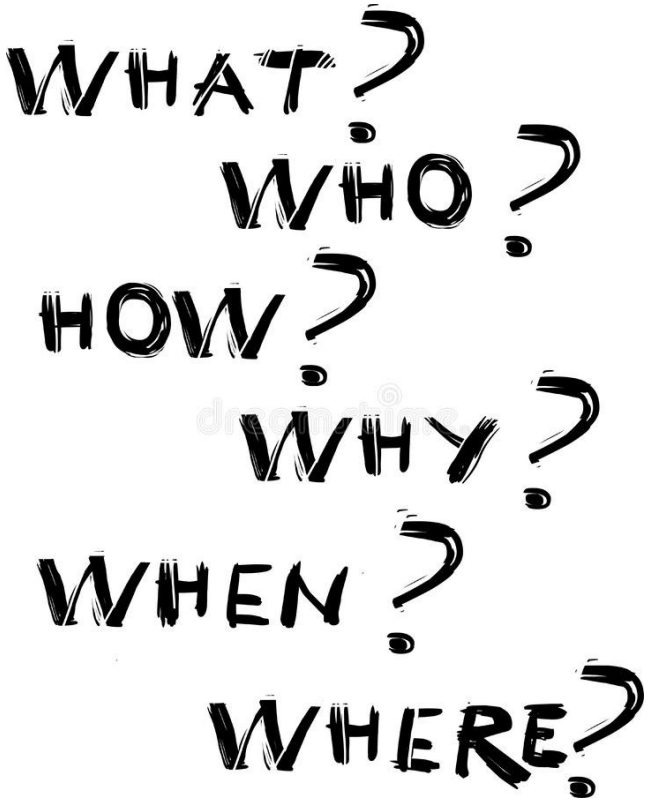
From Exercise to Reality – Notification and communication

- Lots of Emergency Action Plan notifications
- Large number of internal and external enquiries
- Dam related but not Flood Operations Centre related incidents and enquiries
- First dam operations at Wivenhoe Dam since 2015
- “Rain bomb” → Social media bomb

From Exercise to Reality- Human factors

- "*You walk out the exercise and it is done. With this event you come back and do again the next day.*"
  - Sustained period of real-time high pressure response is not something can be simulated in a one-day exercise.
  - Experience in real event is still different to exercise.
  - Post event recovery.

- When it rains / floods, everyone is more demanding on information.

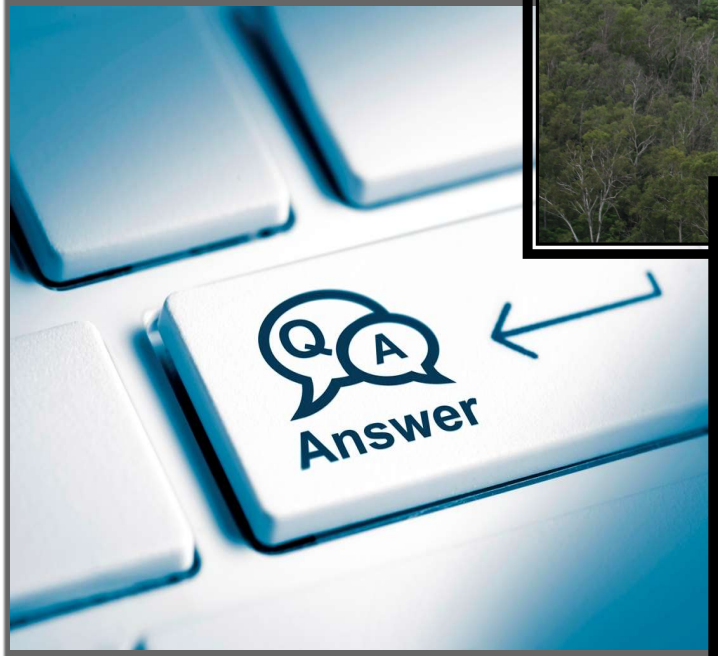


From Exercise to Reality – Why

- **Feedback from government agency stakeholder on Seqwater event report:**

"To perform well during an event requires preparation and planning, often years in the making. It's not just a weekend effort"

- 14 flood events from December 2021 to July 2022 do not replace the annual flood exercise.



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