

Predictive & Operational Catchment Modelling

Is New Zealand Ready?

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Background – Live Operational Modelling

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New Zealand Data Feeds

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Questions



<https://www.abc.net.au/news/2021-04-08/bureau-of-meteorology-predicting-extreme-weather/100045916>

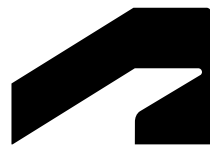
as 05/06/16 21:24UTC 000.5e1 512km 17



Light

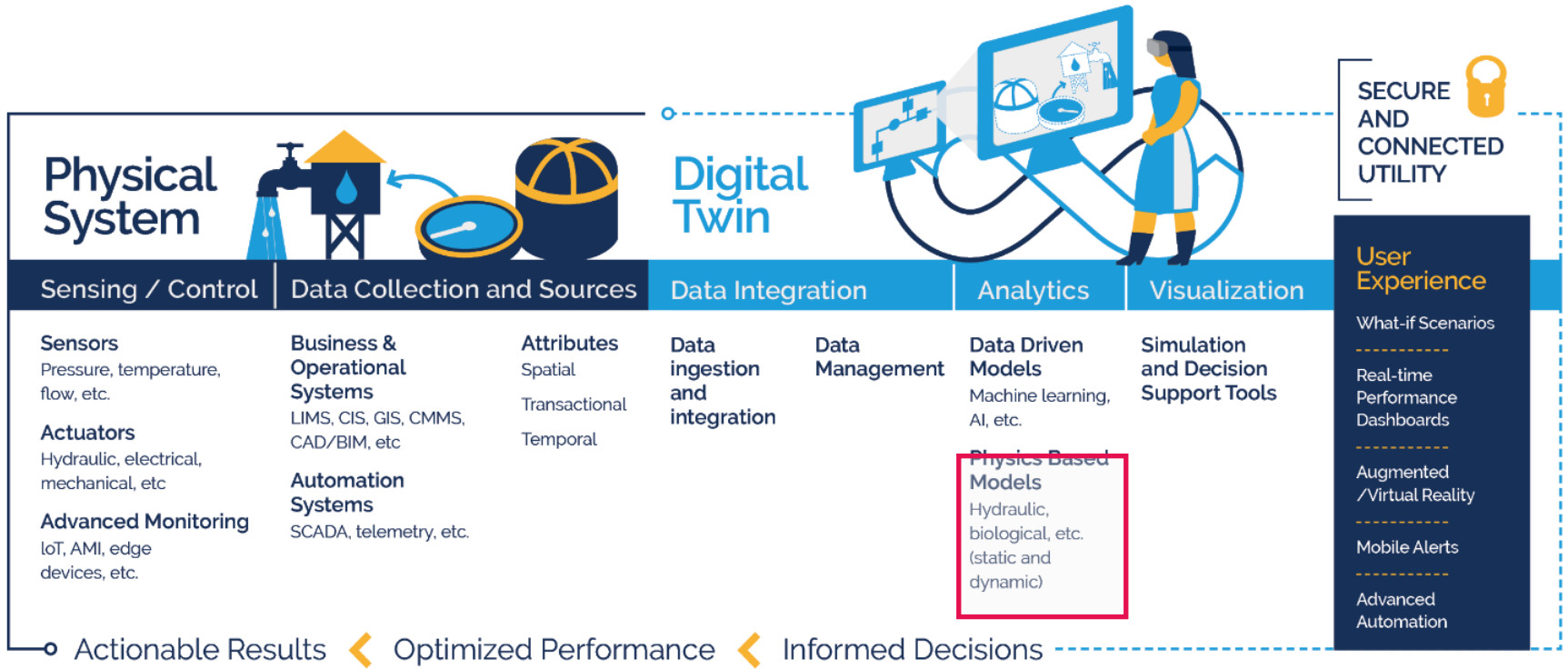
Moderate

Heavy



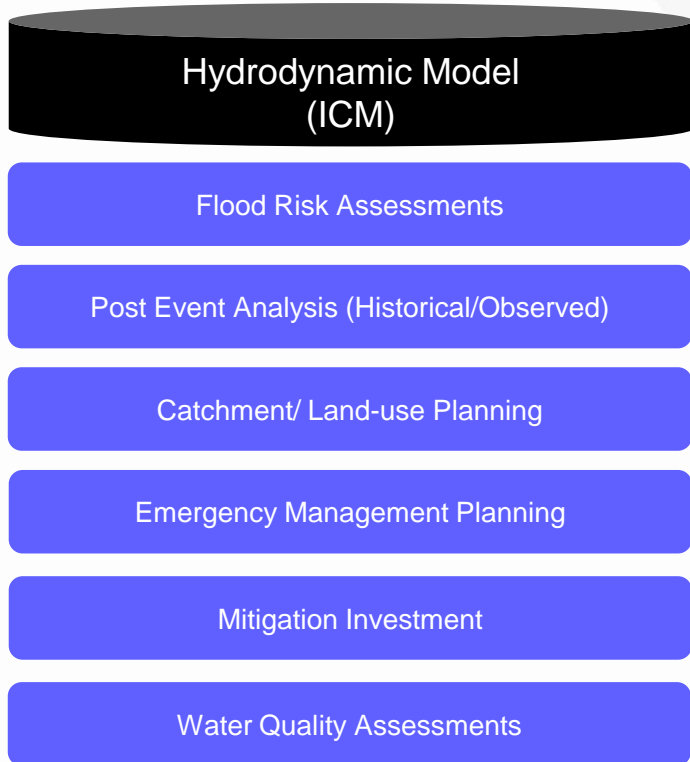
Background – Live Operational Modelling

SWAN Digital Twin Architecture

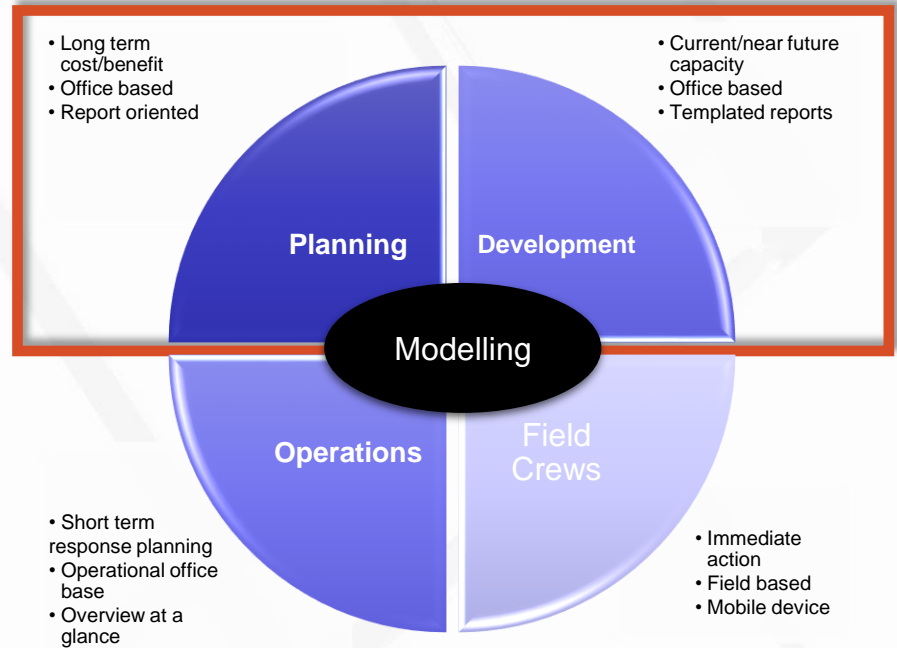


How do we typically use Physics Based Models?

Current Uses Of A Hydrodynamic Model



Hydrodynamic Modelling Expectations



Why do operational modelling & forecasting?

**Live
operational
modelling
provides:**

- TIME
- Real-time & forecasted knowledge of network activity
- Decision-making support
- Automated alert & warning systems



To utilise the power of the digitised representation of the network assets in reality



What are the Modes of Operation?

Data driven decisions to:

- Prevent flooding
- Prevent pollution
- Protect the environment
- Preserve life



Send out alerts



Repair pumps



Send out crews



Tankering



Avoid spills



Keep crews safe



Temporary pumps



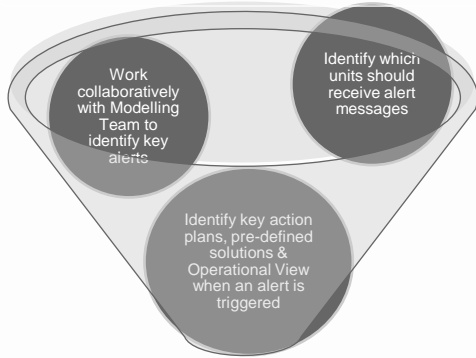
Reroute flows



Plan repairs

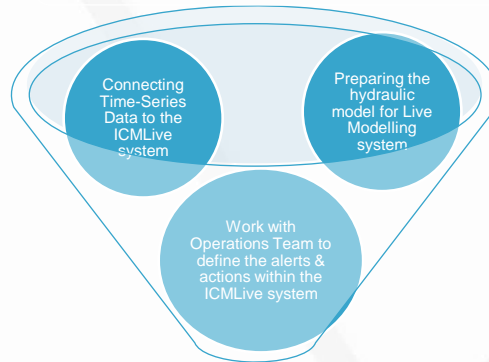
Who are the Key Stakeholders for Live Operational Modelling?

Operations Management



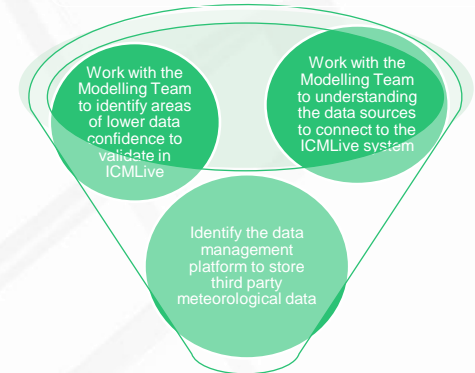
Operations Team ready for Live Operational Modelling

Hydraulic Modelling

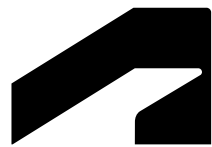


Hydraulic Modelling Team ready for Live Operational Modelling

Data Management



Data Team ready for Live Operational Modelling



ICMLive

What is InfoWorks ICMLive?

Monitoring system

- How much rainfall yesterday?
- Any overflows yesterday?

Management system

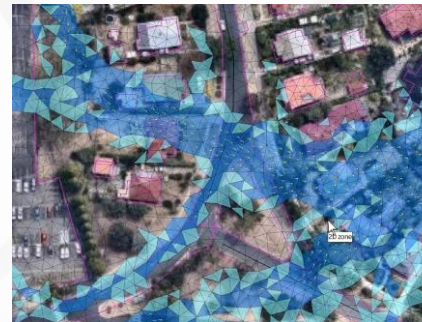
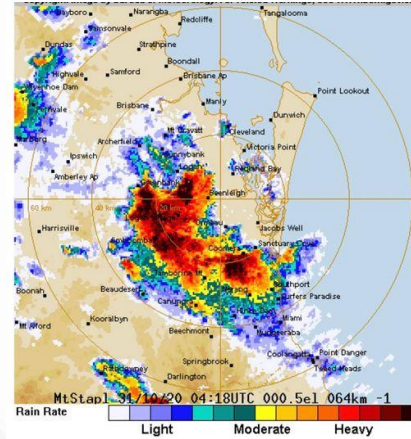
- Centralised system with all sensor data and latest models

Forecasting system

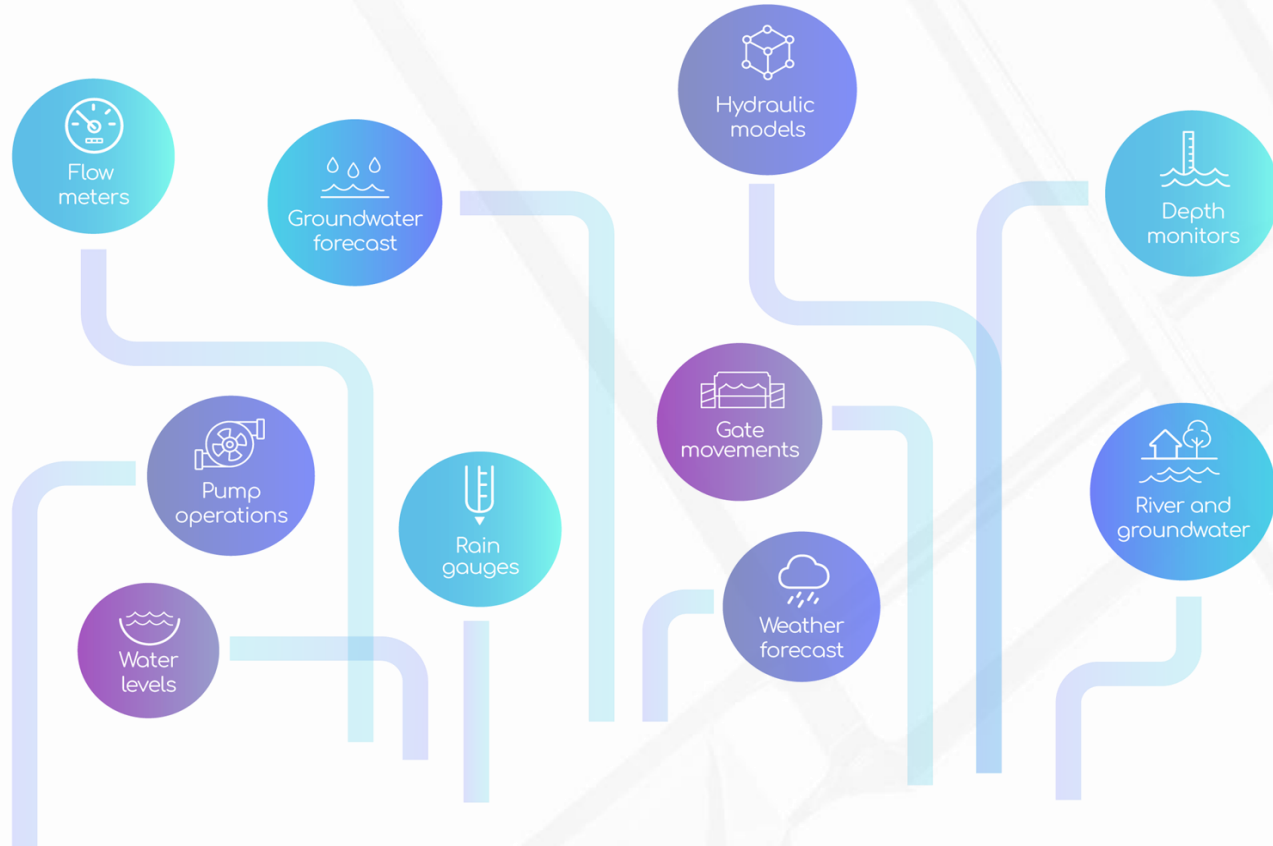
- How much rain are we getting?
- Which road will flood in the coming storm?

Early warning system (EWS)

- Alerts on emerging risks, expected timing, magnitude, and likely impact.



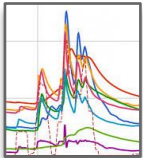
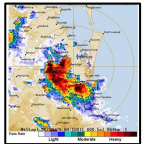
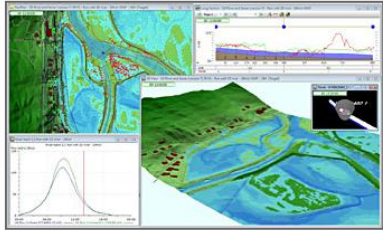
How is it configured?



Real-Time Modeling System



InfoWorks ICM



Real-Time Data

- Rain gauges
- Radar
- Flow meters
- Water levels
- Telemetry



- ✓ A System that runs continuously
- ✓ Harvests, checks and screens live data
- ✓ Forecasts whole system at regular intervals



Notification System

Text, email, HTML

Operational Forecasting



Using the Past, Present & Future to understand predictions

Hindcast:

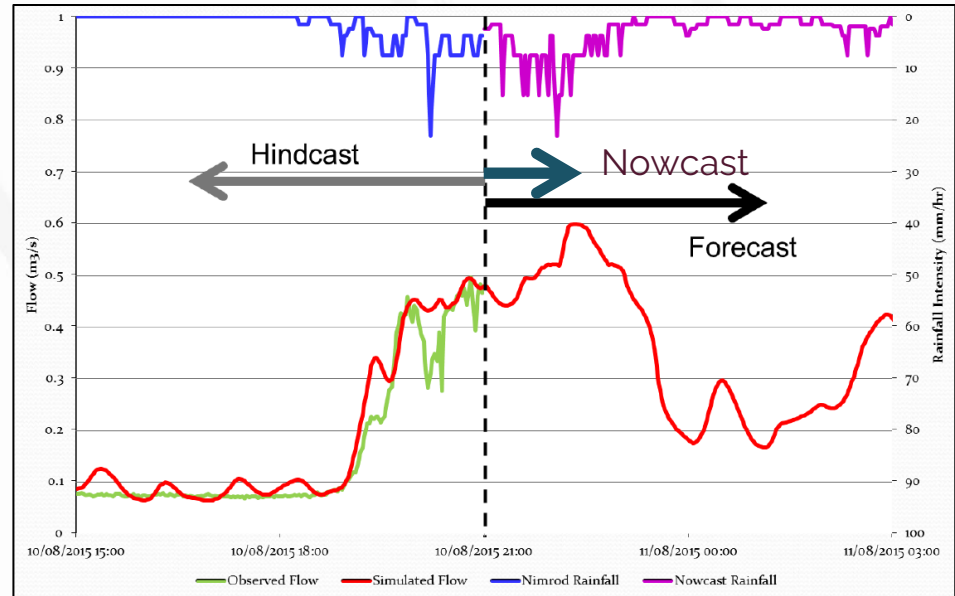
- Observations from recent observed data;
- Confidence in observed data 'usually' well understood.

Nowcast:

- Predictions of the present & very near future;
- Reasonable confidence in predicted data.

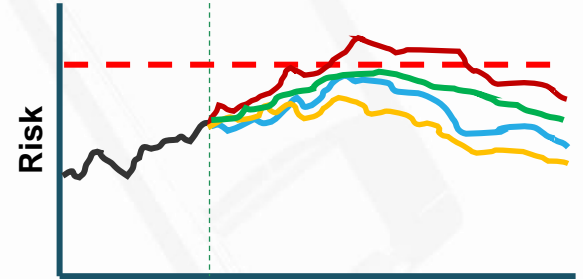
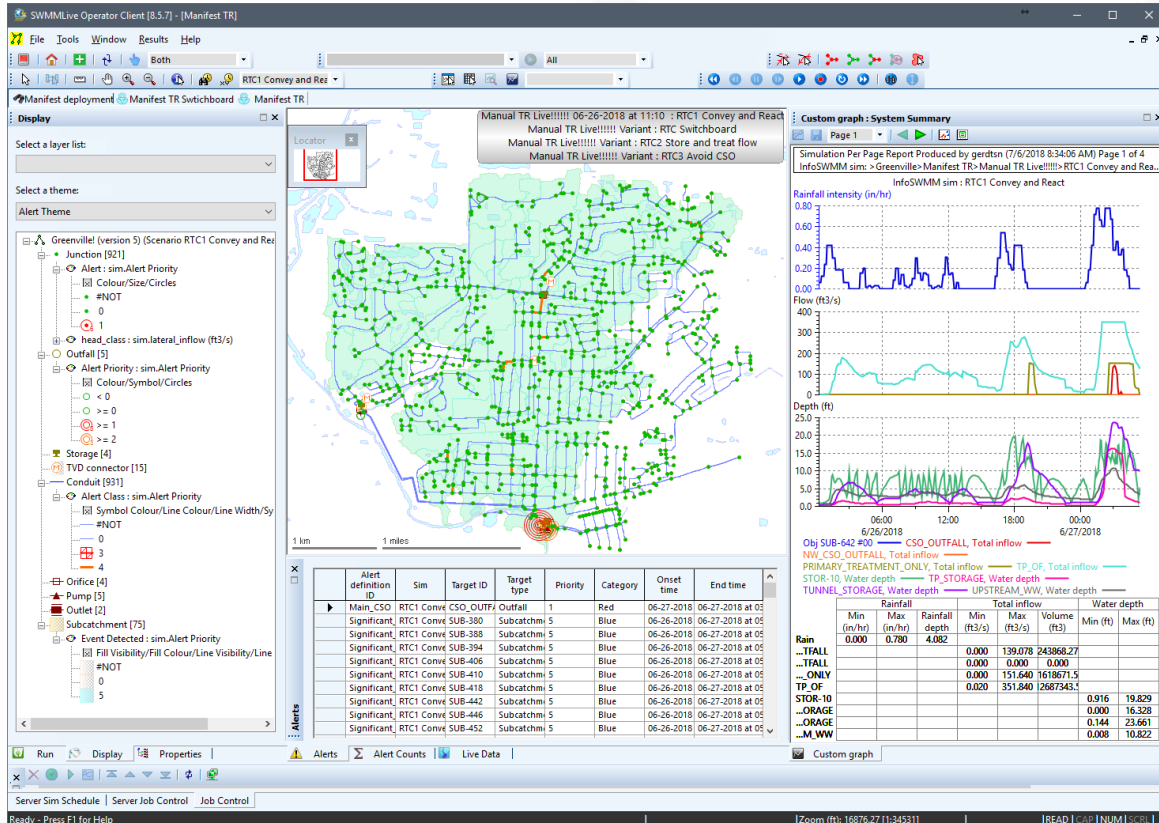
Forecast:

- Predictions of longer timescales;
- Lower confidence in predicted data.

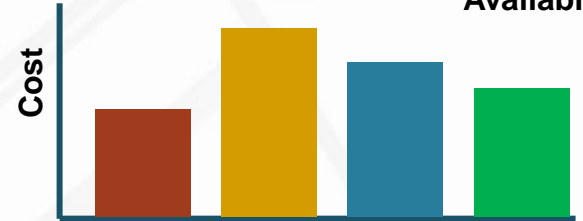


Evaluate Future Operations

Automate many scenarios in the forecast



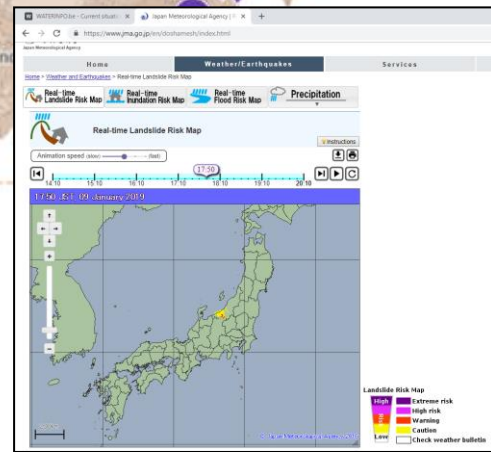
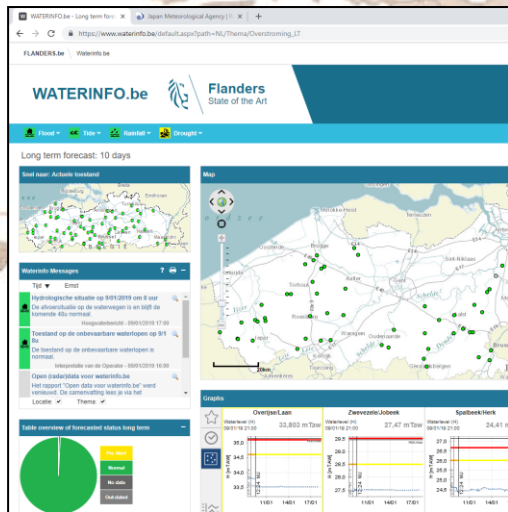
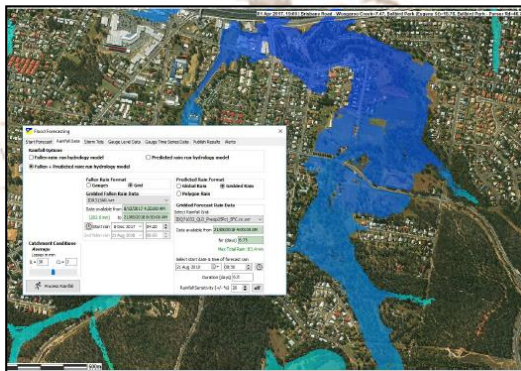
Test out AI Solutions if Available

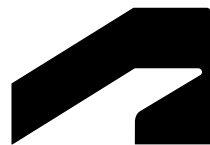




Case Studies

Predictive Operational Models – Global Adoption





South East Water (SEW)

South East Water



About South East Water:

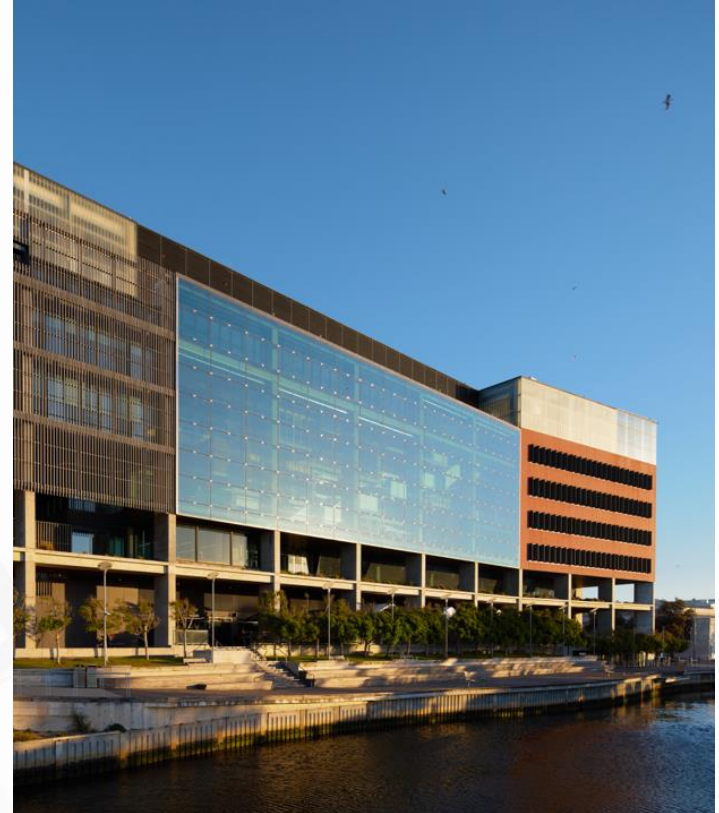
- 1.83M customers in Melbourne's South East suburbs
- Sewer network – 10,995+ kms sewer pipework, 273 pump stations, ~310ML/d transferred

Objectives:

- Advanced warning & mitigation of spills
- Identify pump failure & impact on the network
- Warning of potential blockage
- Increased reliability & accuracy of network planning models

Autodesk Product Used:

- InfoWorks ICM and ICMLive



South East Water – Catchment Based Monitoring

ICMLive Implementation Elster Creek

- 25,000 customers
- Historically was subject to uncontrolled spills during wet weather
- Lots of Blokaidis to incorporate data into the model
- Base model maturity level was suitable





Tasmanian State Emergency Service (SES TAS)

Tasmanian Flood Map Project



The screenshot shows the top navigation bar of the SES website. On the left is the SES logo. To its right are links for 'About', 'Volunteering', and 'Kids'. A search icon is positioned to the right of these links. Further right, a statistics box displays 'Floods & storms 132 500' and 'Life threatening emergencies Triple Zero (000)'. Below the navigation is a large hero image of SES rescue workers in orange gear. The main heading is 'Flood Risk Management'. Below this is a breadcrumb trail: 'Home > About > Risk Management > Flood Risk Management'. A left-hand menu contains links for 'About', 'Contact Us', 'Get involved', 'Risk Management', and 'Flood Risk Management'. The main content area contains text about flooding as a natural process and a link to 'The Floodplain Risk Assessment Guidelines for Municipal Councils in Tasmania'.

\$3 million, 3-year project since October 2018. Funded by the Australian and Tasmanian governments

Ensure that most will have access to a high-res digital terrain model through the collection of light detection and ranging (LiDAR)

Develop the Tasmanian Flood Map to support a flood risk assessment, and the development of land use planning and building controls

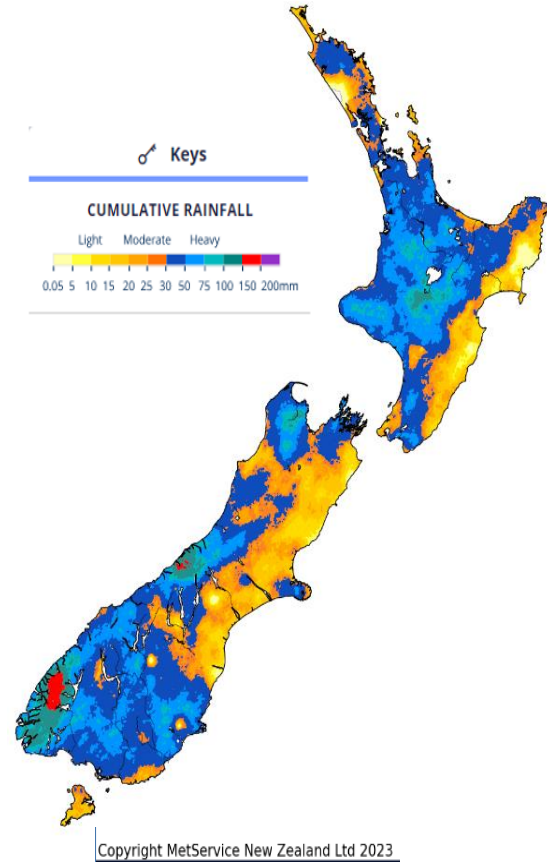
Partner with local governments to undertake detailed flood studies and evacuation planning for the communities most at risk of flooding

<https://www.ses.tas.gov.au/about/risk-management/flood-risk-management/>

<https://www.innovyze.com/en-us/blog/scaling-smart-water-technology-for-one-of-the-biggest-flood-mapping-projects-in-australia>

Summary: Is NZ ready?

- Calibrated model
- Rainfall data
- Private radar
- Any existing flood models?



A close-up, low-angle view of a modern, metallic staircase. The stairs are made of polished, reflective metal, likely chrome or stainless steel, with a white wall in the background. The perspective is from below, looking up at the steps, which creates a sense of height and architectural detail. The lighting is bright, highlighting the sharp edges and reflective surfaces of the metal.

Questions



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