

A Smart Wastewater Network

Smart Infrastructure from
Mott MacDonald



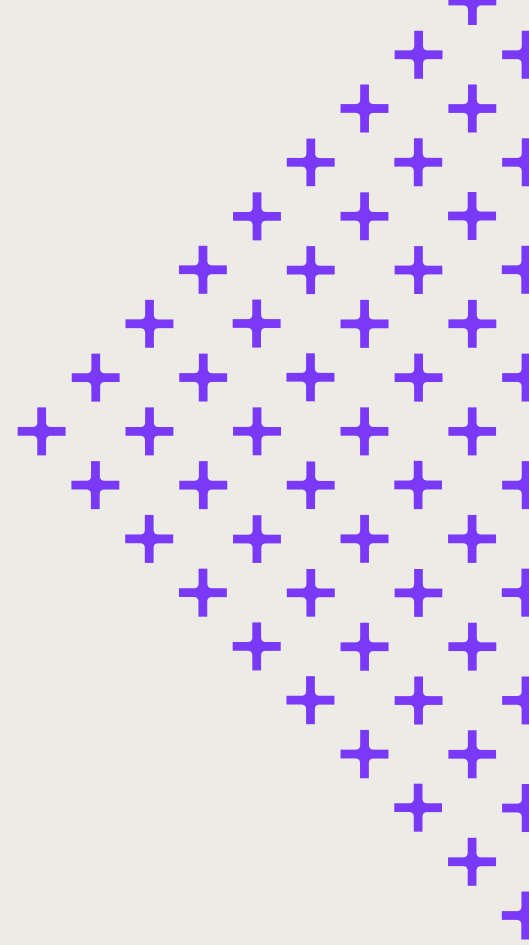
SMART
INFRASTRUCTURE

Christchurch
needed a
smarter network
operating in
real time

Overflow monitoring before 2017

Before 2000 Christchurch monitored overflows with sand on a weir. This was **labour intensive** and **low data return**

In the early 2000s they installed thin plate weirs and measured depth in the manhole, enabling **alerts** and **continuous data**





Thin Plate Weirs

Measuring depth, this offered a **continuous dataset**, alarming and overflow volume computation

but

Increasing river depth and the installation of non-return valves changed core assumptions. Overflow volume became **inaccurate**

**Expanding the
monitoring network
in 2017 Innovation
was required**

Accuracy in all operating conditions

Single sensor



Sensors measuring many aspects

Isolated data



Interconnected data

Simple data



Broader view of site status

Upgraded Network

Depth/Velocity in the overflow pipe

Ultrasonic depth facing down

Capacitance depth

All used for **validation of overflows**

Sites are connected to two data networks for reliability





A more robust monitoring solution



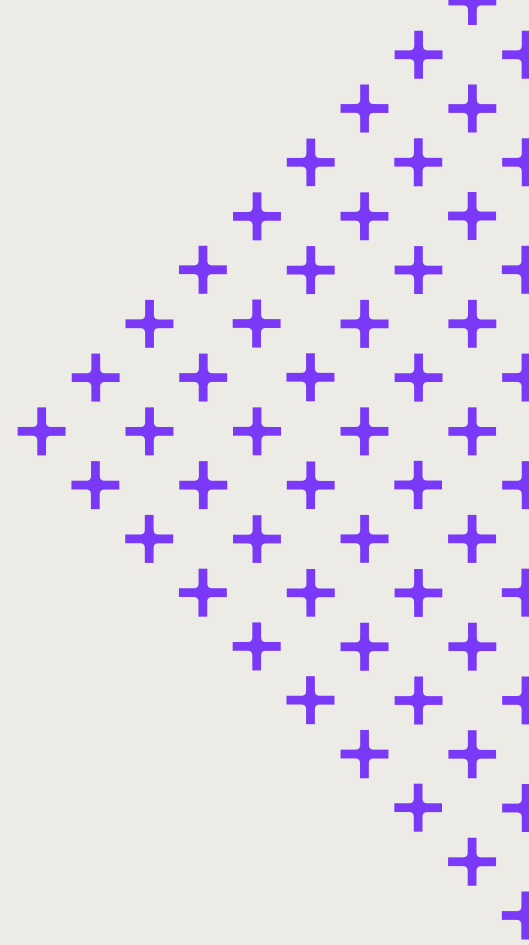
The background image shows a construction site with several concrete pillars and rebar structures partially submerged in water. The scene is set against a clear blue sky with some light clouds. In the distance, there are trees and a building. A purple semi-transparent rectangle is overlaid on the center of the image, containing the text.

**Data collection is just
the start**

Smarter Infrastructure

Moata is Mott MacDonald's digital twin platform

It connects the physical world with our digital expertise



What did we upgrade?

Assured Accuracy

1.

High Availability

Multiple data networks
Monitor all data sources

2.

Timely data

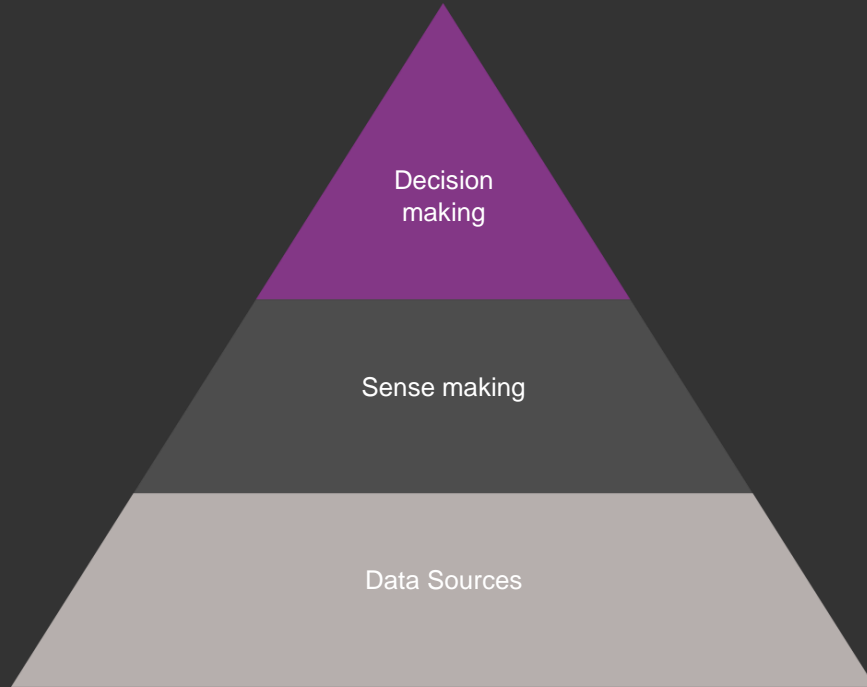
Mains power for least lag
Remove bottlenecks

3.

Reliable Alarms

Alarms drive Operational
decisions

Methodology



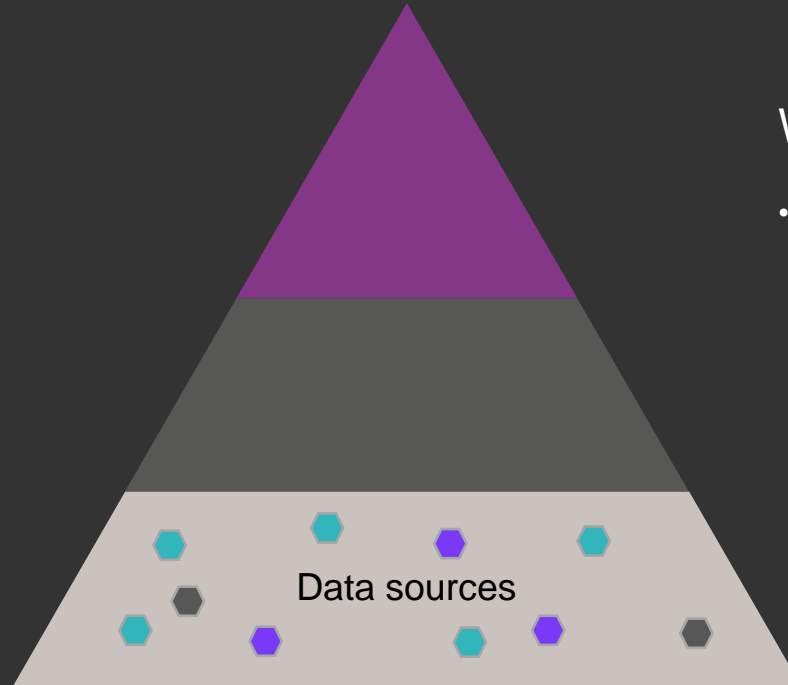
Data Sources

IoT

- Depth/Flow Gauges
- Rain Gauges

Web APIs

- River level



Sense Making

Analytics

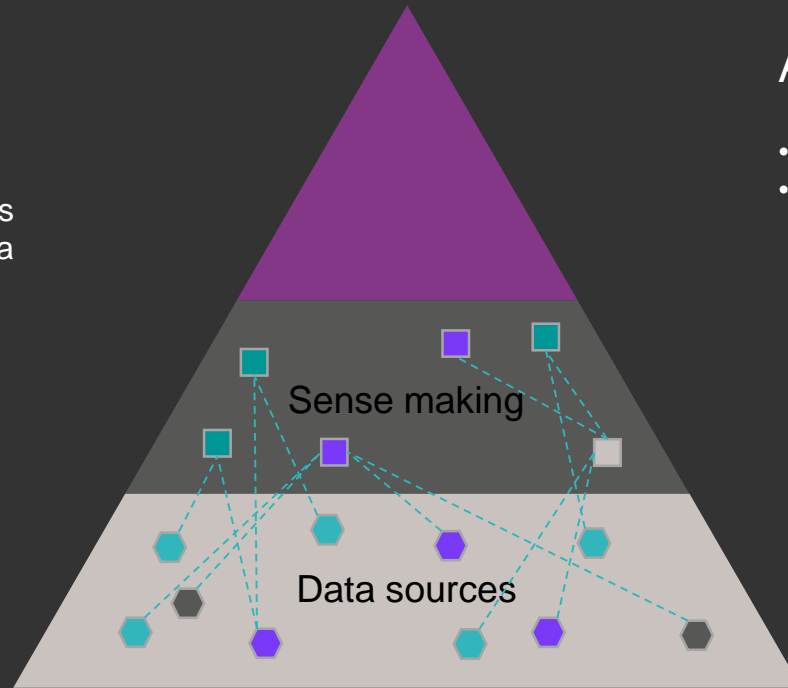
- Overflow volumes
- Timing every data point

Alarming

- Early warning for ops
- Overflow notifications

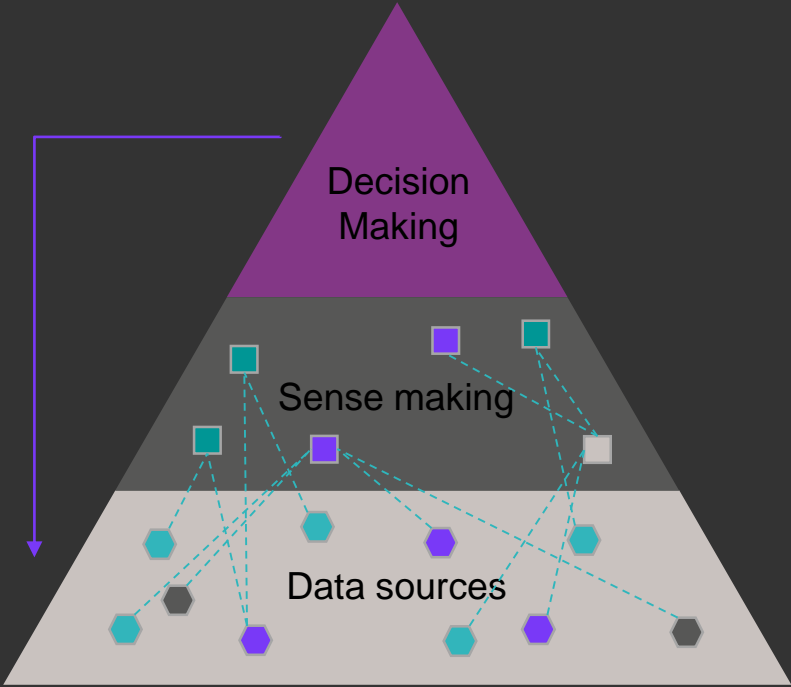
Performance reporting

- Overflows
- Compliance
- Timing
- Completeness



Powered by Moata

Christchurch Smart Wastewater



Powered by Moata

Monitoring

Active Gauges

Rain

HVQ

LevelGauge

Gauge State

Overflow w Discharge

Overflow w/o Discharge

Early Warning

Rain to Flow Connection

Gauge Grouping

CCC STFM

Wastewater Network

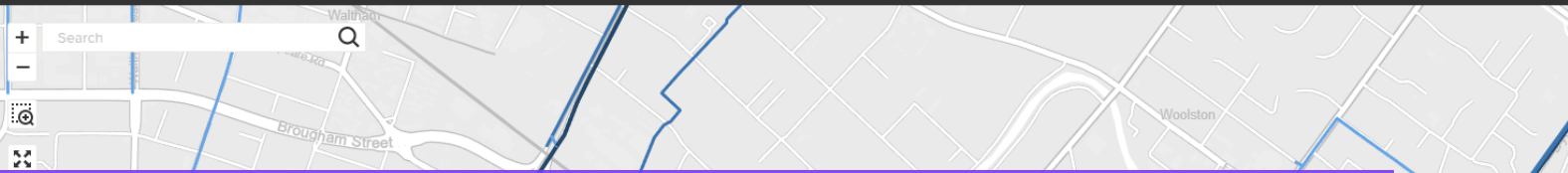
Wastewater PS

Pipe Diameter

> 750 mm

500 - 750 mm

300 - 500 mm



Visualisation of Alarm state



Scenario: **WW Flow and OF Monitoring**

Time Range:
[Relative Range](#) [Absolute Range](#)
Jun 1, 2019 1:32 PM to Jun 1, 2019 3:32 PM

Monitoring

Active Gauges

Rain

HVQ

LevelGauge

Gauge State

Overflow w Discharge

Overflow w/o Discharge

Early Warning

Rain to Flow Connection

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Wastewater Network

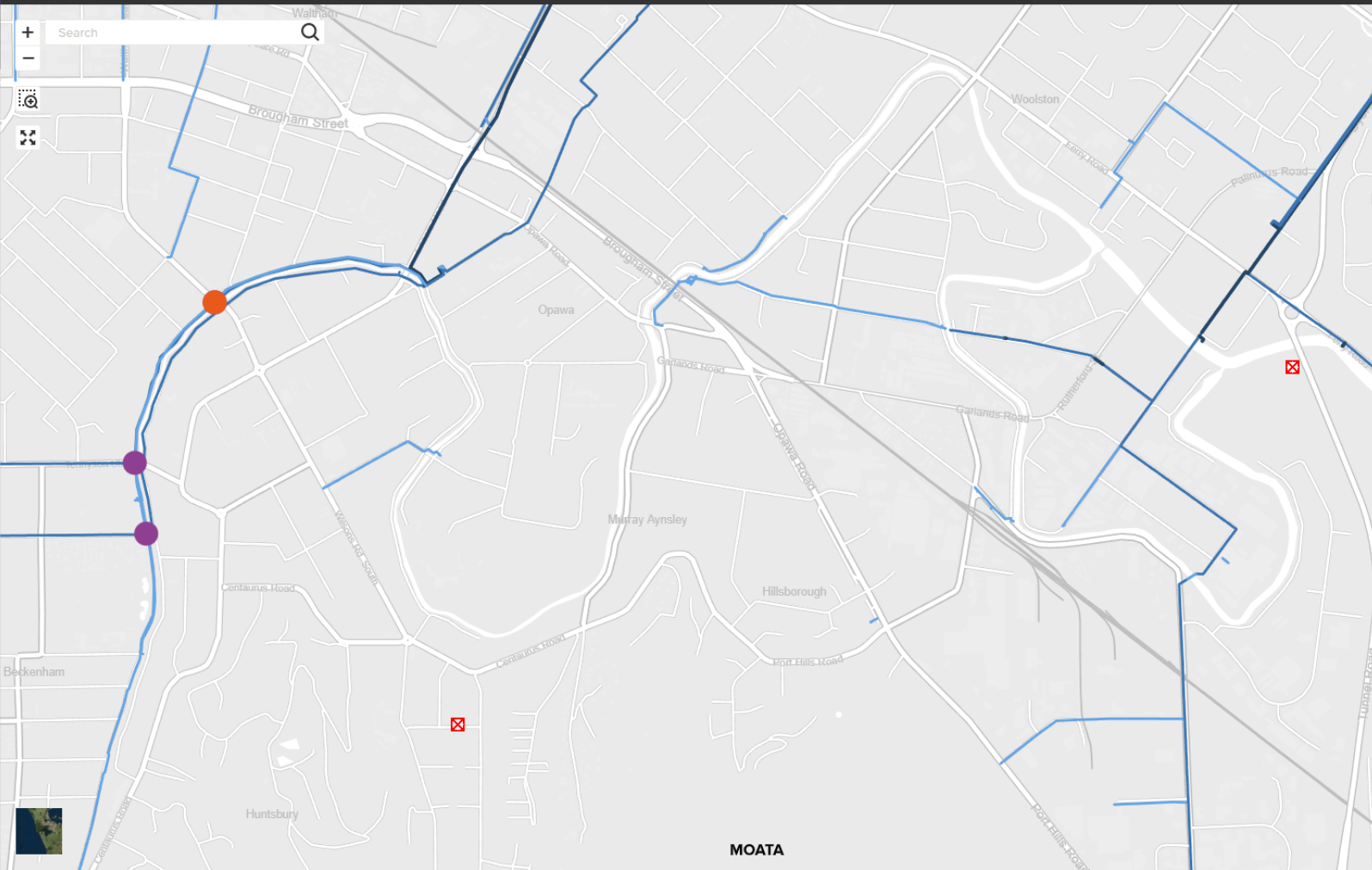
Wastewater PS

Pipe Diameter

> 750 mm

500 - 750 mm

300 - 500 mm



Assets + ↑ ↓

PS20/3 - Tennyson

Sewer Depth

MIN 38.64 MAX 1094.8

Sewer Overflow Discharge

HSI - Bowenvale Flume (GPRS)

Accumulated Rainfall

Rainfall

Wet Weather Event Status: Evaluated at ABO - Botanic Gardens

PS20 Overflows

No Traces Available

Heathcoat Overflow

No Traces Available

All Overflows

No Traces Available

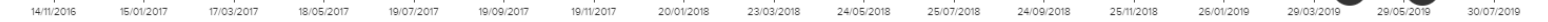
LTFM South

No Traces Available

Show all Checked Only



2 May 2019, 05:19 to 1 June 2019, 15:32



Assets + ↑ ↓

PS20/3 - Tennyson

Sewer Depth

MIN 38.64 MAX 1094.87 MEAN 78.74

Sewer Overflow Discharge

HSI - Bowenvale Flume (GPRS)

Accumulated Rainfall

Rainfall

Wet Weather Event State Evaluated at ABO - Botanic Gardens

PS20 Overflows

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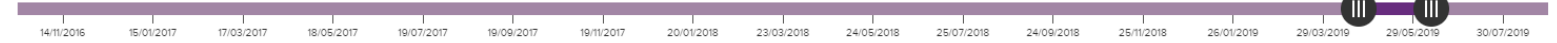
Show all

Checked Only



2 May 2019, 05:19 to 1 June 2019, 15:32

Chart interaction icons: pan, zoom, reset, etc.





This is just the start

**More data science
Predictions**

Thank you

M

MOTT
MACDONALD

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INFRASTRUCTURE