



**Canal &  
River Trust**

Making life better by water

# Introduction to MEICA / SCADA

28 November 2022



- Mechanical
- Electrical
- Instrumentation
- Control and
- Automation

Large automated structures, such as swing / lift bridges, large sluice sites & automated locks. + mooring bollards

- Supervisory
- Control
- And
- Data
- Acquisition

Water monitoring structures, pump / sluice sites. + boat counters

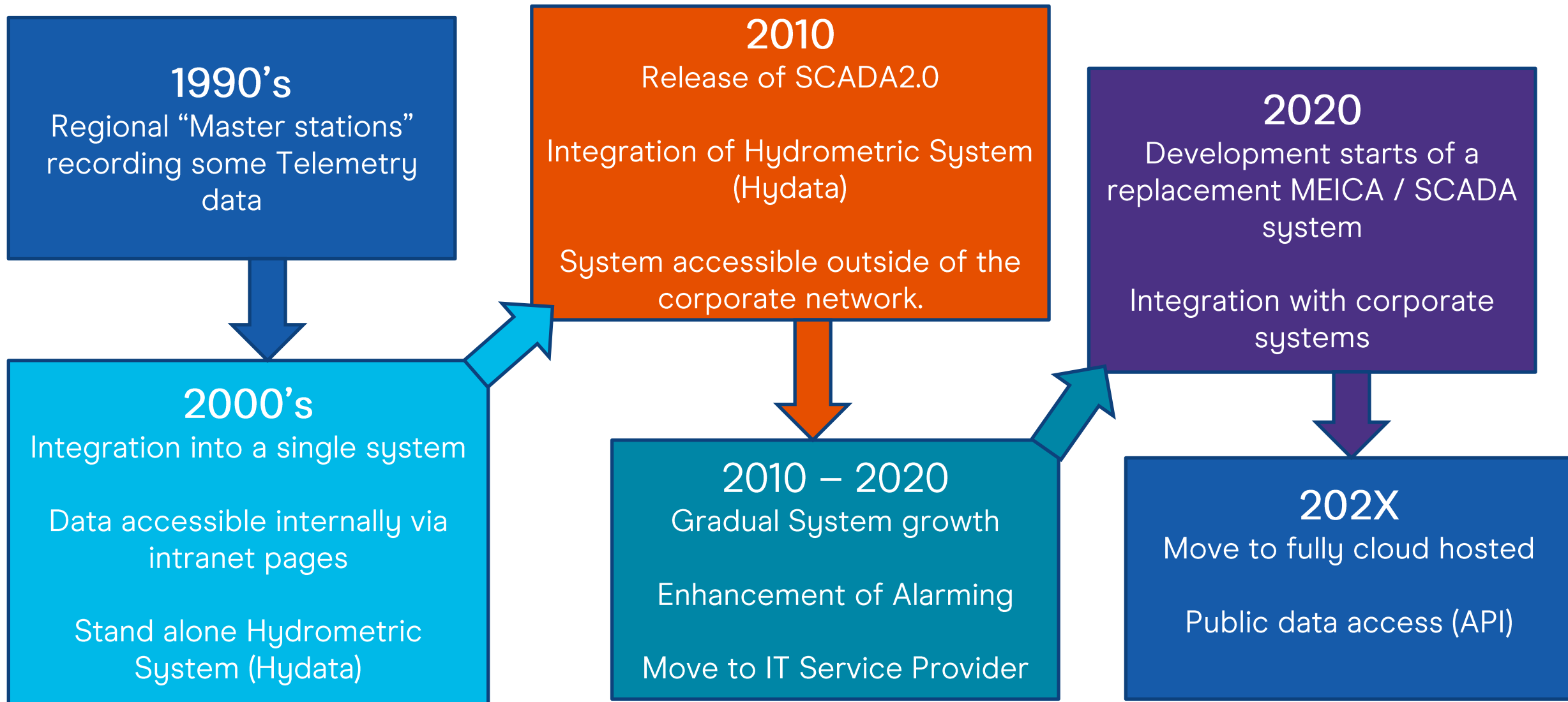
# Our Journey



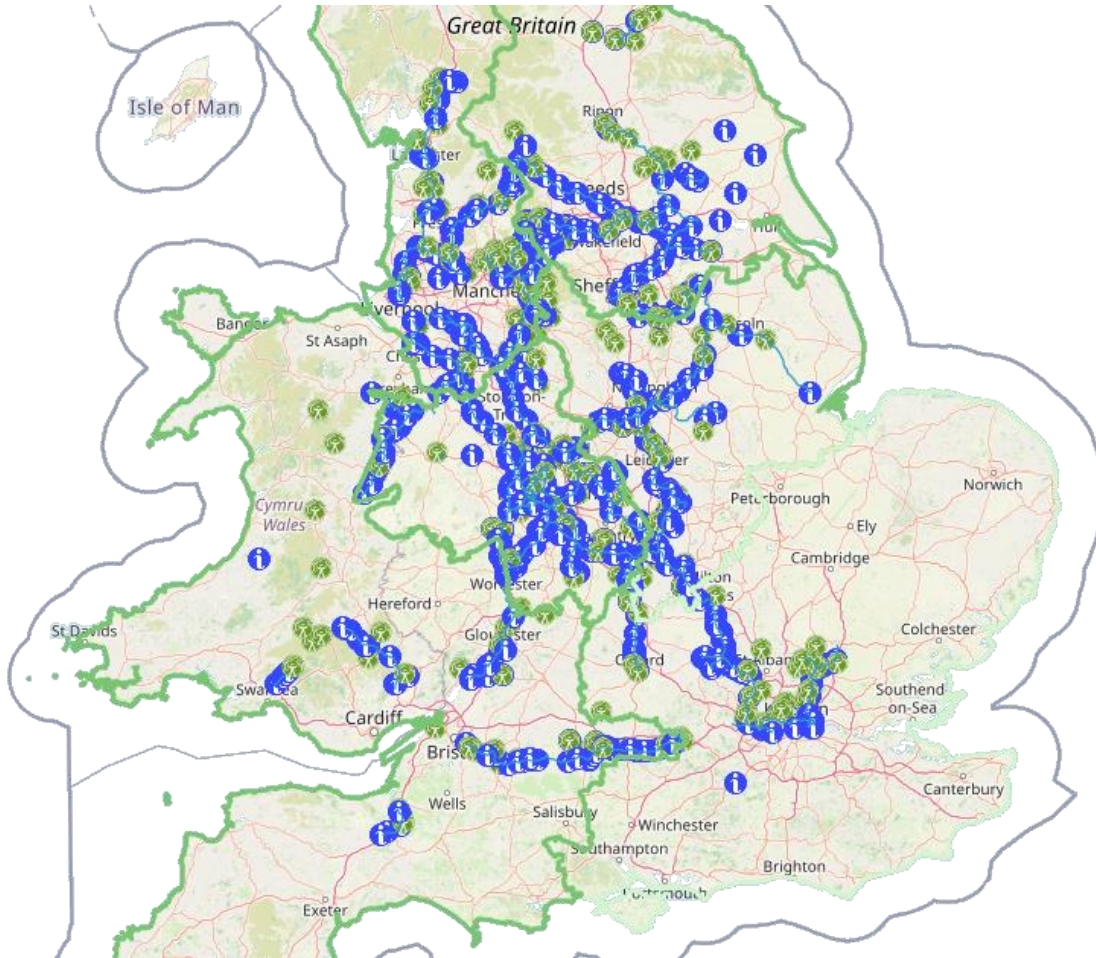
1



# SCADA System Development



- 827 operational buildings with electricity
- 206 moorings sites with electricity
- 232 moving bridges of which 77 are powered
- 1,644 locks/flood locks of which 86 are powered
- 665 sluices of which 31 are powered
- 80 pumping stations
- 600+ SCADA sites and a SCADA system
- 1 boat lift
- Over 70 Reservoirs but we prioritise monitoring



- National
- Predominantly around the old industrial heartlands of the West Midlands, and the large cities of the North
- Essentially – wherever there are canals

# The Heritage Environment



- Despite the modern technology the installations are designed to be in keeping with the Heritage of the Trust's assets
- Care is taken to ensure we don't damage the infrastructure (ie drill through coping stones)



# SCADA Site Types

A man and a woman are walking on a paved path next to a river. The man is in the foreground, wearing a red jacket, blue shorts, a hat, and sunglasses, carrying a white and red kayak. The woman is behind him, also carrying a kayak. In the background, there are trees and a building under construction with scaffolding. A large white number '2' is overlaid on the right side of the image.

2









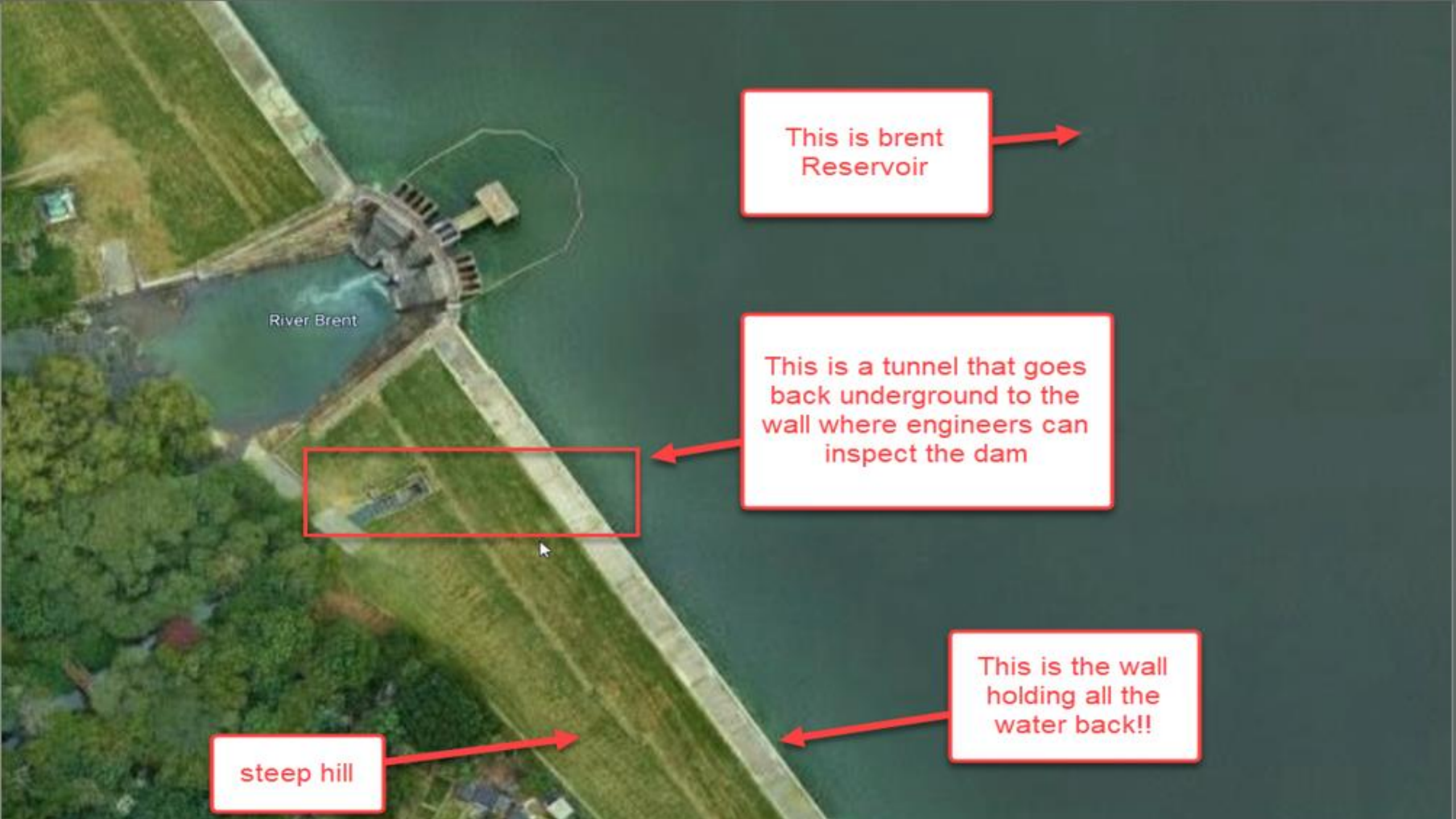
- Lock Count
- Bypass Flow



# Navigation Warning Boards







This is Brent Reservoir

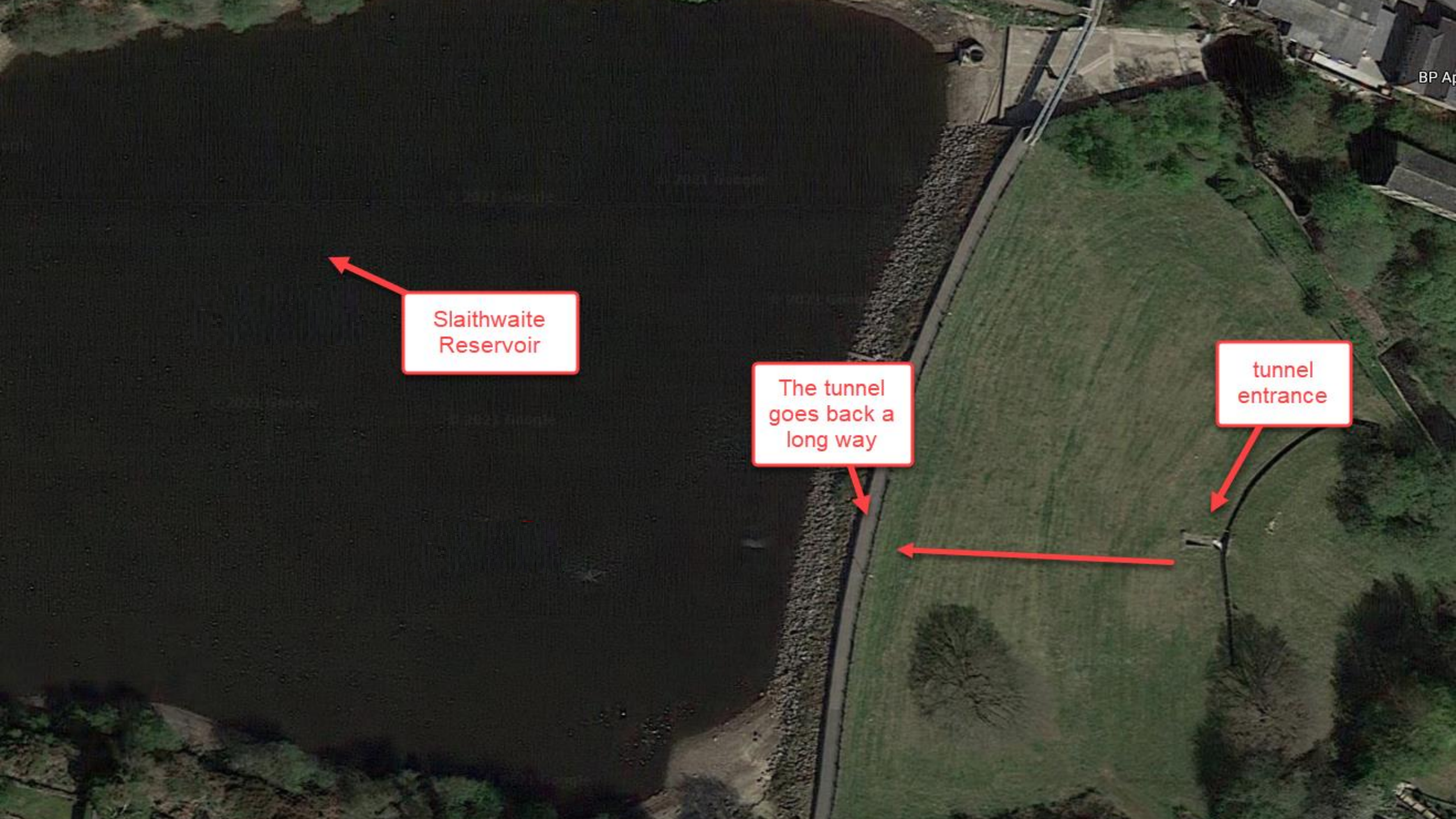
This is a tunnel that goes back underground to the wall where engineers can inspect the dam

This is the wall holding all the water back!!

steep hill

River Brent





Slaithwaite Reservoir

The tunnel goes back a long way

tunnel entrance

BP Ap



# Reservoir V-Notch Monitoring



**RADAR devices**



# Reservoir Piezo Monitoring Sites



**Piezo Monitoring  
devices**



# Pumping Station Control Sites



- Pumping Stations
- Sluice Sites



# 3 x Worthington Simpson pumps 1929





From 2 kilo watts...



..to over 300 kilo watts in size



# Pumping Station Maintenance



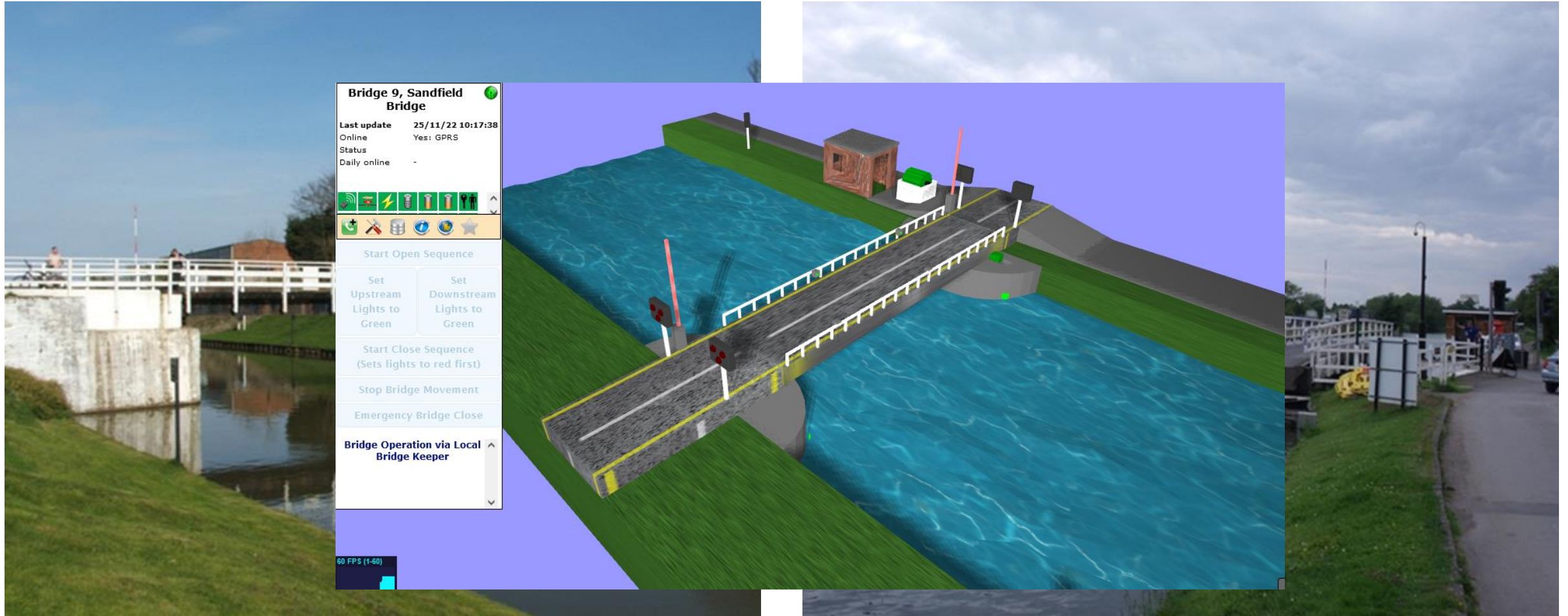
**Maintained by specialist  
national framework  
contractors**





Brent Reservoir Sluice Site





# Powered Locks & Bridges

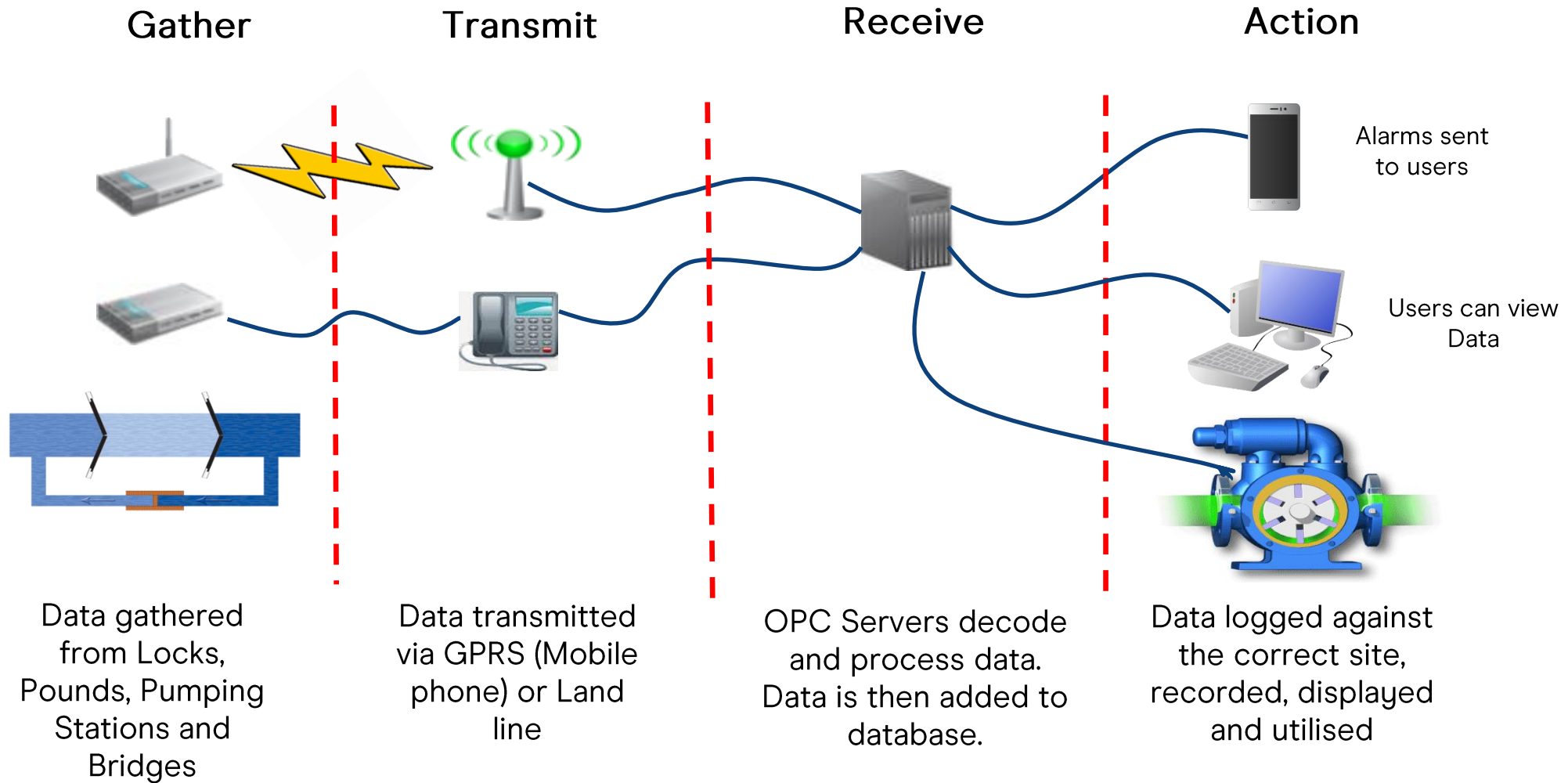




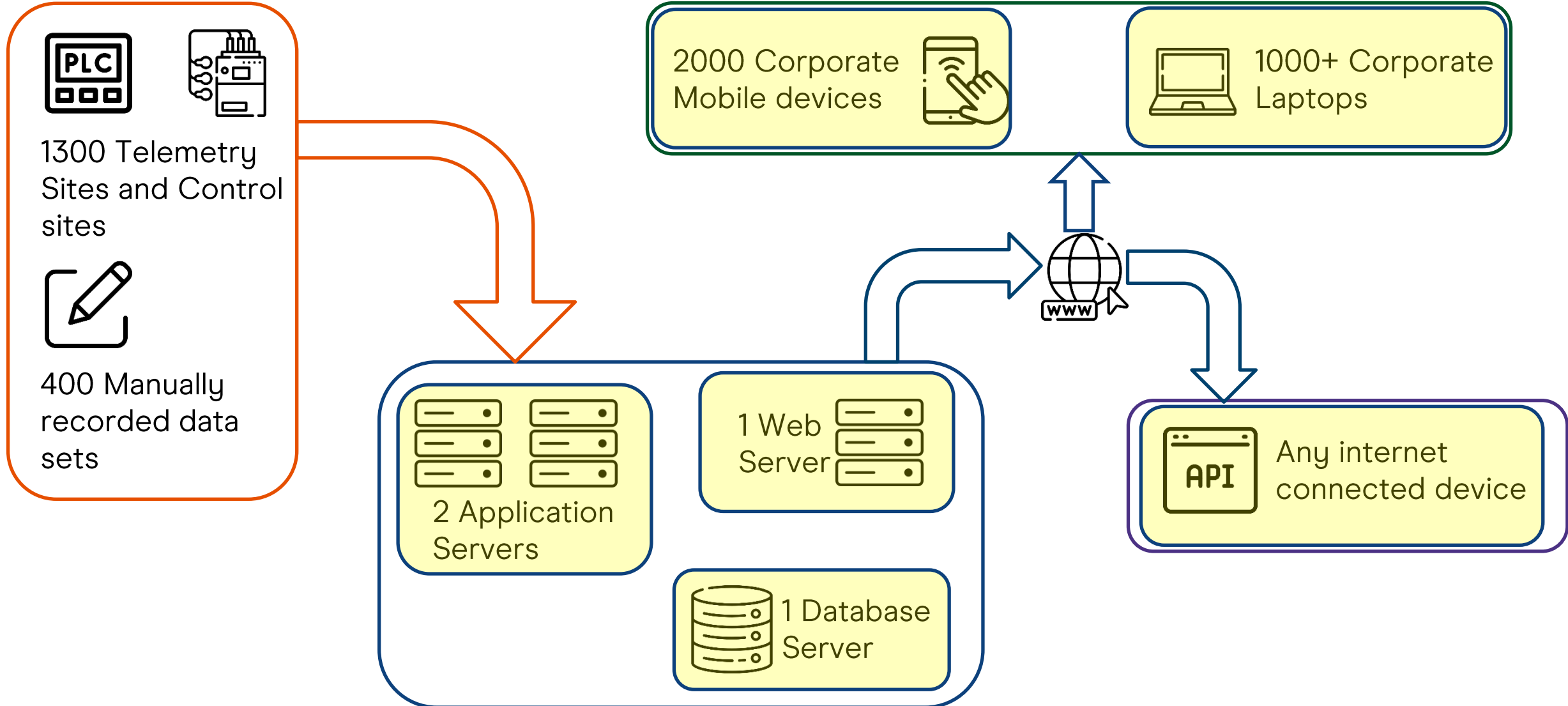
# How the SCADA System Works

3

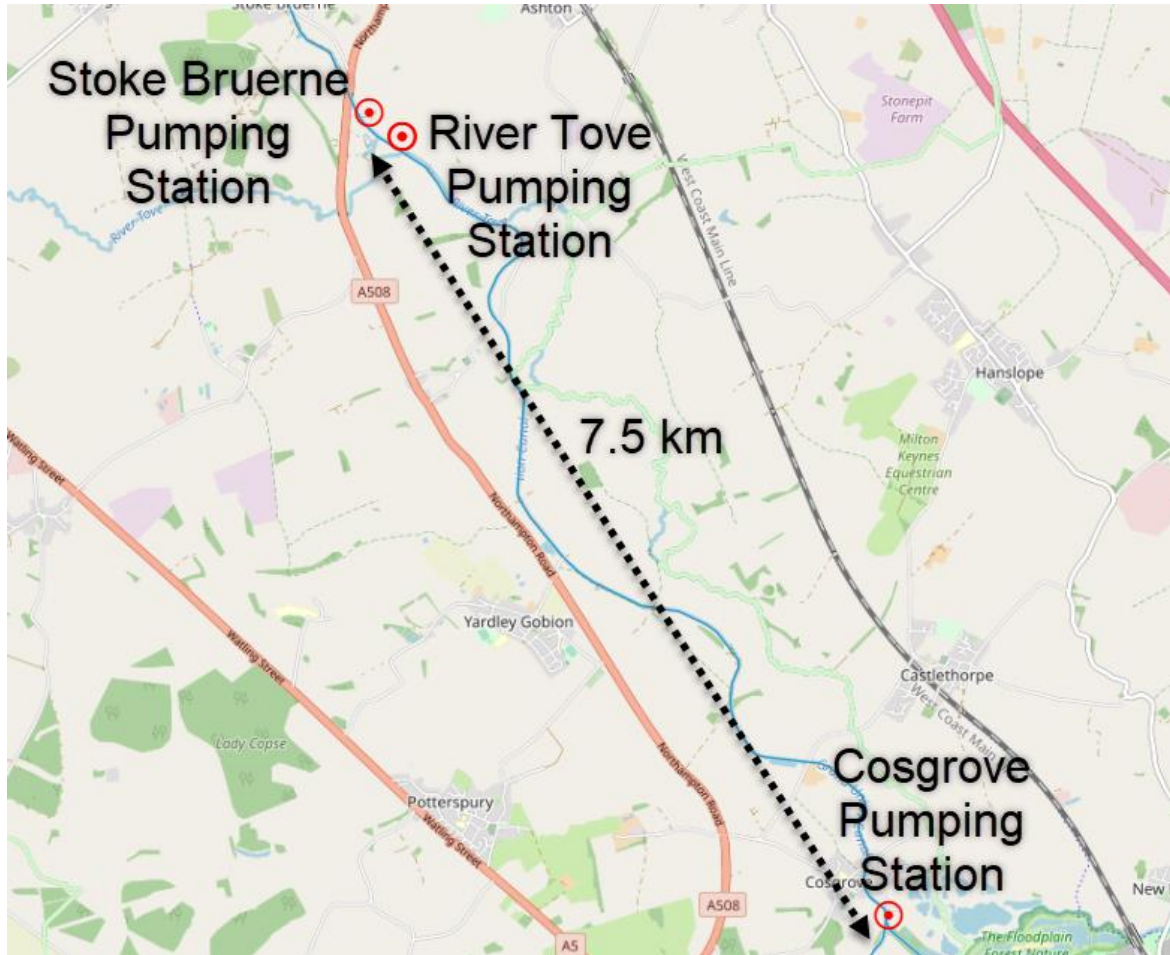








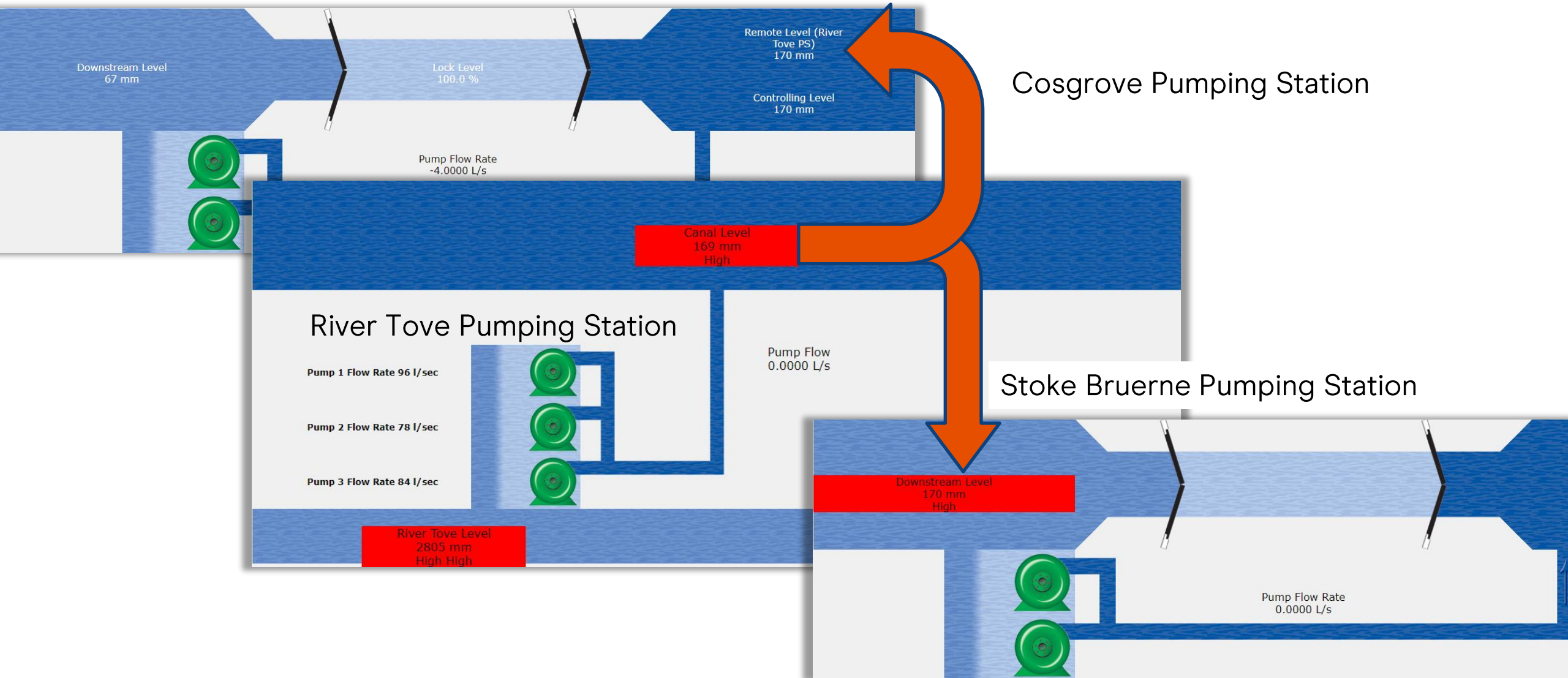
# Remote Site Communications



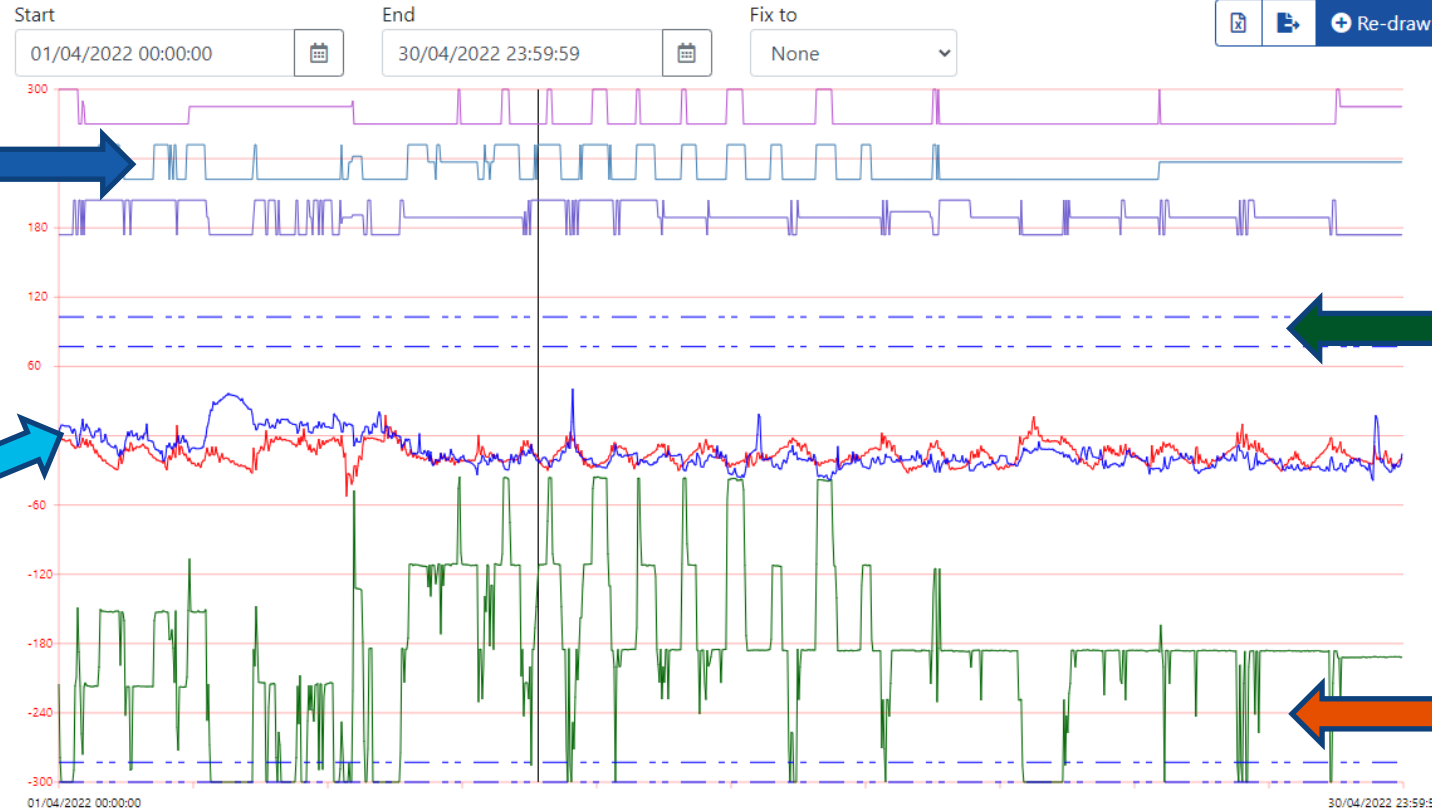
- Allows Pumps and Sluices to operate based on conditions up and downstream
- Data is sent via the SCADA System, not point to point
- Gives it unlimited range
  - Unlike direct radio communication between sites



# Remote Site Communications







Pump run events  
"stacked" at top

Alarm trigger levels  
can be shown

Water levels  
Red = Upstream  
Blue = Downstream

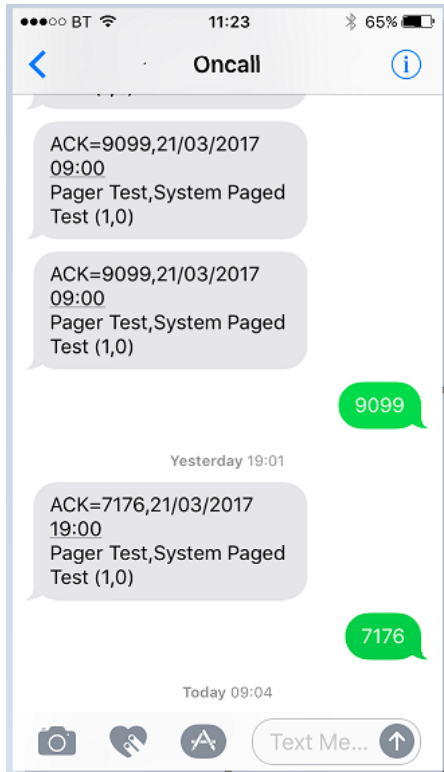
Pumped water flow  
calculated from  
pump run events

Key shows "raw" at  
any given time

Set visibility on all pens

River Tove Pumping Station: Canal Level	11/04/2022 16:19:42 (GMT)	-18.67 mm
River Tove Pumping Station: River Level	11/04/2022 16:19:42 (GMT)	1626 mm
River Tove Pumping Station: Pump 1 Run	11/04/2022 16:19:42 (GMT)	1 0
River Tove Pumping Station: Pump 2 Run	11/04/2022 16:19:42 (GMT)	1 0
River Tove Pumping Station: Pump 3 Run	11/04/2022 16:19:42 (GMT)	0 0
River Tove Pumping Station: Pump Station Flow	11/04/2022 16:19:42 (GMT)	143.44 L/s

When an event on site occurs we can trigger an alarm in the system which will send an SMS message to our bank operatives to action.



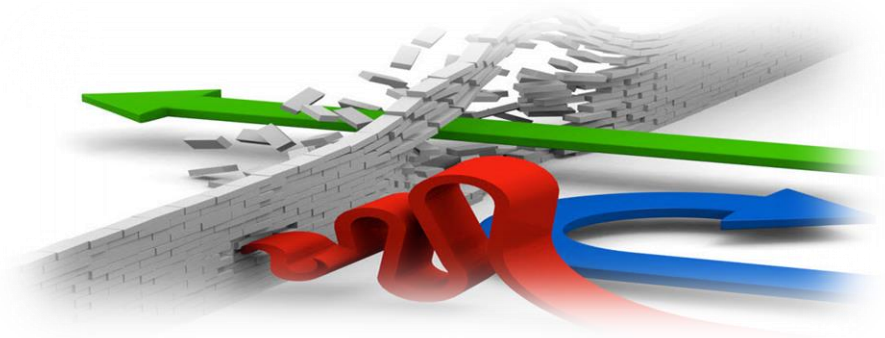
Users can acknowledge Alarms via SMS, with a 4 digit ack code.

Report results					
Id	Site	Raised	Message	Active	Ack
381833	Lock 6, Sheering Mill Lock	22/11/2022 15:07:16	Lock 6, Sheering Mill Lock (SR-014-007) Canal Level (Hi 273 mm at 22/11/22 15:13:43) Acknowledge code: 0907	No	Yes
381828	Lock 46, Cowroast Lock, DS	22/11/2022 13:39:20	Lock 46, Cowroast Lock, DS (GU-164-004) Canal Level (Lo -190 mm at 22/11/22 13:40:21) Acknowledge code: 9926	No	Yes
381827	Lock 6, Sheering Mill Lock	22/11/2022 13:38:54	Lock 6, Sheering Mill Lock (SR-014-007) Canal Level (HiHi 300 mm at 22/11/22 13:40:14) Acknowledge code: 3930	No	Yes
381826	Lock 13, Roydon Lock	22/11/2022 13:04:29	Lock 13, Roydon Lock (SR-003-005) Upstream River Level (Hi 806 mm at 22/11/22 13:06:13) Acknowledge code: 4116	No	Yes
381823	Bridge 114, Bridge Street	22/11/2022 12:46:55	Bridge 114, Bridge Street (GU-145-005) Canal Level (Hi 111 mm at 22/11/22 12:47:33) Acknowledge code: 7150	No	Yes
381822	Lock 6, Sheering Mill Lock	22/11/2022 12:41:52	Lock 6, Sheering Mill Lock (SR-014-007) Canal Level (Hi 250 mm at 22/11/22 12:42:26) Acknowledge code: 1458	No	Yes
381816	River Ouse Pumping Station	22/11/2022 11:57:17	River Ouse Pumping Station (GU-115-001) Canal Level (Hi Alarm 73 mm at 22/11/22 11:57:34) Acknowledge code: 3011	Yes	Yes

Our Waterway Operatives have access to Water Control Manuals for recommended actions and Waterway specific details.



- Weekly automated external security checks
- Annual security (penetration) tests, on servers and PLC's



- Geo-Fenced corporate network

- Private APN (network) between sites and the servers





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# Thank you for listening!