CASE STUDY

ANGLIAN WATER

Blockage Analysis on the Cambridge Network

Anglian Water is the largest water and water recycling company in England and Wales by geographic area. They work to bring environmental and social prosperity through their commitment to Love Every Drop.

Key Points

- Sewer criticality assessment
- Hydraulic simulation of sewer blockages
- Automated tool for running thousands of InfoWorks ICM simulations & scenarios in the cloud
- Leverage Anglian Water's existing data and network knowledge

Customer Reference

Annesley Crisp
Project and Engagement Manager
Anglian Water

Background

Anglian Water supplies water and water recycling services to almost seven million people in the East of England and Hartlepool. This project focused on the Cambridge area, which is 5,830 ha in total area, 165,000 in population, and 670 km in length of collection network.

Purpose

This project was a pilot project to apply and present the capabilities of the AssetAdvanced™ Criticality Module, in which Anglian Water was looking to identify the sensitivity of their network to failures and identify critical areas in the system. They sought to gain insight regarding how sensitive their network was to blockages, where the most hydraulically vulnerable areas were, what the impacts of blocked pipes were throughout the network, what blockage impacts were experienced at each point in the network, how long operators had to respond to blockages, and where sensors could be placed for the best coverage of critical locations.

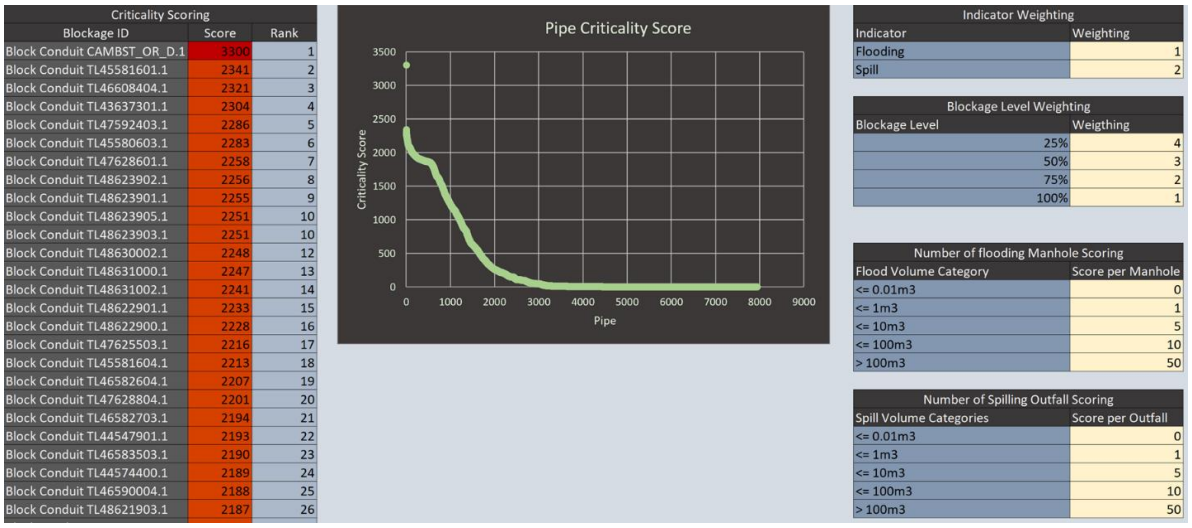
The combined sewer network has a total length of around 670km. For the blockage analysis, the storm water network was not considered. The AssetAdvanced™ Criticality Module (ICM integration) software was used for the analysis. The goal of the project was to work together with the Anglian Water team to apply the Criticality Module to gain valuable insights into the Cambridge network and inform improved operations and planning efforts going forward.

Project Scope

Optimatics conducted a formulation workshop with members of the Anglian Water team to establish dry weather flow and rainfall scenarios, blockage levels and design criteria (flooding, CSOs, etc.) to use in the analysis. A formulation was prepared and used to run a series of blockage analyses. Results were processed, and a summary report and protocol for application to other sewersheds was produced.

Outcomes

Five scenarios were used for this project: 100% blockage for Dry Weather Flow; and 25%, 50%, 75%, and 100% blockage for Wet Weather Flow (5-year return, 120mn storm). Approximately 8,000 blockage simulations were run for each scenario. A data table was generated to assess the blockage consequences across the entire network for all simulations run. An ArcGIS Online dashboard was generated to visualize and interact with the results of the analysis. A pipe criticality model based on the results of the blockage analysis was also generated. Results can be combined with external datasets and processes to add more value. Outputs included top 500 critical pipes and custom risk weighting for each pipe.



Criticality Scoring

Blockage ID	Score	Rank
Block Conduit CAMBST_OR_D.1	3300	1
Block Conduit TL45581601.1	2341	2
Block Conduit TL46608404.1	2321	3
Block Conduit TL43637301.1	2304	4
Block Conduit TL47592403.1	2286	5
Block Conduit TL45580603.1	2283	6
Block Conduit TL47628601.1	2258	7
Block Conduit TL48623902.1	2256	8
Block Conduit TL48623901.1	2255	9
Block Conduit TL48623905.1	2251	10
Block Conduit TL48623903.1	2251	10
Block Conduit TL48630002.1	2248	12
Block Conduit TL48631000.1	2247	13
Block Conduit TL48631002.1	2241	14
Block Conduit TL48622901.1	2233	15
Block Conduit TL48622900.1	2228	16
Block Conduit TL47625503.1	2216	17
Block Conduit TL45581604.1	2213	18
Block Conduit TL46582604.1	2207	19
Block Conduit TL47628804.1	2201	20
Block Conduit TL46582703.1	2194	21
Block Conduit TL44547901.1	2193	22
Block Conduit TL46583503.1	2190	23
Block Conduit TL44574400.1	2189	24
Block Conduit TL46590004.1	2188	25
Block Conduit TL48621903.1	2187	26

Indicator Weighting

Indicator	Weighting
Flooding	1
Spill	2

Blockage Level Weighting

Blockage Level	Weigthing
25%	4
50%	3
75%	2
100%	1

Number of flooding Manhole Scoring

Flood Volume Category	Score per Manhole
<= 0.01m3	0
<= 1m3	1
<= 10m3	5
<= 100m3	10
> 100m3	50

Number of Spilling Outfall Scoring

Spill Volume Categories	Score per Outfall
<= 0.01m3	0
<= 1m3	1
<= 10m3	5
<= 100m3	10
> 100m3	50

Figure 1: Pipe Criticality model based on the results of the blockage analysis

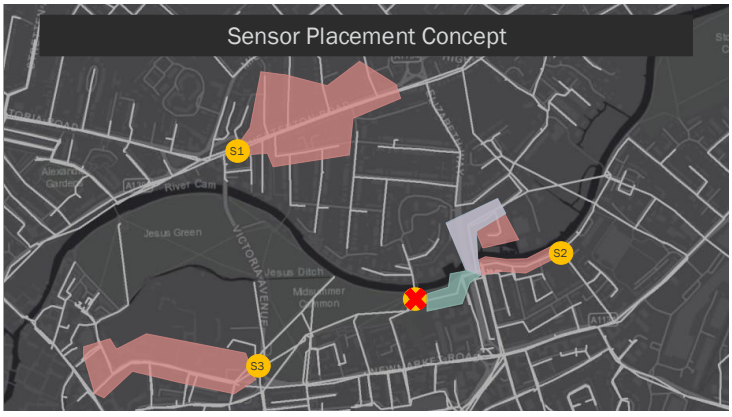


Figure 2: Potential application of the blockage analysis results: sensor placement optimisation

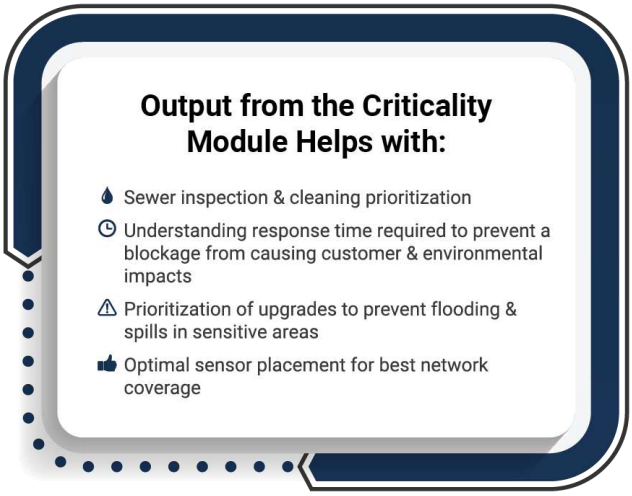


Figure 1: Visualisation of the nodes impacted by blockages (in green)

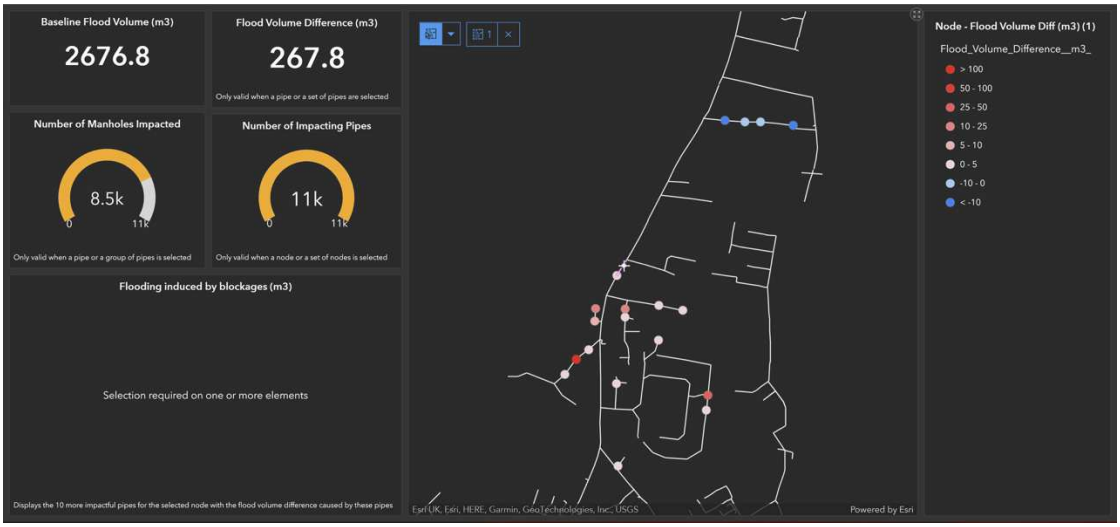


Figure 2: Visualisation of the flood volume difference at the nodes caused by the selected pipe when blocked

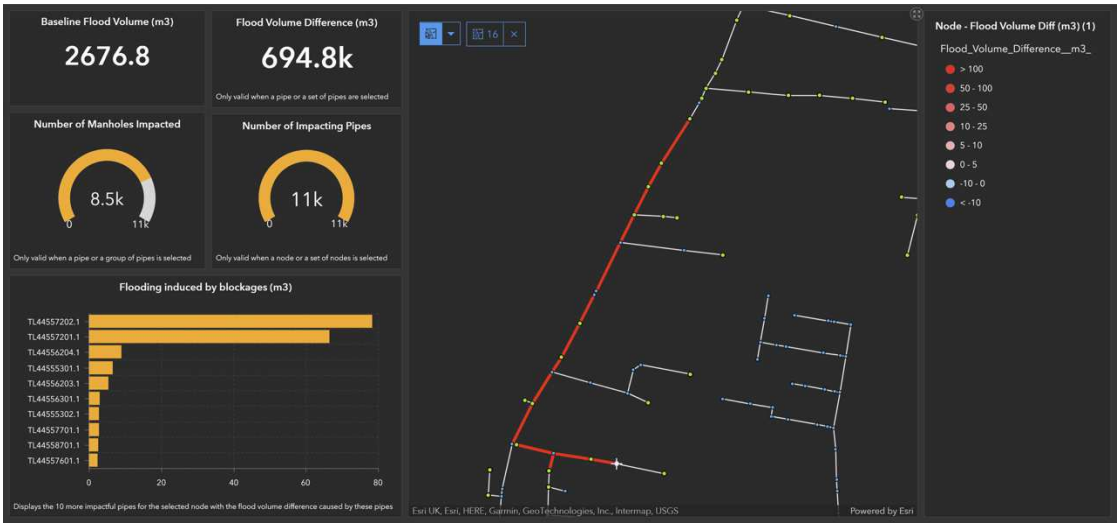


Figure 3: Visualisation of the pipes impacting the selected node when blocked