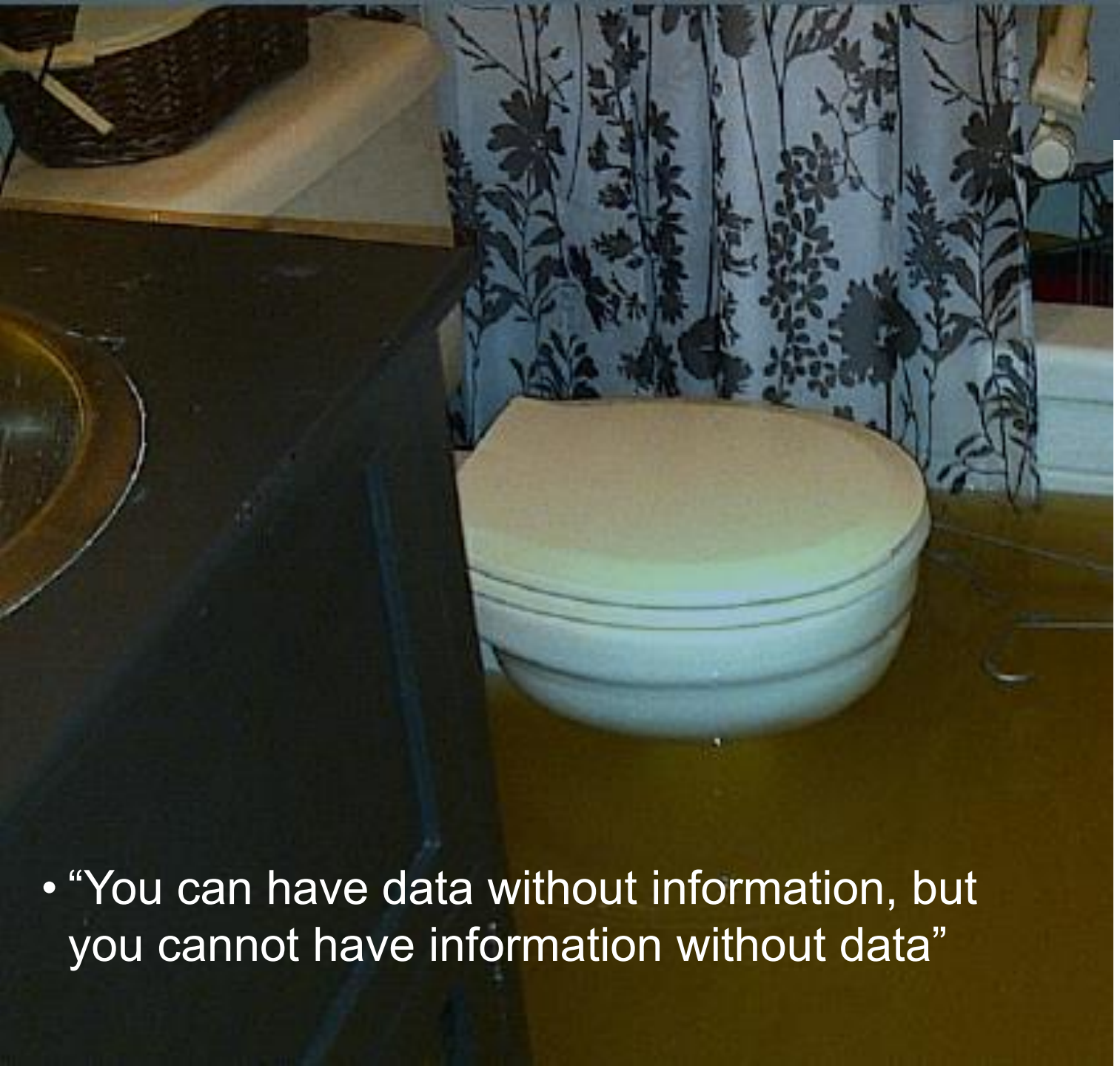
Water New Zealand Conference 2019

Rico Parkinson

Using murky data to clean up wastewater flooding

Stantec



- “You can have data without information, but you cannot have information without data”

Introduction

1. Project Drivers
   - Current Data Sources and Processes
2. Data Analysis Solutions
   - Root Cause Analysis
   - Predictive Analytics
   - Automated FME Analysis
   - Data Collection and Display
3. Operational Solutions
   - Mapping of Sewers
   - Targeted FOG Dosing
   - Property Level Alarms (PLA)
4. Buchan Trap Example Case
5. Conclusions

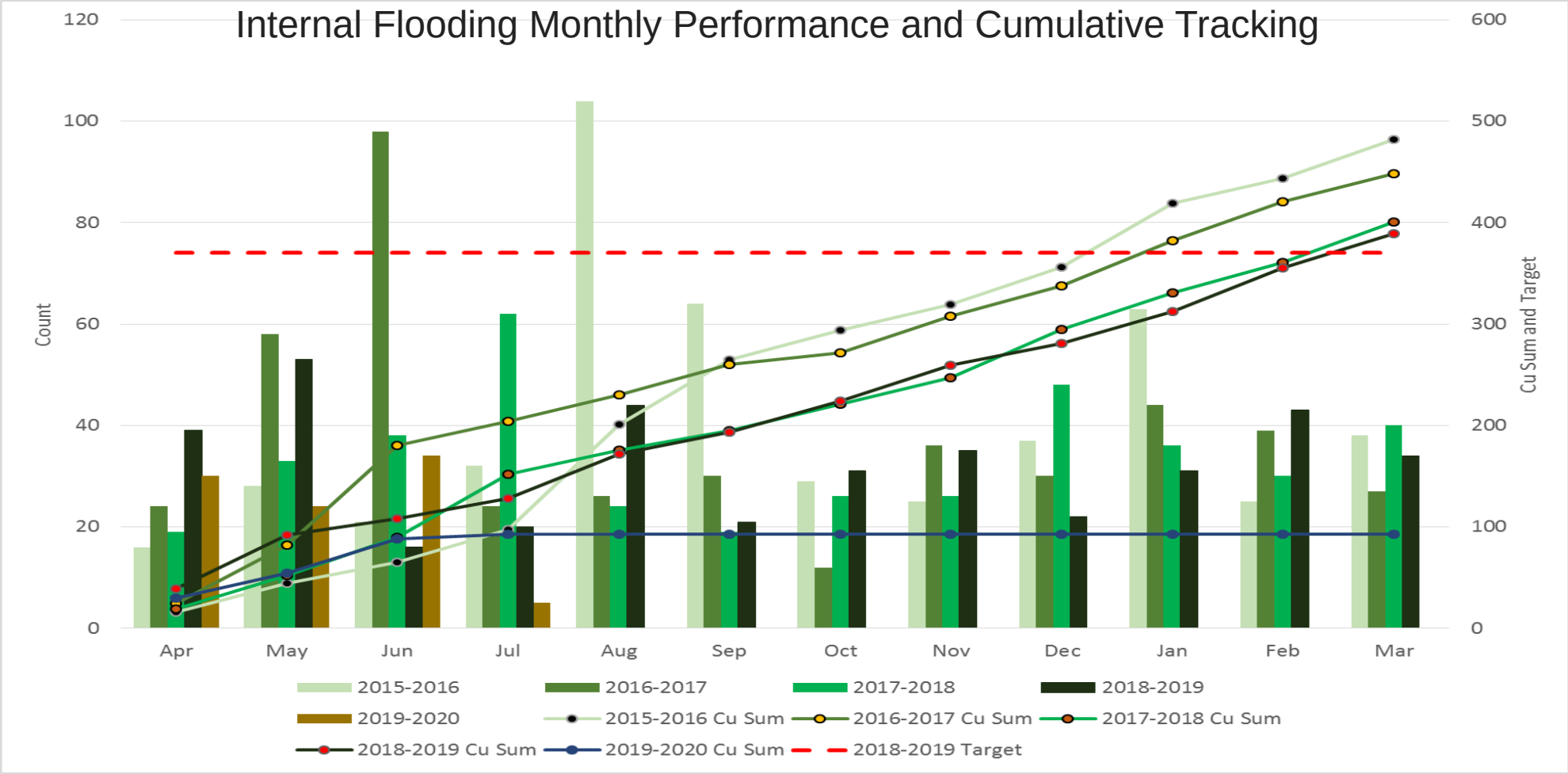
Project Driver – Reducing Flooding's

AMP5 Performance	2755 (551/yr)
AMP6 Target (25%)	2070
Deadband	2215
Collar	2440

Five year AMP target

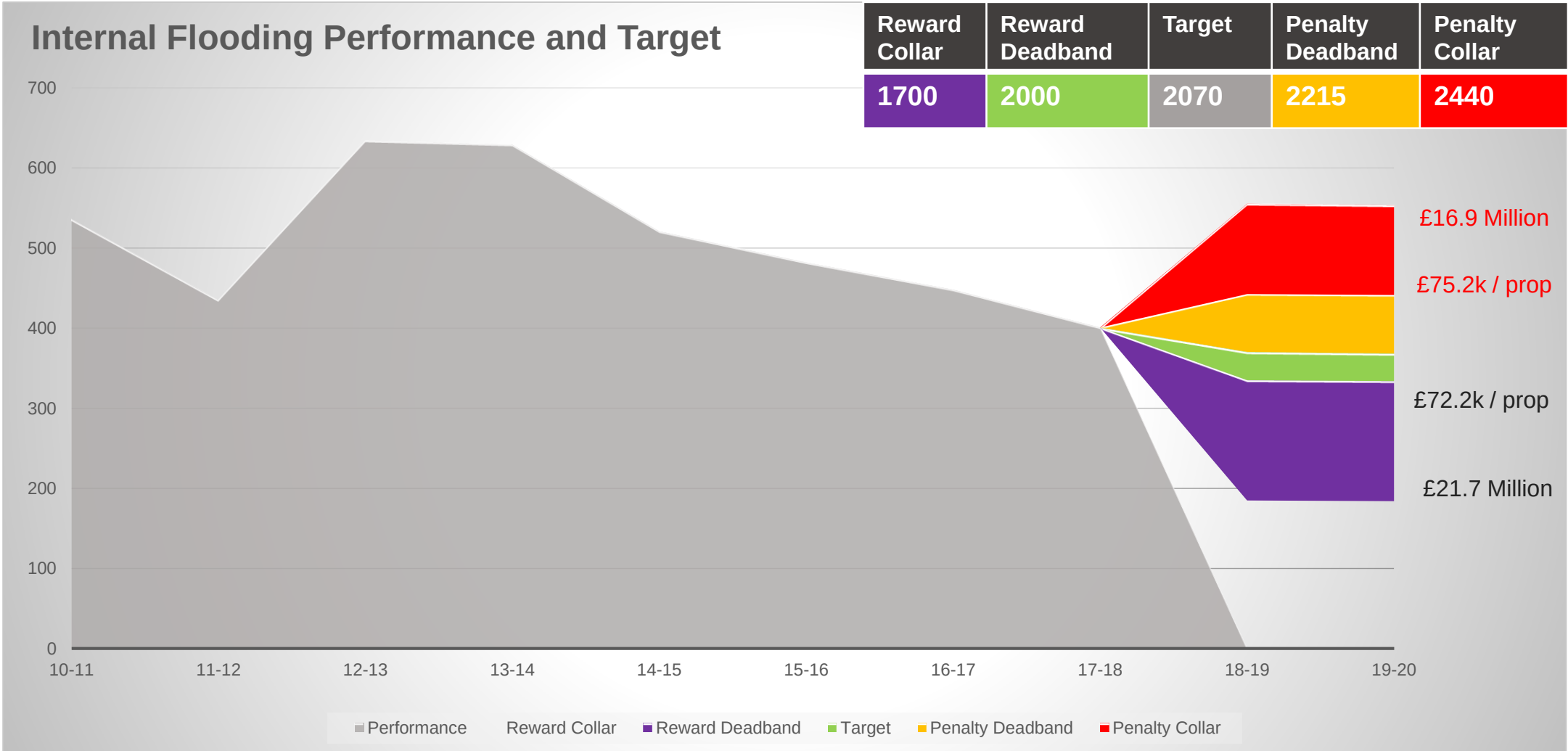
25% Reduction in Internal Property Flooding's

First three year were over target.

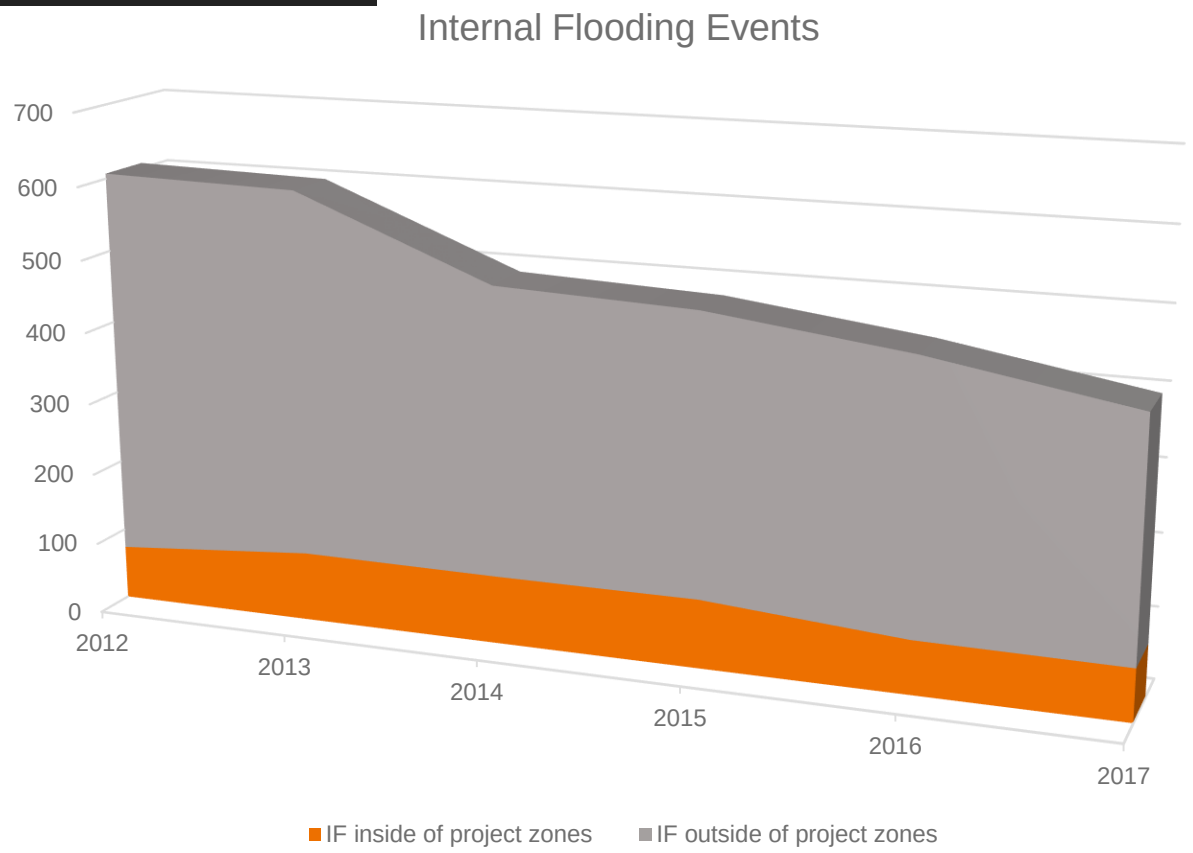


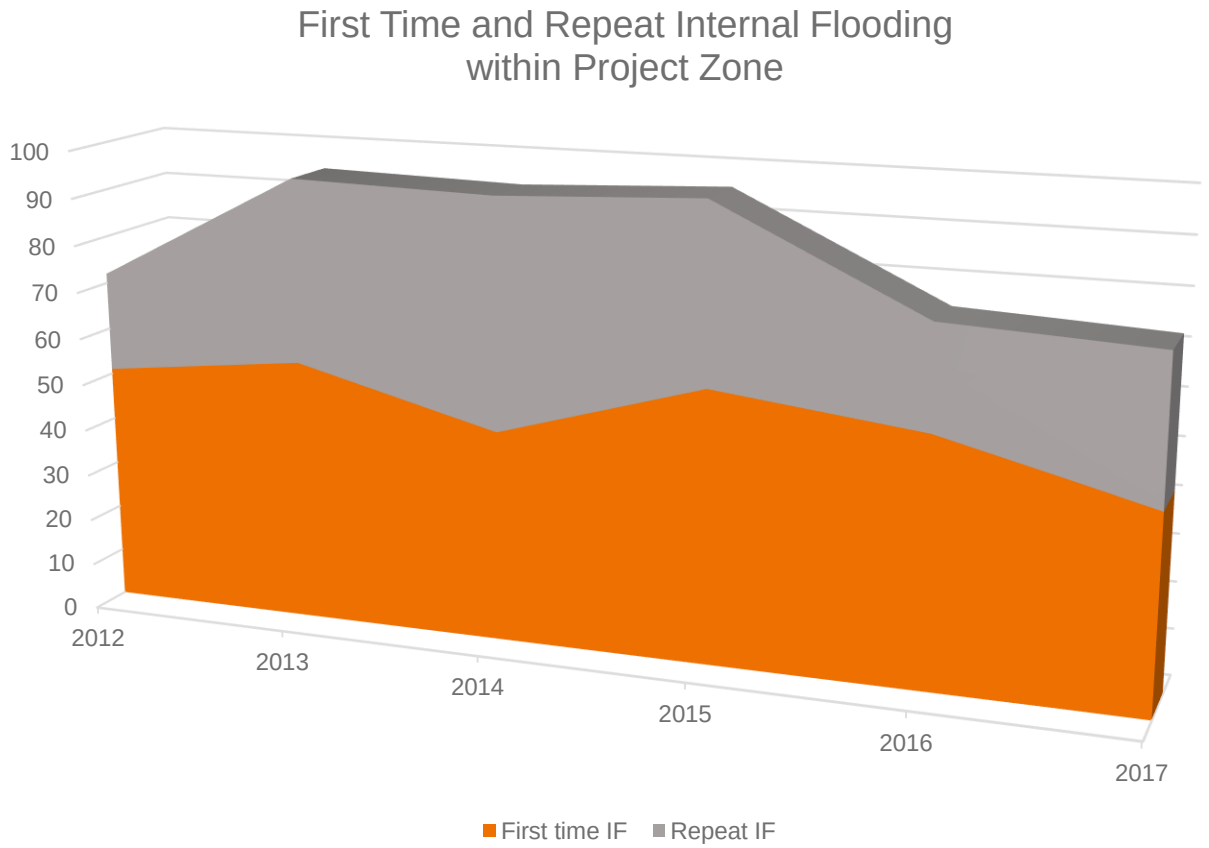
Project Driver – Entire Region

Three years into the AMP risk of Penalties if trends didn't continue downwards.



Project Drivers





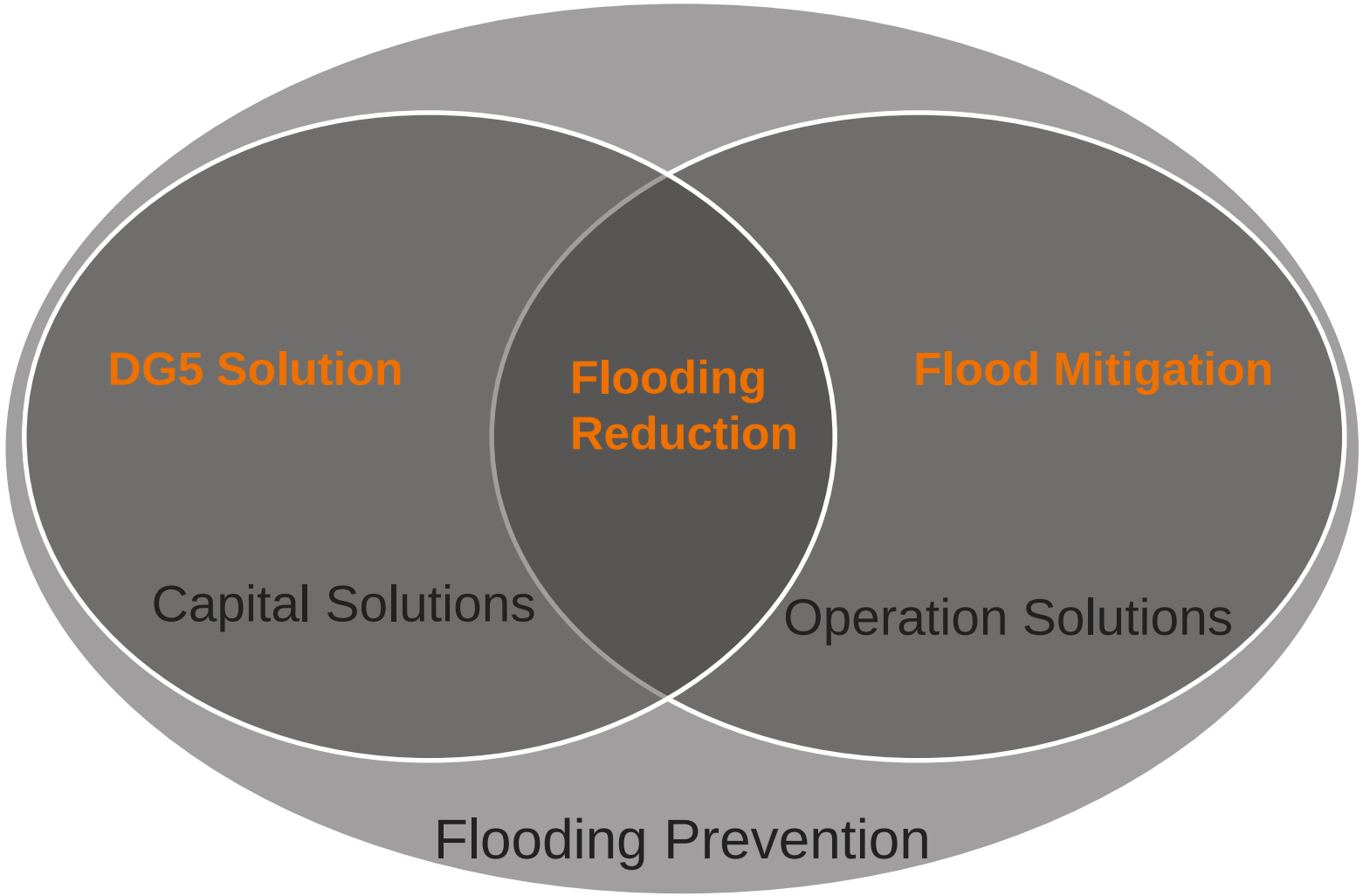
Even though region wide trends were reducing, properties within particular areas are remaining steady.

Flooding Solution Processes Terms

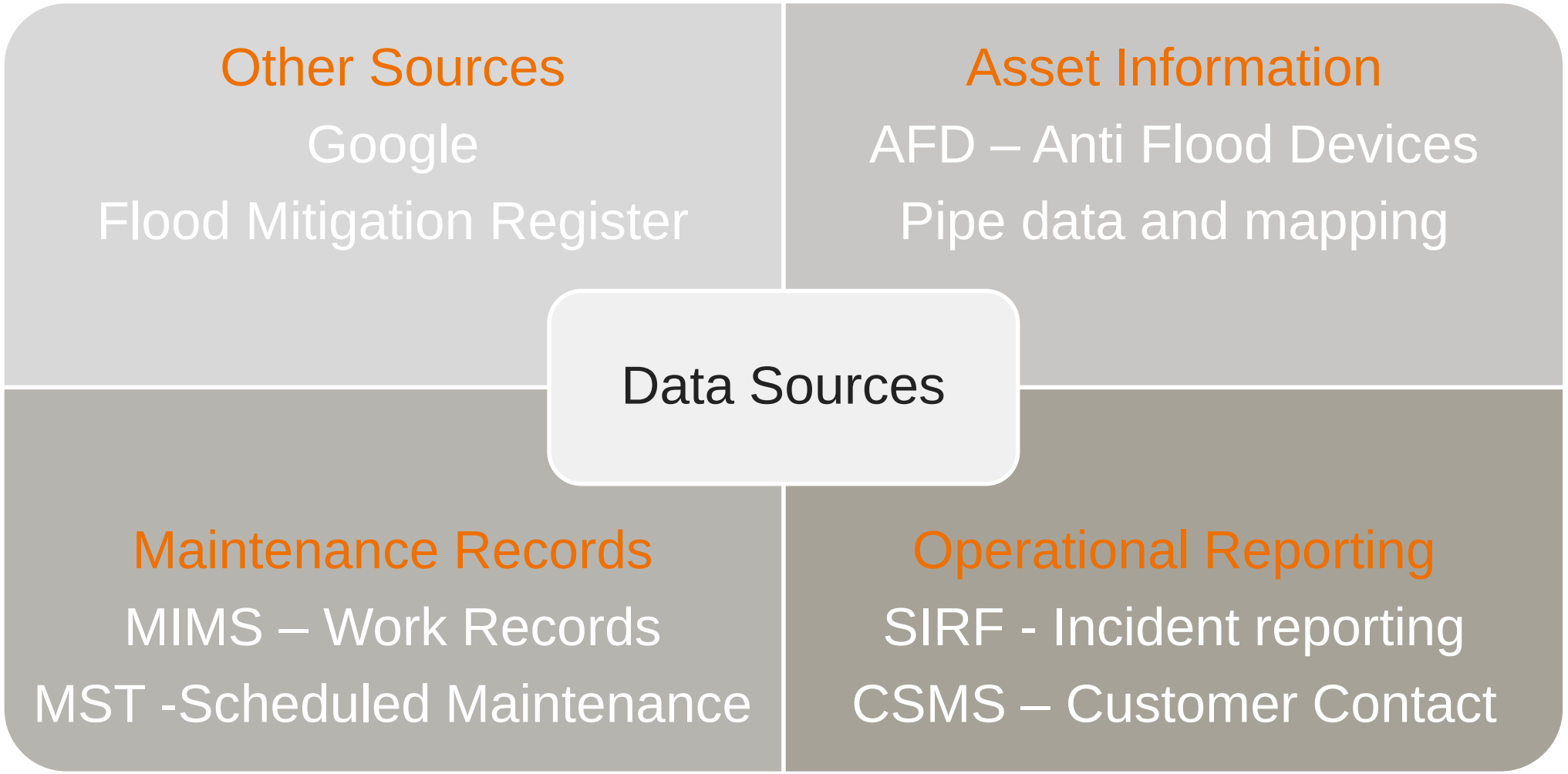
Flood Mitigation
Reactive prevention to prevent flooding repeating on properties

DG5 Solutions
Capital investment to increase capacity related flooding, normally reactive

Flood Reduction Project
Proactive prevention to prevent new flooding and repeating on properties



Data Source Summary - Examples

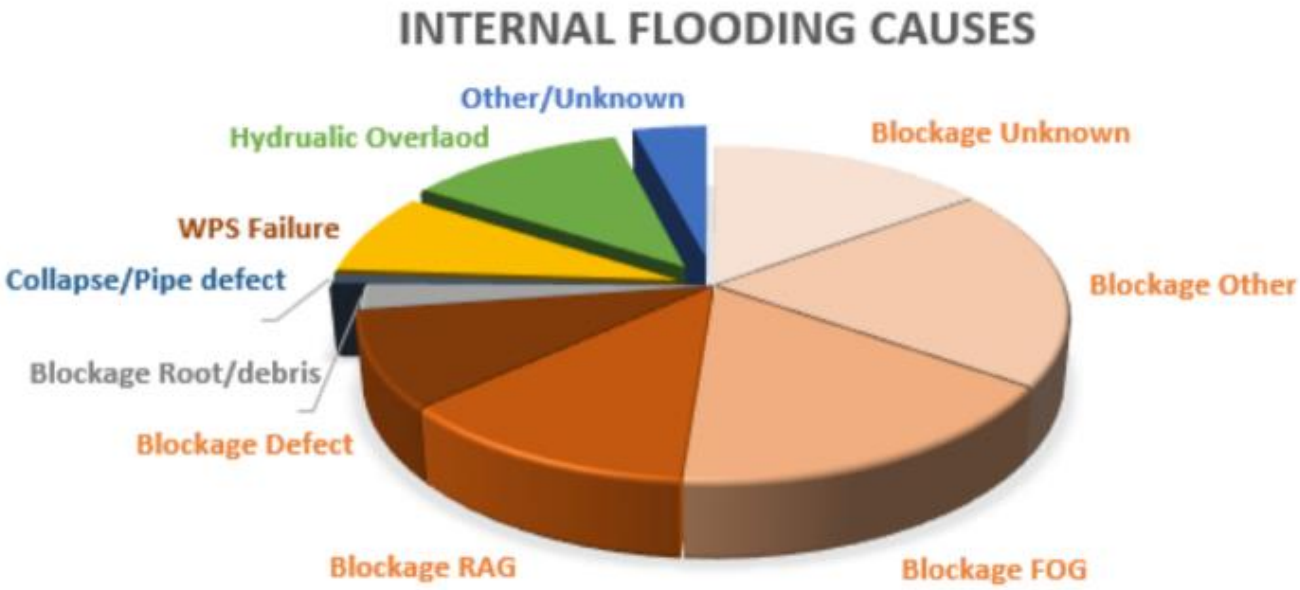


- Root Cause Analysis
- Predictive Analytics
- Automated FME Analysis
- Data Collection and Display

Data Analysis Solutions

Data Analysis Solutions

Root Cause Analysis



10 Zones with the Flood Reduction Project

Root cause of flooding assessed for each area, to identify possible solutions that could be trialed in particular areas.

Data Analysis Solutions

Predictive Analytics

Probability = L/(L+1) where

L = Exp[-4.9 + 0.5*IFatProperty + 0.6*IFatSewer - 0.1*IncidentatProp + 0.06*MHRel_Elevation + if(Commercial,0.95) +if(FOUL, -0.58) + Proportion_Basement + if(BasementFlag, 2) + if(P3,-0.77)]

- Customer report problems but no flooding
- 6 Hr Response

P3 Response

P2 Response

- Customer reports external flooding
- 4 Hr Response

- Customer reports internal flooding
- 2 Hr Response

P1 Response

Identifies properties with opportunities to prevent flooding in this response

Data Analysis Solutions

Automated FME Analysis

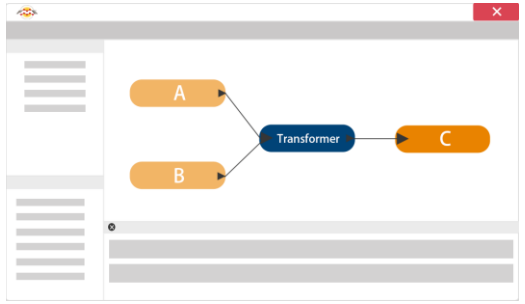
Incident Data

Property Data

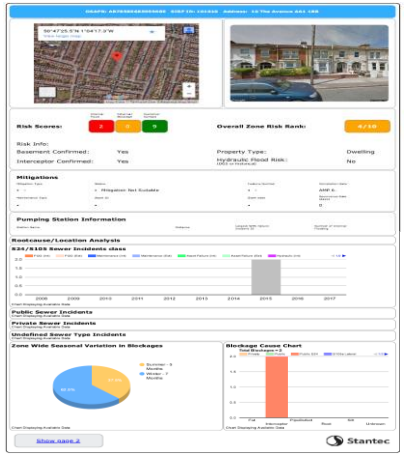
Previous Mitigations

Asset Data

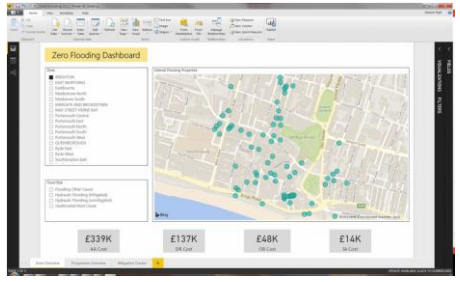
FME Process



Automated Mitigations



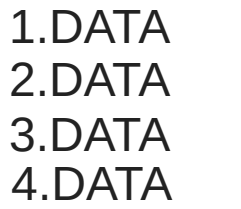
Central Database

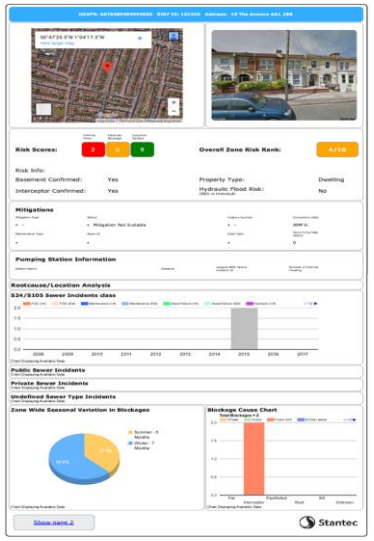


Tracker Dashboard

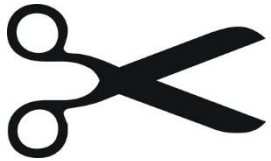
Data Analysis Solutions

Data Collection and Display



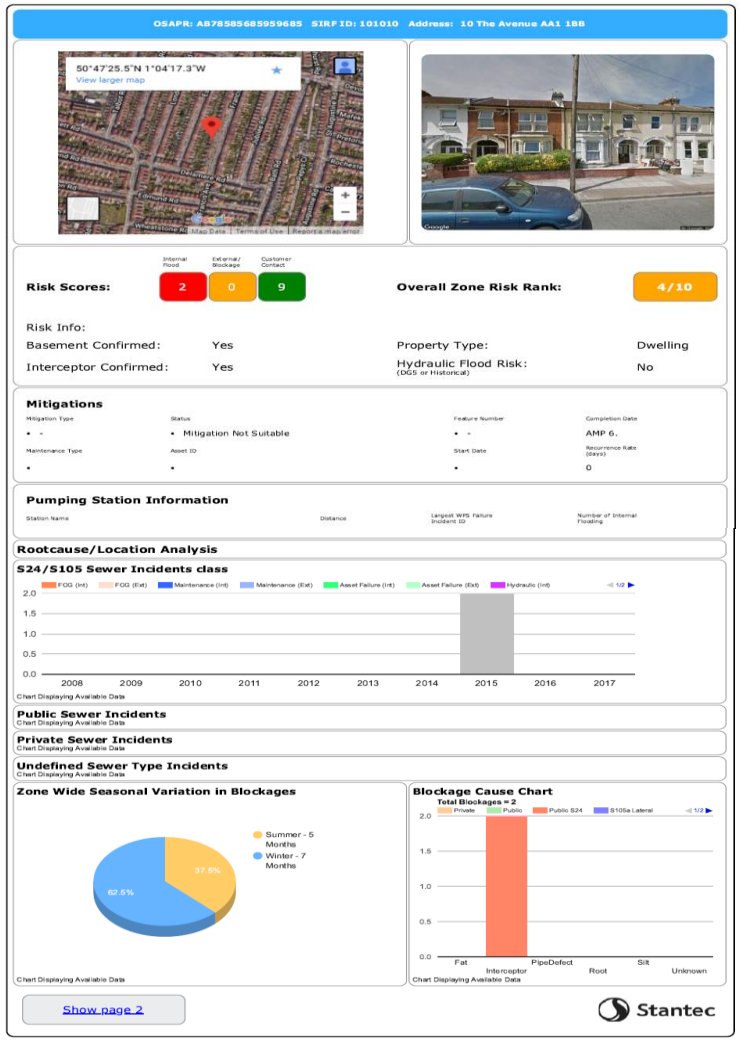


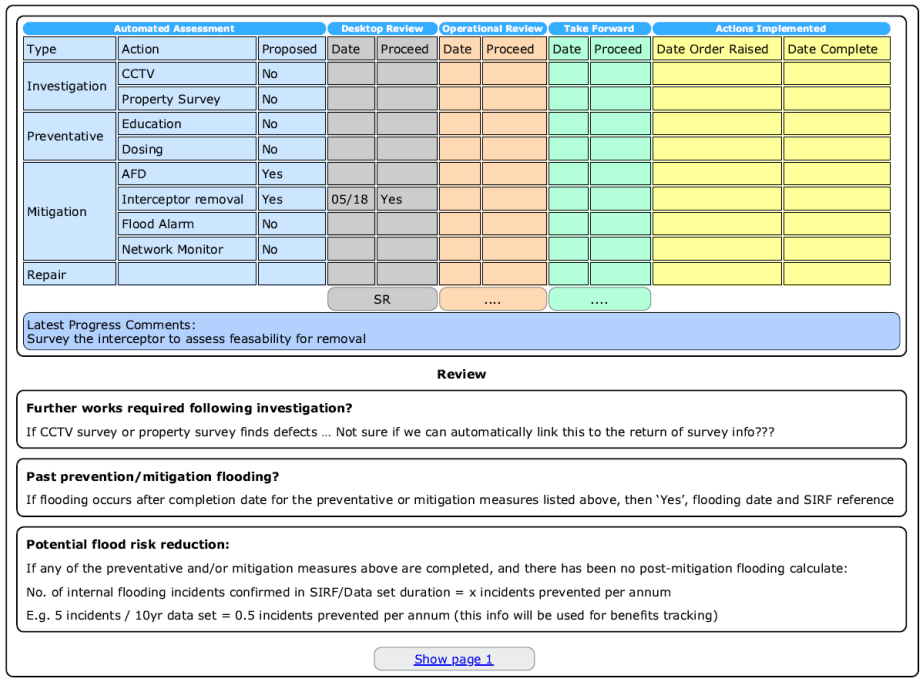
8 Million Lines
22 Datasets
32 Years



Data Analysis Solutions

Data Collection and Display





Automated Assessment			Desktop Review		Operational Review		Take Forward		Actions Implemented	
Type	Action	Proposed	Date	Proceed	Date	Proceed	Date	Proceed	Date Order Raised	Date Complete
Investigation	CCTV	No								
	Property Survey	No								
Preventative	Education	No								
	Dosing	No								
Mitigation	AFD	Yes								
	Interceptor removal	Yes	05/18	Yes						
	Flood Alarm	No								
	Network Monitor	No								
Repair										
			SR		....		....			

Latest Progress Comments:
Survey the interceptor to assess feasability for removal

Review

Further works required following investigation?
If CCTV survey or property survey finds defects … Not sure if we can automatically link this to the return of survey info???

Past prevention/mitigation flooding?
If flooding occurs after completion date for the preventative or mitigation measures listed above, then 'Yes', flooding date and SIRF reference

Potential flood risk reduction:
If any of the preventative and/or mitigation measures above are completed, and there has been no post-mitigation flooding calculate:
No. of internal flooding incidents confirmed in SIRF/Data set duration = x incidents prevented per annum
E.g. 5 incidents / 10yr data set = 0.5 incidents prevented per annum (this info will be used for benefits tracking)

Show page 1

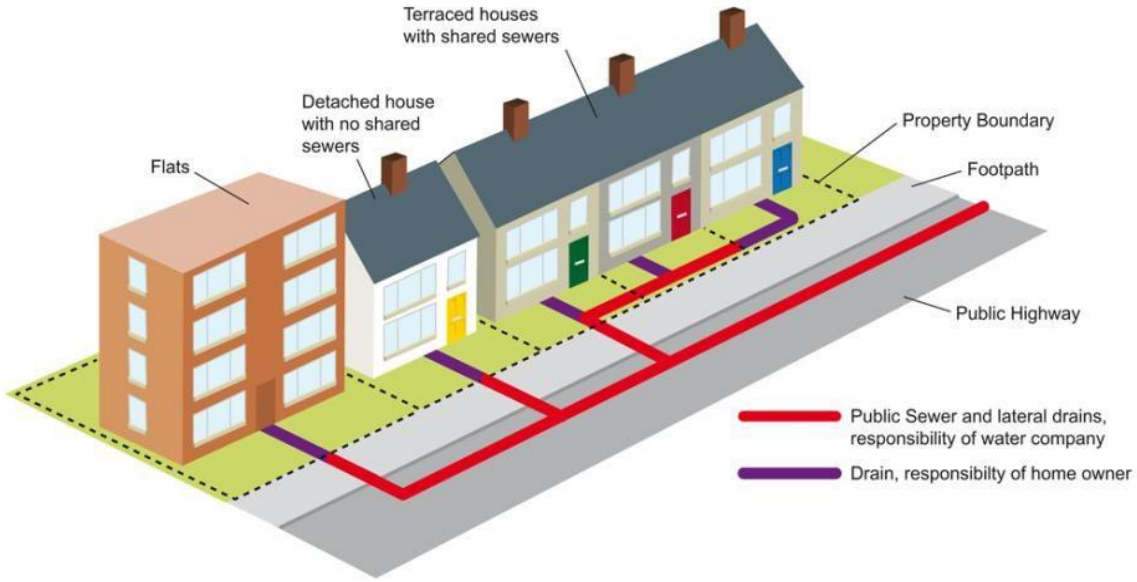
- Summary of properties used to review automated actions
- Used to track progress of individual property solutions
- Collates and displays all key information

- Mapping of Sewers
- Targeted FOG Dosing
- Property Level Alarms (PLA)

Operational Solutions

Operational Solutions

Mapping of Shared Sewers



- Data analysis used to identify properties with conflicting responsibilities for similar events.
- Shared sewers can be hard to identify onsite.

Operational Solutions

Targeted FOG Dosing

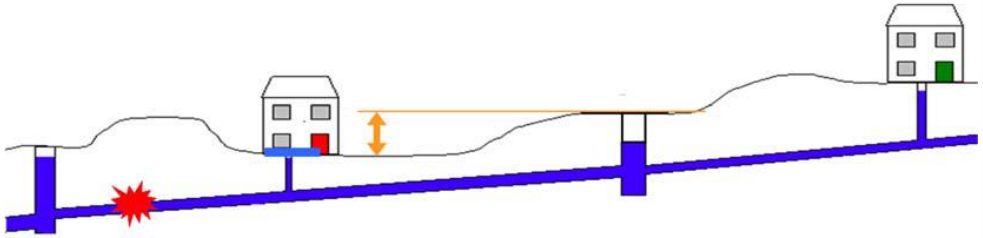
- Data Analysis used to identify clusters of FOG related issues
- FOG build up unable to be prevented by education alone.
- Discussion with Operational team to identify key locations for in network dosing

FOG build up changes over 3 months.

Operational Solutions

Property Level Alarms

- Data Analysis used to identify properties flooding due to blockages
- Removed properties also at risk of hydraulic overload
- Property visit to review if levels indicated no warning is possible within the network

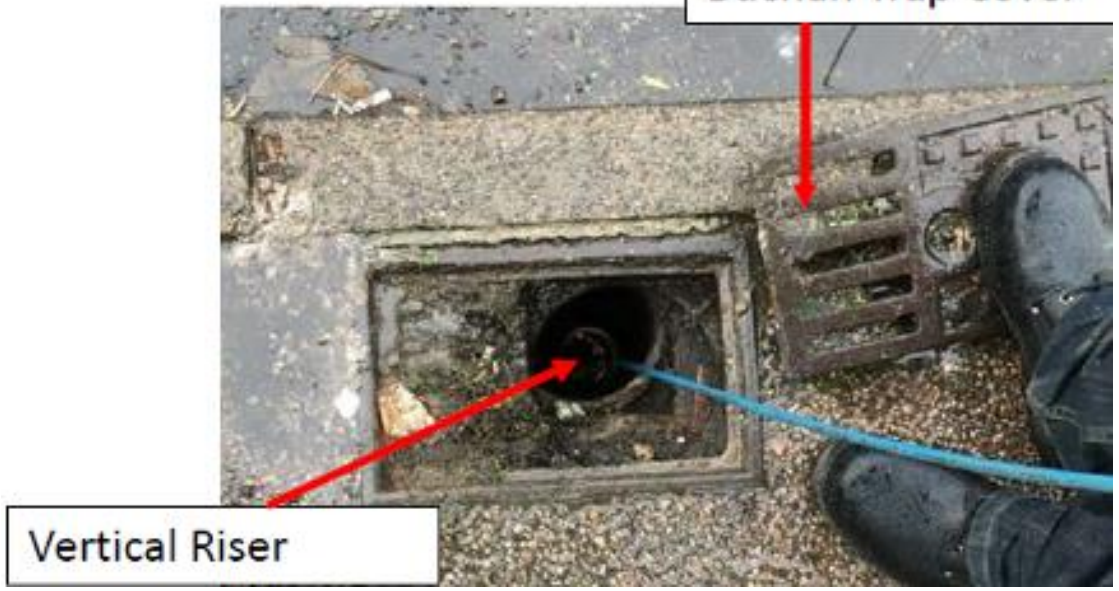


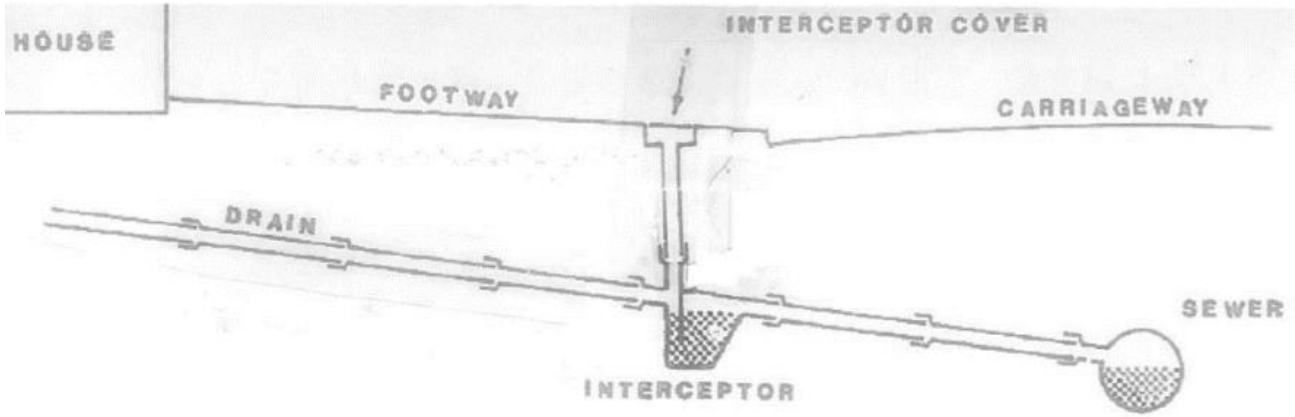
Buchan Traps

Example Case Study

Case Study
Buchan Traps

Buchan Trap – What are they





Case Study
Buchan Traps

Buchan Trap – Flooding in waiting

Case Study
Buchan Traps

Buchan Trap – Identifying the Problem

- 776 Properties Checked for traps
- 50 Surveys to re-attempt
- 474 Traps Mapped
- 52 Identified for removal
- 51 Identified for fix or cleaning
- 26 Dosing Completed

Case Study
Buchan Traps

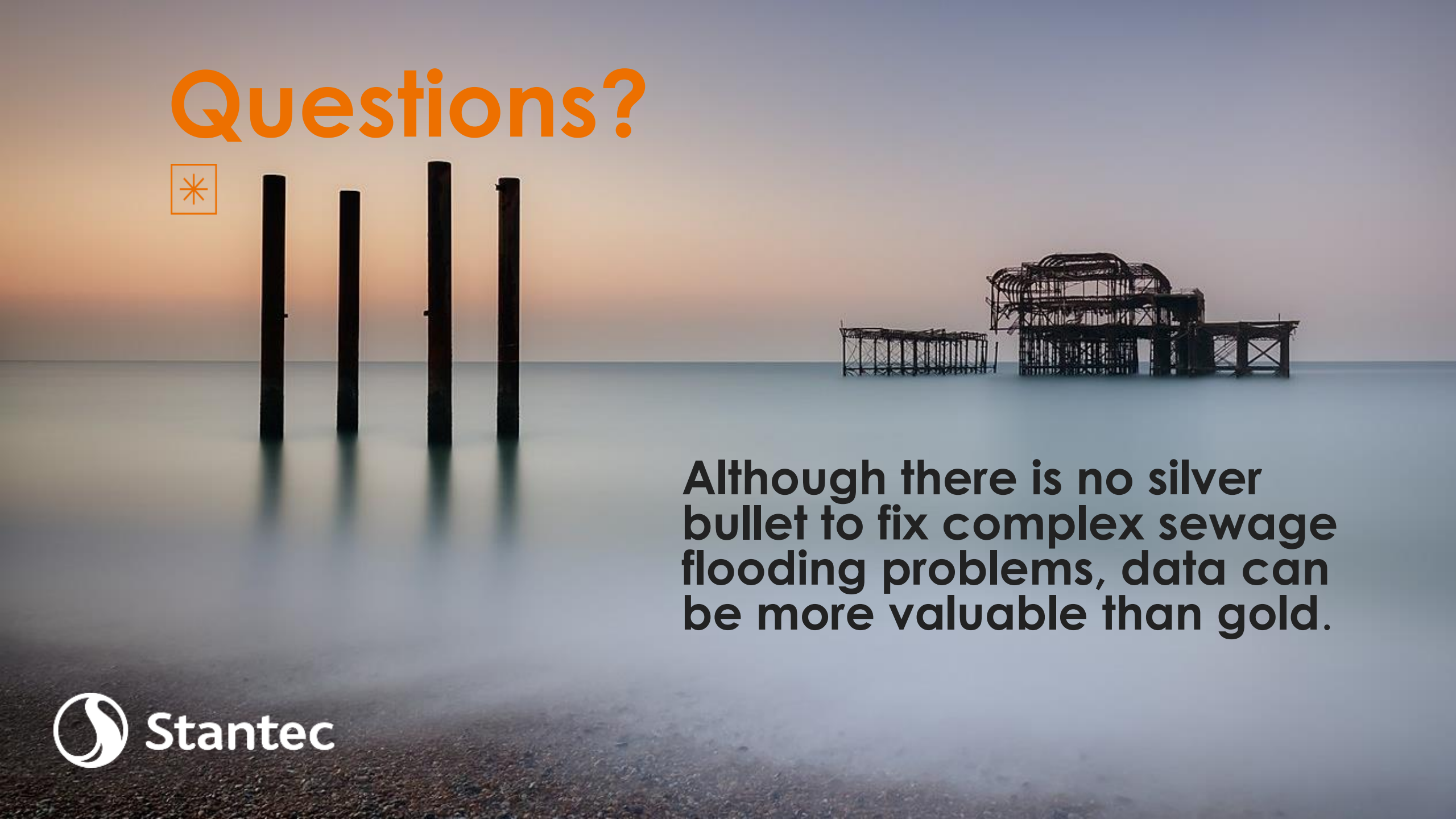
Buchan Trap – Implementing Solutions

- Removal of shallow easy to access Traps
- Cleaning of Sediment filled traps
- FOG Dosing of FOG identified traps (trial)
- Repair of Damaged lids and Riser
- Installation of Alarms on known deep problem traps

Conclusions

- “You can have data without information, but you cannot have information without data”
- Know your data and how “murky” it is
- Use data to understand the problems
- Use process/decision making automation where possible

Questions?



Although there is no silver bullet to fix complex sewage flooding problems, data can be more valuable than gold.

Stantec