



Pressure management optimisation – squeezing the last drop!

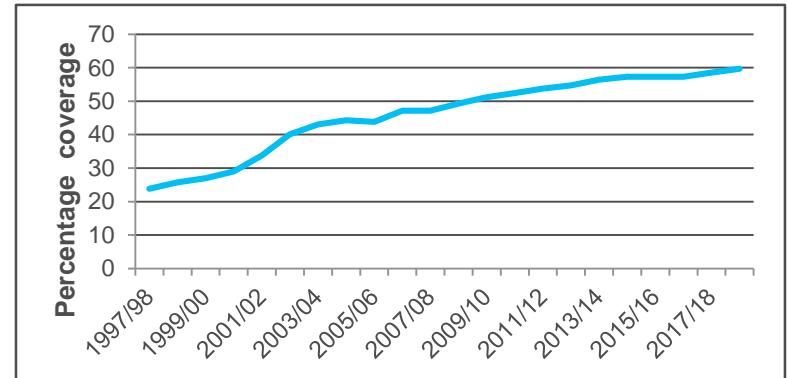
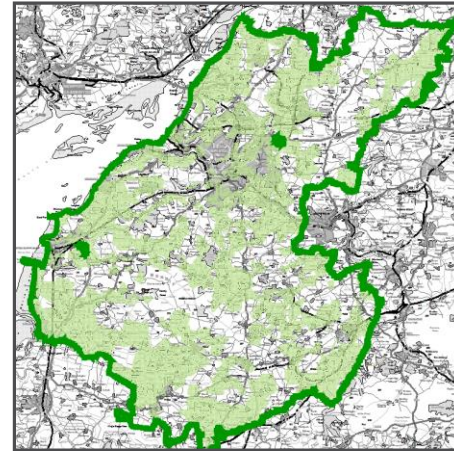
Lucy Pocock, Product Support Engineer, Optimatics

Frank van der Kleij, Head of Asset Risk and Planning,
Bristol Water

Future Water Networks – 7th November 2019

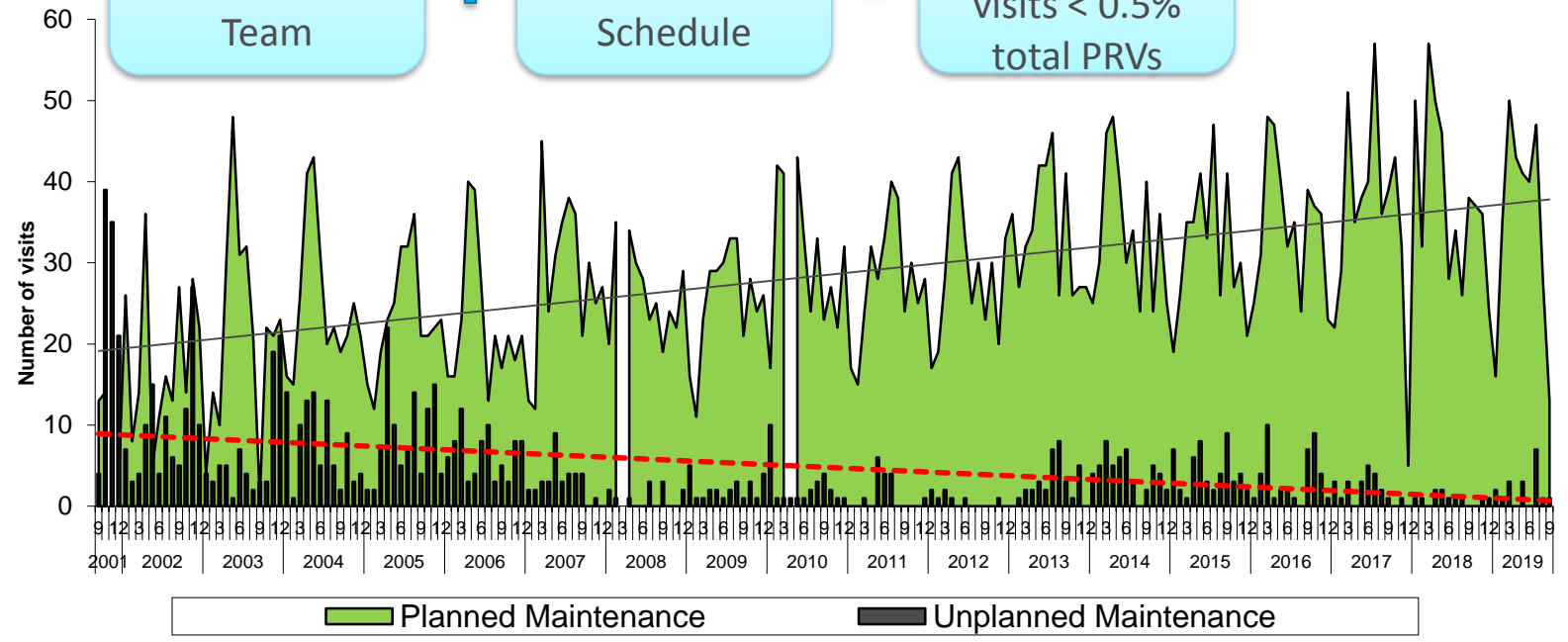
Pressure Management in Bristol Water

- Part of Waste of Water Action Plan since early 1980s – increased activity 1998 onwards
- 600 pressure control areas – 870 prop/area
 - Fixed outlet 90%
 - Flow/ Pressure Modulation 10% and increasing
- Properties on pressure control 24% (1998) – 60% (2018)
- Target point design pressure – 15mH
- Significant long term savings made in reduction in background leakage and burst reduction





Doing the basics right! - Maintenance



Raw Water Quality of Sources

Pressure Management

✓
Mains Repairs

✓
Customer Minutes Lost

✓
Leakage

✗
C-Mex

✗
Low Pressure

Void properties
2025 target: 1.8%

Per Capita Consumption (annual) (litres/head/day)
2025 target: 135

Water industry national environment programme (WINEP) compliance
2025 target: 100%

Waste disposal comp
2025 target: 100%

Turbidity performance (no. of failures) at treatment works
2025 target: 0

Unplanned maintenance (no. of jobs) – non-infrastructure
2025 target: 3272

Customer measure of exp
2025 target: TB

Leakage (annual) (MI/d)
2025 target: 36.5

Supply Interruptions (Minutes/property/year)
2025 target: 01:48

Perce
in wat
2025 t

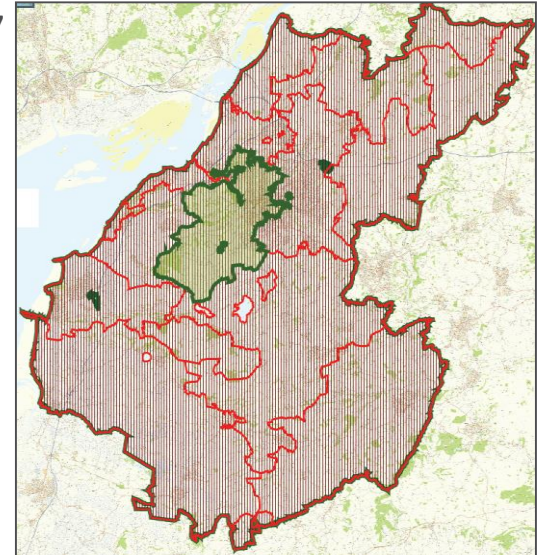
Population at risk from asset failure
2025 target: 290,000 people

Local community satisfaction (stakeholders)
2025 target: 85%

Average household bill in 2025: £172 (in 2017/18 prices)

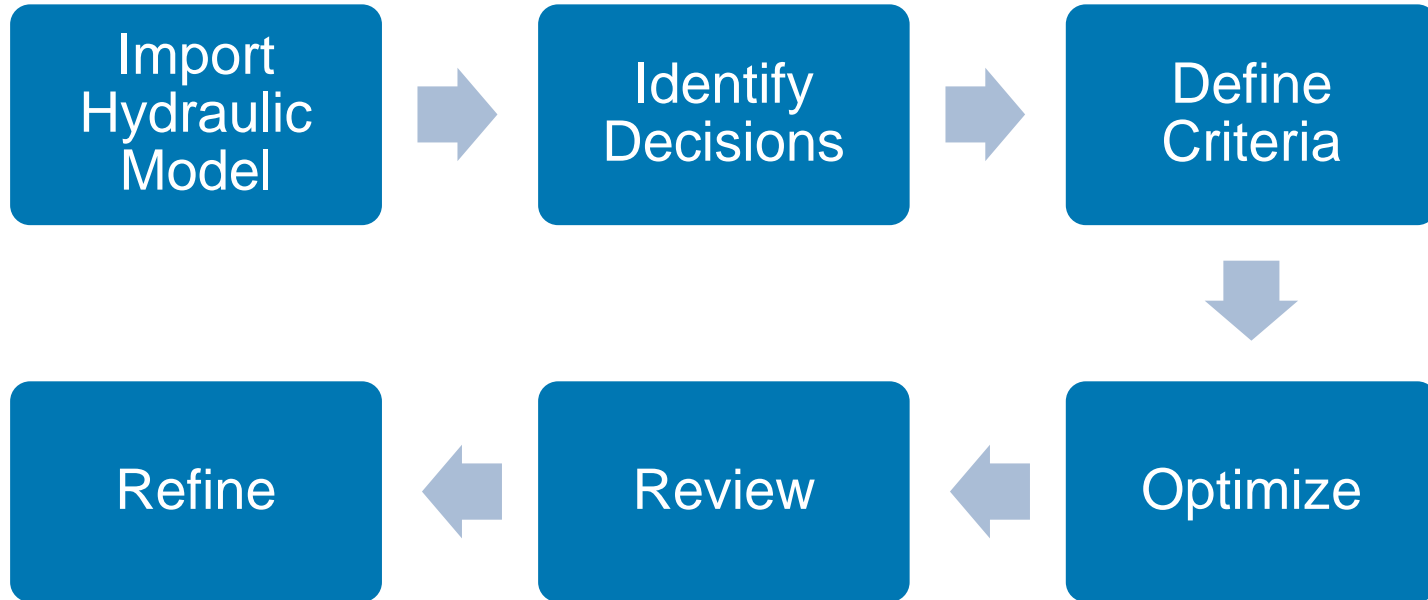
Doing things differently - Optimizer project

- Explore opportunities for an enhanced scheme identification process - AMP 7 preparation
- Maximise the use of hydraulic modelling capability
- Assess the effectiveness of optimisation software including its ease of use, algorithm performance and scalability
- Identify the potential to reduce Capital and/or Operational costs
- Enhance the use of network data & information
- Barrow TW zone pilot:
 - 122,989 properties (25% of total properties)
 - 1,107 km mains (16% of total mains length)

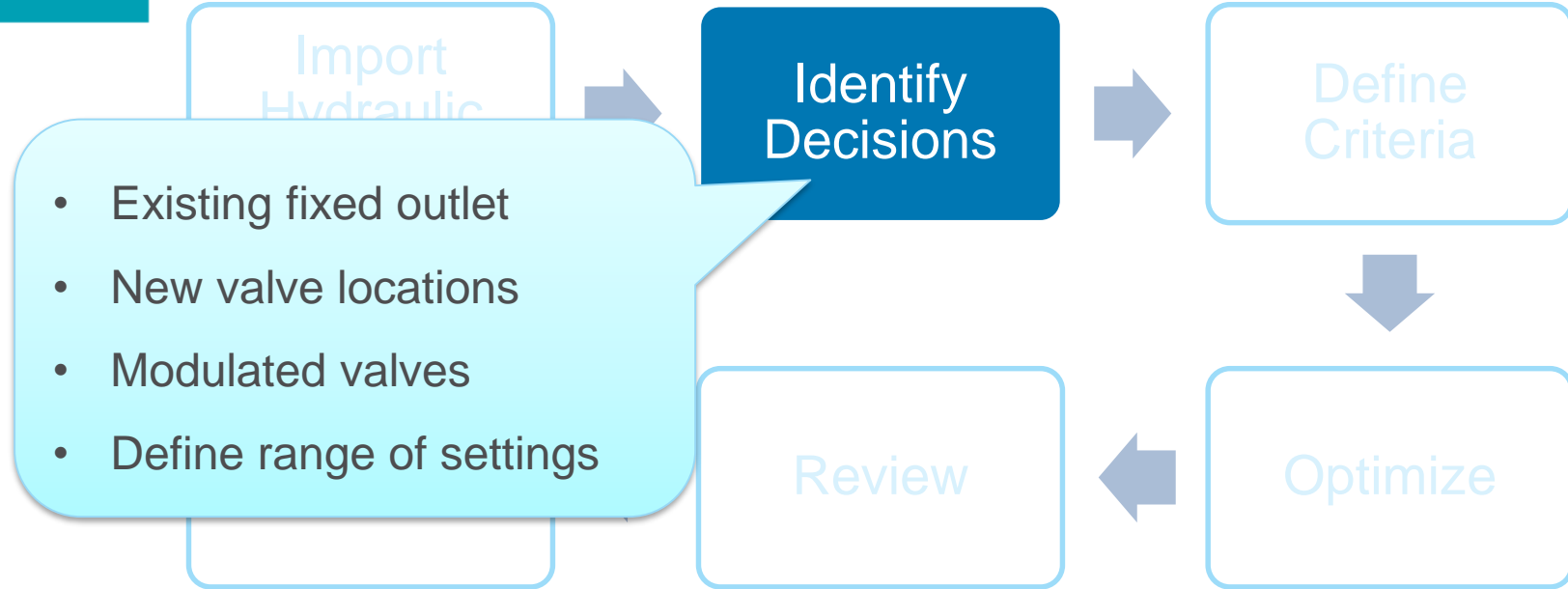




Optimization Process



Optimization Process



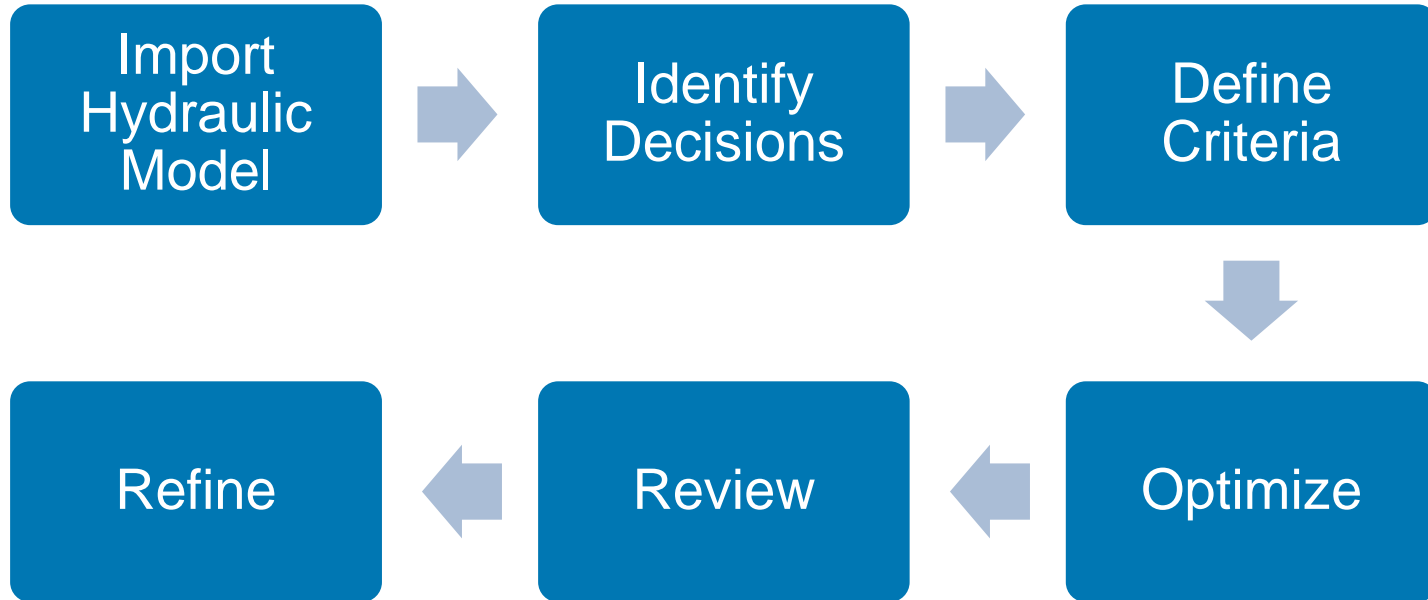


Optimization Process



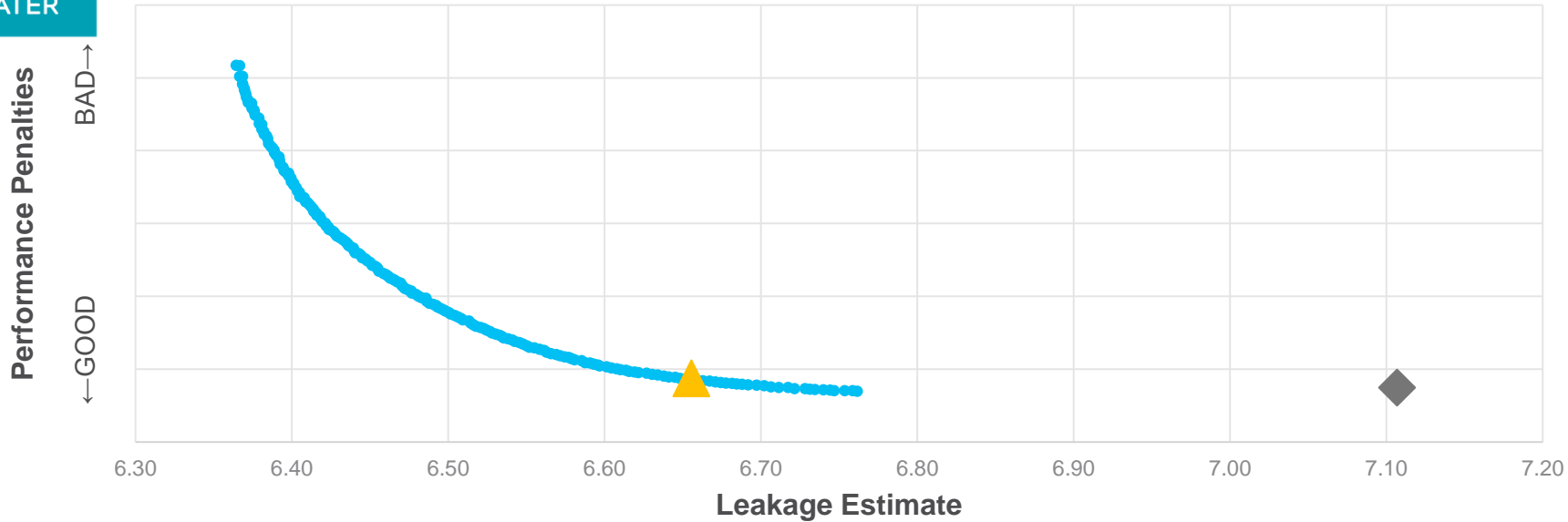


Optimization Process



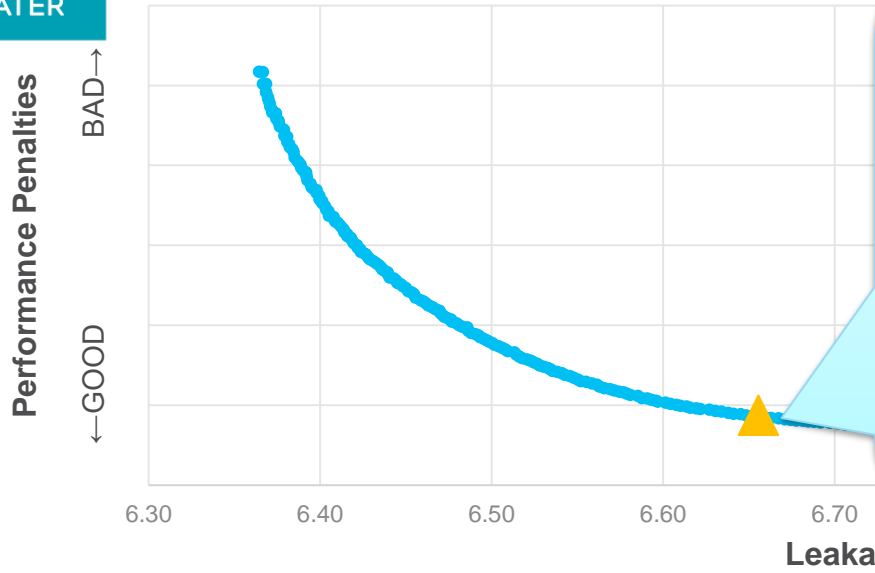


Optimization Results



- Pareto Curve
- ◆ Existing
- ▲ Pareto Point 1

Optimization Results



- 4 PRV settings maintained
- 9 PRV settings increased
- 49 PRV settings decreased

VALVE	EXISTING	PARETO POINT 1
Valve 38751	Setting: 25.00	Setting: 23.00
Valve 45908	Setting: 39.00	Setting: 24.00
Valve 46236	Setting: 26.00	Setting: 20.00

• Pareto Curve ◆ Existing ▲ Pareto Point 1

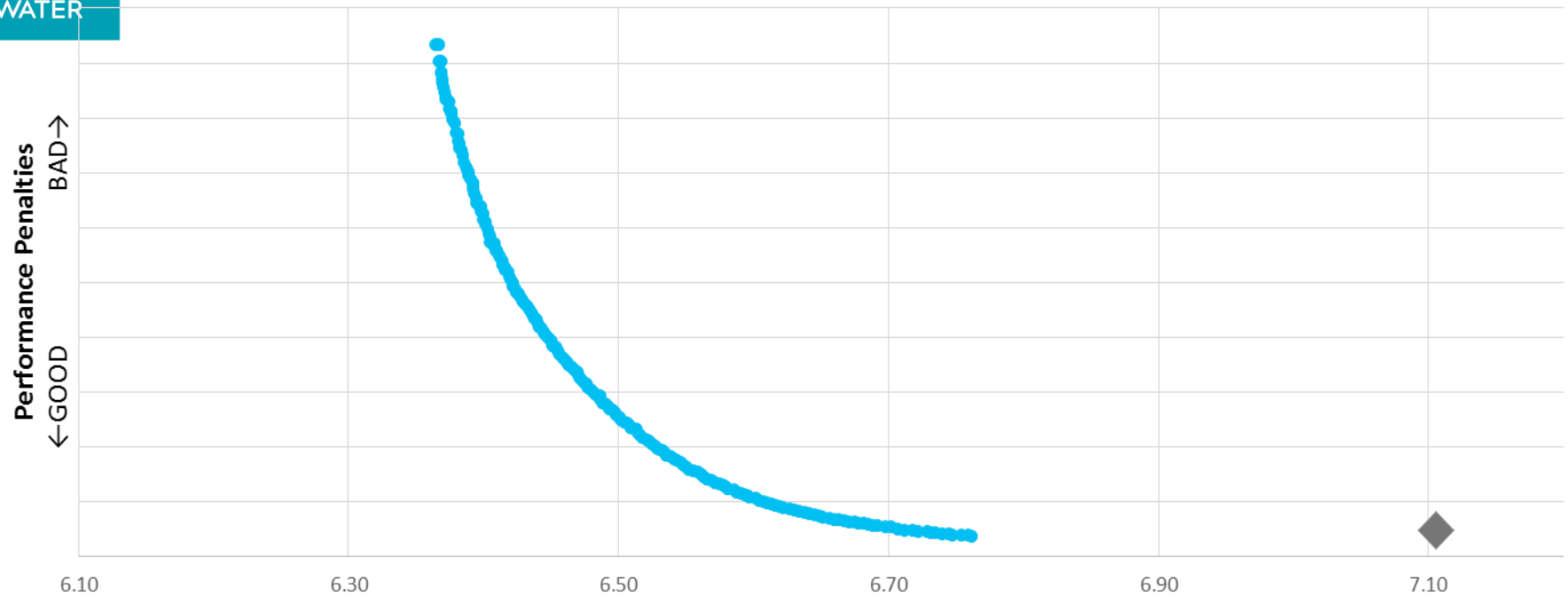


Optimization Results

	Existing	Pareto Point 1	Change
Pressure penalty	5,626,924	5,850,453	
Tank level penalty	3,866,466	3,898,403	
Total Nodes < 15m	283	380	
Performance Penalties	9,493,390	9,748,856	< 3% INC
Leakage Estimate	7.107	6.656	6.4% DEC



Scenario Optimization

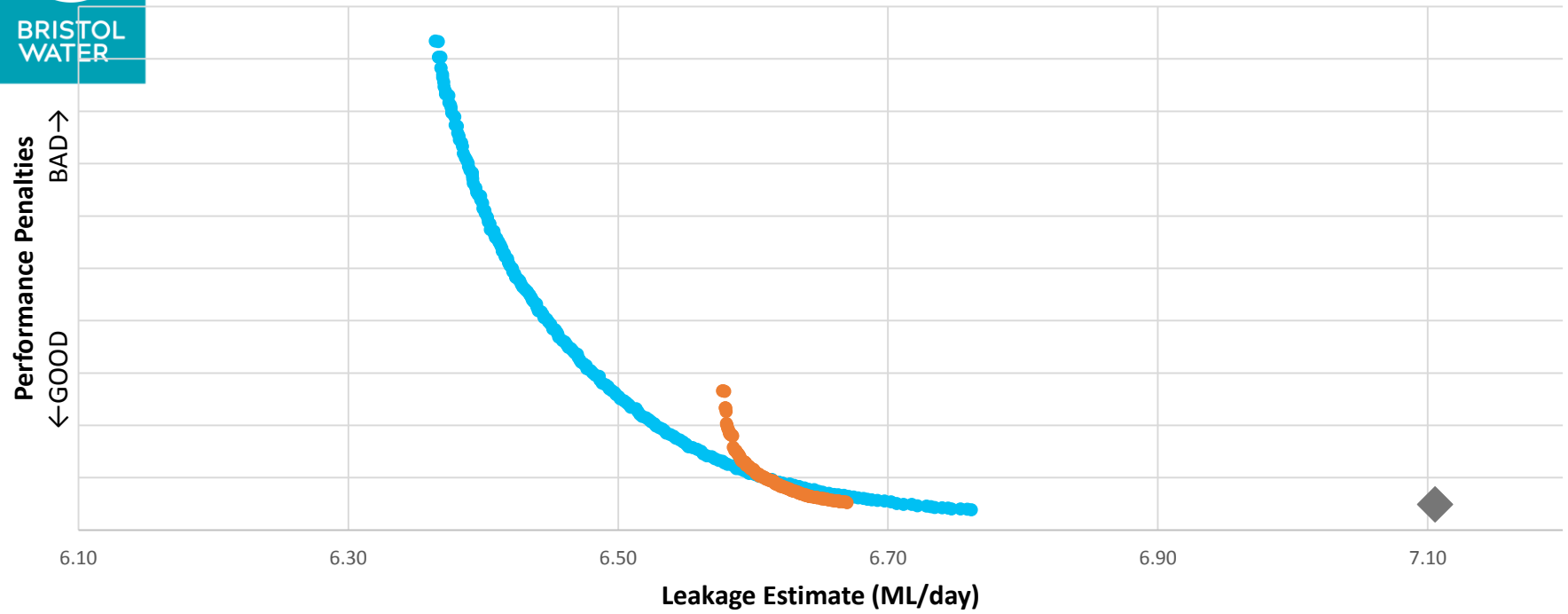


◆ Input ● Fixed





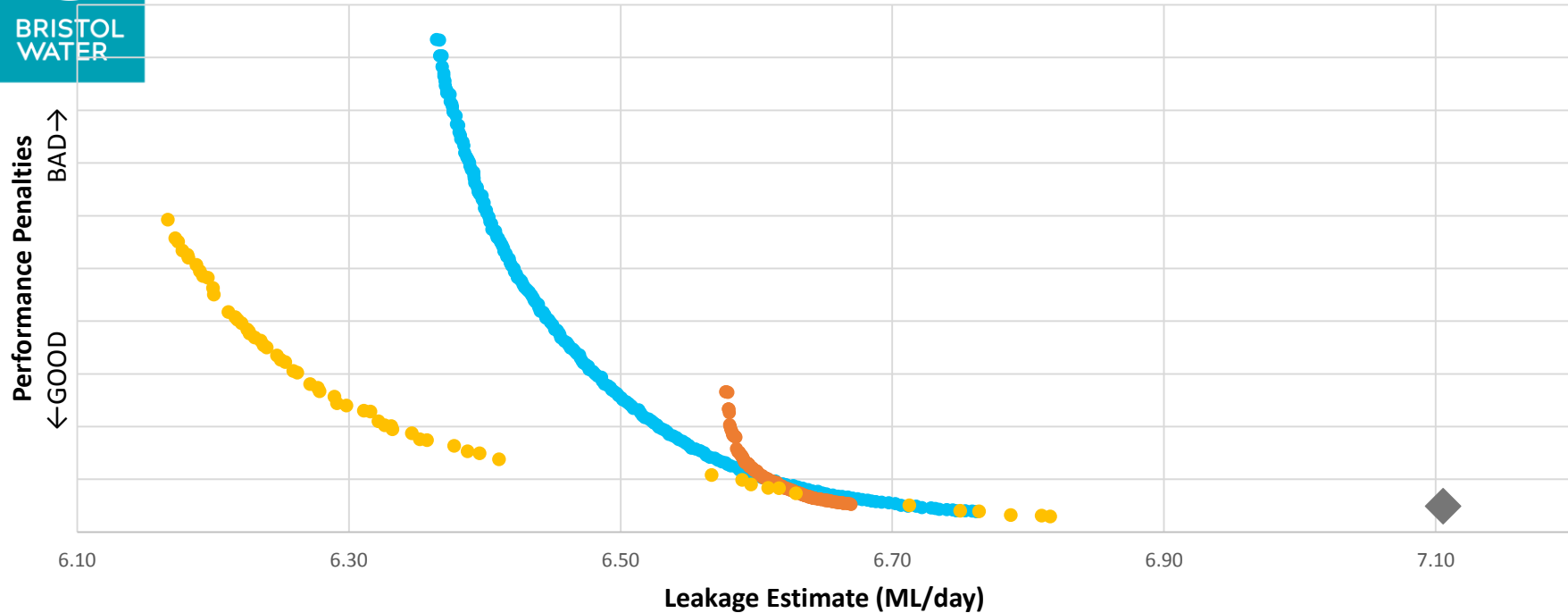
Scenario Optimization



◆ Input ● Fixed ● Time Control - Night



Scenario Optimization



◆ Input ● Fixed ● Time Control - Night ● 1 New Valve



Optimization – Conclusions & Next Steps

- **Conclusions:**
- Reducing leakage with existing infrastructure
- Identify opportunities for further reduction
- Improved process for identifying new schemes – enhancement from Manual process
- Enhancing the capability of hydraulic models – adding value
- Evaluate trade off between performance and leakage
- Informed and improved Asset Planning Intervention process
- **Next steps:**
- Prioritize the opportunities identified (high/medium/low yield)
- Validate the results
- Outline design of pressure control scheme



Thank you

Optimatics