Distribution System Optimization

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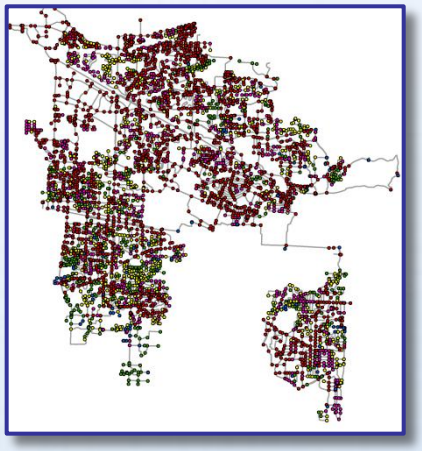
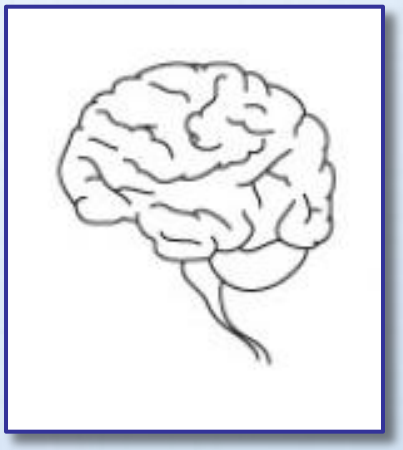
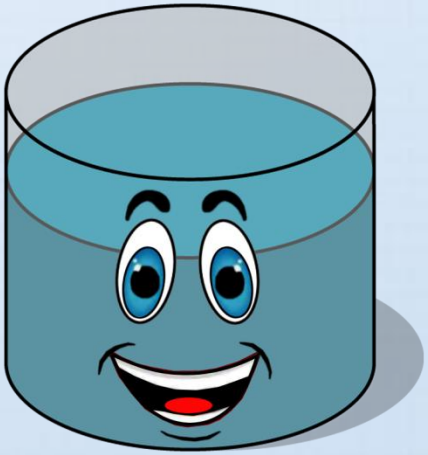
Engineers...Working Wonders With Water®

Your can use your model and your brain to do a lot more with the distribution system you already have



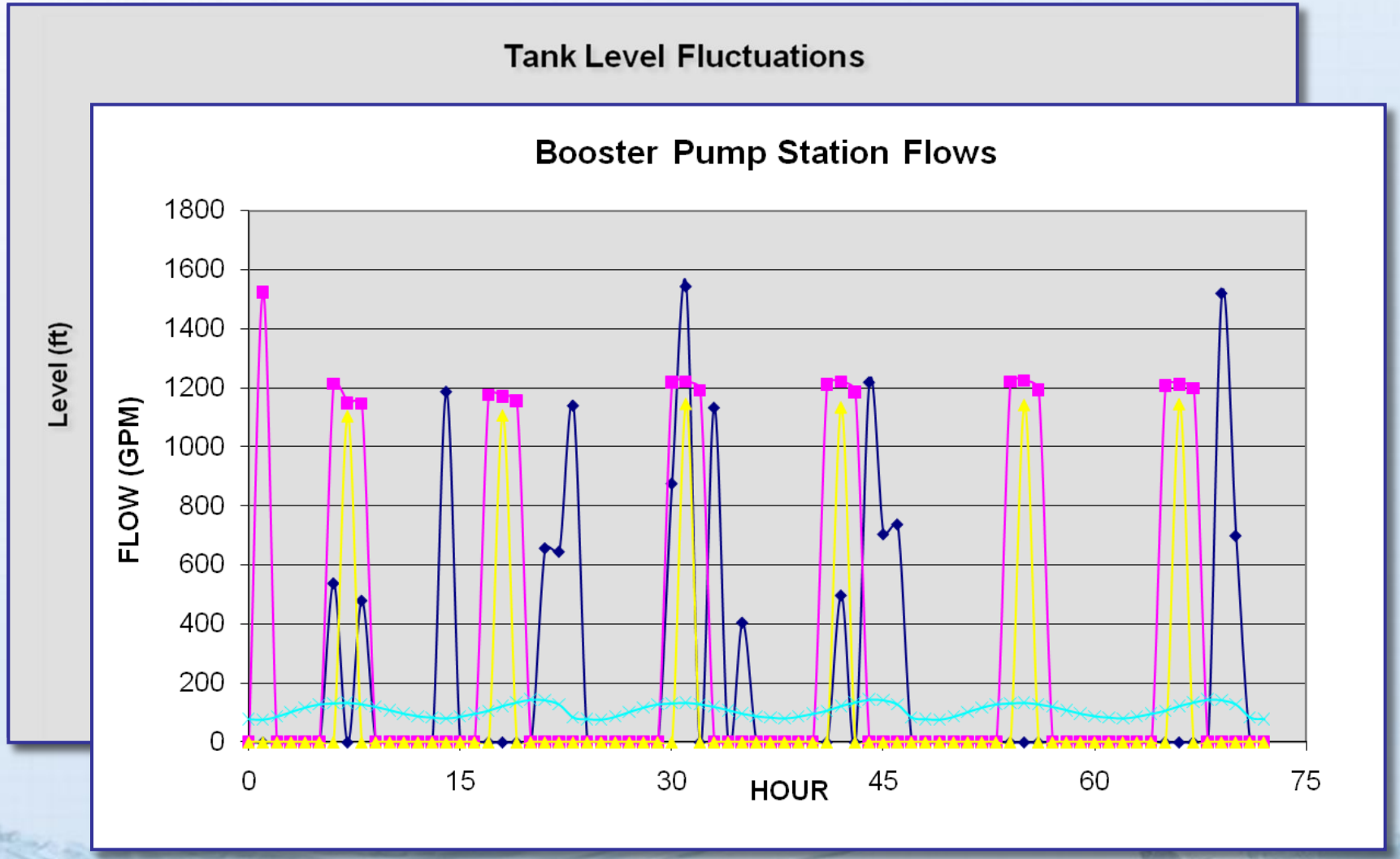




A well-managed distribution system is a happy distribution system

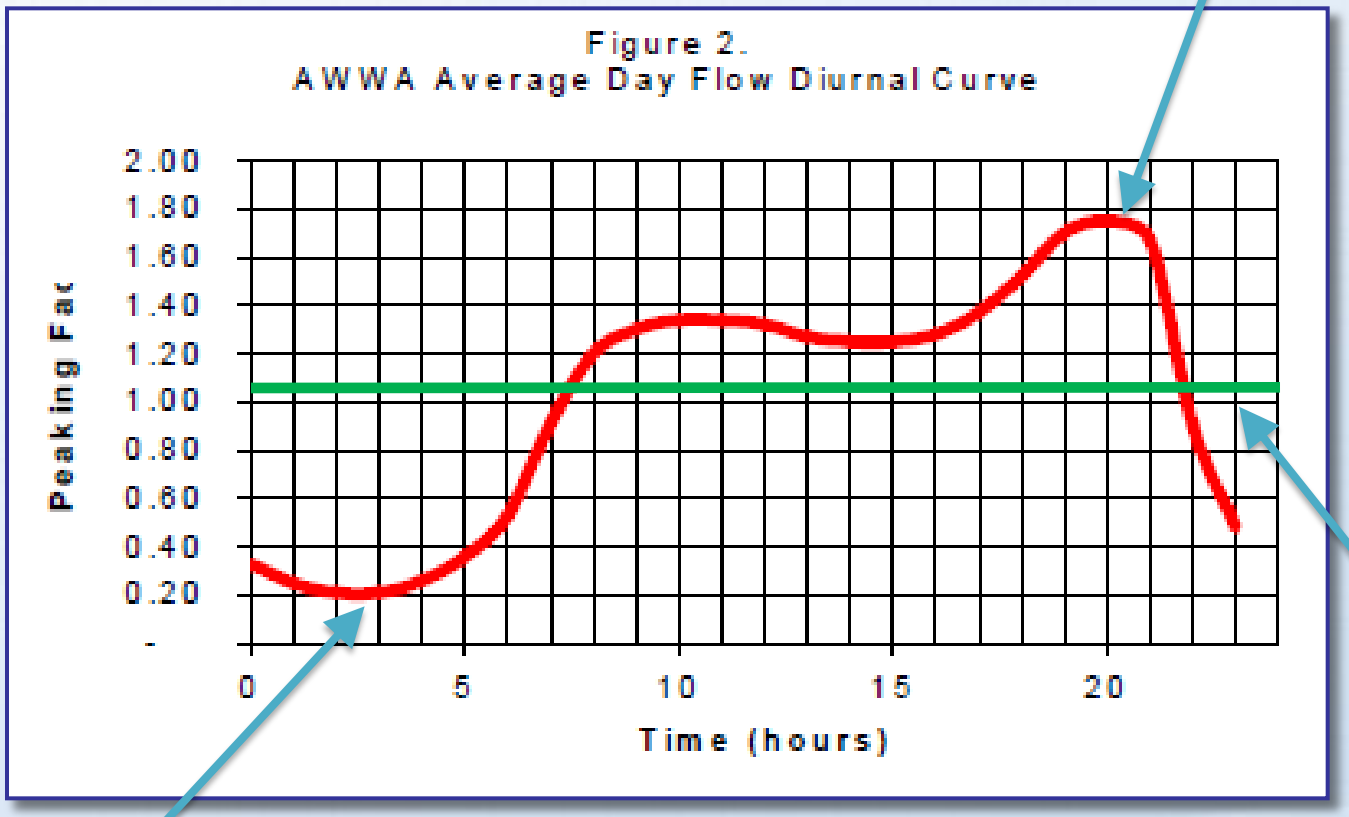
- Control water age
- Make optimal use of existing storage to avoid construction of new storage
- Maintain system pressures
- Manage mixing of different source waters

Distribution system optimization requires a model that runs in extended period simulation (EPS)



EPS requires a diurnal curve

Captures PHD



ADD
or
MDD

Captures Minimum

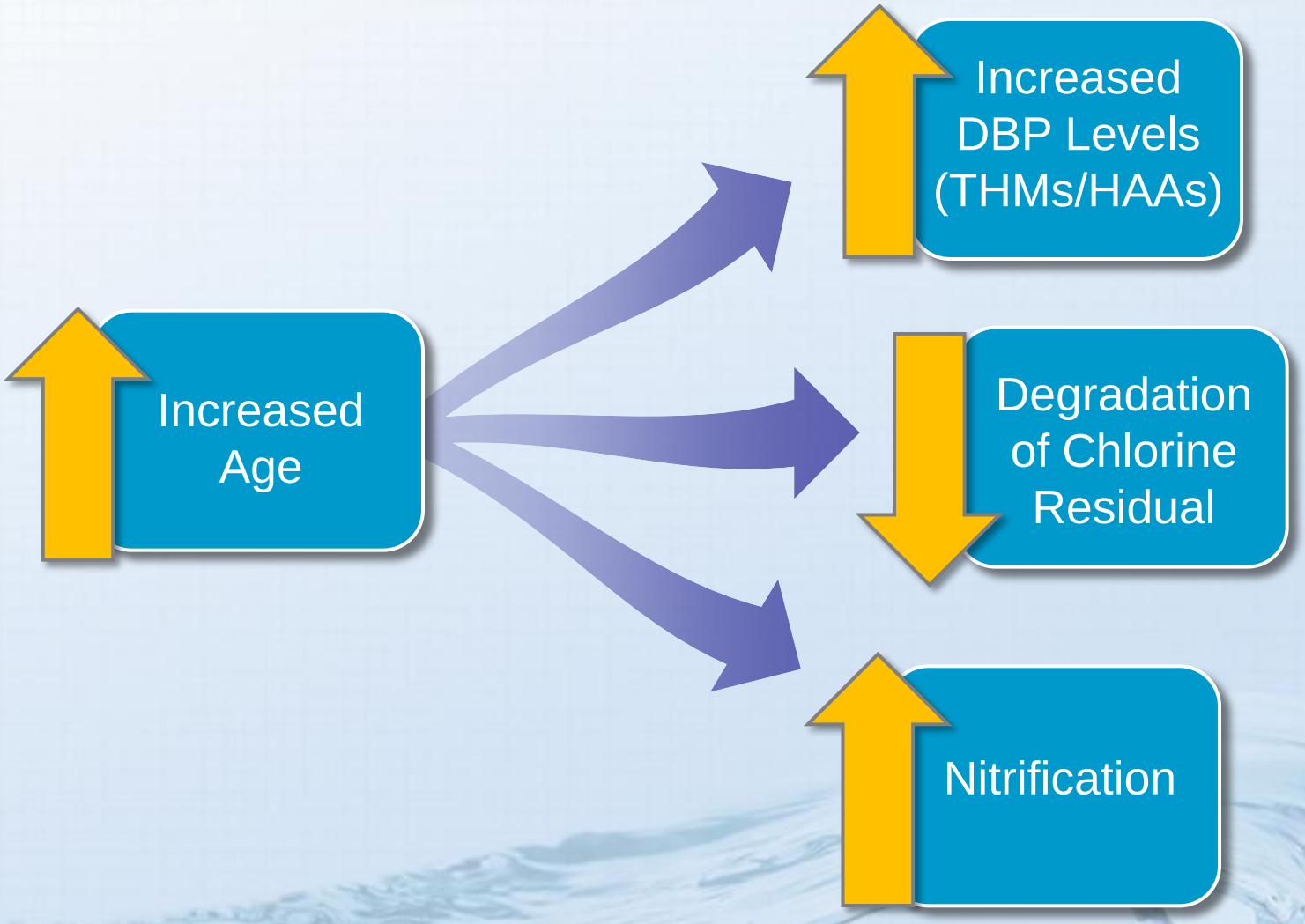
You really need an accurate, system-specific diurnal curve

A hydraulic model will not do your thinking for you

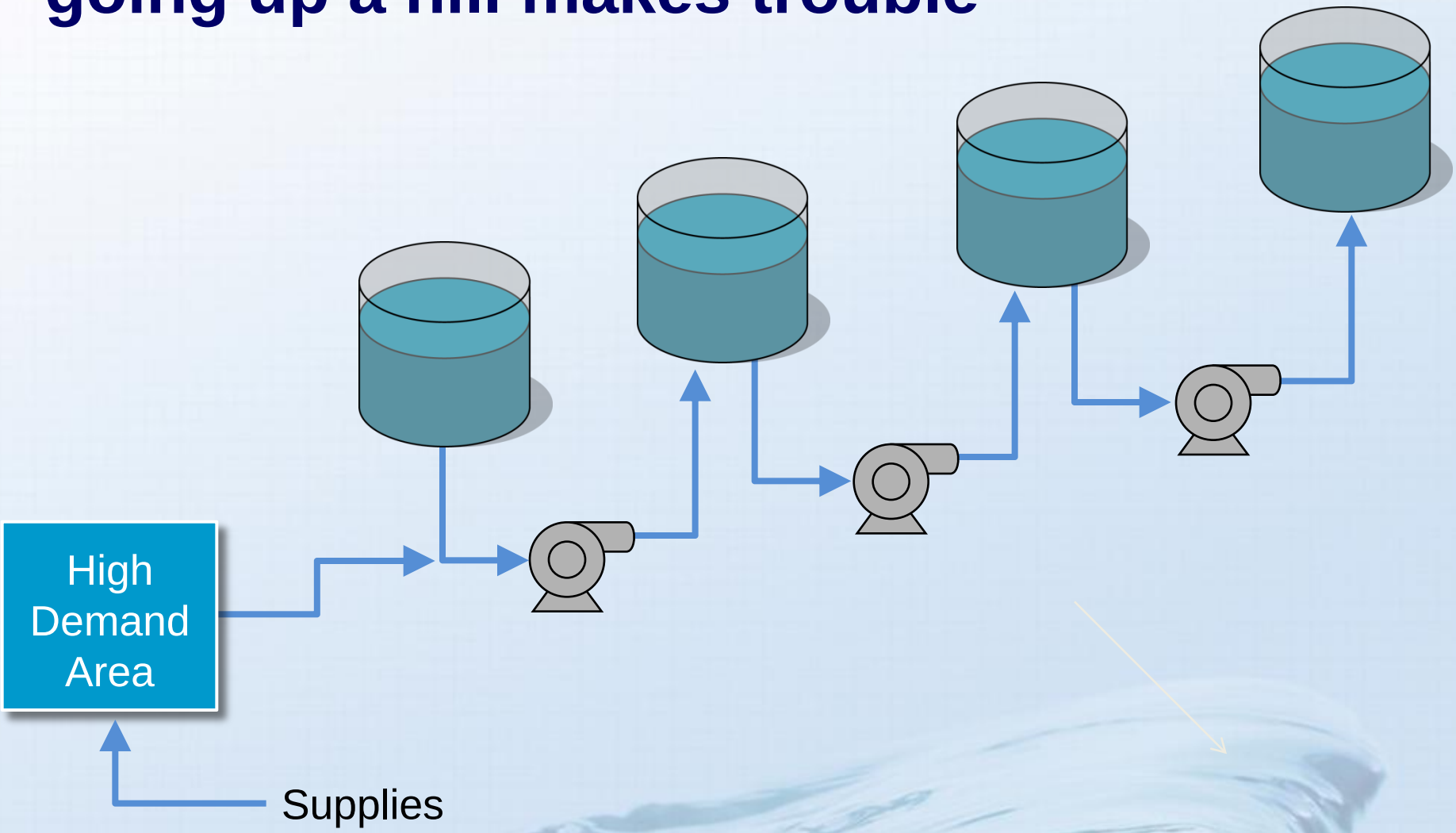
Operations Challenges → Potential Approach → Model Used to Verify Approach → Model Outputs Used to Refine Approach → Potential Approach

Water Age Management

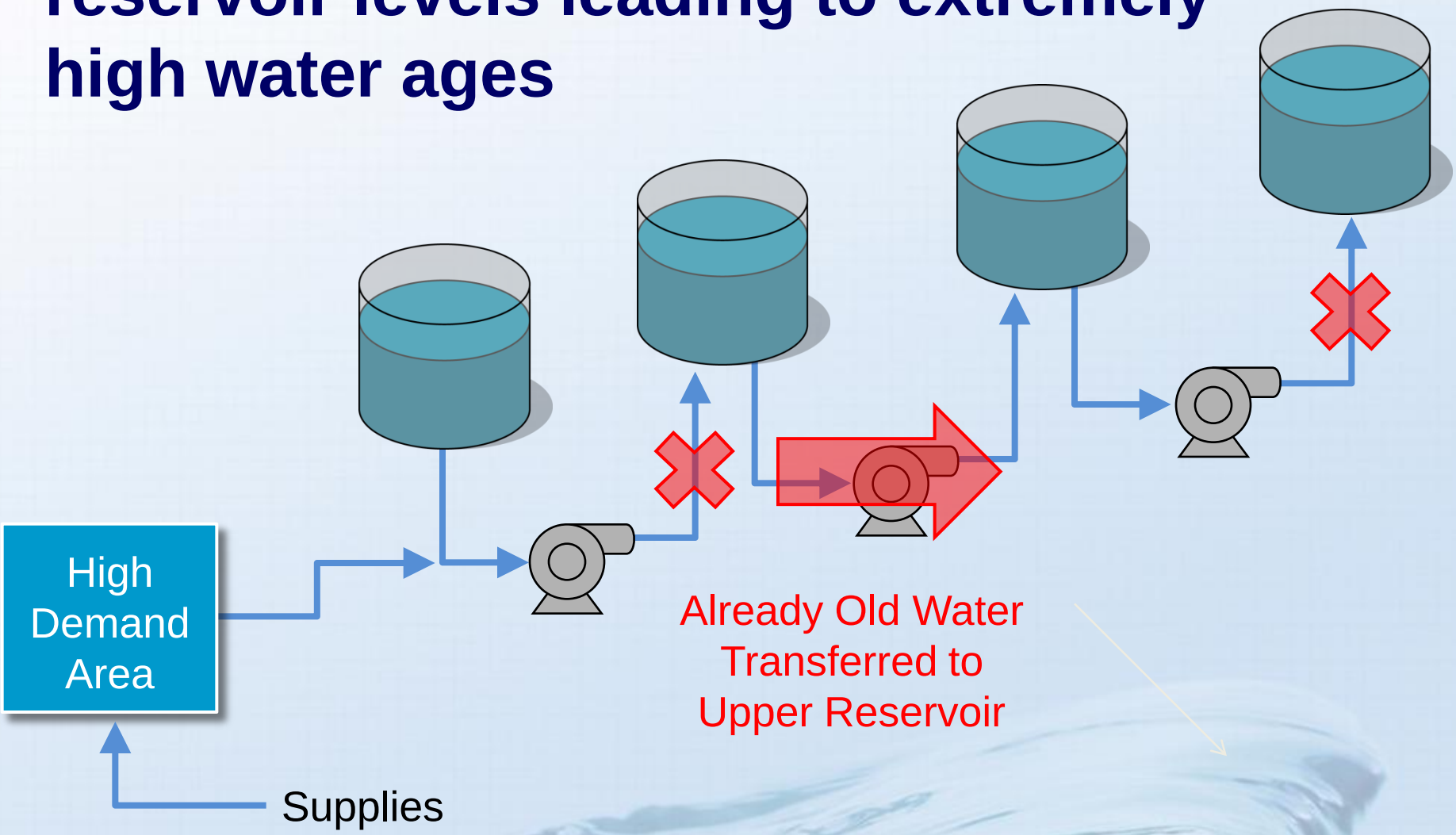
Water age management can preclude numerous water quality challenges



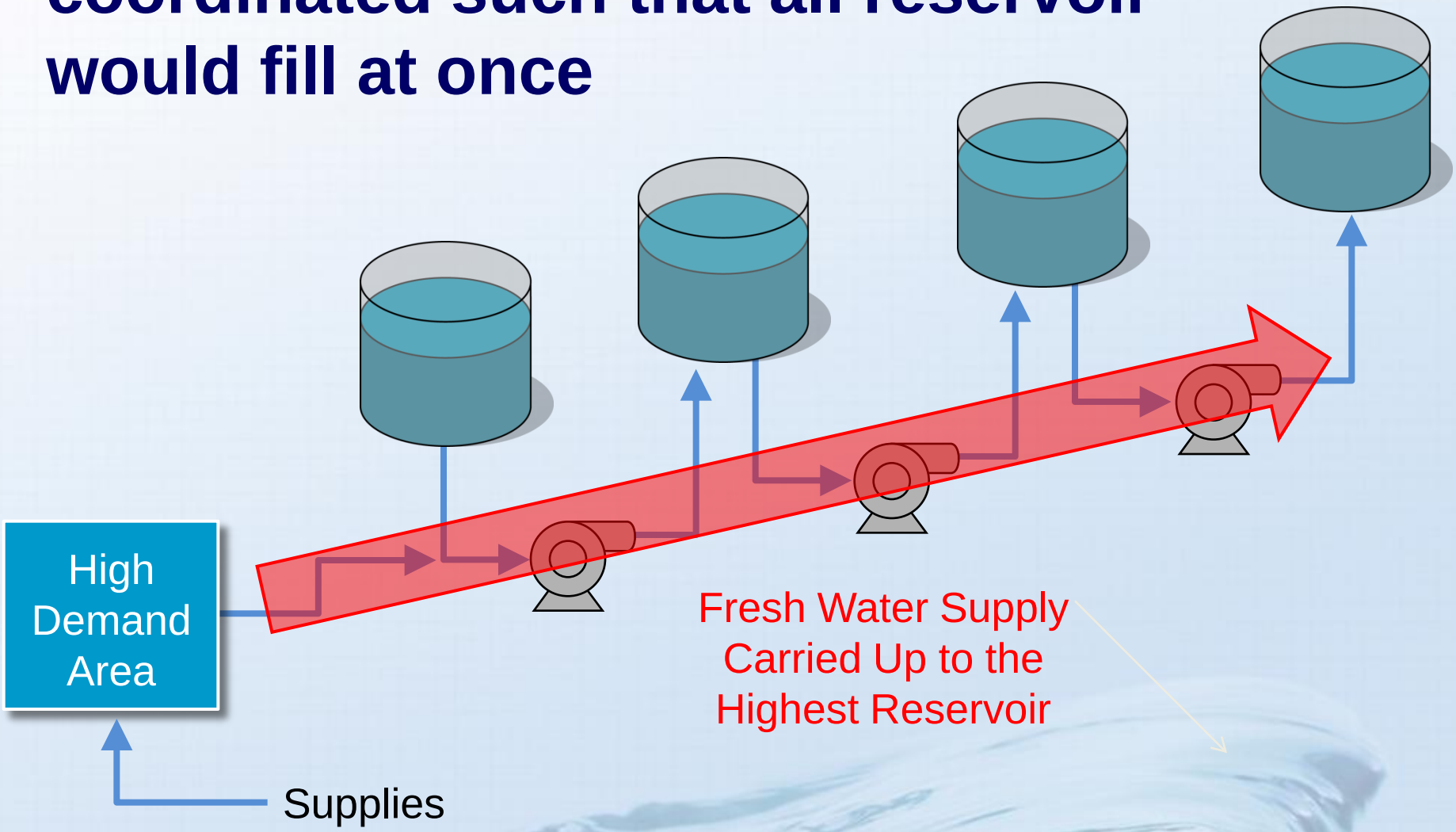
Case Study 1 – A chain of reservoirs going up a hill makes trouble



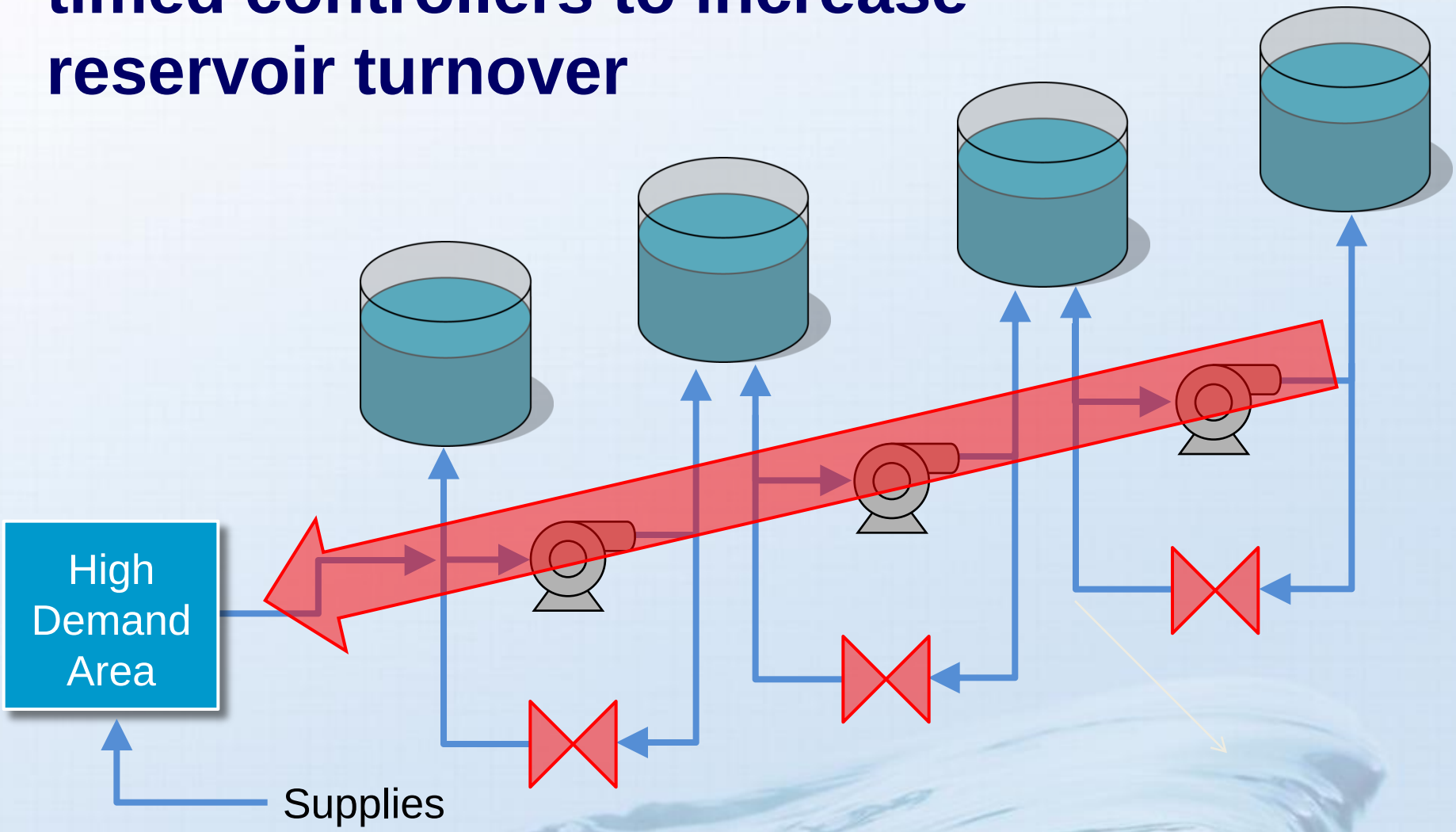
Original controls were based on reservoir levels leading to extremely high water ages



Pump station controls were instead coordinated such that all reservoir would fill at once



PRVs were also installed and put on timed controllers to increase reservoir turnover

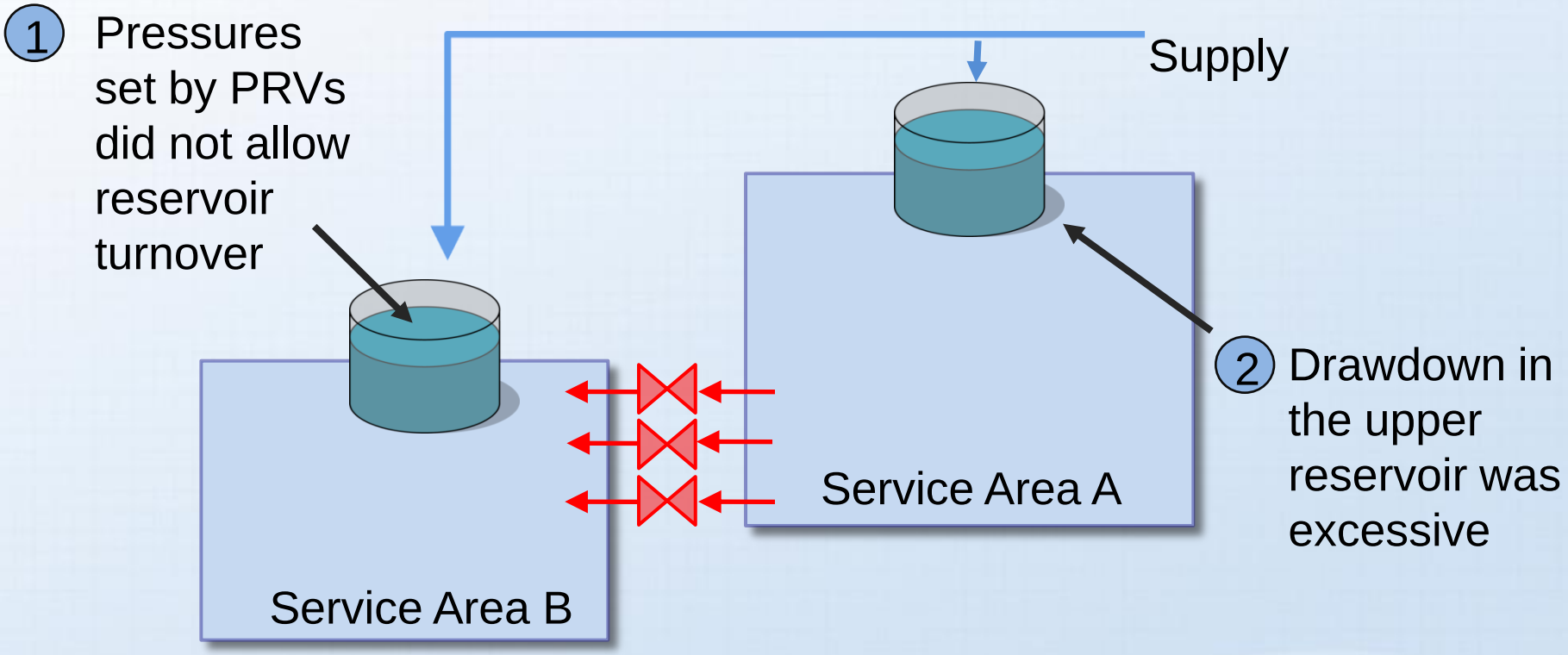


Like for many utilities, improved water quality came at the cost of higher energy costs

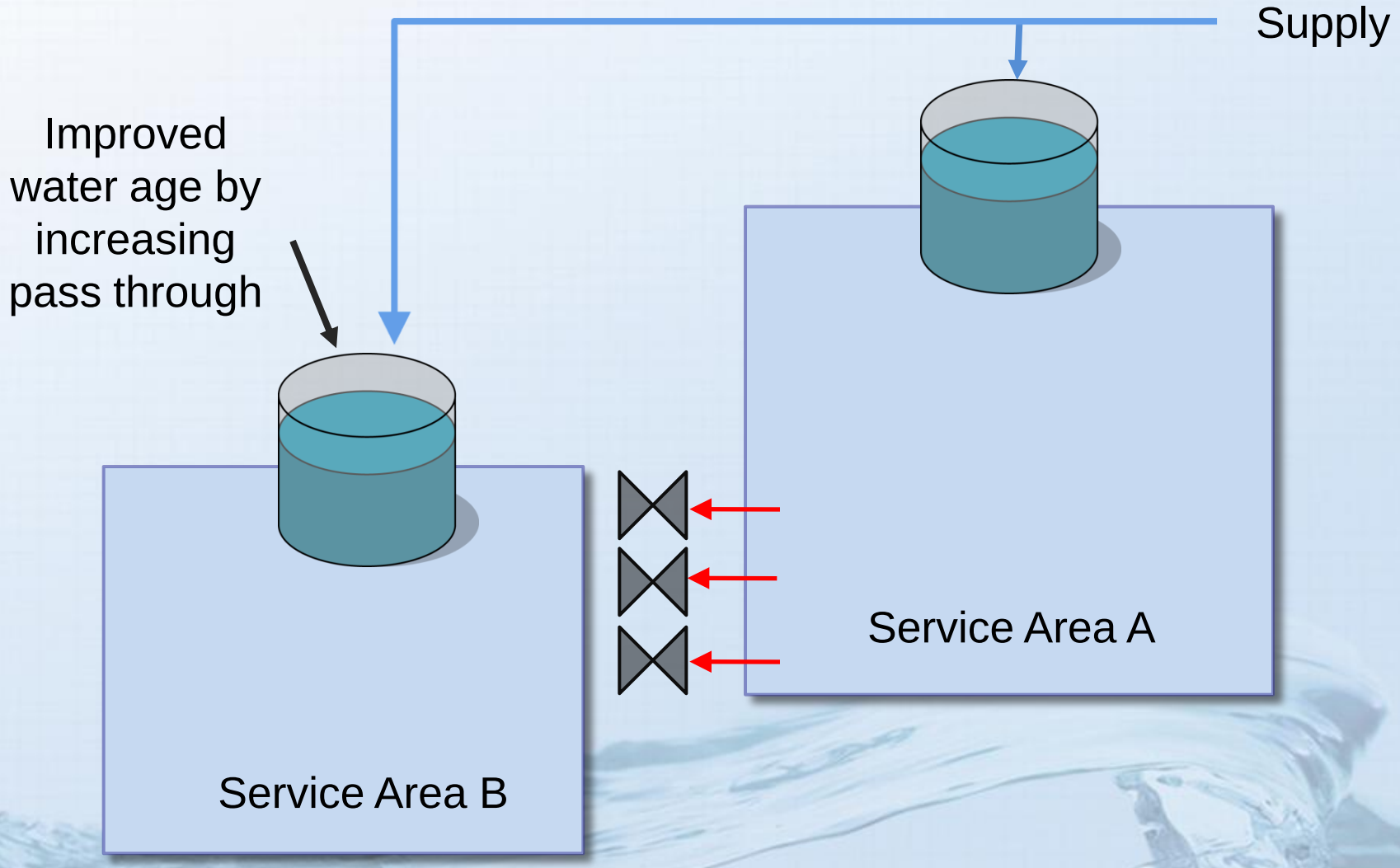
Reduced Water Age and Improved Water Quality

Energy Costs for Increasing Turnover

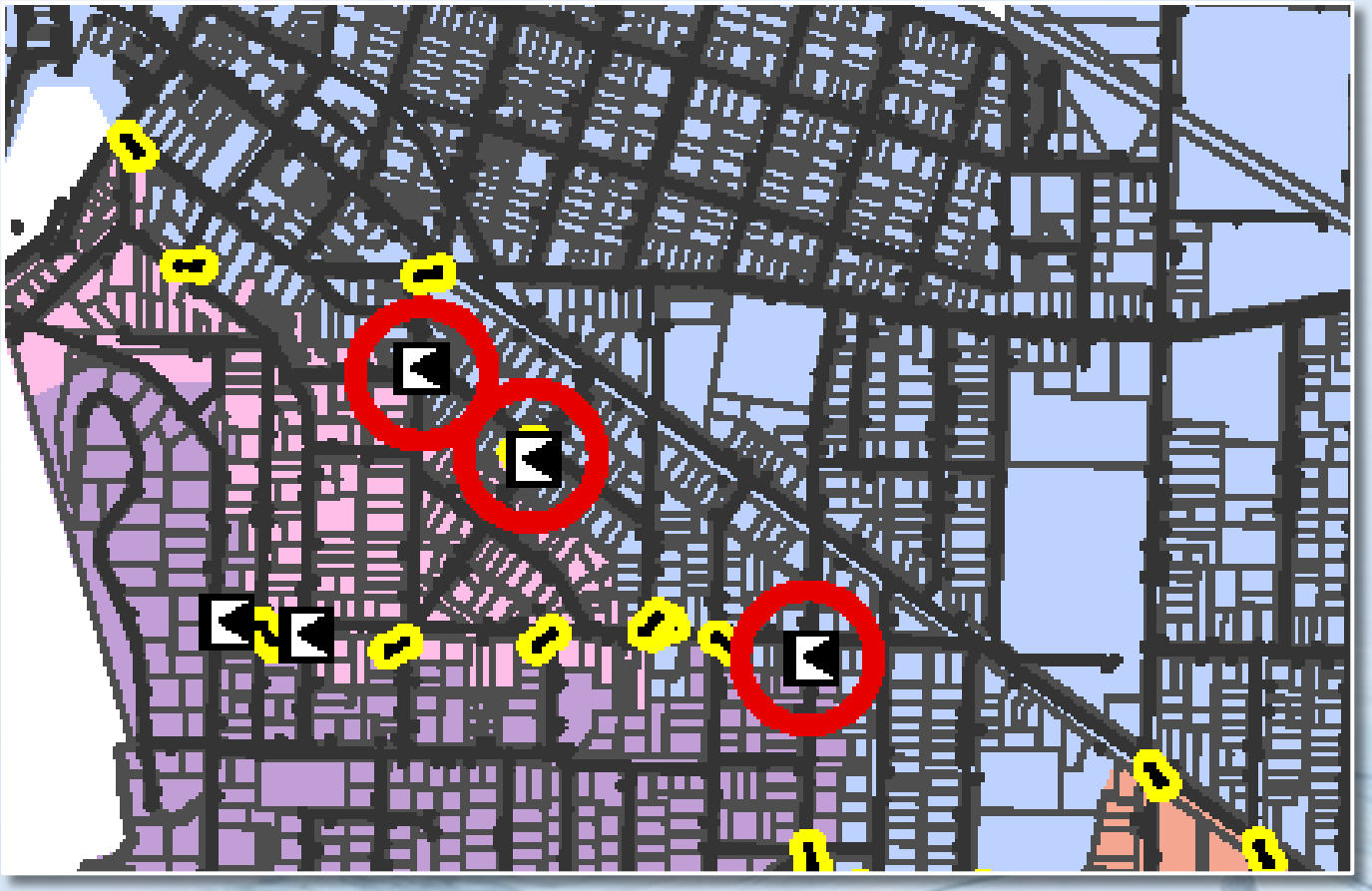
Case Study 2 – Poor turnover in a lower-elevation reservoir



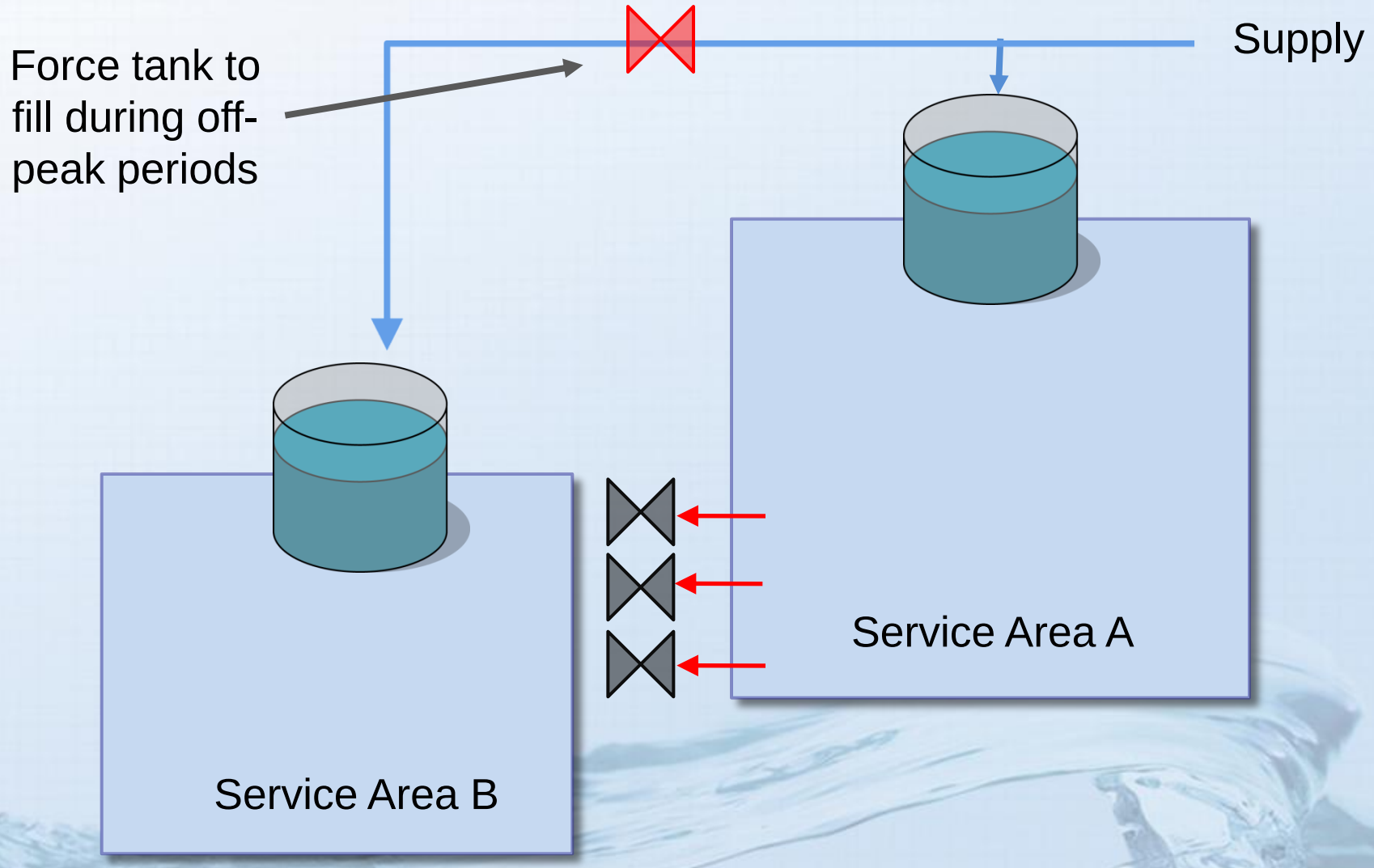
Partial solution was to reduce settings on PRVs to be closed during normal ops



The hydraulic model was used to verify PRV settings could be reduced while meeting pressure requirements

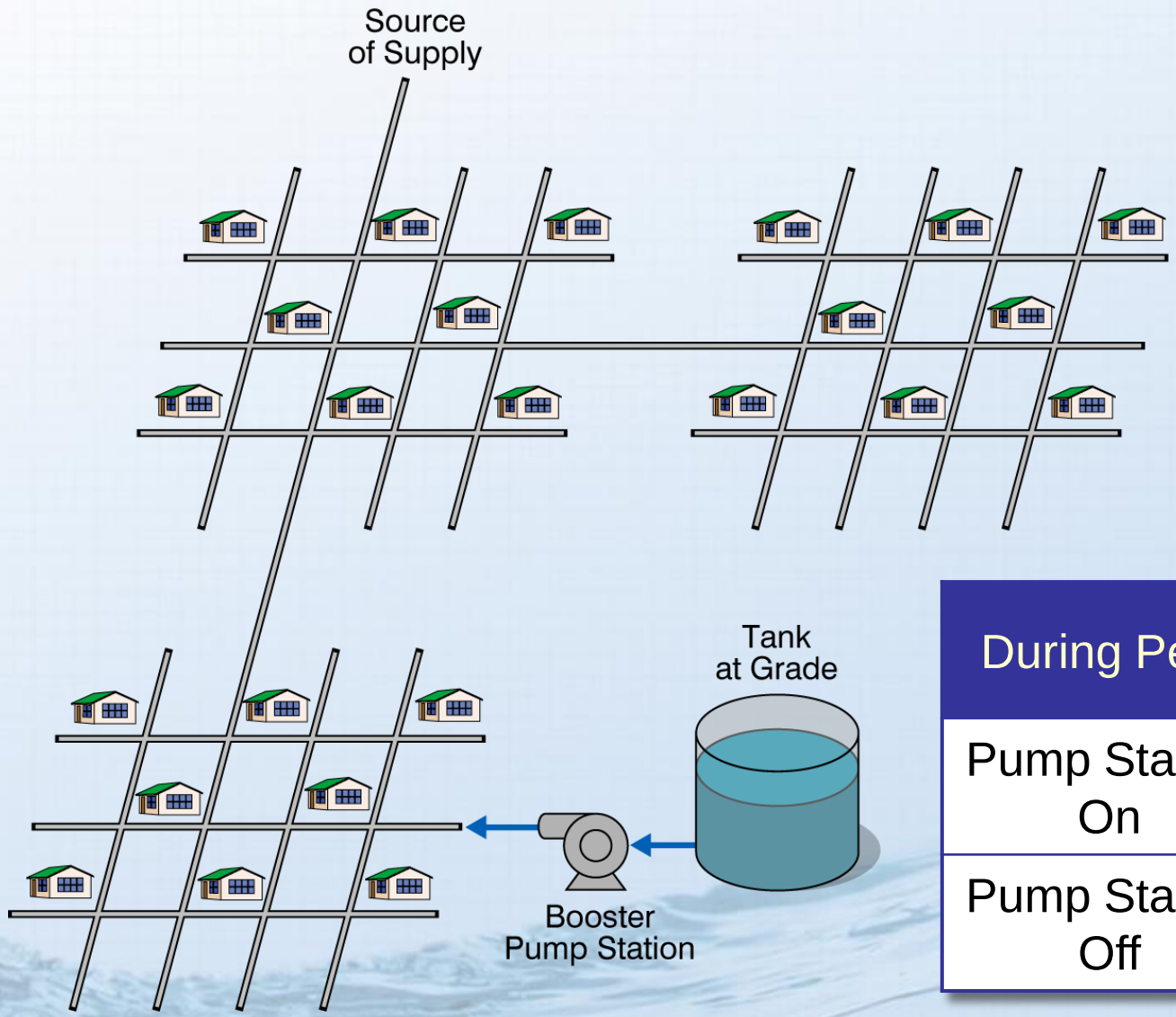


Improved use of the lower tank can be achieved through a SCADA-controlled valve



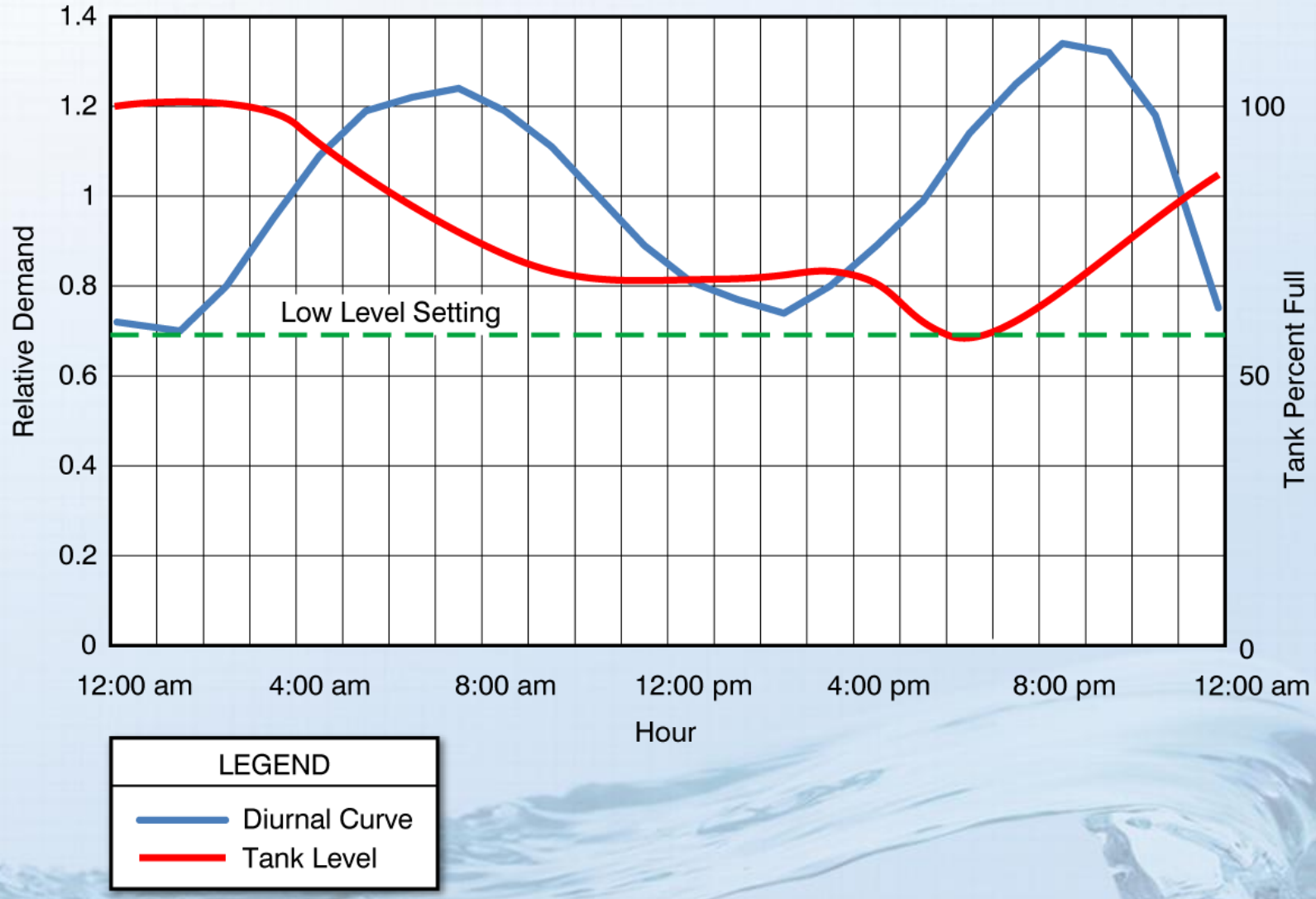
Improving Pressure Management

Case Study 3 – Use of a booster pump station in a rather flat city

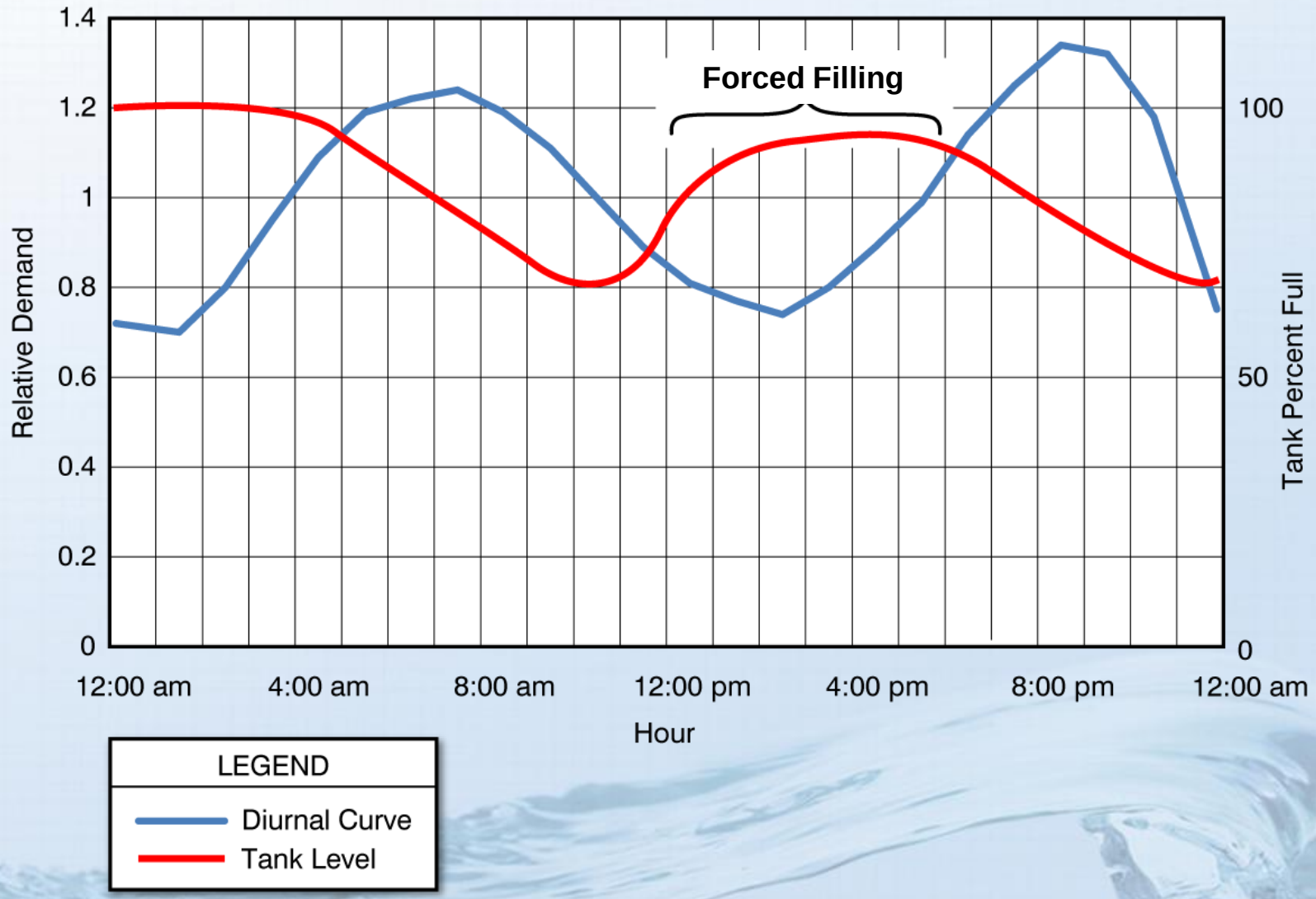


During Peak Usage Periods	
Pump Station On	Pressure ✓
Pump Station Off	Pressure ✗

Existing controls sometimes led to the booster pump station being unavailable during peak periods



Forced filling during non-peak hours prepares the reservoir to be full when needed



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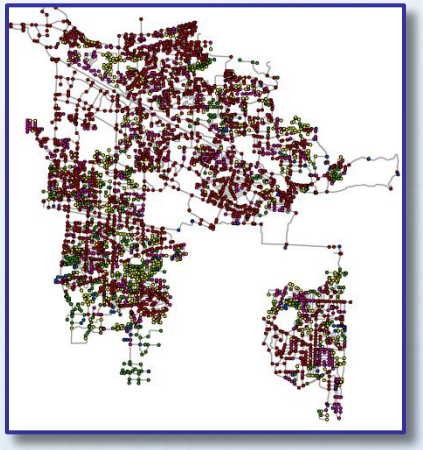

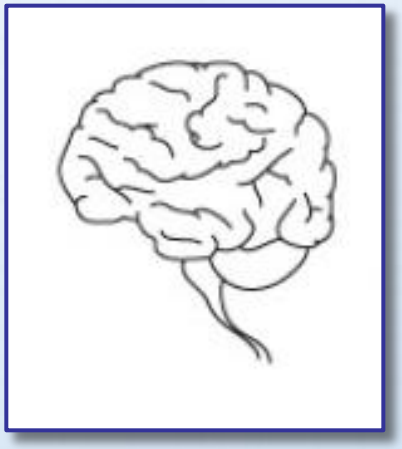

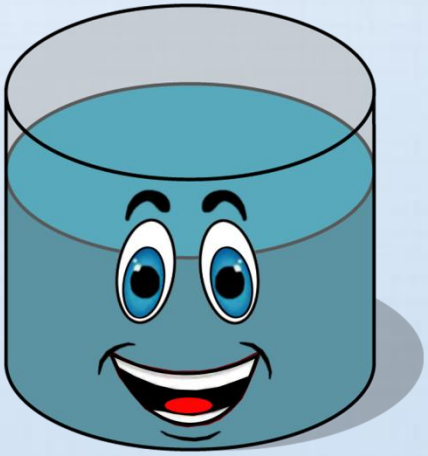

Got questions?