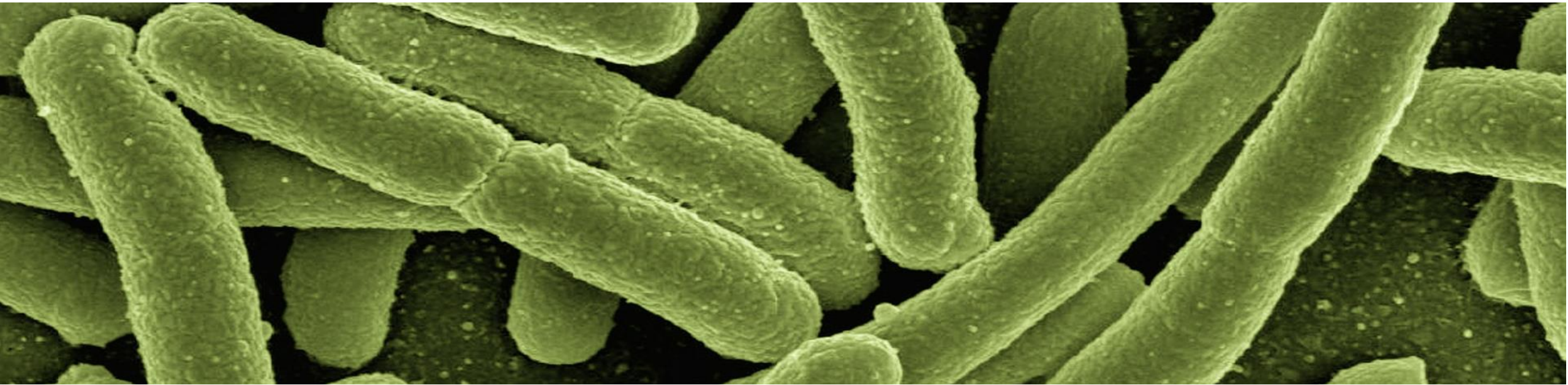




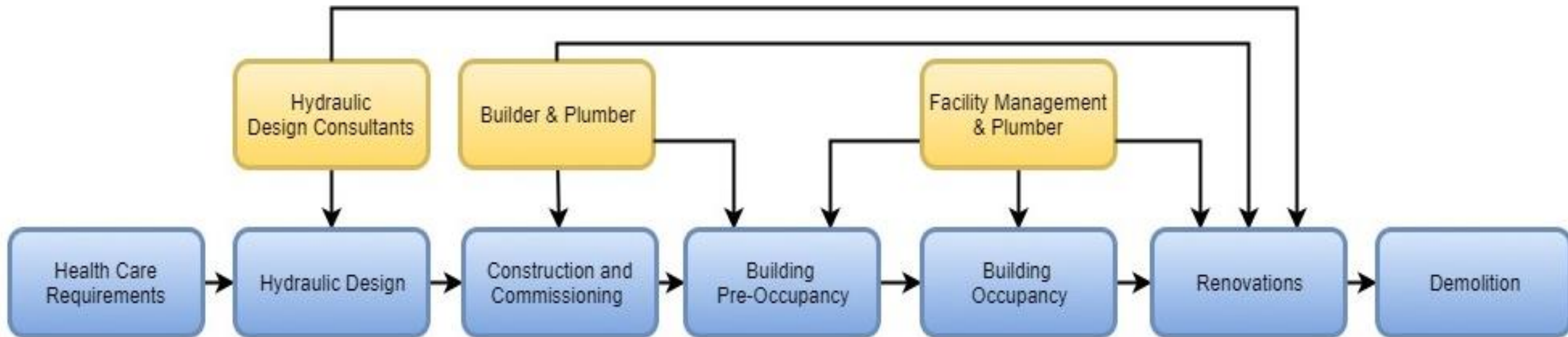
# Incorporating Water Risk Management in Design, Commissioning and Operation of a Health Care Facility



By Josiah Padget  
MOHS&EnvMgt, BAppSc, M.EIANZ, ATTMA L1  
Lead Consultant (QLD)



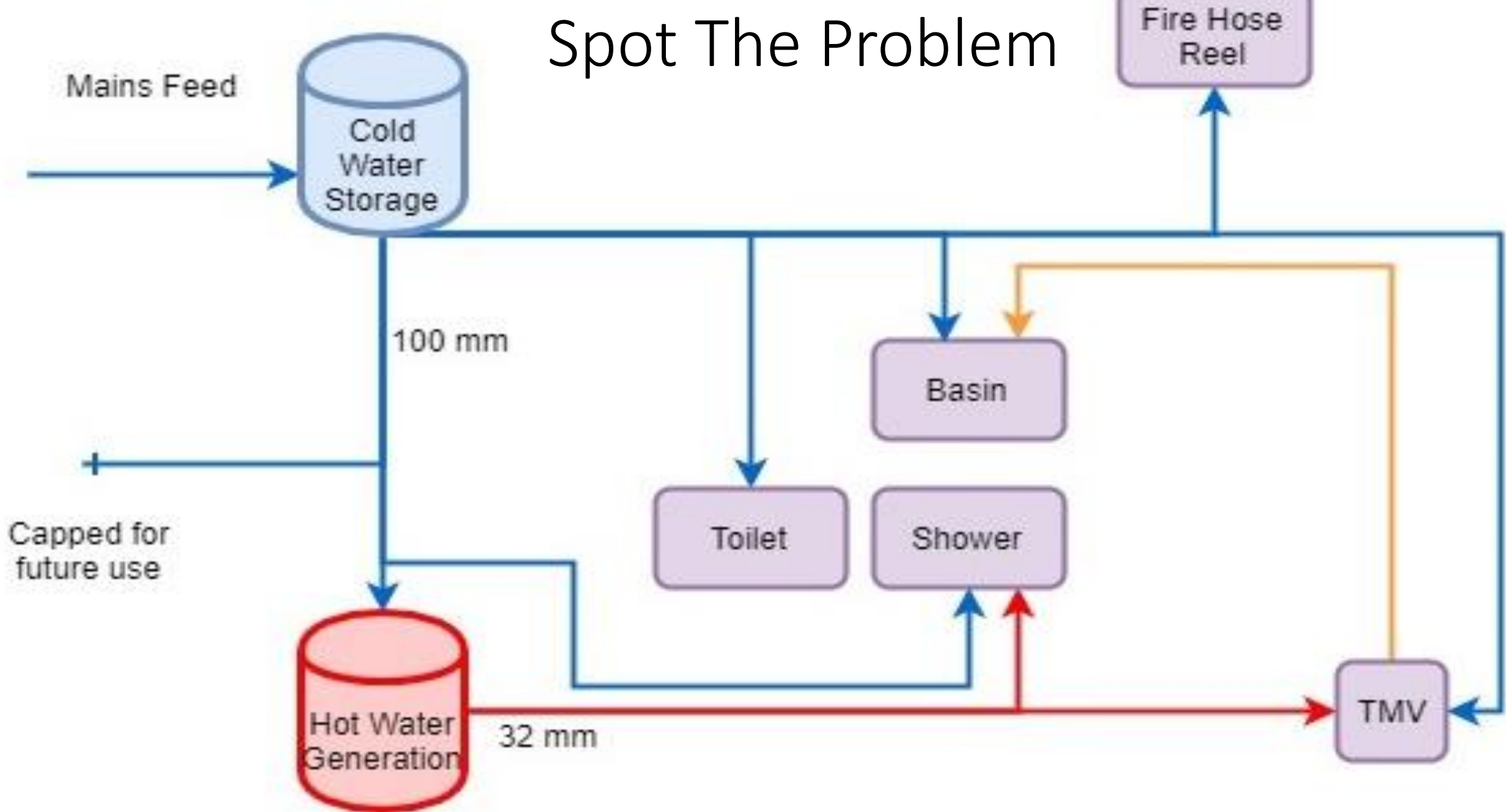
# Water Risk Management - Where to Start?





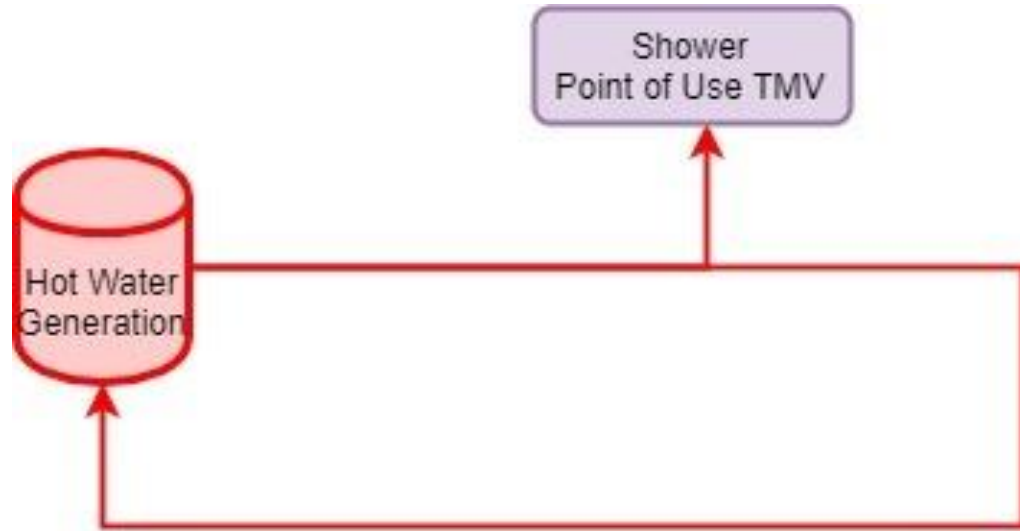
Good Design = Reduced Water Risk

# Spot The Problem

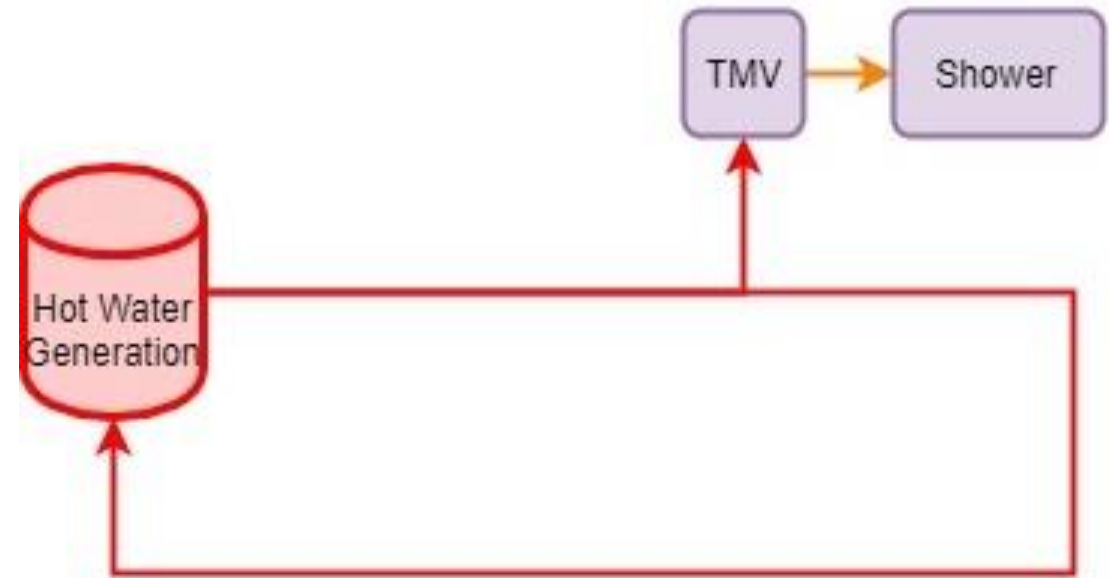




# Hot Water Generation – Good Design



Hot water recirculation system with point of TMVs



Hot water recirculation system with minimal length branch lines



# Hot Water Generation – Good Design



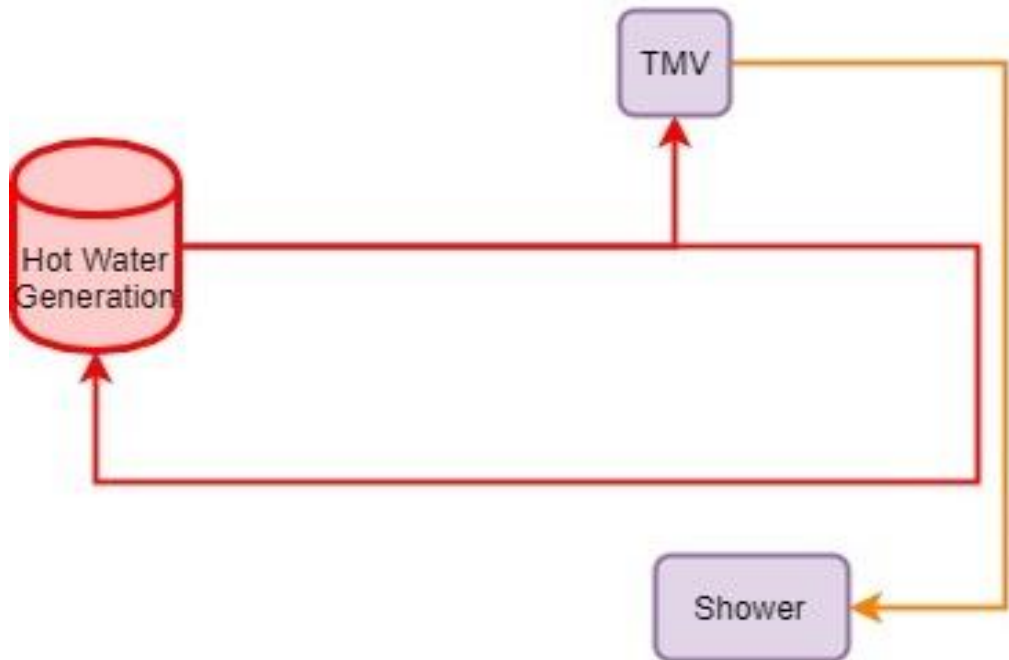
Hot water recirculation system with point of TMVs



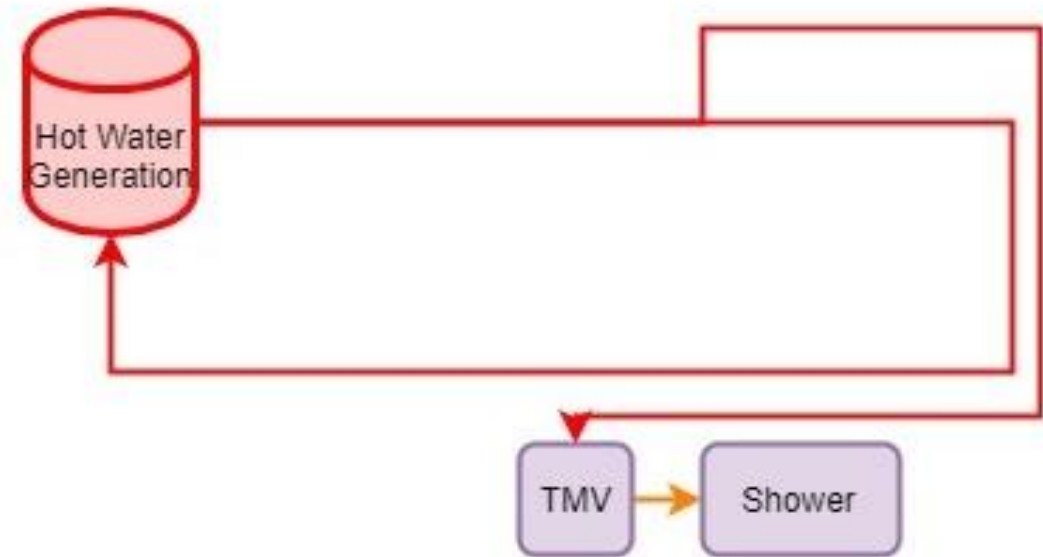
Hot water recirculation system with minimal length branch lines



# Hot Water Generation – Bad Design



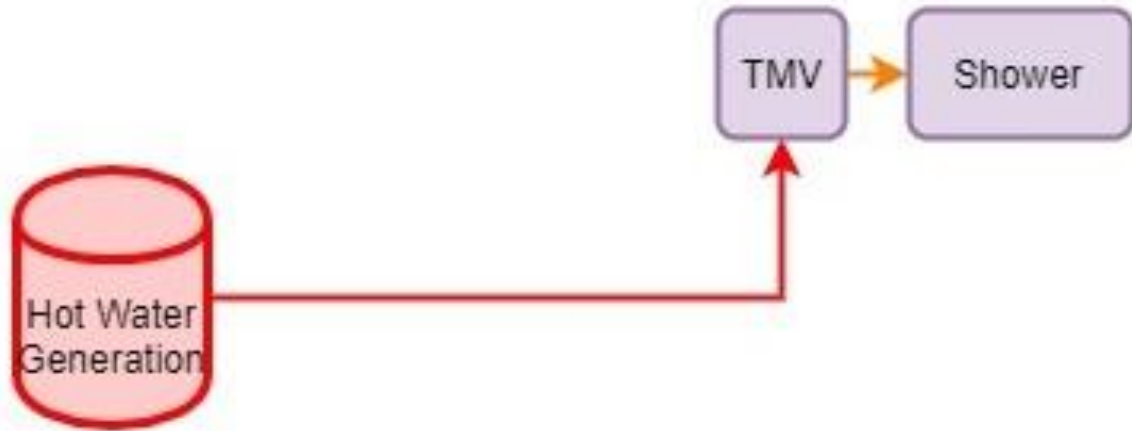
Hot water recirculation system with long branch lines



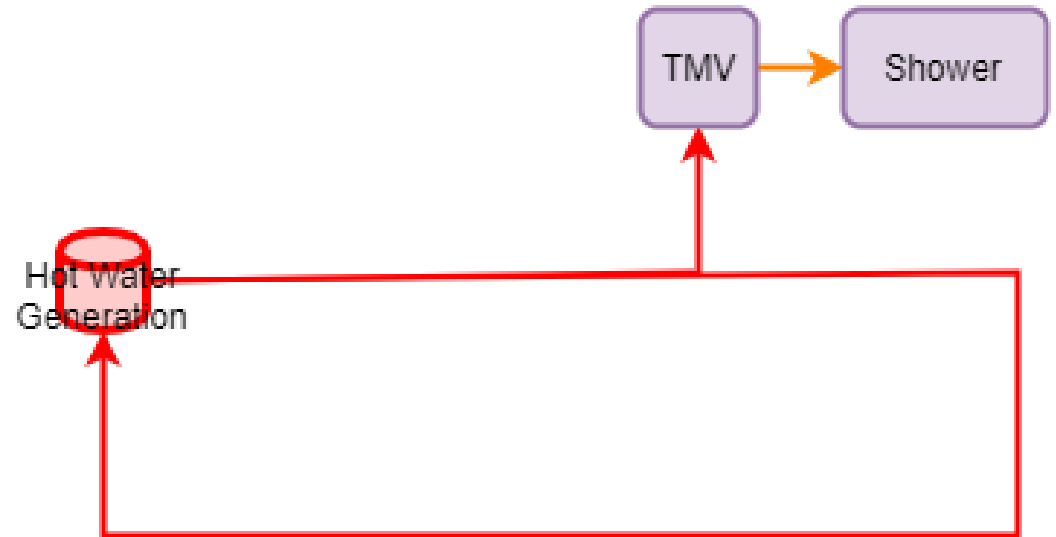
Hot water recirculation system with long branch lines



# Hot Water Generation – Bad Design



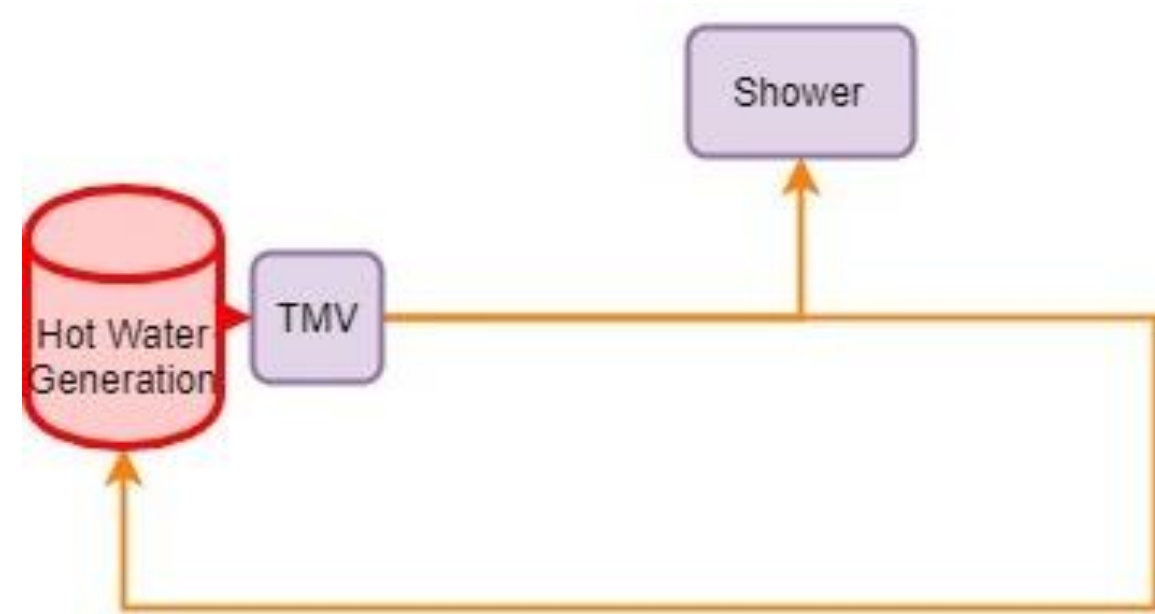
Direct Feed Hot Water System



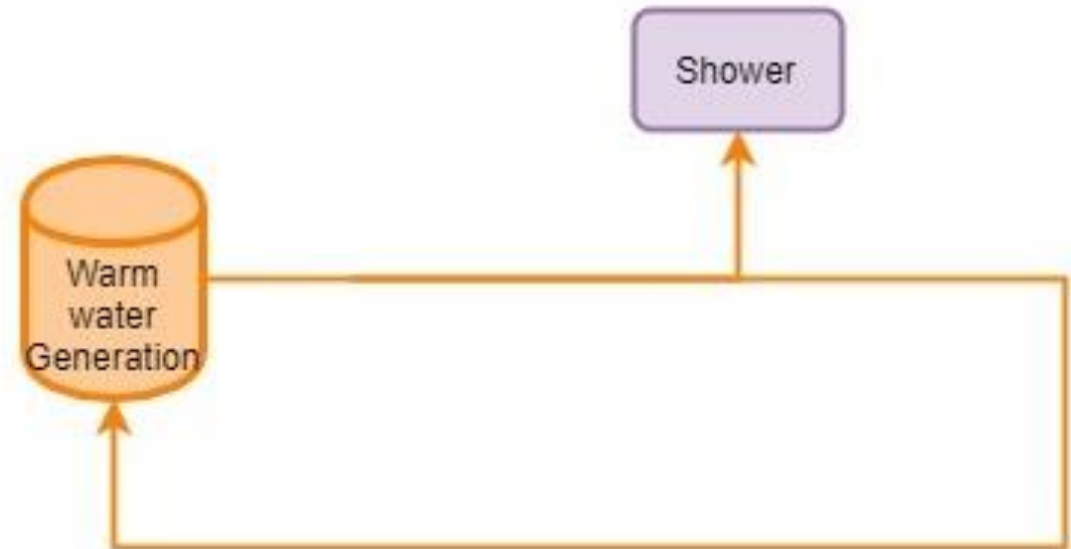
Hot Water Delivery System that Can't Adequately Supply Demand



# Hot Water Generation – Bad Design



Hot Water Storage and Warm Water Delivery System



Warm Water Storage and Delivery System



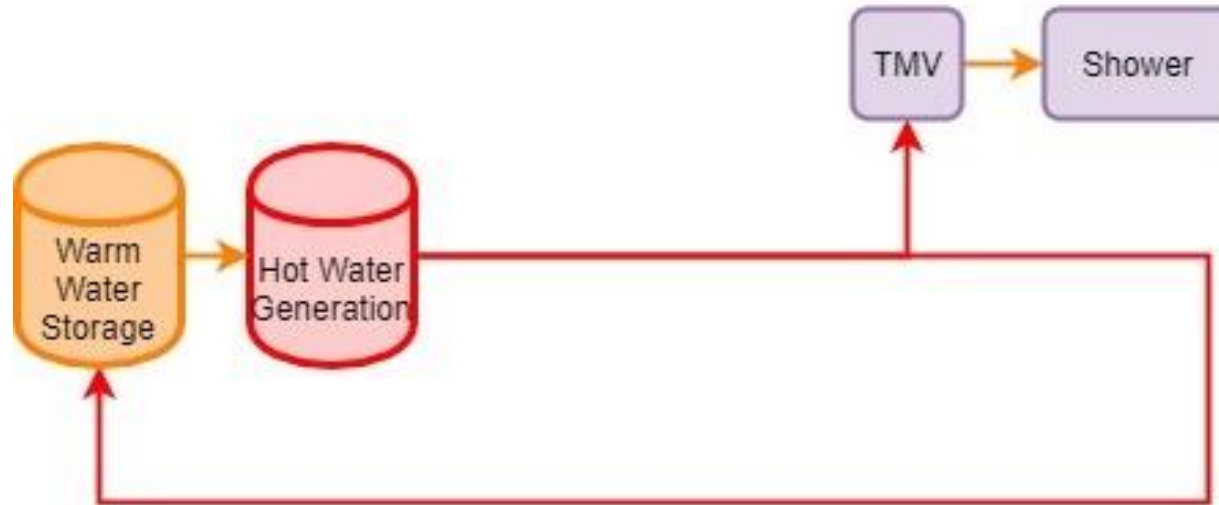
# Hot Water Generation – Bad Design



Warm Water Storage and Delivery System



# Hot Water Generation – Bad Design?



Warm Water Storage and Hot Water Delivery System



## Key Message - Review Design Risks

Remember if you are going to introduce a control you are likely going to introduce a new risk.



# Construction and Commissioning - Key Risks

**Design is often missing detail.**

*Example: Hydraulic drawing does not show pipework.*

**What is designed is not what is installed.**

*Example: Drawing had 20 TMVs, Plumber installed 3 TMVs.*

**Contamination of water supply.**

*Example: Dirt and rocks enter water system due to poor construction methods.*



# Construction and Commissioning - Key Risks

**Water Stagnation from construction to occupancy.**

*Example: Could be years between when plumbing was installed and building is occupied.*

**Outlets can't be used resulting in water stagnation.**

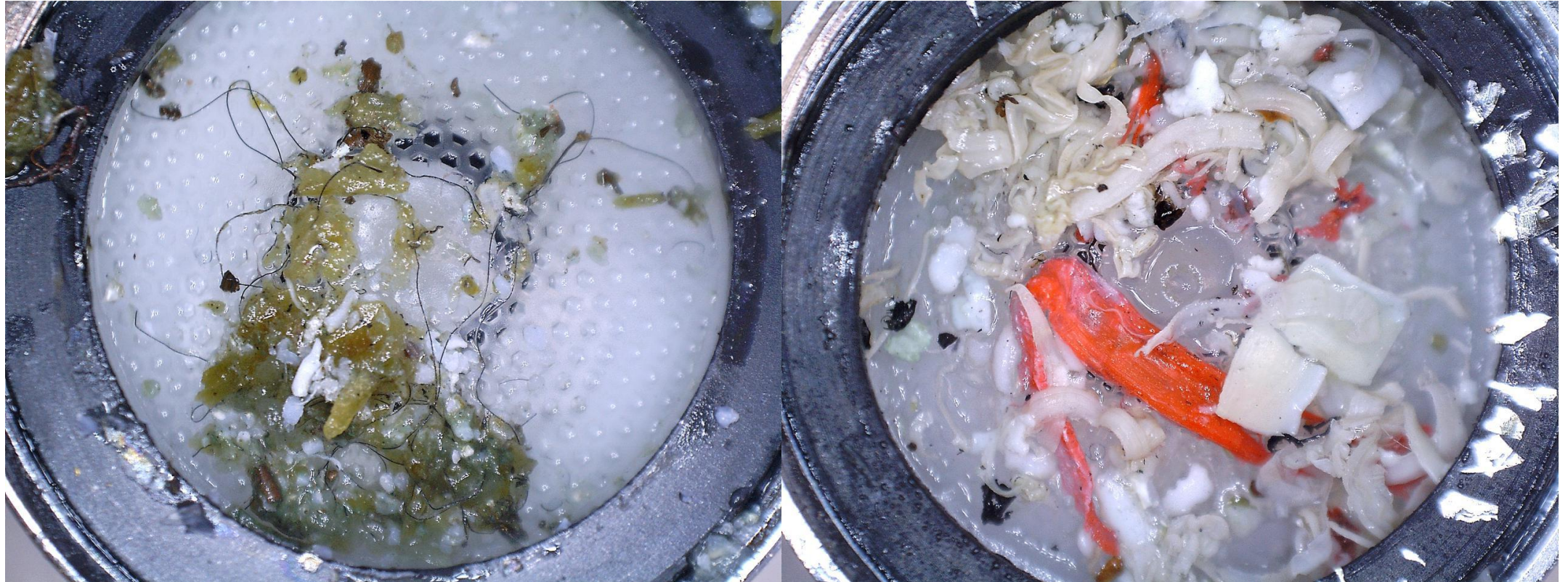
*Example: No power supply to sensor taps.*

**Debris accumulation in water system increase risk of biofilm.**

*Example: Excessive copper or plastic filings caught in strainers.*



# Construction and Commissioning - Key Risks





# Construction and Commissioning - Key Risks

**Materials Installed not suitable for potable Water.**

*Example: Brass fittings leaching lead.*

**Materials installed not compatible with overall design.**

*Example: Some forms of crosslinked polyethylene not compatible with chlorine dioxide treatment.*

**Maintaining specialised equipment.**

*Example: Haemodialysis RO Plant needs to remain switched on.*



# Building Operation - Key Risks

**“As Constructed” drawing is not what's constructed.**

*Example: Drawing had 20 TMVs, Plumber installed 3 TMVs.*

**Drawings don't get updated with building modifications.**

*Example: Room gets new fitout that requires a second basin.*

**Required maintenance is not conducted.**

*Example: Water filter is 5 years overdue for replacement.*



# Building Operation - Key Risks

**Water outlets are not used.**

*Example: Level three no longer used to house patients.*

**Building modifications changes key concepts of original design.**

*Example: Bathroom converted to office - dead-legs.*

**Facility management can't operate equipment.**

*Example: Water treatment system has never been turned on.*



# Building Operation - Key Risks





# Building Operation - Key Risks

## **Water quality changes.**

*Example: Supply changes from catchment to a combination of bore and catchment due to drought.*

## **Equipment fails.**

*Example: Pipe is blocked from excessive scale.*

## **Equipment is not used how it was designed.**

*Example: Hot water is increased to  $>70^{\circ}\text{C}$  causing erosion corrosion of the copper pipework.*



# Building Operation - Key Risks

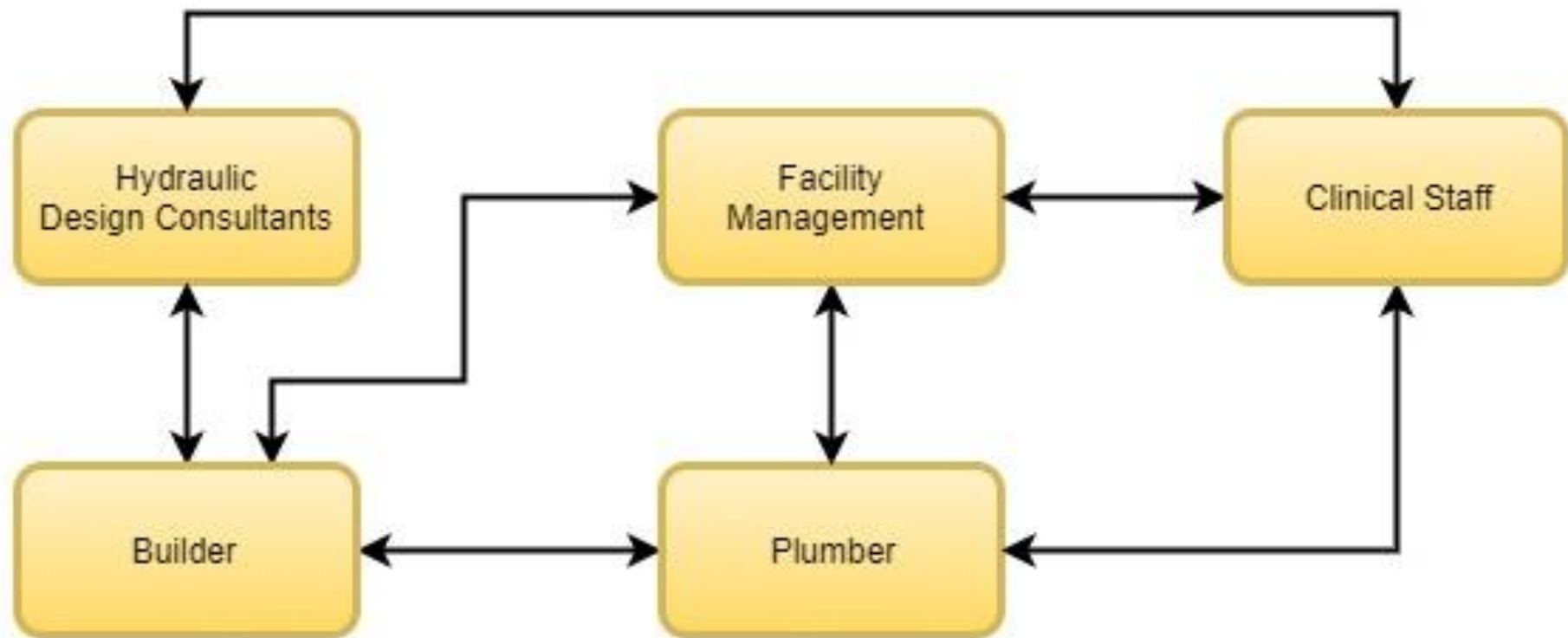




# What is the Number One Water Risk in Health Care?



# POOR COMMUNICATION & CONSULTATION





# CASE STUDY – Sunshine Coast University Hospital





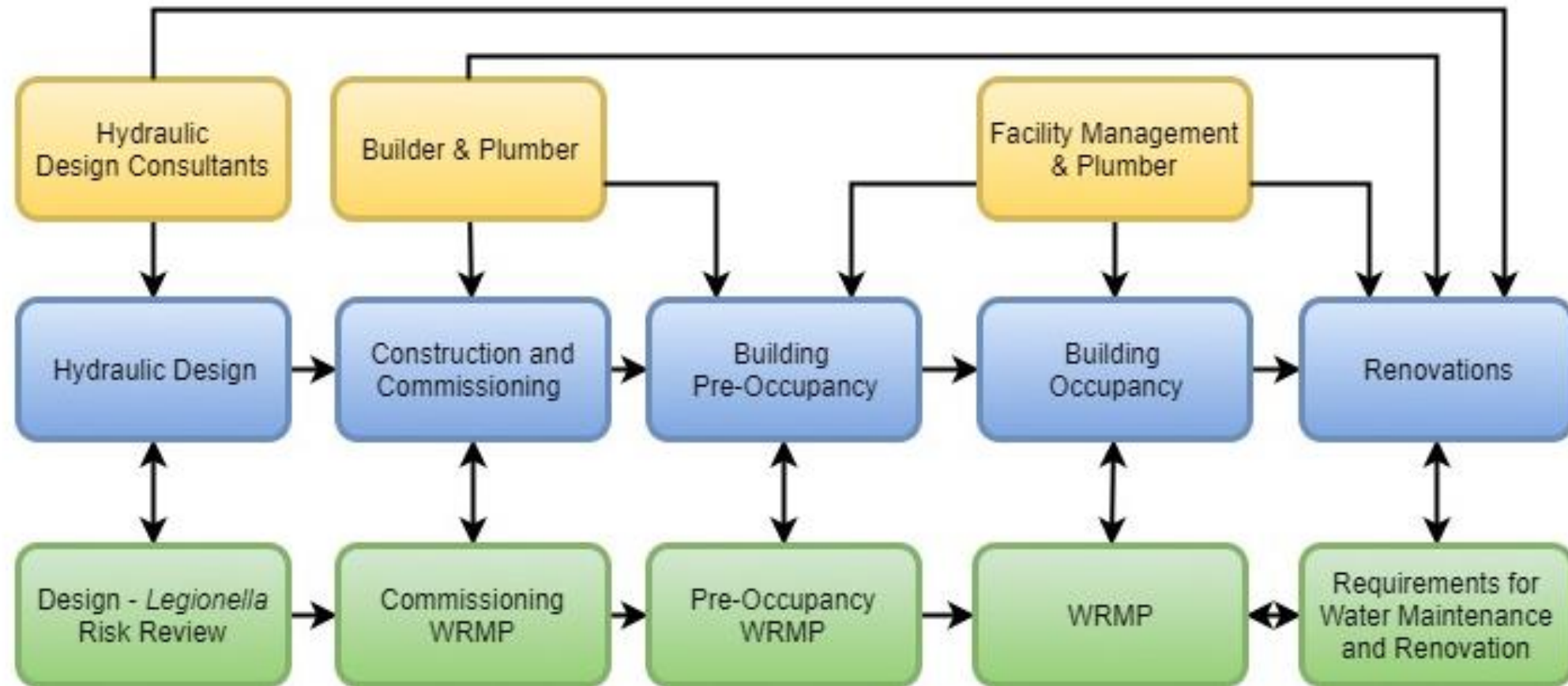
# Stakeholder Engagement = Better Design

**Community Engagement** – Community Reference Group, Consumer Groups, Construction Focused Community Liaison Group.

**Staff Engagement** – Multi-disciplinary staff user groups meet with technical specialists including service planners, architects and engineers. Project Steering Committee and Senior Advisory Group.

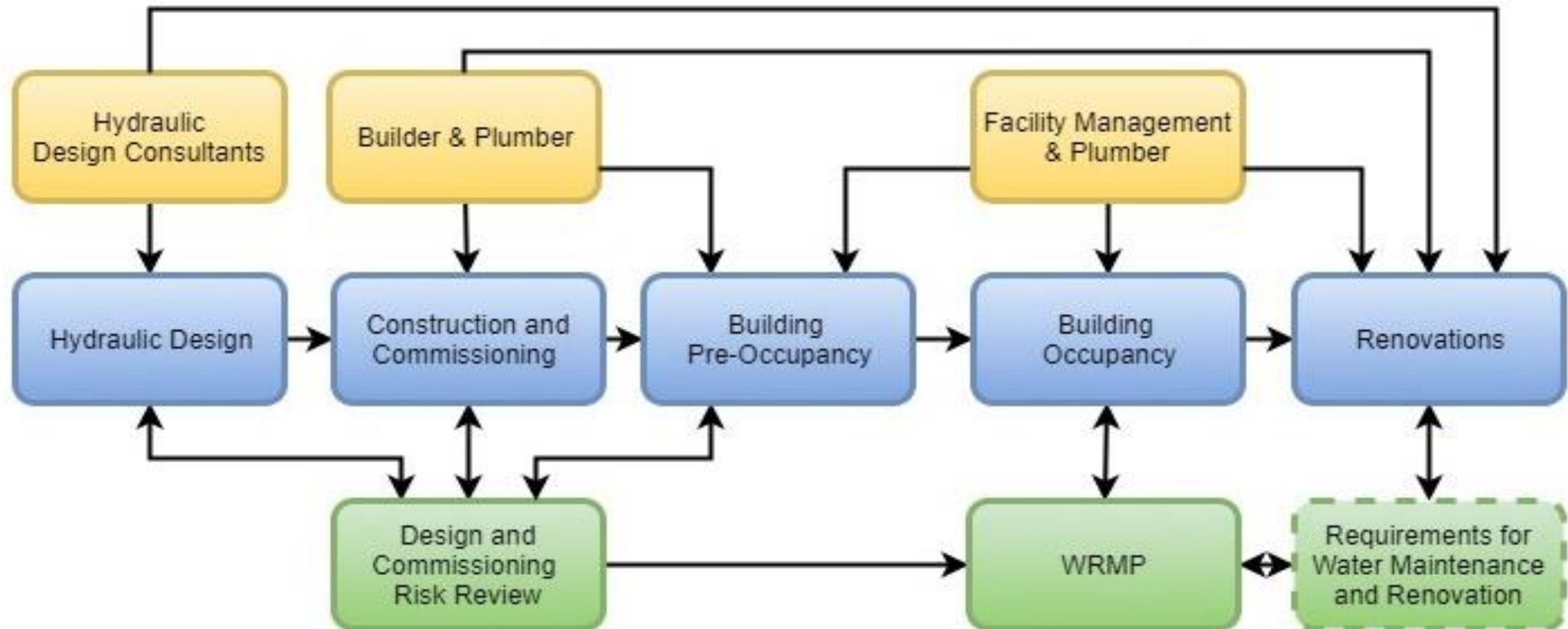


# Incorporating Water Risk Management - SCUH





# Incorporating Water Risk Management in Small Health Care Facilities





# SCUH Water Risk Management Summary

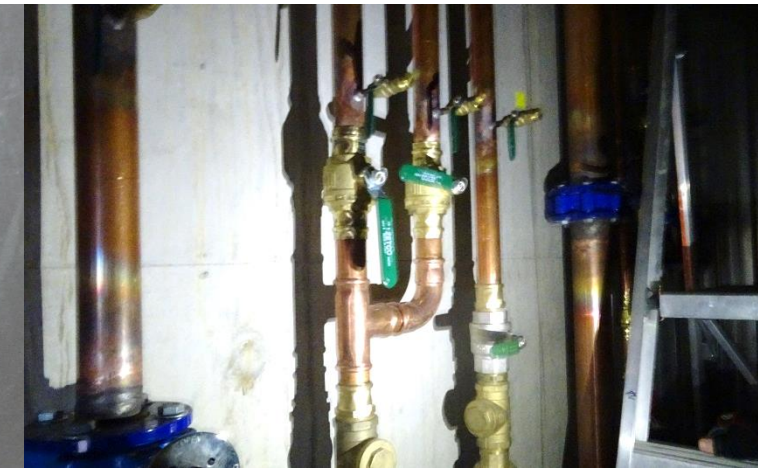
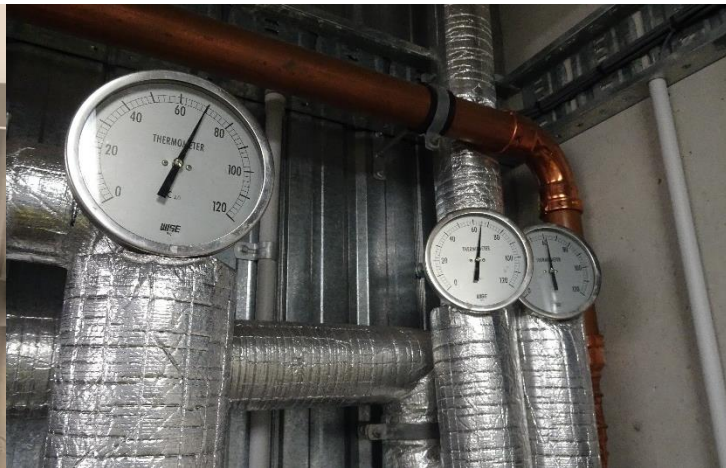
**Design** – Water treatment plant on cold water supply (filtration, softening, chlorination), hot water recirculation with point of use TMVs and short branch lines. Progressive mixers on hygiene outlets. Automatic flushing at end of branch sensor taps.





# SCUH Water Risk Management Summary

**Construction and Commissioning** – Excellent Quality Control used by Plumbers, System Chlorinated and Flushed, Water Stagnation Managed, Operation and Verification Monitoring had a strong focus on engineering risk.





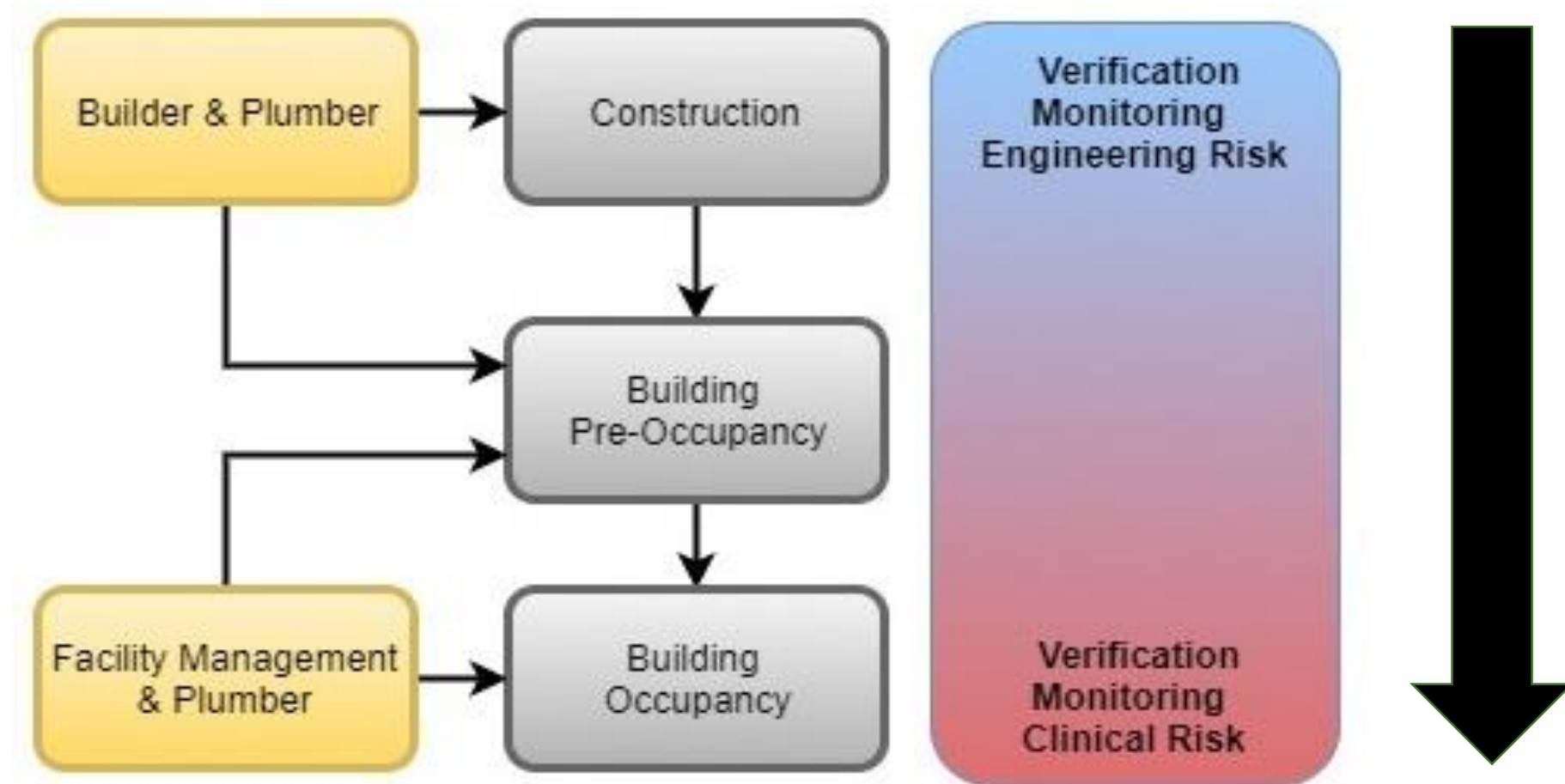
# SCUH Water Risk Management Summary

**Facility Management** – Hydraulic Register, Routine Scheduled Maintenance, Residual Chlorine Management, Operation and Verification Monitoring with strong focus on clinical risk, monitoring and staff findings initiates continual improvement.





# Verification Monitoring Shifts from Engineering to Clinical





# Percentage of Water Samples With *Legionella* 0% Positive

Open Date	Facility name	Total water samples collected	Legionella detections reported	
21 March 2017	Sunshine Coast University Hospital - Birtinya	142	0	450 bed

**2021**  
738 beds

Source: <https://www.health.qld.gov.au/public-health/industry-environment/environment-land-water/water/risk-management/results-quarterly-reports>



Good Design and Commissioning = Reduced  
Maintenance Requirements = Reduced Water Risk



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