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The Control of Legionella Bacteria in Water Systems

Imperial Property Division

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Document Revision Dates

Version	Date	Reason
V1	April 2018	Created.
V2	February 2022	Updated.
V3	November 2024	Updated order of authority to reflect staff changes.
V4	December 2024	Branding updated. Document reviewed and edited.

Introduction

Imperial College London will conduct risk assessments that take necessary precautions to control risks from Legionella bacteria in building water systems (hot and cold water, evaporative cooling and other water systems) for staff, students, contractors and visitors. The Health and Safety Executive's Approved Code of Practice (ACoP L8) provides guidance on complying with legal obligations under HSWA, COSHH, and MHSWR to manage legionella risk. Additional technical guidance is available in HSG274, parts 1, 2 and 3.

Under the Health and Safety at work Ac, 1974, COSHH and MHSWR, employers must assess and control risk from harmful bacteria like legionella. This policy excludes specialised water systems in academic departments, which are the responsibility of the faculties.

For new projects, water systems will be installed in accordance L8 and HSG274 guidelines. Significant alterations to domestic water systems to existing or new builds will require a water risk assessment by an Imperial Project Manager before handover.

ACoP L8 Requirements

Legionnaires' disease is a potentially fatal pneumonia caused by inhaling water droplets containing Legionella bacteria.

ACoP L8 imposes the following responsibilities:

1. **Appoint of staff:**

- **Duty Holder:** Imperial has overall responsibility for the control of premises.

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- **Responsible Person:** Delegated responsibility for implementing policy and managing water systems across campuses.

2. **Assess Risk:** Identify of risk from the hot and cold water systems on each campus.
3. **Manage Risk:** Implement prevention and control measures to manage identified risks.
4. **Monitor Control Measures:** Continuously monitor and implement agreed remedial measure to control the risk
5. **Maintain records:** keep records of maintenance, monitoring, testing, disinfection and pasteurisation to ensure compliance with Imperial's procedures and ACoP L8, following HSG27 guidance.
6. **Training:** Train all relevant employees, including maintenance staff, on ACoP L8 and the guidance and HSG274. Maintenance Manager will receive copies for reference.

The responsibilities will be implemented across all campuses. The Property Division will oversee the maintenance procedures.

Procedure

Appoint Staff

The Duty Holder – Imperial is the Duty Holder in accordance with the Approved Code of Practice L8/ HSG274.

The Responsible Person: Property Division's Director of Capital Projects and Estates Management is the delegated the responsibility of managing the Imperial water systems in accordance with the ACoP L8 / HSG274. The responsible person delegates the duty to Head of Maintenance (HOM) and the duty is further delegated to Maintenance Managers for the area that is under their control.

Identification and Assessment of Risk

A competent person will conduct a survey of all building water systems on Imperial premises, including cooling towers, mains water and hot/cold water services, to assess Legionella risk. The survey will inspect visible pipework, taps, tanks and other components to record potential risks. Following the Risk Assessment, a building specific logbook will be created, including a written scheme of control for the water system. Specialist water systems in academic areas are excluded from the survey and will be addressed by the Imperial Water Safety Group (WSG), which will manage associated risks.

In shared premises, responsibility for water system maintenance may vary.

- Building occupied by one lease holder, the agreement may be for the leaseholder and or owner to be responsible for maintenance of water systems
- Multi tenanted building, the landlord and or owner shall be responsible for maintenance of water systems
- Multi tenanted building, the duty may be shared, the tenant takes charge of the parts they occupy, and owner takes charge of the common parts
- The landlord or tenant shall organise the management of L8 compliance.

Any significant changes to the system (e.g., tank replacement) will be assessed and recorded, with updated risk assessments and reports.

Risk Management Systems

The following measures are in place for the management and maintenance of the water systems to minimise the risk of Legionella bacteria colonisation.

Hot Water Services

- **Calorifiers and Buffer Vessels:** Monthly temperature checks to maintain 60°C flow and 50°C for system return. Internal inspections, cleaning and disinfection are carried out if accessible is possible.

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- **Sentinel taps:** Monthly temperature checks to ensure water reaches between 50-60°C within 1 minute.
- **Little Used Outlets:** Flushed for 5 minutes is used less than weekly (or until the hot water reaches the required temperature). It is the faculties responsibility for identifying and conducting flushing of outlets in laboratories and research areas. Similarly, Village Management are responsible for residential buildings.
- **Water taps:** Monthly checks for water reaching 50-60°C within 1 minute. If taps are not tested annually additional control measures like chemical disinfection and Legionella sampling are applied.

The flushing record shall be provided to the Estates Customer Service Centre for archiving on to Planon system.

Cold Water Services

- **Sentinel Taps:** Monthly checks to ensure water is below 20°C within 2 minutes.
- **Cold Water Storage Tanks:** Biannual bacteriological testing (TVC/coliforms/*E. coli*) and inspection of the tanks and record of temperatures remote from the ball valve shall be carried out 6 monthly. A deep clean and disinfection of the tanks annually.
- **Little-Used Outlets:** (i.e., cold water outlets that are used less than weekly) shall be flushed for 5 minutes (or until the cold water reaches the required temperature). Faculties are responsible for conducting flushing at infrequently used outlets in laboratories and research areas. Similarly, for residential buildings the Village Management are responsible for flushing. All flushing activity shall be provided to the Estates Customer Service Centre for archiving on to Planon system.
- **Water taps:** Monthly tests that temperature confirm reaches 20°C within 2 minutes. Where taps are not tested annually, additional controls such as chemical disinfection of tanks and sampling of Legionella are conducted.

Showers

- 3 monthly, dismantle, clean and descale shower heads and hoses.

Emergency showers and eye wash sprays

- Biannual flush through to drain.

Water Softeners

- Annual clean and disinfect resin bed and brine tan. The faculties remain responsible for assets that are managed by their department.

TMV (Thermostatic Mixing Valve)

- Annual service. Risk assessment completed is access is not possible to determine the need for TMV requirements.

Expansion Vessels

- Annual flush and purge the vessel to drain.

Cooling Towers

- **Every Monday, Wednesday and Friday:** Take microbiological dip slides and basic water treatment tests (e.g. conductivity) from the pond of each tower.
 - Dip slides will be incubated at 30°C for 2 days. If a dip slide exceeds 100000 Colony Forming Units (CFU), emergency procedures detailed in Appendix 1 are implemented.
 - Service providers will take dip slides and inspect the water treatment plant, making necessary adjustments. Report defects to Estates Customer Service Centre at 0207 594 8000.
- Biweekly samples taken from each cooling tower by the specialist water treatment company for 20°C plate counts.
- Monthly water sample taken from each cooling tower by the specialist water treatment company analysed for Legionella bacteria.
- Biannual clean and disinfection of each tower.

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- Annual deep clean and disinfection including the removal and cleaning of the pack.

Monitoring of Control Measures

The Imperial approved consultant will carry out the following tests on the water systems at the intervals specified.

- **Monthly** a rolling programme of annual water tests for each building, including samples taken from hot, cold and drinking water systems. Samples are tested at an independent laboratory for Legionella and bacteria. Any results that are out of the control limits will be reported to Estates Operations Customer Services for corrective action, and the Head of Maintenance will be informed.
- **Every 6 months**
 - The water treatment, maintenance regime and records for all the cooling towers and water systems will be reviewed.
 - Inspection of the external and internal condition of cooling towers, including the drift eliminators, schematic drawings and logbook records. Water samples from each cooling tower ponds are tested at an independent laboratory. Results outside the control limits are reported to the Estates Customer Service Centre, and the Head of Maintenance and Maintenance Manager informed to take corrective emergency actions.
- Maintain adequate records of maintenance, monitoring, testing, disinfection, and pasteurisation of the water systems to ensure compliance with Imperial procedures, ACoP L8 and HSG274 the guidance.
- Risk assessments and record of all maintenance activity shall be stored on Estates Customer Services Centre CAFM system Planon.
- Biannually audit by an approved Imperial consultant on the services providers cooling towers and water systems maintenance records. Plus, a review of maintenance activity completed.

Areas Occupied with Clinical Trials Patients

Clinical trials and NHS environments within Imperial buildings, the Department of Health's Health Technical Memorandum (HTM) 04-01, *Safe Water in Healthcare Premises*, should be followed. The 2016 revised guidance is published in three parts: Part A (Design, Installation and Commissioning), Part B (Operational Management) and Part C (Pseudomonas Aeruginosa – Augmented Care Units). HTM 04-01 advocates a holistic approach to managing water safety through Water Safety Plans (WSP) managed by Water Safety Groups (WSG), addressing the higher vulnerability of patients to waterborne infections in healthcare settings.

Imperial applies these principles across its estate, ensuring higher controls in clinical areas for both new and existing sites.

Pandemic Action Plan

In compliance with HSG 274, when a building, part of a building, or a water system is taken out of use, that microbial growth, including legionella, must be controlled. The following actions are required:

Building Status 1 (Completely closed, no access, hot water off, no staff on site).

- Chemical disinfection
- Operate hot water calorifiers at pasteurisation temperature
- Sample for Legionella (12 days required for result)
- Flush weekly until fully operational
- Put on normal routine L8 controls

Building Status 2 (closed, access possible hot water off, only maintenance staff on site)

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- Flush at outlets at least weekly
- When the building is reopened, the following is required
 - Operate hot water calorifiers at pasteurisation temperature
 - Sample for Legionella (12 days required for result)
 - Flush weekly until fully operational
 - Implement normal routine L8 controls

Building Status 3 (Open, access possible, hot water on, some staff on site)

- Continue with full L8 programme
- Flush weekly all areas that not occupied

Process for the removal of taps & pipework no longer in use. Refer to Appendix 3

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Appendix 1

Emergency procedures

The following emergency procedures will be implemented where there is a departure from the control limits for calorifiers, water tanks, water systems or cooling towers:

Cooling Towers – Poor dip slide result (100000) cfu/l

Dump half volume of water held within the cooling system.

Shot dose with biocide.

Carry out repeat water sampling

Cooling Tower – Poor Legionella result

Drain entire cooling tower water system.

Refill and chlorinate.

Carry out repeat water sampling

Domestic Hot and Cold Water – Poor Legionella result

Cease use of showers and any spray outlets.

The water system to be either pasteurised or chemically disinfected.

- Pasteurise hot water system by raising hot water temperature within the entire calorifier or buffer vessel to 70degC.
Flush through outlets starting from the nearest, through the entire system whilst taking the necessary precaution of airborne atomised particles.
Return elevated temperature setpoint back to normal setting.
- Chemical disinfection shall be carried out by the water treatment specialist either using Chlorine or Hydrogen Peroxide.

Carry out repeat water sampling after 2 to 3 days.

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Appendix 2 **Terms of Reference (TOR) for Water Safety Group (WSG)**

Purpose to oversee and ensure the implementation of measure to maintain and enhance water safety standards within Imperial, especially for legionella.

Scope shall focus on identifying potential hazards, assessing risk and implementing strategies to mitigate risks associated with water-related activities. Includes but is not limited to the following water infrastructure and systems across Imperial:

- Potable water
- Showers
- Tanks
- Pipe works in communal and laboratory areas
- Residences
- Catering facilities
- Research equipment is dependent on discussions with relevant stakeholders.

Objectives to identify potential water safety hazards within designated areas. To develop and implement strategies to minimise risks associated with water-related activities. Collaborate with relevant authorities, organisations and stakeholders.

Composition of the WSG will be the following representatives:

- Director of Safety
- Director of Capital Projects and Estates Management (Property)
- Head of Health and Safety (Property)
- Head of Maintenance (Property)
- Faculty Safety Advisors
- Water Safety Consultants
- Safety and Compliance Manager
- Office Manager
- Other Imperial Colleagues as appropriate

Roles and Responsibilities of group members are as follows:

- Chair will facilitate meetings, coordinate activities, and serve as the primary POC
- Member will attend meetings regularly, contribute expertise and input on water safety matters, and activities participate in decision making processes.
- Secretary will record meeting minutes, maintain documentation and assist with administrative task.
- Working groups will form subcommittees as necessary to address specific water safety issues or projects.

Meetings will be scheduled at least termly to discuss ongoing initiatives, review progress and address any emerging issues. Meeting agendas and minutes shall be circulated to all members in advance. Additional meetings may be scheduled as need to

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address urgent matters. Key stake holders are to attend 80% of the meetings and other nominated persons to deputise in their absence.

Decisions shall be made by group consensus whenever possible. Where a consensus can not be reached, decisions may be made by a simple majority vote or escalated to Health and Safety Management Committee.

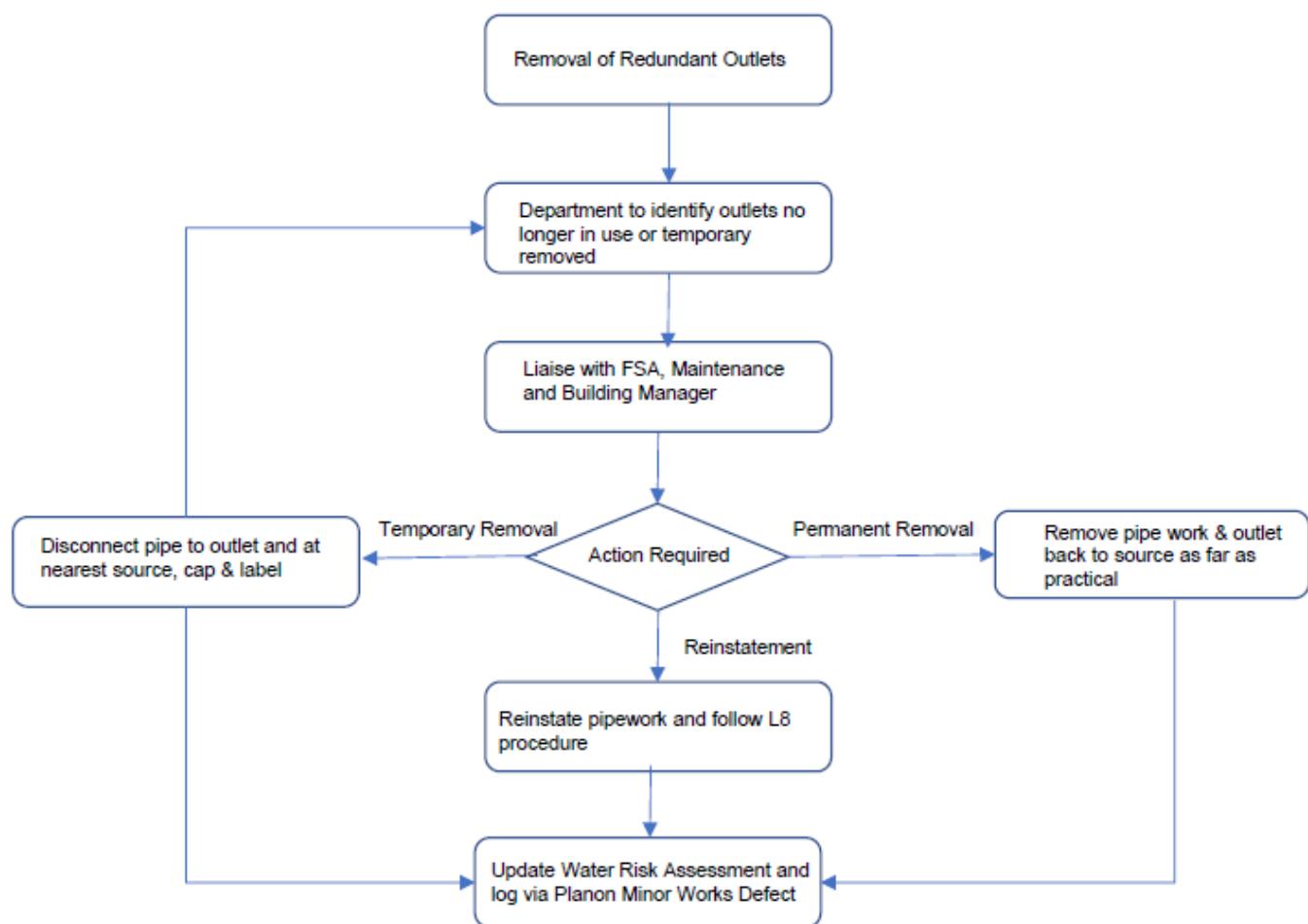
Review and Amendments to the TOR shall be made periodically, at least annually, to ensure relevance and effectiveness. Amendments may be proposed by any member of the WSG and shall be approved by consensus or majority vote.

Adoption to these TOR shall come into effect upon approval by all member of the WSG.

Confidentiality should be upheld by all members on sensitive information discussed during meetings.

Compliance to all relevant laws, regulations and policies governing water safety will be complied with at this group.

Water Safety Group

Process for the removal of taps & pipework no longer In Use

Appendix 3**Imperial College London, Legionella Policy, Management Structure**

Water Safety Group – Advisory Group Members		
Member	Division	Role
Director of Safety	Safety Department	Chair
Director of Capital Projects and Estates Management	Property Division (Capital Projects and Estates Management)	Member
Head of Health and Safety	Property Division (Operations)	Member
Head of Maintenance	Property Division (Capital Projects and Estates Management)	Member
Faculty Safety Advisors	Faculties	Member
Water Safety Consultants	External	Member
Safety and Compliance Manager	Central Biomedical Services	Member
Office Manager	Safety Department	Secretary
Other Imperial Colleagues as appropriate	Various Imperial Departments	Member

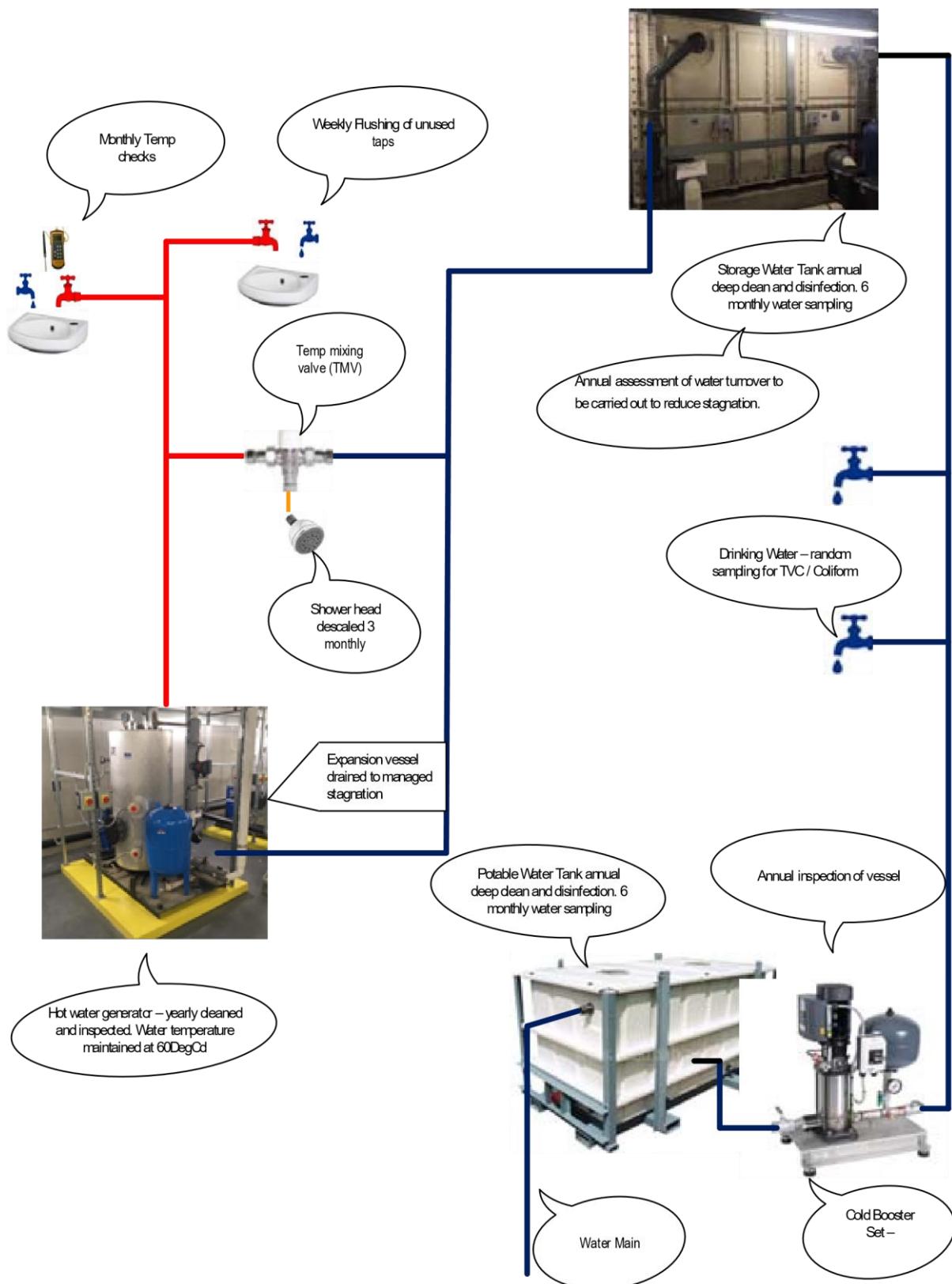
Imperial College London, Legionella Policy, Management Structure



Please contact Customer Service Centre on 020 7594 8000

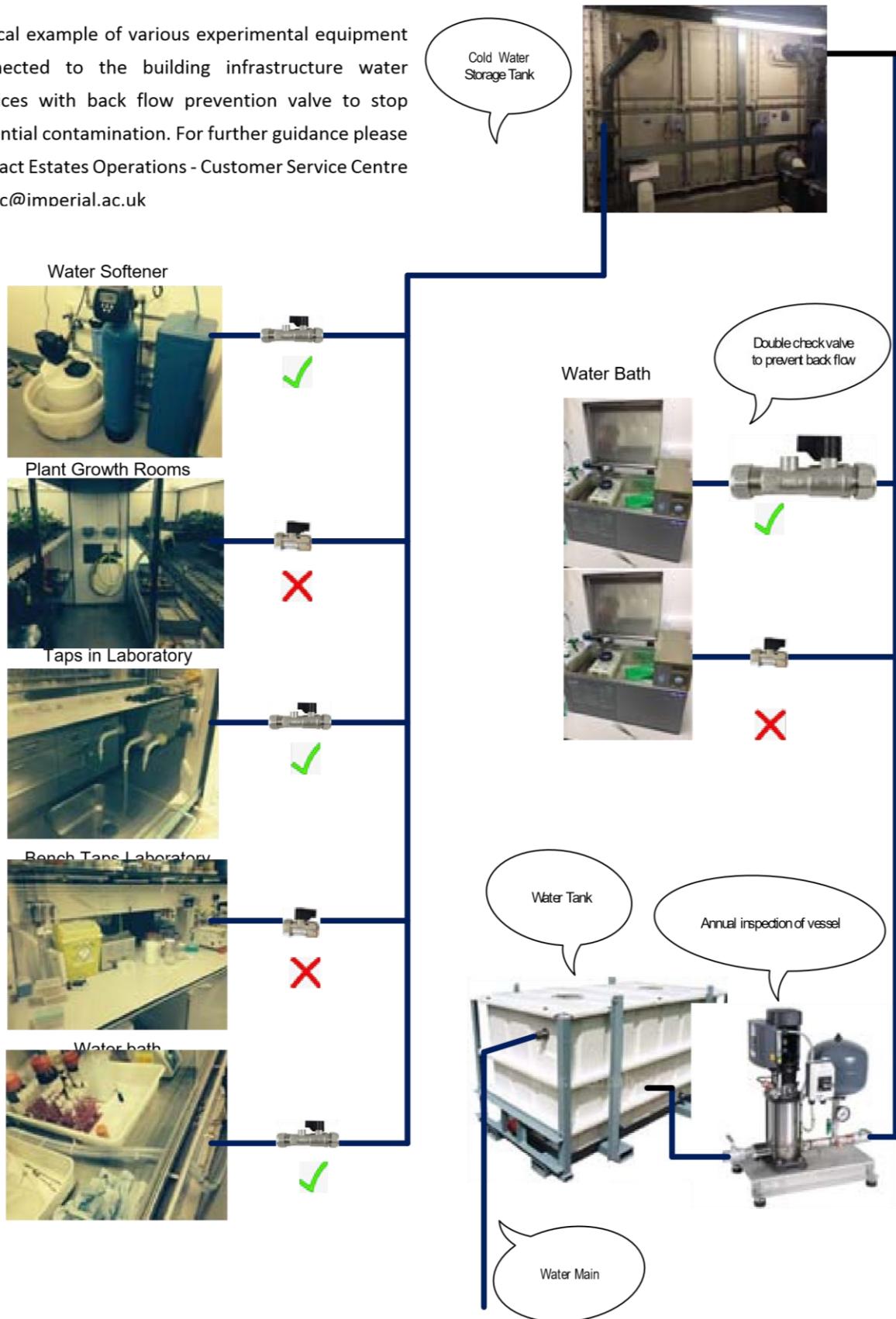
Typical Building Infrastructure

Simplified illustration of one of the various systems installed throughout the campus wide



Academic Faculties & Campus Operations - System For Managing The Risks

Typical example of various experimental equipment connected to the building infrastructure water services with back flow prevention valve to stop potential contamination. For further guidance please contact Estates Operations - Customer Service Centre eocsc@imperial.ac.uk



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Water Flushing Procedure and Record Sheet

Flushing Procedure – Any errors or omissions must be reported to the Estates Facilities Customer Service Centre on 020 7594 8000.

1. 5 Minutes Flush: Turn on the cold & hot water tap at the sink or water outlet. Record the time the flush started and the time it ended.

2. Do not leave any taps unattended and ensure they are closed after flush to prevent flooding.

3. All records must be kept in a safe place for future reference.

Building	Date	Day	Location	All Hot Tap	All Cold Tap	Time	Mains Water Tap	Name of Operative
KEOGH	22/04/2024	MONDAY	M90	YES	YES	9.30-12.30PM	YES	TOBIAS
KEOGH	22/04/2024	MONDAY	M91	YES	YES	9.30-12.30PM	YES	TOBIAS
KEOGH	22/04/2024	MONDAY	M92	YES	YES	9.30-12.30PM	YES	TOBIAS
TIZARD	22/04/2024	MONDAY	M31	YES	YES	9.30-12.30PM	YES	TOBIAS