UNIVERSITY OF SUSSEX

WATER SAFETY PLAN FOR THE CONTROL OF WATER BORNE BIOLOGICAL HAZARDS

June 2020 v1.0

Date	Updated By	Version	Comments
10/06/2020	S. Noble	1.0	New Issue

Title	Water Safety Plan for the Control of Water Borne Biological Hazards			
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Ownership	Water Safety Group			
Operational Date	June 2020		Next Review	June 2021
Version Number	1.0	Supersedes	New Issue	

Table of Contents

Table of Contents

Table of Contents

Glossary of Acronyms & Abbreviated Terms

BMS	Building Management System. A Building Management System (BMS) is a computer-based control system installed in buildings that controls and monitors the building's mechanical and electrical equipment.
CWS	Cold Water Supply within a building for domestic purposes
DHW	Hot Water Supply within a building for domestic purposes
DOH	Department of Health
EFM	Estates Facilities Management Services Dept.
HSE	The Health and Safety Executive
Legionella	Bacteria which exists in the environment but can become more virulent and proliferate in complex engineered water systems
Risk Assessment	Methodology to determine level of compliance with current codes of Practice
SEF	Sussex Estates & Facilities (FM Business Partners)
Sentinel Outlets	Outlets closest to and furthest from each: mains water entry point, water storage tank and calorifier
TMV	Device for the controlling the temperature of water at the point of use and designed to shut of hot water supply if there is a failure of the cold
WSG	Water Safety Group

1.0 Introduction

The Health and Safety at Work etc Act 1974 and the Management of Health and Safety at Work Regulations place a statutory duty upon employers to identify the risks to health and safety to any person arising out of or in connection with, the work place, including the conduct of their undertaking. The assessment should identify how the risks arise and how they impact on those affected. This information is required to make decisions on how to manage those risks in order that the decisions are made in an informed, rational and structured manner, and the action taken is proportionate. The HSE have identified hot and cold water systems as a risk to be assessed, controlled and monitored.

The University of Sussex attaches the greatest importance to the health, safety and welfare of its students, staff and visitors. It is considered essential that management and staff work positively together to achieve an environment compatible with the proper provision of services while health hazards to staff and others are reduced to a minimum.

This Water Safety Plan sets out the University's strategy to work towards compliance with statutory standards and current best practice. The principal guidance documents underpinning this Water Safety Plan are;

- The Health & Safety Commission's Approved Code of Practice and Guidance 'Legionnaires' Disease The control of Legionella bacteria in water systems' L8.
- HSG274 Part 2: The control of legionella bacteria in hot and cold water systems.
- HSG274 Part 3: This guidance for dutyholders, including employers, those in control of premises and those with health and safety responsibilities for others, will help them comply with their legal duties. These include identifying and assessing sources of risk, preparing a scheme to prevent or control risk, implementing, managing and monitoring precautions, keeping records of precautions and appointing a manager responsible for others. The guidance gives practical advice on the legal requirements of the Health and Safety at Work etc Act 1974, the Control of Substances Hazardous to Health Regulations 2002 concerning the risk from exposure to legionella bacteria and guidance on compliance with the relevant parts of the Management of Health and Safety at Work Regulations 1999.

The University will do all that is reasonably practicable to achieve compliance with the HSE and other applicable guidance to control the risk posed by waterborne pathogens within facilities operated by the University (See Section 4). To achieve this, the University is committed to providing the necessary training to ensure staff possess the knowledge and skills to carry out the duties as set out under the University Water Safety Plan. The aim of the Water Safety Plan is to outline the systems and controls required to provide assurance about Water Safety.

2.0 University Water Safety Group

The University Water Safety Group (WSG) is a multi-disciplinary partnership between

Estates, Safety, SEF and Balfour Beatty, which has been established to provide a range of both technical and clinical experience, qualifications and skills.

The WSG has overall responsibility to provide assurance that all water in University Facilities is fit for purpose at the point of use, unless legal contracts specify otherwise. The group is pivotal in ensuring that decisions affecting the safety and integrity of the water systems and associated equipment do not go ahead without being approved by them. This includes consultations relating to decisions on the procurement, design, installation and commissioning of water services, equipment and associated treatment processes.

The Water Safety Group will apply a risk based approach to water safety in order that available funds can be used to target the highest risk areas. A risk assessment of the Schools and Divisions against their susceptibility to water borne pathogens will be carried out. This will categorise the areas into three categories Low, Medium and High.

The overall objective of the WSG is to ensure the safety of all water used by students, staff and visitors, to minimise the risk of infection associated with waterborne pathogens. The Duty Holder shall have the following remit:

- To set strategic direction with regard to water safety.
- To identify the groups susceptible to risks from water borne pathogens.
- To provide reports on University water quality. Reports to include performance against relevant standards and projects in progress to improve water quality.
- To provide assurance to the University that adequate control measures are in place within service and business groups to manage water quality.
- To provide guidance, direction and recommendations with regard to all adverse incidents relating to water quality.
- To convene an Incident/Outbreak Control Group where appropriate. The incident group will investigate and report back to the Water Safety Group.
- To co-ordinate communication with all statutory agencies and external stakeholders as and when required, ensuring good communication with Service and Business Groups.
- To develop and review the Water Safety Plan.
- To approve and monitor the implementation of the current WSP’s

3.0 Approach for the Prevention and Control of Water Borne Biological Hazards

3.1 Primary Objectives

The University's overall objective is to ensure that a safe level of water hygiene is provided throughout the estate.

In order to achieve this, the following primary objectives have been established. –

a) The Duty Holder to define the roles within the structure and to appoint appropriate personnel, i.e. Responsible Person and Deputy Responsible Persons (Water Safety) (whose duties are defined in Section 3.2);
b) To formulate a plan to ensure the overall integrity of domestic water systems and equipment in compliance with the guidelines outlined in Appendix 22.
c) To survey and carry out a risk assessment of all University water systems and equipment, to establish any items of non-compliance in accordance with relevant Guidance and Approved Codes of Practice (L8 ACoP);
d) To establish a programme of remedial works of such systems and equipment in order to achieve compliance;
e) To ensure that the design of relevant building services for new, refurbished or modified systems comply with current guidance and best practice;
f) To maintain record schematic drawings of domestic hot and cold water systems;
g) To maintain operation and maintenance manuals for domestic hot and cold water plant and equipment;
h) To develop a training programme to provide staff with the knowledge and skills to carry out their function;
i) To implement a programme of water quality testing to determine the effectiveness of water quality controls;
j) To develop procedures for the escalation of incidents where water samples test positive.

3.2 Management Responsibilities and Designated Staff Functions

Appendix 18 details the management structure and lines of responsibility for the control of water safety within the Sussex University management responsibilities and designated staff functions are as detailed below;

3.2.1 Duty Holder

The Chief Operating Officer has overall responsibility for water safety within the University.

3.2.2 Head of Service Delivery FM

The Head of Service Delivery FM chairs the Group and will advise on infection prevention elements of water safety.

3.2.3 Responsible Person

A Responsible Person, possessing adequate professional knowledge and with appropriate training, will be appointed (in writing) by the Duty Holder to devise and manage the procedures necessary to maintain water quality. The Responsible Person should be a Manager, or Director, or have similar status and sufficient authority to ensure that all operational procedures are carried out in an effective and timely manner. The Responsible Person will be required to liaise closely with other professionals in various disciplines.

In addition, the Responsible Person should possess a thorough knowledge of the control of Microbiological Hazards in Water Systems and will be a professionally qualified person.

The Senior Maintenance Manager (SEF) will be appointed as Deputy Responsible Persons.

3.2.4 Deputy Responsible Person

This role, in association with the Head of Service Delivery FM and other Estates/SEF staff, involves:

a) Advising on the potential areas of risk and identifying where systems do not adhere to this guidance;
b) Liaising with water undertakers and environmental health departments and advising on the continuing procedures necessary to ensure acceptable water quality;
c) Monitoring the implementation and efficacy of these procedures;
d) Identifying and approving any changes to those procedures;

e) Ensuring that only approved equipment is to be connected to the water supply and that it is properly installed;

f) Ensuring adequate operating and maintenance instructions exist and adequate records are kept.

g) Implement a programme of maintenance and periodic inspection and testing

h) Appraise Capital Project managers of University Policy with respect to the Design, Installation and Commissioning of Water Systems.

3.2.5 Authorising Engineer (Water)

The University will appoint a Water Authorising Engineer who will independently review the University's Water Management Procedures against compliance with statutory requirements and guidance. In addition the Authorising Engineer will provide guidance on how the University Water Management Plan should be developed in order to achieve compliance.

3.2.6 Contractor

A contractor is the person or organisation designated by the University/SEF to be responsible for the supply, installation, validation and verification of hot and cold water services, and for conducting installation checks and tests. In relation to the control of Legionella, the University requires potential contractors to provide evidence that they are appropriately qualified and competent. For example where specialist contractors are involved in the application or monitoring of Legionella control measures they should be members of the Legionella Control Association.

3.2.7 Contract Manager

This is the person nominated by management to witness tests and checks under the terms of the contract. He/she should have specialist knowledge, training and experience of hot and cold water supply storage and mains services. The University has appointed a Water Quality Manager who has specialist knowledge of the design, construction and commissioning of Water Systems and who regularly undergoes in-service training to

3.2.9 Management Arrangements & Responsibilities for Buildings

Water Quality in all buildings is the responsibility of the relevant FM service provider (SEF) who shall have their own management structure, unless other legal contracts override this. SEF shall have a representative who will sit on the Water Safety Group and provide feedback on water safety issues.

3.2.10 Training

A person intending to fulfil any of the staff functions above should be able to prove that they possess sufficient skill, knowledge and experience to be able to perform the designated tasks safely. Staff will be properly trained and competent to carry out the appropriate measures. Maintenance staff in direct contact with potable water, distribution and storage systems must be trained in the principles of water supply hygiene. Details of all training will be held in the individual's training records. Any person working on water distribution systems or cleaning water outlets needs to have completed a water hygiene awareness training course

4.0 Water Safety Plan

This Water Safety Plan is a risk based strategy for water quality which considers both the susceptibility of students, staff and visitors to water borne microbiological hazards and the capacity of a system to promote the proliferation of pathogens.

The susceptibility of these groups is dependent on the type microbiological hazard. Legionella is a water borne bacteria with different susceptibility groups. Each risk assessment assesses the risk associated with each group into three categories

High Risk
Medium Risk
Low Risk

4.1 Annual Water Safety Plan

The Annual Water Safety Plan is updated every year, or in the event of material or significant change, to show where the Estates dept aim to utilise available funding to implement water safety Improvements, procedures and protocols and is available via current share drive / Box.

4.2 Principles of Water Safety

The principles of water safety are; good system hygiene, maintenance of circulation throughout the system, and maintenance of temperatures to achieve thermal disinfection. To this end, the following elements are critical:

- Correct design, installation and commissioning;
- A hydraulically balanced system which avoids areas of stagnation;
- Levels of hygiene to maintain the system is free from sources of infection such as debris, sediment biofilm or unapproved construction materials;
- Implementation of a thermal disinfection regime and, where appropriate, the use of chemical disinfectants;
- Comprehensive planned maintenance programme;
- All water system shall be designed, installed and commissioned in compliance with current guidance and best practice. See Section 7.0
- Monitoring for the effectiveness of control measures;

The Implementation of an effective Water Safety Plan must incorporate the preparation of fully detailed commissioning documentation, operating and maintenance. System records will include the following documentation:

- Water risk assessments and risk register;
- Commissioning data;
- Operating & Maintenance manuals;
- Schematic drawings showing the location of all hot and cold water outlets;
- Material safety data sheets;
- Planned maintenance programme;
- Inspection and testing regime including test results.

4.3 Design/Commissioning/Construction Procedures

The Health and Safety File for all completed projects should contain a new or updated Water Risk Assessment, Records of Water Sampling, As Installed/Built Drawings and details of all Commissioning and Disinfection Procedures. All H&S files are stored by SEF.

On completion of refurbishment projects, the existing risk assessment will be updated to reflect any changes made to the water system.

4.4 Water Safety Plan Review

This Water Safety Plan is a live document and will be continually reviewed by the Water Safety Group to ensure the adequate assessment and control of the risks from water borne pathogens.

5.0 Control Measures

The following control measures shall be utilised in order to assure that water quality in University facilities are fit for purpose.

5.1 Engineering Water Risk Assessment

A water risk assessment, using current statutory standards and codes of practice as reference, will evaluate the degree of compliance with respect to the design installation and maintenance of systems for each building. Risk Assessments will follow BS 8580 Water Quality and Risk Assessments for Legionella Control - A Code of Practice.

The Water Risk Assessment documentation will be the principal tool for managing the safety of water systems and will be:

- Applied to all properties operated by the University;
- Carried out during the construction phase of new projects;
- Carried out before and after renovations;
- Reviewed regularly and particularly when there is reason to suspect it is no longer valid.

A Risk Assessment is required after all new works and will demonstrate that new systems comply with statutory standards and current best practice. Before refurbishments are carried out, the existing risk assessment will be reviewed to identify any risks associated with the proposed project. Where projects impact on the water system, the identified risks must be addressed.

5.2 Cold Water Storage

Ideally cold water should ***not*** be stored or distributed at temperatures 20^{o}C or above. However, the Supply Regulations allow the water companies to supply cold water at up to 25^{o}C and this storage condition may therefore not always be met. Where water is supplied at a temperature 20^{o}C or above, the cold water in storage and at outlets should be not more than 2^{o}C above the incoming supply from the water supply company.

The Water Supply (Water Fittings) Regulations 1999 and relevant parts of BS EN 806 and BS 8558 specify minimum standards for cold water storage cisterns to ensure that the stored water is retained at a wholesome standard suitable for domestic and commerical use. It is necessary to minimise stagnation and stratification of the stored water. A nominal 12 hours' total on-site storage capacity is recommended. The quantity of the water stored should be carefully assessed in relation to the daily requirement so that a reasonable rate of turnover is achieved. The storage capacity should be reduced where it is known or established that it is excessive and where it is practicable to do so.

Where water storage tanks are in use to supply cold water services, the storage tanks shall be suitable for potable water, easily cleaned, equipped with a close fitting cover and adequate drain valve, suitably insulated to minimise heat gains, and have overflow pipes properly screened. Tanks should have take-off and entry points at opposite ends to ensure a flow through the tank.

Tank capacity shall be such that under normal use, complete turnover takes less than 12 hours. Where possible the layout of cold services and tanks should ensure that the system does not gain heat. Tanks and pipe work should not be positioned close to heat sources or where they could be affected by solar gain, unless they are effectively insulated.

Where the above provisions are not fully met a plan should be formailsed and agreed to replace old stock over a reasonable period of time with the support of a life cycle assessment.

Maintenance Actions

- Annual tank inspection with cleaning and disinfection if required

Monitoring

- Annual (summer) temperature checks
- Water sampling for Legionella
- Annual water sampling for Pseudomonas in specified locations

Records

A copy of water sampling results and maintenance regime checklists shall be held by SEF.

See Appendices for sample copies of Maintenance regime checklists.

5.3 Hot Water Storage

There are a number of methods that are utilised to provide a supply of hot water to University Buildings:

- Boilers
- Plate Heat Exchangers
- Calorifier
- Water Heaters
- Buffer Vessels

All methods of generating hot water shall:

- Be capable of heating their contents to the required temperatures of >60^{o}C;
- Be able to supply greater than 55 ^{o}C at associated outlets
- Be of adequate performance to maintain a minimum return temperature of 50^{o}C;
- Be readily accessible for cleaning;
- Be possible to isolate;
- Incorporate drain connections at the lowest points which are large enough to permit the removal of sludge and quick drainage of the vessel;
- Be fitted with non-return valves on the cold feed and also on the circulation return. Both valves shall be within 300mm;

Maintenance Actions

- Annual inspection with cleaning and disinfection if required.
- Annual servicing of temperature controls

Monitoring

- Monthly temperature checks
- Sentinel Tap - quarterly water sampling for Legionella (see appendix 19)

Records

Electronic Records of Water Quality Control Measures are held by SEF.

A hard copy of water sampling results and maintenance regime checklists shall be held by SEF.

See Appendices for sample copies of Maintenance regime checklists.

5.4 Hot and Cold Water Distribution Systems

The main control strategy for hot & cold water distributions system shall be:

- To store and circulate hot water at 60 degrees Celsius.
- To ensure that each hot water outlet shall reach a temperature of 50°C after 1 minute (See Appendix 19).
- To ensure cold water will be stored below 20 degrees Celsius and shall be below 20°C after 2 minutes at each cold water outlet (See Appendix 19).

Where the above parameters are not achievable, the University's control strategy will be to supplement temperature control by adding a chemical biocide to the water.

There are a number of factors that can affect the performance of both temperature and chemical biocides. These therefore are to be considered as part of the control strategy:

- Ensure good design to minimise heat transfer. Cold water should be stored away from heat sources. Hot and cold water services should be separated. All storage and distribution systems should be insulated to relevant British standards.
- Stagnation will allow a build-up of deposits in the system, compromise the temperature regime and reduce the effectiveness of any chemical disinfection programme. Therefore little used outlets are to be avoided or removed. Where facilities have been removed, redundant pipework should be cut back and the tee replaced with a straight connector or 90° bend. Where underused facilities must be retained, a flushing programme will be implemented. In addition, pipe work should be as short and direct as possible especially where it serves intermittently used taps and appliances.
- Flexible Hoses have been identified as a potential source for the growth of micro-organisms. The University will look to undertake a programme for the removal of all flexible hoses through time. Such flexible connections should only be used in

University premises where an installation has to move during operation or is subject to vibration as per HSG274, Part 2, 2.35. If flexible hoses are required due to vibration or movement purposes, it is recommended replacing with WRAS approved flexible hoses and fittings and follow certification.

5.4.1 Thermostatic Mixing Valves

Where a risk assessment indicates a risk of scalding, "fail-safe" thermostatically controlled mixing valves (TMV) positioned as close as possible to the hot water outlets, shall be used to reduce the hot water at the outlet to a safe temperature (See Appendix 16). Typical applications for TMVs are showers, baths and facilities for vulnerable groups.

Maintenance Actions (See Appendix 19)

- Thermostatic mixing valve inspection and service
- Quarterly shower head replacement or cleaning and disinfection.
- Flushing of little used outlets.
- Monthly service of chlorine dioxide plant by specialist contractor.

Monitoring (See Appendix 19)

- Monthly temperature checks of hot and cold sentinel outlets (dependent on risk category
- Monthly temperature monitoring principal loops and representative subordinate loops (dependent on risk category)
- Annual temperature checks of a representative selection of other hot and cold sentinel outlets on a rotational basis to ensure the whole system is reaching satisfactory temperatures (dependent on risk category).
- Monthly chlorine dioxide checks hot and cold sentinel outlets.
- Annual Chlorine Dioxide checks of a representative selection of other outlets on a rotational basis to ensure the whole system is adequately dosed
- Water sampling for Legionella quarterly (dependent on risk category)
- Water sampling for Pseudomonas every six months in all areas

Records

Electronic Records of Water Quality Control Measures are held by SEF.

A hard copy of water sampling results and maintenance regime checklists shall be held by SEF.

5.5 Little Used Outlets and Showers

The School/Department or SEF FM Managers in each facility shall be responsible for identifying water outlets that are used infrequently. The relevant manager will arrange to have these outlets flushed weekly, or as indicated by the risk assessment for at least five minutes (depending on the length of deadleg pipework).

All flushing shall be recorded and records maintained for inspection by regulatory authorities if required.

The need for intermittently or infrequently used taps and appliances (particularly showers) shall be reviewed if outlets are identified as requiring constant flushing. The Deputy Responsible Person in consultation with the manager of the school/department concerned will approve the removal of any little used outlet from the water system. If such taps and appliances are not necessary, the supplies shall be removed from the re-circulating main to ensure that no dead leg is formed.

On a quarterly basis in order to achieve effective maintenance, spray heads and hoses will be replaced or dismantled, cleaned and de-scaled. All work shall be logged on the shower maintenance log. Completed logs will be held by SEF.

5.6 Chilled Water Dispensers

Chilled water dispensers should are not be installed without the approval from the WSG. Some water dispensers have been approved for use by the estates water team, and should be maintained as per the manufacturer's instructions.

6.0 Design, Installation and Commissioning of Building Services

New build or renovation projects present an opportunity to achieve compliance with statutory standards and best practice. The requirement for the design installation and commissioning of new systems is clearly set out in:

- HSG 274 Part 2
- the Construction (Design and Management) Regulations 2007 (CDM);
- the current Building Regulations (and associated amendments);
- for systems provided with water from the public supply – for England and Wales, The Water Supply (Water Fittings) Regulations
- BS EN 806 (Parts 1–5) Specifications for installations inside buildings conveying water for human consumption;
- BS 8558 Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages;
- IBSE Guide G Public Health and Plumbing Engineering.

University project teams will develop documentation to provide evidence upon handover that domestic water systems within buildings comply with statutory standards and current best practice.

This will include the development of a Water Safety Plan during the construction phase of the project. The construction phase WSP will incorporate an independent risk assessment, with all identified risks addressed and recorded. Prior to handover, the contractor must produce documentation which demonstrates evidence of system disinfection, negative microbiological testing of water, and records of flushing if the system has been filled with water more than seven days prior to occupation.

When carrying out renovations, project managers will consult existing Water Risk Assessments to determine the extent of non-compliance that must be addressed within the project. Where partial renovations are planned, designs will consider the hot and cold water system in its entirety. If all remedial works cannot be completed within the scheme, Estates Water Team will have the capacity to accommodate full compliance for the building at a later date. Where an existing Water Risk Assessment does not exist, it will be the responsibility of project manager to commission one.

New projects will be subject to an on-going Water Risk Assessment during the course of the project. On completion of the project, the Water Risk Assessment shall be reviewed to determine the level of compliance with statutory standards. It is the responsibility of the project manager to verify compliance for systems or parts of systems included in the project.

A construction phase log book will be maintained throughout the project and will identify:

- Names and qualifications of personnel working on water systems
- Water Hygiene specific training records
- Dates and results of staged inspections
- Details of pressure tests
- Certificate of disinfection
- Schematic drawings
- Commissioning procedures
- Weekly reports
- Flushing logs
- Material certifications
- Method statements
- A Installed/Built drawings

6.1 The Principles of Good Water Quality.

The principles of water quality to be observed during the design, installation and commissioning of building services are: (1) good circulation (2) temperatures which do not promote the proliferation of micro-organisms and (3) the maintenance of system hygiene throughout the installation and commissioning phase prior to handover.

6.1.1 Circulation

Stagnation in water systems will:

(1) compromise the temperature or chemical disinfection regime

(2) Cause the build-up of biofilm and foreign matter in pipework, thus promoting the colonisation by micro-organisms.

In order to mitigate against these factors, the design of all water distribution networks will ensure that the system is balanced to maintain good circulation throughout. The

number of water outlets will be kept to a minimum to avoid lack of use and efforts should be made to situate areas of heaviest consumption at end of circuits where possible. The water distribution system should be filled as late in the commissioning process as possible.

Once the system has been filled and disinfected, a flushing regime (at least twice weekly) should be implemented until the system has been brought fully online.

All water storage systems shall be designed to limit storage to twelve hours. Where possible a pressurised system without storage may be preferable if client requirements permit.

6.1.2 Hygiene

Materials used in construction will be WRAS approved. All materials used to avoid contamination during construction phase work areas to be kept clean. Open pipework ends to be capped off to prevent ingress of foreign matter prior to final termination.

6.1.3 Temperature

As detailed previously, in order to ensure an effective disinfection regime, hot water systems will be designed to ensure:

- Hot water is stored above 60°C and distributed and circulated through the system at 50 °C.
- Cold water is stored below 20 °C.
- Hot and cold water distribution services are adequately segregated and insulated to relevant British Standards.
- Cold water storage tanks should not in a shared location with heating or hot water services.

Prior to the handover of projects, documentation must be submitted as part of the Health & Safety file to indicate that the above temperature regime is being achieved.

6.1.4 Monitoring

For all future projects, where possible, the principal medium for controlling and recording water temperatures shall be through the Building Management System (BMS). The following is a list of temperatures that will be monitored:

- Hot water flow & return temperatures to sentinel points on each level.
- Cold water temperatures to sentinel points on each level
- Cold water storage tanks
- Calorifiers and storage vessels
- Cold water supply to buildings

7.0 Air Conditioning Systems

Ventilation and air conditioning systems shall be designed so that water, whether from the supply or from other sources such as condensation, cannot accumulate in ductwork or plant which is subject to an air stream. All condensate drains shall incorporate a visible air break as near to the ventilation or air conditioning system as possible, to prevent potentially contaminated water from being drawn back into the system. No domestic type air humidifiers or any similar equipment which may compromise air quality shall be put into use on University premises without the prior approval of the WSG.

8.0 Unoccupied Areas

Buildings which are to be left unoccupied for up to one month shall be subject to a logged weekly flushing regime. Should the temporary closure become permanent, it should be disconnected from the rest of the system, ensuring there are no dead legs. Before reconnecting, the system should be re-commissioned and disinfected in accordance with BS EN 806 series (parts 1-5). It is the responsibility of SEF in conjunction with the School/Department Manager to inform the Estates Head of Service Delivery FM, in advance of any department which is to be vacated.

The flushing procedure is as follows:
Open all taps for a minimum period of 5 minutes (5 minutes on hot and 5 minutes on cold) and flushing all WC cisterns on a twice weekly cycle. Taps that include flow regulation may need to be flushed for longer than 3 minutes. In determining the flushing period, consideration should be given to the water pressure and length of dead-legs and spurs in the connecting pipework.

All the water outlets must be flushed during the vacated period. Prior to re-occupation the complete system shall be disinfected, refilled and tested.

9.0 Fire Hose Reels

Hose reels are no longer considered part of the University Fire Strategy and shall be removed when the opportunity presents.

10.0 Record Keeping

The following records shall be kept for a period five years (or appropriate electronic system):

- Details of remedial work (with dates) carried out to prevent or control water borne biological hazards
- Inspection & flushing of DHW Calorifiers and water heaters
- Check sheets for ventilation systems including condensate drains
- Check sheets for cold water tank inspections
- Cleaning/disinfection of cold water storage tanks
- Monthly temperature checks of hot and cold water sentinel outlets
- Yearly temperature checks of hot and cold water outlets
- Calorifier or water heaters stored flow and return temperatures
- Replacement or disinfection of spray heads
- Flushing records of empty buildings
- Flushing of little used outlets
- Legionella sampling results
- TMV Maintenance inspection sheets
- Electronic Records of Water Quality Control Measures

11.0 Monitoring and Water Quality Sampling

11.1 Laboratory Surveillance

In order to provide an early warning with regards to water borne microbiological hazards, SEF currently carry out laboratory based surveillance.

11.2 Water Quality Sampling

At present water quality sampling throughout the University consists of:

- Legionella sampling
- Pseudomonas sampling for relevant buildings

11.2.1 Pseudomonas Sampling

A Pseudomonas Sampling programme is currently being carried out in two designated buildings within the University..

Upon receipt of a positive count for Pseudomonas, remedial actions may include:

- Check for under used outlets
- Assess the water distribution for non-metallic materials and remove
- Assess the water system for blind ends (deadlegs)
- Clean & disinfect the water distribution system
- Consider replacement of contaminated taps

If tests show counts of >1 cfu/100 mL, a review of the risk assessment and use of water in the unit will be necessary. Simultaneously, retesting of the water outlet should be undertaken (see Appendix 2).

In all cases, all key members of the water group must be informed of the nature and extent of the problem and their approval sought for actions taken.

11.2.2 Legionella Sampling

The following conditions where testing for Legionella would be appropriate:

- When storage and distribution temperatures do not achieve those recommended
- The temperature control regime and systems are treated with a biocide
- In systems where the control regiments are not consistently achieved
- When an incident or outbreak is suspected or has been identified
- High risk areas

Samples should be taken as follows:

- Cold water system - from the cold water storage tank and the furthest available outlet from the tank.
- Hot water systems - from the calorifier or the nearest suitable tap to the calorifier plus the return supply to the calorifier or the nearest tap to that return supply.
- A sample should also be taken from the furthest outlet from the calorifier.
- Samples may also be required from areas of particular concern e.g. in laboratories.

Analysis of water samples for Legionella should be carried out by a UKAS accredited laboratory. The interpretation of any results should be carried out by technically competent personnel.

The water safety group will decide on the location and frequency of Legionella testing, with testing being prioritised based on the three tiered compliance approach.

Where test results show water systems to be colonised with Legionella, actions are set out. These may include:

- Review of control measures
- Check for under used outlets
- Assess the water distribution for non-metallic materials and remove
- Assess the water system for blind ends
- Disinfect the water distribution system
- Consider replacement of contaminated taps.
- Undertake rigorous flushing

In cases of severe colonisation with Legionella, it may be deemed necessary to remove the point of use from service or fit a point of use filters to allow the outlet/outlets to remain in service. In all cases, all key members of the water safety group must be informed of the nature and extent of the problem and their approval sought for actions taken.

11.3 Point-of-use filtration

Point of use filters prevents the discharge of planktonic legionella from an outlet. POU filters are fitted if an outlet is tested positive with Legionella and cannot be taken out of service. POU Filters will only be installed as a temporary measure while appropriate remedial works is carried out and should be changed in accordance with the manufacturer's recommendations.

12.0 Action in the Event of an Incident

In the event of a single case which may be contributed to water borne biological organism, an urgent incident meeting will be convened to include core members of the Water Safety Group. The meeting will be chaired by the Director of Estates. The group shall meet daily or

as appropriate to co-ordinate the investigation of the problem, and remedy any necessary actions. Minutes shall be kept in conjunction with a log of actions taken.

The group shall communicate with key persons/agencies to determine appropriate actions. Actions may include:-

- Stopping use of the building
- Sampling water from taps and showers prior to any disinfection or pasteurisation
- Examination of ductwork of ventilation plant to the area concerned, and sampling of condensate drain water from cooling coil(s)
- Sampling of water from DHW calorifiers or water heaters serving the area prior to any disinfection or pasteurisation
- Testing hot and cold water temperatures at all outlets in affected areas
- Isolation of specific outlets
- Elevation of DHW temperatures to 60°C at outlets and placing of warning notices of raised temperatures
- Inspection of maintenance records
- Disinfection of water services in accordance with BS 8558:2011

All laboratory confirmed cases of Legionnaires' disease must be reported to the Public Health Agency (PHA).

Cases should also be reported to the University Safety Department to ensure follow-up of each case and to ensure that appropriate control measures are taken to remove the source of Legionella. If staff acquire the disease, cases may also be notifiable under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR).

All elements of risk control and reporting will be overseen by the Incident Control Team. The Health and Safety Executive may be involved in the investigation of outbreaks under the Health and Safety at Work etc Act 1974

13.0 In the event of flood or loss of water supply

Refer to the Estates Business Continuity Plan. The aim of the Estates BCP is to return services and/or buildings to a safe and effective operational condition following disruption or a major incident.

Appendices

Appendix 1

RISK GROUPS FOR LEGIONELLA

Susceptibility of individuals

While previously healthy people may develop Legionnaires' disease, there are a number of factors that increase susceptibility:

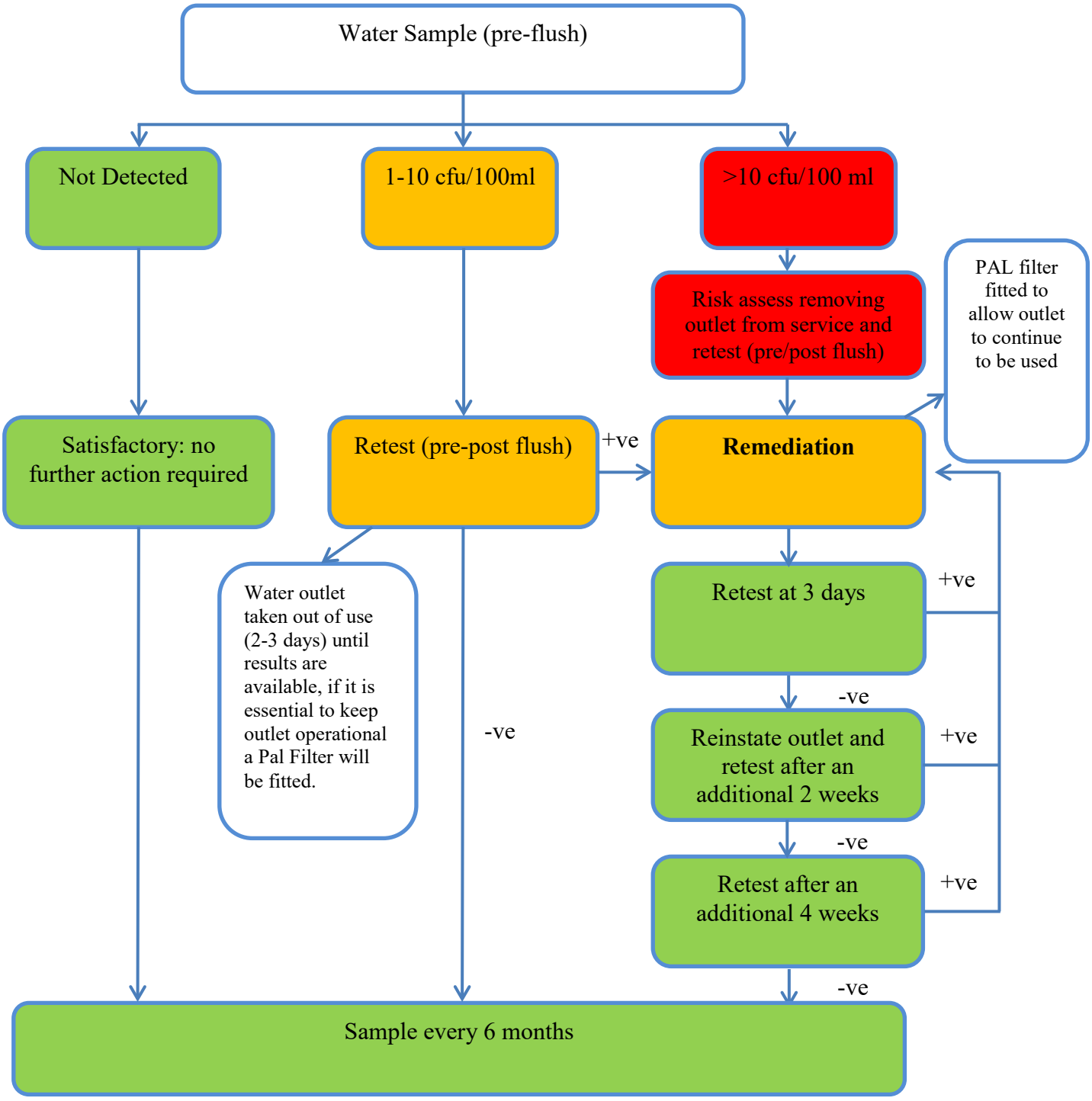
The following at risk groups have been identified

- increasing age, particularly over the age of 50 (children are rarely infected);
- men are approximately three times more likely to be infected than women (this may change with altered smoking habits);
- existing respiratory disease that makes the lungs more vulnerable to infection;
- illnesses and conditions such as cancer, diabetes, kidney disease or alcoholism, which weaken the natural defences;
- smoking, particularly heavy cigarette smoking, because of the probability of impaired lung function;
- People who are immunocompromised as a result of illness or treatment (for example, those on immunosuppressant drugs that inhibit the body's natural defences against infection).

Due to the diverse range of population across the University, the above risk groups have categorised into risk areas based on the likelihood or ability of the person coming into contact with a water outlet with highest risk considered to the capability of the outlet to aerosolise water.

Appendix 2

PSEUDOMONAS WATER SAMPLING PROCEDURE



Appendix 3

Actions in Event of a Positive Legionella Sample

Action levels following Legionella sampling in hot and cold water systems: The table below is refereneced from NHS Policy.

	Results from Pre-flush samples	Systemic results (Post-flush samples)
Legionella bacteria (cfu/l)	Pre-flush samples tend to be an indicator of local conditions and if detected will often require Post-flush samples in order to determine that the contamination is local and not systemic.	Post-flush samples (or multiple positive samples) may be an indication that the whole water systems is contaminated and that controls are not effective.
Legionella not detected	Continue with the current control scheme	
Legionella From detection to 100	Action required • The detection limit for Legionella by culture methods was historically 100cfu/L, at present laboratories may be able to report to levels of 20cfu/L or less. This can cause confusion over what level should bring about corrective actions. The primary concern is protecting susceptible persons, so any detection of legionella should be investigated and, if necessary, the system resampled to aid interpretation of the results in line with the monitoring strategy and risk assessment.	
100 - less than 1000	Action required • Identify remedial actions, Investigate:– o Usage frequency o Outlet for corrosion and scale o local heat gain, o Local Dead ends o Cross flow between hot and cold and vice versa, o Localised failure of the HWS return • It may be appropriate to immediately resample to indicate if initial remedial actions have been effective. The locations should then be resampled after 3 to 6 months to confirm any actions taken have remained effective. In addition to the above, and if the outlet is served by a TMV: • Review the need for the TMV taking into account the relative risks of scalding. Remove the TMV if considered appropriate • If the TMV is to remain, clean and disinfect the TMV, the outlet and the strainers on both cold and hot feeds. • Identify any flexible hoses (particularly after the TMV) and consider replacement, avoiding the use of flexible hoses where practicable.	Action required Whilst low numbers are unlikely to pose a risk to the general population, • Review immediately the system control measures and risk assessment • Identify remedial actions, Investigate: - o Check for any hot water backflow via the calorifier cold feed pipes o Calorifier discharge via open vents to the cold tank. o Failure of HWS to operate at target temperatures o Over capacity or under usage • Cleaning & Disinfection of the entire system should be considered • It may be appropriate to confirm effective disinfection, any required microbiological samples should be taken between two and seven days after the system is treated. (Samples taken immediately after a disinfection process might give false negative results). • The water system should then be resampled regularly to confirm any actions taken have remained effective.

1000 - 10,000	Action required • In addition to the above • Review immediately the local control measures and risk assessment to identify any required remedial action (dead ends etc) • Cleaning and Disinfection of the outlet should be undertaken – (especially showers and spray taps) • If a shower (spray outlet) cannot be taken out of use, consider installing point of use microbiological filters on all affected showers. • It is likely to be appropriate to resample, between two and seven days after, to indicate if initial remedial actions have been effective. • The locations should then be resampled (e.g. 1 to 3 months) to confirm any actions taken have remained effective.	Action required • In addition to the above • Cleaning & Disinfection of the entire system is likely to be required. • To confirm effective disinfection microbiological samples should be taken between two and seven days after the system is treated. (Samples taken immediately after a disinfection process might give false negative results).
>10,000	Action required • In addition to the above. • Take immediate measures to prevent exposure from this outlet until remedial measures are taken and shown to be effective. • If the outlet cannot be taken out of use, install a point of use microbiological filter on all affected outlets. • Resample, between two and seven days after, to indicate if initial remedial actions have been effective. • The locations should then be regularly resampled to confirm any actions taken have remained effective.	Action required • In addition to the above. • Take immediate measures to prevent exposure from all outlets fed by the system until remedial measures are taken. • Clean & Disinfect the entire system as soon as possible.

Appendix 4

PPM Schedules

The following table lists the frequency of tasks for compliance and are to be scheduled as planned preventative maintenance (PPM). The Frequency of these tasks has been subjected to the risk based approach adopted by the University. (Refer to Appendix 19)

Checklist for hot and cold water systems (adapted from HSG274 Part 2)

Service	Action to take	Frequency
Calorifiers	Inspect calorifier internally by removing the inspection hatch or using a borescope, and clean by draining the vessel. The frequency of inspection and cleaning should be subject to the findings and be increased or decreased based on conditions recorded	Annually, or as indicated by the rate of fouling
	Where there is no inspection hatch, purge any debris in the base of the calorifier to a suitable drain Collect the initial flush from the base of hot water heaters to inspect clarity, quantity of debris and temperature	Annually, but may be more frequent as indicated by the risk assessment or result of inspection findings
	Check calorifier flow temperatures (thermostat settings should modulate as close to 60°C as practicable without going below 60°C) Check calorifier return temperatures (not below 50°C).	Monthly
Hot water services	For non-circulating systems: take temperatures at sentinel points (nearest outlet, furthest outlet and long branches to outlets) to confirm they are at a minimum of 50°C within one minute	Monthly
	For circulating systems: take temperatures at return legs of principal loops (sentinel points) to confirm they are at a minimum of 50°C. Temperature measurements may be taken on the surface of metallic pipework	Monthly
	For circulating systems: take temperatures at return legs of subordinate loops; temperature measurements can be taken on the surface of pipes, but where this is not practicable, the temperature of water from the last outlet on each loop may be measured, and this should be greater than 50°C within one minute of running. If the temperature rise is slow, it should be confirmed that the outlet is on a long leg and not that the flow and return has failed in that local area	Quarterly (ideally on a rolling monthly rota)

POU water heaters (no greater than 15 litres)	Check water temperatures to confirm the heater operates at 55°C, or check the installation has a high turnover	Monthly–six monthly, or as indicated by the risk assessment
Combination water heaters	Inspect the integral cold water header tanks as part of the cold water storage tank inspection regime; clean and disinfect as necessary. If evidence shows that the unit regularly overflows hot water into the integral cold water header tank, instigate a temperature-monitoring regime to determine the frequency, and take precautionary measures as determined by the findings of this monitoring regime	Annually
	Check water temperatures at an outlet to confirm the heater operates at 55°C	Monthly
Cold water storage cisterns	Inspect cold water storage cisterns and carry out remedial work where necessary	Annually
	Check the cistern's water temperature remote from the ball valve and the incoming mains temperature. Record the maximum temperatures of the stored and supply water recorded by fixed maximum/minimum thermometers where fitted	Annually (summer) or as indicated by the temperature profiling
Cold water services	Check temperatures at sentinel taps (typically those nearest to and furthest from the cold cistern, but may also include other key locations on long branches to zones or floor levels). These outlets should be below 20°C within two minutes of running the cold tap. To identify any local heat gain, which might not be apparent after one minute, observe the thermometer reading during flushing	Monthly
	Take temperatures at a representative selection of other points to confirm they are below 20°C to create a temperature profile of the whole system over a defined time period. Peak temperatures or any temperatures that are slow to fall should be an indicator of a localised problem	Representative selection of other sentinel outlets considered on a rotational basis to ensure the whole system is reaching satisfactory temperatures for Legionella control
	Check thermal insulation to ensure it is intact, and consider weatherproofing where components are exposed to the outdoor environment	Annually
Showers and spray taps	Dismantle, clean, descale and disinfect removable parts, heads, inserts and hoses where fitted	Quarterly or as indicated by the rate of fouling or other risk factors, e.g. areas with high-risk patients
POU filters	Record the service start date and lifespan or end date and replace filters as recommended by the manufacturer (bacterial-retention filters should be used primarily as a temporary control measure while a permanent solution is developed, although long-term use of such filters may be needed in some healthcare applications)	According to manufacturer's guidelines

Base exchange softeners	Visually check the salt levels and top up salt, if required. Undertake a hardness check to confirm operation of the softener	Weekly, but depends on the size of the vessel and the rate of salt consumption
	Service and disinfect	Annually, or according to manufacturer's guidelines
Multiple-use filters	Backwash and regenerate as specified by the manufacturer	According to manufacturer's guidelines
Infrequently used outlets	Consideration should be given to removing infrequently used showers, taps and any associated equipment that uses water. If removed, any redundant supply pipework should be cut back as far as possible to a common supply (e.g. to the recirculating pipework or the pipework supplying a more frequently used upstream fitting) but preferably by removing the feeding 'T' Infrequently used equipment within a water system (i.e. not used for a period equal to or greater than seven days) should be included on the flushing regime Flush the outlets until the temperature at the outlet stabilises and is comparable to supply water and purge to drain Regularly use the outlets to minimise the risk from microbial growth in the peripheral parts of the water system, sustain and log this procedure once started	Weekly, or as indicated by the risk assessment
TMVs	Where integral, inspect, clean, descale and disinfect any strainers or filters associated with TMVs. To maintain protection against scald risk, TMVs require regular routine maintenance carried out by competent persons in accordance with the manufacturer's instructions. There is further information in paragraphs 2.152–2.168 of HSG274 Part 2.	Annually or on a frequency defined by the risk assessment, taking account of any manufacturer's recommendations
Inline strainers	Where fitted, inspect, clean, descale and disinfect any strainers or filters associated with TMVs or other sensitive equipment	Annually or on a frequency defined by the risk assessment, taking account of any manufacturer's recommendations
Pressurisation and expansion vessels	Where practical, flush through and purge to drain. Where removable, bladders or diaphragms should be changed according to the manufacturer's guidelines or as indicated by the risk assessment	Monthly–six monthly, as indicated by the risk assessment
Biocidal treatment systems	Check the dosing and control system operation including alarms Measure the treatment parameters to establish the required values are being achieved at representative outlets including sentinel outlets	Weekly Weekly

Appendix 5

Cleaning and Disinfection

Hot and cold water services should be cleaned and disinfected in the following Situations:

a) If routine inspection shows it necessary.
b) If the system or part of the system has been substantially altered or entered for maintenance purposes in a manner that may lead to contamination.
c) During or following an outbreak of Legionellosis

Disinfection can be carried out in two ways:

a) By the use of suitable chemical disinfectants, e.g. by chlorination when it is necessary to disinfect the whole system including storage tanks.
b) By thermal disinfection, i.e. by raising water temperature to a level at which legionella will not survive.

Chemical Disinfection

Prior to chemical disinfection it is essential to ensure that the system is clean, and it is important to ensure that all parts of the system are disinfected, not just those that are readily accessible. Chemical disinfection is usually carried out by chlorinating the water in the cold water storage tank to 20-50 mg/litre free residual chlorine. It is then allowed to flow to all parts of the system by successively opening the outlets in the system such as taps and showers (until there is 50ppm achieved), then closing them and leaving it to stand for an appropriate period. This depends on the chlorine concentration. The required concentration should be maintained in the header tank throughout the chlorination procedure and monitored throughout disinfection to ensure there is a sufficient residual chlorine level. The system should be thoroughly flushed following chlorination.

This treatment should only be carried out by trained personnel and should be closely supervised. Building occupants should be warned that the water is heavily chlorinated. If tanks and calorifiers are heavily contaminated by organic materials, the system should be chlorinated before cleaning to reduce risks to cleaning staff.

These potential risks should be brought to the attention of the incident control team to allow appropriate communication to staff groups who may be affected by the risk.

Thermal Disinfection

Thermal disinfection can be carried out by raising the temperature of the whole contents of the calorifier (water heater) then circulating this water throughout the system for at least an hour. To be effective, the temperature at the calorifier (water heater) should be high enough to ensure the temperature at the outlets does not fall below 60 degrees centigrade. Each tap and appliance should be run sequentially for at least five minutes at the full temperature and this should be measured.

The risk of scalding should be considered and particular care taken to ensure that water services are not used, other than by authorised personnel, until water temperatures have reduced to their normal levels.

Appendix 6

Risk Assessment

A Risk Assessment will be carried out on all systems to assess the effectiveness of the procedures and practices in preventing or controlling the risk from Legionellosis. The risk assessment will be reviewed on regular basis or when there is reason to suspect it is no longer valid.

Additionally in accordance with COSHH regulation 6(3) Risk assessment shall be reviewed regularly and forthwith if:

(a) There is reason to suspect that the risk assessment is no longer valid;

(b) There has been a significant change in the work to which the risk assessment relates; or

(c) The results of any monitoring carried out in accordance with regulation 10 show it to be necessary, and where, as a result of the review, changes to the risk assessment are required, those changes shall be made."

Risk Assessments for all University facilities are held by the Safety Department.

All new installations shall be designed so as to comply with the guidance listed above in Section 7.0 or any other relevant documents.

Certain fittings and materials used in water systems may support bacterial or fungal growth. Examples include leather, some rubbers, jointing compounds and mastics, wooden packing and certain plastics. The "Water Fittings and Materials Directory" published by the Water Research Centre (WRAS) lists fittings and materials which are acceptable.

New installations and alterations to existing installations for the University shall incorporate only those fittings and materials published as safe in the latest edition of the Directory published by the Water Research Centre.

Appendix 7

Water Tap Temperature Log and Monitoring Procedure
Objective: To determine whether water distribution temperatures are within recommended limits
Frequency: Monthly For Sentinel Outlets. All Outlets to be tested Yearly.
Procedure:

1. Using a calibrated thermometer take and record outlet temperatures as listed on the log sheet

2. Always measure the cold water temperature first and at the centre of the flow at a normal flow rate

3. A steady state temperature for hot water of between 50-60^{o}C within one minute (ensure the outlet is not TMV controlled)

4. A steady state temperature for cold water below 20^{o}C (or 2^{o}C above incoming supply from the water supply company) within two minutes

5. Return log sheet to supervisor and report any problems

Recommended Temperatures

Cold Water < 20^{o}C Hot Water > 50^{o}C

Appendix 8

TMV Six Monthly Test
Objective : To ensure correct operation of TMV's
Frequency: Six Monthly
Procedure:

Complete the following to each valve

1. Clean out strainers.
2. Record the temperature of the hot and cold water supplies.
3. Record the temperature of the mixed water at the largest draw-off flow rate.
4. Record the temperature of the mixed water at a smaller draw-off flow rate appropriate to the application and within the limit set by the manufacturer.
5. Isolate the cold water supply to the mixing valve and monitor and record the mixed water temperature fail safe time.
6. If fail safe is not functioning correctly check that all in line or integral strainers are clean and that a temperature difference of 12^{o}C exists between the hot supply temperature and water blended supply temperature.
7. Record the maximum temperature achieved.

Appendix 9

Water Storage Tank Inspection and Disinfection Procedure
Objective: To maintain good conditions within the site water storage tanks
Frequency: Annually
Procedure:

1. Inspect water system for any signs of fouling
2. Isolate cold water supply and outlet
3. Place isolation sign on valves
4. Chlorinate contents to 50 parts per million
5. Place sign indicating chlorinating being undertaken
6. Allow to stand for one hour
7. Dilute or neutralise contents and drain
8. Clean tank, flush and wash surfaces
9. Inspect surfaces for any damage, report any defects to your supervisor
10. Add any appropriate comments
11. Open supply valve refill tank, measure cold water supply temperature if above 18^0C report
12. Fill tank to working level
13. Chlorinate to 50 PPM allow to stand for one hour
14. Dilute or neutralise contents and drain
15. Refill tank to working level and return to service
16. Make entry to log sheet attached to tank
17. Complete disinfection certificate and insert into log book.

In the event of a contractor being used for the disinfection of tanks a method statement should be obtained from the company prior to undertaking the disinfection and a chlorination certificate obtained following disinfection.

Appendix 10

Certificate of Chlorination

Location :

Tank Identification :

This is to certify that the above water storage tank was chlorinated, drained, cleaned, refilled, chlorinated and filled for use. It was disinfected by maintaining a chlorine concentration of 50ppm for a period of one hour whilst isolated from the distribution system. All in accordance with HSE L8.

Signed : _____

Name : _____(Printed)

Date : _____

Appendix 11

Cold Water Storage Tank Temperature Monitoring/Inspection Procedure
Objective : To determine whether cold water storage temperatures are within recommended limits
Frequency: Annually (Summer)
Procedure:

1. Ensure the thermometer to be used is calibrated.
2. Remove the tank lid.
3. Put the thermometer probe in the tank water at a suitable point close to the outlet and allow the temperature to stabilise, record the result on the Record Sheet.
4. Take the temperature of the incoming mains at the ball valve, record the result.
5. Inspect the tank for evidence of sediment/slime/surface debris or any other contamination.
6. Replace the lid and ensure all insulation is re-sited.
7. Ensure all temperature/inspection records are signed and inserted into log book.

Recommended Temperatures < 20^0C or 2^0C within incoming supply temperature

Appendix 12

Calorifier Inspection Procedure
Objective: To the calorifier is internally clean and free from sludge & debris
Frequency: Annually
Procedure:

1. Isolate calorifier cold supply
2. Drain off water from drain valve sufficient to ensure no sludge or debris is present
3. Take temperatures and log

   Running Temperature

   Outlet Temperature

   Drain temperature

   Return temperature
4. Report any problems to your supervisor

   OR

   Alternatively monitor using Building management system readings

Recommended Temperatures

> 60^0C at Calorifier flow > 50^0C at Calorifier return

Appendix 13

Closed Wards/Areas System Flushing
Objective: To avoid stagnant water conditions
Frequency: Weekly
Procedure:

1. Open all hot and cold water outlets for Three minutes depending on length of deadleg to remove any stagnant water
2. Flush all WC's
3. Fill out log sheet and return for filling into site water log book
4. Report any system defects to supervisor

Appendix 14

Shower Maintenance Log
Objective: To ensure shower heads are kept clean and free from contamination.
Frequency: At least Quarterly
Procedure:

1 Clean and descale shower head.

2 Disinfect by soaking in sodium hypo chloride 50ppm.

3 Rinse shower head with clean water.

4 Complete log.

Appendix 15

Safety Water Temperatures & Delivery Devices

Table 2 Recommended devices and outlets

Activity/areas	Maximum recommended set delivery temperature (°C)	Type of device
Areas where TMV type 3 valves should be fitted		Type 3 thermostatic mixing valve
Showers and hair-wash facilities	41	
Unassisted baths	44	
Baths for assisted bathing	46 – to allow for the cold mass of the bath. NB – prior to patient immersion, water should be checked with a thermometer.	
Bidets	38	
Note: Bath fill temperatures of more than 44°C should only be considered in exceptional circumstances where there are particular difficulties in achieving an adequate bathing temperature. If a temperature of more than 44°C is to be used, then a safe means of preventing access to the hot water should be devised to protect vulnerable patients.		

Wash-hand basins and sinks

Wherever wash-hand basins are installed, a mixed water temperature outlet is required: a risk assessment should be undertaken, which is overseen by the WSG, that considers the needs of patients and service-users to determine whether there is a scalding risk and whether additional protection is required (e.g. a type 1 with temperature stop, type 2 or type 3 mixing valve – see options below). **Hazard warning signs for scalding risk should be displayed if appropriate.**

For outlets not intended for hand-washing (e.g. sinks in kitchens, dirty utilities or cleaners' rooms), TMVs should not be installed. **All installations require a hot water hazard warning sign.** (The temperature could equate to the maximum temperature available from the calorifier.)

Note: Microbiological risks should also be considered for all installations.

Options:

1. Separate hot and cold taps

2. Mixed temperature outlet:

- Type 1 – a mechanical mixing valve with or without temperature stop (i.e. manually blended)
- Type 2 – a thermostatic mixing valve: BS EN 1111 and or BS EN 1287
- Type 3 – a thermostatic mixing valve with enhanced performance: HTM 04-01: Supplement – 'Performance specification D 08: thermostatic mixing valves (healthcare premises)'

Type 3 TMVs should have undergone third-party testing and certification to the requirements of HTM 04-01: Supplement – 'Performance specification D 08: thermostatic mixing valves (healthcare premises)'.

Notes:

1. Where installed, it is preferable that thermostatic mixing devices are fitted directly to the mixed temperature outlet or be integral with it, and be the method of temperature and flow control, i.e. the mixing device should not be separate nor supply water via a second tap or manual mixer since there will be many cases where draw-off of cold water will not occur. If a separate thermostatic device is used, it should be fitted as close to the outlet as possible, which should be a flow-only control. Where "T" type mixing valves are installed, they should be readily accessible for maintenance.
2. In the case of bidets with ascending sprays or a handle douche, which may be accidentally immersed, the water supply should be independently fed from storage with no draw-offs at a lower level (i.e. a break-tank arrangement). Appropriate backflow protection must be provided (see paragraphs 12.18–12.24).

3. Automatic taps (timed flow) can be considered as a result of a risk assessment and should be specified as appropriate for the conditions of use, either type 2 or 3. If the temperature is non-user adjustable, they should be supplied via a type 2 or 3 TMV set to 39–40°C. The sensors should include a timer that can be adjusted to take account of the optimum washing time: this is particularly for scrub sinks. Sensors should be offset or positioned such as to reduce the risk of accidental contamination of the outlet and be positioned so that POU filters can be used. Facilities for overriding the sensors will be necessary. When a duty cycle setting exists, it should be activated to avoid stagnation. (If there is more than one tap/outlet, e.g. in the case of scrub sinks, then all should deliver water to avoid stagnation.)
4. In the case of dual-function delivery devices, i.e. bath/shower diverter, type 3 valves should deliver the temperature appropriate to each outlet e.g. bath max 44°C or 46°C, shower 41°C. (Refer also to the commissioning procedure section in HTM 04-01: Supplement – 'Performance specification D 08: thermostatic mixing valves (healthcare premises)'.)
5. Taps, components and fittings should be removable and easily dismantled for cleaning and disinfection.
6. Where manual mixing devices with a temperature stop are installed, it is important to ensure that the normal maximum delivery temperature is controlled to safe limits. Installation, commissioning and maintenance should take account of the system's dynamic pressure and temperature changes, and the seasonal changes in incoming cold water temperatures.
7. This table does not cover birthing pools. (See "Areas this HTM does not cover" in Chapter 1.)

Appendix 16

Design Criteria for New Works or Refurbishment Projects

Design Criteria for new works or refurbishment projects:

- If refurbishment – Existing Independent Risk Assessment to be reviewed prior to commencing work.
- For new builds – An Independent Risk Assessment is to be developed.
- Water management Plan to be developed during the construction phase
- On completion Independent risk assessment to be reviewed
- On completion system to be tested for Legionella and other Opportunistic pathogens.
- Development of System Logbook throughout the construction Phase
- Periodic inspections to be carried out at critical phases of project to identify problems which may be concealed as the project progresses.

Standards for the Design of Hot and Cold Domestic installation are set out in:

- BS EN 806 2012 Parts1-5
- BS 6700
- HSE Approved Code of Practice L8
- HSG 274 Part 2

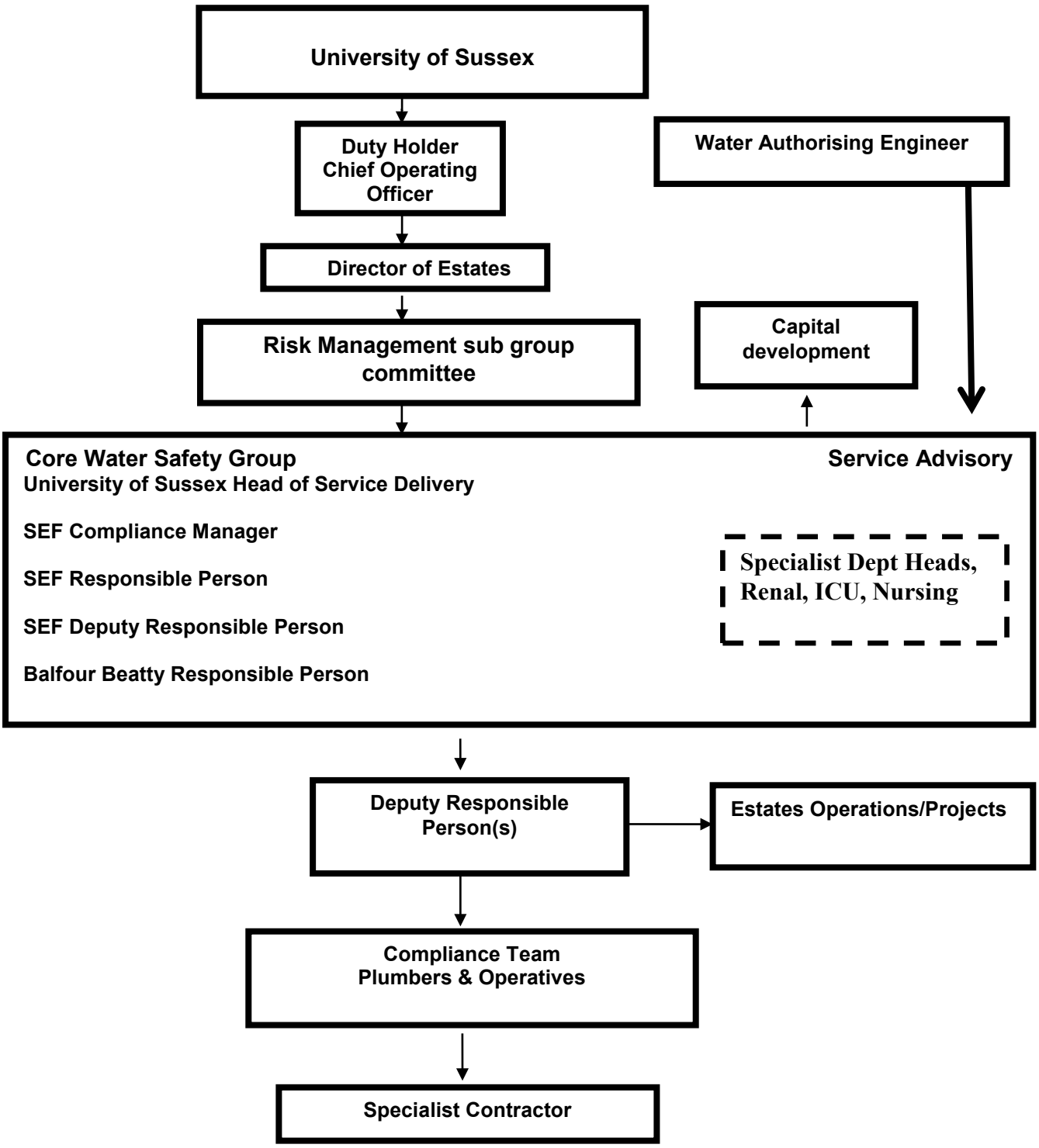
This list is not exhaustive.

While there is clear guidance on all aspects of system design it is important that project officers implement measures during the construction phase which promote the highest level of water quality.

- System design should promote good circulation by for example when possible locating large consumers such as kitchens at the end of circuits
- The number of outlet and the size of the network should be kept to minimum required for service delivery.
- Cold water storage should be located away from heat sources
- Building should be designed to permit the maximum separation between hot and cold services.
- Careful consideration should be given to the selection of sanitaryware.

- Samples of taps should be examined to ensure design and manufacture does not promote the proliferation of microorganisms.
- Point of use temperature control selection should be the subject of a risk assessment.
- BMS temperate monitoring of sentinel points should be included at design stage.
- All hot and cold water terminations are to be in copper. Flexible hoses are forbidden.

Appendix 17
Management Structure for the Control of Water Borne Biological Hazards



Appendix 18 - Reference Documents

The following references form a compendium of literature available at the present time to which reference should be made –

- **Health & Safety Executive** Health & Safety at Work etc Act 1974
- **Health & Safety Executive** The Control of Substances Hazardous to Health Regulations
- **Health & Safety Executive** Approved Code of Practice & Guidance Legionnaires' disease: The control of Legionella bacteria in water systems', L8
- **Health & Safety Executive HSG274 Parts 2 & 3:** The control of legionella bacteria in hot and cold water systems
- **The Chartered Institute Of Building Services Engineers** Technical Memorandum (TM13), Minimising the Risk of 'Legionnaires' Disease', CIBSE 1987
- **Department of the Environment, Transport and the Regions**
- Water Supply (Water Fittings) Regulations, HMSO, 1999
- **Water Regulations Advisory Scheme** Water Regulations Guide, WRAS 2000
- **British Standards Institute** BS EN; 806 Parts 1-5 2012, 'Specifications for installations inside buildings conveying water for human consumption', BSI, 1987.
- **British Standards Institute** BS 7592:2008 Sampling for Legionella bacteria in water systems –Code of practice
- **Water Regulations Service** Research Centre Water fittings and materials