NHS National Services Scotland

Scottish Health Technical Memorandum 04-01:
Water safety for healthcare premises
Part G:
Operational procedures and Exemplar Written Scheme

Health Facilities Scotland
Engineering and Environment

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Contents

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The support of the National Water Services Advisory Group is also gratefully acknowledged, along with estates staff in NHS Dumfries & Galloway and NHS Ayrshire & Arran for their assistance in beta testing the guidance.

Preface

About Scottish Health Technical Memoranda

Engineering Scottish Health Technical Memoranda (SHTMs) give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare.

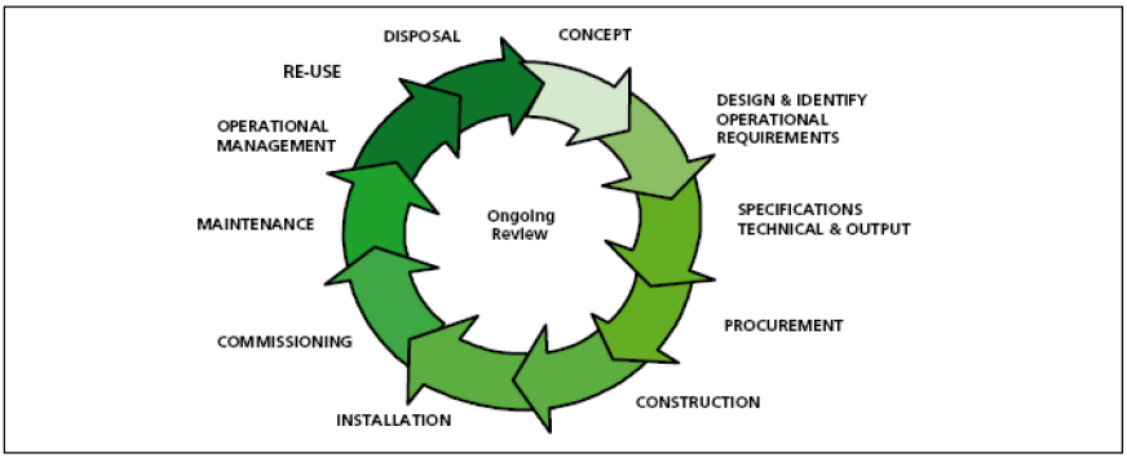
The focus of SHTM guidance remains on healthcare-specific elements of standards, policies and up-to-date established best practice. They are applicable to new and existing sites, and are for use at various stages during the whole building lifecycle. Healthcare providers have a duty of care to ensure that appropriate engineering governance arrangements are in place and are managed effectively. The Engineering Scottish Health Technical Memorandum series provides best practice engineering standards and policy to enable management of this duty of care.

It is not the intention within this suite of documents to repeat unnecessarily international or European standards, industry standards or UK Government legislation. Where appropriate, these will be referenced.

Healthcare-specific technical engineering guidance is a vital tool in the safe and efficient operation of healthcare facilities. Scottish Health Technical Memorandum guidance is the main source of specific healthcare-related guidance for estates and facilities professionals.

The core suite of eight subject areas provides access to guidance which:

- is more streamlined and accessible;
- encapsulates the latest standards and best practice in healthcare engineering;
- provides a structured reference for healthcare engineering.



Healthcare building life-cycle

Structure of the Scottish Health Technical Memorandum suite

The series of engineering-specific guidance contains a suite of eight core subjects:

Scottish Health Technical Memorandum 00: Policies and principles (applicable to all Scottish Health Technical Memoranda in this series)

Scottish Health Technical Memorandum 01: Decontamination

Scottish Health Technical Memorandum 02: Medical gases

Scottish Health Technical Memorandum 03: Heating and ventilation systems

Scottish Health Technical Memorandum 04: Water safety

Scottish Health Technical Memorandum 05: Reserved for future use

Scottish Health Technical Memorandum 06 Electrical services

Scottish Health Technical Memorandum 07: Environment and sustainability

Scottish Health Technical Memorandum 08: Specialist services

Some subject areas may be further developed into topics shown as -01, -02 etc and further referenced into Parts A, B etc.

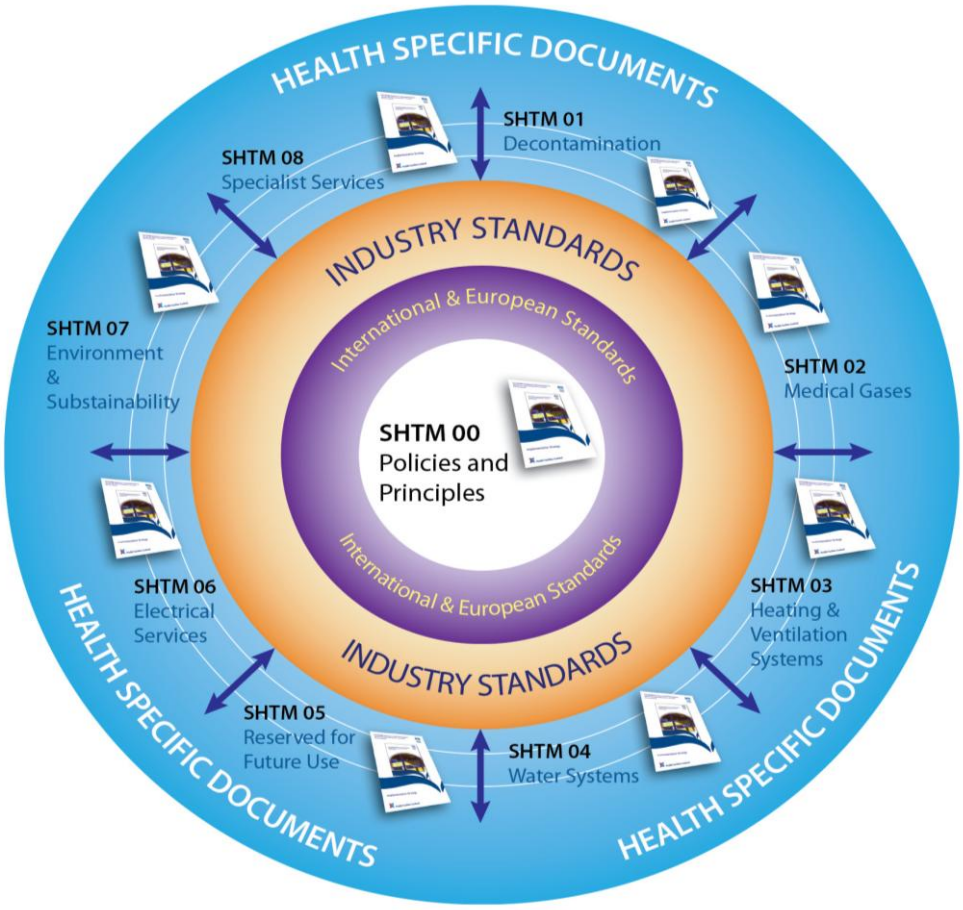
Example: Scottish Health Technical Memorandum 06-02 Part A will represent: Electrical safety guidance for low voltage systems

In a similar way Scottish Health Technical Memorandum 07-02 will simply represent: Environment and Sustainability – EnCO_2de.

All Scottish Health Technical Memoranda are supported by the initial document Scottish Health Technical Memorandum 00 which embraces the management and operational policies from previous documents and explores risk management issues.

Some variation in style and structure is reflected by the topic and approach of the different review working groups.

Health Facilities Scotland wishes to acknowledge the contribution made by professional bodies, engineering consultants, healthcare specialists and NHS staff who have contributed to the review.



Engineering guidance structure

Executive summary

Background information

The Health & Safety Executive's Approved Code of Practice L8 "Preventing or controlling the risk from exposure to *Legionella* bacteria" refers to Written Schemes in paragraph 53 as follows:

"There should be a Written Scheme for controlling the risk from exposure which should be implemented and properly managed. This should specify measures to be taken to ensure that it remains effective. The Written Scheme should comprise:

- *up to date plans of installations (schematic drawings would be acceptable);*
- *a description of correct and safe operation of systems;*
- *precautions to be taken;*
- *checks for efficacy and frequency of checks;*
- *remedial action to be taken if the Written Scheme is ineffective".*

Aim of the guidance

Experience has shown that the quality and acceptability of Written Schemes has been variable. This guidance has drawn upon experience in producing the most comprehensive documentation to date in the form of operational procedures leading to the production of Written Schemes, a relevant extract from the HSE Approved Code of Practice L8 and a template or exemplar for NHS Boards to follow in the preparation of a Written Scheme.

Note: The format of this document comprises two main parts. The first, consisting of Sections 1- 23, sets out operational procedures that can be adapted by NHS Boards to suit individual circumstances. As such, it would provide suitable evidence for Health & Safety Inspectorate that the NHS Board had procedures in place to allow preparation of Written Schemes which comprise the concluding part of this guidance in the form of exemplars.

1. Operational procedures for the Written Scheme

General overview

1.1 Premises used by the NHS for the delivery of healthcare are dependent upon water to maintain hygiene through a safe and comfortable risk assessed environment for all who may use, interface and support the delivery of functional healthcare.

1.2 ***NHS Board***** has a Management and Control of Water Safety Policy, which requires all management and staff across the organisation to be aware of statutory regulations, NHS Scotland mandatory guidance documents and responsibilities with specific arrangements.

** *The name of NHS Board would be inserted here.*

1.3 In the healthcare delivery environment, there are a number of reasonably foreseeable risks leading from potential exposure in the use of water that have to be avoided, as far as is reasonably practicable.

1.4 With respect to the responsibilities and duties identified in the Management and Control of Water Safety Policy devolved to the General Manager, Facilities and Estates, this document sets out in writing the scheme to manage and control the risks from potential exposure.

Introduction and legislative context

1.5 Legionnaires' disease is a potentially fatal form of pneumonia which can affect anybody but which principally affects those who are susceptible because of age, life-style, illness, or immuno-suppression. It is caused by the bacterium *Legionella pneumophila* and related bacteria. *Legionella* bacteria are common and can be found naturally in environmental ground and water sources such as rivers, lakes and reservoirs, usually in low numbers.

1.6 *Legionella* can survive under a wide variety of environmental conditions and have been found in water at temperatures between 6°C and 60°C. Water temperatures in the range 20°C to 45°C seem to favour growth. The organisms do not appear to multiply below 20°C and will not survive above 60°C. The organisms may, however, remain dormant in cool water and multiply only when water temperatures reach a suitable level. Temperatures may also influence virulence. *Legionella* bacteria held at 37°C have greater virulence than the same *Legionella* bacteria kept at a temperature below 25°C.

1.7 *Legionella* bacteria also require a supply of nutrients to multiply. Sources include commonly encountered organisms within water systems, such as algae, amoebae and other bacteria. The presence of sediment, sludge, scale and other materials within the system together with biofilms plays an important role in harbouring and providing favourable conditions in which the *Legionella* bacteria may grow. A biofilm is a thin layer of micro-organism which forms a

slime on surfaces which are in contact with water. Sludge, scale and biofilms can protect *Legionella* bacteria from temperatures and concentrations of biocide that would otherwise kill or inhibit these organisms if they were freely suspended in water.

1.8 *Pseudomonas aeruginosa* is a Gram negative organism most commonly found in soil and water. It can be isolated from any moist environment. It is often termed an 'opportunistic pathogen'. Water within systems can periodically be contaminated with these organisms. Although mains supplied water is treated and disinfected, it contains at the point of use, only residual (relatively low) levels of disinfectant chemicals (e.g. chlorine). Water is therefore not sterile and has a (highly variable) background level of micro-organisms, measured in terms of the Total Viable Count (TVC). Levels of TVC organisms in water samples give an indication of the effectiveness of residual disinfection and consequently the likelihood of finding potentially pathogenic micro-organisms.

Note: An opportunistic pathogen is one which normally only causes an infection in a person with a weakened immune system.

1.9 Where TVCs are higher, there may be an increased risk that water systems are colonised by opportunistic pathogens (e.g. *Pseudomonas* Spp). However, clinical problems are only likely to arise if *Pseudomonas* Spp or other waterborne organisms are present in significant numbers in association with biofilms. There is a combination of factors that may have facilitated *Pseudomonas* Spp becoming a clinical problem. These factors include any or all of the following:

- water system materials which may have facilitated biofilm formation (e.g. plastic pipework, plastic and rubber components in TMVs and flexible hose liners etc);
- water outlets with thermostatic mixing valves (TMVs) designed to regulate water temperature and minimise the risk of scalding, which may also have increased the risk of other waterborne pathogens;
- the increased number of wash hand basins / sinks in clinical areas, combined with the increased use of alcohol based hand rubs (ABHRs) which may have resulted in a decreased use of water at individual wash hand basins / sinks;
- the use of non-touch (sensor) water fittings, resulting in low water volumes flowing through outlets. This combined with a column of standing water left in the pipework provides an ideal condition for bacterial growth.

1.10 There are a number of Regulations involved in the management and control of *Legionella*, *Pseudomonas* Spp and other similar harmful bacteria. The main requirements are covered in:

- The Health and Safety at Work etc Act 1974;
- The Control of Substances Hazardous to Health 2002;
- The Management of Health and Safety at Work Regulations 1999;

- The Water (Scotland) Act 1980.

1.11 The following documents are cited under these regulations (*statutory guidance*) and require to be read and used in conjunction with the policy

- L5 ACOP The Control of Substances Hazardous to Health Regulations 2002;
- L8 ACOP The Control of *Legionella* Bacteria in Water Systems 2000 and its part replacement HSG 274, 2013;
- Water Byelaws (Scotland) 2004.

Also relevant are:

- HSE – OC 255/12 Control of *Legionella*: Investigation of Outbreaks (and Single Cases) of *Legionellosis* from Water Systems;
- BS7592: 2008 Sampling for bacteria in water systems;
- BS8580: 2010 Water Quality – Risk Assessments for *Legionella* Control – Code of Practice;

  Water safety in buildings, World Health Organisation;
  http://whqlibdoc.who.int/publications/2011/9789241548106_eng.pdf

Reference should be made also to the healthcare specific guiding principles contained in the following NHS Scotland mandatory guidance documents:

- SHTM 03-01 'Ventilation for healthcare premises';
- SHTM 04-01 'Water Safety' Parts A – F;
- HPN2 'Guidance on Management of *Legionella* Incidents, Outbreaks and Clusters in the Community'.

Note: SHTN 2 'Domestic hot and cold water systems for Scottish Healthcare Premises' to which reference is widely made, has been withdrawn and the relevant sections are included in Part E of SHTM 04-01.

1.12 ***NHS Board*** is committed to meeting the requirements of the relevant current statutory and associated guidance. The purpose of this document is to detail the Scheme, set out in writing the principles and procedures by Facilities and Estates in compliance with the above, to manage and control the *Legionellosis* and water safety risks and in 'so far as is reasonably practicable' with respect to other requirements.

Responsibilities of the General Manager, Facilities and Estates (The Designated Person [Water]) appointed by the Duty Holder

1.13 These comprise:

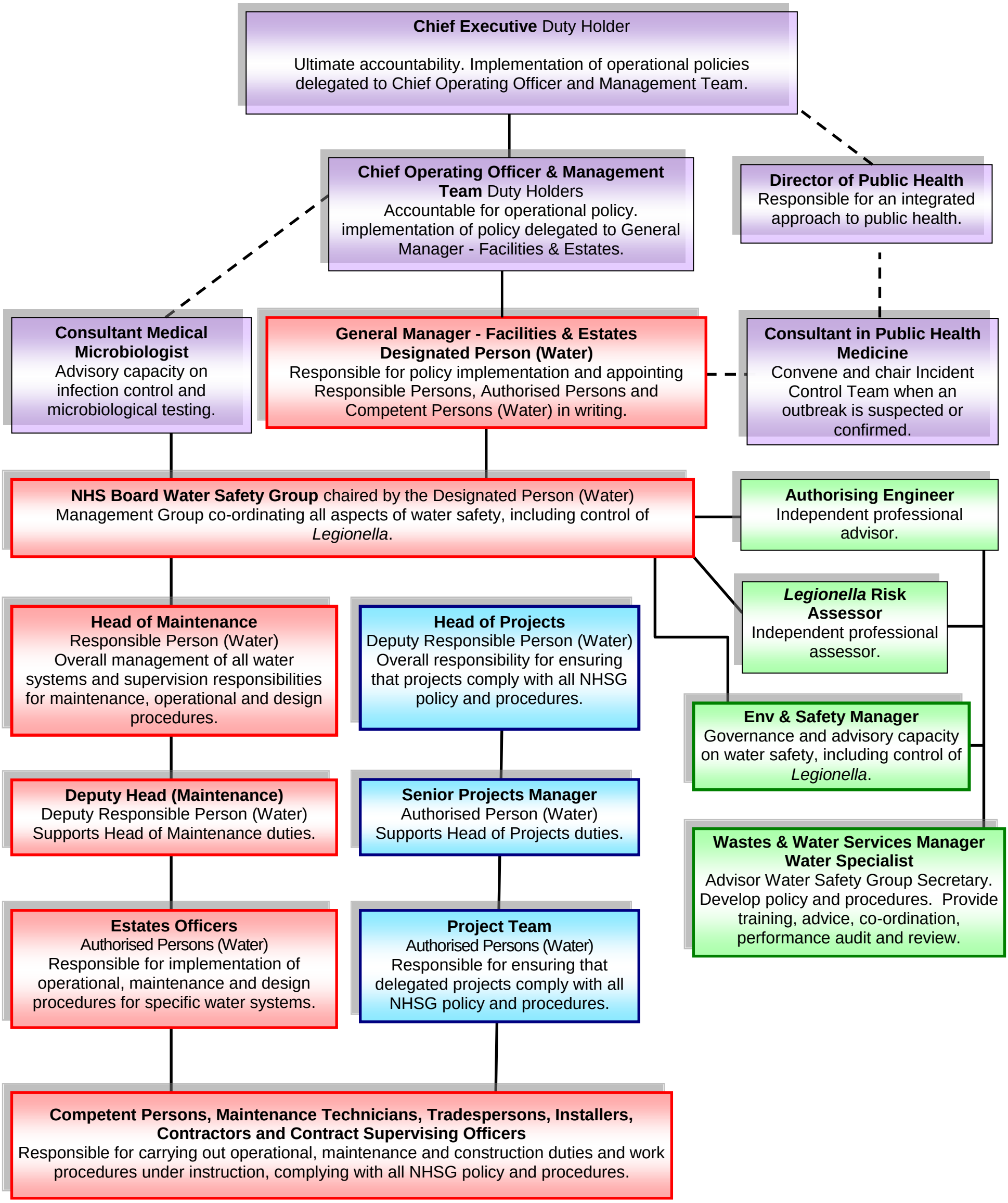
- ensuring the Chief Executive (The Duty Holder) and Management Teams (Duty Holders) and their devolved staff are aware of and co-ordinate with

the policy and are familiar with their devolved responsibilities, duties and relevant procedures;

- identifying water safety risks and non-compliance;
- providing adequate facilities, resources and competency training to support, implement and maintain all aspects of the policy;
- providing management and annual performance reports to Chief Executive, Management Teams, Infection Prevention & Control, Occupational Health & Safety, and Risk Management;
- reviewing the effectiveness of the policy across *NHS Board*;
- establishing a Water Safety Group to provide appropriate expertise, to support, co-ordinate and review operational management and controls in accordance with statutory and mandatory requirements;
- seeking support from a consultant medical microbiologist in the event of suspected exposure to *Legionella*, *Pseudomonas* Spp and other similar harmful bacteria;
- appointing in writing an independent professional advisor to act as "Authorising Engineer" with a brief to provide services in accordance with SHTM and HSE guidance under the policy;
- appointing in writing an independent professional assessor to act as "*Legionella* Risk Assessor" with a terms of reference to provide services in accordance BS8580, SHTM and HSE guidance under this policy;
- appointing in writing appropriate Managers to act as "Responsible Person (Water)" as defined in appointment letters, to adopt day-to-day responsibility for controlling and managing any identified risk from potential exposure to *Legionella, Pseudomonas* Spp and other similar harmful bacteria under the policy;

Note: The Head of Maintenance (or appointed deputy) is the "Responsible Person (Water)" managing day-to-day risks and will be the estates lead in the event of an operational incident;

- appointing in writing appropriate deputies and "Authorised Persons (Water)" who have sufficient authority, competence and knowledge of the water systems and installations to ensure that all operational procedures and SHTM 04-01 requirements are carried out in a timely and effective manner. The Scheme will involve "Competent Persons", "Maintenance Technicians", "Tradespersons", "Installers", "Contractors" and "Contract Supervising Officers" co-ordinated with Duty Holders in accordance with SHTM and HSE guidance under the policy;
- The organisational structure for *NHS Board* inclusive of the above-mentioned local arrangements for the management and control of risk from potential exposure to *Legionella*, *Pseudomonas* Spp and other similar harmful bacteria under the Policy are now expanded as shown below and in the chart opposite:



Authorised Persons (Water) will be selected from Table 1 and appointed to specific Written Schemes (as shown on Table 2).

Legionella Role	Name	Appointment	Generic Title	Phone
The Duty Holder			Chief Executive	
Duty Holders			Chief Operating Officer	
.. ..			General Manager *Enter General Managers for each site or division as appropriate*	
Designated Person (Water)		In writing by Chief Operating Officer for Chief Executive on xx	General Manager, Facilities and Estates	
Deputy Designated Person (Water)		In writing by Chief Operating Officer for Chief Executive on xx	Head of Soft FM	
Authorising Engineer (Water)		In writing by General Manager Facilities & Estates on xxx	Technical Director of independent appointed organisation	
Legionella Risk Assessor		In writing by General Manager Facilities & Estates on xxx	To be Appointed	
Responsible Person (Water) AP		In writing by General Manager Facilities & Estates on xxx	Head of Maintenance	
Deputy Responsible Person (Water) AP		In writing by General Manager Facilities & Estates on xxx	Head of Projects	
Deputy Responsible Person (Water)		In writing by General Manager Facilities & Estates on xxx	Deputy Head of Maintenance	
Authorised Person (Water)		In writing by General Manager Facilities & Estates on xxx	Estates Officer, Supervisor or Projects Manager *Enter names of all Authorised Persons as appropriate for sites or divisions*	

Table 1: Role Holders

Legionella Role	Name	Appointment	Generic Title	Phone
Competent Person (Water) New staff for AP training		In writing by General Manager Facilities & Estates on xxx	CAD Operator	
Competent Person (Water) AP		In writing by General Manager Facilities & Estates on xxx	Plumber / TSS Plumber *Enter names of all Competent Persons as appropriate for sites or divisions*	
Others involved				
Infection Prevention & Control			Consultant Medical Microbiologist	
Laboratory Services			Biomedical Scientist	
Governance and Advisor			Environment and Safety Support Team Manager	
Water Specialist Advisor			Wastes & Water Services Manager	
Public Health			Consultant in Public Health Medicine	
O H & S Auditor			Health & Safety Auditor	
HSE	Health and Safety Executive			

Table 1 continued: Role Holders

Note: The names of any member of staff yet to receive relevant training should be entered separately.

1.14 All training and competency assessments provided to and received by all NHS Board personnel involved in water systems will be recorded in the individual's personal training file and the national NHS eKSF system.

1.15 The Authorising Engineer (Water) shall conduct a regular annual assessment review of competency and training requirements and shall make Training Programme recommendations to the Responsible Person (Water) for approved courses run by approved training organisations and where appropriate by the manufacturers of equipment.

1.16 Authorised Persons (Water) shall be selected from Table 1 and appointed in writing. They will be given the role of the named person with sole responsibility for the water system(s) identified in specific Written Schemes. (Table 2 refers).

1.17 The Authorised Person shall conduct and record induction and familiarisation with Estates staff and any new Competent Persons, Maintenance Technicians, Tradespersons, Installers, Contractors and Contract Supervising Officers being introduced to water systems. The Authorised Person shall conduct a regular annual review of system familiarisation, operational maintenance, monitoring issues and report recommendations to the Responsible Person (Water).

NHS Board sites and blocks with water systems

1.18 Table 2 extracted from the Property & Asset Portfolio, details where there are known applicable piped water distribution systems in owned and leased premises. It is anticipated that additional systems will become evident within the various premises, as the risk assessments and Written Schemes (WS) are compiled. Non-applicable Sites, Blocks and Systems are shaded in red.

WS Ref No.	NHS Site Code	Site Name	Block No.	Block Name	GIA m^2	Potential Water Distribution Systems (normally each with 1 CW system & 1 DHW system)	WS Contact
WS1-6						6 systems	
WS7						1 system	
WS8-9						2 systems	
WS243						1 system	
WS244						1 system	

Table 2: Specific Written Schemes

2. Managing the risks

Water systems

2.1 ***NHS Board*** has a property and asset base of circa xx sites (owned and leased) with circa xxx building blocks (including hospitals, health centres, clinics and support premises) ranging from large multi-hospital campus to small areas within shared buildings, covering circa xxx,000m^2 with a wide range of construction, age and condition criteria (e.g. which can include asbestos, contamination, PPE requirements, confined spaces, access restrictions, permit to access/work).

2.2 Most building blocks will have their own individual water system. However, some systems may cover more than one building block and some building blocks may have multiple water systems.

2.3 Water used in the each building block will be controlled to that of the Temperature Control Regime (as outlined in HSE ACOP L8 and HSG 274) with full temperature control as advocated in SHTM 04-01 to temperatures in the various parts of the water system.

2.4 Each Building Block has a Water Safety Log Book (located in the Estates Department Offices at xxxxxxxxx Campus and xxxx Hospital and Site Estates Offices) containing details of the specific local water system(s). This includes:

- confirmation of the location with site name, building block name, system name and the Authorised Person (Water) who has been appointed in writing as the sole person with knowledge and full control of the identified water system;
- the applicable Written Scheme;
- the current applicable *Legionella* Risk Assessment with summary details of system, equipment, safe operation criteria, precautions to be taken and an Action Plan for any remedial works or routine control measures that may be required to control *Legionellosis* and water safety risks;
- an up to date plan of the system identifying all system plant, to include:
  - water softeners, filters, strainers, pumps, non-return valves and all outlets including showers, wash hand basins, sinks, baths and equipment – such as ice-making machines, drinking fountains etc and any external connections to hoses, mobile units or equipment;
  - all standby equipment such as spare pumps, with details for incorporating into use;
  - all associated pipework and piping routes (including flexible hoses, residual dead legs, blind stub-ends and plugged tee-pieces);
  - all associated storage and header tanks;
  - details of the origin of the water supply;

- any parts that may be out of use temporarily;
- thermostatic mixing valves;
- sentinel hot and cold water outlets;
- schematic and detailed drawings of the system are also available at the Estates Department, xxxxxxx, and viewable electronically > Shared on Yaren > *Legionella* > Site Drawings.

Note: Plans must be kept up to date to include any alterations made to the water system. Notify xxxxxxx on tel 0xxxxxxx0 to make any changes to schematics or detailed drawings.

- insurance examination reports (where applicable) by the Competent Person (Pressure Systems);
- any Hazard and Safety Action Notices and/or operational restrictions;
- any depreciation and condition reports highlighting actions for planned (in whole or component parts) system replacement;
- a clear detailed description of the correct and safe operation of the system;
- the precautions to be taken in respect of any identified risks;
- the checks to be carried out to ensure efficacy of the scheme and the frequency of the checks;
- the remedial action to be taken in the event that the scheme is shown not to be effective.

Note: The Written Scheme Template to be used for specific locations is detailed in Appendix B.

3. Planned maintenance procedures

Operational criteria

3.1 Water used in the water systems will be controlled in accordance with the Temperature Control Regime (as outlined in HSE ACOP L8 / HSG274) with full temperature control as advocated in SHTM 04-01 to temperatures in the various parts of the water system as follows:

Note: Water must not be stored or circulated at temperatures within the range: above 20°C or below 50°C

3.2 Cold Water (CW) must be stored or distributed to outlets at or below 20°C.

3.3 Domestic Hot Water (DHW) must be at or above 60°C (at the flow point from heat exchangers/vessels) as it enters the supply system and circulated at no less than 50°C (at the return point to heat exchangers).

3.4 Domestic Hot Water supplied to Thermostatic Mixing Valves (TMV) or other outlets must be at no less than 55°C.

3.5 Cold Water supplied to Thermostatic Mixing Valves (TMV) or other outlets must be at or below 20°C.

3.6 Special attention and escalation in writing to the relevant Authorised Person (Water) and Responsible Person (Water) is required where and when any of the above criteria cannot be met.

Note: Hot water (and hot surfaces) above 45°C present risks of scalding and burning.

3.7 Point-of-Use Filters (P.O.U) Filters will only be installed and used where this is practical and there has been a written policy decision by the Water Safety Group, along with a complimentary managed maintenance change-filter process. This will be have to be put in place for life – or until a further policy decision is taken by the Water Safety Group confirming that they are satisfied that the affected outlet and pipework can be removed or disinfected without compromising the rest of the water system.

3.8 Taps or other water outlets should **not** be installed if they will not be used regularly, that is, less than twice in a week.

3.9 Where taps or water outlets are not, or are unlikely to be, in regular daily use, Management Team Duty Holders and their staff should be alerted and reminded to flush these through and purge to drain, or purge to drain immediately before use, without release of aerosols. In Neonatal Units (NNUs), Adult and Paediatric Intensive Care Units (ICUs) infrequently used taps should be flushed daily at the start of each day. The Maintenance Department and Designers have responsibilities to be alert to the Duty Holder requirements contained in

Risk Control Notice 11/04 – and the record keeping on Sample Record Sheet - or take steps to have the outlet removed and the resultant dead-legs eliminated by taking out redundant branch pipework back to the circulating mains, removing the tee-piece and replacing with a straight coupling.

3.10 Management Team Duty Holders and their staff should also be alerted on awareness and actions to minimise the risk of *Pseudomonas* Spp and other similar harmful bacteria in the use of equipment, transmission routes and requirements (such as in the use of hand wash stations and wash basins) in Risk Control Notice 12/04.

Maintenance schedules summary

Frequency	Item	Procedure	Description
Daily	Temperature Monitoring	P1C1 (with ALL incidents logged on Form 004 and BEMS alarms incidents on 021)	Incidents and Faults; BEMS monitoring & log of all alarms
Daily	DHW Temperature Monitoring	P1C1A (logged on Form 005A)	Manual monitoring or where BEMS not installed or BEMS not operational
Weekly	Water Quality	P1C2 (logged on Form 027)	Chloramine/chlorine checks (initially weekly)
	DHW Calorifiers	P1C3 (logged on Form 028)	Manual change over and log of circulating pumps not on BEMS control
Monthly	Temperature Monitoring	P1C4 (logged on Form 005)	a) Sentinel hot water taps b) Sentinel cold water taps c) Sentinel TMV taps d) DHW calorifier/heat exchanger flow & return temperatures e) Chilled Water heat exchanger flow & return temperatures
	Air Handling Plant	P1C5 (logged on Form 022)	Inspect, clean & log glass traps
3 Monthly	DHW Calorifiers, DHW & CW Storage/ Buffer Vessels	P1C6 (logged on Form 006)	Flushing of DHW calorifier(s) and Storage/Buffer Vessel(s) associated with Hot /Cold/Chilled Water Heat Exchanger(s)
Annually (April/May each year)	Water System Sampling (at random water outlets) in High Patient Risk Areas.	As described in Section 23. Post-Flush sampling without disinfection (as BS7592: 2008) at sentinel and other randomly selected outlet points.	Annual Water System Sampling (following the protocols and any actions as described in Section 23) in areas where patients may be most at risk. Sampling Reports to be tabled at Water Safety Group Meetings.

Frequency	Item	Procedure	Description
Quarterly during periods of Change	Water System Sampling (at random water outlets in High Risk Patient Areas) in Water Systems still serving High Patient Risk Areas.	As described in Section 23. Post-Flush sampling without disinfection (as BS7592: 2008) at sentinel and other randomly selected outlet points in High Risk Patient Areas.	In Water Systems serving multiple Wards or Departments, where during periods of change or decanting Section 7 Procedures may not be practical and there are still pockets of operational Wards or Departments with High Patient Risk areas - there will be Water System Sampling (following the protocols and any actions as described in Section 23) in areas where patients may be most at risk for the entire period of change or where there is reduced water use. Sampling Reports to be tabled at Water Safety Group Meetings.
3 Monthly for high risk areas and as required elsewhere, but at least once Annually	Shower Heads and Hoses	P1C12 (*logged on Form 005B*)	Dismantle, clean and de-scale / or replace with new disinfected Shower Head and Hose
6 Monthly	Summer and Winter Temperature Monitoring	P1C7 (*logged on Form 003*)	a) Cold Water at inlet to building block. Also to be continuously monitored by BEMS & log of all alarms
	Water Tanks	P1C7 (*logged on Form 003*)	a) Tank and temperature checks & log b) Tank inspection
	Air Handling Plant	P1C8 (*logged on Form 007*)	a) Humidity section inspection (if installed) b) Cooling section inspection c) Disinfection
Annually	DHW Calorifiers, DHW & CW Storage/ Buffer Vessels	P1C9 (*logged on Form 006*)	Drain & cleaning of DHW Calorifier(s) and Storage/Buffer Vessel(s) associated with Hot /Cold/Chilled Water Heat Exchanger(s)
	Temperature Monitoring	P1C10 (*logged on Form 005*)	a) Representative hot water taps b) Representative cold water taps c) Representative TMV taps d) DHW calorifier flow & return temps e) BEMS graphs printout

Other Procedures	Record	Description
Short / Limited Closure Record Form	Logged on Form *001*	For a period not exceeding 30 days
Indefinite Closure / Re – Occupation Record Form	Logged on Form *002*	For periods exceeding 30 days
Incident Report Record Form	Logged on Form *004*	For all incidents and resulting actions
Water Maintenance Frequencies Risk Based Assessment Form	Logged on Form *023*	For review and change of any maintenance frequency
Water Disinfection Risk Based Assessment Form	Logged on Form *024*	For assessment for disinfection of systems after work or alterations
Checklist for New Water System Designs	Logged on Form *025*	Checklist for designers
Flushing Water Outlets Record Form	Logged on Form *026*	Record sheet for Estates Department use
Estates Chloramine Record Form (*027*) *(where relevant)*	Logged on Form *027*	Record sheet for Estates Department use
Water Safety Control Log – Record Form	Logged on Form *028*	For plant status, maintenance tasks and resulting actions
Acceptance of Work to be Conducted and Completed Record Form	Logged on Form *029*	Record sheet for designers and Estates Department for alterations to existing and provision of new Water Systems
Risk Control Notice 11/04	Logged on Sample Record Sheet	For Duty Holders
Risk Control Notice 12/04	Actions to Estates Helpdesk	For Duty Holders

Temperature monitoring by BEMS – P1C1

(Where Building Energy Management Systems (BEMS) installed)

3.11 All hot and cold water systems fitted with BEMS monitoring and control devices should be set to give high priority alarms in the event of system failure and/or temperature variances outwith alarm set points. Temperature monitoring devices shall be physically tested annually and recalibrated in accordance with manufacturers' instructions.

3.12 All system failures and/or temperature alarms should be continually monitored 24 hours a day, with alarms being generated at Estate locations and by remote paging of Estates staff (i.e. controls engineer or duty engineer etc).

3.13 The Estates person carrying out the monitoring or being notified of an alarm condition should log all incidents in the Estates Incident Report Record Form (004) and also where appropriate in the Estates BEMS Record Form (021).

3.14 The incident should be investigated by the Estates staff and appropriate action taken (see *Legionella* Operational Procedures, SHTM 04-01 & *Legionella* ACOP L8 / HSG 274) and recorded in the Estates Incident Report Record Form (004)

Temperature monitoring where a BEMS is *not* installed or where the BEMS is not operational – P1CC1A

3.15 Check the flow and return temperatures on the domestic hot water calorifier system as defined in the local plan of the system being checked, using the temperature gauges fitted or a suitable surface temperature probe.

3.16 The flow temperature to be at least 60ºC and the return temperature to be no less than 50ºC.

3.17 Record all temperatures daily on the Record Form (005A).

3.18 Inspect cold water tank and conduct temperature checks – P1C7 as per 3.7 below and record all inspection and temperatures on the Record Form (003).

3.19 The frequency of manual temperature checks and recording shall be:

Policy Generic Areas	Frequency for Domestic Hot Water systems	Frequency for Cold Water Systems
High Risk – Acute and Primary Care Premises, Hospitals and any premises concerned with the treatment of care of the elderly and susceptible immuno-compromised patients.	Daily	6 Monthly
Moderate Risk – **all** other Hospital clinical premises	Daily	6 Monthly
Moderate Risk – **all** other Non Hospital (health centres, clinics and specialist clinical premises	Weekly	6 Monthly
Low Risk – **all** Non Clinical premises	Monthly	6 Monthly

Water dosing systems – P1C2

3.20 *(Applicable where chloramination disinfection is provided by the water authority)*

If, under the Water Supply (Water Quality) (Scotland) Regulations as amended, the water across the *NHS Board* area as supplied by the water authority is subject to a chloramination disinfection regime, sampling results of ***NHS Board*** water systems shall be recorded in the Estates Chloramine Record Form (027). Sampling will be taken from a hot or cold water outlet point, representative of each secondary distribution pipework system. These will initially be conducted weekly and then subject to ongoing trend based frequency risk assessment, limited to no less than at once per month sampling test frequency. Frequency risk assessments shall be held in the Water Safety Log Book.

Should the water authority's disinfection regime across the ***NHS Board*** area change, then all cold water tanks and any systems with water treatment dosing systems should be checked weekly in accordance with the manufacturers' recommended instructions as follows:

3.21 The relevant Authorised Person (Water) should produce and implement local planned maintenance tasks in accordance with the manufacturers recommended instructions for the approval of the Responsible Person (Water).

3.22 This and all maintenance tasks should be recorded in the Water Safety Log Book on Form (028).

3.23 All water test readings should also be recorded on an appropriate record sheet.

Manual changeover of circulating pumps – P1C3

(Where Building Energy Management Systems (BEMS) not installed)

3.24 Any plumbed-in duplicate circulating pump should be removed from the system. Where this is not practicable, the duty pump should be manually changed over a least once per week to reduce any danger of water stagnation. A spare pump should be kept for immediate replacement in the event of pump failure.

3.25 The relevant Authorised Person (Water) should produce and implement local maintenance tasks.

3.26 This and all maintenance tasks should be recorded in the Water Safety Log Book in Form (028).

Monthly temperature checks – P1C4

Sentinel hot and cold taps

3.27 Sentinel taps for hot water services (and any recirculating cold water systems) are the first and last taps on a recirculating system. For non-recirculating cold water systems (or non-circulating hot water systems), they will comprise the nearest and furthest taps from the storage tank. The choice of further sentinel taps may also include other taps that are considered to represent a particular risk.

3.28 Check the temperatures at the sentinel taps as defined in the local plan of the system being checked.

- Using a calibrated temperature probe, check the temperature of water from the cold water tap does not rise above 20ºC after running the tap for 2 minutes.
- Using a calibrated temperature probe, check the temperature of water from the hot water tap does not drop below 50ºC whilst running the tap for 1 minute.
- Record all temperatures on Record Form (005).

3.29 Sentinel Thermostatic Mixing Valves (TMV):

- check the temperatures at the TMVs on a sentinel basis as defined in the local plan of the system being checked. The system should achieve 55°C under normal use at the supply to the furthermost draw-off point in the circulating system;
- using a calibrated temperature surface probe check that the temperature of water in the hot water pipework to the TMV does not fall below 50ºC whilst running the tap for 1 minute;
- record all temperatures on Record Form (005).

3.30 Domestic Hot Water Calorifier(s) and Plate Heat Exchanger(s):

- check the flow and return temperatures on the domestic hot water system as defined in the local plan of the system being checked, using the temperature gauges fitted or a suitable surface temperature probe;
- the flow temperature to be at least 60ºC and the return temperature shall be no less than 50ºC;
- record all temperatures on the Record Form (005).

3.31 Domestic Cold / Chilled Water Heat Exchanger(s):

- check the flow and return temperatures on the domestic cold / chilled water system as defined in the local plan of the system being checked, using the

temperature gauges fitted or a suitable surface temperature probe;

- the flow and return temperatures shall be no more than 20ºC;
- record all temperatures on the Record Form (005).

3.32 Frequency Risk Based Assessment:

Systems that continually conform to and have a database history of temperature readings within the control parameters should have a risk-based assessment carried out annually to determine if the maintenance frequency can be changed. This assessment should be recorded on Form 023 by the Authorised Person (Water) and ensure the Responsible Person (Water) is notified immediately in writing. Frequency risk assessments shall be held in the Water Safety Log Book.

Water glass trap drains on ventilation units – P1C5

3.33 Visually inspect condition of glass drain trap assembly:

- top up glass trap assembly with clean water to the desired level if required;
- remove any glass trap assemblies that are dirty, clean and top up with clean cold water;
- record checks on Estates monthly checks of water drain traps on ventilation plant Record Form (022).

Domestic hot water calorifier(s) and storage/buffer vessel(s) associated with hot /cold/chilled water heat exchanger(s), flushing – P1C6

3.34 Flush each domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel through its drain valve by opening the drain valve 3 times, each time for a 3 minute period. The hose from the drain valve should be discharged to the nearest drain.

3.35 Record all actions on the top section of Record Form (006).

3.36 Where the domestic hot water system has a stratification pump(s) fitted to circulate the hot water from the top to the base of the calorifier or the storage/buffer vessel, and the history data shows no sludge deposits during flushing, then this procedure should be risk assessed to determine if the maintenance frequency can be changed. This assessment should be recorded on Form 023.

Water tank inspection and temperature checks – P1C7

3.37 Summer / Winter Inspection of water tank as per Record Form (003).

3.38 Where the system has no BEMS temperature sensors connected the readings should be taken using a temperature sensor. The tank temperature should be below 20ºC.

3.39 Record all inspection and temperatures including the mains water supply at the building/block inlet on the Record Form (003).

Ventilation plant inspection and disinfection – P1C8

Disinfection procedure

3.40 Record all actions on “Air Handling Unit Disinfection Record Form” (007) for each system.

3.41 Prior to taking a plant into use or at intervals not exceeding six months, all parts of the plant that become damp in normal use shall be disinfected following the procedure given below. This will include humidifiers (where installed), cooler batteries/cooling coils, drainage systems and energy recovery devices.

3.42 All procedures must comply with the Health and Safety at Work etc Act, COSHH Regulations and other subordinate legislation.

3.43 Sodium Hypochlorite solution of strength 5ppm will normally be used. This can no longer be ordered from Pharmacy (Central Pharmacy at xxxxxx Health Campus). The solution may be made up using Actichlor (or equivalent) tablets and mains tap water. This should only be done by personnel who have relevant training and the authority from the Authorised Person (Water). Follow the instructions provided with the Actichlor, taking care to use appropriate PPE.

- the Sodium Hypochlorite solution 5ppm should be used without delay, normally within 2 hours of issue;
- notify all persons working in those areas served by the plant to be disinfected;
- switch off all ventilation systems containing devices to be disinfected;
- close the plant isolating dampers;
- open and remove the inspection covers/access doors on both sides of the devices;
- spray all internal surfaces of the humidifier section or cooler battery/cooling coil with a 5 ppm chlorine solution until all surfaces are thoroughly wetted, also flood drip trays and drainage system with the same solution and allow to stand for a minimum of 2 hours;
- spray all internal surfaces of the humidifier and cooler battery/cooling coil with sufficient clean water to remove all traces of the chlorine solution from the device, its drip trays and drainage system;
- restore the plant to normal operation.

Note: If any suspicion arises as to the possible contamination of the system then the microbiologist should be requested to take swab tests from all drain trays and cooler battery/cooling coil tubes and fins.

Domestic hot water calorifier(s) and storage/buffer vessel(s) associated with hot /cold/chilled water heat exchanger(s), drain and clean – P1C9

3.44 Follow the manufacturers' maintenance instructions (in Water Safety Log Book). Record all actions where applicable on the lower section of "Calorifier and Storage/Buffer Vessel Maintenance Record Form" (006) for each system.

- isolate domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel service valves;
- heat any domestic hot water calorifier or hot water storage/buffer vessel up until the contents has reached 60ºC and hold at this temperature for a period of at least 1 hour;
- drain domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel and remove inspection hatch;
- hose out the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel to remove any debris, scale or other deposit. Care should be taken to keep aerosols to a minimum;
- if the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel does not have an inspection hatch, the pipework at the top of the vessel should be disconnected to allow the insertion of a water hose to allow debris to be washed down off internal surfaces;
- examine the internal and external condition of the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel and pipework, any defects should be reported in writing to the relevant Authorised Person (Water). The safety valve should be checked, overhauled and reset as necessary. The temperature, altitude and pressure gauges to be checked for operation.

3.45 On completion of examination and any repairs, the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel should be re-constructed.

3.46 On completion of the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel assembly, the following sequence must be undertaken:

- refill with cold water;
- drain the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel;
- refill with cold water, leave cold feed valve open;
- run domestic hot water calorifier or hot water storage/buffer vessel at a temperature of 60ºC for at least 1 hour. Test the operation of high limit cut-out system if fitted. Check the temperature of the calorifier/vessel top and bottom with a surface thermometer;
- adjust any controls as necessary.

3.47 Take bacteriological samples from the domestic hot water calorifier or hot, cold

or chilled water storage/buffer vessel drainage trap (where possible) and nearest and furthest outlet.

3.48 Record all actions on the Record Form (006).

Annual temperature monitoring – P1C10

Representative hot and cold taps

3.49 Check the temperatures at the hot and cold taps on a representative number of taps on a rotational basis as defined in the local plan of the system being checked.

- using a temperature probe check the temperature in the cold water tap does not go above 20ºC after running the tap for 2 minutes;
- using a temperature probe check the temperature in the hot water tap does not go below 50ºC within running the tap for 1 minute;
- record all inspection and temperatures on the Record Form (005). Add "Annual Monitoring Procedure" to the Comments / Action box to clarify.

BEMS data

3.50 DHW and CW system performance data is valuable for assurance and continuous improvement of *Legionellosis* risk control. Data should be reviewed and exploited as follows:

- produce a BMS plot covering a typical week, for each DHW and CW system;
- identify non-compliant systems and prioritise them for remedial actions by risk category;
- repeat the plots on an annual basis and when there is a change e.g. change of use, engineering modifications, etc;
- maintain hard copy records in the Water Safety Log Book.

Shower head and hoses replacement – P1C12

3.51 Planned Shower Head and Hose Replacement Programme conducted 3 monthly in High Risk Areas and as required elsewhere, but undertaken at least once per annum, as follows:

- remove the shower head and hose assembly. Place shower head and hose assembly into a plastic bag and seal;
- check that the new clean disinfected head and hose package is intact;
- open replacement new clean disinfected shower head and hose assembly sealed packaging, remove and fit following the manufacturer's instructions;
- run water and flush for 3 minutes in accordance with *Legionella* Risk

Assessment in such a way as to avoid the creation of aerosols;

- check final temperature for compliance and working order and return shower appliance to use;
- return redundant sealed bag with shower head and hose assembly to workshop for disposal in accordance with Waste Procedures;
- record all actions on the Record Form (005B).

4. Procedure for domestic hot water systems following plant failure, allowing system water temperature to drop below critical control levels

4.1 This escalation procedure should be employed if the Calorifier or Plate Heat Exchanger outflow temperature falls below 45°C.

4.2 Decision Table for Hot Water System Breakdown

The table below should be used to decide on the actions necessary in the event of a plant breakdown such as power failure or steam supply failure.

Breakdown leading to temperature <45ºC, lasting for:	Risk Category	Action
<12 hrs	High	Verify[1]
	Significant	Verify[1]
	Moderate	Verify[1]
>12 hrs	High	Thermally pasteurise[2]
	Significant	Verify[1]
	Moderate	Verify[1]
>24 hrs	High	Thermally pasteurise[2]
	Significant	Thermally pasteurise[2]
	Moderate	Verify[1]
>72 hrs	High	Thermally pasteurise[2]
	Significant	Thermally pasteurise[2]
	Moderate	Thermally pasteurise[2]

[1] Ensure that normal temperature performance has been resumed, i.e. 60°C.

[2] Calorifier or plate Heat Exchanger and complete distribution system.

4.3 In the event of a reduction in domestic hot water temperature the Authorised Person (Water) should be notified in writing as soon as possible. The reason for failure must be identified and rectified as soon as possible.

4.4 The Authorised Person (Water) shall notify the Duty Holder and users on the failed system that they must not draw off any hot water from the affected services until further notice.

4.5 The relevant Duty Holder shall ensure that their staff are aware of the situation, and that they in turn shall prevent patients from using affected services.

4.6 Where thermal pasteurisation is to be carried out, the temperature of the calorifier or plate heat exchanger shall be raised to 70°C, and the water shall be circulated throughout the affected distribution system for at least one 1 hour. Each tap or appliance should be run in sequence until full temperature is achieved (this should be measured). To be effective the temperature in the

calorifier or plate heat exchanger should be high enough to ensure that all distribution outlets receive water at a temperature of greater than 60°C. Ensure the return flow to the calorifier or plate heat exchanger is no less than 50°C.

4.7 The Authorised Person (Water) shall inform users that the system is back in operation.

4.8 Bacteriological samples should be taken in consultation with the Infection Prevention and Control team.

4.9 The Authorised Person (Water) shall complete an Incident Report Record (004) and ensure the Responsible Person (Water) is notified in writing as soon as possible. Maintain hard copy records in the Water Safety Log Book.

5. Procedure for cold water tanks following the identification of water temperature greater than 20°C

5.1 Drinking water, to a relevant water quality under the Scottish Water Byelaws, is provided to ***NHS Board*** by Business Stream, a Licensed Provider (LP), which works with Scottish Water to make sure that the water supply is connected properly, and that the water is clean and ready to use.

5.2 These obligations cover the supply network up to the boundary point (normally the meter point). Thereafter obligations rest with ***NHS Board***. Currently there is no legal maximum water supply temperature from the Licensed Provider. In practice the water supply temperature to boundary point will be subject to seasonal variation. In winter this would normally be expected to be within the 5 to 10 °C range and in summer up to 20°C.

5.3 The following staged risk assessment escalation procedure should be employed where the water temperature in Cold Water Storage Tanks is greater than 20°C. (i.e. the water storage tanks for Domestic Cold Water Systems and for Domestic Hot Water Systems).

5.4 **Stage 1** - Verification:

- Where tepid cold water occurrence (i.e. more than 20 °C) is reported from any number of cold water outlets, from maintenance procedures, from BEMS monitoring, or from the manual monitoring of storage tanks, the person identifying, or making a report must notify the relevant Authorised Person (Water) as soon as the problem is identified and confirm this in writing within 24 hours.
- The Authorised Person (Water) should liaise with the person identifying the problem and verify the problem by independently rechecking by taking the water temperature of the appropriate cold water storage tank, the temperature of the incoming mains cold water at the site boundary point (and building entry point if there are multiple buildings served by the mains cold water system) and the outflow distribution temperature.
- If the cold water storage temperature is confirmed greater than 20°C, then the Authorised Person (Water) should record this in writing as well as conducting continuous monitoring of the incoming cold water mains, the cold water storage and the outflow temperatures to establish the temperature profiles and in more detail over at least a one week period to determine the level of risk.
- The Authorised Person (Water) should also review the Water Safety Log Book and take into account the recent water system history specifically to include the primary water treatment levels (for mains cold water supplied with chlorination or chloramination treatment); any water sampling carried out following SHTM 04-01; system monitoring data, including temperature monitoring and water quality chlorine or chloramine checks; recent

maintenance history; recent alterations, changes or additions to the water system; and any other changes made by Duty Holders or users of the water system.

- On reviewing continuous monitoring temperature profiles, in conjunction with Water Safety Log Book and recent history, action as Stage 2 or Stage 3 or Stage 4 as appropriate. The Authorised Person (Water) will ensure the Responsible Person (Water) is notified immediately in writing at each Stage and also recorded in the Water Safety Log Book.

5.5 **Stage 2** - Initial Action – high incoming mains cold water temperature:

- Where the incoming mains cold water is 18°C or greater for more than a 48 hour period the Responsible Person (Water) should contact Business Stream the Licensed Provider, who will work with Scottish Water to establish the reasons and determine a resolution. Continuous monitoring should continue and recorded in the risk assessment.

5.6 **Stage 3** - water temperatures fluctuating above and below 20°C (but no greater than 25°C):

- Where water temperatures are fluctuating above and below 20°C in a regular cyclic manner over 72 hour periods in response to regular user water demand (but no greater than 25°C) and are more than 2°C higher than the incoming cold water mains supply temperature at the building entry point, then continuous monitoring should be continued by the Authorised Person (Water), the reason(s) for failure(s) identified and rectified as soon as possible. This should be recorded by updated risk assessment (specifically in relation to the patient risk rating – where there may be increased risk and appropriate actions may be required to mitigate exposure);
- Considerations for failures include:
  - accuracy of temperature sensors (requiring recalibration);
  - temperature sensors being located in water (requiring reposition where tank storage levels have been reduced and sensor no longer sensing stored water);
  - inappropriate standby tank configuration;
  - temperature sensor in standby system;
  - temperature sensor measuring stagnation (requiring reposition);
  - inappropriate siting (not in a cool location);
  - heat gain to the tank and pipework (due to lack of appropriate insulation or located close to heat gain from other heat sources);
  - storage capacity not minimised to match daily use (changes in user water demand);
  - Ingress of hot water through cross connection or mixing valve failure (i.e. from DHW system or Steam systems).

5.7 **Stage 4** - water temperatures fluctuating above and below 25°C (and rarely below 20°C):

- In this situation continuous monitoring should be continued by the Authorised Person (Water), the reason(s) for failure(s) (as Stage 3) identified and rectified on an urgent basis. This should be recorded by updated risk assessment (specifically in relation to the patient risk rating – where there will be an increased risk and appropriate actions will be required to mitigate exposure);
- In this situation a permanent solution, such as ventilation for the plant room, or changing the water storage arrangements, or forming a circulating distribution system (with or without chilling depending on the circumstances) must be implemented;
- The Authorised Person (Water) should, unless instructed in writing to the contrary by Responsible Person (Water);
  - arrange to drain the tank contents and clean if necessary;
  - inform the users of the failed system that they must not draw off any cold water (and hot water if a single domestic hot water header) from the affected system until further notice;
  - chlorine (or other suitable) disinfection of the tank and distribution system shall be carried out;
  - thereafter the tank shall be brought back into service;
  - then the users shall be informed that the system is back in operation.

5.8 The Authorised Person (Water) shall complete an Incident Report Record Form (004). An entry should also be made in the Water Safety Log Book and ensure the Responsible Person (Water) is notified in writing as soon as possible.

5.9 Water systems should be cleaned and disinfected under the circumstances in the table overleaf

System/ Service	Circumstance Requiring Cleaning and Disinfection* (* for disinfection check current Risk Assessment)	Frequency
Domestic Cold Water and Domestic Hot Water Tanks	New installations.	As required
	Re-commissioning empty/unused tanks.	As required
	Tank temperature exceeds 25°C. (check with Risk Assessment).	As required
	Tank contains moderate sediment, i.e. a complete covering of tank base.	As required
	Evidence of tank corrosion (check with Risk Assessment).	As required
	Any contamination of tank (by organic, by vermin or vermin faeces or similar).	As required
	Gross organic contamination e.g. large number of dead insects, feathers, animal or bird bodies etc.	As required
	Regular programme for high-risk healthcare category, with disinfection* where identified in the local Written Scheme (check with Risk Assessment).	Annually
	Regular programme for medium risk healthcare category, with disinfection* where identified in the local Written Scheme (check with Risk Assessment).	2 Yearly
	Regular programme for non-healthcare premises, with disinfection* where identified in the local Written Scheme (check with Risk Assessment).	5 Yearly
Domestic Cold Water Distribution System	New installations and modifications or additions.	As required
	Temperature exceeds 25°C. (check with Risk Assessment).	As required
	Any contamination of tank (by organic, by vermin or vermin faeces or similar).	As required
	Gross organic contamination e.g. large number of dead insects, feathers, animal or bird bodies etc.	As required
Domestic Hot Water Calorifier and Storage/ Buffer Vessels	New installations and modifications or additions.	As required
	Temperature has fallen below 45°C.	As required
	Re-commissioning of empty/unused plant.	As required
	Any contamination of header tank (by organic, by vermin or vermin faeces or similar).	As required
	Regular programme.	Annually
Domestic Hot Water Distribution System	New installations and modifications or additions.	As required
	Temperature has fallen below 45°C. .	As required
	Any contamination of header tank (by organic, by vermin or vermin faeces or similar).	As required
Air Handling Units	Any contamination (by organic, by vermin or vermin faeces or similar).	As required
	Gross organic contamination e.g. large number of dead insects, feathers, animal or bird bodies etc.	As required
	Chiller battery, drip trays and drainage pipework.	6 monthly

6. Protection of maintenance personnel

6.1 The disinfection procedures presented for cold water storage tanks, domestic hot water vessels and water systems are designed to minimise the risk to staff and others that may come into contact with water which may have been contaminated with *Legionella* sp or other harmful bacteria. In all instances of draining, water should be drained in such a way as to avoid the creation of an aerosol.

6.2 Appropriate protective clothing should be worn during such procedures. This can be a powered filter and hood, European Class TH3 (assigned protection factor of 40) or a power assisted filter and close fitting full face mask TM3 (assigned protection factor 40). It should be borne in mind that the filter on these systems is liable to get wet and subsequent resistance to air can increase with consequent discomfort to the operator.

6.3 Where possible, cleaning methods which create an aerosol (e.g. high-pressure water jets) should be avoided. If this is not possible, the operation should be executed when the building is unoccupied or, in the case of permanently occupied building, windows in the vicinity should be closed and air inlets temporarily blanked off. As systems requiring cleaning will have high organic load the operator and others closely involved should wear suitable respiratory protective equipment.

6.4 If plant is located in confined spaces, reference on entry into confined spaces can be sought from Safe Work in Confined Spaces Approved Code of Practice, Regulations and Guidance (L101), and ***NHS Board's*** Confined Space Entry procedure. Personnel shall not be permitted to enter any water storage system (i.e. tank, calorifier, AHU) without working to the ***NHS Board*** safe system (GEMsoft7 or equivalent) for access or work. Health Facilities Scotland publication "Confined Spaces policies, procedures and guidance" (2012) also refers.

6.5 Because water treatment chemicals, including chlorine-containing chemicals and solutions, are often toxic or corrosive they should be used cautiously to ensure that they do not endanger the users or other occupants of the building. Caustic resistant gauntlet type gloves will be required. Water treatment should be carried out by, or under the direction of, people who are suitably qualified and experienced.

6.6 The use of water treatment chemicals should be subject to a COSHH assessment in advance and permission would be required from the Water Authority prior to any discharge to sewers, storm water drains and watercourses.

Note: Scottish Water and SEPA should always be contacted prior to direct discharge to watercourses.

Safe purging of stagnant water

6.7 Stagnant water may potentially contain large concentrations of *Legionella* bacteria. In order to avoid *Legionellosis* and water safety risks, precautions must be taken to avoid the creation of aerosols and to avoid the exposure of people to any unavoidable aerosols.

6.8 The specific precautions may vary according to the particular circumstances, but typically include:

- work on or removal of dead-leg pipework;
- running a hose from the outlet into a container of clean water;
- running hoses directly into a drain cover;
- running fire hoses at a distance from occupied buildings;
- testing fire mains or fire suppression systems;
- closing windows and air conditioning / ventilation intakes where aerosols are created outdoors;
- closing windows and air conditioning / ventilation intakes where excavations and soils removal is conducted outdoors;
- wearing respiratory protective equipment (remember this does not protect nearby members of the public and others who are not wearing masks).

Note: Care should be taken at all times to avoid the risk of contamination by the possibility of back siphonage into mains water supplies.

7. Procedure in the event of ward or department closure

Background

7.1 Where a ward or department is planned to close for a period of greater than 7 days, the Duty Holder must ensure that the manager of that department/ward has notified the relevant Authorised Person (Water) of the details so that the impact on the safety of the water system can be evaluated.

7.2 Following a decision to close a ward/department, full negotiations between the ward or department manager and the Authorised Person (Water) must take place to assess the risks and ensure that relevant safety procedures are established to mitigate the risks of exposure to *Legionella, Pseudomonas* Spp and other similar harmful bacteria. The documented procedures shall clearly define responsibilities and the actions named individuals shall perform, including record keeping.

7.3 The period of closure should be established at the earliest point in negotiations as the duration can play an important part in assessing the likelihood of exposure to *Legionella, Pseudomonas* Spp and other similar harmful bacteria, the cost implications and the arrangements involved in closure.

Short / Limited closure

7.4 Where a short term or limited closure of a ward/department is required (typically not exceeding 30 days) a nominated individual shall be identified to run every tap for three (3) minutes and to flush every toilet on a twice weekly cycle basis. The nominated individual should then complete the Record Form (001), signed by themselves and their relevant manager, the completed form being forwarded to the Estates Department for the attention of the Authorised Person (Water).

7.5 Before the department/ward is re-occupied the Estates Department shall organise an inspection and test of the water systems and report its condition to the Authorised Person (Water) for any remedial works that may be required.

Indefinite closure

7.6 When a ward/department is to close with no planned re-opening date, or where the closure period typically exceeds 30 days, the Estates Department must be consulted *and provided with funding* in order to alter or disconnect and drain the relevant water services ‘so far as is reasonably practicable’. The department or ward manager should be aware that considerable cost for modifications could be needed to achieve this requirement in some large properties with multiple wards/departments being served by the water system. The top section of Record Form (002) shall be completed “Indefinite Closure – System removed from operation from (*the date closed*)” by the Authorised Person (Water).

Detail of works for an indefinite closure (where relevant)

7.7 All water tanks associated with the affected area shall be drained, cleaned and dried out.

7.8 All pipework and devices shall be drained and domestic hot water calorifiers (or other storage vessels) shall be opened up, cleaned and left open to the atmosphere.

7.9 To avoid dead-legs, pipework shall be disconnected from the mains services and tees replaced with straight couplings. Mains cold water services shall be isolated at the mains, capped off from the system and all relevant pipework drained.

7.10 Notices shall be posted throughout the affected department or ward area stating that all water services are disconnected.

7.11 The Estates Department shall be responsible for ensuring that an adequate water seal exists in unused toilets etc to prevent odours from the foul drain system entering the premises.

Re-occupation of an indefinitely closed area

7.12 In the event of re-occupation of an indefinitely closed department or ward, full negotiations must take place between the ward/department manager and the Estates Department prior to the re-occupation exercise.

7.13 The Estates Department will require the following information:

- the planned re-opening date;
- any proposed changes in use of the department or ward;
- any areas which will not be used;
- the approval of the Authorised Person (Water) in advance.

7.14 The Estates Department will provide the department/ward manager with a cost to put the water systems back in service.

7.15 Before the water system is put back into service, any necessary modifications and maintenance shall be carried out prior to cleaning and disinfecting the system.

7.16 The bottom section of Record Form (002) shall be completed at re-occupation and operation from (*the date re-occupied*)" by the Authorised Person (Water).

8. Occupation after alterations to water systems including refurbished and new premises – safe operation of water systems

Procedure until occupation

8.1 This procedure is designed to prevent *Legionellosis* and other water safety risks developing during and after alterations to water systems, including the occupation of refurbished and new buildings through the interim period following alteration, construction, commissioning and hand over with interface with the Authorised Person (Water) for occupancy.

8.2 In design and build type contracts **-** outbreaks of Legionnaires' disease have been encountered, whereby the client did not retain a clerk of works on site and/or where there was no 'commissioning' period on completion of the work. It is vital that the measures outlined in SHTM 04-01 have been implemented immediately before re-occupation.

8.3 Disinfection and cleaning shall be in accordance with:

- SHTM 04-01 Part A: Testing and Commissioning (Section 16);
- SHTM 04-01 Part A: Disinfection (Section 17);
- SHTM 04-01 Part E: Flushing and Disinfection (Section 2) *which was formerly in SHTN 2 (section 2).*

8.4 Once the system is in use and has been cleaned and disinfected prior to hand over, an Authorised Person (Water) shall be nominated to monitor and observe the system. The Authorised Person (Water) shall ensure that the system is operated in accordance with ***NHS Board's*** 'procedure for ward/department closure - short/limited closure' and the relevant Record Forms (001) completed.

8.5 At the point of hand over **all** relevant information written on operating the system, system performance, together with accurate ‘as-fitted’ drawings and design criteria of the domestic hot water systems and cold water services shall be submitted to ***NHS Board*** (i.e. an appropriate current Written Scheme, accepted in writing by the relevant Authorised Person [Water]).

8.6 Full operation of the system and occupancy of the building/property should be as soon after hand over as possible to reduce the potential of *Legionellosis* and other water safety risks and avoid further costs being incurred due to of any further re-disinfection of the water systems.

Residential accommodation owned or leased by NHS Board

8.7 This sub-section applies to domestic residential properties served by individual water systems. Where domestic residential properties share a common water system, the procedures for the larger premises apply.

8.8 ***NHS Board*** recognises its obligations as a provider of residential accommodation. In practical terms it fulfils these by routine maintenance actions/checks immediately prior to the occupation of a domestic residential dwelling by a new tenant and by the provision of information to the new tenant.

Maintenance actions/checks prior to occupation by tenant

8.9 Whenever the expected time delay between vacation of accommodation by one tenant and occupation by the next is greater than one week, the following actions should be taken where appropriate.

8.10 A member of the Estates staff visits the accommodation unit within one week prior to occupation. The following actions are taken, in the order stated:

- the hot water is switched on;
- all WCs are flushed twice (one full flush where dual flush type WCs);
- the cold water storage tank, where present, is checked for contamination e.g. microbiological growth, the presence of organic debris or live organisms such as insects. In the event of discovering such contamination the Estates Officer shall arrange tank cleaning and disinfection. The remaining actions below are not undertaken until the cleaning and disinfection of the tank is complete;
- each hot and cold water outlet is run for three minutes, creating as little aerosol as possible;
- the shower head is removed and the shower hose run under water for three minutes;
- the hot water system is left switched on;
- any defects are reported to the Estates Officer and wherever possible, rectified prior to tenant occupation.

Note: These actions apply to accommodation served by either a conventional hot water system or a combination boiler.

Provision to inform new tenants

8.11 ***NHS Board*** can influence but not control the actions of its domestic tenants. It exerts its influence by the provision of the following guidance as part of the general information pack as provided to new tenants.

"The water systems in this accommodation have been prepared by the Estates Department in such a way as to protect water hygiene. Personal health and safety can be protected by:

- *Ensuring that all outlets are used regularly (preferably once per week) or run for a couple of minutes per week to keep water fresh.*
- *Reporting any water system defects, such as hot water temperatures failure or dirty drinking water, to the Estates Department as soon as possible".*

9. Domestic hot water systems

9.1 The default hot water treatment method used by ***NHS Board*** is that of the Temperature Control Regime (as outlined in HSE ACOP L8 / HSG 274) with full temperature control as advocated in SHTM 04-01.

9.2 Should an alternative water treatment regime be sought, the onus shall be on ***NHS Board*** to establish the efficacy of the system in its control of *Legionella* and water safety for each site, this shall be in the form of a trial to establish:

- a control level;
- the ability to achieve that control level;
- the assurance that the control levels will be maintained;
- develop a Written Scheme for operation and control.

9.3 With regard to scalding risk ***NHS Board*** will ensure that all that is reasonably practicable will be done to follow the requirements of the Safe Hot Water and Surface Temperature guidance in SHTM 04-01.

Hot water storage and distribution temperatures

9.4 The storage of domestic hot water should be arranged to ensure that a water outflow temperature of at least 60°C is achieved. No two water systems are the same and through periodic monitoring operational system performance, the system outflow temperature should be set to over 60°C to ensure an outflow of 60°C is achieved under normal draw-off demand and achieve 55°C at the supply to the furthermost draw-off point in the circulating system. It is important to maintain temperatures at above this figure (*Legionellae* organisms will survive for only a short period of time above this temperature - approximately two minutes).

9.5 Periodic performance monitoring and a system of continuous monitoring and recording of water temperatures via a building management system (BEMS) or data logger is essential to ensure compliant system performance.

9.6 The outflow water temperature, under prolonged maximum continuous demand (at least 20 minutes) from calorifiers should not be less than 60°C.

9.7 While it is accepted that occasionally under peak instantaneous or prolonged demand the water outflow temperature will fall, it is not acceptable if this occurs frequently (more than twice in any 24 hour period) and/or for long periods (exceeding 20 minutes).

9.8 Under no circumstances should the domestic hot water flow temperature fall below 50°C.

9.9 It is recommended that disinfection by pasteurisation is undertaken if the water temperature of the calorifier falls below 45°C.

9.10 A minimum domestic hot water circulation (return) temperature of 50°C shall be maintained during the hours of occupancy.

Water temperature checks (Including cold water outlets)

9.11 Temperature checks on calorifiers and distribution systems should be carried out on a monthly, six-monthly and annual basis. In the event of non-compliance, both the Authorised Person (Water) and the Responsible Person (Water) should be informed as soon as possible. Use of a digital thermometer with a touch and immersion probe is recommended.

9.12 Although the HSE recommends spot temperature checks, SHTM 04-01 requires a temperature excursion limit of less than 20 minutes; therefore continuous monitoring and recording will be necessary in certain circumstances.

Calorifier operation

9.13 Calorifiers are to **be run 24 hours per day, 7 days per week, with the domestic hot water circulation pump kept running**. Should it be necessary for interrupted operation or shutdown overnight, then the calorifier should be allowed to maintain its water storage temperature and the domestic hot water pump should be started up to ensure full temperature throughout the distribution system for at least one hour prior to occupation of the premises.

Plate heat exchangers

9.14 Plate heat exchangers and any associated storage/buffer vessels are to be run to the same temperature regime as calorifiers. The large contact area and lack of dead spots should ensure good kill of *Legionella* bacteria.

9.15 In the event of a plant failure the water outflow temperature will quickly fall below 60°C and it may be necessary to apply Section 4 - “Procedure for domestic hot water systems following plant failure, allowing system water temperature to drop below control levels”.

DHW circulation pumps

9.16 Domestic hot water circulation pumps should perform in such a way to ensure a minimum water circulation (return) temperature of 50°C.

9.17 Where possible, any plumbed-in duplicate circulating pump should be removed. Where this is not practicable, the duty pump should be manually changed over a least once per week to reduce any danger of water stagnation. It may be more efficient to utilise an auto-changeover system. A spare pump should be kept for immediate replacement in the event of pump failure.

Stratification checks

9.18 Domestic hot water storage vessels and any associated storage/buffer vessels should be subject to water temperature stratification checks every two years for each calorifier/vessel. These checks should extend over a period of seven (7)

days using a logging device. Logging should also be used where de-stratification pumps have been fitted to establish that such a pump will ensure that the water temperature at the base of the vessel achieves 50°C.

Quarterly flushing

9.19 Each calorifier and any associated storage/buffer vessels should be flushed quarterly through its drain valve by opening the drain valve 3 times, each time for a 3 minute period.

9.20 Calorifier and any associated storage/buffer vessels flushing should be carried out after temperature checks on the calorifier and system have been completed. Record Form (006) should be completed.

9.21 Hot Water Services Routine Inspection and Frequency Table:

Service	Task	Frequency
Hot Water Services	Arrange for samples to be taken from hot water calorifiers, in order to note condition of drain water. (on Procedure P1C9 – recorded on 006)	Annually
	Visual check on internal surfaces of calorifiers for scale and sludge. Clean and disinfect. Check representative taps for temperature as above on a rotational basis. (on Procedure P1C9 – recorded on 006)	Annually
	Check temperatures in flow and return at calorifiers. (on Procedure P1C4 – recorded on 005)	Monthly
	Check water temperature up to one minute to see if it has reached 50ºC in the sentinel taps. (on Procedure P1C4 – recorded on 005)	Monthly

10. Domestic cold water systems

Cold water cisterns and cold feed tanks

10.1 All new domestic cold water storage cisterns and tanks shall comply with the requirements of the Scottish Water Byelaws.

10.2 Duplicate tanks often create a risk of water becoming stagnant in one of them, leading to risk of *Legionella, Pseudomonas* Spp or similar contamination. Consideration should be given to taking one of the tanks out of service. See guidance in "Guidance for Alterations to Water Systems".

10.3 All cold water storage tanks are to be examined and the temperature tested on a regular summer / winter six monthly cycles and cleaned on an annual basis as required. (on Procedure P1C7 – recorded on Form (003).

10.4 Temperatures in cold water storage tanks and the mains inlet to them should be checked during periods of high ambient temperatures (e.g. summer afternoons between June and August). Water temperatures should be less than 20°C. At the same time, the furthest and nearest draw off points in the system should be checked to ensure that the water distribution temperatures are less than 20°C within 1 minute of running the water (at full flow). A similar temperature check regime should be undertaken during the winter months to identify the performance of cold water distribution systems and the impact of heat gain from heating systems.

Cold water services - Pressurisation/supply pumps

10.5 Where two or more pumps have been fitted for pressurisation systems, the lead pump shall be changed over at least once a week in order to avoid water stagnation.

10.6 Dates and times of the pump changeover should be recorded in the Water Safety Log Book (on Safety Control Log – Record Form 028). Printouts of regimes for automatic systems will be adequate.

10.7 Where pumps have not been in service for a period of four weeks or greater, or have been removed for any reason, the pump and associated pipework shall be thoroughly washed out and disinfected before being brought back into service. Disinfection of pumps shall be to 50ppm free residual chlorine for one hour and pumps shall be totally submerged during this period. Incident report Record Form (004) shall be completed giving details of why the pump was out of use.

Tank cleaning procedure

10.8 ***NHS Board*** staff or contract staff shall not be permitted to enter any water storage system (i.e. tank, calorifier, AHU) without working to the ***NHS Board*** safe system (GEMsoft7 or equivalent) for access, or work or if they are suffering or have recently suffered from any gastric or other communicable illness, or a

condition which may result in their increased susceptibility to *Legionellosis, Pseudomonas* Spp and other similar harmful bacteria. It is the responsibility of the individual to inform the supervisor immediately if applicable.

10.9 The relevant Authorised Person (Water) shall notify all users of the proposed line of action, and of any disruption or modification to service.

10.10 All equipment and tools to be employed during the cleaning and disinfection process must be dedicated only to this task - this will include hire equipment. All equipment should be disinfected in a high concentration of chlorine solution prior to commencement of the process.

10.11 The Process Steps:

- isolate and shut down the cold water storage tank and remove the cover or inspection hatch. The operator shall display warning labels in and around the plant room stating disinfection in progress;
- permission must be obtained from Scottish Water before dumping the tank contents. The Water Authority will need to be informed of the volume to be discharged. Any further quantities of disinfected/chlorinated water that are to be dumped as a result of tank cleaning should be included;
- the tank shall be examined visually for signs of damage, corrosion, debris and biological growth. The water storage temperature and any such defects identified are recorded for report to the Estates Department;
- tank cleaning shall be performed using non-abrasive cleaning materials;
- protective clothing, footwear, face goggles and masks are to be employed. These items must be specific to the task of cleaning and chlorination, and must not have been used for other activities;
- where tanks are to be painted, only paints or coatings and materials that are recognised and approved by the WRc and detailed in "The Water Fittings and Materials Directory" shall be employed. The specification for any such product must be submitted to the Authorised Person (Water) or their nominated deputies for their approval prior to use;
- details of all cleaning and painting materials shall be listed on Record Form (003);
- on completion of the cleaning/painting exercise, and after the necessary paint maturing period (if required), the tank shall be thoroughly flushed and washed out with water, refilled to the tanks normal working level and dosed to a level of 50 ppm free residual chlorine. The tank shall be left to stand for a minimum period of one hour. During this period the level of free chlorine shall be monitored and maintained at 50 ppm;
- on completion of the tank chlorination period, the tank contents shall be discharged as previously detailed in (b) above. The tank is then refilled to its normal operating level with fresh water. The free chlorine level in the tank water shall be monitored until it matches that of the incoming water supply;
- on completion of this exercise the tank shall be put back into service immediately, and water samples taken for analysis - A sample of water

should be taken using sterile bacteriological techniques for deposit and examination at a UKAS accredited laboratory;

- the TVC and *Legionella* Sampling and Test Protocol are detailed in SHTM 04-01 Part C. As described, sampling must follow that set out in BS7592: 2008 Code of Practice and BS EN ISO 5667-1: 2008 on Water Quality Sampling. Those organising sampling must make clear in advance which water quality technique is to be undertaken in order that systematic conclusion on risk can be drawn;
- for initial water system sampling take a Post-Flush sample (as defined in BS7592: 2008) at sentinel points without disinfection. Where there is an initial concern with a particular outlet location – say, a combined system and outlet problem – a BS Pre-Flush sample should be taken. If concerns persist with an outlet location (typically, a known dead-leg issue or lack of, or low, water use, a further BS Pre-Flush sample should be taken followed by disinfection before a BS Post-Flush with disinfection sample. Water should be allowed to run hot for 1 minute and cold for 2 minutes by which sampling would be temperature calibrated;

Note: Samples following SHTM 04-01 Part C, taken for *Legionella* must be in a 1 litre container, available from the Microbiology Laboratory.

Samples from source sampling **must** reach the UKAS Laboratory within 2 hours, if there is a delay the samples should be stored between 6ºC and 18ºC for examination within 24 hours.

- on receipt of analysis results, these shall be submitted to the Authorised Person (Water). The assistance of Infection Prevention and Control team may be required to aid with the interpretation of the results, and the identification of remedial actions if necessary;
- on completion of the tank cleaning or inspection exercise, it is recommended that details should be entered onto a tank cleaning record label to be posted on or adjacent to the tank. Such a label must be robust, and able to withstand contact with water;
- details of findings, actions taken and test results are to be entered onto the Water Storage Tank Maintenance Record Form (003). Chlorination certificates are to be obtained and be retained in the Water Safety Log Book;

Note: Any defect shall be reported **immediately** to the Authorised Person (Water) or Nominated Deputies.

- once a system has been filled ***NHS Board*** and/or their Contractors **will not** drain that system unless full disinfection is to be undertaken before the system is brought into use again. The only exception is in the case of an emergency and with the consent of the Infection Prevention and Control Team.

Service	Task	Frequency
Cold Water Services	Check tank water temperature remote from ball valve and mains temperature at ball valve. Note maximum temperatures recorded by fixed maximum thermometers where fitted. (on Procedure P1C7 – recorded on 003)	Six monthly
	Check that temperature is below 20ºC after running the water for up to two minutes in the sentinel taps. (on Procedure P1C4 – recorded on 005)	Monthly
	Visually inspect cold water storage tanks and carry out remedial work where necessary. Check representative taps for temperature as above on a rotational basis. (on Procedure P1C7 – recorded on 003)	Annually
Shower Heads	Dismantle, clean and de-scale shower heads and hoses / or replace with new disinfected Shower Head and Hose. (on Procedure P1C12 – recorded on 005B)	3 Monthly for high risk areas and as required elsewhere, but at least Once Annually
Little Used Outlets	Flush through and purge to drain, or purge to drain immediately before use, without release of aerosols. (on Risk Control Notice 11/04 – recorded on Sample Record Sheet by Duty Holder) NB Little-used outlets in ICUs should be flushed daily at the start of each day.	Twice weekly

Cold water services routine inspection and frequency table

11. Air conditioning plant

General

11.1 Air conditioning plant and ductwork should be inspected at the access point(s) on an annual basis in order to check cleanliness, general condition and assess risk. After several years of service, even a correctly filtered system may contain dirt accumulation. It may be necessary to consider cleaning of the system taking account of HAI-SCRIBE procedures and the risk assessment.

11.2 In particularly recurring polluted areas, it may be necessary to consider the installation of high grade final and pre-filters. The quality of filter housing design and in particular the seals are critical factors in maintaining the efficiency of the filtration system by ensuring that air does not bypass the filter panels.

11.3 All information on condition, cleanliness etc., to be recorded in the plant room log book, with any non-compliance or incidents being identified to the Authorised Person (Water) immediately on identification. An Incident Report Record Form (004) should be completed and the Responsible Person (Water) must be notified as soon as possible.

Draining traps and pipework

11.4 A drainage drip tray should be provided to collect condensation build-up on cooling coils (including the return bends and headers), for humidifiers (if installed), eliminators and, if necessary, heat recovery devices. The drainage drip tray should be constructed from a corrosion resistant material and be so arranged that it will completely drain - i.e. the drain connection should have no upstand in order to prevent 'pooling'. The drainage tray should be large enough to collect all the water produced by the device it serves. Provision should be made to allow for inspection of the drainage tray (i.e. viewing window/access panel). A slope of 1:20 in all directions towards the drain outlet position should be incorporated.

11.5 Drainage drip trays should be connected to a drainage trap assembly which should discharge via a Type ‘A’ air gap as laid down in BS6281: Part1: 1992.

11.6 The depth of any trap should be at least twice the static pressure head generated by the fan so that the water seal is not 'blown out' during plant start up.

11.7 A trap need not be directly under the drainage drip tray which it serves, provided that the connecting pipework has a continuous fall. Each trap shall be made of the clear (borosilicate) glass or transparent plastic type in order to show clearly the integral water seal level, and should be fitted with a screw-top cap to permit re-filling. The water seal level shall be permanently marked on the trap, to indicate the water seal levels when the fan is operational at its design duty.

11.8 Traps fitted to plant located outside or in unheated plant rooms may require trace heating to prevent freezing damage during the winter period. The trace heating system employed should not raise the temperature of the water in the trap to greater than 5°C. Similarly, it may be necessary to shield the trap from direct sunlight in mid-summer in order to prevent heat gain and algae growth.

11.9 The pipework from each trap should be constructed of thermoplastic, copper or stainless steel tube. Stainless steel may be particularly useful in instances where greater mechanical strength is required. The pipework shall have a minimum fall of 1 in 60 in the direction of water flow.

11.10 Water from each trap should discharge over an open tundish connected to a drainage stack via a second trap or a floor gully.

11.11 Where the drainage pipework from the tundish outlet, which should be ventilated, discharges to a surface water drainage stack or a dedicated plant drainage stack, then the connection shall be in the form of an easy-sweep tee.

11.12 It may be necessary to employ chlorine or other chemicals in order to clean humidifiers and cooling coils etc. Under such circumstances it is necessary to discharge the plant effluent produced to the foul drainage system.

11.13 Individual drain trap systems should be separate wherever possible. All drain trap systems are to be examined, cleaned and topped up on a monthly basis as required. (on Procedure P1C5 – recorded on Form 022.

Humidifiers (where installed)

11.14 Humidification was originally required for some healthcare ventilation applications in order to control the risk associated with the use of flammable anaesthetic gases. The use of such gases has now ceased.

11.15 Where humidification is still required this must follow the requirements of SHTM 03-01 and this should be included in the *Legionella* risk assessment.

11.16 The steam supply connections to the humidifier should be provided with a dirt pocket and trap set installed as close as practicable to the humidifier. The water supply to the steam generating unit shall be designed as if potable supply right up to the device.

11.17 The humidifier chamber should be inspected on a six-monthly basis and specified in the plant PPM schedule. Particular attention should be given to any pooling of water. The chamber interior should be clean, and free from any scale or other build-up on the walls.

Heater batteries

11.18 Inspection of the heater batteries is needed in order to ensure free airflow and no build up of dirt, scale or other debris. Cooling coils should be examined regularly to ensure that correct drainage is being achieved, and that there is no pooling of water or development of slime, algae or other deposit. Drainage drip trays should be removed (if possible) and cleaned on a regular basis.

12. Hydrotherapy pools, whirlpool baths, whirlpool spas and birthing pools

General

12.1 Hydrotherapy pools, whirlpool baths, whirlpool spas, birthing pools and water features provide conditions which may favour the growth of *Legionella, Pseudomonas* Spp and other similar harmful bacteria. Whirlpool spas are particularly vulnerable because of the recirculation of a relatively small volume of water, and careful maintenance and chemical water treatment is needed in order to maintain water quality. A detailed log must be kept detailing the treatment method, filter cleaning, temperature, PH, chlorine residual, quantity and strength of chemicals applied and other key parameters.

12.2 Whirlpool baths and birthing pools normally employ a single fill for each user, and do not present the same level of risk as spas, provided that the guidance recommended for hot and cold water systems is followed.

Guidance

12.3 Hydrotherapy pools and spa pools should be operated to the guidance given in the following publications published by the Public Health Laboratory Service (PHLS):

- 'Hygiene for Hydrotherapy Pools';
- 'Hygiene for Spa Pools'.

12.4 Copies of these publications should be held in the Estates Department, and used as the primary source of guidance for the management of such pools.

12.5 All information on condition, cleanliness, servicing and monitoring to be recorded in a pool log book. Non-compliance or incidents to be identified to the Authorised Person (Water) immediately, and the Incident Report Record Form (004) completed and ensure the Responsible Person (Water) is notified as soon as possible.

13. Showers / unused outlets

13.1 Showers and other water outlets which are rarely used should preferably be removed or, if retained, flushed to waste at intervals for a 3 minute period. The interval should be at least twice-weekly. Where the outlet may be used by high risk patients, more frequent flushing will be needed and the increased frequency should be determined following risk assessment. In ICUs little-used outlets should be flushed daily at the start of each day.

13.2 The flushing must be carried out in such a way as to avoid the creation of aerosols. Full flow is not necessary.

13.3 A record must be kept of the flushing operation and should be retained for at least 5 years. The sample Record Form for Estates Department use is (026).

13.4 Risk Control Notice XXXXX was first issued on XXXXX to instruct all Duty Holders and Department Heads of this requirement. This has been updated to reflect SHTM 04-01 changes to allow Duty Holders to instruct ALL devolved management and local ward or departmental staff of the requirements. A sample record sheet for devolved mangers was included. The record sheet is audited as an integral part of Infection Control Audit (3 monthly using the HEI Inspection Audit Tool).

14. Monitoring requirements for other risk systems

Service	Task detailed Under Risk Assessment	Frequency
Ultrasonic humidifiers/ foggers and water misters	**Not** to be used in ***NHS Board***	
Spray humidifiers, air washers and wet scrubbers	**Not** to be used in ***NHS Board***	
Water Softeners and R.O. Systems	Clean and disinfect resin and brine tank - check with manufacturer what chemicals can be used to disinfect resin bed Duty Holders and their Local Managers to **note** their specific responsibilities for systems installed and used by functional departments (Renal etc.)	As recommended by specific manufacturer
CBRN, Deluge & Emergency Showers and Eye Wash Sprays	Flush through and purge to drain. Duty Holders and their local Managers to **note** their specific responsibilities for systems installed and used by functional departments	2 times per week following Risk Control Notice 11/04
Fire Sprinkler / Suppression and Hose Reel Systems	When witnessing tests of sprinkler / suppression system blow down and hose reels ensure that there is minimum risk of exposure to aerosols. *Any Hose Reels identified must be reported on Incident Report Record Form (004) for immediate removal including all dead-leg pipework*	As directed by specific manufacturers
Lathe and Machine Tool coolant systems	Coolant **not** to be used in ***NHS Board*** Systems	
Horticultural misting systems	**Not** to be used in ***NHS Board***	
Dental Equipment	Drain down and clean	At the end of each working day
Trolley Wash & Vehicle and Power Washing Plant	To be operated in line with manufacturer's instructions	See manufacturer's instructions
External Fountains and Water Features	Clean and disinfect ponds, spray heads and make-up tanks including all wetted surfaces, de-scaling as necessary. Risk Assessment to take account of proximity and likelihood of risk to healthcare buildings	Interval depending on condition
Internal Fountains and Water Features	**Not** to be used in ***NHS Board***	
Vending, Chilled Water and Ice-Making Machines	Follow the infection control precautions detailed in Scottish Health Facilities Note 30 Duty holders and their Local Managers to note Freestanding water dispensing machines using proprietary water containers *should not to be used in healthcare applications* (remove and return to supplier if found)	

15. Alterations to (including refurbishment or new) water systems guidance

15.1 Where alterations are planned to water systems and the Written Scheme, the Guidance for Alterations to Water Systems document must be followed. The document provides separate specific guidance and the details to be followed for controlling and avoiding the potential of *Legionellosis, Pseudomonas* Spp, other similar harmful bacteria and water safety risks. (specifically using Record Form 029 to record the acceptance of work to be conducted and conformation of work completed on a water system and all conditions involving Duty Holders and their staff, the Authorised Person (Water) of the written scheme of the system and the Authorised Person (Water) from the Project Team accepting responsibility for the work).

Note: Record Form 029 shall e used to record the acceptance of **all** work to be conducted, confirmation of **all** work completed on a water system, **all** conditions involving Duty Holders and their staff, the Authorised Person (Water) of the Written Scheme of the system and the Authorised Person (Water) from the Project Team accepting responsibility for the work.

15.2 At the point of hand over **all** relevant information written on operating the system, system performance, together with accurate as-fitted drawings and design criteria of the domestic hot water systems and cold water services shall be submitted to ***NHS Board*** (i.e. an appropriate current Written Scheme, accepted in writing by the relevant Authorised Person [Water]).

15.3 Full operation of the system and occupancy of the building/property should be as soon after hand over as possible to reduce the potential of *Legionellosis, Pseudomonas* Spp, other similar harmful bacteria and avoid further costs being incurred due to any further necessary re-disinfection of the water systems.

16. Control of contractors

16.1 Contractors shall only be engaged in work on water systems or air conditioning plant under the control of the Authorised Person (Water) co-ordinated with any Estates persons.

16.2 The ***NHS Board*** Management and Control of Contractors – Health, Safety and Environment Policy & Procedural Arrangements along with the associated Guide for Contractors (and Consultants etc) will apply.

16.3 The Authorised Person (Water) shall ensure that the contractor is competent for the task(s) to be undertaken and shall ensure that the contractor is aware of and has made provision for all responsibilities under the various Environmental, Health and Safety Regulations, including CDM, COSHH, *Legionella*, water safety etc.

16.4 The Authorised Person (Water) shall ensure that the contractor:

- is suitably briefed in writing on the task(s) to be undertaken and is fully aware of the water safety implications and prescribed *Legionella* Procedures to be followed;
- demonstrates that all workforce to be engaged on the task(s) are suitably trained and experienced for the task and are properly managed and supervised;
- has provided appropriate equipment for the task including PPE;
- carries out the task(s) to the correct standards and in the correct manner all in accordance with ALL *NHS Board* and Estates policies and procedures.

16.5 The Authorised Person (Water) shall record the evidence provided by the contractor and store it for future reference and maintain hard copy records in the Water Safety Log Book.

16.6 The Authorised Person (Water) shall complete a review questionnaire upon completion of the work and shall forward it to the Environment & Safety Support team for recording.

17. Designer's responsibilities

Safety criteria

17.1 In order to avoid potentially costly remedial works, the design of new buildings or the installation or alterations to existing buildings and their water systems should be controlled in order to "get it right first time". The checklist provided in the "Control of Water Record Forms" document 025 (included in Appendix C for ease of reference), should be used by relevant Estates staff and/or supplied to design consultants in order that they may check their own design. The Designer (*i.e. the person identified to perform the design duties through clarifying assumptions, eliminating hazards and risks and providing the information about remaining risks – in compliance with the Construction (Design and Management) Regulations: 2007 which are part of the Health & Safety at Work regulatory framework*) shall ensure the Client and CDM Co-ordinator are aware.

17.2 This checklist is not a design brief and is not intended to deal with the potential design issues, but is a management checklist. If these issues are incorrect it is likely that other aspects of the design are also not compliant with regulatory and mandatory standards, or best practice. Also see Record Form 029.

The checklist should be used to record, take account and weigh up all relevant matters regarding the safety of the water system, the operating parameters, the assumptions and what is known (or importantly the level not known) or reasonably be expected to be known to eliminate or mitigate risk. ('*reasonably practicable*').

17.3 Water systems operate in premises across a wide range of settings - through a scale from suites of rooms within larger premises, to premises with single building blocks, to premises with multiple building blocks with multiple functions, up to large health campus containing multiple hospitals and complex specialist care services.

Additionally due to the age, construction type and nature of ***NHS Board*** premises there are a wide number of potential health hazards arising from care and support functions (such as infectiousness, hazardous, dangerous substances and radiation etc) and the nature of the physical environment (such as exposure to asbestos, confined spaces and access restriction etc). Where buildings owned or leased by ***NHS Board*** were built or refurbished prior to 2004 the use of asbestos-containing materials in their construction was common practice and it is possible that personnel could encounter asbestos material in difficult physical environments whilst undertaking work activities. It may also be very difficult to safely investigate intrusively, so considerations and assumptions on what is actually known must be recorded.

NHS Board takes a positive approach to controlling and reducing any potential risk exposure to those conducting work or exposing others to risk through the work activities. This will be achieved by staff and contractors co-operating, working together to the control measures and work methods outlined in Board

Policies and associated Procedural Arrangements.

17.4 Domestic Hot and Cold Water Systems should be designed to ensure safe operation at all time by avoiding, preventing or controlling conditions which permit the growth of *Legionella, Pseudomonas* Spp or any other similar harmful bacteria and which allow easy maintenance, cleaning and disinfection. In particular, the following must be considered:

- materials such as natural rubber, hemp, linseed oil based jointing compounds and fibre washers must **not** be used in domestic water systems. Materials and fittings for use in water systems, such as plastic pipework, plastic and rubber components in TMVs and flexible hose liners etc must **not** support microbial growth. The WRAS Water Fitting and Materials Directory should be consulted to identify approved products in keeping with regulatory requirements. Flexible hoses, WRAS approved or not, shall not be used in water systems except in exceptional (approved) circumstances;
- water storage tanks should be fitted with covers which comply with the Scottish Water Byelaws, also insect screens fitted to any pipework open to atmosphere, e.g. the overflow pipe and vent;
- tanks should be provided with a bottom drain outlet that allows the full contents to be safely drained to a suitable drainage point;
- multiple linked storage tanks or tanks with multiple ball valves should be avoided because of operational difficulties due to possible unequal flow rates and possible stagnation;
- accumulator vessels on pressure boosted hot and cold services should be fitted with diaphragms which are accessible for cleaning and that do **not** support microbial growth;
- point of use hot water generators, with minimal or no storage, taken with safe temperature guidance should be considered for remote low use outlets;
- thermostatic mixing valves (TMVs) where fitted, should be sited as close as possible to the point of use. A single TMV should serve a single shower outlet or a single tap outlet. A single TMV **must not** serve multiple tap or shower outlets. Where pipework contains blended water the maximum length of pipe is given in SHTM 04-01 Part A with the downstream leg not exceeding 2 metres and the complete length of the spur without circulation not exceeding 3 metres;
- duplicate or multiple circulation pumps should **not** be installed, as the pump on standby may harbour stagnant water. Instead, a single pump should be installed and a spare provided.
- for applications involving Neonatal Units and Adult & Paediatric Intensive Care Units there is particular guidance (which should be good practice elsewhere) to ensure:
  - engineering and cleaning protocols are achieved and manufacturers' instructions are followed;

- taps and thermostatic mixing valves (manual and automated) are commissioned (including programming auto flush cycles) and can be routinely validated, as per the manufacturer's instructions;
- for automated taps, ensure records of remote flushing can be achieved;
- flushing of all hand wash stations and sinks can be performed for 1 **minute** daily, at the maximum flow rate that this does not give rise to any splashing beyond the sink, e.g. on the floors;
- that water flowing from the taps cannot flow directly into the drain holes (to prevent splash back). Water flow must impact on the basin offset from the drain hole. Flushing (automated or manual) should not result in splashes beyond the wash hand station area;
- where outlets are planned to be flushed daily, there is no additional requirement for weekly (or automated) flushing;
- liaison with the user (Senior Charge Nurse) regarding the potential of infrequently used wash hand stations or sinks (used and / or flushed once a day) which will have to be subjected to a documented flushing regime, risk assessed and regularly reviewed for the need for the wash hand station or sink to be still there. (See: Guidance on the number of hand wash stations required);
- removal of any redundant branches from circulating mains and provide straight couplings on distribution pipework to eliminate residual dead-legs or blind stub-ends created by plugged tee-pieces (anywhere in the water system under alteration);
- the length of any dead-legs is checked and minimise where possible by taking the return leg pipework up to wash hand stations and sinks. (this should be included in the *Legionella* Risk Assessment for the water system);
- before undertaking any modifications to pipework, perform an impact risk assessment. Keep records of risk assessments and modifications made;
- considering whether thermostatic mixer valves can be located closer to the outlet;
- new taps, wherever considered necessary, have integral thermostatic control;
- the careful selection of taps to minimise the formation of aerosols. The water flow profile should be compatible with the shape of the wash hand station. Flow straighteners can capture biofilm, but their removal can create turbulent flow and increased pressure resulting in splashing of surrounding surfaces and flooring. Any policy for removal should result from risk assessments and / or restricting flow to the same as applied prior to the removal of the straighterners;
- to avoid positioning soap dispensers / alcohol based hand rubs such that any drips could fall on to the taps or into the basin of the hand wash station;

- as it is not possible to have taps, shower heads and hoses etc 'pre-disinfected' in the supply from manufacturers - disinfection will have to rely on normal flushing and disinfection protocols that would apply to any new installation before commissioning and putting into use. In large projects this process should be undertaken as close as possible to the system being handed over to avoid pipework being left unused filled with stagnant water. A daily flushing regime should be put in place until the system is handed over to the ***NHS Board***.

Domestic hot water systems

17.5 The storage capacity and recovery rate of the water heater should be selected to meet the normal daily functions in hot water use without any drop in the supply temperature.

17.6 Temperature is used as a means of control and each water heating device shall deliver water at a minimum of 60^0C at the flow point from the water heating device under normal water system demand draw-off. All storage water heating devices should have a suitably located drain valve.

The flow of water throughout the domestic hot water circuit shall be balanced by adjusting regulating valves to ensure that the target temperature is achieved throughout the system under all levels of water consumption.

Temperature is used as the means of controlling *Legionella* and other harmful bacteria. The domestic hot water circulating loop shall be designed to give a return temperature to the storage water heater of 55°C, but certainly no less than 50°C. The pipe branches to the individual hot taps shall be of sufficient size to enable the water in each of the hot taps ideally to reach 55°C, but certainly no less than 50°C, within one minute of turning on the tap.

In normal use, the system should be designed to achieve 55°C at the supply to the furthermost draw-off (sentinel) point in the circulating system. The set points for the water heating device should be adjusted to be at or above 60°C to ensure the water system achieves these criteria. Thermometer/immersion pockets shall be fitted on the flow and return to the storage water heating device and in the base of the storage water heater in addition to those required for control.

17.7 In larger domestic storage water heating devices, the fitting of time control shunt pumps (de-stratification pumps) shall be included to overcome temperature stratification of stored water.

Domestic hot water distribution pipes should be insulated with sufficient thermal performance to avoid affecting cold water pipes.

Whether a BEMS is fitted or not – a visible manual means of monitoring domestic hot water system storage, flow and return temperatures must be available at all time.

Cold water systems

17.8 The cold water storage tank should be sited in a cool place and protected from extremes of temperature by thermal insulation. Tanks and piping should be insulated with sufficient thermal performance and kept away from heat sources, hot ducting and other hot pipes to prevent excessive temperature rises in the cold water supply and distribution system.

Access hatches should be provided on cold water tanks for inlet valve maintenance, inspection and cleaning (more than one hatch may be needed on larger tanks). In new installations consideration should be given to locating hatches on the tanks sides to facilitate means of escape in an emergency for those inspecting the interior.

The volume of cold water stored should be minimised. It should not normally be greater than one day's water use. Multiple cold water storage tanks require care in the connecting piping to ensure water flows through each of the tanks, to avoid stagnation in any one tank.

17.9 The pipework should be easy to inspect so that the thermal insulation can be checked to see that it is in position and has remained undisturbed.

17.10 Low-use outlets should be installed upstream of higher use outlets to maintain frequent flow; e.g. a safety shower can be installed upstream of a WC.

Whether a BEMS is fitted or not – a visible manual means of monitoring cold water system supply (at building block inlet or meter point), tank storage, flow (and return where appropriate) temperatures at **no more than 20^{0}C** must be available at all time

Temperature settings and Building Energy Management Systems (BEMS)

17.11 Domestic hot and cold water systems should be temperature monitored by the BEMS performing to SHTM 08-05 to ensure compliance with the temperature standards specified in the relevant regulations and guidance. System parameters must be detailed in the Written Scheme for the water system.

17.12 The minimum BEMS performance monitoring of the water system must be to ensure:

- Domestic Hot Water is continuously monitored and records the parameters highlighted in paragraph 17.6 above and described in detail in SHTM 04-01. i.e. 60^{o}C flow (minimum) from the water heating device to ensure 55°C at the supply to the furthermost draw-off (sentinel) point in the circulating system under normal use and no less than 50^{o}C return (lowest limit) to the water heating device;
- Cold Water is continuously monitored and recorded from the point it enters a building to the parameters highlighted in paragraph17.8 above and described in detail in SHTM 04-01. i.e. no more than 20^{o}C (highest limit);

- failures outwith the parameters are subject to alarms and service response messages;
- performance data requires to be secured and retained for at least 5 years, but must be easily available to the Authorised Person (Water), the other independent professional advisors, assessors and others with an interest in system performance.

Note: The definition of sentinel taps and information on TMV settings can be found in SHTM 04-01 Part A, Appendix 6

Other water systems connected or operating in close proximity

17.13 Designers must ensure there are no other water systems (such as for Fire Suppression, Fire Precautions or Fire Protection) connected or in close proximity to the water system. Reference should be made to the Water Safety Log Book and Written Scheme for the Building Block for information, changes or alterations.

18. Scottish water byelaws 2004

18.1 On 30 August 2004, the Scottish Water Byelaws 2004 replaced the previous Byelaws in governing the prevention of waste, misuse, undue consumption and contamination of public water supplies in domestic and commercial plumbing installations and represent important protection for public health and the environment. The Byelaws are based on performance standards, e.g. British Standards or those European Standards being mandated under the Construction Products Directive.

18.2 The Byelaws are enforced by Scottish Water, and further advice should be sought from them or from their website: www.scottishwater.co.uk

18.3 The Byelaws introduce a new specification to prevent the backflow of water. This brings the UK approach into line with the emerging harmonised European Standard. The system consists of five fluid categories, which reflect the potential toxicity of the downstream fluids. These categories relate to the risk posed to public health should fluids contaminate drinking water. The specification then equates each fluid category to the range of suitable backflow prevention devices. Particular reference should be made to the determination of fluid categories when considering alternative water treatment systems. The addition of a treatment chemical to potable water may result in it changing fluid categories to Category 3, with the resultant backflow prevention being required.

18.4 General issues of design, sizing, layout, construction and commissioning are discussed in BS EN 806-1-5: 2000-2012 and BS8558: 2011 following a transitional period. Material and fittings acceptable for use in the water system are listed in the directory published by the Water Regulations Advisory Scheme (WRAS). Low corrosion materials (copper, plastic, stainless steel etc) should be used where practicable. Non-metallic materials are deemed to be compliant provided they meet with the appropriate British Standard, BS6920: 'Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of water'.

18.5 Certain aspects of the system will have to comply with the Building Regulations.

18.6 Water storage tanks should be fitted with covers which comply with Byelaws and insect screens fitted to any pipework open to the atmosphere, e.g. the overflow pipe.

18.7 The Scottish Water Byelaws 2004 introduced a scheme for 'Approved Contractors' (approved plumbers) who are approved to carry out work in compliance with the Water Byelaws. All approved plumbers undertake to work to the terms of the Plumbing Industry Licensing Scheme (PILS). Scottish Water has encouraged all professional plumbers to become members of a Licensing Scheme, showing a commitment to their industry, a willingness to raise quality standards and promote to customers a professional image of the industry. Scottish Water continues to support the "Plumbing Industry Licensing Scheme" (PILS) operated by the Scottish and Northern Ireland Plumbing Employers

Federation (SNIPEF) and recognises members of the Water Industry Approved Plumbers Scheme (WIAPS) operated by the Water Regulations Advisory Service (WRAS).

Note: Organisations seeking advice on the Scottish Water Byelaws should refer to their Licensed Provider (Business Scheme).in the first instance.

19. Risk assessments

Identification and assessment of risk

19.1 A suitable and sufficient assessment following the requirements of BS8580: 2010 Water Quality – Risk assessments for *Legionella* Control – Code of Practice is required to identify and assess the risk of exposure to *Legionella* bacteria from work activities and water systems on NHS Boards premises and any necessary precautionary measures.

19.2 The *Legionella* Risk Assessor shall be appointed as the Risk Assessor, shall be UKAS accredited and complete *Legionella* risk assessments to BS8580 criteria and the written terms of reference. The Risk Assessor will have access to competent assistance to assess the risks of exposure to *Legionella* bacteria in the water systems present in the premises and the required control measures.

19.3 The assessment will include

- identification and evaluation of potential sources of risk and the particular means by which exposure to *Legionella* bacteria is to be prevented, or
- the particular means by which the risk from exposure to *Legionella* bacteria is to be controlled, if prevention is not “reasonably practicable”;
- identification of the use of flexible hoses in water supply and distribution systems following Safety Action Notice 886, for elimination of risk. Where flexible hoses are essential components to connect the water system to necessary equipment (or are part of equipment such as in hi-low baths) identification of action measures to test and prevent risk;
- identification of primary heat sources (such as steam systems and fixed temperature heating systems etc) that impact (directly, or indirectly, or seasonally) on the control and management of water systems and the operational criteria;
- a drinking water quality assessment.

19.4 Where the assessment demonstrates that there are no reasonably foreseeable or insignificant risks that are likely to increase, no further assessment or measures are necessary. The assessment needs to be reviewed and any necessary changes implemented should the situation change or whenever there is a reason to believe that the original assessment may no longer be valid.

19.5 The following types of records are kept.

Record	Retention Period
Policy & Procedure Documents.	Throughout the period for which they remain current and for at least two further years.
Risk Assessments.	
Risk minimisation scheme & details of its improvement.	
Monitoring, inspection, test & check results, including details of the state of operation of systems.	At least five years.

Record Retention Period

20. Training

20.1 ***NHS Board*** staff appointed to carry out the control measures and strategies shall be suitably informed, instructed & trained and their suitability assessed. Staff shall be trained to a standard, which ensures that tasks are carried out in a safe, technically competent manner.

20.2 The Authorising Engineer (Water) shall conduct a regular annual assessment review of competency and training requirements and shall make Training Programme recommendations to the Responsible Person (Water) for approved courses run by approved training organisations and where appropriate by the manufacturers of equipment.

20.3 The Authorised Person (Water) shall conduct and record induction and familiarisation with any new Competent Persons, Maintenance Technicians, Tradespersons, Installers, Contractors and Contract Supervising Officers being introduced to water systems. The Authorised Person shall also conduct a regular annual review of system familiarisation, operational maintenance, monitoring issues.

20.4 Recommendations shall be reported to the Responsible Person (Water).

20.5 Training will be appropriate to the post holders' duties, covering the following:

- Water Safety Policy, Procedures and the Written Scheme;
- SHTM 03-01 'Ventilation for healthcare premises';
- SHTM 04-01 'Water safety for healthcare premises';
- HSE Approved Code of Practice L8 – legislation and its part successor HSG 274;
- *Legionellosis* and other water safety risks – responsibilities;
- prevention or controlling the risk from exposure to *Legionella, Pseudomonas* Spp and other similar harmful bacteria;
- hot & cold water systems;
- ventilation systems;
- water treatment;
- maintenance procedures;
- action in the event of a case of outbreak of Legionnaires' disease.

20.6 The training will be presented in the following formats

- annual 'In-house' awareness training;
- induction training;
- toolbox talks;

- training (update and refresher on changes).

20.7 Regular refresher training shall be given and records of all initial and refresher training and competency assessments provided to and received by all ***NHS Board*** personnel involved in water systems will be recorded in the individual's personal training file and the national NHS eKSF system.

20.8 ***NHS Board*** staff engaged in work which may have a direct or indirect effect on the control of *Legionella*, shall have adequate information, instruction & training to ensure that the Code of Practice and Written Scheme is applied at all times, and so ensure that ***NHS Board*** systems are not compromised.

21. Performance monitoring

21.1 The relevant Authorised Person (Water) will gather and maintain all the relevant information and records, including relevant *Legionella* Risk Assessments and Written Schemes.

21.2 Working with the Authorising Engineer (Water) and Responsible Person (Water), the relevant Authorised Person (Water) will review and analyse all records for compliance with *Legionella* and other water safety parameters.

21.3 The relevant Authorised Person (Water) will detail on these records any deviations from the *Legionella* and other water safety parameters giving a brief description as to the reason for this deviation.

21.4 The relevant Authorised Person (Water) will file locally all relevant information and maintain hard copy records in the Water Safety Log Book.

22. Audit / management review

Internal audit procedure

22.1 This procedure will be audited at agreed intervals.

22.2 Prepare an Audit Programme and ensure the entire procedure is audited.

22.3 The Audit Programme will consist of planned audits on the following elements of the procedure:

- this Procedure document;
- documentation associated with this Procedure;
- training review and records;
- risk Assessments;
- Written Schemes;
- schematic drawings;
- Water Safety Log Book(s).

22.4 A report will be produced on the audit.

External audit procedure

22.5 A duly appointed Authorising Engineer (Water) will audit the entire *Legionella* and Water Safety Systems within ***NHS Board*** annually.

22.6 A duly appointed Authorising Engineer for *Legionella* and Water Safety Systems will produce an annual report for management review.

22.7 A duly appointed *Legionella* Risk Assessor for *Legionella* and Water Safety Systems will update the *Legionella* risk assessment database annually, as appropriate.

Management review

22.8 The Responsible Person (Water) will hold regular review meetings to confirm:

- current compliance with *Legionella* and Water Safety System requirements;
- identification of any deficiencies and actions required to resolve;
- staff training needs.

22.9 The management review will be based on following:

- results of internal audits;
- results of external audits;

- staff suggestions;
- training records;
- operation of the system and procedures over the last six months.

23. The course of action for suspected Nosocomial Legionnaires' disease

Suspected or confirmed incident or outbreak

23.1 *NHS Board* will follow the guidance presented in the following regulatory and mandatory guidance documents:

- HSE ACOP L8 "The control of *Legionella* bacteria in water systems", see Appendix 2;
- SHTM 04-01 "Water safety for healthcare premises", Part B, Appendix 1;
- HPN2, "Guideline on management of *Legionella* incidents, outbreaks and clusters in the community";
- The *NHS Board* "Outbreak Plan".

Legionellosis is an atypical and potentially life-threatening form of pneumonia (Legionnaires' Disease). The majority of cases are isolated although outbreaks can occur (including large community outbreaks and hospital outbreaks).

In the event of a nosocomial case(s) of Legionnaires' disease ***NHS Board*** will follow the Health Protection Network's (HPN) – *'Guideline on Management of Legionella, Incidents, Outbreaks and Clusters in the Community'* (2009), SHTM 04-01 and *NHS Board's* Outbreak Plan.

23.2 An outbreak is defined in HSE ACOP L8 by the Public Health Laboratory Service (PHLS) as two or more confirmed cases of *Legionellosis* occurring in the same locality within a six month period. However:

- HPN2 sets out and defines:

Incident	A (first) single case – presumptive or confirmed- where based on the evidence there are concerns about actual or suspected threats to the safety or quality of water systems that could require intervention to protect the public's interest.
Sporadic case	A single case not associated with any other case. No other case may be linked to probable source of exposure in last 2 years.
Outbreak	Two or more cases in the same locality for which there is strong epidemiological evidence of a common source of infection, with or without microbiological evidence, occurring within a 6 month period of the onset of illness from the first case confirmed.

Linked case	Two or more cases associated with a single source with dates of onset more than 6 months apart but less than 2 years apart.
Probable Nosocomial	Legionnaires' disease in a person who was in hospital for between one and nine of the ten days before the onset of symptoms and either became ill in a hospital associated with one or more previous cases of Legionnaires' disease or yielded an isolate that was indistinguishable (by monoclonal antibody subgrouping [mAB] or by molecular typing methods) from isolates obtained from the hospital water system at about the same time.
Possible Nosocomial	Legionnaires' disease in a person who was in hospital for between one and nine of the ten days before the onset of illness in a hospital not previously known to be associated with any case of Legionnaires' disease and where no microbiological link has been established between the infection and the hospital.

- The ***NHS Board*** "Outbreak Plan" defines an outbreak and incident as:
  - "An outbreak is defined either as two or more linked cases of the same illness or when the observed number of cases exceeds the number expected;
  - An incident is defined as a case of communicable disease that has actual or potential serious implications for the public's health e.g. VHF or measles in a health care setting. An Incident Management Team (IMT) should be established using the approach described in this plan."

Actions

23.2 A nosocomial case(s) of Legionnaires' disease (definite/probable/possible) should be investigated immediately.

23.3 An Incident Management Team (IMT) or an Outbreak Control Team (OCT) will be convened for a single case or an outbreak of nosocomial Legionnaires' disease respectively;

The IMT/OCT will be convened by the Consultant in Public Health Medicine (CPHM) with responsibility for Health Protection (or the duty CPHM). The CPHM will lead and co-ordinate the investigation and control of the incident/outbreak in close collaboration with the Infection Prevention and Control Doctor. Further information on the roles and responsibilities of the different members of the IMT/OCT can be found in ***NHS Board's*** Outbreak Plan;

In the event of a case(s) of nosocomial Legionnaires' disease the following people/groups will be members of IMT/OCT and will be briefed by the CPHM:

- Consultant in Public Health Medicine (IMT/OCT Chair);
- Consultant Physician (involved with care of case);
- Consultant Medical Microbiologist/Infection Prevention and Control Doctor;
- Infection Prevention and Control Nurse;
- Health Protection Nurse Specialist;

- Facilities & Estates Department ;
- Environmental Health Officer;
- Health & Safety Executive;
- Health Protection Scotland;
- Reference Laboratory;
- Corporate Communications (***NHS Board***);
- Other members from partner agencies as decided by IMT/OCT Chair.

Guidance on the general response to a case(s) of nosocomial Legionnaires' disease can be found in the HPN Guidance, Section 3.1.1.2 and ***NHS Board's*** Outbreak Plan.

23.5 See Table 1 for the contacts to be used in the event of a confirmed or suspected incident:

Legionella **Role**	**Name**	**Title**	**Phone**
Designated Person (Water)	See table 1		
Responsible Person (Water)	See table 1		
Responsible Person, Defined	See table 1		
Advisor Responsible Person, Defined	See table 1		
Infection Control	See table 1		
Legionella **Role**	**Name**	**Title**	**Phone**
Laboratory Services	See table 1		
Authorising Engineer	See table 1		
Wastes & Water Services Manager – Water Specialist Advisor	See table 1		
Public Health	See table 1		
HSE	See table 1		
Health Protection Scotland	Duty Epidemiologist advised by Public Health		
Reference Laboratory Microbiologist	Duty Microbiologist advised by Public Health		

23.6 When it is unclear whether there is a threat to public health the CPHM may choose to convene a Problem Assessment Group (PAG) in order to undertake an initial assessment of the problem and determine if an IMT is required. Further information on the role of the PAG can be found in the Scottish Government guidance on the *Management of Public Health Incidents: Guidance on the Roles and Responsibilities of NHS led Incident Management Team: October 2011*.

23.7 The general response to an incident or outbreak may include:

- investigation of all potential sources of *Legionella* infection. This shall include checking recent maintenance work and project work that may have been carried out on water or air handling systems;
- identifying the location of any medical equipment used for dental care, respiratory therapy and within Haemodialysis units;

- identifying off-site information such as excavation or earth moving works, alterations to water supply and drainage;
- shutting down any processes which are capable of generating and disseminating airborne water droplets and keeping them shut down until sampling procedures and any remedial cleaning or other work has been done. Final clearance to restart the system may be required;
- taking water samples from the system before any emergency disinfection being undertaken. This will help the investigation of the cause of the illness. The investigating officers from the local authority may take samples or require them to be taken;
- co-operating fully in an investigation of any plant that may be suspected of being involved in the cause of the outbreak. This may involve, for example:
  - tracing of all pipework runs;
  - detailed scrutiny of all operational records;
  - statements from plant operatives and managers;
  - statements from water treatment contractors or consultants;
- any emergency cleaning and disinfection will be undertaken in accordance with ***NHS Board*** procedures;
- the Designated Person (Water) shall brief relevant Estates staff so that they are aware of the event and can respond to phone calls etc as instructed. The briefing shall include instructions that any comments to outside parties are agreed by Infection Prevention and Control;
- records shall be kept of all relevant information, including that provided by other departments.

General microbiological and Legionella sampling in hot & cold water systems

23.8 Circumstances under which samples are taken:

- prior alterations to an existing water system;
- as part of commissioning process, prior to handover of a new building or introduction of a (altered, refurbished or new) water system into use;
- one week following handover of a new building or new water system;
- as part of the tank cleaning and disinfection process;
- as part of an assessment programme;
- in response to taste, odour or sustained discoloured water complaints.

SHTM 04-01 Section C details Total Viable Counts (TVC) and *Legionella* water quality testing requirements (to BS EN ISO 5667-1, BS6068 and ISO 11731) to identify sampling for the following harmful bacteria:

Coliforms	*Legionella*
Escherichia coli	*Salmonella*
Pseudomonas aeruginosa	*Campylobacter*
Aerobic Colony Counts	*E.coli O157*
Environmental Mycobacteria	*Staphylococcus aureus*
The following may also be identified:	
Cryptosporidium	*Klebsiella*
Clostridia	*Enterococci*

There are also a variety of other organisms that can behave in a similar way to that of *Pseudomonas aeruginosa* that may also be identified. These organisms are less pathogenic and less frequently isolated than *Pseudomonas aeruginosa:*

Burkholderia cepacia	*Ralsotonia picketti*
Chrysebacterium spp	*Serratia marsecens*
Stenotrophomonas maltophilia	*Acinetobacter spp*
Sphingomonas spp	*Enterobacter spp*

The Consultant Microbiologist will provide interpretation on the isolation of particular bacteria, the results and confirm any necessary actions.

23.9 When such samples are taken, a mains supply sample should be taken as a control to verify whether the supply could be the source of the identified problems. Scottish Water should also be contacted for distribution zone water quality data.

23.10 Samples for *Legionella* testing may be taken:

- monthly from hot water systems treated with biocides where storage and distribution temperatures are reduced from those recommended in the HSE ACOP L8 / HSG 274. At the time of preparation of this procedure, there are no such testing regimes within ***NHS Board*;**
- weekly from hot and cold water systems where control levels of the treatment regime, i.e. temperatures, are not consistently achieved – these samples should be taken until the system is brought back under control;
- when an outbreak is suspected or has been identified;
- regularly where a department specialises in services for “high risk” patients.

Note: Samples taken for *Legionella* must follow SHTM 04-01 in a 1 litre container as described, available from the Microbiology Laboratory.

23.11 Laboratory Compliance: Samples of *Legionella* should be tested by a UKAS accredited laboratory for the isolation of *Legionella* from water.

23.12 The Sampling and Leachate Testing to be undertaken is detailed in SHTM 04-01 Part E.

23.13 The TVC and *Legionella* Sampling and Test Protocol are detailed in SHTM 04-01 Part C. As described, sampling must follow that set out in BS7592: 2008 Code of Practice and BS EN ISO 5667-1: 2008 on Water Quality Sampling. Those organising sampling must make clear in advance which water quality technique is to be undertaken in order that systematic conclusion on risk can be drawn.

For initial water system sampling take a Post-Flush sample (as defined in BS 7592: 2008) at sentinel points without disinfection. Where there is an initial concern with a particular outlet location – say, a combined system and outlet problem – a BS Pre-Flush sample should be taken. If concerns persist with an outlet location (typically, a known dead-leg issue or lack of, or low, water use, a further BS Pre-Flush sample should be taken followed by disinfection before a BS Post-Flush with disinfection sample. Water should be allowed to run hot for 1 minute and cold for 2 minutes by which sampling would be temperature calibrated.

Where water quality sampling in a water system confirms (acceptable) *Legionella* results less than 100 CFUs/Litre – the Authorised Person (Water) would be informed and provided with copies of the samples in writing and record keeping. The Authorised Person (Water) would provide interpretation (with the Consultant Microbiologist when and where required) on the results and confirm if any actions are required.

Where water quality sampling in a water system confirmed *Legionella* results in excess of 100, but less than 1,000 CFUs/Litre – the Authorised Person (Water) and Consultant Microbiologist must be informed and provided with copies of the samples in writing. The Consultant Microbiologist would provide interpretation on the results and confirm the necessary actions prior to bringing the water system into use.

Where water quality sampling in a water system confirmed *Legionella* results in excess of 1,000 CFUs/Litre **immediate action must be taken** and the Consultant Microbiologist and Authorised Person (Water) must be informed and provided with copies of the samples in writing. They will immediately confirm the necessary actions prior to re-sampling and bringing the water system into use when (acceptable) *Legionella* results are reliably less than 100 CFUs/Litre.

Where continued water system sampling is required, this would be undertaken on a weekly frequency.

Where the results of 3 consecutive weekly water system samples remained below 100 CFUs/Litre, the Authorised Person (Water) and Consultant Microbiologist would be informed and sampling would revert to a monthly sampling frequency.

Where the results of 3 consecutive monthly Water System samples remained below 100 CFUs/Litre, the Authorised Person (Water) and Consultant Microbiologist would be informed and sampling would revert to a 3 monthly sampling frequency.

Appendix A: Understanding "*the Written Scheme**"

Extract replicated courtesy HSE - ACOP & GUIDANCE L8

"Preventing or controlling the risk from exposure to Legionella bacteria (Regulations Control of Substances Hazardous to Health Regulations 2002, Regulation 7 and 9 Health and Safety at Work etc. Act 1974, Sections 2, 3 and 4**)**

52 "Where the assessment shows that there is a reasonably foreseeable risk, the use of water systems, parts of water systems or systems of work that lead to exposure has to be avoided so far as is reasonably practicable.

53 "Where this is not reasonably practicable, there should be a written scheme for controlling the risk from exposure which should be implemented and properly managed. The scheme should specify measures to be taken to ensure that it remains effective. The scheme should include:

- an up-to-date plan showing layout of the plant or system, including parts temporarily out of use (a schematic plan would suffice);
- a description of the correct and safe operation of the system;
- the precautions to be taken;
- checks to be carried out to ensure efficacy of scheme and the frequency of such checks; and
- remedial action to be taken in the event that the scheme is shown not to be effective.

54 "The risk from exposure will normally be controlled by measures which do not allow the proliferation of *Legionella* bacteria in the system and reduce exposure to water droplets and aerosol. Precautions should, where appropriate, include the following:

- controlling the release of water spray;
- avoidance of water temperatures and conditions that favour the proliferation of *Legionella* bacteria and other micro-organisms;
- avoidance of water stagnation;
- avoidance of the use of materials that harbour bacteria and other micro-organisms, or provide nutrients for microbial growth;
- maintenance of the cleanliness of the system and the water in it;
- use of water treatment techniques; and
- action to ensure the correct and safe operation and maintenance of the water system.

55 "Once the risk has been identified and assessed, a Written Scheme should be prepared for preventing or controlling it. In particular, it should contain such information about the system as is necessary to control the risk from exposure.

56 "The primary objective should be to avoid conditions which permit *Legionella* bacteria to proliferate and to avoid creating a spray or aerosol. It may be possible to prevent the risk of exposure by, for example, using dry cooling plant, adiabatic cooling systems or point-of-use heaters (with minimal or no storage). Where this is impractical, the risk may be controlled by minimising the release of droplets and by ensuring water conditions which prevent the proliferation of *Legionella* bacteria. This might include engineering controls, cleaning protocols and other control strategies. Decisions should be made about the maintenance procedures and intervals, where relevant, on equipment used for carrying out the control measures. *Legionella* bacteria may be present in very low numbers in many water systems but careful control will prevent them from multiplying.

57 "In general, proliferation of *Legionella* bacteria may be prevented by:

- avoiding water temperatures between 20ºC and 45ºC – water temperature is a particularly important factor in controlling the risks;
- avoiding water stagnation, which may encourage the growth of biofilm;
- avoiding the use of materials in the system that can harbour or provide nutrients for bacteria and other organisms;
- keeping the system clean to avoid the build-up of sediments which may harbour bacteria (and also provide a nutrient source for them);
- the use of a suitable water treatment programme where it is appropriate and safe to do so; and
- ensuring that the system operates safely and correctly and is well maintained.

58 "The scheme should give details on how to use and carry out the various control measures and water treatment regimes including

- the physical treatment programme - for example, the use of temperature control for hot and cold water systems;
- the chemical treatment programme, including a description of the manufacturer's data on effectiveness, the concentrations and contact time required;
- health and safety information for storage, handling, use and disposal of chemicals;
- system control parameters (together with allowable tolerances); physical, chemical and biological parameters, together with measurement methods and sampling locations, test frequencies and procedures for maintaining consistency;
- remedial measures to be taken in case the control limits are exceeded, including lines of communication; and

- cleaning and disinfection procedures.

59 "The scheme should also describe the correct operation of the water system plant including:

- commissioning and re-commissioning procedures;
- shutdown procedures;
- checks of warning systems and diagnostic systems in case of the system malfunctions;
- maintenance requirements and frequencies; and
- operating cycles - including when the system plant is in use or idle.

60 "Detailed guidance on how to effectively prevent or control exposure can be found in ACOP Part 2.

Review of control measures - monitoring and routine inspection

61 "If precautions are to remain effective, the condition and performance of the system will need to be monitored. This should be the responsibility of the responsible person or, where appropriate, an external contractor or an independent third party and should involve:

- *checking* the performance of the system and its component parts;
- *inspecting* the accessible parts of the system for damage and signs of contamination; and
- *monitoring* to ensure that the treatment regime continues to control to the required standard.

62 "The frequency and extent of routine monitoring will depend on the operating characteristics of the system, but should be at least weekly.

63 "Testing of water quality is an essential part of the treatment regime, particularly in cooling towers. It may be carried out by a service provider, such as a water treatment company or consultant, or by the operator, provided they have been trained to do so and are properly supervised. The type of tests required will depend on the nature of the system and further details are given in Part 2 for both cooling towers and hot and cold water systems."

Note: Although there are no cooling towers in use in the NHS Scotland, *NHS Boards* require to be alert to where there may be cooling towers operating in the local proximity.

64 "The routine monitoring of general bacterial numbers (total viable count) is also appropriate as an indication of whether microbiological control is being achieved. This is generally only carried out for cooling towers, rather than hot and cold water systems. Periodic sampling and testing for the presence of *Legionella* bacteria may also be relevant to show that adequate control is being

achieved. However, reliably detecting the presence of *Legionella* bacteria is technically difficult and requires specialist laboratory facilities. The interpretation of results is also difficult; a negative result is no guarantee that *Legionella* bacteria are not present. Conversely, a positive result may not indicate a failure of controls as *Legionella* are present in almost all natural water sources. Further guidance on bacteriological monitoring and interpretation of test results can be found in ACOP Part 2.

65 “The results of monitoring and testing should be interpreted by a suitably experienced and competent person and any remedial measures, where necessary, should be carried out promptly.”

Appendix B: "*the Written Scheme*" template document

Water Safety – Facilities & Estates Sector

Note: Although the following pages set out a typical Written Scheme, it is stressed that account will require to be taken of issues that will not necessarily apply to all NHS facilities that could be influenced by configuration of accommodation (particularly plant spaces), varying NHS Board policies, type, age and complexity of accommodation.

The following pages detail *the Written Scheme** for controlling the risks of exposure to *Legionella* and other harmful bacteria at

Location: xxx

Building Block: Block zz, (xx Block)

System(s): Water System

Authorised Person (Water): xxx

Valid from:

Note 1: No work will be carried out on the water system without the knowledge and written consent of the Authorised Person (Water).

Note 2: The Written Scheme document is to be read in conjunction with the Operational Procedures for the Written Schemes document and should also be read in conjunction with the Control of Water Records document. For any alterations to the Water System this Written Scheme Document is to be read in conjunction with the Guidance for alterations to water systems document.

NHS Board_____

Facilities & Estates Sector

The Written Scheme

Controlling the risk of exposure to *Legionella* and other harmful bacteria.

	Contents
1	Strategy for the correct and safe operation of the Water System……..……....
2	System Description……
3	Drawings and Schedules of Plant / Equipment…..……
4	Risk Assessment and Annual Review .
5	System Monitoring / Information
6	Contractors
7	Temporary Closures
8	Risk Control Notices
9	Documentation and Records……..
10	Outbreaks – Actions……..……..
11	Operational Restrictions…….
12	Alterations to Water Systems…….

Strategy for the correct and safe operation of the water system

1. Safe management criteria

1.1 The Head of Maintenance (or appointed deputy) is the "Responsible Person (Water)" who is appointed in writing to manage the day–to–day risks of exposure to *Legionella, Pseudomonas* Spp and other similar harmful bacteria and will be the estates lead in the event of an operational incident.

1.2 This water system is within the knowledge and control of an "Authorised Person (Water)" who is appointed in writing and has authority, competence, knowledge and control of the identified water system to ensure that all operational procedures and SHTM 04-01 requirements are carried out in a timely and effective manner to documented timescales. This strategy will involve "Competent Persons", "Maintenance Technicians", "Tradespersons", "Installers", "Contractors" and "Contract Supervising Officers" co-ordinated with Duty Holders in accordance with SHTM and HSE guidance.

2. Safe operational criteria

2.1 Water used in the Block will be controlled by means of the Temperature Control Regime (as outlined in HSE ACOP L8 / HSG 274) with full temperature control as advocated in SHTM 04-01 to temperatures in the various parts of the water system as follows:

Note: Water **will not** be stored or circulated at temperatures in the range – above 20°C or below 50°C

- Cold Water (CW) shall be stored or distributed to outlets at or below 20°C.
- Domestic Hot Water (DHW) shall be at or above 60°C (at the flow point from heat exchangers/vessels) as it enters the supply system and shall be circulated at no less than 50°C (at the return point to heat exchangers).
- Domestic Hot Water supplied to Thermostatic Mixing Valves (TMV) or other outlets shall be at no less than 55°C.
- Cold Water supplied to Thermostatic Mixing Valves (TMV) or other outlets shall be at or below 20°C.

Special attention and escalation in writing to the relevant Authorised Person (Water) and Responsible Person (Water) is required where and when any of these criteria cannot be met.

Remember that hot water (and hot surfaces) above 45°C presents a scalding (or burning) risk.

2.2 Point-of-Use Filters (P.O.U Filters) will only be installed and used where this is practical and there has been a written policy decision by the Water Safety

Group, along with a complimentary managed maintenance change filter process. This will be have to put in place for life – or until a further policy decision by the Water Safety Group are satisfied that the affected outlet and pipework has been removed or disinfected without compromising the rest of the water system.

2.3 Taps or other water outlets should **not** be installed if they will not be used regularly, that is, less than twice in a week.

2.4 Where taps or water outlets are not, or are unlikely to be, in regular daily use, Duty Holders have been alerted and reminded to flush these through and purge to drain, or purge to drain immediately before use, without release of aerosols. In Neonatal Units (NNUs), Adult and Paediatric Intensive Care Units (ICUs) infrequently used taps should be flushed daily at the start of each day. The Maintenance Department and Designers have responsibilities to be alert on Duty Holder requirements in Risk Control Notice 11/04 – and the record keeping on Sample Record Sheet) *or take steps to have the outlet removed* and the resultant dead-legs eliminated by taking out redundant branch pipework back to the circulating mains, removing the tee-piece and replacing with a straight coupling. The Instruction and Actions to Duty Holder's is detailed in Section 8 below.

2.5 Management Team Duty Holders have also been alerted on awareness and actions to minimise the risk of *Pseudomonas* Spp and other similar harmful bacteria in the use of equipment, transmission routes and requirements (such as in the use of hand wash stations and wash basins) in Risk Control Notice 12/04.

3. System description

XXXX, Block xx

3.1 The mains cold water supply which serves Block xx is fed directly from xxx and is located at the xxx end of the site at the corner of xxxx.

3.2 The point of entry is fed directly from the Scottish Water "xxx Pressure Line".

3.3 Scottish Water have introduced** Chloramine as the water treatment/disinfecting agent to the incoming water supply. As advised in writing by Scottish Water at introduction in 2004, *NHS Board* are not required to carry out any secondary water treatment of the reservoir supply feeding the site.

** Only incorporate paragraph 3.3 if applicable to the site.

3.4 A xxmm water supply makes its way underground into the basement area within the xxxx Blocks.

Domestic cold water system

3.5 A xxmm Mains Cold Water (MCW) supply rises from basement level through a pipe duct and feeds the LPHW Heating System and Block xx Cold Water Storage Tank. A xxmm MCW supply branches off before the tank and feeds

down through the Block serving the following areas

- Ward xx;
- Ward xx;
- Ward xx.

3.6 The Cold Water Storage Tank has a capacity of approximately xx litres and serves the following:

- xxmm Cold Feed supply to the Domestic Hot Water Plate Heat Exchangers located in Plant Room xx (xx Block);
- xxmm Cold Downwater Service to Wards xx;
- A Cold Water Down Service serving the Block xx area is fed via a xxmm supply, water is drawn from the tank via the automated water booster pump set which is located within the roof plant room. This supplies cold water to all showers, washbasins, baths and WCs as per the reference drawings;
- Cold Feed to the Domestic Hot Water storage calorifiers is fed via a xxmm supply. Water is drawn from the tank via the automated water booster pump set located within the roof plant room. The xxmm cold feed runs within the DHW calorifier plant room at high level, the cold feed serving DHW calorifier No 1 (xx) drops and enters the lower section of the DHW calorifier. Prior to entering the DHW calorifier a xxmm branch goes to the system pressurisation vessel which serves DHWC No 1. The xxmm cold feed continues on to serve DHW calorifier No.2 (xx) in a similar manner.

Domestic hot water system

3.7 A xxmm Hot Water supply from each of the domestic hot water calorifiers, branches into a xxxmm Hot Water supply pipe at high level within the plant room. This pipe is routed around the xx Block dropping within the pipe duct, branching off at ceiling void level, feeding fitments *en route* and returning within the pipe duct to the DHW Calorifiers. Circulation is achieved by means of a single circulating pump located within the roof plant room.

Other water systems connected or operating in close proximity

3.8 There are no other water systems (such as for Fire Suppression, Fire Precautions or Fire Protection) connected or in close proximity. Regular reference should be made to the Water Safety Log Book for the Building Block for any changes or alterations.

Other water safety features

3.9 There are no Point-of-Use (P.O.U.) Filters fitted in the water system.

Details of any future policy decisions to fit, operate and maintain or remove Point of Use Filters to/from specific points in the system in specific locations to be held in the Water Safety Log Book.

4. Drawings, water safety log book and schedules of plant/equipment

- Schematic and detailed drawings of the main systems are kept within the Maintenance Section, Estates Department Offices, xxx.
- CAD Drawings, Schematic and detailed drawings of the system are also available at the Estates Department, xxxx, and viewable electronically > Shared on Yaren > *Legionella* > Site Drawings.
- Plans are to be kept up to date to include any alterations made to the water system. Notify xxx on tel 01xxx of any changes to be made to schematics or detailed drawings.
- All drawings of water distribution for xxx Block xx (xxx Block) are referenced with the Drawing Reference Number - Nxxx – Ox
- Each Building Block has a Water Safety Log Book held by the Competent Person (Water) Site Supervisor, located in the Estates Department Offices at xxxx containing details of the specific local water system(s).
- The Property Asset register reference number is as detailed per ***NHS Board*** Planet System. The Planet System produces Works Dockets for precautionary checks and maintenance routines for the water system.

5. Risk assessment and annual review

5.1 A current *Legionella* Risk Assessment by Water Hygiene Centre for the site is in place. Reference Number xxx.

By complying with the provisions of HSE ACOP L8 / HSG 274 and SHTM 04-01 the level of risk will be minimised. Any system modifications will be designed in accordance with the above standards and recorded.

The *Legionella* Risk Assessments are reviewed every two years or earlier when any changes are made to the operation or configuration of the system.

6. System monitoring / information

Water treatment

6.1 Primary water treatment is by Scottish Water (Chloramination/chlorination*).

* Delete as required

Sampling

6.2 Sampling will be carried out following SHTM 04-01Part B. Protocols for general microbiological and *Legionella* sampling in hot and cold water systems are detailed in the Operational Procedures for the Written Scheme Document Section 22 (22.7 – 22.12).

Temperature controls and checks

6.3 Water used in the Block will be controlled to the Temperature Control Regime (as outlined in HSE ACOP L8 / HSG 274) with full temperature control with a minimum flow temperature of 60°C from heat exchangers/vessels as advocated in SHTM 04-01. Water **will not** be stored or circulated at temperatures in the range above 20°C or below 50°C.

Regular temperature and maintenance checks on cold water tanks and hot and cold water distribution systems are carried out in accordance with operational procedures and with the detailed instructions on Planet Works Dockets, current guidance and the values logged in the Water Safety Log Book.

Daily - Temperature monitoring

6.4 This shall be carried out in accordance with the following:

Procedure	Description
P1C1 (with ALL incidents logged on Form 004 and BEMS alarms incidents on 021)	Incidents and Faults; BEMS monitoring & log of all alarms

Temperature is monitored by BEMS - to procedure P1C1

6.5 This system continually monitors the temperature of the following points

- BEMS Outstation No xxx
- Common Flow Temp Point No xx
- Common Return Temp Point No xx
- No 1 DHW Calorifier (xx) Flow Temp, Point No xx
- No 1 DHW Calorifier (xx) Return Temp, Point No xx
- No 2 DHW Calorifier (xx) Flow Temp, Point No xx
- No 2 DHW Calorifier (xx) Return Temp, Point No xx

6.6 The BEMS monitoring and control devices are set to give high priority alarms in the event of system failure and/or temperature variances outwith alarm set points. Temperature monitoring devices are physically tested annually and recalibrated in accordance with manufacturers' instructions.

System failures and/or temperature alarms are continually monitored 24 hours a day, with alarms being generated at Estate locations and by remote paging of Estates staff (i.e.controls engineer or duty engineer etc).

The Estates person carrying out the monitoring or being notified of an alarm condition is required to log all incidents in the Water Incident Report Record Form (004) and also where appropriate in the BEMS Water System Alarm/Fault Record Form (021).

All incidents require to be investigated by the Estates staff and appropriate

actions implemented (see Water Safety Operational Procedures, SHTM 04-01 & *Legionella* ACOP L8 / HSG 274) Incidents are to be recorded in the Incident Report Record Form (004).

Temperature monitoring in the event where the BEMS is not operative

6.7 This shall be carried out in accordance with the following

Procedure	Description
P1C1A (logged on Form 005A)	Manual monitoring or where BEMS not installed or BEMS not operational

Check the flow and return temperatures on the domestic hot water calorifier system as defined in the local system plan, using the temperature gauges fitted or a suitable surface temperature probe.

The flow temperature to be at least 60°C and the return temperature has to be at least 50°C.

Record all temperatures on the Water Temperature Record Form (005A) DHW – daily; CW 6 monthly.

Inspect cold water tank and conduct temperature checks – P1C7 and record all inspection and temperatures on the Record Form (003).

Weekly – Water quality

6.8 The following procedures shall be carried out where chloramination treatment is provided by the water authority

Procedure	Description
P1C2 (logged on Form 027)	Chloramine checks (initially weekly)

Sampling results of *NHS Board* water systems shall be recorded in the Estates Chloramine Record Form (027). Sampling will be taken from a hot or cold water outlet point, representative of each secondary distribution pipework system. These will initially be conducted weekly and then subject to ongoing trend based frequency risk assessment, limited to no less than at once per month sampling test frequency. Frequency risk assessments to be held in the Water Safety Log Book.

Weekly – Manual change-over of DHW circulating pumps

6.9 Where applicable, the following procedures shall apply

Procedure	Description
P1C3 (logged on Form 028)	Manual change over and log of circulating pumps not on BEMS control

Not applicable on this system. The BEMS controls and logs the change-over of circulating pumps.

System failures and/or temperature alarms are continually monitored, with alarms being generated at Estate locations and by remote paging of Estates staff (i.e.controls engineer or duty engineer etc).

Monthly (and Annual) – Temperature monitoring

6.10 The extent of temperature monitoring is set out below

Procedure	Description
P1C4 (monthly logged on Form 005) P1C10 (annual logged on Form 005)	a) Sentinel hot water taps b) Sentinel cold water taps c) Sentinel TMV taps d) DHW calorifier/heat exchanger flow & return temperatures e) Chilled Water heat exchanger flow & return temperatures

6.11 Sentinel Hot and Cold Water Outlets in the water system are located

- 4th Floor, Ward xx;
- 3rd Floor, Ward xx;
- 2nd Floor, Ward xx;
- 1st Floor, Ward xx.

Sentinel hot and cold taps

6.12 Sentinel taps for hot water services (and any recirculating cold water systems) **are the first and last taps on a recirculating system**. For non-recirculating cold water systems (or non-circulating hot water systems) they would comprise the nearest and furthest taps from the storage tank.

Note: The choice of further sentinel taps may also include other taps that are considered to represent a particular risk. In normal use the system should achieve 55°C at the supply to the furthermost draw-off point in the circulating system.

6.13 Check the temperatures at the sentinel taps as defined

- using a calibrated temperature probe, check the temperature of water from the cold water tap does not rise above 20°C after running the tap for 2 minutes;
- using a calibrated temperature probe, check the temperature of water from the hot water tap does not fall below 50°C whilst running the tap for 1 minute;
- record all temperatures on Water Temperature Record Form (005).

Sentinel Thermostatic Mixing Valves (TMV)

6.14 Sentinel Thermostatic Mixing Valves (TMV) in the water system are located

- 4th Floor, Ward xx;
- 3rd Floor, Ward xx;
- 2nd Floor, Ward xx;
- 1st Floor, Ward xx.

Note: In normal use the system should achieve 55°C at the supply to the furthermost draw-off point in the circulating system.

6.15 Check the temperatures at the TMVs on a sentinel basis as defined

- using a calibrated temperature surface probe check that the temperature of water in the hot water pipework to the TMV does not fall below 50°C whilst running the tap for 1 minute;
- record all temperatures on Water Temperature Record Form (005).

Domestic hot water calorifier(s) and plate heat exchanger(s)

6.16 Check the flow and return temperatures on the domestic hot water system, using the temperature gauges fitted or a suitable surface temperature probe.

Note: The flow temperature to be at least 60ºC and the return temperature to be no less than 50ºC.

Record all temperatures on the Water Temperature Record Form (005).

Domestic cold / chilled water heat exchanger(s)

6.17 Not normally applicable.

Monthly – Air handling plant

6.18 *Complete the following where applicable:*

Procedure	Description
P1C5 (logged on Form 022)	Inspect, clean & log glass traps

Three-monthly – DHW Calorifier, DHW & CW storage/ buffer vessel flushing

6.19 The following procedures should be carried out:

Procedure	Description
P1C6 (logged on Form 006)	Flushing of DHW calorifier(s) and Storage/Buffer Vessel(s) associated with Hot /Cold/Chilled Water Heat Exchanger(s)

- flush each domestic hot water calorifier or hot, cold or chilled water

storage/buffer vessel through its drain valve by opening the drain valve 3 times, each time for a 3 minute period. The hose from the drain valve should be discharged to the nearest drain;

- record all actions on the top section of Record Form (006);
- where the domestic hot water system has a stratification pump(s) fitted to circulate the hot water from the top to the base of the calorifier or the storage/buffer vessel, and the history data shows no sludge deposits during flushing, then this procedure should be risk assessed to determine if the maintenance frequency can be changed. This assessment should be recorded on Form 023 as below.

Frequency risk based assessment

6.20 Systems that continually conform to and have a database history of temperature readings within the control parameters should have a risk-based assessment carried out annually to determine if the maintenance frequency can be changed. This assessment should be recorded on Form 023 by the Authorised Person (Water) ensuring that the Responsible Person (Water) is notified immediately in writing. Frequency risk assessments are to be held in the Water Safety Log Book.

Three-monthly for high risk areas and as required elsewhere, but at least once annually - Shower heads and hoses

6.21 The following procedures shall be carried out

Procedure	Description
P1C12 (logged on Form 005B)	Dismantle, clean and de-scale / or replace with new disinfected Shower Head and Hose

6.22 Showers in the water system are located

- 4th Floor, Ward xx;
- 3rd Floor, Ward xx;
- 2nd Floor, Ward xx;
- 1st Floor, Ward xx.

6.23 Planned Shower Head and Hose Replacement Programme shall be conducted 3-Monthly in identified High-Risk Areas and as required elsewhere, but undertaken at least once per Annum.

- remove the shower head and hose assembly. Place shower head and hose assembly into a plastic bag and seal;
- check that the new clean disinfected head and hose package is intact;
- open replacement new clean disinfected shower head and hose assembly sealed packaging, remove and fit following the manufacturer's instructions;
- run water and flush for 3 minutes in accordance with *Legionella* Risk

Assessment in such a way as to avoid the creation of aerosols;

- check and record final temperature for compliance and return shower appliance to use;
- return redundant sealed bag with shower head and hose assembly to workshop for disposal in accordance with Waste Procedures;
- record all actions on the Record Form (005B).

Six-monthly cold water summer / Winter temperature monitoring

6.24 These procedures shall be carried out as follows

Procedure	Description
P1C7 (logged on Form 003)	a) Cold Water at inlet to building block. Also to be continuously monitored by BEMS & log of all alarms
P1C7 (logged on Form 003)	a) Tank and temperature checks & log b) Tank inspection

- complete the Summer / Winter Inspection of water tank as per Record Form (003);
- where the system has no BEMS temperature sensors connected, the readings should be taken using a temperature sensor. The tank temperature should be below 20°C;
- record all inspection and temperatures including the mains water supply at the building/block inlet on the Record Form (003).

Six-monthly air handling plant

6.25 Where applicable these procedures shall be carried out as follows

Procedure	Description
P1C8 (logged on Form 007)	a) Humidity section inspection b) Cooling section inspection c) Disinfection

Annual - DHW Calorifiers, DHW & CW storage/ buffer vessels

6.26 The following procedures shall be carried out

Procedure	Description
P1C9 (logged on Form 006)	Drain & cleaning of DHW Calorifier(s) and Storage/Buffer Vessel(s) associated with Hot /Cold/Chilled Water Heat Exchanger(s)

- follow the manufacturers' maintenance instructions (in the Water Safety Log Book). Record all actions where applicable on the lower section of "Calorifier and Storage/Buffer Vessel Maintenance Record Form" (006) for each system;

- isolate domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel service valves;
- heat up any domestic hot water calorifier or hot water storage/buffer vessel until the contents have reached 60°C and hold at this temperature for a period of at least 1 hour;
- drain domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel and remove inspection hatch;
- hose out the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel to remove any debris, scale or other deposit. Care should be taken to keep aerosols to a minimum;
- if the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel does not have an inspection hatch, the pipework at the top of the vessel should be disconnected to allow the insertion of a water hose to allow debris to be washed down off internal surfaces;
- examine the internal and external condition of the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel and pipework. Any defects should be reported in writing to the relevant Authorised Person (Water). The safety valve should be checked, overhauled and reset as necessary. The temperature, altitude and pressure gauges to be checked for operation;
- on completion of examination and any repairs, the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel should be re-constructed;
- on completion of the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel assembly, the following sequence must be undertaken;
- refill with cold water;
- drain the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel;
- refill with cold water, leave cold feed valve open;
- run domestic hot water calorifier or hot water storage/buffer vessel at a temperature of 60°C for at least 1 hour. Test the operation of high-limit cut out system if fitted. Check the temperature of the calorifier/vessel top and bottom with a surface thermometer;
- adjust any controls as necessary;
- take bacteriological samples from the domestic hot water calorifier or hot, cold or chilled water storage/buffer vessel drainage trap (where possible) and nearest and furthest outlet;
- record all actions on the Record Form (006).

Flexible hoses

6.27 There are no flexible hoses in the water supply and distribution system.

(Amend statement to suit circumstances if required. Refer to paragraph 19.3 in "Operational Procedures" for detail as to likely occurrences).

Risk assessments for any future flexible hoses added to the system to be held in the Water Safety Log Book.

General comments – Hot water system

6.28 If conditions, e.g. temporary ward closure, leave a system unused for a period greater than 7 days, for a short term or limited closure typically not exceeding 30 days, then the Authorised Person (Water) must be notified.

Arrangements for the system must be made to ensure thorough flushing of all outlets weekly by opening all taps and allowing water temperatures to stabilise (see Section 7). If shutdown is longer than 30 days the Authorised Person (Water) will make arrangements for the system to be drained and left dry and sealed (see Section 7).

If and when the system is reinstated the Authorised Person (Water) will make arrangements for the system to be subject to a disinfecting regime. This will also include any de-stratification pumps.

The minimum number of DHW Calorifiers will be operated on line 24 hours per day, 7 days per week, with the domestic hot water circulation pump kept running to provide maximum turnover of water storage. Off-duty DHW Calorifiers will always be held in a drained, empty and dry condition until required for use. On return to service, DHW Calorifiers must be run through the pasteurising procedure.

Valves should be opened slowly to avoid disturbance of any sediment in the system.

Over-capacity of hot water storage must be identified and surplus equipment disconnected from the system.

Materials that sustain microbiological growth will not be used in connection with the waterside of domestic hot water systems (i.e. Water Byelaws, WRAS and SHTM 04-01 compliant).

Every DHW Calorifier shall be clearly marked with the following information

- Insurance Folio 'xx' Number;
- Areas supplied;
- DHW Calorifier capacity.

Hot Water circulating pumps

6.29 The *Legionella* risk is where duty and standby pumps are provided and there is no automatic changeover sequencer fitted to prevent stagnant water forming in the standby pump unit.

The circulation for secondary domestic hot water circuits from each calorifier are run on a simplex basis with one pump installed and operating 24 hours per day, 7 days per week.

Thermostatic Mixing Valves (TMVs)

6.30 Thermostatic mixing valves are installed to condition water for whole or partial body submersion to eliminate the risk of scalding.

These devices are fixed to showers, bidets, baths and wash basins. They are indicated on the Domestic Services Water Layout drawings for the site.

A maintenance programme of testing is ongoing throughout the year to ensure compliance with Safe Hot Water and Surface Temperatures requirements as set out below.

All temperature and maintenance checks are recorded on the Planet F.M. Pre-Planned Maintenance docket P.P.M. Completed Control of Water Record Sheets are to be returned to the Supervisor / Estates Officer for filing in the Water Safety Log Book. In normal use the system should achieve 55°C at the supply to the furthermost draw-off point in the circulating system.

Only Type 3 TMVs are used in the water system.

The maximum set domestic hot water temperature must not exceed the following temperatures

- 38°C Bidets;
- 41°C Showers;
- 41°C Wash basins;
- 43°C Bath (43°C fill);
- 46°C Bath (46°C fill).

Note: Bath fill temperatures of more than 43°C should only be considered in exceptional circumstances where there are particular difficulties in achieving an adequate bathing temperature. If a temperature of greater than 43°C is to be used then a safe means of preventing access to the hot water should be devised to protect vulnerable patients. Any valve delivering hot water exceeding this temperature should be isolated and removed from service immediately.

Materials and fittings

6.31 All materials for use on water systems shall comply with The Water Supply (Water Fittings) Regulations 1999 (WRc approved).

Tap washers, joint rings and compound shall be in accordance with the appropriate British Standard.

6.32 Materials in contact with water shall not

- impart any objectionable taste or colour;
- release any toxic substance;
- support microbiological growth;
- include traditional white products such as “Boss White” used with hemp contain linseed oil and shall **not be** used as they support microbiological growth.

6.33 However

- polytetrafluroethylene (PTFE) products can be used;
- lead-free solder fittings must be used on all potable water supplies.

6.34 All systems shall be designed and installed to ensure no back syphonage occurs and where applicable be passed to the Local Water Authority for comment and or information.

6.35 Also there is a combination of factors that may have facilitated *Pseudomonas* Spp becoming a clinical problem. These factors include any or all of the following:

- water system materials which may have facilitated biofilm formation (e.g. plastic pipework, plastic and rubber components in TMVs and flexible hose liners etc);
- water outlets with thermostatic mixer valves (TMVs) designed to regulate water temperature and minimise the risk of scalding, which may also have increased the risk of other waterborne pathogens;
- the increased number of wash hand basins / sinks in clinical areas, combined with the increased use of alcohol based hand rubs (ABHRs) which may have resulted in a decreased use of water at individual wash hand basins / sinks;
- the use of non touch (sensor) water fittings, resulting in low water volumes flowing through outlets. This combined with a column of standing water left in the pipework provides an ideal condition for bacterial growth;
- some recent cold water storage tanks incorporate 100mm dia. PVC-U piping to support the lids. These supporting pipes are not sealed to the tank base or lids resulting in creation of a column of stagnant water following filling with incoming cold water. This has been the source of high TVCs and seeding of bacterial contamination that has circulated through the piping network distribution.

Planned maintenance programme

Legionella and water safety risk reduction

6.36 *Legionellosis* and other water safety risks can be controlled by actively pursuing a policy of good housekeeping.

This requires the following maintenance actions:

- yearly tank inspection and monitoring/recording of tank temperatures;
- quarterly inspection and annual cleaning of DHW Calorifiers;
- daily monitoring and recording of DHW Calorifier temperatures;
- twice-weekly flushing, of all little used water outlets except in ICUs where daily flushing is required at the start of each day;
- monthly monitoring and recording of sentinel water outlet temperatures;
- annual monitoring and recording of representative water outlet temperatures;
- annual cleaning of humidity chambers on air movement systems;
- satisfactory operation of thermostatic mixer valves (3 monthly for high risk areas and as required elsewhere, but at least once annually).

Water Safety Log Books and maintenance records are kept in the Maintenance Managers office

Daily BMS Record Forms are printed out, for all critical system temperatures and plant status, and are held in the Maintenance Managers Office.

6.37 The procedures set out below shall be followed

Service	Task	Frequency
Cold Water Services	Check tank water temperature remote from ball valve and mains temperature at ball valve. Note maximum temperatures recorded by fixed maximum thermometers where fitted. (on Procedure P1C7 – recorded on 003)	Six monthly
	Check that temperature is below 20°C after running the water for up to two minutes in the sentinel taps. (on Procedure P1C4 – recorded on 005)	Monthly
	Visually inspect cold water storage tanks and carry out remedial work where necessary. Check representative taps for temperature as above on a rotational basis. (on Procedure P1C7 – recorded on 003)	Annually
Shower Heads	Dismantle, clean and de-scale shower heads and hoses / or replace with new disinfected Shower Head and Hose. (on Procedure P1C12 – recorded on 005B)	3 Monthly for high risk areas and as required elsewhere, but at least once annually
Little Used Outlets	Flush through and purge to drain, or purge to drain immediately before use, without release of aerosols. (on Risk Control Notice 11/04 – recorded on Sample Record Sheet by Duty Holder)	Twice weekly

Cold water services routine inspection and frequency table

6.38 The procedures set out below shall be followed

Service	Task	Frequency
	Arrange for samples to be taken from hot water calorifiers, in order to note condition of drain water. (on Procedure P1C9 – recorded on 006)	Annually
	Visual check on internal surfaces of calorifiers for scale and sludge. Clean and disinfect. Check representative taps for temperature as above on a rotational basis. (on Procedure P1C9 – recorded on 006)	Annually
	Each calorifier and any associated storage/buffer vessels should be flushed quarterly through its drain valve by opening the drain valve 3 times, each time for a 3 minute period. Calorifier and any associated storage/buffer vessels flushing should be carried out after temperature checks on the calorifier and system have been completed. Record form (006) should be completed.	Quarterly
	Check temperatures in flow and return at calorifiers. (on Procedure P1C4 – recorded on 005)	Monthly
	Check water temperature up to one minute to see if it has reached 50°C in the sentinel taps. (on Procedure P1C4 – recorded on 005)	Monthly

Hot water services routine inspection and frequency table

Maintenance instructions

6.39 The Planet System produces Works Dockets for the precautionary checks and maintenance routines for the water system. Copies of the maintenance instructions for each of the above tasks are included in the Water Safety Log Book.

Disinfection

6.40 Where not an integral part of the Planet precautionary checks and maintenance routines, water systems should also be cleaned and disinfected under the circumstances in the following table:

System/ Service	Circumstance Requiring Cleaning and Disinfection* (* for disinfection check current Risk Assessment)	Frequency
Domestic Cold Water Tank	New installations. Re-commissioning empty/unused tanks. Tank temperature exceeds 25°C. Tank contains moderate sediment, i.e. a complete covering of the tank base. Evidence of tank corrosion (check with current Risk Assessment). Any contamination of tank (by organic, by vermin or vermin faeces or similar). Gross organic contamination e.g. large number of dead insects, feathers, animal or bird bodies etc. Regular programme for high-risk healthcare category, with disinfection* (check with current Risk Assessment). Regular programme for medium risk healthcare category, with disinfection* (check with current Risk Assessment). Regular programme for non-healthcare premises, with disinfection* (check with current Risk Assessment).	As required As required As required As required As required As required As required Annually 2 Yearly 5 Yearly
Domestic Cold Water Distribution System	New installations and modifications or additions. Temperature exceeds 25°C. Any contamination of tank (by organic, by vermin or vermin faeces or similar). Gross organic contamination e.g. large number of dead insects, feathers, animal or bird bodies etc.	As required As required As required As required
Domestic Hot Water Calorifier and Storage/ Buffer Vessels	New installations and modifications or additions. Temperature has fallen below 45°C. Re-commissioning of empty/unused plant. Any contamination of header tank (by organic, by vermin or vermin faeces or similar). Regular programme.	As required As required As required As required Annually
Domestic Hot Water Distribution System	New installations and modifications or additions. Temperature has fallen below 45°C. Any contamination of header tank (by organic, by vermin or vermin faeces or similar).	As required As required As required
Air Handling Units	Any contamination (by organic, by vermin or vermin faeces or similar). Gross organic contamination e.g. large number of dead insects, feathers, animal or bird bodies etc. Chiller battery, drip trays and drainage pipework.	As required As required 6 monthly

Domestic cold water tanks and distribution systems table

6.41 The procedures set out below shall be followed

Procedure	Description
(logged on Form 004)	for Cold Water Tanks and Distribution Systems following the identification of water temperature greater than 20°C

Drinking water, to a relevant water quality under Regulations, is provided to *NHS Board* by Business Stream, a Licensed Provider (LP) who works with Scottish Water to make sure that the water supply is connected properly, and the water is clean and ready to use.

These obligations cover the supply network up to the boundary point (normally the meter point), thereafter obligations rest with *NHS Board*.

Note: Currently there is no legal maximum water supply temperature from the Licensed Provider. In practice the water supply temperature to boundary point will be subject to seasonal variation. In winter this would normally be expected to be in the 5 – 10 °C range and in summer up to 20°C.

6.42 The following staged risk assessment escalation procedure should be employed where the water temperature in Cold Water Storage Tanks is greater than 20ºC. (i.e. the water storage tanks for Domestic Cold Water Systems and for Domestic Hot Water Systems).

Stage 1 - Verification

- where tepid cold water occurrence (i.e. more than 20 °C) is reported from any number of cold water outlets, from maintenance procedures, from BEMS monitoring, or from the manual monitoring of storage tanks, the person identifying, or making a report must notify the relevant Authorised Person (Water) as soon as the problem is identified and confirm this in writing within 24 hours;
- the Authorised Person (Water) should liaise with the person identifying the problem and verify the problem by independently rechecking by taking the water temperature of the appropriate cold water storage tank, the temperature of the incoming mains cold water at the site boundary point (and building entry point if there are multiple buildings served by the mains cold water system) and the outflow distribution temperature;
- if the cold water storage temperature is confirmed greater than 20°C, then the Authorised Person (Water) should record this in writing as well as conducting continuous monitoring of the incoming cold water mains, the cold water storage and the outflow temperatures to establish the temperature profiles and in more detail over at least a one week period to determine the level of risk;
- the Authorised Person (Water) should also review the Water Safety Log Book and take into account the recent water system history to specifically include - the primary water treatment levels, any water sampling carried out following SHTM 04-01; system monitoring data, including temperature monitoring and water quality chloramine checks; recent maintenance history; recent alterations, changes or additions to the water system; and any other changes made by Duty Holders or users of the water system;
- on reviewing continuous monitoring temperature profiles, in conjunction with Water Safety Log Book and recent history, action as Stage 2 or Stage 3 or Stage 4 as appropriate. The Authorised Person (Water) will ensure the Responsible Person (Water) is notified immediately in writing at each Stage and also recorded in the Water Safety Log Book.

Stage 2 - Initial Action – high incoming mains cold water temperature

- where the incoming mains cold water is 18°C or greater for more than a 48

hour period the Responsible Person (Water) should contact Business Stream, the Licensed Provider, who will work with Scottish Water to establish the reasons and determine a resolution. Continuous monitoring should continue and recorded in the risk assessment.

Stage 3 - Water temperatures fluctuating above and below 20°C (but no greater than 25°C)

- where water temperatures are fluctuating above and below 20°C in a regular cyclic manner over 72 hour periods in response to regular user water demand (but no greater than 25°C) and are more than 2°C higher than the incoming cold water mains supply temperature at the building entry point, then continuous monitoring should be continued by the Authorised Person (Water), the reason(s) for failure(s) identified and rectified as soon as possible. This should be recorded by updated risk assessment (specifically in relation to the patient risk rating – where there may be increased risk and appropriate actions may be required to mitigate exposure).

Considerations for failures include

- accuracy of temperature sensors (requiring recalibration);
- temperature sensors being located in water (requiring reposition where tank storage levels have been reduced and sensor no longer sensing stored water);
- inappropriate standby tank configuration;
- temperature sensor in standby system;
- temperature sensor measuring stagnation (requiring reposition);
- inappropriate siting (not in a cool location);
- heat gain to the tank and pipework (due to lack of appropriate insulation or located close to heat gain from other heat sources);
- storage capacity not minimised to match daily use (changes in user water demand);
- ingress of hot water through cross connection or mixing valve failure (i.e. from DHW system or Steam systems).

Stage 4 - Water temperatures fluctuating above and below 25°C (and rarely below 20°C)

- in this situation continuous monitoring should be continued by the Authorised Person (Water), the reason(s) for failure(s) (as Stage 3) identified and rectified on an urgent basis. This should be recorded by updated risk assessment (specifically in relation to the patient risk rating – where there will be an increased risk and appropriate actions will be required to mitigate exposure);
- in this situation a permanent solution, such as ventilation for the plant room, or changing the water storage arrangements, or forming a circulating distribution system (with or without chilling depending on the circumstances)

must be implemented;

- the Authorised Person (Water) should, unless instructed in writing to the contrary by Responsible Person (Water)
  - arrange to drain the tank contents and clean if necessary;
  - inform the users of the failed system that they must not draw off any cold water (and hot water if a single domestic hot water header) from the affected system until further notice;
  - chlorine (or other suitable) disinfection of the tank and distribution system shall be carried out;
  - thereafter the tank shall be brought back into service;
  - then the users shall be informed that the system is back in operation.

The Authorised Person (Water) shall complete an Incident Report Record Form (004). An entry should also be made in the Water Safety Log Book and ensure the Responsible Person (Water) is notified in writing as soon as possible.

Domestic hot water plant and distribution systems

6.43 The following procedure should be employed if the Calorifier or Plate Heat Exchanger outflow temperature falls below 45°C.

Procedure	Description
(logged on Form 004)	Domestic Hot Water Systems following plant failure, allowing system water temperature to drop below critical control levels

Decision table for hot water system breakdown

6.44 The Table overleaf should be used to decide on the actions necessary in the event of a plant breakdown such as power failure or steam supply failure.

Breakdown leading to temperature <45°C, lasting for:	Risk Category	Action
<12 hrs	High	Verify[1]
	Significant	Verify[1]
	Moderate	Verify[1]
>12 hrs	High	Thermally pasteurise[2]
	Significant	Verify[1]
	Moderate	Verify[1]
>24 hrs	High	Thermally pasteurise[2]
	Significant	Thermally pasteurise[2]
	Moderate	Verify[1]
Breakdown leading to temperature <45°C, lasting for:	**Risk Category**	**Action**
>72 hrs	High	Thermally pasteurise[2]
	Significant	Thermally pasteurise[2]
	Moderate	Thermally pasteurise[2]

[1]Ensure that normal temperature performance has been resumed, i.e.60°C

[2]Calorifier or plate heat exchanger and complete distribution system

6.45 In the event of a reduction in domestic hot water temperature the Authorised Person (Water) should be notified in writing as soon as possible. The reason for failure must be identified and rectified as soon as possible.

6.46 The Authorised Person (Water) shall notify the Duty Holder and users on the failed system that they must not draw off any hot water from the affected services until further notice.

6.47 The relevant Duty Holder shall ensure that their staff are aware of the situation, and that they in turn shall prevent patients from using affected services.

6.48 Where thermal pasteurisation is to be carried out, the temperature of the calorifier or plate heat exchanger shall be raised to 70°C, and the water shall be circulated throughout the affected distribution system for at least one 1 hour. Each tap or appliance should be run in sequence until full temperature is achieved (this should be measured). To be effective the temperature in the calorifier or plate heat exchanger should be high enough to ensure that all distribution outlets receive water at a temperature of greater than 60°C. Ensure the return flow to the calorifier or plate heat exchanger is no less than 50°C.

6.49 The Authorised Person (Water) shall inform users that the system is back in operation.

6.50 Bacteriological samples should be taken in consultation with the Infection Prevention and Control team.

6.51 The Authorised Person (Water) shall complete an Incident Report Record (004) and ensure the Responsible Person (Water) is notified in writing as soon as possible. Maintain hard copy records in the Water Safety Log Book.

Air handling plant

6.52 If applicable the following procedures shall be carried out

Procedure	Description
P1C8 (logged on Form 007)	a) Humidity section inspection b) Cooling section inspection c) Disinfection

Aerosol generation

Note: The disease caused by the *Legionella* bacteria is a type of pneumonia, affecting the lungs and other organs of the body. The basic cause of infection is the inhalation of droplets of water infected with the *Legionella* bacteria, the highest risk being aerosols.

6.53 Aerosols may be generated from a number of sources, such as showers, aerated taps, air conditioning units, water disturbances in tanks and calorifiers and by the use of hoses for flushing and cleaning. All maintenance tasks are therefore conducted in a manner that minimises the production of potentially dangerous aerosols. Some examples are as follows: -

- calorifiers are pasteurised, fully drained, prior to opening for examination;
- sediment and sludge should be carefully cleared before hosing.

6.54 Risk Assessment has been used to identify the possible producers of aerosols, the hazards associated when they are produced, and the control measures in place to reduce the risks to a manageable level.

7. Contractors

7.1 Only Competent Contractors may be used to supplement the in-house labour force in carrying out the following operations

- water storage tank cleaning and disinfection;
- thermostatic Mixer Valve (TMV) maintenance;
- system disinfection;
- BEMS Maintenance.

Note: Contractors are appointed in accordance with the *NHS Board* Control of Contractors Policy. Contractors shall only be engaged in work on water systems or air conditioning plant under the control of the Authorised Person (Water) co-ordinated with any Estates persons.

7.2 The *NHS Board* Management and Control of Contractors – Health, Safety and

Environment Policy & Procedural Arrangements along with the associated Guide for Contractors will apply.

7.3 The Authorised Person (Water) shall ensure that the Contractor is competent for the task(s) to be undertaken and shall ensure that the Contractor is aware of and has made provision for all responsibilities under the various Environmental, Health and Safety Regulations, including CDM, COSHH, *Legionella*, water safety etc.

7.4 The Authorised Person (Water) shall ensure that the Contractor:-

- is suitably briefed in writing on the task(s) to be undertaken and is fully aware of the water safety implications and prescribed Water Safety Procedures to be followed;
- demonstrates that all workforce to be engaged on the task(s) are suitably trained and experienced for the task and are properly managed and supervised;
- has provided appropriate equipment for the task including PPE;
- carries out the task(s) to the correct standards and in the correct manner all in accordance with all *NHS Board* and Estates policies and procedures.

7.5 The Authorised Person (Water) shall record the evidence provided by the contractor and store it for future reference and maintain hard copy records in the Water Safety Log Book.

7.6 The Authorised Person (Water) shall complete a review questionnaire upon completion of the work and shall forward it to the Environment & Safety Support team for recording.

8. Temporary closures

8.1 The Duty Holder requires to ensure that Ward/Departmental Managers notify the Authorised Person (Water) and Estates Maintenance Department in advance to assess the risks of exposure to *Legionella, Pseudomonas* Spp and other similar harmful bacteria when closures are planned.

8.2 When wards or departments are closed temporarily (for short terms or limited periods not exceeding 30 days), a procedure for the regular flushing of all domestic water outlets will be implemented immediately. The flushing operation should be conducted on a twice weekly flushing cycle basis and details recorded and transferred to the Water Safety Log Book and the Planet system. The procedure will involve running every water outlet for 3 minutes and flush each toilet.

8.3 Domestic Services Supervisors and Managers will also notify the Maintenance Department if they identify any unused areas or outlets.

8.4 Where wards or departments are to be closed indefinitely or mothballed with no planned re-opening date, or where the closure period typically exceeds 30 days, the Estates Department must be consulted and provided with funding in order to

assess the risks of exposure to *Legionella, Pseudomonas* Spp and other similar harmful bacteria with a view to alter or disconnect and drain the relevant water services.

9. Risk control notices

9.1 *NHS Board* Clinical Governance and Risk Management Unit have issued Risk Control Notice 11/04 dated 20th June 2011 **to Duty Holders** on the Management and Control of *Legionella*. This instructs actions by devolved management and local ward or department staff to eliminate or manage the risk as follows:

Use of water system outlets

9.2 The manager responsible for the ward or department must put systems in place to undertake a weekly review of the use of water systems outlets.

Where water outlets are

- Unused or Redundant – follow Action 9.3 below;
- Little Used – follow Action 9.4 below.

9.3 **Unused or Redundant System Outlets** – outlets deemed unused or redundant (and associated supply pipework at showers, taps in basins & baths, etc) must be reported by the manager responsible for the ward or department to the Estates Department on ext: xxxxx to be taken out of service and for removal, to eliminate the risk.

Alternatively, if the outlet has to be retained (such as for emergency or irregular use) the manager responsible for the ward or department must put systems in place for the outlet to be flushed to waste for 3 minutes, at least **twice weekly**, by ward or department staff, following Actions 9.5 – 9.8 below.

9.4 **Little Used System Outlets** - (i.e. outlets that are not used at least twice weekly). The manager responsible for the ward or department must put systems in place for the outlet to be flushed to waste for 3 minutes, at least twice weekly, by ward or department staff, following Actions 9.5 – 9.8 below. Where the outlet may be used by high-risk patients, more frequent flushing may be needed and the frequency should be determined following a risk assessment.

9.5 The flushing must be carried out in such a way as to avoid (or protect from) the creation of any aerosols. If the flushing has been *regular and in accordance with this notice,* the risk posed by aerosols is very low.

9.6 Shower heads which are dirty and are to be retained should be reported to domestic services so that these may be thoroughly cleaned or replaced.

9.7 A record must be kept of the weekly flushing operation. A template record sheet is attached. This must be retained in the ward or department for at least 5 years.

9.8 Local flushing regimes must be ongoing and continuous at all times, in order to prevent critical increases in *Legionella* growth and to demonstrate auditable management control of *Legionella* in local workplaces.

9.9 The Record Sheet is audited as an integral part of Infection Control Audit (3-monthly using the HEI Inspection Audit Tool).

9.10 Management Team Duty Holders have also been alerted on awareness and actions to minimise the risk of *Pseudomonas* Spp and other similar harmful bacteria in the use of equipment, transmission routes and requirements (such as in the use of hand wash stations and wash basins) in Risk Control Notice 12/04.

10. Documentation and records

10.1 The documentation and records of all work undertaken to prevent the growth and spread of *Legionella* require to be maintained and performance reviewed by the Authorised Person. These records include:

- Risk Assessments;
- the *Legionella* operational maintenance site plan;
- records of maintenance actually carried out, contained within Water Safety Log Books and Planet;
- records of procedural audit and review, contained within the Water Safety Log Book;
- other Procedures are set out below:

Other Procedures	Record	Description
Short / Limited Closure Record Form	Logged on Form 001	For a period typically not exceeding 30 days
Indefinite Closure / Re–occupation Record Form	Logged on Form 002	For periods typically exceeding 30 days
Incident Report Record Form	Logged on Form 004	For all incidents and resulting actions
Water Maintenance Frequencies Risk Based Assessment Form	Logged on Form 023	For review and change of any maintenance frequency
Water Disinfection Risk Based Assessment Form	Logged on Form 024	For assessment for disinfection of systems after work or alterations
Checklist for New Water System Designs	Logged on Form 025	Checklist for designers
Other Procedures	Record	Description
Flushing Water Outlets Record Form	Logged on Form 026	Record sheet for Estates Department use
Estates Chloramine Record Form *(where applicable)*	Logged on Form 027	Record sheet for Estates Department use

Other Procedures	Record	Description
Water Safety Control Log – Record Form	Logged on Form 028	For plant status, maintenance tasks and resulting actions
Risk Control Notice 11/04	Logged on Sample Record Sheet	For Duty Holders
Risk Control Notice 12/04	Actions to Estates Helpdesk	For Duty Holders

11. Outbreaks – Actions

Note: Any incidents or deviance from the controls for the Temperature Control Regime must be reported to the Authorised Person (Water) immediately, the Incident Report Record Form (004) is completed and ensure the Responsible Person (Water) is notified as soon as possible.

11.1 In the event of an Outbreak, an Incident Management Team (IMT) or an Outbreak Control Team (OCT) will be convened for a single case or an outbreak of nosocomial Legionnaires' disease respectively.

11.2 The IMT/OCT will be convened by the Consultant in Public Health Medicine (CPHM) with responsibility for Health Protection (or the duty CPHM). The CPHM will lead and co-ordinate the investigation and control of the incident/outbreak in close collaboration with the Infection Prevention and Control Doctor. Further information on the roles and responsibilities of the different members of the IMT/OCT can be found in *NHS Board's* Outbreak Plan. Refer to Section 22 and *NHS Board* Control of Infection Manual for full information.

11.3 The general response to an incident or outbreak may include:

- investigation of all potential sources of *Legionella* infection. This shall include checking recent maintenance work and project work that may have been carried out on water or air handling systems;
- identifying the location of any medical equipment used for dental care, respiratory therapy and within Haemodialysis units;
- identifying off-site information such as excavation or earth moving works, alterations to water supply and drainage;
- shutting down any processes which are capable of generating and disseminating airborne water droplets and keep them shut down until sampling procedures and any remedial cleaning or other work has been done. Final clearance to restart the system may be required;
- taking water samples from the system before any emergency disinfection being undertaken. This will help the investigation of the cause of the illness. The investigating officers from the local authority may take samples or require them to be taken;
- co-operating fully in an investigation of any plant that may be suspected of being involved in the cause of the outbreak. This may involve, for example

  - tracing of all pipework runs;
  - detailed scrutiny of all operational records;
  - statements from plant operatives and managers;
  - statements from water treatment contractors or consultants;
- any emergency cleaning and disinfection will be undertaken in accordance with *NHS Board* procedures;
- the Designated Person (Water) shall brief relevant Estates staff so that they are aware of the event and can respond to phone calls etc as instructed. The briefing shall include instructions that any comments to outside parties are agreed by Infection Prevention and Control;
- records shall be kept of all relevant information, including that provided by other departments.

12. Operational restrictions

12.1 These will be recorded within the Water Safety Log book, in consultation with the users (if any) of the facility.

13. Alterations to water systems

13.1 Where alterations are planned to water systems and the Written Scheme, the Guidance for Alterations to Water Systems document must be followed. The document provides separate specific guidance and the details to be followed for controlling and avoiding the risk of *Legionellosis* and other water safety risks. (specifically using Record Form 029 to record the acceptance of work to be conducted and conformation of work completed on a water system and all conditions involving Duty Holders, the Authorised Person (Water) of the written scheme of the system and the Authorised Person (Water) from the Project Team accepting responsibility for the work).

13.2 Record Form 029 shall be used to record the acceptance of ALL work to be conducted and confirmation of ALL work completed on a water system and ALL conditions involving Duty Holders, the Authorised Person (Water) of the Written Scheme of the systems and the Authorised Person (Water**)** from the Project Team accepting responsibility for the work.

13.3 At the point of hand over **all** relevant information written on operating the system, system performance, together with accurate ‘as-fitted’ drawings and design criteria of the domestic hot water systems and cold water services shall be submitted to *NHS Board* (i.e. an appropriate current Written Scheme, accepted in writing by the relevant Authorised Person [Water]).

13.4 Full operation of the system and occupancy of the building/property should be progressed as soon after hand over as possible to reduce the potential of *Legionellosis* and other water safety risks and avoid further costs being incurred due to of any further re-disinfection of the water systems.

Appendix C: Typical report forms

Contents:

Note: This Control of Water Record Forms document is to be read in conjunction with the Written Scheme and the Guidance for Alterations to Water Systems documents

Temporary ward / Department closure record form (001)

NHS Board					
Estates Department					
Site/Premises		Closure date			
Ward/Department		Closure period (typically not exceeding 30 days)			
Equipment and outlets affected by closure:					
Compiled by (signature)		Print name			
Supervisor (signature)		Print name			

Approval by Authorised Person (Water) to operate on a twice weekly flushing cycle basis (to run every water outlet for 3 minutes and to flush each toilet)

To operate the water system listed above in accordance with the procedure for short/limited closure

Approved by (signature)		Print name	
Date			
Remarks			

Completed record forms to be held in Water Safety Log Book

Indefinite ward / Department / Site closure record form (002)

NHS Board			
Estates Department			
Site/Premises		Closure date	
Ward/Department		Closure period	
Work carried out to disconnect and close down water services:			
Closure declaration by Authorised Person (Water)			
Compiled by (signature)		Print name	
Date			
Reoccupation of the area above		Date	
Work carried out and details of modifications:			
Work done by (signature)		Print name	
Clean and disinfect (carried out by)		Print name	
Re-occupation declaration approved by Authorised Person (Water)			
Approved by (signature)		Print name	
Date			

Completed record forms to be held in Water Safety Log Book

Annual tank inspection record form (003a)

NHS Board			
Estates department			
Site/Premises		Tank Location	
Date		Tank Reference	

Annual tank inspection		
Question	Compliance Yes / No	Comments / Action
Tank Clean – (does tank require draining and chlorinating?)		
Tank Access Locked? (if applicable)		
Adequate Covers?		
Water Regulations Compliant?		
Insect Screens Fitted?		
External Condition?		
Internal Condition?		
Water Level?		
Operation of Ball Valve?		
Cleaning Method Used? (if used)		
Paint/Coating? (if used)		
Bacteriological Results? (if applicable)		

Work done by (Print name)		Signature	
Supervisor accepted by (Print name)		Signature	
Date			

Completed record forms to be held in Water Safety Log Book

6-Monthly (Summer/Winter) Temperature recordings (003b)

NHS Board			
Estates department			
Site/Premises		Tank Location	
Date		Tank Reference	
6-Monthly Temperature Readings:			
Reading at	Temp °C	Comments / Action	
Ambient Outside Air			
Tank Room			
Water within Tank			
Mains Supply Water at inlet to Building/Block			
Ambient Outside Air			
Work done by (Print name)		Signature	
Supervisor accepted by (Print name)		Signature	
Date			

Completed record forms to be held in Water Safety Log Book

Incident report record form (004)

NHS Board			
Estates department			
Site/Premises		Date	
Ward/Department		Time	
Nature and details of incident/fault			
Identified by (Print name)		Signature	
Actions taken			
Work done by (Print name)		Signature	
Time completed		Date completed	
Supervisor accepted by (Print name)		Signature	

Completed record forms to be held in Water Safety Log Book

Water temperature record form (005)

NHS Board			
Estates department			
Site/Premises		Date	
Ward/Department		Time	

Storage Temperatures (°C)

Detail	Cal/Heat Exchanger No 1 Plant Ref No:	Cal/Heat Exchanger No 2 Plant Ref No:	Cal/Heat Exchanger No 3 Plant Ref No:
Storage Temp			
Outflow Temp			
Return Temp			
Cold Feed Temp			

Outlet Temperatures (°C)

Ward/Department	Room	Temperature		Okay Yes/No	Comments
		Hot	Cold		

Additional Comments/Actions

Reading taken by (Print name)		Signature	
Supervisor accepted by (Print name)		Signature	
Date completed		Time completed	

Completed record forms to be held in Water Safety Log Book

Daily DHW Calorifier / Water temperature record form (**005a**) or where a BEMS is not installed or where BEMS is not Operational

NHS Board			
Estates department			
Site/Premises		Month/Year	
Block/System		Calorifier No.	

Temperatures

Day	Temperature (°C)			Comments	Time of Recording	Name & Signature
	Storage	Flow	Return			
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

(continued overleaf)

Day	Temperature (°C)			Comments	Time of Recording	Name & Signature
	Storage	Flow	Return			
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
Additional Comments / Actions						
Supervisor accepted by (Print name)				Signature		

Completed record forms to be held in Water Safety Log Book

Disinfected shower head and Hose replacement record form (005b)

NHS Board					
Estates department					
Site/Premises				Date	
Block/System(s)				Time	
Replacement details					

Ward / Dept	Room	Shower Ref. or Item No.	Replaced by		Attach Disinfection ID and LOT Number (sticker from pack)
			Print name	Signed	

Additional Comments/Actions			
Supervisor accepted by (Print name)		Signature	

Completed record forms to be held in Water Safety Log Book

Calorifier and storage / Buffer vessel maintenance record form (006)

NHS Board					
Estates department					
Site/Premises			System ref		
System (Domestic Hot water calorifier(s) and Storage /Buffer vessel(s) associated with Hot/Cold/Chilled water heat exchanger(s)				Plant ref no	
Quarterly flushing					
Period	Date Undertaken	By (Name)	Signature	Comments	
1st Quarter					
2nd Quarter					
3rd Quarter					
4th Quarter					
Annual Plant Cleaning (Plant Ref No as above):					
Plant taken out of service for annual cleaning	Date		Time		
Drain and clean done by (Print name)			Signature		
Drain and clean done by (Second man print name)			Signature		
Start up procedure done by (Print name)			Signature		
Where domestic hot water calorifier or Storage/buffer vessel – held at 60°C for (hours)					
Date Plant back in service			Time Plant back in service		
Supervisor accepted by (Print name)			Signature		
Additional Comments / Actions – forward to **Authorised Person (Water)**					

Completed record forms to be held in Water Safety Log Book

Air handling unit disinfection record form (007) (Please refer to water operational procedure at all times)

NHS Board					
Estates department					
Site/Premises				Plant Location	
Date		Plant Reference		**NB: Use Sodium Hypochlorite Solution 5ppm within 2 hours of issue**	
Sodium Hypochlorite Solution 5ppm		Batch Number		Expiry Date	

Ref	Details	Yes/No	Comments
Safety Checks			
1	Have you read and understood the data COSHH sheet?		
2	Have you read and understood the risk assessment sheet?		
3	Have you put appropriate signage in place?		
4	Are you wearing the appropriate PPE?		
Pre-Disinfection Checks			
1	Was there water present in ductwork?		
2	Was drain glass trap clean? (i.e. transparent)		
3	Any sign of biological growth?		
4	Drainage trays clean and corrosive free?		
How long was 5ppm chlorine applied for before being washed off?			Hours
Completion Checks			
1	All wetted areas dry?		
2	Was sample taken for analysis?		
3	All panels replaced and plant switched on?		
4	Entry made in local maintenance log?		
Comments			

Signed (Craftsperson)		Date	
Accepted by (Supervisor)		Date	

Completed record forms to be held in Water Safety Log Book

Building energy management system water system alarm/Fault record form (021)

NHS Board					
Estates department					
Site/Premises				Plant Location	
Date		Time		Plant Reference	
Details of alarm condition					
Details of actual Fault/Alarm					
Action taken					
System back in operation at (date & time):					
Craftsperson who reported (signature)				Date	
Craftsperson who repaired (Signature)				Date	
Accepted by (Signature of Authorised Person (Water))				Date	

Completed record forms to be held in Water Safety Log Book

Monthly checks of water drain traps on ventilation plant form (022)

NHS Board						
Estate department						
a) Visually inspect condition of drain trap assembly. b) Top up any drain trap that is below minimum level. c) Remove and clean any dirty glass drain traps.						
Checked by					Date	
Location (Site/Block/Plant Room)	Drain Ref No	Plant drain trap fitted to (or Plant Ref No)	Water level Yes / No	Trap clean/dirty	Remarks	
Accepted by Authorised Person (Water) (Signature)					Date	

Completed record forms to be held in Water Safety Log Book

Water maintenance frequencies risk based assessment form (023)

NHS Board			
Estates department			
Site/Premises		Plant Location	
Date / Time		Plant Reference	
Maintenance Task being Accessed		Existing Frequency	
Brief description for change of maintenance frequency:			

Assessment					
Patients/Staff Risk Rating (A) (tick). See Appendix A, Patient Risk Rating - "Guidance for Alterations to Water Systems)	5 (high)		4.5 (med)	4 (low)	
Water System Risk Rating (B) (tick). Range 5 (high) – 1 (low)	1	2	3	4	5
Patients/Staff Risk Rating (A) x Water System Risk rating (B) = (C)	5 or less	5 to 15	15 or more		

Check risk register database for all outstanding work required to the system	Database checked Yes / No		Amount of outstanding Items	
Existing paperwork, logs, forms and graphs checked and show consistent level of control against *Legionella* and any other harmful bacteria	Yes / No		Paperwork starting (date)	

Details of changes to frequency of task	Date changed		New frequency	
Comments				

Assessment carried out by (Signature of Authorised Person (Water))		Date	
Agreed by Head of Maintenance (Signature of Responsible Person (Water))		Date	

Completed record forms to be held in Water Safety Log Book

Water disinfection risk based assessment form (024)

NHS Board					
Estates department					
Site/Premises:			Location of Work:		
Date:			Project Ref:		
Person Making Assessment: (Print Name)					
Brief description of work / upgrade:					
Assessment for Disinfection of System after Upgrade Completed (refer to "Guidance for Alterations to Water Systems" Section 3 and Disinfection Assessment Risk Table on page 10) Circle appropriate level of risk.					
A. Patients risk rating (see tables in Appendix A): 5, 4.5 or 4	4		4.5		5
B. Water system risk rating (see tables in Appendix A):	1	2	3	4	5
C. Level of work being carried out (delete as required):	1 Minimal (non intrusive or work at outlet)	2 Moderate (intrusive work)		3 Extensive (intrusive work taking more than 7 days)	
Risk Score = A. x B. x C. =					
Disinfection assessment (delete as required):	No action	Immersion or spray of fittings		Full disinfection	
Comments					

Assessed by (Signature)		Authorised Person (Water) (Project/Estates Officer)	Date	
Approved by (Signature)		Deputy Responsible Person (Water) (Head of Projects)	Date	
Accepted by (Signature)		Authorised Person (Water) (For the Written Scheme to accept the System back in use)	Date	

Completed record forms to be held in Water Safety Log Book

Design checklist for alterations to or new work to water systems (025)

NHS Board			
Estates department			
Site premises		Location of works	
Project reference		Date	
Person Making Assessment (Print name)		'Designer' *in compliance with the Construction (Design and Management) Regulations: 2007.*	
Brief description of alteration/upgrade/project:			

Completed record forms to be held in Water Safety Log Book

Design Checklist

Ref	Design, Planning and Construction	Yes	No
	General		
1	If you are altering an existing system, are all outstanding and retrospective issues in the *Legionella* Risk Assessment or Written Scheme accounted for in the project work to ensure the Temperature Regime works?		
2	If you are fitting a new system or new components to any existing system, do any of the materials or fittings to be used support the growth of micro-organisms?		
3	Are low corrosion materials used?		
4	Have arrangements been made to follow the requirements of SHTM 04-01 Part E (materials and filtration) and include the leachate flushing and disinfection regime?		
5	If fitted, are thermostatic mixing valves (TMVs) sited as close as possible to the point of use?		
6	Has the inclusion of flexible hoses been avoided (and any existing removed) in the project?		
7	Are all showers fitted with fixed heads to prevent backflow?		
8	Are all dead-legs and blind stub-ends/plugged-tees been removed from the system?		
9	At hand wash stations – has an assessment been made to ensure that the tap outlet is appropriate and suits the basin? i.e. is without requiring water straighteners to avoid splashing? – and water from the tap outlet does not flow directly into basin drain hole, whilst avoiding splashing?		
10	At hand wash stations, are soap dispensers/ alcohol hand rubs placed to avoid drips on taps or into the basin?		
11	Has the Written Scheme for the water system been *Legionella* risk assessed?		
12	Have arrangements for updating the Written Scheme for the water system been planned to take account of this project, including written operating instructions, accurate schematic and detailed as fitted drawings at handover?		
13	Is the water system connected to BEMS with the required performance parameters?		
14	Have arrangements been made prior to work commencing for water sampling and testing to follow the requirements of SHTM 04-01 Part C?		
15	Have arrangements been made for Palintest Chlorometer readings of the water system(s) prior to the project? (027)		
16	Have arrangements been made for Palintest Chlorometer readings of the water system(s) to be included in the commissioning details for the project on completion? (027)		

(continued overleaf)

Ref	Design, Planning and Construction	Yes	No
	Cold Water Systems		
17	Whether a BEMS is fitted or not – is a visible and accessible manual means of monitoring cold water system supply (at building block inlet or meter point), tank storage, flow (and return where appropriate) temperatures available?		
18	Is cold water stored and distributed to outlets at below 20^0C?		
19	Is the cold water circulated?		
20	If cold water is circulated will it require to be chilled to ensure distribution below 20^0C?		
21	Are low use outlets installed upstream of higher use outlets?		
22	Has cold water storage been assessed and minimised, i.e. holds enough for one days use?		
23	Is supply and distribution piping insulated and kept away from all heat sources?		
24	Is the cold water tank:		
a)	Fitted with a cover and insect screen(s) on any pipework open to the atmosphere?		
b)	Located in a cool place and protected from external temperature?		
c)	Accessible?		
	Domestic Hot Water Systems		
25	Whether a BEMS is fitted or not – is a visible and accessible manual means of monitoring domestic hot water system storage, flow and return temperatures available?		
26	Is domestic hot water stored and distributed above 60^0C as it enters the supply system and circulated at no less than 50^0C at the return into the calorifier?		
27	Does the calorifier storage capacity meet normal daily fluctuations in hot water use while maintaining a supply temperature of at least 55^0C to the furthermost draw-off (sentinel) point in the circulating system?		
28	Are the hot water distribution pipes insulated?		
29	If more than one calorifier is used, are they connected in parallel?		
30	Does the calorifier have the following fitted:		
a)	A drain valve?		
b)	A temperature gauge on the calorifier and on inlet and outlet pipework?		
c)	An accessible access panel?		

(continued overleaf)

Ref	Design, Planning and Construction	Yes	No
	Domestic Hot Water Systems		
25	Whether a BEMS is fitted or not – is a visible and accessible manual means of monitoring domestic hot water system storage, flow and return temperatures available?		
26	Is domestic hot water stored and distributed above 60^0C as it enters the supply system and circulated at no less than 50^0C at the return into the calorifier?		
27	Does the calorifier storage capacity meet normal daily fluctuations in hot water use while maintaining a supply temperature of at least 55^0C to the furthermost draw-off (sentinel) point in the circulating system?		
28	Are the hot water distribution pipes insulated?		
29	If more than one calorifier is used, are they connected in parallel?		
30	Does the calorifier have the following fitted:		
a)	A drain valve?		
b)	A temperature gauge on the calorifier and on inlet and outlet pipework?		
c)	An accessible access panel?		
Assessment and any Comments *(to clarify assumptions, eliminate hazards and risks and provide information about any remaining risks):*			

Assessed by: Designer (Print name)		Signature		Date	
Co-ordinated by Authorised Person (Water) (Project / Estates Officer) (Print name)		Signature		Date	
Approved by Deputy Responsible Person (Water) (Head of Projects) (Print name)		Signature		Date	
Accepted by Authorised Person (Water) (For the Written Scheme holder accepting Pre-Start) (Print name)		Signature		Date	

Completed record forms to be held in Water Safety Log Book

Flushing water outlets record form (026)

NHS Board	
Site / Premises :	
Ward / Dept :	

Outlet being flushed	Date flushed	Initials

Supervisor Accepted by (Signature)	
Print name	

NB: This record to be retained for 5 years, to comply with regulations.

Estates chloramines record form (027) *(Use where applicable)*

NHS Board			
Estates department			
Site/Premises		Thermometer and Calibration No's.	
System(s)		Chlorometer No.	

Instructions for Palintest DPD Test Chlorometer PTH 045D:

1. Select an appropriate hot or cold water outlet, representative of secondary distribution pipework system. Run hot water for 1 minute and cold water for 2 minutes before commencing sampling in Test A.
2. **Test A Free Chlorine** – rinse test tube with sample leaving 2 or 3 drops in the tube. Add one DPD No 1 tablet, crush table, then fill to the 10ml mark. Mix dissolved tablet and ensure particles have settled. Take reading immediately and record.
3. **Test B Total Chlorine** – Using solution from Test A – Add one DPD No 3 Table, crush and mix to dissolve. Stand for 2 minutes. Take reading immediately thereafter and record.
4. **Calculate Combined Chlorine** – Subject A from B and record. Readings should normally be just less than 1.0 mg/litre down to 0.4 mg/litre. If the reading is less than 0.4 mg/litre – inform the Authorised Person, who will investige.

Data recorded

Ward / Dept	Room No.	Date and Time	Outlet Details				Palintest Readings			Comments Okay - Yes / No (tick / cross)
			WHB/SINK/ BATH/SHWR	HOT (tick)	COLD (tick)	Temp (°C)	Free Chlorine (Tablet No 1) (A) (mg/litre)	Total Chlorine (Tablet No 3) (B) (mg/litre)	Combined Chlorine (B – A) (mg/litre)	

(continued overleaf)

Additional comments/Actions			
Reading taken by (Print name)		Signature	
Supervisor accepted by (Print name)		Signature	
Assessor (Authorised Person (Water))	Print name		
Signature		Date	
Manager (Responsible Person (Water))	Print name		
Signature		Date	

Completed record forms to be held in Water Safety Log Book

Safety control log (including plant and maintenance) record form (028)

NHS Board				
Estates department				
Site/Premises				
Block/System		Plant Room		
Date (day/month/ year)	Description / Comments	Actions to	Time of Record	Name & Signature
Accepted by (Signature of Supervisor)		Print name		

Completed record forms to be held in Water Safety Log Book

Record form for acceptance of work to be conducted and confirmation of work completed on a water system (029)

NHS Board			
Estates department			
Pre-start			
Project Number:		Project Manager:	
Site / Block / Premises:		Location of Work (Ward/Department):	
Written Scheme Ref. No.:		Authorised Person (Water) The holder of the Written Scheme:	
Expected Start Date:		Project Designer:	
Anticipated Duration:		Project Contractor:	
Expected Completion Date:		Contractor(s) Working on the Water System:	
Reference Specification No.:		Reference Drawing No(s):	
Form 024 Completed and attached:		Form 025 Completed and attached:	
Water Quality Sampling Certificate and Palintest Results completed and attached:		Where required are -Leachate / Disinfection Test Results completed and attached:	
Confirmation that those working on the water system are Approved Plumbers (PILS):			
The Water System remains operational in **part?** or **whole?** or **not operational?**			
Date Form Compiled:		Water Quality acceptable prior to work commencing:	
Authorised Person (Water) From the Project Team compiling this Form and taking responsibility for the work:			

(continued overleaf)

Summary Description of the Work / Project and the Area / Rooms affected:			
Duty Holder(s) or their devolved Local Manager(s) informed and affected by the work / project are:			
Approval and acceptance of work and conditions			
Duty Holder(s) or their devolved Local Manager(s)	Accepted by (Print name)		
Signature		Date	
Authorised Person (Water) (Holder of the written scheme)	Approved by (Print name)		
Signature		Date	
Authorised Person (Water) (From the project team accepting responsibility for the work, working with the holder of the Written Scheme – who remains responsible for the water system	Accepted by (Print name)		
Signature		Date	

Completed record forms to be held in Water Safety Log Book

Post completion – Confirmation of work completed and acceptance:

Post Completion Checklist:

Ref	Design, Planning and Construction	Yes	No
	General		
1	Has **all** the work as described in the PRE-START Section been completed?		
2	Comments:	-	-
3	Where an existing system has been altered, are all outstanding and retrospective issues in the *Legionella* Risk Assessment or Written Scheme accounted for in the completed work to ensure the Temperature Regime works?		
4	Where a new system or where new components have been fitted to an existing system, do any of the materials or fittings to be used support the growth of micro-organisms?		
5	Have low corrosion materials been used?		
6	Have arrangements followed the requirements of SHTM 04-01 Part E (materials and filtration) and include the leachate flushing and disinfection regime?		
7	Where fitted, are thermostatic mixing valves (TMVs) sited as close as possible to the point of use?		
8	Has the inclusion of flexible hoses been avoided (and any existing removed) in the project?		
9	Have all showers been fitted with fixed heads to prevent backflow?		
10	Have all dead-legs and blind stub-ends/plugged-tees been removed from the system?		
11	At hand wash stations – has an assessment been completed to ensure that the tap outlet is appropriate and suits the basin? i.e. is without requiring water straighteners to avoid splashing? – and water from the tap outlet does not flow directly into basin drain hole, whilst avoiding splashing?		
12	At hand wash stations, have soap dispensers/ alcohol hand rubs been placed to avoid drips on taps or into the basin?		
13	Has the Written Scheme for the water system been updated to take account of this project, with written operating instructions, accurate schematic and detailed as fitted drawings provided at handover?		
14	Has the updated Written Scheme for the water system been *Legionella* risk assessed?		

(continued overleaf)

15	Has the water system been connected to BEMS with the required performance parameters?		
16	Have arrangements been made after the work has been completed for water quality sampling and testing to follow the requirements of SHTM 04-01 Part C?		
17	Have arrangements been made for Palintest Chlorometer readings of the water system(s) after completion of the project? **(027)**		
18	Have the Palintest Chlorometer readings of the water system(s) been included in the commissioning details for the project at completion? **(027)**		
19	Has a certificate of disinfection to BS6700 (or BS EN 806) been provided?		
20	Whether a BEMS has been fitted or not – is a visible and accessible manual means of monitoring cold water system supply (at building block inlet or meter point), tank storage, flow (and return where appropriate) temperatures available?		
21	Is cold water stored and distributed to outlets at below 20^0C?		
22	Is the cold water circulated?		
23	If cold water is circulated – is it (or require to be) chilled to ensure distribution below 20^0C?		
24	Are low use outlets installed upstream of higher use outlets?		
25	Has cold water storage been assessed and minimised, i.e. holds enough for one days use?		
26	Has all supply and distribution piping been insulated and kept away from all heat sources?		
27	Is the cold water tank:		
a)	Fitted with a cover and insect screen(s) on any pipework open to the atmosphere?		
b)	Located in a cool place and protected from external temperature?		
c)	Accessible?		
	Domestic Hot Water Systems		
28	Whether a BEMS has been fitted or not – is a visible and accessible manual means of monitoring domestic hot water system storage, flow and return temperatures available?		
29	Is domestic hot water stored and distributed above 60^0C as it enters the supply system and circulated at no less than 50^0C at the return into the calorifier?		
30	Does the calorifier storage capacity meet normal daily fluctuations in hot water use while maintaining a supply temperature of at least 55^0C to the furthermost draw-off (sentinel) point in the circulating system?		

(continued overleaf)

31	Have the hot water distribution pipes been insulated?		
32	If more than one calorifier is used, have they been connected in parallel?		
33	Does the calorifier have the following fitted:		
a)	A drain valve?		
b)	A temperature gauge on the calorifier and on inlet and outlet pipework?		
c)	An accessible access panel?		
34	Leachate / Disinfection Test Results completed and attached:		
35	Water Quality Sampling Certificate and Palintest Resulted completed and attached:		
36	Water Quality acceptable prior to returning the water system into use?		
Any other comments			
Confirmation of work completed and acceptance:			

Completed record forms to be held in Water Safety Log Book

Confirmation of work completed and acceptance:

This confirms compliance of all work described in the Post completion checklist, in accordance with the NHS Board - Management and Control of Water Safety Policy and associated Procedures. No other work has been carried out under this notification other than that described previously.

Confirmed all Work Completed by:		
(signed) (Designer)	Date:	
(print name)		
and:		
(signed)	Date:	
(print name)		
Authorised Person (Water) (From the Project Team accepting responsibility for the work, completing work with an updated Written Scheme)		
Approved and Accepted by:		
(signed)	Date:	
(print name)		
Authorised Person (Water) (Holder of the updated Written Scheme)		
Accepted by **Duty Holder(s)** or their devolved Local Manager(s)		
(signed)	Date:	
(print name)		
(for those that were affected by the work / project)		

Completed record forms to be held in Water Safety Log Book