



**Guildhall Museum Queenborough**

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**PREFACE**

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**Date of Assessment:** 16<sup>th</sup> January 2013

**Date of Review:** 16<sup>th</sup> January 2015

## **INTRODUCTION & LEGIONELLA CONTROL**

This report relates to a water source risk assessment carried out by Peter Smith of Freeston Water Treatment Ltd on the 16<sup>th</sup> January 2013 on behalf of Swale Borough Council. The survey was carried out at the Guildhall Museum, High Street, Queenborough, Sheerness Kent ME11 5AA. During the course of the survey water systems within the building was risk assessed. These sources were chosen as being fully representative of the overall domestic water systems and outlets within the building.

The survey and risk assessment were undertaken in order to comply with the Health and Safety Executive requirements on the control and prevention of Legionellosis. The risk assessment has been carried out in accordance with ACoP L8 - The control of Legionella bacteria in water systems (APPROVED CODE OF PRACTICE & GUIDANCE) and BS8580 (WATER QUALITY – RISK ASSESSMENTS FOR LEGIONELLA CONTROL) – CODE OF PRACTICE.

The survey has been limited to the terms of reference agreed between Swale Borough Council and Freeston Water Treatment Ltd. Observations relating to system conditions and other factors applicable to the requirements of L8 have been recorded during the survey and specific references are made to compliance with the ACoP in the Observations section of the report.

A Summary of Recommendations concludes the report. ACoP L8 places responsibility on employers and others to prepare a scheme for preventing or controlling the risk from Legionellosis. Adoption of a monitoring scheme in conjunction with a regime of preventative maintenance and associated record keeping will meet these requirements.

### **Health and Safety at Work etc ACT 1974**

This Act is concerned with health, safety and welfare in connection with work and those people who may be affected by it. The act is primary legislation under which the Secretary of State for Employment makes specific regulations affecting the control of Legionellosis.

### **Management of Health and Safety at Work Regulations 1999**

The regulations provide a framework for managing health and safety at work including the requirement for risk assessments and the establishment of appropriate management systems and procedures.

### **Control of Substances Hazardous to Health Regulations 2002 (as amended)**

The aim of the Control of Substances Hazardous to Health Regulations (as amended) (COSHH) is to protect persons who may be affected by hazardous substances present in the workplace. This includes both chemical and biological agents. The employer has to assess the risk from such substances, and for certain substances he has to measure the employees' exposure to them.

### **Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR)**

While Legionnaires' disease as such is not a notifiable disease under public health legislation (except in Scotland), it is reportable under RIDDOR if it could have been contracted in the workplace.

## Notification of Cooling Towers and Evaporative Condensers Regulations 1992

These regulations require all premises containing a cooling tower or evaporative condenser to notify the local authority in whose area the building is situated. A form is available from the Environmental Health Department of the local authority. Notification must also be given of changes to the information supplied. It is however inspectors of the Health and Safety Executive who police the safe operation of cooling towers.

## Water Supply (Water Fittings) Regulations 1999

These regulations are not directly concerned with the Legionellosis hazard, but govern the design, construction and use of materials in water systems. In particular they cover: -

- Backflow protection, i.e. the use of air gaps and not-return valves to protect the supply.
- The maintenance of water quality, e.g. tank design for hot and cold water services.
- The use of materials, i.e. those that do not promote bacterial growth.
- Water conservation, i.e. prevention of leakage.

## Legionella Bacteria

- Legionellaceae are common environmental bacteria found in most natural water resources, including lakes and rivers. They can also survive water treatment processes in small numbers and can be supplied within mains water. Should these bacteria then enter any water service where they can multiply, and where a means of creating and transmitting water droplets is present, people using or in the vicinity of these services may be at risk.
- Infections caused by Legionella pneumophila bacteria or other organisms within the family legionellaceae are termed legionellosis. Legionnaires' disease is the worst of these and causes a pneumonia which can be fatal. Those most at risk are the very old and very young, the immunosuppressed and smokers etc.
- Legionella bacteria can also cause other, less harmful illnesses such as Pontiac fever and Lochgoilhead fever, which can affect all people.

The primary route of infection is caused by inhaling airborne water droplets that contain Legionella and are small enough to pass deep into the lung. It is also now believed that the disease can be contracted by inhaling Legionella bacteria following

- Ingestion of contaminated water by susceptible individuals. It cannot be spread from person to person.
- The majority of individual cases or outbreaks of disease have been attributed to domestic water services within buildings, evaporative cooling towers and whirlpool spas, etc.

Legionnaire's disease is most commonly caused by the inhalation of water droplets contaminated with the Legionella bacteria. It is therefore important that systems susceptible to colonisation by Legionella and which incorporate a potential means for creating and disseminating water droplets should be identified and the risk they present assessed.



**A number of factors are required to create a risk of Legionellosis:-**

- The presence of Legionella bacteria.
- Conditions suitable for the proliferation of those bacteria.
- A means of creating and disseminating an aerosol.
- The presence of individuals who may be exposed.

**The conditions favouring the proliferation of Legionella are: -**

- Moisture
- Temperature between 20 °C and 45 °C
- Availability of nutrients, for example, from sediment, sludge, organic material, scale, rust, compatible organisms and materials used in construction of water systems
- Presence of biofilm (bacterial slime) on surfaces in contact with water

The elimination of as many of these conditions as possible forms the basis of control of the risk. Treatment regimes to eradicate or reduce the proliferation of Legionella (based on physical or chemical disinfection of water systems) also help to control the risk but do not prevent it.

Under the ACoP, a suitable and sufficient assessment is required to identify and assess the risk of exposure to Legionella bacteria from work activities and water systems on the premises and any necessary precautionary measures.

The assessment is carried out by or on behalf of: Swale Borough Council

- The employer, where the risk from their undertaking is to their employees or to other;  
or
- A self employed person, where there is a risk from their undertaking to themselves or to others; or
- The person who is in control of the premises or systems in connection with the work where the risk is present from systems in the building (e.g. Tenants where the building is let. However, the landlord retains responsibility for its maintenance).

The assessment needs to be reviewed regularly and, in any case, whenever there is reason to believe that the original assessment may no longer be valid.

L8 2000, the control of Legionella bacteria in water systems (APPROVED CODE OF PRACTICE & GUIDANCE), which was published by Health & Safety Commission, actually highlights at paragraph 45 the importance of using competent service providers, it states;

**“Those who are appointed to carry out the control measures and strategies should be suitably informed, instructed and trained and their suitability assessed”.**

Then at paragraph 50 it states;

**“Organisations should make reasonable enquiries to satisfy themselves of the competence of contractors in the area of work”**

Further at paragraph 51 it states;

**“An illustration of the levels of service which should be expected from service providers can be found in the Code of Conduct”**

Freeston Water Treatment Ltd are registered with The Legionella Control Association (LCA), which when L8 was written was known as the code of conduct association (referred to above). To be registered with the LCA a service provider has to agree to meet eight key service provider commitments and they are required each year as evidence that they meet these commitments to submit to the LCA secretariat an up to date statement of compliance. The statement should explain how the registering company complies with the eight commitments in terms of the Legionella control services that it provides.

#### **Other Important Information**

This assessment is based on information known to Freeston Water Treatment on the date of survey. Freeston Water Treatment Ltd accepts no responsibility for any loss or claim arising from information contained within this or any other associated document.

Freeston Water Treatment Ltd reserve the right to allow our client fourteen days in which to notify Freeston Water Treatment Ltd of any inaccuracies contained within this documentation or changes that should be made, after which it will be assumed that our client has accepted the documentation to be satisfactory and fully complete.

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## Periodic Review

Risk assessments should be reviewed when: -

- Significant changes have been made to a system, e.g. remedial works or planned modifications have been implemented.

The assessment must be completed for routine system operation and also for circumstances such as breakdown, abnormal operation, commissioning or other unusual circumstances.

- Changes have been made to the management and/or maintenance of the system, e.g. 6 months after a new maintenance company has been appointed.
- Significant changes have occurred in the way a system is being used, e.g. a formerly fully occupied building is now only partially occupied. If there is a doubt about what circumstances should initiate a review of the risk assessment, particularly at a complex or developing site, then a programme of annual reviews of audits should be considered.

### **IN ANY EVENT A REVIEW MUST BE CARRIED OUT EVERY TWO YEARS**

**The risk assessment report relates to observations made and information supplied at the time of the survey. Every effort has been made to examine as much of the domestic water system as possible although some areas, such as pipe work beneath floors or behind walls, would not have been inspected due to restricted access.**

## SITE SURVEY

The following section contains the condition survey reports for all identified plant located within the buildings premises.

This includes where fitted,

- Cold Water Storage Tanks
- Calorifiers\Hot Water Cylinders
- Local Water Heaters
- Showers
- Water Softeners
- Hot and Cold Water Distribution Temperatures

Any points of note or results that are out of parameter are highlighted in red.

<b>System Reference</b>	<b>Domestic Hot &amp; Cold Water Systems</b>
<b>Location</b>	<b>Guildhall Museum Queenborough</b>
<b>Method</b>	<b>Visual Assessment and Temperature Profiling</b>

## Management Control

The Health & Safety Executive (HSE) highlights that poor management control and lack of record keeping can be major factors contributing to the inadequate control of Legionella bacteria. At all times there should be a documented responsible person and a suitable communication pathway list. All personnel involved with Legionella management should be suitably trained.

During the survey it was identified that there is a Legionella control regime in place for Swale Borough Council buildings but this is not being carried out in all buildings; it should be ensured that the Guildhall Museum is included in the Legionella control regime and monitoring is carried out and recorded monthly when the system is in use.

It should be ensured that all staff involved with the Legionella control within Swale Borough Council properties has adequate training; all training records should be filed within the water hygiene folder on the computer system at Swale House.

All monthly monitoring must be maintained up to date within all of Swale Borough Council properties; this includes all of the data recorded onto the computer system at Swale House.

Ensure Schematic drawings of the water systems for the Guildhall Museum are filed on the computer system; all drawings must be kept updated when any changes are made to the water systems.

## **COLD WATER STORAGE**

There is no cold water storage within the Guildhall Museum; all cold water is supplied directly from the mains water services; the main was seen to rise within the ground floor toilet; the main serves the toilet wash basin, toilet flush and local water heater.

It should be noted that the water system within the Guildhall Museum was drained at the time of this assessment; the Guildhall Museum is only open from April to October each year so the water system is drained and isolated during the winter months.

Monthly temperature monitoring is only carried out during the months that the Guildhall Museum is open and the water system is live.

## HOT WATER STORAGE

Hot water within the Guildhall Museum is by one local water heater supplied directly from the mains water service; there is a minimal amount of stored water within this water heater when in use. The water heater was drained at the time of this assessment therefore no temperature monitoring could be carried out.

### Photographs of Hot Water Storage

Local water heater serving the toilet wash basin only. Water heater was drained at the time of this assessment due to the Museum being shut for winter.

Ensure water heater stores hot water at 60.0°C when back in use.





## DOMESTIC WATER DISTRIBUTION

Domestic water systems are very susceptible to colonization by Legionella bacteria where favourable conditions occur. Poorly designed, inadequately maintained systems, or those that operate at unsuitable temperatures, can aid the rapid multiplication of bacteria such as Legionella within these services.

Any water system achieving temperatures within the band 20°C to 45°C may allow the establishment and proliferation of Legionella bacteria. These conditions may occur within hot water services, including calorifiers or heaters, in "dead legs", intermittently used water services, or indeed cold water services where due to insufficient lagging, over-capacity and stagnation, warming occurs.

The direct risk comes from the generation of aerosols (fine water droplets). This may happen from any water outlet within the premises although the risk is low from non spray outlets. Where showers, spray taps etc are installed within the building water services, the risk is increased.

Mains cold water within the Guildhall Museum serves the toilet wash basin; toilet flush and local water heater.

Hot water within the Guildhall Museum is from the local water heater that serves the toilet wash basin only.

In all areas of distribution and use, inspection, test and measurement was undertaken at representative positions in order to evaluate conditions and areas of potential risk.

At the time of the survey (within one minute) for hot water and (within two minutes) for cold water outlets in the building were recorded as follows:-

Location	Temperature °C			Comments
	Hot	Cold	Mixed	
Toilet				

**No temperature monitoring was carried out due to the water system being drained and isolated for the winter months.**

**L8 recommends hot water should achieve 50.0°C at the outlet or to the TMV if fitted within one minute and cold water should be stored and distributed at no more than 20°C.**

**ASSET REGISTER**

Location	Toilet	Urinals	Sink/Basin	Shower	TMV-Tap	Other	Spray Fixings
Toilet	1		1			1	

## GENERAL

- All tap outlets should be kept free of scale build up as ideal nutrient for bacteria proliferation; clean on a regular basis.
- Flush any infrequently used outlets on a weekly basis.
- Insulation should be fitted to the domestic water pipe work within the Guildhall Museum to help prevent elevated water temperatures in summer and prevent freezing of pipe work.
- Ensure all flexible hose connections if fitted are WRAS approved change as required or hard plumb pipe work.

## ADDITIONAL PHOTOGRAPHS

Insulate domestic water pipe work within the Guildhall Museum to help prevent freezing in winter and elevated water temperatures in summer months.



## **RECORDS**

A water quality log book should be put in place and include records of weekly, monthly, quarterly, six monthly and annual procedures. These should be carried out as recommended in this risk assessment.

**Details of the responsibilities they hold should be included together with items listed as follows:**

**Annual inspections of calorifiers.**

**Audit sheet for inspections of the logbook and dated when completed.**

**Changing/cleaning of inline filters where fitted**

**Cleaning and chlorination of water tanks**

**Faults and defects to be recorded.**

**Flushing of all infrequently used outlets (weekly).**

**Inspection of water storage tanks.**

**Maintenance carried out on water systems**

**Monthly temperature monitoring**

**Purging of calorifiers**

**All of the above should be included in the water systems logbook and signed for when completed.**

**WRITTEN SCHEME**

	<b>Task</b>		<b>Frequency</b>
<b>1</b>	Flush infrequently used outlets taps, etc.		<b>Weekly</b>
<b>2</b>	Record hot and cold sentinel and additional outlet temperatures.		<b>Monthly</b>

## REMEDIAL RECOMMENDATIONS

Priority Rating	
	<b>High priority issue</b> - Urgent remedial action required to control a serious risk.
	<b>Medium priority issue</b> - Action is required in the near future to achieve compliance with L8 standards/guidelines.
	<b>Low priority issue</b> - Minor action or remedial work that is beneficial, but may not be directly linked with compliance to L8.



<b>RECOMMENDATION</b>			
<b>Risk</b>	HIGH	<b>System</b>	DOMESTIC WATER
<p>Continue the Legionella control regime that is in place; ensure monitoring for the Guildhall Museum is carried out and recorded onto the computer system at Swale House and maintained up to date.</p> <p>Ensure water heater is adjusted to store hot water at 60.0°C when back in use.</p>			
Work Assigned to:			
Date Work Completed			
Comments:			

<b>RECOMMENDATION</b>			
<b>Risk</b>	MEDIUM	<b>System</b>	DOMESTIC WATER
<p>Flush any infrequently used outlets on a weekly basis; record when carried out.</p> <p>I would recommend that Legionella and Bacteriological water samples be taken if temperature monitoring falls out of the recommended limits.</p> <p>Fit insulation to domestic water pipe work to help prevent heat gain and freezing.</p> <p>Ensure Schematic drawings of the water systems for the Guildhall Museum are filed within the water hygiene folder on the computer system at Swale House. These schematics must be maintained up to date.</p>			
Work Assigned to:			
Date Work Completed			
Comments:			

<b>RECOMMENDATION</b>			
<b>Risk</b>	LOW	<b>System</b>	DOMESTIC WATER
<p>Ensure all flexible hose connections where fitted are WRAS approved change as required or hard plumb pipe work.</p>			
Work Assigned to:			
Date Work Completed			
<p>Comments:</p>			

## **SUMMARY**

The water system within the Guildhall Museum is drained during the winter months as the Museum is shut. It should be ensured that when the water heater is back in use the heater should be set to store hot water at 60.0°C.

As already mentioned a Legionella control regime is in place but records were not seen to be up to date at the time of this assessment; monitoring records for the Guildhall Museum should be maintained up to date at all times. All monitoring records for this building and all Swale Borough Council buildings should be recorded onto the computer system; there is a water hygiene file on the computer system which has information including responsible persons for this building.

Staff who carry out monthly monitoring within the Guildhall Museum should have deputies nominated to ensure monitoring is still carried out when the person is on holiday or off through sickness.

All staff involved with the Legionella control within the Guildhall Museum should have adequate legionella awareness training and all certification should be filed within the water hygiene folder on the computer system.

## GLOSSARY

This section contains the glossary of terms that may have been used within this documentation.

<b>Aerosol</b>	A suspension in a gaseous medium of solid particles, liquid particles, or solid and liquid particles having negligible falling velocity
<b>Algae</b>	A small usually aquatic plant which requires light to grow, often found on exposed areas of cooling towers
<b>Air conditioning</b>	A form of air treatment whereby temperature, humidity and air cleanliness are all controlled with limits determined by the requirements of the air-conditioned enclosure
<b>Antibodies</b>	Substances in the blood that destroy or neutralise various toxins or components of bacteria known generally as antigens. The antibodies are formed as a result of the introduction into the body of the antigen to which they are antagonistic as in all infectious diseases.
<b>Bacteria (singular bacterium)</b>	A microscopic, uni-cellular (or more rarely multi-cellular) organism.
<b>Biocide</b>	A substance that kills micro-organisms.
<b>Biofilm</b>	A community of bacteria and other micro-organisms, embedded in a protective layer with entrained debris, attached to the surface.
<b>Blow-down/bleed-off</b>	Water discharged from the system to control the concentration of salts or other impurities in the circulating water, usually expressed as a percentage of re-circulating water flow.

<b>Calorifier</b>	An apparatus used for the transfer of heat to water in a vessel by indirect means, the source of heat being contained within a pipe or coil immersed in the water.
<b>Chlorine</b>	An element used in disinfection
<b>Cold water service</b>	Installation of plant, pipes and fittings in which cold water is stored, distributed and subsequently discharged.
<b>Cooling tower</b>	An apparatus through which warm water is discharged against an air stream; in doing so part of the water is evaporated to saturate the air and this cools the water. The cooler water is usually pumped to a heat exchanger to be reheated and recycled through the tower.
<b>Concentration factor</b>	Compares the level of dissolved solids in the cooling water with that dissolved in the makeup water (also known as cycle of concentration). Usually determined by comparison of either the chloride or magnesium hardness concentration.
<b>Corrosion inhibitor</b>	Chemicals which protect metals by: (a) passivating the metal by the promotion of a thin metal oxide film (anodic inhibitors), or (b) physically forming a thin barrier film by controlled deposition (cathodic inhibitors).
<b>Dead end/blind end</b>	A length of pipe closed at one end through which no water passes.
<b>Dead leg</b>	Pipes leading to a fitting through which water only passes when there is draw off from the fitting.
<b>Dip slide</b>	A dip slide is a means of testing the microbial content of liquids. It consists of a plastic carrier bearing a sterile culture medium which can be dipped in the liquid to be sampled. It is then incubated to allow microbial growth. The resulting microbial colonies are estimated by reference to a chart.

<b>Disinfection</b>	A process which destroys or irreversibly inactivates micro-organisms and reduces their number to a non-hazardous level.
<b>Distribution circuit</b>	Pipework which distributes water from hot or cold water plant to one or more fittings/appliances.
<b>Domestic water services</b>	Hot and cold water intended for personal hygiene, culinary, drinking water or other domestic purposes.
<b>Drift</b>	Circulating water lost from the tower as liquid droplets entrained in the exhaust air stream; usually expressed as a percentage of circulating water flow but for more precise work it is part of water per million by weight of air for a given liquid to gas ratio.
<b>Drift eliminator</b>	More correctly referred to as drift reducers or minimisers – equipment containing a complex system of baffles designed to remove water droplets from cooling tower air passing through it.
<b>Evaporative condenser</b>	A heat exchanger in which refrigerant is condensed by a combination of air movement and water sprays over its surface.
<b>Evaporative cooling</b>	A process by which a small portion of a circulating body of water is caused to evaporate thereby taking the required latent heat of evaporation from the remainder of the water and cooling it.
<b>Fill/packing</b>	That portion of a cooling tower which constitutes its primary heat transfer surface; sometimes called ‘packing’ or ‘pack’.
<b>Fouling</b>	Organic growth or other deposits on heat transfer surfaces causing loss of efficiency.
<b>Half life</b>	Ratio of system volume to purge rate.
<b>Hot water service</b>	Installation of plant, pipes and fittings in which water is heated, distributed and subsequently discharged (not including cold water feed tank or cistern).
<b>Legionnaires’ disease</b>	A form of pneumonia caused by Legionella bacteria.

<b>Legionellae</b>	The genus Legionella belongs to the family legionellaceae which has over 40 species. These are ubiquitous in the environment and found in a wide spectrum of natural and artificial collections of water.
<b>Legionella (singular of Legionellae)</b>	Type of aerobic bacterium which is found predominantly in warm water environments.
<b>L.pneumophila</b>	One of the causative organisms of Legionnaires' disease.
<b>Legionellosis</b>	Any illness caused by exposure to Legionella bacteria.
<b>Pontiac fever</b>	A disease caused by species of Legionella bacteria, an upper respiratory illness less severe than Legionnaires' disease.
<b>Make up water</b>	Water which is added to a cooling water system to compensate for wastage (e.g. via system leaks), evaporative loss and bleed.
<b>Micro-organism</b>	An organism of microscopic size including bacteria, fungi and viruses.
<b>Non oxidising biocide</b>	A non oxidising biocide is one that functions by mechanisms other than oxidation, including interference with cell metabolism and structure.
<b>Nutrient</b>	A food source for micro-organisms.
<b>Oxidising biocide</b>	Agents capable of oxidising organic matter, e.g. cell material, enzymes or proteins which are associated with microbiological populations resulting in death of the micro-organisms. The most commonly used oxidising biocides are based on chlorine or bromine (halogens) which liberate hypochlorous or hypobromous acids on hydrolysis in water. The exception is chlorine dioxide, a gas which does not hydrolyse but which functions in the same way.



<b>Pasteurisation</b>	Heat treatment to destroy micro-organism usually at high temperature.
<b>Planktonic</b>	Free floating micro-organisms in an aquatic system.
<b>PPM</b>	Parts per million: a measure of dissolved substances given as the number of parts there are in a million parts of solvent. It is numerically equivalent to milligrams per litre (mg/l) with respect to water.
<b>Pond/sump</b>	Collection of cooling water at the base of a cooling tower.
<b>Retention time</b>	Time a chemical is retained in the system.
<b>Scale inhibitors</b>	Chemicals used to control scale. They function by holding up the precipitation process and/or distorting the crystal shape, thus preventing the build up of a hard adherent scale.
<b>Sentinel taps</b>	For a hot water service – the first and last taps on a re-circulating system. For a cold water service (or non re-circulating hot water systems) the nearest and furthest taps may also include other taps which are considered to represent a particular risk.
<b>Sessile</b>	Aquatic micro-organisms adhering to a surface normally as part of a biofilm.
<b>Sludge</b>	A general term for soft mud like deposits found on heat transfer surfaces or other important sections of a cooling system. Also found at the base of calorifiers and cold water storage tanks.
<b>Shunt pump</b>	A circulation pump fitted to hot water service/plant to overcome the temperature stratification of stored water.

<b>Slime</b>	Mucus like exudates which cover a surface produced by some micro-organisms.
<b>Stagnation</b>	The condition where water ceases to flow and is therefore liable to microbiological growth.
<b>Strainer</b>	A coarse filter usually positioned upstream of a sensitive component such as a pump control valve or heat exchanger to protect it from debris.
<b>Thermal disinfection</b>	Heat treatment to disinfect a system.
<b>Thermostatic mixing valve</b>	Mixing valve in which the temperature at outlet is pre-selected and controlled automatically by the valve.
<b>Total viable count (TVC)</b>	The total number of culturable bacteria (per volume or area) in a given sample (does not include Legionella).
<b>Risk assessment</b>	Identifying and assessing the risk from exposure to Legionella bacteria from work activities and water sources on premises and determining any necessary precautionary measures.
<b>Windage</b>	Physical loss of water from a cooling tower caused by draught of air or wind – water is lost around the base of the cooling tower as a result of cross winds as opposed to drift.

If any further information is required, please feel free to contact Freeston Water Treatment Ltd, or the surveyor responsible for the works on your site.