



Links Children's Centre

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PREFACE

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INTRODUCTION & LEGIONELLA CONTROL

This report relates to a Legionella Risk Assessment carried out by Peter Smith of Freeston Water Treatment Ltd on the 21st May 2014 on behalf of Hampshire County Council. The survey was carried out at the Links Children's Centre, Linnet Close, Wecock Farm, Cowplain, Havant PO8 9UY. During the course of the survey the water systems within the children's centre only were risk assessed; the children's centre shares the water systems with the council building and nursery; these areas were not included in this assessment.

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 2013; HSG 274 - 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 Hampshire County 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 Hampshire County 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 2001, 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.

HOWEVER, IT IS OUR RECOMMENDATION THAT A REVIEW SHOULD BE CARRIED OUT AT A MINIMUM FREQUENCY OF 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.

System Reference	Domestic Hot & Cold Water Systems
Location	Links Children's Centre
Method	Visual Assessment and Temperature Profiling

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.

Legionella control within Links children's centre is being carried out as part of the Legionella control within the whole building; but this is not being carried out as recommended in the ACoP L8. A folder has been produced for the recording of temperatures in the different areas of the building; this folder does not meet the requirements of the ACoP L8.

A water systems logbook which conforms to the requirements of the ACoP L8 should be produced; the duty holder, responsible person and deputies for the building and children's centre should be nominated in writing and recorded within a water systems logbook; a written scheme should be produced and filed within the water systems logbook detailing all monitoring and checks that are and will be carried out within the building / centre.

Monthly monitoring should be carried out on sentinel outlets and some additional outlets on a monthly basis; at present only one hot and cold water temperature is being recorded on a monthly basis within the children's centre. Sentinel thermostatic mixing valves (TMVs) where fitted should also be monitored where fitted and accessible; the hot water calorifier flow and return should be monitored on a monthly basis; this at present is not being carried out.

Ensure Schematic drawings of the building / children's centre water systems are obtained or produced and are filed within the water systems logbook when put in place; all drawings must be kept updated when any changes are made to the water systems.

It should be ensured that all staff involved with the Legionella control has adequate training and all training records be filed within the logbook documentation.

COLD WATER STORAGE

There is no cold water storage within the Links Children's Centre; all cold water is supplied directly from the mains water service which serves all cold water outlets within the council building, nursery and children's centre; it also serves the hot water calorifier. The rising main was seen to rise within the buildings boiler room.

HOT WATER STORAGE

Hot water storage within the Links Children's Centre is from one hot water calorifier located within the council building boiler room; the calorifier is a Tribune type with a capacity of 250 litres. The calorifier is heated by the LTHW boiler located adjacent to the calorifier; the calorifier also has two electric elements located at the base and middle of the vessel for back up. The calorifier has a return system; this is fitted with a single return pump; a good return temperature was recorded at the time of this assessment. The calorifier has factory fitted insulation located beneath the outer metal casing; it is recommended the calorifier is purged to drain at least on an annual basis and recorded when carried out. The calorifier is supplied directly from the mains water service via a pressure reducer. At the time of this survey the storage temperature was also found to be satisfactory. There are temperature gauges mounted on the flow and return pipe work; the return gauge is on extended pipe work which can act as deadleg pipe work.

It should be ensured that this calorifier is monitored on a monthly basis as recommended in the ACoP L8 and temperatures are recorded within a water systems logbook.

Hot water storage and return temperatures at the time of this assessment were:

Calorifier Storage	60.0°C	This is Satisfactory
Calorifier Return	50.0°C	This is Satisfactory

ACoP L8 recommends hot water should be stored at no less than 60.0°C and the return maintain 50.0°C or more at all times. Hot water should achieve 50.0°C at the outlet or to the TMV within one minute.

Calorifier ID / Location	Tribune Type / Boiler Room
Calorifier Storage Temperature	60.0°C This is Satisfactory
Calorifier Return Temperature	50.0°C This is Satisfactory
Heat source	LTHW Boiler 2 x Electric Element
Linked/Single	Single
Insulation	Factory fitted beneath outer metal casing
De-Stratification pump	Not fitted
Temperature Gauges	Fitted on flow and return
Return System	Yes fitted
Number of Return Pumps	1 x Return Pump
Standby Pump	No
Drain	Yes fitted
Purged	No records seen
Notes	Start monitoring this calorifier flow and return temperatures on a monthly basis and record in a water systems logbook.

Photographs of Hot Water Storage

Hot water calorifier serving the council building, nursery and children centre outlets; It should be ensured that this calorifier is monitored on a monthly basis as recommended in the ACoP L8 and temperatures are recorded within a water systems logbook.



The hot water return temperature should be monitored and recorded on a monthly basis.



Pipe work to the expansion vessel can act as deadleg pipe work.



Temperature gauge on extended pipe work can act as deadleg; fit direct to main return pipe work.



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 rises within the boiler room and serves the council building first floor, nursery and children's centre cold water outlets; it also serves the hot water calorifier.

Hot water within the children's centre is by a Tribune type hot water calorifier located within the boiler room; this serves all hot water within the council building first floor, nursery and children's centre areas.

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	
Community Room	54.0	15.3		Satisfactory
Cleaners Room	55.2	14.8		Satisfactory
Gents Toilet	No Access	14.8	41.5	Not Satisfactory
Ladies Toilet	No Access	14.7	41.2	Not Satisfactory
Training Room	54.0	15.1		Satisfactory
Health Room	52.3	14.6	41.3	Satisfactory

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

The maximum from a TMV should not exceed more than 43°C.

Access should be made available to all TMVs for monitoring and maintenance to be carried out.

SHOWERS

Location	Disabled toilet
Number of showerheads fitted	1 in total
Type of showers?	Removable head and hose
Water Source Serving Showers?	Mains Water Service and Domestic Hot Water.
Are showers fitted with a TMV?	Shower has thermostatic control
Are Showerheads Cleaned & Inspected?	There is no regime in place for the cleaning and inspection of the showerheads; I would recommend this is put in place as soon as possible and carried out at least on a quarterly basis and recorded in a water systems logbook when carried out.
Shower risk rating	High due to aerosol creation
Are showers being used on a regular basis?	The shower is not used but is being flushed weekly; I would recommend this is removed if not required along with all associated pipe work.

It is essential that all showers are used on a regular basis; if showers are not used regularly then they should be flushed at least on a weekly basis and recorded when carried out. If showers are not used then consideration should be given into the removal ensuring no deadleg pipe work is created. Care should be taken when flushing showers consider removal of showerhead to prevent aerosol creation.

Showerhead cleaning and descaling should be carried out at least on a quarterly basis or as required and recorded within the water systems logbook when carried out.

ASSET REGISTER

Location	Toilet	Urinals	Sink/Basin	Shower	TMV-Tap	Other	Spray Fixings
Community Room			1			1	
Baby Change	1		1	1	1		
Cleaners Room			2				
Gents Toilet	1		1		1		
Ladies Toilet	2		2		1		
Training Room			1				
Health Room			1		1		

GENERAL

- Deadleg pipe work is an ideal area for bacteria proliferation and should be removed or flushed without creating an aerosol at least on a weekly basis and recorded when carried out. Deadleg pipe work was seen in the following areas:-
 - Calorifier return temperature gauge on extended pipe work can act as deadleg pipe work.
 - Calorifier expansion vessel pipe work can act as deadleg pipe work.
 - There is a deadleg on the rising main within the boiler room.
 - Infrequently used tap outlet within the boiler room will act as deadleg pipe work.
 - The shower within the disabled toilet is not used thus creating deadleg pipe work.
- Infrequently used outlets within the children's centre are being flushed on a weekly basis and recorded in the monitoring folder.
- Showerheads should be cleaned and descaled at least on a quarterly basis and recorded when carried out; no records seen for this.
- All tap outlets within the children's centre areas should be kept free of scale build up as ideal nutrient for bacteria proliferation; clean on a regular basis.

- Thermostatic mixing valves (TMVs) are fitted within the children's centre areas; all TMVs should be serviced and maintained as recommended by the manufacturer. Records were seen at the time of this assessment to indicate servicing and maintenance is being carried out; this was last carried out in February 2014.
- It should be ensured that all flexible hose connections where fitted are WRAS approved change as required or hard plumb pipe work.

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 disinfection 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.

CONTROL MEASURES (ACoP L8 Minimum)

	Task	Frequency
1	Flush infrequently used outlets showers outside taps etc.	Weekly
2	Record hot water calorifier flow and return temperatures.	Monthly
3	Record hot and cold sentinel outlet temperatures including TMV supply.	Monthly
4	Record a representative number of other outlet temperatures	During the Year
5	Clean and descale shower heads and hoses.	Quarterly or as Required
6	Record cold water storage tank temperature at inlet and the stored water	Annually (Summer) or as indicated by the temperature monitoring
7	Visually inspect cold water storage tank and carry out remedial work where necessary	Annually
8	Purge hot water calorifier to drain and record condition of drain water	Annually
9	Inspect hot water calorifier internal surfaces for scale and sludge if access permits.	Annually

REMEDIAL RECOMMENDATIONS

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

RECOMMENDATION			
Risk	HIGH	System	DOMESTIC WATER
<p>A Legionella water systems logbook which conforms to the requirements of the ACoP L8 must be put in place at the earliest opportunity; duty holder, responsible person, deputies and all operational staff for the council building / children's centre should be nominated in writing along with all contact details. A written scheme should be put in place to identify checks and procedures that are carried out and frequency of when carried out.</p> <p>Start monthly temperature monitoring of all sentinel hot and cold water outlets and additional outlets within the children's centre on a monthly basis and record in a water systems logbook.</p> <p>Start monthly monitoring of the hot water calorifier flow and return temperatures and record in a water systems logbook.</p> <p>Remove all deadleg pipe work.</p> <p>Remove shower and all associated pipe work if not required.</p>			
Work Assigned to:			
Date Work Completed			
Comments:			

RECOMMENDATION			
Risk	MEDIUM	System	DOMESTIC WATER
<p>Continue to flush all infrequently used outlets within the children's centre 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>All tap outlets within the children's centre should be kept free of scale build up as ideal nutrient for bacteria proliferation; clean on a regular basis.</p> <p>Continue to service all TMVs to manufacturer's recommendations or at least on an annual basis.</p> <p>Ensure all TMVs within the children's centre are made accessible for maintenance and monitoring to be carried out.</p> <p>Ensure the showerhead is cleaned and descaled at least on a quarterly basis; record when carried out.</p> <p>It must be ensured that all personnel who carry out legionella management within the council building / children's centre are competent and adequately trained. Refresher training should be given annually.</p> <p>Ensure Schematic drawings of the council building / children's centre water systems are obtained or produced and filed within the water systems logbook when put in place.</p>			
Work Assigned to:			
Date Work Completed			
Comments:			

CONTROL MEASURE RECOMMENDATIONS			
Risk	LOW	System	DOMESTIC WATER SYSTEM
<p>Ensure that flexible pipe work where fitted is WRAS approved. Change or replace with hard plumbed copper pipe work.</p>			
Work Assigned to:			
Date Work Completed			
Comments:			

SUMMARY

As already mentioned Legionella control within Links children's centre is not being carried out as recommended in the ACoP L8; at present a single hot and cold water temperature is monitored on a monthly basis; the hot water calorifier is not being monitored; this is not satisfactory.

A water systems logbook which conforms to the requirements of the ACoP L8 should be produced; the duty holder, responsible person and deputies for the council building / children's centre should be nominated in writing and recorded within a water systems logbook; a written scheme should be produced and filed within the water systems logbook detailing all monitoring and checks that are and will be carried out within the centre.

All staff involved with the Legionella control within this council building / children's centre should have adequate training and all certification should be filed within the logbook documentation.

Ensure Schematic drawings of the council building / children's centre water systems are obtained or produced and filed within the water systems logbook when put in place.

GLOSSARY

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

Aerosol	A suspension in a gaseous medium of solid particles, liquid particles, or solid and liquid particles having negligible falling velocity
Algae	A small usually aquatic plant which requires light to grow, often found on exposed areas of cooling towers
Air conditioning	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
Antibodies	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.
Bacteria (singular bacterium)	A microscopic, uni-cellular (or more rarely multi-cellular) organism.
Biocide	A substance that kills micro-organisms.
Biofilm	A community of bacteria and other micro-organisms, embedded in a protective layer with entrained debris, attached to the surface.
Blow-down/bleed-off	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.

Calorifier	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.
Chlorine	An element used in disinfection
Cold water service	Installation of plant, pipes and fittings in which cold water is stored, distributed and subsequently discharged.
Cooling tower	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.
Concentration factor	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.
Corrosion inhibitor	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).
Dead end/blind end	A length of pipe closed at one end through which no water passes.
Dead leg	Pipes leading to a fitting through which water only passes when there is draw off from the fitting.
Dip slide	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.

Disinfection	A process which destroys or irreversibly inactivates micro-organisms and reduces their number to a non-hazardous level.
Distribution circuit	Pipework which distributes water from hot or cold water plant to one or more fittings/appliances.
Domestic water services	Hot and cold water intended for personal hygiene, culinary, drinking water or other domestic purposes.
Drift	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.
Drift eliminator	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.
Evaporative condenser	A heat exchanger in which refrigerant is condensed by a combination of air movement and water sprays over its surface.
Evaporative cooling	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.
Fill/packing	That portion of a cooling tower which constitutes its primary heat transfer surface; sometimes called 'packing' or 'pack'.
Fouling	Organic growth or other deposits on heat transfer surfaces causing loss of efficiency.
Half life	Ratio of system volume to purge rate.
Hot water service	Installation of plant, pipes and fittings in which water is heated, distributed and subsequently discharged (not including cold water feed tank or cistern).
Legionnaires' disease	A form of pneumonia caused by Legionella bacteria.

Legionellae	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.
Legionella (singular of Legionellae)	Type of aerobic bacterium which is found predominantly in warm water environments.
L.pneumophila	One of the causative organisms of Legionnaires' disease.
Legionellosis	Any illness caused by exposure to Legionella bacteria.
Pontiac fever	A disease caused by species of Legionella bacteria, an upper respiratory illness less severe than Legionnaires' disease.
Make up water	Water which is added to a cooling water system to compensate for wastage (e.g. via system leaks), evaporative loss and bleed.
Micro-organism	An organism of microscopic size including bacteria, fungi and viruses.
Non oxidising biocide	A non oxidising biocide is one that functions by mechanisms other than oxidation, including interference with cell metabolism and structure.
Nutrient	A food source for micro-organisms.
Oxidising biocide	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.

Pasteurisation	Heat treatment to destroy micro-organism usually at high temperature.
Planktonic	Free floating micro-organisms in an aquatic system.
PPM	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.
Pond/sump	Collection of cooling water at the base of a cooling tower.
Retention time	Time a chemical is retained in the system.
Scale inhibitors	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.
Sentinel taps	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.
Sessile	Aquatic micro-organisms adhering to a surface normally as part of a biofilm.
Sludge	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.
Shunt pump	A circulation pump fitted to hot water service/plant to overcome the temperature stratification of stored water.
Slime	Mucus like exudates which cover a surface produced by some micro-organisms.

Stagnation	The condition where water ceases to flow and is therefore liable to microbiological growth.
Strainer	A coarse filter usually positioned upstream of a sensitive component such as a pump control valve or heat exchanger to protect it from debris.
Thermal disinfection	Heat treatment to disinfect a system.
Thermostatic mixing valve	Mixing valve in which the temperature at outlet is pre-selected and controlled automatically by the valve.
Total viable count (TVC)	The total number of culturable bacteria (per volume or area) in a given sample (does not include Legionella).
Risk assessment	Identifying and assessing the risk from exposure to Legionella bacteria from work activities and water sources on premises and determining any necessary precautionary measures.
Windage	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.