



Forest First Children's Centre
Hampshire County Council

CONTENTS

PREFACE	Page 3
INTRODUCTION	Pages 4 - 5
BACKGROUND TO LEGIONELLA	Page 6
ASSESSMENT OF RISK	Pages 7 - 8
OBSERVATIONS	Pages 9 - 11
SITE SURVEY HOT & COLD DISTRIBUTION	Pages 12 - 15
GENERAL, RECORDS, ADDITIONAL PHOTOGRAPHS	Pages 16 - 20
ASSET REGISTER	Page 21
CONTROL MEASURES & REMEDIAL RECOMMENDATIONS	Pages 22 - 28
GLOSSARY	Pages 29 - 34

PREFACE

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Date of Review: May 2016

INTRODUCTION

This report relates to a Legionella Risk Assessment carried out by David Borthwick of Freeston Water Treatment Ltd on the 29th May 2014 on behalf of Hampshire County Council. The Survey was carried out at Forest First Children's Centre, Heather Road, Fawley, Hampshire SO45 1DZ.

During the course of the Survey water systems within the properties were risk assessed. These sources were chosen as being fully representative of the overall domestic water systems and outlets within the buildings.

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 specific observations made in this assessment should be read in conjunction with the practices and procedures detailed in the recommendations section and also with ACoP L8 2013 and HSG247 Part 2.

The Risk Assessment has been carried out in accordance with ACoP L8 - The control of Legionella bacteria in water systems (Approved Code of Practice and Guidance) & 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 ACoP L8 have been recorded during the Survey and specific references are made to compliance with these documents 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.

BACKGROUND TO LEGIONELLA

Legionella is the bacterium that causes Legionnaires disease. Of this bacterium, Legionella pneumophila is the species most commonly associated with disease outbreaks. Legionnaire's disease is identified as a pneumonia type of infection of the lower respiratory tract. The infection is most commonly acquired by the inhalation of airborne droplets or particles containing viable Legionella. Exposure to Legionella can also cause a short feverish illness without pneumonia known as Pontiac Fever.

Research indicates that Legionella can occur in hot and cold water services.

Sediment, scale, and organic materials present in water systems, can provide nutrients and give protection for Legionella. Legionella has been shown to colonise certain types of water fittings, pipe work and materials used in the construction of water systems.

The formation of bio films within water systems is undesirable and may also provide harbourage and favourable conditions for Legionella growth. Legionella is most likely to proliferate in water systems that have a temperature between 20°C and 50°C. Human blood temperature of approximately 37°C is the most ideal temperature for proliferation. Stagnant water within the above temperature range appears to provide the ideal conditions for proliferation of Legionella.

Once a risk has been identified and assessed, a scheme should be prepared for preventing or controlling it. The risk is heightened when conditions are not monitored and control of the system is lost, thereby allowing Legionella to proliferate.

Legionella will survive at temperatures below 20°C but is considered to be in a dormant state with no growth activity. The bacterium does not survive temperatures maintained consistently at 60°C or above.

ASSESSMENT OF RISK

The Legionella risk

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.

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

Risk assessment categories:-

- A) The potential for the formation of droplets.
- B) The condition of the water.
- C) Water temperature.
- D) The water turnover rate.
- E) The susceptibility of persons exposed to droplets.
- F) The population density exposed to droplets.

In undertaking the Risk Assessment and drawing up precautions, particular attention must be paid to situations where the population exposed contains a relatively high number of people susceptible to Legionella, due to their age and in many cases poor health.

Risk Assessment Review

The Risk Assessment should be reviewed regularly (dependent on the level of risk) and whenever there is reason to suspect that it is no longer valid or otherwise for any of the reasons below:-

- 1) Changes are made to plant or water systems or its use.
- 2) Changes are made to building use in which the water system is installed.
- 3) New information about risks or control measures becomes available.
- 4) Results of checks indicate that control measures are no longer effective.

An indication of when to review the assessment and what needs to be reviewed should be recorded.

OBSERVATIONS

General and specific observations on the systems made during the course of the Survey are recorded and the more general requirements of L8 are commented where applicable, although references are made to compliance with the requirements of L8.

Compliance with ACoP L8 may be classified into two distinct categories:

- a) Management Procedures - The management procedures, which have been implemented, to ensure that all control measures, record keeping and monitoring are adequate and effective.
- b) Systems Conditions - The physical conditions of the water systems in the building must be considered when assessing the risk from Legionellosis.

This report therefore addresses the above categories. A general overview of existing Management Procedures is included and followed by comprehensive observations of the Systems Conditions as seen during the course of the Survey.

General Management Compliance

ACoP L8 para 23 - Identify Sources of Risk

Observations

The assessments are detailed in the relevant section of this report.

General Management Compliance

ACoP L8 para's 39, 53 and 66 - Prepare a Scheme for Preventing or Controlling the Risk - Implement and Manage Precautions - Maintain Records

Observations

A regime of repair and breakdown maintenance should be implemented for the building at Forest First Children's Centre for all of the water services and systems. Procedures and records for the various maintenance activities must be documented and the Written Scheme recommendations be implemented in order to control Legionellosis. The precautions taken must be documented within an operational logbook.

Further Action Required

A Logbook should be prepared and records kept within it, as outlined in our recommendations. The logbook, documentation and operation should be audited on a periodic basis in order to ensure that the system conditions and precautionary procedures are being carried out satisfactorily.

The precise procedures relating to the precautionary measures, i.e. cleaning of water tank systems and calorifiers together with start up and shut down procedures for calorifiers, should be maintained within the logbook system and updated as required. The details of persons who are trained and competent to undertake the works should also be recorded in the logbook along with details of the training undertaken. This also applies to specialist contractors who may undertake part of these duties.

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 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

A responsible person should be appointed to take day-to-day responsibility for the Written Scheme. If the assessment shows that there is a reasonably foreseeable risk and it is reasonably practicable to prevent exposure or control the risk from exposure, the person on whom the statutory duty falls (see paragraph 23) should appoint a person or persons to take managerial responsibility and to provide supervision for the implementation of precautions. (Paragraph 39 HSE's ACoP L8)

There is no dedicated water systems logbook in place and no Legionella management or weekly flushing of all outlets currently being carried out.

The central heating system is not included in this survey as it is a closed system and in normal operation does not pose a Legionella or bacterial risk.

System Reference	Forest First Children's Centre
Location	Site Buildings
Method	Visual Assessment and Temperature Profiling

HOT WATER STORAGE

There is no domestic hot water storage at Forest First Children's Centre. Domestic hot water is provided by a Worcester 28CDI combi boiler, located in the cleaner's room.

Combi boilers should heat domestic hot water sufficiently to achieve a minimum of 50°C at the inlet to all TMVs (Thermostatic Mixing Valves) or hot outlets within one minute.

At the time of this survey the combi boiler was not working correctly and there was no hot domestic water on site.

COLD WATER STORAGE

There is no domestic cold water storage at Forest First Children's Centre.

DOMESTIC WATER DISTRIBUTION

Domestic water services should operate at temperatures that prevent the proliferation of Legionella. L8 specifies that hot water should be stored at no less than 60°C and distributed at no less than 50°C, obtainable at user outlets within one minute of opening. Cold water should be stored and distributed at no more than 20°C.

Domestic hot water storage at Forest First Children's Centre is by a combi boiler in the cleaner's room which provides hot water to all domestic hot water outlets.

Mains cold water within Forest First children's centre serves the combi boiler, all cold water outlets and all appliances on site.

At the time of the Survey (within one minute) these hot water outlets within the buildings were recorded as follows:-

Forest First Children's Centre	
Hot Water Outlet Temperatures	
Disabled Toilet	15°C inlet to TMV Not Satisfactory 15°C TMV Outlet Not Satisfactory
Ladies Toilet	16°C Not Satisfactory
Kitchen Sink	17°C Not Satisfactory

ACoP L8 recommends that the hot water should achieve a minimum of 50°C, obtainable at user outlets within one minute of opening.

TMVs (Thermostatic Mixing Valves) are fitted to ensure that the water temperature at hot water outlet does not exceed 43°C and scald users. Ideally the water temperature from a TMV should be no less than 39°C.

The hot water supplying TMVs should be a minimum of 50°C at the TMV inlet as recommended in ACoP L8.

At the time of the Survey (within two minutes) the cold water outlets within the buildings were as follows:

Forest First Children's Centre	
Cold Water Outlet Temperatures	
Disabled Toilet	15°C Satisfactory
Ladies Toilet	15°C Satisfactory
Kitchen sink	16°C Satisfactory

ACoP L8 recommends cold water should be stored and distributed at no more than 20°C.

GENERAL

- I would recommend a water systems logbook which conforms to the requirements of the ACoP L8 be produced and put in place at the earliest opportunity. The duty holder, responsible person; deputies and all operational staff involved with the Legionella control within the centre are nominated in writing and the names and contact details should be written within the logbook documentation.
- Thermostatic Mixing Valves (TMVs) and TMV Taps are fitted in most areas and should be serviced and maintained to the manufacturers recommendations.
- Infrequently used outlets are ideal areas for the proliferation of bacteria. Areas where the outlets are not used at least on a weekly basis should be removed or put on a weekly flushing regime (without creating an aerosol) and recorded.
- Dead leg pipework is an ideal area for the proliferation of bacteria and should be removed or put on a weekly flushing regime (without creating an aerosol) and recorded within a logbook. Dead legs found at the time of this survey:-
 - In the office and IT room there are wash basins which have been boxed in thus preventing their use. Pipe work to these outlets is still connected.
 - There is a capped off pipe in the Kitchen creating a dead leg.
- There are no showers on site.

- Monthly temperature monitoring of the hot and cold outlets is not being carried out and recorded within a logbook. The water temperatures of **every** sentinel (the nearest and furthest outlets from the domestic hot and cold supplies) must be taken monthly and recorded. Other outlets should have temperatures taken on a monthly rotational basis so that over a period of 12 months an amount of outlets which are representative of the total number of outlets on site will have been covered.
- I would recommend that schematic drawings of the domestic water and heating systems for the building are produced and filed within the logbook.
- I would recommend that a Responsible Person be nominated to carry out Legionella management within this building. A Deputy Responsible Person should also be appointed to carry out Legionella management in periods of annual leave and sickness. I would recommend that Legionella training is given to all personnel involved with Legionella management and would consider it prudent to carry out annual refresher training.
- Pipe work within this building did not appear to be adequately insulated against heat loss / gain in some areas.
- It is unknown when, or if, water samples for legionella and bacteriological testing have been taken. I would recommend that water samples are taken for testing if temperatures fall outside of the limits as detailed in ACoP L8.

- There is a bubble tube in the main play room. Bubble tubes should be cleaned on a regular basis and be treated with a suitable biocide. This should be recorded when carried out.
- It is unknown where the cold mains rises in the building as it has been boxed in. I recommend the location is identified and access made to enable the stop cock to be used when needed.
- A Written Scheme should be prepared to ensure that all necessary controls are maintained, monitored and remain effective.

BS8580 states – 'Note - The Risk Assessment does not involve the preparation of the written scheme but rather provides information that is critical to the preparation'.

Regulations and guidance regarding the Written Scheme can be found in ACoP L8 Paragraphs 52-76.

RECORDS

It is recommended that a water quality log book be produced for the site to 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:

Maintenance carried out on the domestic hot and cold systems

TMV maintenance and servicing

Monthly temperature monitoring

Flushing of infrequently used outlets

Faults and defects to be recorded

Inline strainers cleaning and descaling

Changing / replacing of water filters

Audit sheet for inspections of the logbook and dated when completed

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

ADDITIONAL PHOTOGRAPHS

Office

Wash basins in the office and in the IT room have been boxed in creating dead leg pipe work.

Recommend removal of pipe work.



Kitchen

Dead Leg

Dead legs are an ideal area for bacteria proliferation and should be removed back to the nearest live pipe work or put on a weekly flushing regime.



Play Room

Bubble Tubes should be cleaned out on a regular basis or as required and be treated with a suitable biocide. This should be recorded when carried out.



Hampshire County Council Forest First Children's Centre Domestic Water Asset Register	
Area	Asset Type
Office	1 X Wash Basin SENTINEL
It Room	1 X Wash Basin
Disabled Toilet	1 X Wash Basin 1 X TMV 1 X WC
Gents Toilet	2 X Wash Basin 1 X WC 3 X Urinals
Kitchen	1 X Sink SENTINEL
Ladies Toilet	2 X Wash Basin 2 X WC

REMEDIAL RECOMMENDATIONS

Note - Recommendations are divided into two categories:-

CONTROL MEASURES – These are generally ongoing actions.

CORRECTIVE ACTIONS – These are generally actions carried out once.

The priority grading of Control Measures and Corrective Actions is as follows:-

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 ACoP L8 & BS8580 standards/guidelines.
	Low priority issue - Minor action or remedial work that is beneficial, but may not be directly linked with compliance to ACoP L8 & BS8580.

CONTROL MEASURE RECOMMENDATIONS			
Risk	HIGH	System	DOMESTIC WATER SYSTEM
<p>A water systems logbook which conforms to the requirements of the ACoP L8 should be produced and put in place at the earliest opportunity. The duty holder, responsible person; deputies and all operational staff involved with the Legionella control within the centre are nominated in writing and the names and contact details should be written within the logbook documentation.</p> <p>I would recommend that Legionella and Bacteriological water samples be taken from the domestic water system if temperature monitoring shows temperatures out of the recommended limits.</p> <p>Flush all infrequently used outlets on a weekly basis (without creating an aerosol) and record within the logbook when carried out.</p> <p>Commence monthly temperature monitoring of the domestic hot and cold water outlets including sentinel and representative outlets as soon as is practicable and record within the logbook when carried out.</p> <p>Ensure that <u>all</u> Legionella Management is recorded within the logbook when carried out.</p>			
Work Assigned to:			
Date Work Completed			
Comments:			

CONTROL MEASURE RECOMMENDATIONS			
Risk	MEDIUM	System	DOMESTIC WATER SYSTEM
<p>Audit the logbook on a regular basis to ensure monitoring is being carried out and is up to date.</p> <p>Ensure that the cold mains stop cock is identified and made accessible.</p> <p>Ensure that TMVs are cleaned on a regular basis and recorded within the logbook when carried out.</p> <p>Insulate pipe work to minimise heat losses and gains.</p> <p>Bubble Tubes should be cleaned on a regular basis or as required and be treated with a suitable biocide. This should be recorded when carried out.</p>			
Work Assigned to:			
Date Work Completed			
Comments:			

CONTROL MEASURE RECOMMENDATIONS			
Risk	LOW	System	DOMESTIC WATER SYSTEM
No Low Risk Recommendations made.			
Work Assigned to:			
Date Work Completed			
Comments:			

CORRECTIVE ACTION RECOMMENDATIONS			
Risk	HIGH	System	DOMESTIC WATER SYSTEM
<p>I would recommend that an ACoP L8 / BS8580 compliant water services logbook should be produced and all legionella management recorded within it. The management structure should be listed with the names, contact details and responsibilities of the Statutory Duty Holder, the Responsible Person and Deputy Responsible Persons.</p> <p>A Written Scheme should be prepared to ensure that all necessary controls are maintained, monitored and remain effective.</p> <p>BS8580 states – ‘Note - The Risk Assessment does not involve the preparation of the written scheme but rather provides information that is critical to the preparation’.</p> <p>Remove all dead leg pipe work or put on a weekly flushing regime (without creating an aerosol) and record in the logbook when carried out.</p>			
Work Assigned to:			
Date Work Completed			
Comments:			

CORRECTIVE ACTION RECOMMENDATIONS			
Risk	MEDIUM	System	DOMESTIC WATER SYSTEM
<p>Nominate a Responsible Person to carry out Legionella management on site.</p> <p>Appoint a Deputy Responsible Person to carry out Legionella management on site in periods of annual leave and sickness.</p> <p>It must be ensured that all personnel who carry out legionella management on site are competent and adequately trained. Refresher training should be given annually.</p>			
Work Assigned to:			
Date Work Completed			
Comments:			

CORRECTIVE ACTION RECOMMENDATIONS			
Risk	LOW	System	DOMESTIC WATER SYSTEM
Ensure that flexible pipe work is WRAS approved. Change or replace with copper pipe work.			
Work Assigned to:			
Date Work Completed			
Comments:			

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.

<p>Oxidising biocide</p>	<p>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.</p>
<p>Pasteurisation</p>	<p>Heat treatment to destroy micro-organism usually at high temperature.</p>
<p>Planktonic</p>	<p>Free floating micro-organisms in an aquatic system.</p>
<p>PPM</p>	<p>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.</p>
<p>Pond/sump</p>	<p>Collection of cooling water at the base of a cooling tower.</p>
<p>Retention time</p>	<p>Time a chemical is retained in the system.</p>
<p>Scale inhibitors</p>	<p>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.</p>
<p>Sentinel taps</p>	<p>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.</p>

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 contact Freeston Water Treatment Ltd, or the surveyor responsible for the works on your site.