

CONTENTS

PREFACE	Page 2
INTRODUCTION	Page 3
BACKGROUND TO LEGIONELLA	Pages 4
ASSESSMENT OF RISK	Pages 5-6
OBSERVATIONS	Pages 7-9
SITE SURVEY HOT & COLD DISTRIBUTION	Pages 10-16
GENERAL RECORDS, ADDITIONAL PHOTOGRAPHS & DRAWINGS	Pages 17-22
WRITTEN SCHEME & REMEDIAL RECOMMENDATIONS	Pages 23-26

PREFACE

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INTRODUCTION

This report relates to a water source Risk Assessment carried out by Mr Chris Wilson of Freeston Water Treatment Ltd on the 1st February 2011 on behalf of Hampshire County Council. The Survey was carried out at The Waterloo School, Warfield Avenue, Waterlooville, Hampshire PO7 7JJ. 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 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).

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 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 every 2 years as stated in the HSE's ACoP L8 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.

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 buildings at The Waterloo School 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 cistern 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 a dedicated water systems logbook in place and monthly temperature monitoring of the hot and cold outlets are being carried out.

No monthly temperature monitoring of the calorifier storage and return temperatures is being carried out and should be commenced as soon as is practicable.

System Reference	The Waterloo School
Location	Site Buildings
Method	Visual Assessment and Temperature Profiling

HOT WATER STORAGE

Hot water storage at The Waterloo School is by one calorifier located within the Plant Room. The calorifier is manufactured by Hoval. It is fed by the domestic cold water storage cistern, is indirectly heated by an internal coil from the heating boilers and supplies all the domestic hot water on site. The calorifier has insulation under the metal outer casing. There is a return system fitted to the calorifier that has two circulating pumps piped in parallel. At the time of the Survey the left hand pump appeared to be working correctly but the right hand was not working despite being turned on at the switch. This is causing a dead leg and should be replaced as soon as is practicable, in the meantime it should be removed and flushed weekly (without creating an aerosol) by opening the valves either side of it. This should be recorded within the logbook when carried out.

I would recommend that the calorifier be purged to drain to check the water quality on at least a six monthly period and recorded within a water systems logbook when carried out.

L8 recommends that calorifiers are checked internally for scale and sludge on an annual basis. It is unknown if an internal inspection and descale has been carried out.

There are temperature gauges on the hot flow pipe but not on the return and I would recommend that one is fitted for monthly temperature monitoring to be carried out.

L8 recommends hot water storage to be a minimum of 60°C and the return to be maintained at a minimum of 50°C at all times. **I would recommend that the calorifier is adjusted to achieve this.**

The temperature of the water at the time of the Survey was:-

Calorifier	Storage	58.1°C	Not Satisfactory
Calorifier	Return	50.1°C	Satisfactory

Plant Room

Calorifier



COLD WATER STORAGE

There is one domestic cold water storage and one feed and expansion tank for the heating boilers at The Waterloo School. As the feed and expansion tank supplies the heating system which is a closed system it therefore does not pose a Legionella risk in normal operation, so the vessel is not covered by this report.

Both vessels are in the roof space above the server on a platform. The vessels are at height and access is difficult; I was therefore unable to carry out a Risk Assessment Survey on the domestic cold water storage cistern. I would recommend that safe access is arranged for a Risk Assessment to be carried out.

Roof Space above Servery

The view looking upwards showing the difficult access to the platform that supports the domestic cold water storage cistern.



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 within The Waterloo School site distributes from one calorifier located within the Plant Room and supplies all the domestic hot water on site.

The domestic cold water storage cistern within The Waterloo School is located on a platform within the roof space above the Servery. It is thought to supply cold water to the calorifier and all cold outlets except in the Food Tech Room 48, Corridor Room 2, Toilet Room 4, Toilet Room 3, Kitchen Room 14 and the Caretakers Room 19 which are mains cold water fed.

Mains cold water within The Waterloo School supplies the domestic cold water storage cistern, the heating boilers feed and expansion tank and all other cold outlets and appliances not supplied by the domestic cold water storage cistern.

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) these hot water outlets within the buildings were recorded as follows:-

The Waterloo School	
Hot Water Outlet Temperatures	
First Floor Food Technology Room 48 Sink	53.6°C Inlet to TMV Satisfactory 40.6°C TMV Outlet Satisfactory
First Floor Toilet Room 42 Wash Basin	48.5°C Inlet to TMV Satisfactory 40.1°C TMV Outlet Satisfactory
Ground Floor Room 22 Sink	50.0°C Inlet to TMV Satisfactory 41.7°C TMV Outlet Satisfactory
Ground Floor Caretakers Room Room 19 Sink	58.1°C Satisfactory
Ground Floor Toilet Room 4 Wash Basin	50.7°C Inlet to TMV Satisfactory 42.2°C TMV Outlet Satisfactory
Ground Floor Kitchen Changing Room Room 61 Wash Basin	50.2°C Inlet to TMV Satisfactory 40.4°C TMV Outlet Satisfactory

L8 recommends that the hot water should achieve 50°C, obtainable at user outlets within one minute of opening. TMV's (Thermostatic Mixing Valves) are fitted to ensure that the water temperature at hot water outlets does not exceed 43°C and scald users. The hot water supplying the TMV's should be 50°C at the TMV inlet as recommended in L8.

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

The Waterloo School	
Cold Water Outlet Temperatures	
First Floor Food Technology Room 48 Sink	9.1°C Satisfactory
First Floor Toilet Room 42 Wash Basin	18.6°C Satisfactory
Ground Floor Room 22 Sink	18.6°C Satisfactory
Ground Floor Caretakers Room Room 19 Sink	6.9°C Satisfactory
Ground Floor Toilet Room 4 Wash Basin	8.0°C Satisfactory
Ground Floor Kitchen Changing Room Room 61 Wash Basin	8.4°C Satisfactory

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

GENERAL

- Thermostatic Mixing Valves (TMV's) are fitted in many areas of The Waterloo School; these valves should be serviced and maintained to the manufacturers recommendations. I was informed that this is carried out twice annually by an outside contractor.
- 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. This is currently being carried out weekly and recorded but needs to include disabled toilet room 16 and the showers in room 15. I was informed that this will now be included on the flushing list and will be recorded when carried out.
- Dead leg pipework are ideal areas for the proliferation of bacteria and should be removed or put on a weekly flushing regime (without creating an aerosol) and recorded.

Dead legs were found in the following areas:-

- Plant Room - there are two dead legs on the calorifier flow pipe. The pipe to the temperature gauge is too long and should be shortened and there is a pigtail type dead leg pipe to the pressure gauge that should be removed.
- The right side hot return circulation pump to the calorifier is not working and therefore creating a dead leg.

- The outside tap has been disconnected and the pipe to it has an open end;. I would recommend that this pipe is traced back to the water header to ensure that no dead legs have been created.
- The shower heads and hoses must be cleaned and disinfected quarterly and recorded when carried out as recommended in L8. This is being carried out and being recorded within the logbook.
- It is unknown when Legionella or Bacteriological samples were last taken and I would recommend that this is carried out if temperatures fall outside of the limits as detailed in L8.
- Monthly temperature monitoring of the calorifier flow and return pipework is not being carried out and recorded and I would recommend that this is commenced as soon as is practicable.
- There is an electric water boiler within the Staff Room. Although not seen there is likely to be an inline filter fitted. If this is the case it should be cleaned and replaced in-line with the manufacturer's recommendations.
- Monthly temperature monitoring of the hot and cold outlets is being carried out on an outlet in the kitchen. The water temperatures of every sentinel (the nearest and furthest from the supply) outlet must be taken monthly and recorded. Other representative basis should have temperatures taken on a monthly rotational basis so that over a period of 12 months all outlets will have been covered. This may be hindered by the fact that many of the TMV's are behind panels that are not easy to remove in all cases. I was informed that this will be carried out in the future and all results will be recorded within the logbook.

RECORDS

The log book should 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 water systems

Cleaning and disinfection of water cistern

Inspection of water storage cistern

Monthly temperature monitoring

Flushing of infrequently used outlets

Annual inspections of calorifier

Purging of calorifier

Faults and defects to be recorded

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

Plant Room

Hot return circulation pumps to calorifier. Right side pump not working.



Girls Showers

Room 15

The showers are infrequently used.

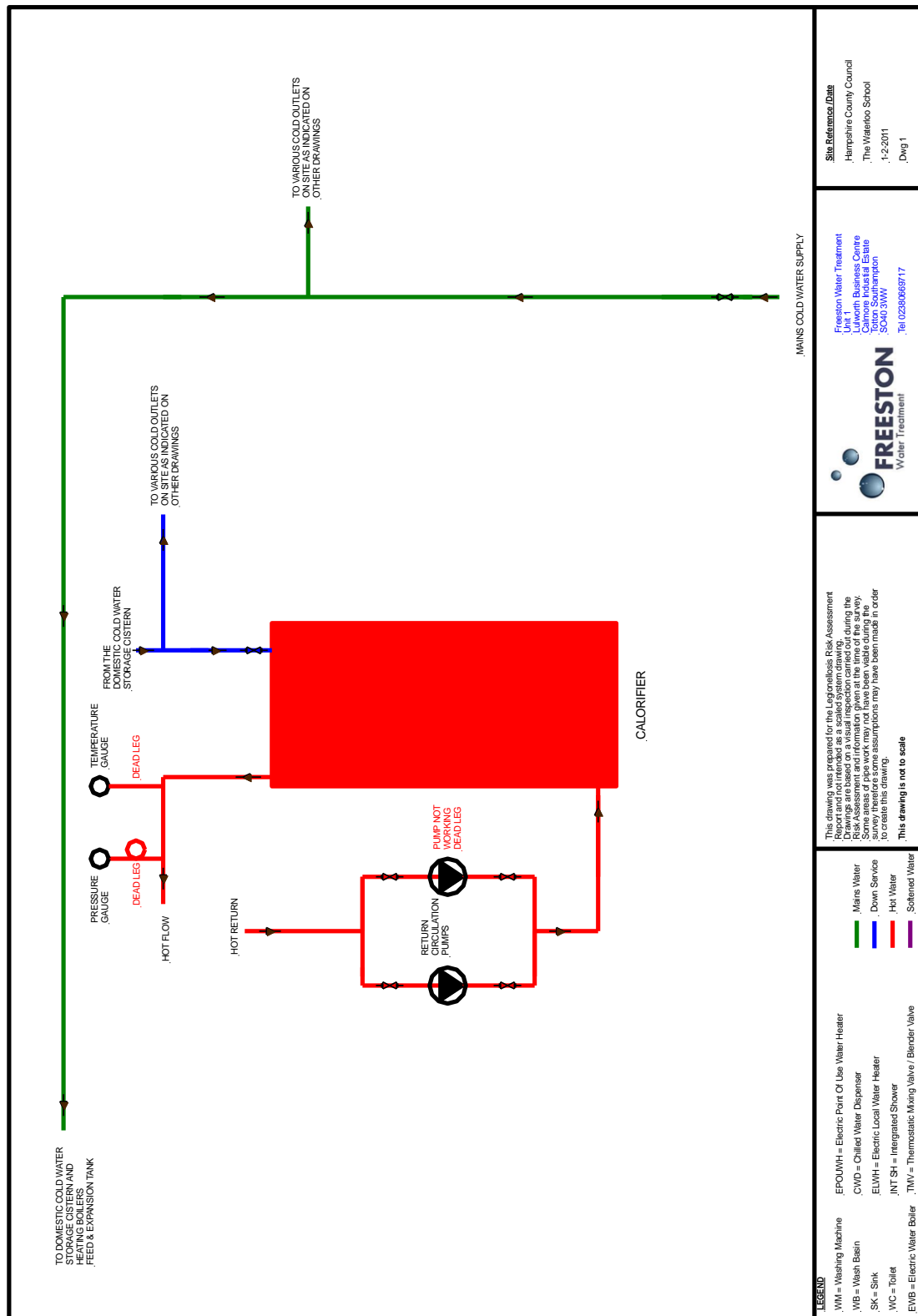


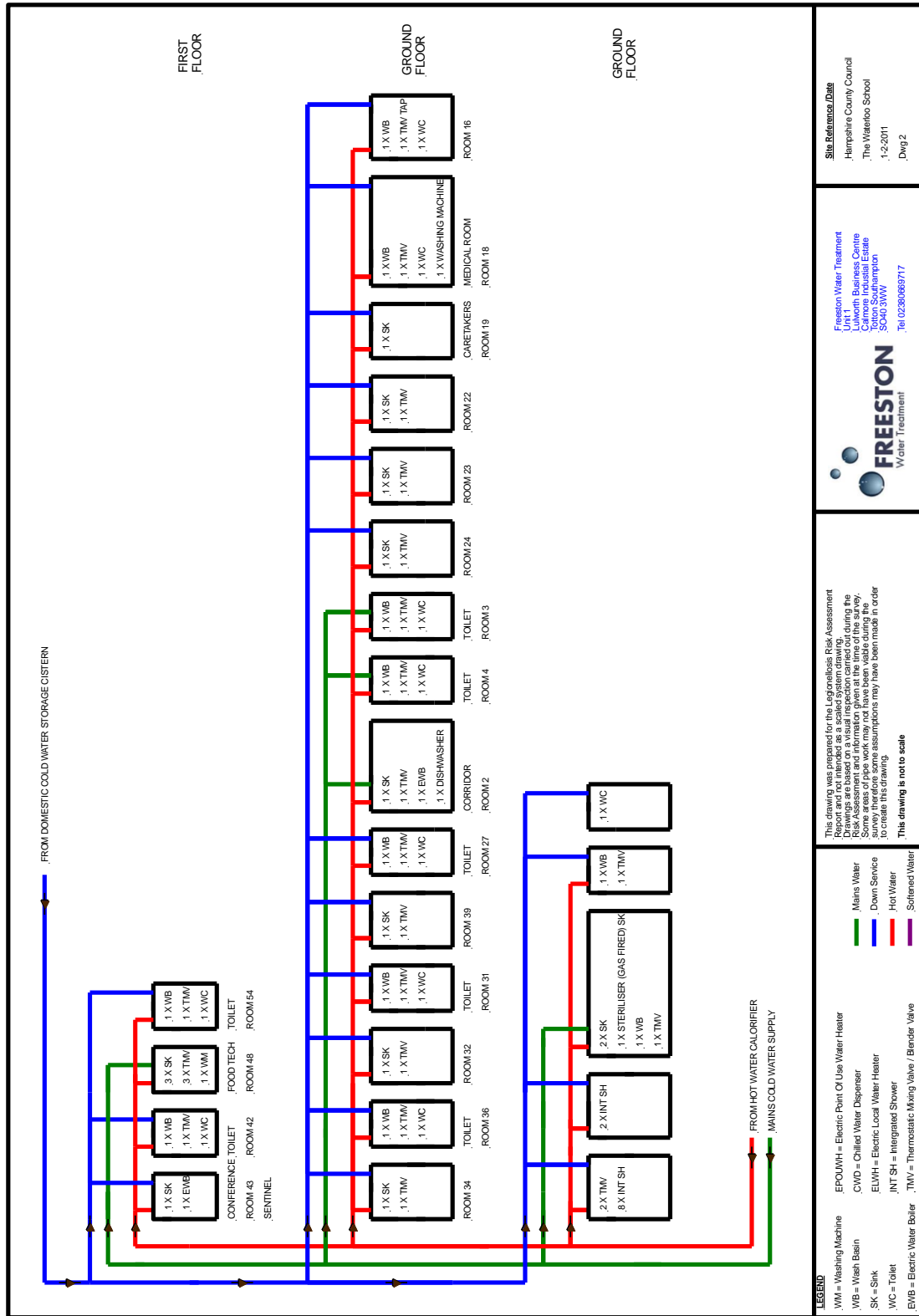
Plant Room

Dead legs on the calorifier hot pipe.



DRAWINGS





WRITTEN SCHEME

	Task		Frequency
1	Prepare full site logbook for the Site.		ASAP
2	Flush infrequently used outlets.		Weekly
3	Record hot water calorifier flow and return temperatures.		Monthly
4	Record cold water outlet temperatures.		Monthly
5	Record hot water outlet temperatures.		Monthly
6	Record cold water cistern temperatures.		Six Monthly
7	Clean and descale showerheads and hoses.		Quarterly
8	Purge hot water calorifiers to drain and record.		Six Monthly
9	Inspect, clean and disinfect cold water storage cistern if required.		Annually
10	Internally inspect hot water calorifiers annually and descale if required.		Annually

REMEDIAL RECOMMENDATIONS

Legionella Risk Category Key

1 = Insignificant risk.

2 = Controlled risk monitoring is being carried out maintain this standard.

3 = Risk is controlled, but deteriorating conditions could increase risk.

4 = Potential hazards identified.

5 = Risk Uncontrolled.

Site Reference/ Address	Remedial/Recommendations	Priority	Date Actioned	Signature
<u>Hot Water</u> <u>Storage & System</u> HCC The Waterloo School	Continue monthly temperature monitoring of the domestic hot water systems; all sentinel outlets. Record within the logbook.	2		
	Commence monthly temperature monitoring of the calorifier storage and return temperatures and record within the logbook.	5		
	Purge the calorifier to drain on at least a six monthly basis and record when carried out.	3		
	If access allows, visually inspect the calorifier internally for scale and sludge on an annual basis.	3		
<u>Cold Water</u> <u>Storage & System</u> HCC The Waterloo School	Commence full monthly temperature monitoring of the domestic cold water systems; sentinel outlets. Record within a logbook.	5		
	Arrange for safe access to allow a Risk Assessment of the cold water storage cistern to be carried out.	5		

Site Reference/ Address	Remedial/Recommendations	Priority	Date Actioned	Signature
<u>Distribution</u> HCC The Waterloo School	Remove dead leg pipe work or put on a weekly flushing regime and record in the logbook when carried out	5		
	I would recommend Bacteriological and Legionella water samples be taken if the temperatures fall out of the recommended limits.	5		
	Continue weekly flushing of all low use outlets, disabled toilet, girls showers etc and record when carried out.	5		
	Clean and descale showerheads at least quarterly. Record when carried out.	2		
	If any inline water filters are found on site it must be ensured that they are cleaned/replaced in line with the manufacturer's recommendations.	2		
	Trace the supply pipe to the disconnected outside tap to ensure that there are no dead legs.	5		