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**PREFACE**

**Customer:** Hampshire County Council

**Customer Address:** Property, Business and Regulatory Services  
Three Minsters House  
76 High Street  
Winchester  
Hampshire, SO23 8UL

**Customer Contact:** Martin De Wied

**Telephone:** 01962 846284

**Site:** Osborne School  
Athelstan Road  
Winchester  
Hampshire SO23 7GA

**Site Contact:** Richard Arnold

**Site Telephone:** 01962 854537

**Freeston Water Treatment Address:**  
Unit 1  
Lulworth Business Centre  
Nutwood Way  
Calmore Industrial Estate  
Totton  
Southampton SO40 3WW  
Telephone: 02380 669713  
Fax: 02380 663825

**Risk Assessment Consultant:** Mr Chris Wilson MWM Society

**Date of Assessment:** 9<sup>th</sup> June 2010

**Date of Review:** June 2012

## INTRODUCTION

This report relates to a water source Risk Assessment carried out by Mr Chris Wilson of Freston Water Treatment Ltd on the 1<sup>st</sup> June 2010 on behalf of Hampshire County Council. The survey was carried out at Osborne School, Athelstan Road, Winchester, Hampshire SO23 7GA. 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 Freston 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 Osborne 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)

**It appears that there is no dedicated water systems logbook in place or monthly temperature monitoring of the hot and cold outlets or calorifier being carried out. I would recommend a logbook be produced along with a written scheme and temperature monitoring be commenced as soon as is practicable.**

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

## HOT WATER STORAGE

Hot water storage at Osborne School is by two calorifiers. Calorifiers No.'s 1 and 2 are located within the Main Boiler Room and supplies all the hot water to the school building. Calorifier No. 3 is located within the Plant Room of Osborne House and supplies hot water to all hot outlets within that building with the exception of the first floor flat kitchen and the ground floor kitchen. Calorifier No. 4 is located within a cupboard in the kitchen of Osborne House and supplies hot water to the first floor flat kitchen and the ground floor kitchen.

Calorifiers No.'s 1 and 2 are identical units and were manufactured by Andrews Water Heaters. They are gas fired units and are fed by the mains cold water supply. The calorifiers have insulation under the metal outer casings. There is a common return system fitted to the calorifiers that has a circulating pump which at the time of the survey appeared to be working correctly.

I would recommend that the calorifiers 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, I was informed that it is unknown if this is being carried out.

There is a temperature gauge on the common hot return pipe work but not on the flow. I would recommend that temperature gauges are fitted to the individual flow pipes for monthly temperature monitoring to be carried out.

L8 recommends that calorifiers are checked internally for scale and sludge on an annual basis. I was informed that it is unknown if this is being carried out.

L8 recommends hot water storage to be 60.0°C and the return to be maintained at 50.0°C at all times.

The temperature of the stored water within the calorifier at the time of the survey was:-

Calorifier No 1	Storage	62.8°C	Satisfactory
Calorifier No 1	Return	53.1°C	Satisfactory
Calorifier No 2	Storage	60.0°C	Satisfactory
Calorifier No 2	Return	53.1°C	Satisfactory

Calorifier No. 3 was manufactured by Andrews Water Heaters. It is a gas fired unit and is fed by the mains cold water supply. The calorifier has insulation under the metal outer casings. There is a return system fitted to the calorifier that has a circulating pump which at the time of the survey appeared to be working correctly.

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. I was informed that it is unknown if this is being carried out.

There are no temperature gauges on the calorifier and I would recommend that temperature gauges are fitted to the flow and the return pipework for monthly temperature monitoring to be carried out.

L8 recommends that calorifiers are checked internally for scale and sludge on an annual basis. I was informed that it is unknown if this is being carried out.

L8 recommends hot water storage to be 60.0°C and the return to be maintained at 50.0°C at all times.

**The temperature of the stored water within the calorifier at the time of the survey was:-**

Calorifier No 3	Storage	60.1°C	Satisfactory
Calorifier No 3	Return	51.8°C	Satisfactory

Calorifier No. 4 was manufactured by Andrews Water Heaters. It is a gas fired unit and is fed by the mains cold water supply. The calorifier has insulation under the metal outer casings. There is a return system fitted to the calorifier that has a circulating pump which at the time of the survey appeared to be working correctly.

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. I was informed that it is unknown if this is being carried out.

There are no temperature gauges on the calorifier and I would recommend that temperature gauges are fitted to the flow and the return pipework for monthly temperature monitoring to be carried out.

L8 recommends that calorifiers are checked internally for scale and sludge on an annual basis. I was informed that it is unknown if this is being carried out.

L8 recommends hot water storage to be 60.0°C and the return to be maintained at 50.0°C at all times.

**The temperature of the stored water within the calorifier at the time of the survey was:-**

Calorifier No 4	Storage	63.5°C	Satisfactory
Calorifier No 4	Return	63.1°C	Satisfactory

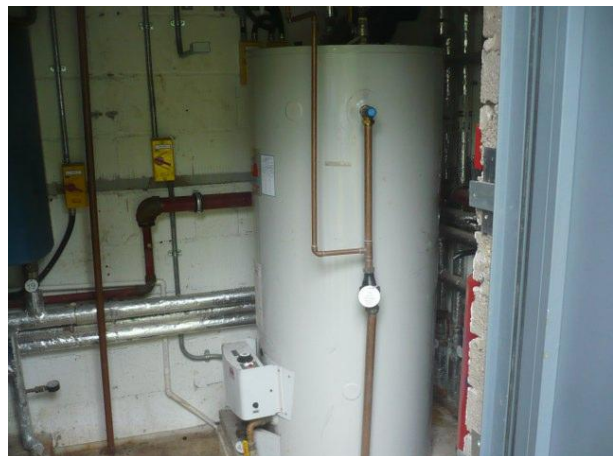
**Plant Room**

Calorifiers No's. 1 & 2.



**Plant Room**

Calorifier No. 3.



**Kitchen**

Calorifier No. 4.



## COLD WATER STORAGE

There is no domestic cold water storage at either Osborne School or Osborne House.



## 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 Osborne School site distributes from four calorifiers. Calorifiers No 1 and 2 are located within the main boiler room and supplies all the hot water to the school building.

Calorifier No. 3 is located within the Plant Room of Osborne House and supplies hot water to all hot outlets within that building with the exception of the first floor flat kitchen and the ground floor kitchen.

Calorifier No. 4 is located within a cupboard in the kitchen of Osborne House and supplies hot water to the first floor flat kitchen and the ground floor kitchen.

There is no domestic cold water within the Osborne School site.

Mains cold water within the Osborne School site supplies all the cold water on site.

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:-

<b>Osborne School</b>	
<b>Hot Water Outlet Temperatures</b>	
<b>First Floor</b> Art & Design Room Sink	50.6°C Inlet to TMV Satisfactory 43.0°C TMV Outlet Satisfactory
<b>First Floor</b> Room 10EM Sink	56.8°C Inlet to TMV Satisfactory <b>44.9°C TMV Outlet Not Satisfactory</b>
<b>First Floor</b> Staff Room Sink	58.9°C Satisfactory
<b>Ground Floor</b> Room 16GY Sink	57.2°C Inlet to TMV Satisfactory 40.7°C TMV Outlet Satisfactory
<b>Ground Floor</b> Room 7BV Sink	57.9°C Inlet to TMV Satisfactory 43.8°C TMV Outlet Satisfactory
<b>Ground Floor</b> Boiler Room Wash Basin	62.1°C Satisfactory

<b>Osborne House</b>	
<b>Hot Water Outlet Temperatures</b>	
<b>First Floor</b> Flat Kitchen Sink	56.0°C Satisfactory
<b>First Floor</b> Flat Toilet Wash Basin	57.8°C Inlet to TMV Satisfactory 38.6°C TMV Outlet Satisfactory
<b>Ground Floor</b> Bathroom Wash Basin	Inlet to TMV No Access 40.6°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:

<b>Osborne School</b>	
<b>Cold Water Outlet Temperatures</b>	
<b>First Floor</b> Art & Design Room Sink	16.1°C Satisfactory
<b>First Floor</b> Room 10EM Sink	16.4°C Satisfactory
<b>First Floor</b> Staff Room Sink	16.1°C Satisfactory
<b>Ground Floor</b> Room 16GY Sink	16.5°C Satisfactory
<b>Ground Floor</b> Room 7BV Sink	15.3°C Satisfactory
<b>Ground Floor</b> Boiler Room Wash Basin	16.7°C Satisfactory

<b>Osborne House</b>	
<b>Cold Water Outlet Temperatures</b>	
<b>First Floor</b> Flat Kitchen Sink	<b>16.8°C Satisfactory</b>
<b>First Floor</b> Flat Toilet Wash Basin	<b>16.9°C Satisfactory</b>
<b>Ground Floor</b> Bathroom Wash Basin	<b>16.6°C Satisfactory</b>

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 Osborne School; these valves should be serviced and maintained to the manufacturers recommendations. I was informed that this was carried out in February 2010.
- 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 not being carried out.
- Dead leg pipework are ideal areas for the proliferation of bacteria and should be removed or put on a twice weekly flushing regime (without creating an aerosol) and recorded.

Dead legs were found in the following areas:-

- Boiler Room two swan neck type dead leg pipes are on the hot water return pipe.
- Science Prep Room two dead legs were found under the worktop.
- Room 16GY Hygiene Area the WC Sluice has been removed and the pipe work to the taps is still in place albeit with open ends. This should be investigated behind the panels to ensure that no dead legs have been left.
- Hygiene Room adjacent to Room 8WF the shower has no hose, rendering it a dead leg.
- Outside tap near ASD Class this outlet is never used.
- Ground Floor Hygiene Room next to room 7JS there was no water from the sink possibly rendering it a dead leg. This should be investigated further.

- The shower heads and hoses must be cleaned and disinfected quarterly and recorded when carried out as recommended in L8. I was informed that this is carried out on a six monthly basis only.
- 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, I would recommend that this is commenced as soon as is practicable.
- There is a water softener within the Staff Room for the hot water boiler and another in the Main Kitchen for the dishwasher. These should be cleaned and replaced in-line with the manufacturer's recommendations. I was informed that it is unknown if this is being carried out.
- Monthly temperature monitoring of the hot and cold outlets is not being carried out. The water temperatures of every sentinel 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. I would recommend that temperature monitoring is commenced as soon as is practicable and all results be recorded within a logbook.
- The Hydrotherapy Pool is a stand alone system and is not connected to the mains cold water supply; the pool is topped up by a hose from the mains cold water supply via a tundish thereby creating an air gap.

I was informed that the following checks are carried out:-

Twice a day - free chlorine level, total chlorine level, air and water temperature.

Three times a week - the filters are backwashed.

Monthly - calcium check.

Quarterly - bacteriological water samples are taken.



## 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 water systems

Monthly temperature monitoring

Flushing of infrequently used outlets

Annual inspections of calorifiers

Purging of calorifiers

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

### Boiler room

Swan-neck dead legs on hot return pipe.



### Staff Room

Water softener.



### Room 16GY Hygiene Area

Ensure no dead legs are left behind the panels.



**Hygiene Area adjacent Room 8WF**

Shower with no hoses is rendered a  
dead leg.



**Main Kitchen**

Water softener.

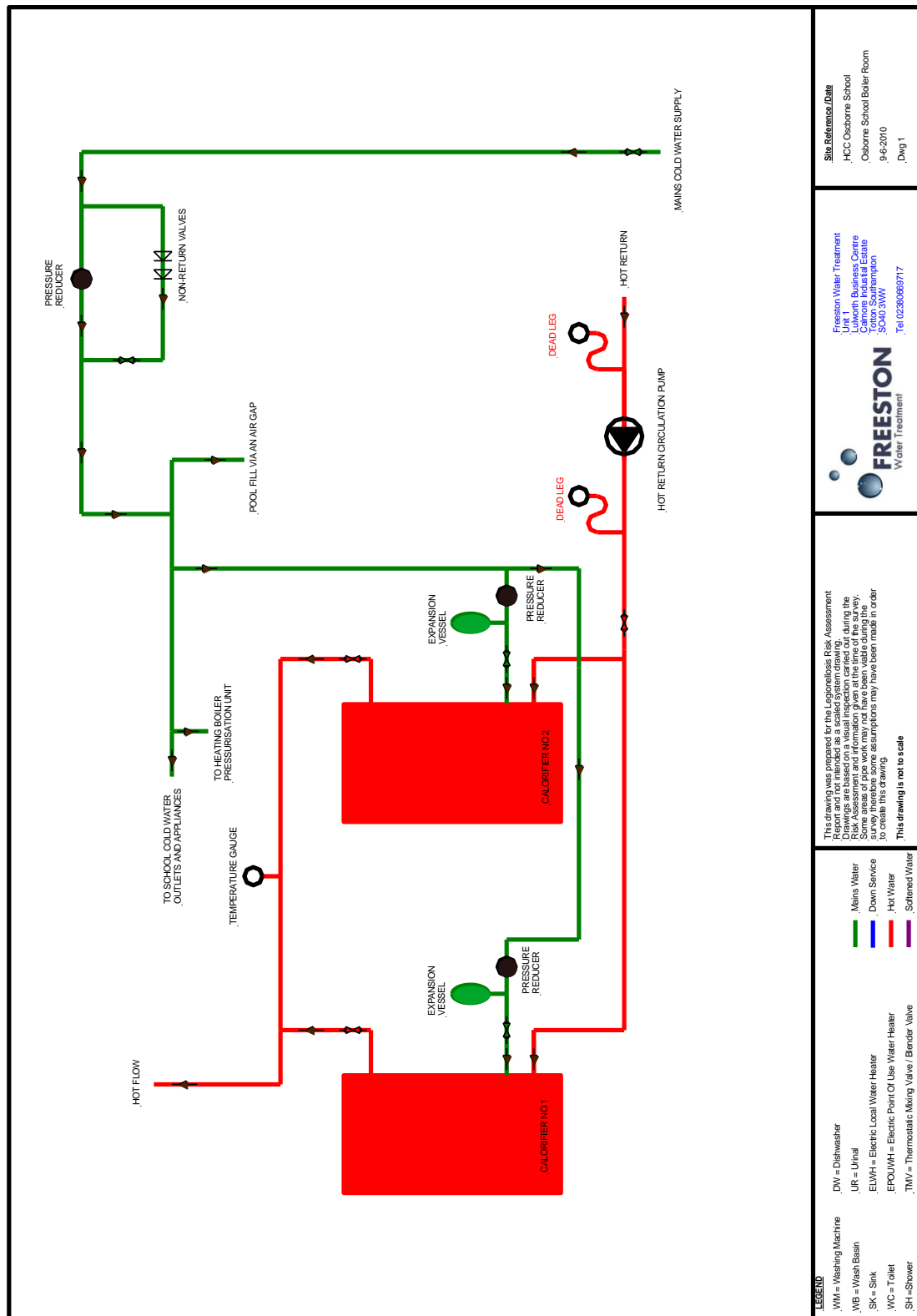


**Outside Tap near ASD Class**

Not used.



DRAWINGS

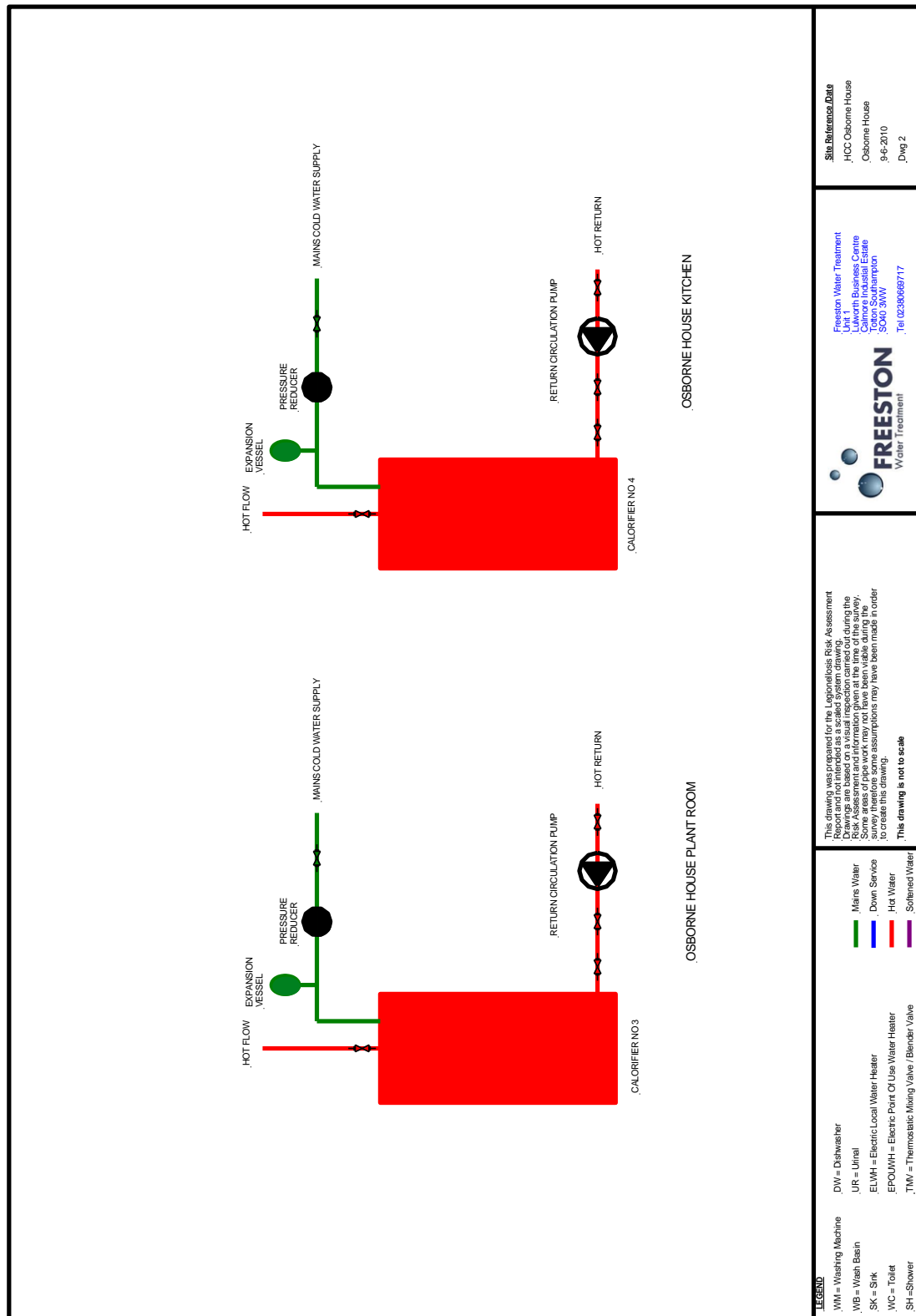


**Site Reference/Date**  
HCC Osborne School  
Osborne School Boiler Room  
9-6-2010  
Dwg 1

**Freeston Water Treatment Unit 1**  
Culworth Business Centre  
Culworth Road  
Totton, Southampton  
SO40 3WW  
Tel: 02380698717

**FREESTON**  
Water Treatment

This drawing was prepared for the Legionellosis Risk Assessment. Drawings are based on a visual inspection carried out during the Risk Assessment and information given at the time of the survey. A survey therefore some assumptions may have been made in order to create this drawing.  
**This drawing is not to scale**



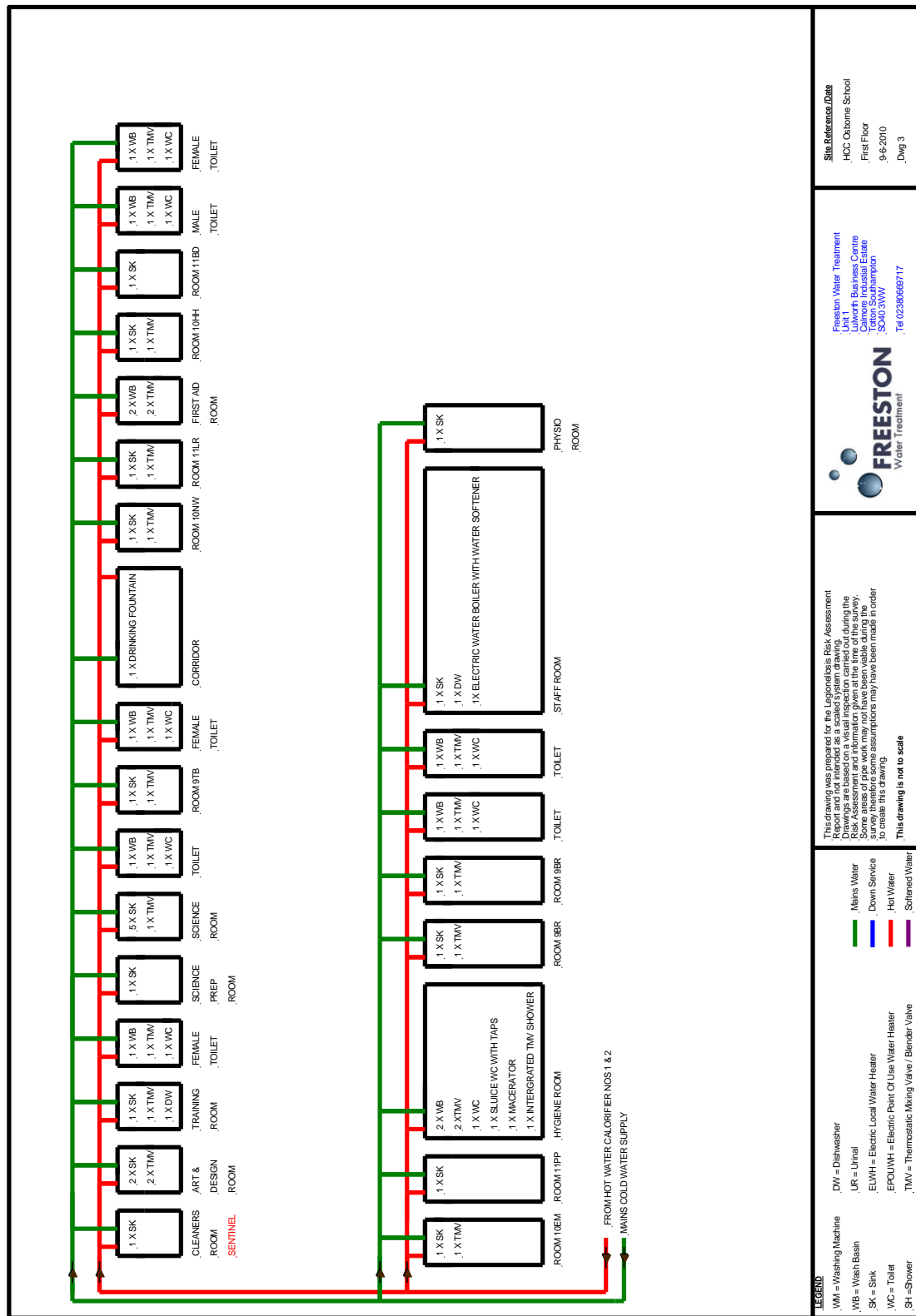
**LEGEND**  
 .WM = Washing Machine  
 .WB = Wash Basin  
 .SK = Sink  
 .WC = Toilet  
 .SH = Shower  
 .DW = Dishwasher  
 .UR = Urinal  
 .ELWH = Electric Local Water Heater  
 .EROUWH = Electric Point Of Use Water Heater  
 .TMV = Thermostatic Mixing Valve / Blender Valve

.Mains Water  
 .Down Service  
 .Hot Water  
 .Softened Water

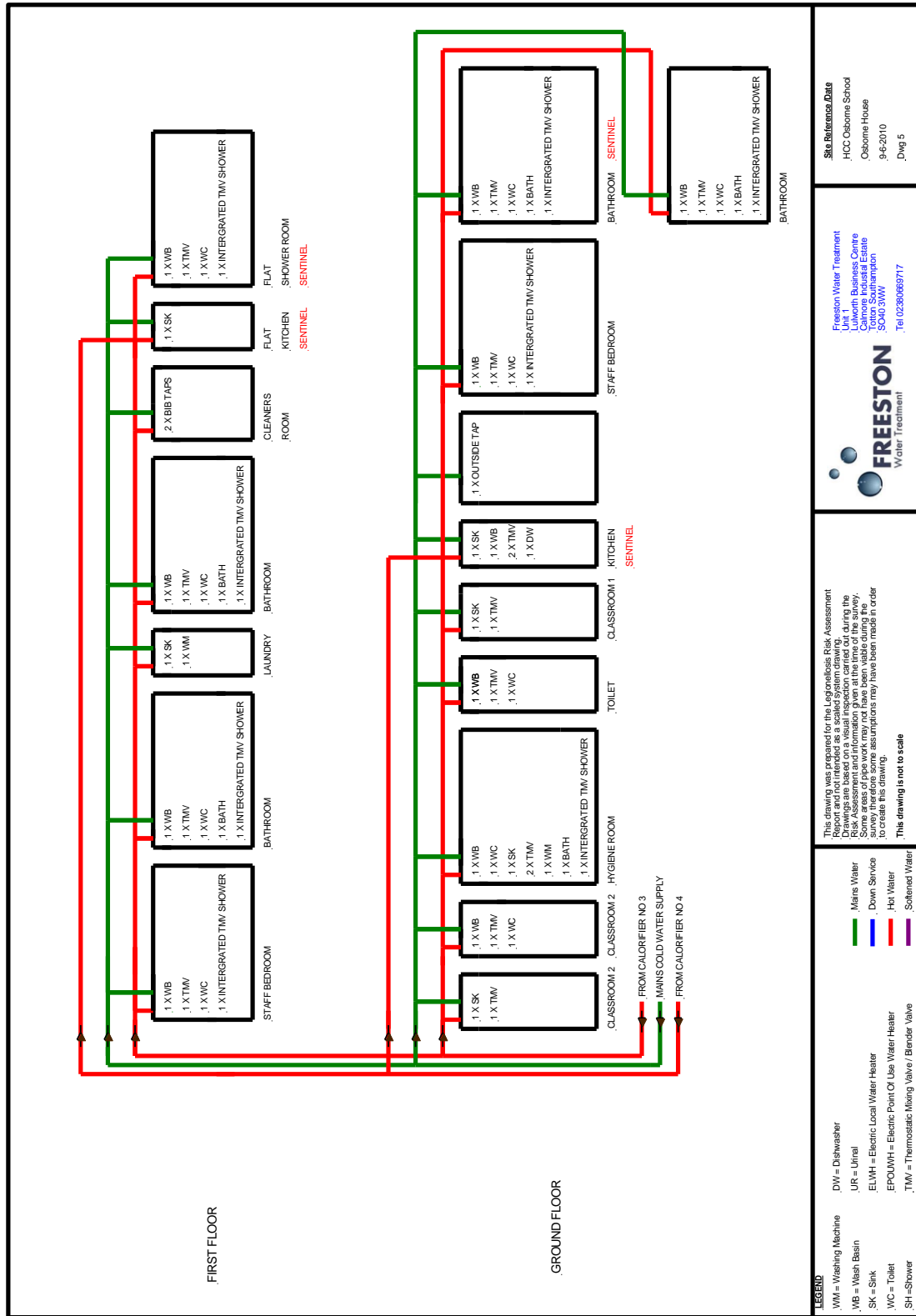
This drawing was prepared for the Legionellosis Risk Assessment for Osborne House. Drawings are based on a visual inspection carried out during the Risk Assessment and information given at the time of the survey. The survey therefore some assumptions may have been made in order to create this drawing.  
**This drawing is not to scale**

**FREESTON**  
 Water Treatment  
 Freston Water Treatment  
 Unit 1  
 Luwath Business Centre  
 Totton, Southampton  
 SO4 3WV  
 Tel: 0238068977

**Site Reference Data**  
 .HCC Osborne House  
 Osborne House  
 9-6-2010  
 .Dwg 2









**WRITTEN SCHEME**

	<b>Task</b>		<b>Frequency</b>
1	Prepare site logbook for the Site.		<b>ASAP</b>
2	Flush infrequently used outlets.		<b>Weekly</b>
3	Record hot water calorifiers flow and return temperatures.		<b>Monthly</b>
4	Record cold water outlet temperatures.		<b>Monthly</b>
5	Record hot water outlet temperatures.		<b>Monthly</b>
6	Clean and descale shower head and hoses.		<b>Quarterly</b>
7	Purge hot water calorifier to drain and record.		<b>Six Monthly</b>
8	Internally inspect hot water calorifiers annually and descale if required.		<b>Annually</b>

## 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 Storage &amp; System</u> HCC Osborne School	Commence monthly temperature monitoring of the domestic hot water systems; sentinel outlets. Record within a logbook.	5		
	Commence monthly temperature monitoring of the hot water calorifier flow and return water temperatures. Record within a logbook.	5		
	Purge calorifiers to drain on at least a six monthly basis and record when carried out.	3		
	If access allows, visually inspect the calorifiers internally for scale and sludge on an annual basis.	3		
	Fit temperature gauges to flow and return pipes on Calorifier No.'s 3 & 4.	3		
	Fit temperature gauges to the flow pipes on Calorifier No.'s 1 & 2.	3		

Site Reference/ Address	Remedial/Recommendations	Priority	Date Actioned	Signature
<u>Distribution</u> HCC Osborne 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		
	Commence <b>weekly</b> flushing of any low use outlets etc and record when carried out.	5		
	Clean and descale showerheads at least quarterly. Record when carried out.	3		
	Ensure all domestic hot and cold pipe work is insulated within the building.	2		
	Commence monthly temperature monitoring of the domestic cold water systems; sentinel outlets. Record within a logbook.	5		