

# LEGIONELLA RISK ASSESSMENT



**CUSTOMER** : NATURAL ENVIRONMENTAL  
RESEARCH COUNCIL

**SITE** : BRITISH GEOLOGICAL SURVEY,  
KEYWORD

**DATE** : 13 JULY 2016

*Disclaimer: This assessment is based on information provided by site including verbal statements, any relevant plans, explanations regarding operation and usage, etc., and only includes areas within the scope of the assessment and those made known to the Assessor whilst on site.*

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# LEGIONELLA RISK ASSESSMENT

## CONTACT DETAILS



### CUSTOMER

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**SITE CONTACT(S)** : AS ABOVE  
**DATE OF SURVEY** : 13 JULY 2016

### H<sub>2</sub>O CHEMICALS LTD

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## EXECUTIVE SUMMARY

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This report provides an assessment of the current risks with regards to the control of legionella and its proliferation potential within the water systems on site. Areas considered include:

- the presence of legionella bacteria
- conditions suitable for multiplication of legionella bacteria
- sources of breathable droplets
- the presence, susceptibility and number of people who may be exposed
- review of current control measures and system of control

The most significant concerns found from these key areas are highlighted in the executive summary.

Individual calculations can be found in the Evaluation of the Risk Factors (Section 5).

### **The presence of legionella bacteria**

No legionella samples are routinely taken at the site. However, as legionella bacteria are commonly encountered in environmental sources they may eventually colonise manufactured water systems and be found in cooling tower systems, hot and cold water systems and other plant which use or store water.

### **Conditions suitable for the multiplication of legionella bacteria and presence of breathable droplets**

*i.e. Temperature 20-45°C, source of nutrients: sludge, scale, rust, algae and other organic matter and biofilms, deadlegs and parts of the system used intermittently.*

There were some cold mains temperatures which were above 20°C, however this system is pre-treated with chlorine dioxide.

The following systems produce breathable droplets whilst operating under normal conditions: the showers. However, the act of opening a tap and the water striking a surface (e.g. sink or wash basin) or any act that agitates water in an open environment has the potential to create breathable droplets.

For the specific evidence see survey details for individual water systems and the recommendations.

### **The presence, susceptibility and number of people who may be exposed**

It was not possible to identify specific individuals, however a variable proportion of any group of people will be susceptible to legionella infection: risk increases with age and notably for smokers, heavy drinkers and those who are immuno-compromised or have underlying pre-disposed clinical conditions.

### **Review of current control measures and system of control**

There were no evident concerns with respect to the current systems of control.

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## Scope of survey and exclusions

This inspection was carried out as a Legionella Risk Assessment in accordance with the ACoP L8 and HSG274 (Legionnaires' disease – The control of Legionella bacteria in water systems) and H<sub>2</sub>O Chemicals Ltd documented in-house Standard Operating Procedures.

This assessment is only valid for the plant and areas listed as described in the site description and asset register. All other plant, known or otherwise to H<sub>2</sub>O Chemicals Ltd, has not been assessed. The scope of works excludes undertaking an evaluation (practical or financial) of the feasibility of the removal or replacement of any plant or equipment identified as presenting a reasonably foreseeable risk of causing Legionellosis. Some or all of these actions may be necessary upon completion of this Risk Assessment.

The survey has been undertaken on a non-destructive and non-intrusive basis, so is limited to those items in plain sight that may be safely accessed. Whilst all efforts have been made to identify any potential deadlegs associated with the systems assessed, the complex nature of pipework installations, many of which are hidden within buildings, prevents this from being a fully complete and accurate list.

For the same reasons it is neither practical nor possible to assess all materials used in the construction of complex multi-component systems such as those covered by this document. It should, therefore, be noted that not all materials present can or have been assessed for their suitability of use.

H<sub>2</sub>O Chemicals Ltd cannot be accountable for any omissions to this report resulting from information, data, systems or plant not made readily and reasonably accessible by the client.

Please note that this Risk Assessment only addresses one of many requirements of the ACoP L8 and is, therefore, not alone sufficient to ensure complete compliance with the law.

## Background to the disease and organisms

Legionnaires' disease is a potentially fatal form of pneumonia which can affect anybody, but which principally affects those who are susceptible because of age, illness, immunosuppression, smoking, etc. It is caused by the bacterium *legionella pneumophila* and related bacteria. Legionella bacteria can also cause less serious illnesses which are not fatal or permanently debilitating.

On average there are about 200-250 reported cases of Legionnaires' disease each year in the UK of which half are contracted abroad. It is thought that the number of cases is underestimated because the symptoms are similar to other illnesses and cases are not generally reported.

Outbreaks have been associated with cooling tower systems, hot and cold water systems in factories, hotels, hospitals and other establishments. Cases of Legionnaires' disease have occurred among staff in the workplace (factories, offices, shops and hospitals); visitors (delivery drivers) and members of the public (patients, hotel guests or passers-by).

Legionellosis (including Legionnaires' disease) is contracted when inhaling tiny droplets of water contaminated with the bacteria. Sources of droplet formation include cooling towers, showers, spa pools, spray taps, water features, sprinkler systems, wash systems, hoses and any other similar spray forming device. It causes a variety of symptoms and can be fatal in about 12% of reported cases. Some groups are higher risk e.g. men, smokers, people aged over 45, and those with certain existing illnesses.

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### **Natural history of the legionella bacterium**

Legionella bacteria are common and can be found naturally in environmental water sources. They may eventually colonise man-made water systems and can multiply where there are ideal growth conditions, e.g. warm temperatures between 20°C and 45°C and a supply of nutrients such as other bacteria, sediment, sludge and scale. Biofilms help protect legionella from biocides and temperature control.

The bacteria remain dormant in cool temperatures and do not appear to multiply below 20°C. They will not survive above 60°C. They are more virulent at 37°C (human body temperature) than at 25°C.

### **Legislation - Health and Safety Law**

- The Health and Safety at Work Act 1974
- Management of Health & Safety at Work Regs. 1999
- The Approved Code of Practice (ACoP) and Guidance L8: “Legionnaires’ Disease - The Control of Legionella Bacteria in Water Systems” and technical guidance HSG274.
- COSHH Regulations – 2002
- Notification of Cooling Towers and Evaporative Condensers Regulations 1992

### **Management Responsibilities - ACoP L8 paras 48 - 57**

The ACoP L8 requires the Duty holder to appoint a responsible person having sufficient authority, competence and knowledge. Clarity of duties, contact arrangements and defined lines of communication are important. These are to be understood, documented and audited regularly.

### **Risk Assessment**

The ACoP L8 para 23 states that a reasonably foreseeable risk of exposure to legionella bacteria in:

- a) cooling systems with cooling towers, evaporative condensers or dry / wet cooling systems;
- b) hot and cold water services; and
- c) spa pools
- d) other plant and systems containing water that can create and increase risk from legionella during operation or when being maintained.

The ACoP L8 para 41 states that a number of factors are required to create a risk of acquiring legionellosis, such as:

- a) the presence of legionella bacteria;
- b) conditions suitable for multiplication of the organisms, e.g. suitable temperatures (20°C - 45°C) and deposits that are a source of nutrients for the organism, such as sludge, scale, rust, algae, other organic matter and biofilms;

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- c) a means of creating and spreading breathable droplets, e.g. the aerosol generated by cooling towers, showers or spa pools;
- d) the presence (and numbers) of people who may be exposed, especially in premises where occupants are particularly vulnerable, e.g. healthcare, residential and nursing homes.

The Risk Assessment is focussed on establishing whether there is a risk to health and if so what control measures are needed. ACoP L8 para 42 lists some factors to consider. These relate to the water systems and their operation.

### **Risk Assessor (Legionella Control Association)**

The competence of the assessor is of paramount importance and should be matched to the system being assessed. The assessor should be able to demonstrate that they have specialist knowledge of legionella bacteria and of the water system(s) to be assessed, and are competent to carry out the necessary surveys and sampling. In addition the assessor should have undertaken the necessary practical training and gained experience with a competent assessor to be able to assess the systems described below.

Anthony has extensive experience as a Risk Assessor working at a variety of different sized operations. He holds City & Guilds in Plumbing, Levels 2 and 3.

### **Review of Risk Assessment**

The ACoP L8 para 47 states the assessment is a living document and should be reviewed regularly to ensure it remains up-to-date. Arrange to review the assessment regularly and specifically whenever there is reason to suspect that it is no longer valid. An indication of when to review the assessment and what to consider should be recorded. This may result from, e.g.:-

- a) changes to the water system or its use;
- b) changes to the use of the building in which the water system is installed;
- c) the availability of new information about risks or control measures;
- d) the results of checks indicating that control measures are no longer effective;
- e) changes to key personnel;
- f) a case of legionnaires' disease / legionellosis is associated with the system.

### **Schematic**

HSG 274 Pt 2 (Introduction, para 13) states that the Risk Assessment should consider and evaluate a description of the water system, including an up-to-date schematic diagram.

The schematic included in this Assessment is a simplified but accurate illustration of the layout of the water system, including parts temporarily out of use. It is not intended to be a comprehensive technical schematic of the buildings water pipe system. The supplied schematic drawing should be updated, with approval from the site Responsible Person, where required and particularly where changes to the system are undertaken.

## SITE DESCRIPTION

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### GEOSCIENCE INNOVATION HUB

#### Description of site, water systems and usage

The **Geoscience Innovation Hub** (GIH) is a three-storey building, located between the Kingsley Dunham and William Smith Buildings. It contains offices and welfare facilities. Previously the building was supplied by tank-fed water and mains water. The tank water supply has now been isolated, with deadlegs removed.

The majority of the domestic hot water services (DHWS) are supplied from the mains-fed calorifier (CAL) in the Staff Restaurant Meeting Room (SRMR) plant room (which also supplies the SRMR and Kingsley Dunham Building). A couple of toilet hot outlets are supplied by local point of use water heaters (POU).

There is a list of all systems in the Asset Register (Section 4) and further details can be found in the individual survey sections, together with photographs where appropriate.

The main site is open from 7 a.m. to 7 p.m. weekdays.

#### Seasonal factors

The site is used all year round and there will be little variation in demand on the water systems. The only changes are expected to be due to the fluctuation in temperature of the incoming mains with weather conditions. This may affect the risk where there is evidence of the cold water temperature rising.

#### Other Relevant Factors

All water supplied to the building is treated with chlorine dioxide.

Some point of use water heaters in the ground floor gents and first floor ladies (Geological walk entrance side) have been removed and the hot water placed on the CAL supply. The second floor gents toilet and cleaners outlets at this end of the building have also been removed.

There are some new toilets and a kitchen on the second floor at the far end of the building, this area is currently not in use, but the outlets are on a flushing programme.

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### HANLON HOUSE

#### Description of site, water systems and usage

**Hanlon House** is located towards the south of the site. It is a small two-storey building, currently used as a gym, with equipment on the ground floor and changing facilities on the first.

The water systems are for domestic use, i.e. toilet and washing facilities.

The building has only a mains water supply. All the DHWS are supplied from point of use (POU) water heaters.

There is a list of all systems in the Asset Register (Section 4) and further details can be found in the individual survey sections, together with photographs where appropriate.

The main site is open from 7 a.m. to 7 p.m. weekdays.

#### Seasonal factors

The site is used all year round and there will be little variation in demand on the water systems. The only changes are expected to be due to the fluctuation in temperature of the incoming mains with weather conditions. This may affect the risk where there is evidence of the cold water temperature rising.

#### Other Relevant Factors

There is a mains-fed stand pipe located in front of the building which is on a flushing programme. It is unclear if this tap is connected to the supply to Hanlon House.

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### JAMES HUTTON BUILDING

#### Description of site, water systems and usage

The **James Hutton Building** is located towards the rear of the site. It is a large modern two-storey building, opened in May 2012, containing office areas and welfare facilities.

The water systems are for domestic use, i.e. toilet, washing, and kitchen facilities.

The building is supplied with mains water from the town's supply and has a rainwater system for toilet and urinal flushing. The mains water service passes underground from the SRMR plant room. The rainwater is collected in an underground tank (RWT); from there it is pumped to the toilet cisterns. The rain water system has a supplementary supply from the mains water services. All the DHWS are supplied from a calorifier (CAL).

There is a list of all systems in the Asset Register (Section 4) and further details can be found in the individual survey sections, together with photographs where appropriate.

The main site is open from 7 a.m. to 7 p.m. weekdays.

#### Seasonal factors

The site is used all year round and there will be little variation in demand on the water systems. The only changes are expected to be due to the fluctuation in temperature of the incoming mains with weather conditions. This may affect the risk where there is evidence of the cold water temperature rising.

#### Other Relevant Factors

All the gents and ladies toilet wash basin water outlets are fixed temperature single outlet sensor taps. Water temperatures of the hot outlets in the gents and ladies toilets are regulated by thermostatic mixing valves (TMV).

There is a comprehensive water system schematic on the wall of the plant room: Drawing No. 110297 – M – 000 – S – 003 (from Hilton Building Services, dated 1/12/2010).

Both the mains and hot water are treated with chlorine dioxide.

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### KINGSLEY DUNHAM BUILDING

#### Description of site, water systems and usage

The **Kingsley Dunham Building** (KDB) is a large two-storey building, located to the front of the site. It houses the main reception area, seminar rooms, the library and offices. The Sport Centre, treated as part of the KDB, has its own water system and is covered within a separate section of this report.

The water systems are for domestic use, i.e. toilet and washing facilities.

The site is supplied with mains water from the town's supply. The water services pass underground from the SRMR plant room. The domestic hot water services (DHWS) are supplied from the mains-fed calorifier (CAL) in the Staff Restaurant Meeting Room (SRMR) plant room (which also supplies the SRMR and Geoscience Innovation Hub).

There is a list of all systems in the Asset Register (Section 4) and further details can be found in the individual survey sections, together with photographs where appropriate.

The main site is open from 7 a.m. to 7 p.m. weekdays.

#### Seasonal factors

The site is used all year round and there will be little variation in demand on the water systems. The only changes are expected to be due to the fluctuation in temperature of the incoming mains with weather conditions. This may affect the risk where there is evidence of the cold water temperature rising.

#### Other Relevant Factors

The toilet wash basin water outlets in the newly refurbished area are fixed temperature single outlet sensor taps. Hot water temperatures at toilet wash basins are regulated by thermostatic mixing valves (TMV).

Some previous hot outlets near the rear stairwell were supplied by point of use water heaters (POU), these have since been removed and all hot outlets are connected to the CAL. There was also previously a cold tank supply to the building.

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### KINGSLEY DUNHAM BUILDING – SPORT CENTRE

#### Description of site, water systems and usage

The **Kingsley Dunham Building Sport Centre** is a self-contained building, but treated as part of the Kingsley Dunham Building (KDB). It consists of a sports hall with two-storey changing facilities to the front, located to the south side of the KDB.

The water systems are for domestic use, i.e. toilet and washing facilities.

The sport centre is supplied with mains water from the town's supply, the water services pass underground from the SRMR plant room via the main KDB building.

All the DHWS are supplied by two point of use water heaters.

There is a list of all systems in the Asset Register (Section 4) and further details can be found in the individual survey sections, together with photographs where appropriate.

The main site is open from 7 a.m. to 7 p.m. weekdays.

#### Seasonal factors

The site is used all year round and there will be little variation in demand on the water systems. The only changes are expected to be due to the fluctuation in temperature of the incoming mains with weather conditions. This may affect the risk where there is evidence of the cold water temperature rising.

#### Other Relevant Factors

The hot outlet temperatures of both the gents and ladies changing wash basins are regulated by thermostatic mixing valves (TMV).

The mains water supply to this building is pre-treated with chlorine dioxide.

Previously there was a CAL supplying seven showers in this area, this has now been removed and replaced with five electric showers.

## SITE DESCRIPTION

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### PUBLICATIONS STORE

#### Description of site, water systems and usage

The **Publications Store** is located at the back of the site by the boundary fence. It is a high roofed store with a work room, kitchen area and toilet at the front.

The water systems are for domestic use, i.e. toilet, kitchen and washing facilities.

The water systems are minor, mains-fed systems with an instantaneous wall mounted gas-fired water heater (IWH) providing the domestic hot water services (DHWS) to both the kitchen and toilet.

The main site is open from 7 a.m. to 7 p.m. weekdays.

#### Seasonal factors

The site is used all year round and there will be little variation in demand on the water systems. The only changes are expected to be due to the fluctuation in temperature of the incoming mains with weather conditions. This may affect the risk where there is evidence of the cold water temperature rising.

#### Other Relevant Factors

The water supply in this area is pre-treated with chlorine dioxide.

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### SECURITY BLOCK

#### Description of site, water systems and usage

The **Security Block** is located at the main entrance to the site and controls the access. It is a small single-storey block with a control room, kitchen area and toilet.

The water systems are for domestic use, i.e. toilet, washing and kitchen facilities.

There are two point of use water heaters (POU) supplying hot water to the kitchen and toilet.

The main site is open from 7 a.m. to 7 p.m. weekdays.

#### Seasonal factors

The site is used all year round and there will be little variation in demand on the water systems. The only changes are expected to be due to the fluctuation in temperature of the incoming mains with weather conditions. This may affect the risk where there is evidence of the cold water temperature rising.

#### Other Relevant Factors

Previously the POU in the kitchen also supplied the toilet hot outlet; a TMV supplying this outlet was also in the kitchen. This TMV has since been removed and a small POU installed on the toilet wash basin.

The water supply in this area is pre-treated with chlorine dioxide.

## REVIEW OF SYSTEM OF CONTROL

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BGS, Keyworth		Comments
Duty Holder detailed	Yes	All details are held on their electronic Log Book, up2date.
Responsible Persons detailed	Yes	
Deputy Responsible Persons detailed	Yes	
Water hygiene service provider detailed	Yes	
Training Records	Yes	All details are held on their electronic Log Book, up2date.
Roles and Responsibilities identified	Yes	These are defined in the on site Log Book.
Is there a previous Risk Assessment?	Yes	A Risk Assessment was carried out in 2014 by H <sub>2</sub> O Chemicals.
Have recommendations been carried out?	Yes	Recommendations have been carried out and signed off where appropriate.
Schematics of Plant Layout	Yes	
Description of Safe Operation of water systems	Yes	Operating manuals / instructions for safe operation of systems i.e. chemical dosing, can be found with the systems.
Defects Entered into Log Book	Yes	
Appropriate Corrective Actions Taken and recorded	Yes	
Signatures or Electronic IDs Against All Records	Yes	
Is a regular review of the control scheme undertaken by the RP or Deputy	Yes	Regular review meetings are held.
If chemicals are used in any aspect of the scheme, is relevant Health and safety information available	Yes	Data sheets are displayed with all chemicals.
Incident plan in the event of plant failure	Yes	Chemical dosing units have e-mail alarm alerts in case of failure.
Incident plan in the event of an outbreak or positive legionella test	Yes	Legionella policy is displayed in on site Log Book and electronic Log Book.
Shut Down & Start Up Procedures	N/a	
<b>Calorifiers</b>		
Annual internal Inspection	No	
Annual blow down of drain	Yes	

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BGS, Keyworth		Comments
Monthly Calorifier Readings	Yes	
<b>Hot Water Services</b>		
Monthly One Min Tap Temps	Yes	
Circulation Loops Checked	Yes	
Annual One Min Tap Temps	Yes	
<b>POUs (&lt; 15 litres) Water Heaters</b>		
Temperature / usage checks	Yes	
<b>Combination Water Heaters</b>		
Annual Inspections	N/a	
<b>Cold Water Storage Tanks</b>		
Annual internal Inspection and summer temperature checks	Yes	
<b>Cold Water Services</b>		
Monthly Two Min Sentinel Tap Temperatures	Yes	
Annual Two Min Tap Temperatures	Yes	
Annual inspection of the insulation on all system components	No	
<b>Showers / Rinse Sprays</b>		
Quarterly dismantle , de-scale and clean	Yes	
<b>Base exchange Softeners</b>		
Weekly checks	No	
Annual service and disinfect	Yes	
<b>Infrequently Used Outlets</b>		
Flushing regime in place	Yes	
Rotation Records for multiple pumps	N/a	
<b>TMVs</b>		
Maintenance regime in place	Yes	
<b>Expansion Vessels</b>		
Flush and purge to drain as recommended	No	

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BGS, Keyworth		Comments
<b>Other Risk Systems</b>		
Relevant checks in place	Yes	

**ASSET REGISTER**  
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**GEOSCIENCE INNOVATION HUB**

ASSET	BGS REF	SYSTEMS	LOCATION	NOTES
CAL 1	SRMR/HWC/052	DHWS	Staff restaurant basement plant room	Vertical mains-fed cylinder (800 litre)
POU 1	GIH/HWH/054	DHWS	Ground floor ladies J/LT/29 under basin	10 litre water heater
POU 2	GIH/HWT/029	DHWS	First floor unisex toilet J/LT/33	Instantaneous water heater
HUM 1	-	Humidifier	Computer suite	Uniflair chiller
HUM 2	-	Humidifier	Computer suite	Uniflair chiller
HUM 3	-	Humidifier	Computer suite	Uniflair chiller
HUM 4	-	Humidifier	Computer suite	Uniflair chiller
HUM 5	-	Humidifier	Computer suite	Uniflair chiller
WS 1	-	Water Softener	GIH plantroom	Supplies chillers
PU 1	-	LTHW	GIH plantroom	Pressurisation unit
PU 2	-	LTHW	GIH plantroom	Pressurisation unit
WB 1	GIH/TB/050	Water Boiler	Ground floor tea point Room J037	
WB 2	GIH/TB/052	Water Boiler	Ground floor tea point Room J036	
WB/CW	-	Water Boiler / Chiller	First floor kitchen	ZIP Hydrotap boiler / chiller unit for beverages

**ASSET REGISTER**  
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**HANLON HOUSE**

<b>ASSET</b>	<b>BGS REF</b>	<b>SYSTEMS</b>	<b>LOCATION</b>	<b>NOTES</b>
POU 1 POU 2	HH/HWT/001 HH/HWT/003	DHWS DHWS	First floor unisex toilet First floor ladies changing area	Small instantaneous point of use water heaters with little or no stored water
S 1 – 2 S 3 – 4	HH/SHW/005 – 6 HH/SHW/007 – 8	Showers Showers	First floor ladies changing area First floor gents changing area	Mains fed electric showers
ACU 1	-	Air Cooling Unit	Ground floor gym	Gym cooling

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**JAMES HUTTON BUILDING**

ASSET	BGS REF	SYSTEMS	LOCATION	NOTES
CAL 1	JHB/HWC/002	DHWS	Plant room mezzanine floor	Vertical mains-fed cylinder
PU 1	-	LPHWS	Plant room	Pressurisation unit for heating system
S 1	JHB/SHW/ 024-25	Shower	Ground floor shower room	Accessible mixer shower with 2 heads
AHU 1	JHB/AHU/001	Air Handling Unit	Plant room	Office ventilation and cooling
ACU 1	JHB/ACU/001	Air Cooling Unit	Server room	Server cooling
WB/CW 1-2	-	Water Boiler / Chiller	Ground & first floor tea point	ZIP Hydrotap boiler / chiller units for beverages
RWT	-	Rainwater tank	Underground outside building	

**ASSET REGISTER**  
**BGS, KEYWORTH – 13 JULY 2016**



**KINGSLEY DUNHAM BUILDING**

ASSET	BGS REF	SYSTEMS	LOCATION	NOTES
CAL 1	SRMR/HWC/052	DHWS	Staff restaurant basement plant room	Vertical mains-fed cylinder (800 litre)
RS 1	KDB/SW/071	Rinse Spray	First floor staff kitchen	Mixer type
AHU 1 AHU 2	KDB/AHU/001 KDB/AHU/002	Air Handling Unit Air Handling Unit	Roof plant room Roof plant room	Seminar room ventilation & cooling Library & office ventilation & cooling
WB 1 WB 2 WB 3 WB 4	KDB/TB/038 KDB/TB/068 KDB/TB/075 KDB/TB/083	Water Boiler Water Boiler Water Boiler Water Boiler	First floor rear stairwell kitchen First floor staff kitchen Ground floor rotunda kitchen First floor rotunda kitchen	
HUM 1	-	Humidifier	Ground floor library	
WS 1	-	Water Softener	First floor staff kitchen	Supplies dishwasher
CW	-	Drinking Water	Reception area & first floor rotunda tea point	Chilled water dispensers
DW	KDB/DW/072	Dishwasher	First floor staff kitchen	

**ASSET REGISTER**  
**BGS, KEYWORTH – 13 JULY 2016**



**KINGSLEY DUNHAM BUILDING SPORT CENTRE**

<b>ASSET</b>	<b>BGS REF</b>	<b>SYSTEMS</b>	<b>LOCATION</b>	<b>NOTES</b>
POU 1 POU 2	- -	DHWS DHWS	Ground floor ladies First floor gents	
S 1 – 2 S 3 – 5	- -	Showers Showers	Ground floor ladies changing area First floor gents changing area	Electric shower Electric shower

**ASSET REGISTER**  
**BGS, KEYWORTH – 13 JULY 2016**



**PUBLICATIONS STORE**

<b>ASSET</b>	<b>BGS REF</b>	<b>SYSTEMS</b>	<b>LOCATION</b>	<b>NOTES</b>
IWH 1	PS/ICB/OO1	DHWS	On wall in toilet	Gas fired combi boiler

**ASSET REGISTER**  
**BGS, KEYWORTH – 13 JULY 2016**



**SECURITY BLOCK**

<b>ASSET</b>	<b>BGS REF</b>	<b>SYSTEMS</b>	<b>LOCATION</b>	<b>NOTES</b>
POU 1	SB/HWH/003	DHWS	Under the kitchen sink	15 litre unvented point of use water heater
POU 2	SB/HWH/004	DHWS	Toilet	Instantaneous water heater

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## GEOSCIENCE INNOVATION HUB

### Legionella Risk Factor Calculation Summary

Asset ref.	Risk System	Risk Factor
MCWS	Cold outlets (mains supply cold water systems)	64
DHWS	Hot outlets (domestic hot water)	50

#### Comments

Systems identified as having a high risk factor are those with a score of greater than 610 in the above table. The risk factors identified for the domestic systems were found to be low and it is recommended that these systems are maintained in a manner likely to minimise the risk of legionellosis.

There were limited conditions suitable for the multiplication of legionella. There are no systems that specifically create breathable droplets in normal use, however the act of opening any tap and the water striking a surface (e.g. sink or wash basin) or any act that agitates water in an open environment has the potential to create breathable droplets. There is generally low exposure to breathable droplets.

The above risk factors do not include for the presence of legionella organisms. The identification of legionella bacteria at any outlet should be considered as a significant risk, irrespective of the risk factor determined above, and should be treated as reason for immediate action.

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. MCWS

### Cold outlets (mains supply cold water systems)

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	1		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	10		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	1				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	8
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<b>Amplification</b>	= C x D x E x I	<b>X =</b>	20
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<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	36
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<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	64
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### Risk Factor Table

Factor	Code	Lowest		Low Middle		High Middle		Highest
Contamination	W	1		64		100		1000
Amplification	X	1		144		270		2400
Exposure & Host Susceptibility	Y	12		54		240		2400
<b>Total</b>	<b>Z</b>	14	<b>64</b>	262		610		5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. DHWS

### Hot outlets

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	1		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
					Aerosol, fine mist	10	
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	1		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	3				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	8
<b>Amplification</b>	= C x D x E x I	<b>X =</b>	6
<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	36
<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	50

Risk Factor Table							
Factor	Code	Lowest		Low Middle		High Middle	Highest
Contamination	W	1		64		100	1000
Amplification	X	1		144		270	2400
Exposure & Host Susceptibility	Y	12		54		240	2400
<b>Total</b>	<b>Z</b>	14	<b>50</b>	262		610	5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## HANLON HOUSE

### Legionella Risk Factor Calculation Summary

Asset ref.	Risk System	Risk Factor
MCWS	Cold outlets (mains supply cold water systems)	50
DHWS	Hot outlets (domestic hot water from POU)	46
S 1 – 4	Electric showers	180

#### Comments

Systems identified as having a high risk factor are those with a score of greater than 610 in the above table. The risk factors identified for the domestic systems were found to be low and it is recommended that these systems are maintained in a manner likely to minimise the risk of legionellosis.

Conditions suitable for the multiplication of legionella were limited. The water heaters store little or no water and heat water on demand as do the electric showers. The showers and spray head on the ladies changing point of use water heater will create breathable droplets in normal use, and in addition the act of opening any tap and the water striking a surface (e.g. sink or wash basin) or any act that agitates water in an open environment has the potential to create breathable droplets. There is generally low exposure to these droplets, unless using the showers, when there will be considerable exposure.

The above risk factors do not include for the presence of legionella organisms. The identification of legionella bacteria at any outlet should be considered as a significant risk, irrespective of the risk factor determined above, and should be treated as reason for immediate action.

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. MCWS

### Cold outlets (mains supply cold water systems)

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	1		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
					Aerosol, fine mist	10	
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	3		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	1				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	8
<b>Amplification</b>	= C x D x E x I	<b>X =</b>	6
<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	36
<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	50

Risk Factor Table							
Factor	Code	Lowest		Low Middle		High Middle	Highest
Contamination	W	1		64		100	1000
Amplification	X	1		144		270	2400
Exposure & Host Susceptibility	Y	12		54		240	2400
<b>Total</b>	<b>Z</b>	14	<b>50</b>	262		610	5800



# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. S 1 – 4

### Electric showers

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	3		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	8
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	10		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	3				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	24
<b>Amplification</b>	= C x D x E x I	<b>X =</b>	60
<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	96
<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	180

Risk Factor Table							
Factor	Code	Lowest		Low Middle		High Middle	Highest
Contamination	W	1		64		100	1000
Amplification	X	1		144		270	2400
Exposure & Host Susceptibility	Y	12		54		240	2400
<b>Total</b>	<b>Z</b>	14	<b>180</b>	262		610	5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## JAMES HUTTON BUILDING

### Legionella Risk Factor Calculation Summary

Asset ref.	Risk System	Risk Factor
MCWS	Cold outlets (mains supply cold water systems)	64
DHWS	Hot outlets (domestic hot water 50°C or more)	50
S 1	Shower	180

#### Comments

Systems identified as having a high risk factor are those with a score of greater than 610 in the above table. The risk factors identified for the domestic systems were found to be low and it is recommended that these systems are maintained in a manner likely to minimise the risk of legionellosis.

There were limited conditions suitable for the multiplication of legionella. The shower will create breathable droplets in normal use; in addition the act of opening any tap and the water striking a surface (e.g. sink or wash basin) or any act that agitates water in an open environment has the potential to create breathable droplets. There is generally low exposure to breathable droplets, but those using the shower will have considerable exposure.

The above risk factors do not include for the presence of legionella organisms. The identification of legionella bacteria at any outlet should be considered as a significant risk, irrespective of the risk factor determined above, and should be treated as reason for immediate action.



# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. DHWS

### Hot outlets

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	1		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	1		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	3				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						
<b>Contamination</b>		= A x B		<b>W =</b>	8		
<b>Amplification</b>		= C x D x E x I		<b>X =</b>	6		
<b>Exposure &amp; Host Susceptibility</b>		= F x G x H		<b>Y =</b>	36		
<b>Risk Factor Total</b>		= W+X+Y		<b>Z =</b>	50		

### Risk Factor Table

Factor	Code	Lowest		Low Middle		High Middle		Highest
Contamination	W	1		64		100		1000
Amplification	X	1		144		270		2400
Exposure & Host Susceptibility	Y	12		54		240		2400
<b>Total</b>	<b>Z</b>	14	<b>50</b>	262		610		5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. S 1

### Shower

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1			Average risk	3	
	Clean	3	3		High Risk (elderly/infirm)	10	3
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1			Slight (<3 hours/week)	4	
	Open indoors	8	8		Moderate (3 to 30 hrs/wk)	6	4
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1			Still water	1	8
	pH 6.2 to 6.6 or 7.2 to 9.1	2	2		Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1			Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3	10		In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
	Heated: 20° - 50°C	10			More than 10 <sup>5</sup> /ml	8	
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1					
	Frequent to moderate	3	3				
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	24
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<b>Amplification</b>	= C x D x E x I	<b>X =</b>	60
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<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	96
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<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	180
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### Risk Factor Table

Factor	Code	Lowest	Low Middle	High Middle	Highest
Contamination	W	1	64	100	1000
Amplification	X	1	144	270	2400
Exposure & Host Susceptibility	Y	12	54	240	2400
<b>Total</b>	<b>Z</b>	14	<b>180</b>	262	5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## KINGSLEY DUNHAM BUILDING

### Legionella Risk Factor Calculation Summary

Asset ref.	Risk System	Risk Factor
MCWS	Cold outlets (mains supply cold water systems)	50
DHWS	Hot outlets (domestic hot water)	50
RS 1	Rinse Spray	138

#### Comments

Systems identified as having a high risk factor are those with a score of greater than 610 in the above table. The risk factors identified for the domestic systems were found to be low and it is recommended that these systems are maintained in a manner likely to minimise the risk of legionellosis.

There are limited conditions suitable for the multiplication of legionella. The rinse spray will create breathable droplets in normal use; in addition the act of opening any tap and the water striking a surface (e.g. sink or wash basin) or any act that agitates water in an open environment has the potential to create breathable droplets. There is generally low exposure to breathable droplets, but those using the rinse spray will have considerable exposure.

The above risk factors do not include for the presence of legionella organisms. The identification of legionella bacteria at any outlet should be considered as a significant risk, irrespective of the risk factor determined above, and should be treated as reason for immediate action.

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. MCWS

### Cold outlets (mains supply cold water systems)

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	1		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
					Aerosol, fine mist	10	
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	3		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	1				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

**Contamination** = A x B **W =** 8

**Amplification** = C x D x E x I **X =** 6

**Exposure & Host Susceptibility** = F x G x H **Y =** 36

**Risk Factor Total** = W+X+Y **Z =** 50

### Risk Factor Table

Factor	Code	Lowest		Low Middle		High Middle		Highest
Contamination	W	1		64		100		1000
Amplification	X	1		144		270		2400
Exposure & Host Susceptibility	Y	12		54		240		2400
<b>Total</b>	<b>Z</b>	<b>14</b>	<b>50</b>	<b>262</b>		<b>610</b>		<b>5800</b>

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. DHWS

### Hot outlets

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	1		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	1		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	3				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						
<b>Contamination</b>		= A x B		<b>W =</b>	8		
<b>Amplification</b>		= C x D x E x I		<b>X =</b>	6		
<b>Exposure &amp; Host Susceptibility</b>		= F x G x H		<b>Y =</b>	36		
<b>Risk Factor Total</b>		= W+X+Y		<b>Z =</b>	50		

### Risk Factor Table

Factor	Code	Lowest		Low Middle		High Middle		Highest
Contamination	W	1		64		100		1000
Amplification	X	1		144		270		2400
Exposure & Host Susceptibility	Y	12		54		240		2400
<b>Total</b>	<b>Z</b>	14	<b>50</b>	262		610		5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. RS 1

### Rinse Spray

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1			Average risk	3	3
	Clean	3	3		High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1			Slight (<3 hours/week)	4	4
	Open indoors	8	8		Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1			Still water	1	8
	pH 6.2 to 6.6 or 7.2 to 9.1	2	2		Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
					Aerosol, fine mist	10	
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	3		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	3				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	24
<b>Amplification</b>	= C x D x E x I	<b>X =</b>	18
<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	96
<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	138

### Risk Factor Table

Factor	Code	Lowest	Low Middle	High Middle	Highest
Contamination	W	1	64	100	1000
Amplification	X	1	144	270	2400
Exposure & Host Susceptibility	Y	12	54	240	2400
<b>Total</b>	<b>Z</b>	14	<b>138</b>	262	5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## KINGSLEY DUNHAM BUILDING SPORT CENTRE

### Legionella Risk Factor Calculation Summary

Asset ref.	Risk System	Risk Factor
MCWS	Cold outlets (mains supply cold water systems)	64
S1 – 5	Showers	180

#### Comments

Systems identified as having a high risk factor are those with a score of greater than 610 in the above table. The risk factors identified for the domestic systems were found to be low and it is recommended that these systems are maintained in a manner likely to minimise the risk of legionellosis.

There were limited conditions suitable for the multiplication of legionella. The showers will create breathable droplets in normal use; in addition the act of opening any tap and the water striking a surface (e.g. sink or wash basin) or any act that agitates water in an open environment has the potential to create breathable droplets. There is generally low exposure to breathable droplets, but those using the showers will have considerable exposure.

The above risk factors do not include for the presence of legionella organisms. The identification of legionella bacteria at any outlet should be considered as a significant risk, irrespective of the risk factor determined above, and should be treated as reason for immediate action.

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. MCWS

### Cold outlets (mains supply cold water systems)

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	1		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
					Aerosol, fine mist	10	
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	10		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	1				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	8
<b>Amplification</b>	= C x D x E x I	<b>X =</b>	20
<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	36
<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	64

Risk Factor Table							
Factor	Code	Lowest		Low Middle		High Middle	Highest
Contamination	W	1		64		100	1000
Amplification	X	1		144		270	2400
Exposure & Host Susceptibility	Y	12		54		240	2400
<b>Total</b>	<b>Z</b>	14	<b>64</b>	262		610	5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. S 1 – 5

### Showers

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	3		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	8
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
					Aerosol, fine mist	10	
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	10		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	3				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	24
<b>Amplification</b>	= C x D x E x I	<b>X =</b>	60
<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	96
<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	180

Risk Factor Table							
Factor	Code	Lowest	Low Middle	High Middle	Highest		
Contamination	W	1	64	100	1000		
Amplification	X	1	144	270	2400		
Exposure & Host Susceptibility	Y	12	54	240	2400		
<b>Total</b>	<b>Z</b>	14	<b>180</b>	262	610		5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## PUBLICATIONS STORE

### Legionella Risk Factor Calculation Summary

Asset ref.	Risk System	Risk Factor
MCWS	Cold outlets (mains supply cold water systems)	50
DHWS	Hot outlets	46

#### Comments

Systems identified as having a high risk factor are those with a score of greater than 610 in the above table. The risk factors identified for the domestic systems were found to be low and it is recommended that these systems are maintained in a manner likely to minimise the risk of legionellosis.

Conditions suitable for the multiplication of legionella were very limited. The water heater does not store water, heating it only on demand. There were no systems which create breathable droplets in normal use, however the act of opening any tap and the water striking a surface (e.g. sink or wash basin) or any act that agitates water in an open environment has the potential to create breathable droplets. There is generally low exposure to these droplets.

The above risk factors do not include for the presence of legionella organisms. The identification of legionella bacteria at any outlet should be considered as a significant risk, irrespective of the risk factor determined above, and should be treated as reason for immediate action.

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. MCWS

### Cold outlets (mains supply cold water systems)

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	1		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
					Aerosol, fine mist	10	
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	3		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	1				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	8
<b>Amplification</b>	= C x D x E x I	<b>X =</b>	6
<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	36
<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	50

Risk Factor Table							
Factor	Code	Lowest		Low Middle		High Middle	Highest
Contamination	W	1		64		100	1000
Amplification	X	1		144		270	2400
Exposure & Host Susceptibility	Y	12		54		240	2400
<b>Total</b>	<b>Z</b>	14	<b>50</b>	262		610	5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. DHWS

### Hot outlets

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1			Average risk	3	3
	Clean	3	1		High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>				<b>G</b>	<b>Degree of exposure</b>	
	Enclosed system	1	8	Slight (<3 hours/week)		4	4
	Open indoors	8		Moderate (3 to 30 hrs/wk)		6	
	Open outdoors	10		High (>30 hours/week)		8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
					Aerosol, fine mist	10	
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	1		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	1				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	8
<b>Amplification</b>	= C x D x E x I	<b>X =</b>	2
<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	36
<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	46

Risk Factor Table							
Factor	Code	Lowest		Low Middle		High Middle	Highest
Contamination	W	1		64		100	1000
Amplification	X	1		144		270	2400
Exposure & Host Susceptibility	Y	12		54		240	2400
<b>Total</b>	<b>Z</b>	14	<b>46</b>	262		610	5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## SECURITY BLOCK

### Legionella Risk Factor Calculation Summary

Asset ref.	Risk System	Risk Factor
MCWS	Cold outlets	50
DHWS	Hot outlets	50

#### Comments

Systems identified as having a high risk factor are those with a score of greater than 610 in the above table. The risk factors identified for the domestic systems were found to be low and it is recommended that these systems are maintained in a manner likely to minimise the risk of legionellosis.

Conditions suitable for the multiplication of legionella were limited. The kitchen water heater stores only a small volume of water and usage will very likely turnover the stored water within one day. There were no systems which create breathable droplets in normal use, however the act of opening any tap and the water striking a surface (e.g. sink or wash basin) or any act that agitates water in an open environment has the potential to create breathable droplets. There is generally low exposure to these droplets.

The above risk factors do not include for the presence of legionella organisms. The identification of legionella bacteria at any outlet should be considered as a significant risk, irrespective of the risk factor determined above, and should be treated as reason for immediate action.

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. MCWS

### Cold outlets

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	1		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	3		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	1				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	8
<b>Amplification</b>	= C x D x E x I	<b>X =</b>	6
<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	36
<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	50

### Risk Factor Table

Factor	Code	Lowest		Low Middle		High Middle		Highest
Contamination	W	1		64		100		1000
Amplification	X	1		144		270		2400
Exposure & Host Susceptibility	Y	12		54		240		2400
<b>Total</b>	<b>Z</b>	14	<b>50</b>	262		610		5800

# EVALUATION OF THE RISK FACTORS

BGS, KEYWORTH – 13 JULY 2016



## Legionella Risk Factor Calculation

Asset ref. DHWS

### Hot outlets

<b>A</b>	<b>Source condition</b>			<b>F</b>	<b>Nature of exposed population</b>		
	Chemically treated	1	1		Average risk	3	3
	Clean	3			High Risk (elderly/infirm)	10	
	Moderate contamination	8			Special risk (cooling tower / healthcare)	30	
Heavy contamination	10						
<b>B</b>	<b>Source accessibility</b>			<b>G</b>	<b>Degree of exposure</b>		
	Enclosed system	1	8		Slight (<3 hours/week)	4	4
	Open indoors	8			Moderate (3 to 30 hrs/wk)	6	
	Open outdoors	10			High (>30 hours/week)	8	
Adjacent to or in airstream	100						
<b>C</b>	<b>Acidity/Alkalinity</b>			<b>H</b>	<b>Droplet formation</b>		
	pH > 9.1 or < 6.2	1	2		Still water	1	3
	pH 6.2 to 6.6 or 7.2 to 9.1	2			Flowing water	3	
pH 6.7 to 7.1 neutral	3	Coarse Droplets		8			
<b>D</b>	<b>Incubation – Water Temperature</b>			<b>I</b>	<b>Total Microbial Count</b>		
	Heated or Chilled >49°C or < 13°C	1	1		Less than 10 <sup>4</sup> /ml	1	1
	Ambient: 13° - 20°C	3			In range 10 <sup>4</sup> to 10 <sup>5</sup> /ml	3	
Heated: 20° - 50°C	10	More than 10 <sup>5</sup> /ml		8			
<b>E</b>	<b>Water change rate</b>						
	High rate of change	1	3				
	Frequent to moderate	3					
	Infrequent to low rate	8					
Static	10						

<b>Contamination</b>	= A x B	<b>W =</b>	8
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<b>Amplification</b>	= C x D x E x I	<b>X =</b>	6
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<b>Exposure &amp; Host Susceptibility</b>	= F x G x H	<b>Y =</b>	36
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<b>Risk Factor Total</b>	= W+X+Y	<b>Z =</b>	50
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### Risk Factor Table

Factor	Code	Lowest		Low Middle		High Middle		Highest
Contamination	W	1		64		100		1000
Amplification	X	1		144		270		2400
Exposure & Host Susceptibility	Y	12		54		240		2400
<b>Total</b>	<b>Z</b>	14	<b>50</b>	262		610		5800

## PRIORITY RATINGS FOR RECOMMENDATIONS

BGS, KEYWORTH – 13 JULY 2016



Where an imminent risk to health and safety is found during a legionella Risk Assessment, this will have been communicated to the Site Responsible Person as soon as practicable by use of the High Risk Response notification.

H<sub>2</sub>O Chemicals Ltd use a straightforward system designed for ease of use and ease of understanding. These categories depend upon the level of risk and relevance to the control of legionella. The following descriptions define the approach used by H<sub>2</sub>O Chemicals Ltd.

### **HIGH PRIORITY**

Taking action will substantially improve management or control of the risk from legionella.

This requires prompt action.

### **MEDIUM PRIORITY**

Taking action will assist in managing or controlling the risk from legionella.

This requires action.

### **LOW PRIORITY**

Taking action will assist in managing or controlling the risk from legionella.

This requires action.

## RECOMMENDATIONS

BGS, KEYWORTH – 13 JULY 2016



		ACTIONED	
HIGH PRIORITY		BY	DATE
	None at this time.		
MEDIUM PRIORITY			
<b>GIH Plantroom</b>	Fit double check valves on supply pipework to pressurisation units and the water softener as near to the mains tee off point as possible to prevent any possible risk of backflow.		
<b>Expansion Vessels</b>	Ideally, expansion vessels fitted to the system should be of the 'flow through' type to minimise stagnation of water within them. Where this is not the case, and wherever practical, expansion vessels should be fitted with isolation and drain valves to allow for the draining and flushing of these units. Internal bladders (where fitted) should be replaced according to manufacturer's guidelines.		
<b>KDB small water softener</b>	The plant should be serviced by a qualified softener engineer in accordance with the manufacturer's instructions (usually six-monthly, depending upon the softener usage).		
<b>KDB Humidifier</b>	Check operation of system to check if it is currently using water. Fit a double check valve to supply pipe near to tee off point from the mains.		
<b>Humidifiers, Air Conditioning Units</b>	Units should be serviced and maintained as per manufacturer's instructions.		
<b>James Hutton Building RWST</b>	If not already flushed, place mains top up to RWST 1 on a weekly flushing programme.		
LOW PRIORITY			
<b>AHUs</b>	The cooling coil and condensate tray should be regularly treated with a suitable biocide to provide ongoing protection from micro-organisms. This, however, should not be a substitute for manual cleaning.		

## RECOMMENDATIONS

BGS, KEYWORTH – 13 JULY 2016



### Monitoring Programme

This is based on ACoP L8 checklists in HSG274 and the current site Monitoring Programme.

#### WEEKLY

- Flush through and purge to drain before use without release of aerosols any infrequently used outlets.

#### MONTHLY

- Check that temperature is below 20°C after running for up to two minutes in the cold water sentinel taps.
- Check temperatures of stored water / flow and return from calorifiers.
- Check a representative selection of other sentinel outlets on a rotational basis.
- For circulating systems: take temperatures at return legs of principal loops (sentinel points) to confirm they are at a minimum of 50°C (55°C in healthcare premises). Temperature measurements may be taken on the surface of metallic pipework.

#### QUARTERLY

- Dismantle, clean and descale showerheads, including kitchen rinse spray (RS 1).
- For circulating systems: take temperatures at return legs of subordinate loops, temperature measurements can be taken on the surface of pipes, but where this is not possible, the temperature of water from the last outlet on each loop may be measured and this should be greater than 50°C within one minute of running. If the temperature rise is slow, it should be confirmed that the outlet is on a long leg and not that the flow and return has failed in that local area.

#### SIX MONTHLY

- Check tank water temperature remote from ball valve and mains temperature at ball valve.
- Check water temperatures to confirm the POU water heater operates at 50–60°C or check the installation has a high turnover.

## RECOMMENDATIONS

BGS, KEYWORTH – 13 JULY 2016



### Monitoring Programme (continued)

#### ANNUALLY

- Visually inspect cold water storage tank and carry out remedial work where necessary.
- Inspect the water in the tank. The surface should be clean and shiny and the water should not contain any debris or contamination. If considered necessary it should be cleaned and disinfected.
- Take temperatures at a representative selection of hot water outlets (intermediate outlets of single pipe systems and tertiary loops in circulating systems) to confirm they are at a minimum of 50°C (55°C in healthcare premises) to create a temperature profile of the whole system over a defined time period.
- Take temperatures at a representative selection of cold water outlets to confirm they are below 20°C to create a temperature profile of the whole system over a defined time period. Peak temperatures or any temperatures that are slow to fall should be an indicator of a localised problem.
- Check the plans for both the hot and cold water circuits to make sure they are correct and up-to-date. This should be done by physical examination of the circuits, if possible. Plans should be updated if necessary.
- Check the existence of all water connections to outside services: kitchens, fire hydrants and chemical wash units. Any insulation should be checked to ensure it remains intact. Any water outlets that are no longer used should be removed.
- Visual check on internal surfaces of the calorifier for scale and sludge where possible, or consider the use of a boroscope. The calorifier should then be cleaned if considered necessary.
- A sample to be taken from the hot water calorifier (where possible) to note condition of the drain water for clarity, quantity of debris and temperature.

## RECOMMENDATIONS

BGS, KEYWORTH – 13 JULY 2016



### CHLORINE DIOXIDE MONITORING

#### WEEKLY

- Check operation of chlorine dioxide dosing equipment – dose rate / chemical reserves.

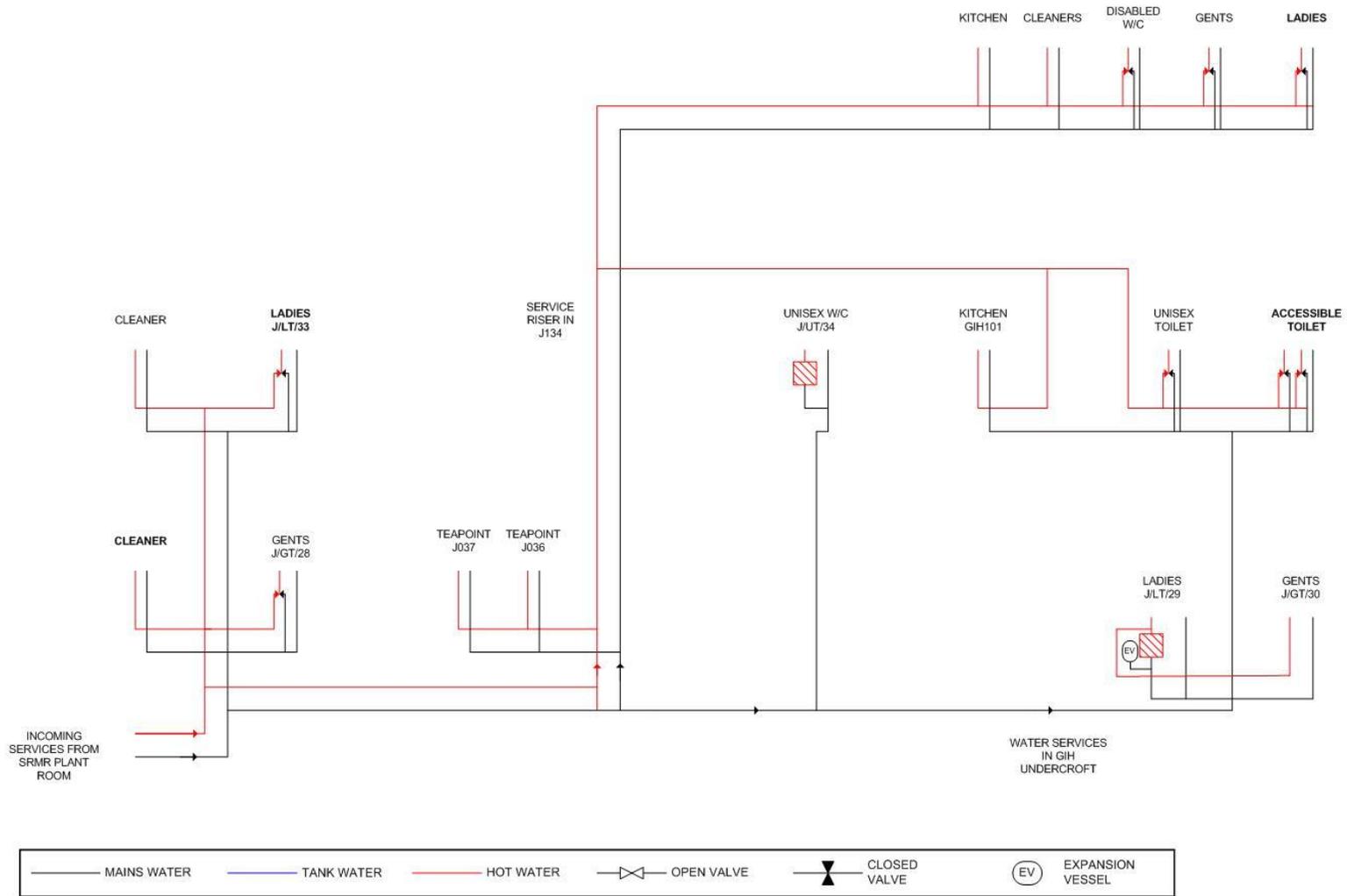
#### MONTHLY

- Check chlorine dioxide levels at sentinel outlets.

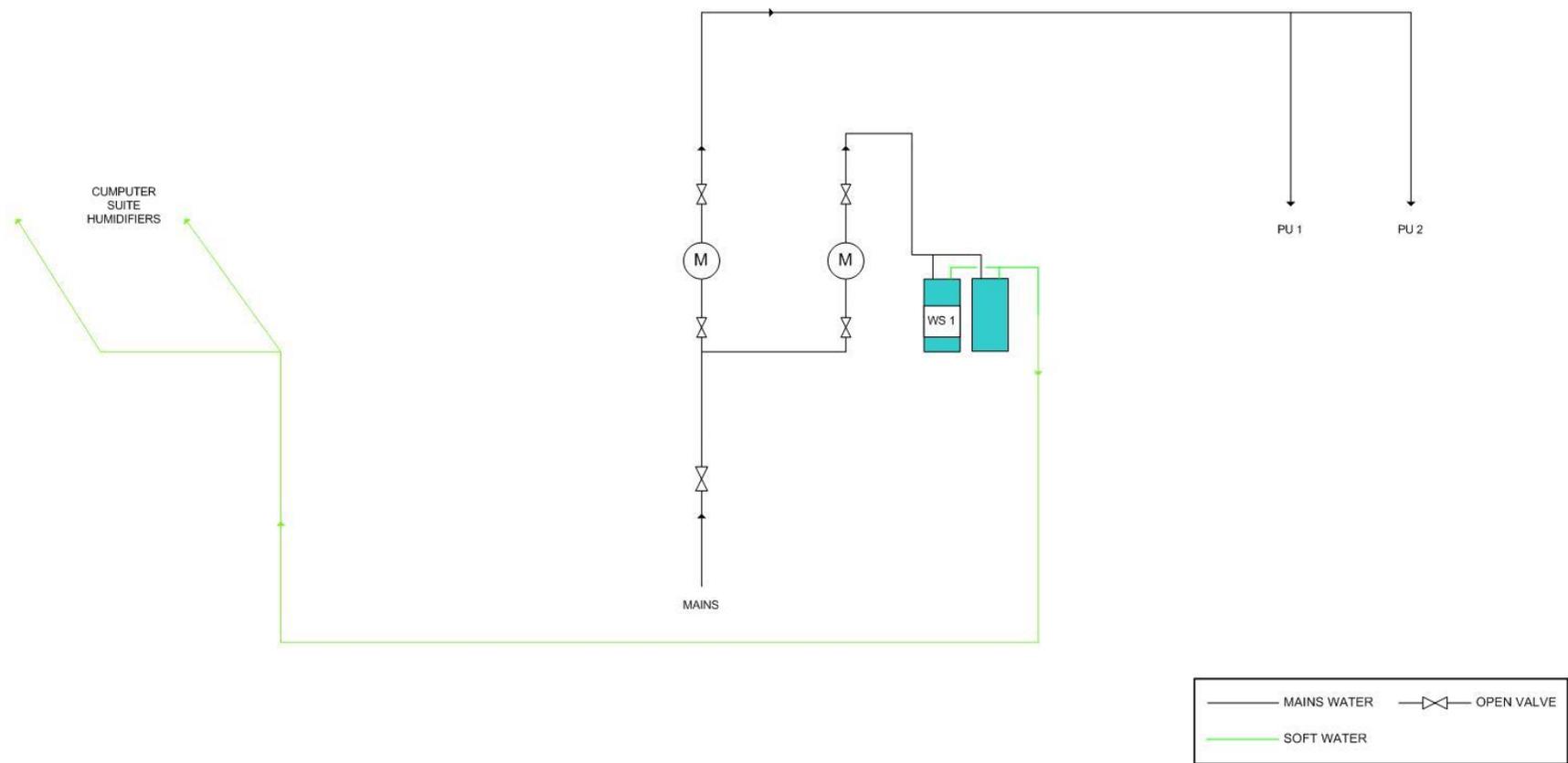
#### ANNUALLY

- Check chlorine dioxide levels at a representative number of hot and cold water taps on a rotational basis.

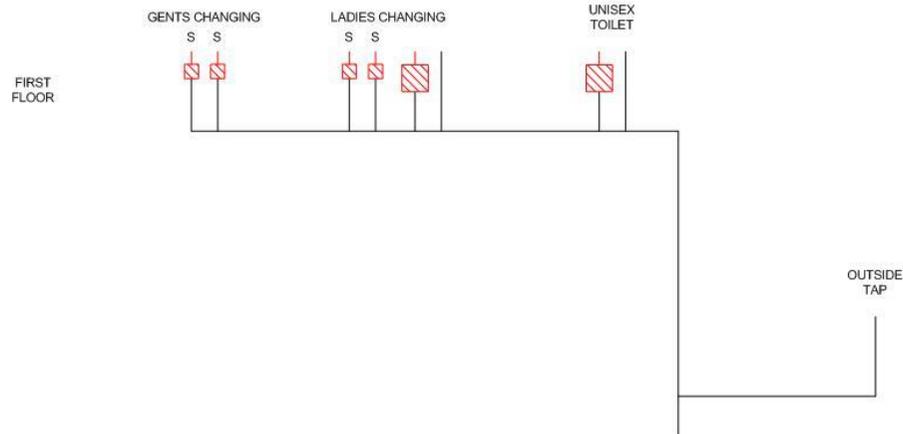
# SCHEMATIC DRAWINGS



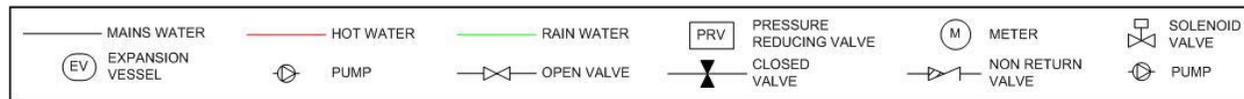
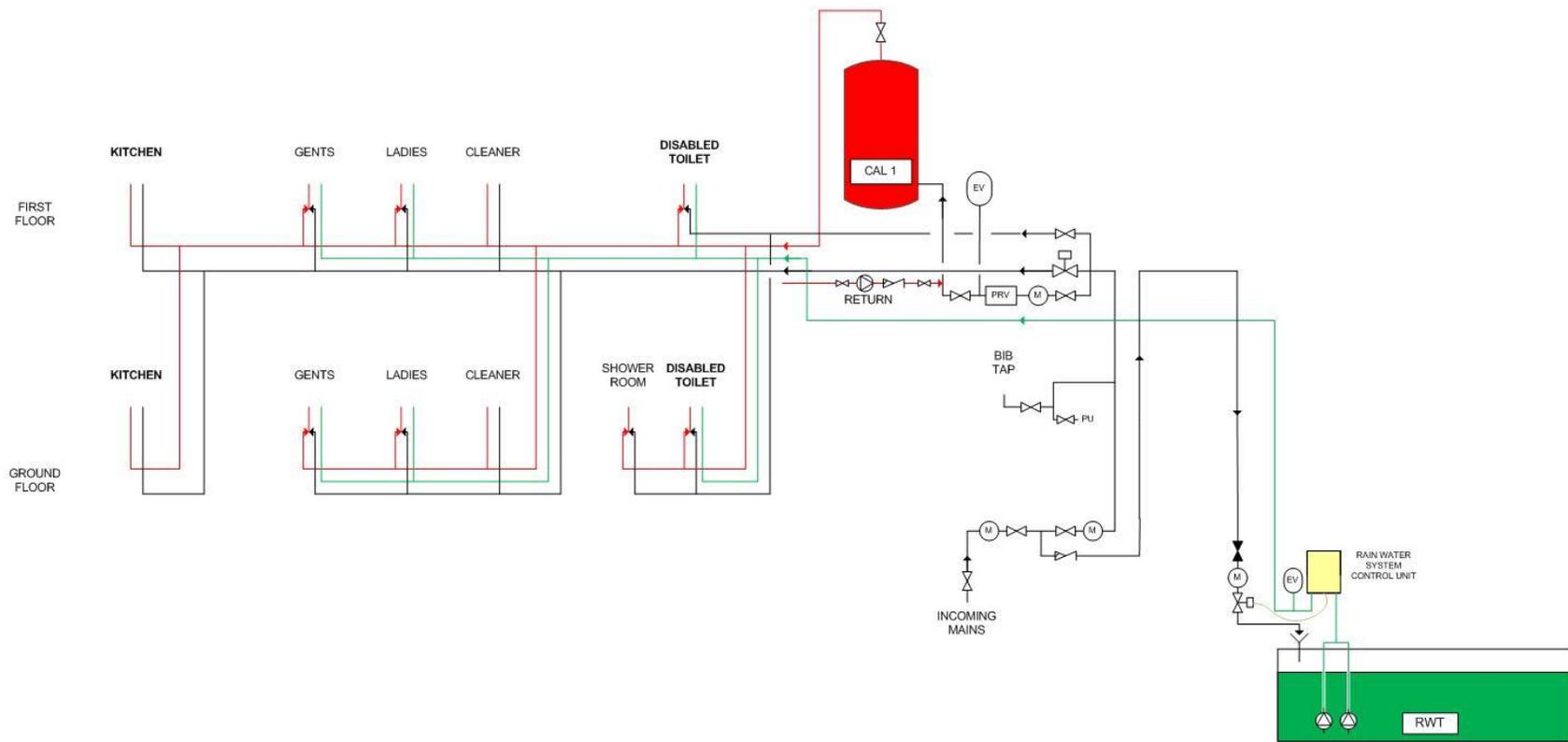
# SCHEMATIC DRAWINGS



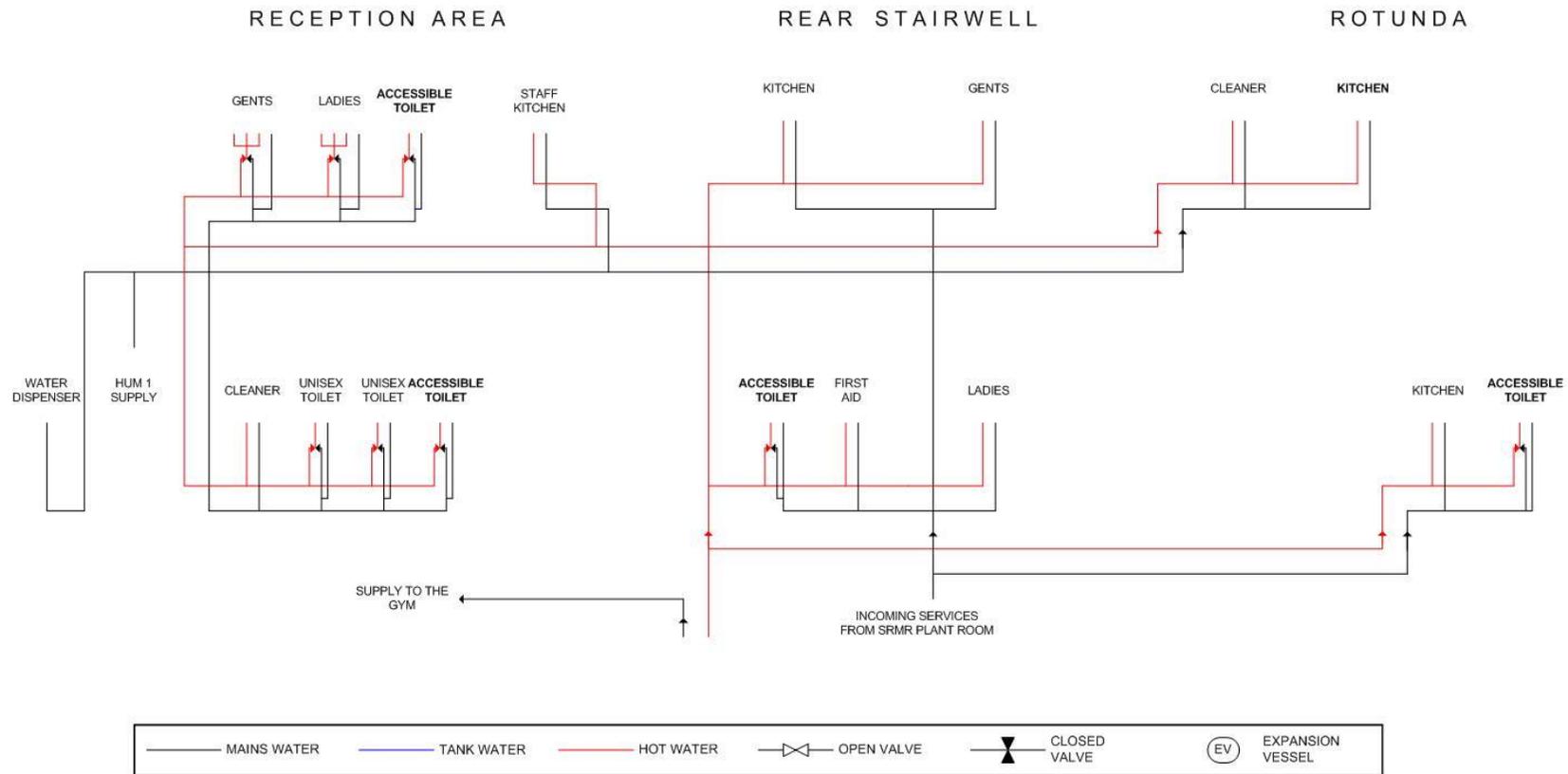
# SCHEMATIC DRAWINGS



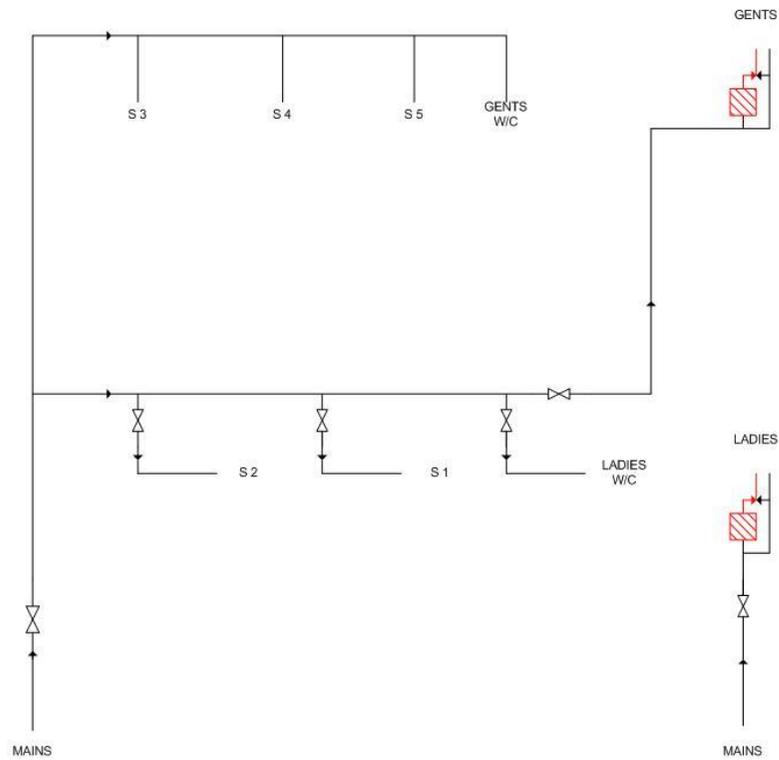
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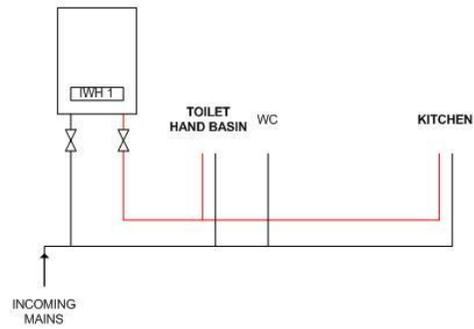
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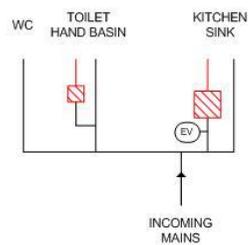
# SCHEMATIC DRAWINGS



# SCHEMATIC DRAWINGS



# SCHEMATIC DRAWINGS



## WATER OUTLETS

**BGS, KEYWORTH – 13 JULY 2016**



### GEOSCIENCE INNOVATION HUB

Location	Description	Is Area in Use?	Hot Temp °C < 1 min	Cold Temp °C < 2 min	Outlet Tested	Note no(s)
Ground Floor	Cleaners cupboard	yes	57.7	<b>21.6</b>	sink	1, 2
	J/GT/28 gents	yes	53.0 43.4 TMV	<b>21.4</b>	wash basin	
	J036 office	yes	59.2	<b>22.5</b>	wash basin	
	J/LT/30 gents	yes	61.5	<b>20.9</b>	wash basin	3
First Floor	Unisex toilet J/UT/34	yes	58.5	<b>22.2</b>	wash basin	3
	Kitchen GIH101	yes	54.3	<b>23.8</b>	sink	
	Unisex toilet (near GIH103)	yes	54.4	<b>21.9</b>	wash basin	
Second Floor	New second floor ladies	flushed	56.7 38.8 TMV	26.5	wash basin	4, 5
	New kitchen	flushed	58.0	<b>28.0</b>	sink	

**Notes:-**

Temperatures shown in bold are out of parameter for Legionella control, or present a scalding risk.

The outlets listed reflect sentinel outlets, some representative outlets, and those deemed to be a potential risk. Other outlets have been assessed in the relevant areas as identified on the schematic drawing.

1. Nearest outlet to incoming DHWS
2. Nearest outlet to incoming mains
3. Hot supplied by POU
4. Furthest outlet from incoming DHWS
5. Furthest outlet from incoming mains

**WATER OUTLETS**  
**BGS, KEYWORTH – 13 JULY 2016**



**HANLON HOUSE**

Location	Description	Is Area in Use?	Hot Temp °C < 1 min	Cold Temp °C < 2 min	Outlet Tested	Note no(s)
<b>First Floor</b>	Unisex toilet	yes	50.3	16.7	wash basin	1
	Ladies changing	yes	54.1	17.1	wash basin	1

**Notes:-**

Temperatures shown in bold are out of parameter for Legionella control, or present a scalding risk.

The outlets listed reflect sentinel outlets, some representative outlets, and those deemed to be a potential risk. Other outlets have been assessed in the relevant areas as identified on the schematic drawing.

1. Mains cold, hot supplied by POU

**WATER OUTLETS**  
**BGS, KEYWORTH – 13 JULY 2016**



**JAMES HUTTON BUILDING**

Location	Description	Is Area in Use?	Hot Temp °C < 1 min	Cold Temp °C < 2 min	Outlet Tested	Note no(s)
<b>Ground Floor</b>	Kitchen	yes	57.8	<b>22.5</b>	sink	
	Disabled	yes	51.8	21.8	wash basin	1
<b>First Floor</b>	Kitchen	yes	60.3	<b>22.5</b>	sink	2
	Gents	yes	40.6	-	wash basin	

**Notes:-**

Temperatures shown in bold are out of parameter for Legionella control, or present a scalding risk.

The outlets listed reflect sentinel outlets, some representative outlets, and those deemed to be a potential risk. Other outlets have been assessed in the relevant areas as identified on the schematic drawing.

1. Nearest outlet to CAL 1
2. Furthest outlet from CAL 1

## WATER OUTLETS

**BGS, KEYWORTH – 13 JULY 2016**



### KINGSLEY DUNHAM BUILDING

Location	Description	Is Area in Use?	Hot Temp °C < 1 min	Cold Temp °C < 2 min	Outlet Tested	Note no(s)
Reception Area Ground Floor	Unisex toilet (left)	yes	40.8	-	wash basin	
Reception Area First Floor	Staff kitchen	yes	53.3	19.2	sink	
	Disabled toilet	flushed	40.2 supply 54.5	19.6	wash basin	1
Rear Stairwell Ground Floor	First aid	flushed	57.9	19.6	sink	
	Ladies L/LT/39	yes	39.8 supply 56.3	19.2	wash basin	2
Rotunda Area Ground Floor	Kitchen	yes	53.5	19.8	sink	
Rotunda Area First Floor	Kitchen	yes	56.5	19.8	sink	

**Notes:-**

Temperatures shown in bold are out of parameter for Legionella control, or present a scalding risk.

The outlets listed reflect sentinel outlets, some representative outlets, and those deemed to be a potential risk. Other outlets have been assessed in the relevant areas as identified on the schematic drawing.

1. Furthest DHWS outlet
2. Nearest DHWS outlet

**WATER OUTLETS**  
**BGS, KEYWORTH – 13 JULY 2016**



**KINGSLEY DUNHAM BUILDING SPORT CENTRE**

Location	Description	Is Area in Use?	Hot Temp °C < 1 min	Cold Temp °C < 2 min	Outlet Tested	Note no(s)
<b>Ground Floor</b>	Ladies change	yes	40.7 61.3 supply	21.8	wash basin	1
<b>First Floor</b>	Gents change	yes	39.9 60.7 supply	21.5	wash basin	1

**Notes:-**

Temperatures shown in bold are out of parameter for Legionella control, or present a scalding risk.

The outlets listed reflect sentinel outlets, some representative outlets, and those deemed to be a potential risk. Other outlets have been assessed in the relevant areas as identified on the schematic drawing.

1. Hot supplied by POU

**WATER OUTLETS**  
**BGS, KEYWORTH – 13 JULY 2016**



**PUBLICATIONS STORE**

Location	Description	Is Area in Use?	Hot Temp °C < 1 min	Cold Temp °C < 2 min	Outlet Tested	Note no(s)
Ground floor	Kitchen	yes	54.1	17.9	sink	1
	Toilet	yes	50.6	17.9	wash basin	2

**Notes:-**

Temperatures shown in bold are out of parameter for Legionella control, or present a scalding risk.

The outlets listed reflect sentinel outlets, some representative outlets, and those deemed to be a potential risk. Other outlets have been assessed in the relevant areas as identified on the schematic drawing.

1. Furthest outlet from IWH 1
2. Nearest outlet to IWH 1

**WATER OUTLETS**  
**BGS, KEYWORTH – 13 JULY 2016**



**SECURITY BLOCK**

Location	Description	Is Area in Use?	Hot Temp °C < 1 min	Cold Temp °C < 2 min	Outlet Tested	Note no(s)
Ground floor	Kitchen	yes	52.3	19.4	sink	1
	Toilet	yes	50.4	18.6	wash basin	2

**Notes:-**

Temperatures shown in bold are out of parameter for Legionella control, or present a scalding risk.

The outlets listed reflect sentinel outlets, some representative outlets, and those deemed to be a potential risk. Other outlets have been assessed in the relevant areas as identified on the schematic drawing.

1. Hot supplied by POU 1
2. Hot supplied by POU 2

**COLD WATER STORAGE TANKS**  
**BGS, KEYWORTH – 13 JULY 2016**



**CWST**

Location	Basement plantroom	System supplies:	DCWS / DHWS
<b>Identification</b>	<b>NO TANKS WERE INSPECTED DURING THIS PART OF THE SURVEY</b>		
<b>Structure</b>	Dimensions (m) - (l x w x h)		
	Materials of tank		
	Adequate insulation		
	Evidence of unapproved WRAS fittings		
<b>Lid detail</b>	Secure tight fitting lid		
	Vent / Screen fitted		
<b>Overflow</b>	Rodent screens		
<b>Supply</b>	Adequate insulation		
	Valved		
	Return / Open vent pipes		
	Fed by		
<b>Outlets</b>	Adequate insulation		
	Valved		
<b>Operation and condition</b>	Temperatures (°C) tank / supply		
	Adequate cross flow		
	More than one day's usage		
	Sediment		
	Biofilm		
	Corrosion		
	Internal structure		
<b>Comments</b>			

# COLD WATER STORAGE TANKS AND SYSTEMS

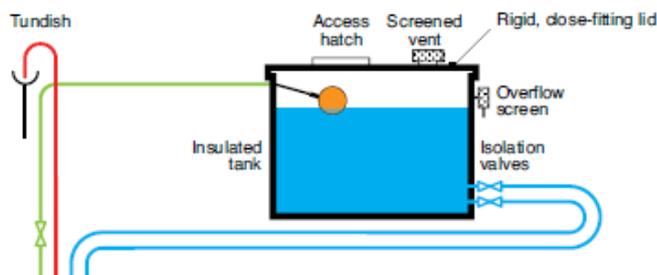
BGS, KEYWORTH – 13 JULY 2016

## Design, Construction and Usage

### **Cold water systems (from HSG274 Part 2)**

2.36 The general principles of design should be aimed at avoiding temperatures within the system that encourage the growth of microorganisms including legionella with the following taken into account:

- Cold water storage tanks should be installed in compliance with The Water Supply (Water Fittings) Regulations 1999 and Scottish Water Byelaws 2004. To prevent dirt and other potential nutrients getting in, they should have secure, tightly fitting lids (Figure 2.10). Insect and vermin screens should be fitted to protect any pipework open to the atmosphere, such as the overflow pipe and vent. Where screens are fitted, they should be installed so they do not hold water. To avoid stagnation, where multiple cold water storage tanks are fitted, they should be connected to ensure each tank fills uniformly and water is drawn off through each of the tanks. Access ports should be provided on cold water tanks for inlet valve maintenance, inspection and cleaning.
- All pipe branches to individual outlets should be capable of delivering cold water at a temperature that is as close to the incoming water temperature within two minutes of running.
- The volume of stored cold water should be minimised and should not normally exceed that required for one day's water use although in healthcare premises, a nominal 12 hours total onsite storage capacity is recommended.
- There should be a regular water flow throughout the system and all outlets to avoid stagnation. In cold water storage tanks this can be facilitated by locating inlet and outlet pipes on opposing sides of the tank at different heights (see Figure 2.10).
- Thermal gain should be kept to a minimum by adequate lagging and separation of cold water services pipework and components from hot water services and heating systems; ensuring higher use outlets are installed at the end of each branch to improve flow; and considering, where appropriate, ventilation of void spaces and risers.
- Systems that encourage the movement of cold water in areas of the distribution system that are prone to stagnation and heat gain should be considered.
- All pipework and components carrying fluids other than water supplied by the water supplier and components should be clearly labelled.
- System components and associated equipment which require maintenance are easily accessible.
- Water fittings should only be chosen where they are compliant with The Water Supply (Water Fittings) Regulations 1999 and Scottish Water Byelaws 2004. In the case of non-metallic materials, this will also include conformity with BS 6920. The best method to ensure compliance is to select products from the Water Regulations Advisory Scheme Water Fittings and Materials Directory.



1 **Figure 2.10** Acceptable tank design

# CALORIFIERS

BGS, KEYWORTH – 13 JULY 2016



## JAMES HUTTON BUILDING

CAL	Gauges Fitted	Temperatures (°C)			Return Type	Access Hatch	Drain Operable	Blowdown Appearance	Is Shunt Pump Required?	Are Recs Required?
		Stored	Flow	Return						
1	yes	62.0	-	56.0	single	yes	yes	clear	no	no
Comments:										



CAL 1

### Design, Construction and Usage

#### Hot water systems (from HSG274 Part 2)

2.37 The general principles of design aim to avoid temperatures within the system that encourage the growth of legionella. Consideration should be given to the following:

Maintaining a supply temperature of at least 60°C from the heat source and / or storage vessel (calorifier):

- the hot water circulating loop should be designed to give a return temperature to the calorifier from each loop of at least 50°C;
- appropriate means for measuring temperature, e.g. thermometer / immersion pockets fitted on the flow and return to the calorifier and in the base of the calorifier;
- all pipe branches to individual outlets should be insulated and sufficiently short to enable the hot water at each outlet to reach 50°C within one minute of turning on the tap;
- the storage capacity and recovery rate of the calorifier should be selected to meet the normal daily fluctuations in hot water use without any significant drop in target supply temperature. The open vent pipe from the calorifier should be sufficiently raised above the water level and suitably sited in the water circuit to prevent hot water from being discharged in normal circumstances. The open vent should ideally discharge to atmosphere via a tundish providing a safe and visible warning of a fault condition;
- where more than one calorifier is used, they should be connected in parallel and deliver water at a temperature of at least 60°C;
- to overcome localised failures in the distribution system, circulating pump design and the correct commissioning of balancing valves are key issues to ensure flow throughout all parts of the hot water system, particularly the hot water return legs. Balancing the hot water system flow and return circuits is critical to avoid long lengths of stagnant pipework that is likely to be at a lower temperature (see Figure 2.11);
- the calorifier drain valve should be located in an accessible position at the lowest point and as close as possible to the vessel, so that accumulated particulate matter can be safely drained;
- all types of water heaters, including storage calorifiers, should be designed and installed so that they are safe to use and maintain, and able to be inspected internally, where possible.

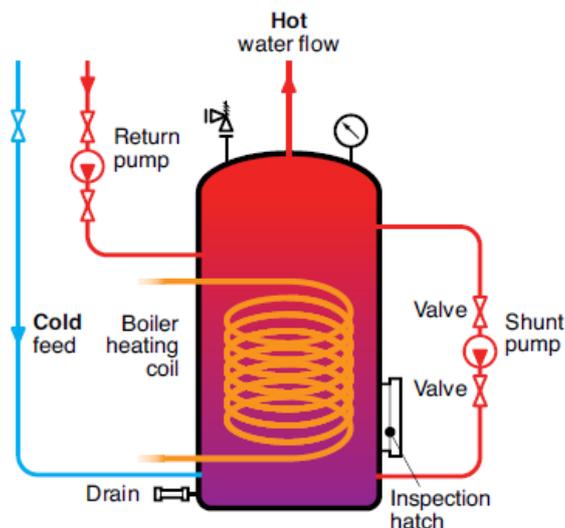


Figure 2.8 Indirect heating calorifier vessel

# WATER HEATERS

BGS, KEYWORTH – 13 JULY 2016



## GEOSCIENCE INNOVATION HUB

Asset Reference	System Usage	Outlet Temps > 50°C ?	Recommendations Required?
POU 1	Daily	Yes	No
POU 2	Daily	Yes	No



POU 1



POU 2

# WATER HEATERS

BGS, KEYWORTH – 13 JULY 2016



## HANLON HOUSE

Asset Reference	System Usage	Outlet Temps > 50°C ?	Recommendations Required?
POU 1	At least weekly	50.3	No
POU 2	At least weekly	54.1	No



POU 1 (HH/HWT/001)



POU 2 (HH/HWT/003)

# WATER HEATERS

BGS, KEYWORTH – 13 JULY 2016



## KINGSLEY DUNHAM BUILDING SPORT CENTRE

Asset Reference	System Usage	Outlet Temps > 50°C ?	Recommendations Required?
POU 1	At least weekly	Yes	No
POU 2	At least weekly	Yes	No



POU 1

# WATER HEATERS

BGS, KEYWORTH – 13 JULY 2016



## PUBLICATIONS STORE

Asset Reference	System Usage	Outlet Temps > 50°C ?	Recommendations Required?
IWH 1	Daily	Yes	No



IWH 1

# WATER HEATERS

BGS, KEYWORTH – 13 JULY 2016



## SECURITY BLOCK

Asset Reference	System Usage	Outlet Temps > 50°C ?	Recommendations Required?
POU 1	Daily	52.3	No
POU 2	Daily	50.4	No



POU 1



POU 2

# SHOWERS

BGS, KEYWORTH – 13 JULY 2016



## HANLON HOUSE

Shower	Location	Contamination	Usage	Hot > 50°C	Cold < 20°C	Type
S 1 – 2	First Floor Ladies Changing	Clean	At least weekly	Yes	Yes	Mains electric showers
S 3 – 4	First Floor Gents Changing	Clean	At least weekly	Yes	Yes	Mains electric showers
<b>Comments:</b>						



TYPICAL SHOWER



TYPICAL SHOWERHEAD

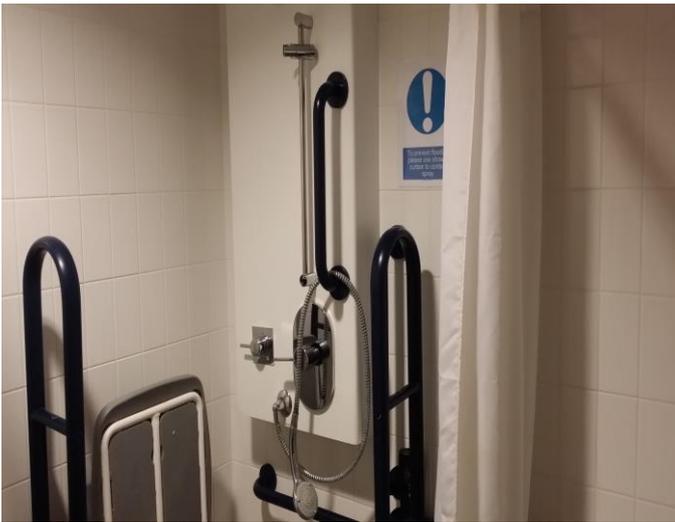
# SHOWERS

BGS, KEYWORTH – 13 JULY 2016



## JAMES HUTTON BUILDING

Shower	Location	Contamination	Usage	Hot > 50°C	Cold < 20°C	Type
S 1	Ground Floor Shower Room	Slight scale	At least weekly	Yes	No	Domestic mixer shower
<b>Comments</b> The shower is of the accessible type with two heads: one fixed and one on a hose.						



S 1



S 1 SHOWERHEAD

# SHOWERS

BGS, KEYWORTH – 13 JULY 2016



## KINGSLEY DUNHAM BUILDING

Shower	Location	Contamination	Usage	Hot > 50°C	Cold < 20°C	Type
RS 1	First floor staff kitchen	Slight scale	At least weekly	Yes	Yes	Mixer
<b>Comments</b>						



RS 1



RS 1 SPRAY HEAD

# SHOWERS

BGS, KEYWORTH – 13 JULY 2016



## KINGSLEY DUNHAM BUILDING SPORT CENTRE

Shower	Location	Contamination	Usage	Hot > 50°C	Cold < 20°C	Type
S 1 – 2	Ground Floor Ladies Changing Area	Clean	At least weekly	-	No	Electric
S 3 – 5	First Floor Gents Changing Area	Clean	At least weekly	-	No	Electric
<b>Comments</b>						



TYPICAL SHOWER



TYPICAL SHOWERHEAD

OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



GEOSCIENCE INNOVATION HUB

LOCATION	Location of outlet	GIH plantroom
TYPE	Type of System	Water Softener
IDENTIFICATION	Designation	WS
STRUCTURE	Materials of Construction	Mixed
	System Serves	Humidifiers
OPERATION & CONDITION	System Water Temperature	<20°C
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	None seen
	Degree of Biological Slime	None seen
	Extent of Corrosion	None
	Assessment of risk	Low
 <p>WS 1</p>		
<b>Observations:</b>		
Water softener should be serviced and resin bed disinfected as per manufacturer's instructions.		

## OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



### GEOSCIENCE INNOVATION HUB

LOCATION	Location of outlet	Computer Suite
TYPE	Type of System	Humidifiers
IDENTIFICATION	Designation	HUM 1 to 5
STRUCTURE	Materials of Construction	Mixed
	System Serves	Humidity
OPERATION & CONDITION	System Water Temperature	N/A
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	None seen
	Degree of Biological Slime	None seen
	Extent of Corrosion	None seen
	Assessment of risk	Low



**TYPICAL HUMIDIFIER**

**Observations:**

These humidifiers are supplied by softened water from the softener in the GIH plantroom. A water meter is fitted so the usage can be monitored.

## OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



### GEOSCIENCE INNOVATION HUB

LOCATION	Location of outlet	GIH plantroom
TYPE	Type of System	Pressurisation Units
IDENTIFICATION	Designation	PU 1 & 2
STRUCTURE	Materials of Construction	Mixed
	System Serves	LTHW / Chilled
OPERATION & CONDITION	System Water Temperature	<20°C
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	Light
	Degree of Biological Slime	None
	Extent of Corrosion	None
	Assessment of risk	Low
<b>Observations:</b>		
The units supply closed systems and present negligible or no risk from legionella. There may be a low risk when the units are maintained.		

## OTHER SYSTEMS

**BGS, KEYWORTH – 13 JULY 2016**



### GEOSCIENCE INNOVATION HUB

LOCATION	Location of outlet	First floor kitchen
TYPE	Type of System	Water Boiler / Chiller
IDENTIFICATION	Designation	WB / CW
STRUCTURE	Materials of Construction	Mixed
	System Serves	Beverages
OPERATION & CONDITION	System Water Temperature	>50°C / <20°C
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	None
	Degree of Biological Slime	None
	Extent of Corrosion	None
	Assessment of risk	Very low / negligible



**COMBINED WATER BOILER / CHILLER**



**BOILING WATER / CHILLED WATER TAP**

## OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



### GEOSCIENCE INNOVATION HUB

LOCATION	Location of outlet	Ground floor tea points Rooms J036 & J037
TYPE	Type of System	Water Boiler
IDENTIFICATION	Designation	WB
STRUCTURE	Materials of Construction	Mixed
	System Serves	Beverages
OPERATION & CONDITION	System Water Temperature	>50°C
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	None
	Degree of Biological Slime	None
	Extent of Corrosion	None
	Assessment of risk	Very low / negligible
		
<b>Observations:</b>		
The boiling of the water sterilises the water system and these units do not present a legionella risk.		

## OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



### HANLON HOUSE

LOCATION	Location of outlet	Gym area
TYPE	Type of System	Air cooling unit
IDENTIFICATION	Designation	ACU
STRUCTURE	Materials of Construction	Mixed
	System Serves	Gym cooling
OPERATION & CONDITION	System Water Temperature	N/A
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	Not inspected
	Degree of Biological Slime	Not inspected
	Extent of Corrosion	Not inspected
	Assessment of risk	Low
		
<b>Observations:</b>		
<p>Water condensing from the cooled air may create conditions suitable for bacteria to grow if units are not regularly cleaned and serviced. Cooling coils and drainage trays of these units could support bacteria growth and should be regularly inspected and maintained in a clean condition.</p>		

## OTHER SYSTEMS

**BGS, KEYWORTH – 13 JULY 2016**



### JAMES HUTTON BUILDING

LOCATION	Location of outlet	Plant Room
TYPE	Type of System	Pressurisation unit
IDENTIFICATION	Reference	PU 1
	Labelled	Yes
STRUCTURE	Materials of Construction	Mixed
	System Serves	LPHWS (heating)
OPERATION & CONDITION	System Water Temperature	Ambient
	Outlet Temperature	-
	Direct Spray Formation	None, closed system
	Degree of Dirt	Not inspected
	Degree of Biological Slime	Not inspected
	Extent of Corrosion	Not inspected
	Assessment of Risk	Very low
		
<b>Observations:</b>		
The unit supplies a closed system and presents negligible or no risk from legionella. There may be a low risk when the units are maintained.		

## OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



### JAMES HUTTON BUILDING

<b>LOCATION</b>	<b>Location of outlet</b>	Plant Room
<b>TYPE</b>	Type of System	Air handling units
<b>IDENTIFICATION</b>	Designation	AHU
<b>STRUCTURE</b>	Materials of Construction	Mixed
	System Serves	Heating, cooling & ventilation
<b>OPERATION &amp; CONDITION</b>	System Water Temperature	N/A
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	None
	Degree of Biological Slime	None
	Extent of Corrosion	None
	Assessment of Risk	Low
		
<b>AHU 1</b>		
<b>Observations:</b>		
<p>Water condensing from the cooled air at the cooling coils in the air handling units may create conditions suitable for bacteria to grow. The cooling coils and drainage trays of these units could support bacteria growth and should be regularly inspected and maintained in a clean condition.</p>		

## OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



### JAMES HUTTON BUILDING

LOCATION	Location of outlet	Server room
TYPE	Type of System	Air cooling unit
IDENTIFICATION	Designation	ACU
STRUCTURE	Materials of Construction	Mixed
	System Serves	Computer server cooling
OPERATION & CONDITION	System Water Temperature	N/A
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	Not inspected
	Degree of Biological Slime	Not inspected
	Extent of Corrosion	Not inspected
	Assessment of risk	Low
		
<b>Observations:</b>		
<p>Water condensing from the cooled air may create conditions suitable for bacteria to grow if units are not regularly cleaned and serviced. Cooling coils and drainage trays of these units could support bacteria growth and should be regularly inspected and maintained in a clean condition.</p>		

## OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



### JAMES HUTTON BUILDING

LOCATION	Location of outlet	Outside under ground
TYPE	Type of System	Rain water harvesting tank
IDENTIFICATION	Designation	RWT
STRUCTURE	Materials of Construction	Mixed
	System Serves	Rain water system
OPERATION & CONDITION	System Water Temperature	Ambient
	Outlet Temperature	Not accessed, system isolated at roof tank
	Direct Spray Formation	No
	Degree of Dirt	None seen
	Degree of Biological Slime	None seen
	Extent of Corrosion	None seen
	Assessment of risk	Very low / negligible
 <p><b>RAIN WATER CONTROL UNIT</b></p>		
<b>Observations:</b>		
<p>The stored temperatures are not believed to be generally high enough to encourage bacterial proliferation, but it is likely bacteria will be present. Commonly rain water systems have an ultra violet unit on the supply to the service tank to kill bacteria in the supply, but there is no such system here.</p>		

## OTHER SYSTEMS

**BGS, KEYWORTH – 13 JULY 2016**



### JAMES HUTTON BUILDING

LOCATION	Location of outlet	Ground & first floor tea points
TYPE	Type of System	Water Boiler / Chiller
IDENTIFICATION	Designation	WB / CW
STRUCTURE	Materials of Construction	Mixed
	System Serves	Beverages
OPERATION & CONDITION	System Water Temperature	>50°C / <20°C
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	None
	Degree of Biological Slime	None
	Extent of Corrosion	None
	Assessment of risk	Very low / negligible



**COMBINED WATER BOILER / CHILLER**



**BOILING WATER / CHILLED WATER TAP**



**SUB MICRON FILTER**

## OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



### JAMES HUTTON BUILDING

LOCATION	Location of outlet	At ground & first floor tea points
TYPE	Type of System	Water Boiler / Chiller
IDENTIFICATION	Designation	WB / CW
<b>Observations:</b>		
<p>The boiling of the water sterilises the water system and the temperature of the chilled side is not conducive to bacteria growth. These units do not present a legionella risk.</p> <p>The units have integral sub-micron filters which will filter almost all bacteria. As a result the water filters can accumulate bacteria. For this reason they should be changed every six months or sooner if recommended by the manufacturer.</p>		

## OTHER SYSTEMS

**BGS, KEYWORTH – 13 JULY 2016**



### KINGSLEY DUNHAM BUILDING

<b>LOCATION</b>	<b>Location of outlet</b>	Roof Plant Room
<b>TYPE</b>	Type of System	Air handling units
<b>IDENTIFICATION</b>	Designation	AHU 1 & 2
<b>STRUCTURE</b>	Materials of Construction	Mixed
	System Serves	Heating, cooling & ventilation
<b>OPERATION &amp; CONDITION</b>	System Water Temperature	N/A
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	Not inspected
	Degree of Biological Slime	Not inspected
	Extent of Corrosion	Not inspected
	Assessment of Risk	Low



**AHU 1**



**AHU 2**

**Observations:**

Water condensing from the cooled air at the cooling coils in the air handling units may create conditions suitable for bacteria to grow. The cooling coils and drainage trays of these units could support bacteria growth and should be regularly inspected and maintained in a clean condition.

AHU 1 supplies the seminar rooms. AHU 2 supplies the library and offices.

**OTHER SYSTEMS**

**BGS, KEYWORTH – 13 JULY 2016**



**KINGSLEY DUNHAM BUILDING**

<b>LOCATION</b>	<b>Location of outlet</b>	<b>Ground floor library entrance</b>
TYPE	Type of System	Humidifier
IDENTIFICATION	Designation	HUM
STRUCTURE	Materials of Construction	Mixed
	System Serves	Humidity
OPERATION & CONDITION	System Water Temperature	-
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	None seen
	Degree of Biological Slime	None seen
	Extent of Corrosion	None seen
	Assessment of risk	Low
		
<b>HUM 1</b>		
<p>Currently the unit is not fully in working use. Site are to investigate location of incoming mains supply to the unit.</p>		

**OTHER SYSTEMS**

**BGS, KEYWORTH – 13 JULY 2016**



**KINGSLEY DUNHAM BUILDING**

<b>LOCATION</b>	<b>Location of outlet</b>	<b>1<sup>st</sup> floor staff kitchen</b>
TYPE	Type of System	Water Softener
IDENTIFICATION	Designation	WS 1
STRUCTURE	Materials of Construction	Mixed
	System Serves	Dishwasher
OPERATION & CONDITION	System Water Temperature	<20°C
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	None seen
	Degree of Biological Slime	None seen
	Extent of Corrosion	None seen
	Assessment of risk	Very low
 <p><b>WS 1</b></p>		
<b>Observations:</b>		

**OTHER SYSTEMS**

**BGS, KEYWORTH – 13 JULY 2016**



**KINGSLEY DUNHAM BUILDING**

<b>LOCATION</b>	<b>Location of outlet</b>	<b>1<sup>st</sup> floor staff kitchen</b>
TYPE	Type of System	Dish washer
IDENTIFICATION	Designation	DW
STRUCTURE	Materials of Construction	Mixed
	System Serves	Dish washing
OPERATION & CONDITION	System Water Temperature	>50°C & <20°C
	Outlet Temperature	N/A
	Direct Spray Formation	Contained
	Degree of Dirt	None
	Degree of Biological Slime	None
	Extent of Corrosion	None
	Assessment of risk	Very low / negligible
		
<b>Observations:</b>		

OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



KINGSLEY DUNHAM BUILDING

LOCATION	Location of outlet	1 <sup>st</sup> floor kitchen and 1 <sup>st</sup> & ground floor rotunda tea points and 1 <sup>st</sup> floor rear stairwell tea point
TYPE	Type of System	Water Boiler
IDENTIFICATION	Designation	WB
STRUCTURE	Materials of Construction	Mixed
	System Serves	Beverages
OPERATION & CONDITION	System Water Temperature	>50°C
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	None
	Degree of Biological Slime	None
	Extent of Corrosion	None
	Assessment of risk	Very low / negligible
<b>Observations:</b>		
The boiling of the water sterilises the water system and these units do not present a legionella risk.		

OTHER SYSTEMS

BGS, KEYWORTH – 13 JULY 2016



KINGSLEY DUNHAM BUILDING

LOCATION	Location of outlet	Reception area & first floor rotunda tea point
TYPE	Type of System	Chilled Water Dispensing
IDENTIFICATION	Designation	CW
STRUCTURE	Materials of Construction	Mixed
	System Serves	Chilled drinking water
OPERATION & CONDITION	System Water Temperature	<20°C
	Outlet Temperature	N/A
	Direct Spray Formation	No
	Degree of Dirt	None seen
	Degree of Biological Slime	None seen
	Extent of Corrosion	None seen
	Assessment of risk	Very low / negligible
		
<b>ROTUNDA UNIT</b>		
<b>Observations:</b>		
Due to their filtering effect in-line filters on the supply can harbour bacteria and should be regularly changed during services.		

