

Water Neutrality Component Schedule - Rainwater Harvesting

DC/22/1458 erection of 2no storage units (Use Class B8)

Produced with advice from Silverline UK Ltd, Manufacturers of Water Treatment Equipment, and Darren Clarke, Somerset Scientific Services.

Questions and clarifications are available on request.

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References:

Water Neutrality Report - Development at Denver, Okehurst Lane, Billingshurst RH14 9HR
For Denver Commercial LLP Rev – P3 Reference C2182 Date 22nd June 2023

The Private Water Supplies Regulations 2009 (revoked)

The Private Water Supplies (England) Regulations 2016

The Private Water Supplies (England) (Amendment) Regulations 2018

The Private Water Supplies (Wales) Regulations 2017

The Water Supply (Water Quality) Regulations 2016

The Microbiology of Drinking Water (2010) - Part 2 - Practices and procedures for sampling (archived)

The Standing Committee of Analysts (SCA) Methods for the Examination of Waters and Associated Materials

BS EN 16941-1:2018 On-site non-potable water systems - Systems for the use of rainwater

BS 8515:2009+A1:2013 Rainwater harvesting systems. Code of practice (replaced by BS EN 16941-1:2018)

BS 8680:2020 Water quality. Water safety plans. Code of practice

<https://www.dwi.gov.uk/private-water-supplies/guidance-documents/pws-regulations/information-note-on-regulation-10/>

<https://www.dwi.gov.uk/private-water-supplies/guidance-documents/pws-regulations/information-note-on-regulation-9/>

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Water Supply Treatment

The supply treatment system will consist of a single system supplying the 5 staff facilities across the proposed 3no storage units (Use Class B8). The system is scaled by Silverline for UV sterilization 72 lpm exceeding the BREEAM calculation requirement of 9.5 lpm per facility (aggregate taps and flush) x 5 total 47.5 lpm.

Installation of the system will be in accordance with the manufacturer's instructions and carried out by qualified personnel with regard to location and access to components for future maintenance and/or replacement. The system will be commissioned (flushed, sampled, and tested prior to deployment).

The size of the storage tank, which will be located underground to regulate temperature (opaque and potable compliant material), is 5000 litres exceeding the BREEAM calculations in CGS Civils Denver C2182 P3 22/06/2023 Water Neutrality Report. 4350 litres storage calculated required for 60 day drought protection in total.

The 5000 litre tank carries an additional 9 days of supply beyond the 4350 litres storage required for 60 day drought protection. This yields 69 days of supply.

Treatment stages

There are 9 stages in the treatment of the rainwater.

1. Gutter brush guard system installed in the gutters collecting rainwater as a first stage filter to prevent leaves clogging filters. Roof outlets, guttering and pipework are free-draining to avoid stagnation and contamination of rainwater from other sources.
2. Large vortex rainwater collection filters to divert leaves, moss, and other debris to the stormwater drain (or a collection chamber) whilst allowing filtered rainwater to be sent to the catchpit chamber to be harvested.
3. Catchpit chamber to separate silts from the rainwater before it is fed to the storage tank. Drained via automatic wet/dry valve to storm drains after rain events to prevent standing water upstream of the rainwater tank.
4. 5000 litre Enduramaxx underground rainwater storage tank (food grade MDPE) with aerator to oxygenate the water and keep it fresh. 4350 litre capacity provides 60 days supply with drought protection as per BREEAM calculations in CGS Civils Denver C2182 P3 22/06/2023 Water Neutrality Report.
5. Water pressure boost pump to feed water from the tank to the prefilter before the filtered water arrives for UV sterilization.
6. Commercial high power ultraviolet sterilization system. WRAS (Water Regulations Advisory Scheme Testing) approved. To remove bacteria including Pseudomonas, Clostridium Perfringens, Cryptosporidium, Legionella, Giardia from water before it arrives at the activated carbon / heavy metal reduction water filter system.
7. Activated carbon heavy metal reduction whole house water filter system to remove any chemicals and metals from the water before being sent for pH correction. Activated carbon is another method of reducing Heterotrophic bacteria. Activated carbon adsorbs dissolved organics, which heterotrophs use as food, essentially starving them.
8. pH correction unit to neutralize acidic water before it is sent for point of use reverse osmosis treatment.
9. Reverse Osmosis system with pump receives treated water at point of use fitted adjacent to the staff facilities. Sediment, particle and chlorine prefiltration, membrane separation and polishing filter with pump. Reverse osmosis is most commonly known for its use in drinking water purification from seawater, removing the salt and other effluent materials from the water molecules.

At stage 9 after reverse osmosis the treated rainwater is potable. Point of use instantaneous water heating taps are used to supply hot water for washing hands or kitchen items.

Contaminants and their treatment

Roofing materials use a Kingspan insulated profiled coated metal roofing system with smooth PVC coating (not painted) and Kingspan insulated Kingspan KS1000srw sinusoidal profiled roofing panel compliant with rainwater harvesting standards as per consultation with Kingspan technical support. No solar panels are installed. No contaminants will be introduced using this roofing system and materials.

All guttering and pipe work is uPVC, no contaminants will be introduced using this material.

Leaves, moss, and other debris are removed by the primary gutter brush guard system and the secondary vortex filters at point of collection.

First flush diversion follows to reduce roof dust from the first rainfall and send it to surface water drainage.

Following point of collection, the most common contaminant from rainwater runoff will be silts, this will be dealt with by installing a catchpit chamber upstream of the rainwater harvesting tank.

Other likely contaminants may be dust, bacteria including *Pseudomonas*, *Clostridium Perfringens*, *Cryptosporidium*, *Giardia*, and nitrates, organics, and corrosive water.

Dust is removed by a sediment filter (already reduced by first flush diversion), bacteria including *Pseudomonas*, *Clostridium Perfringens*, *Cryptosporidium*, *Legionella*, and *Giardia* is removed using a high dose of UV treatment, nitrates are removed by heavy metal reduction filter, organics are removed by activated carbon filtration including any chemicals from roof materials. PH correction is applied to neutralize acids.

Finally reverse osmosis at point of use is applied to separate ions, unwanted molecules and larger particles from the treated water and render the final product water potable.

It is not considered that chlorination of the water bodies is required at this stage, but this will be reviewed during the final design risk assessment. Continuous chlorination or "batch chlorination" are options. An alternative to maintaining a residual disinfectant is to consider using ozone as an alternative to UV.

Component List

KINGSPAN INSULATED PROFILED METAL ROOFING / INSULATED KINGSPAN KS1000SRW SINUSOIDAL ROOFING PANEL
PVC coated not painted to ensure rainwater has no contaminants from the roofing system or any paint system.

uPVC GUTTERING SYSTEM / PIPEWORK

Stable uPVC gutters and pipes not painted or metal to ensure no contaminants.

HEDGEHOG GUTTER BRUSH GUARD SYSTEM

The Hedgehog Gutter Brush is designed to help prevent leaves clogging gutters and drains, and subsequent water overflow. Roof outlets, guttering and pipework are free-draining preventing stagnation and contamination of the rainwater from other sources.

WISY WFF 300 VORTEX FILTER

WISY vortex filters are unique in construction with a vertical surface, which enhances the self-cleaning function. The patented design gives extremely efficient performance and reliability, and has the remarkable ability to enrich the water with oxygen. It is suitable for filtering large amounts of rainwater. The unit filters and diverts rainwater to a storage tank. Leaves, moss and other debris are washed through to the drain or soakaway or a collection chamber. Manufacturer specification filter efficiency of 90% complies with BS 8515:2009 / BS EN 16941-1:2018 prefiltration of water before entering main body of stored water.

WASP05050 SERIES PREFABRICATED CATCHPIT CHAMBER

WASP catchpits are designed to separate and retain silt and other particles from stormwater, helping to protect the downstream drainage system and local environment. Not required to BS 8515:2009 / BS EN 16941-1:2018 but may be specified to increase prefiltration of water.

ENDURAMAXX 5,000 LTR FLUID UNDERGROUND TANK

5,000 Litre Underground tank c/w 250mm Turret and 450mm Dia Plastic Lid - 2480mm L x 2030mm W x 2388mm H
Enduramaxx's 5,000 Litre Underground Tank – is designed for use in industrial, agricultural, commercial and domestic schemes. Manufactured from UV stabilised MDPE (mid-density polyethylene) food grade ideal for carrying water including Potable Water.

NOVAIR SUBMERGED AERATOR

NOVAIR 600 M-NA 5m

The submerged aerator is designed for aeration in small water treatment systems. Other fields of application include pond water oxygenation and fish farms.

LOWARA 0.55 KW VARIABLE SPEED BOOSTER SET

The SMB series is designed for water pressure boosting and transfer. It uses the latest technology to easily deliver water at the correct pressure and flow for residential and commercial applications.

PREFILT 103/4 10" PREFILTER HOUSING

This PREFILT 103/4 is a 10" standard cartridge housing

This product comes with bracket (for fitting to the wall) and spanner (for bowl removal) for use with potable or private water supply systems.

It is designed to take a range of cartridges depending on your requirements, It is normally used to prevent sediment and particles and can also be used where there is a problem with limescale and nitrates plus a variety of other problems.

CRT10SW-05 5 MICRON SEDIMENT FILTER

For sediment reduction only. 5 micron rating. cartridge fits most housings.

Sediment filters can be used for pre filtration to help to protect sensitive equipment, such as pumps, water treatment systems and ultraviolet systems to ensure water is clear of particles that could otherwise block or inhibit the workings of the product. Sediment filters can also be used in post filtration.

UV-CS110 ULTRAVIOLET STERILISER

UV-CS110 – Commercial ultraviolet sterilisation system. WRAS approved. Treats 72 litres of water per minute, stainless steel chamber, lamps included. Visual and audio alarms plus hour counter are fitted as standard.

This unit has 2 lamps that will need replacing every year the replacement lamps cost £24.96 each. The unit is very large as rainwater contains bacteria called Pseudomonas and Clostridium Perfringens which take a much higher dose than standard bacteria for effective treatment.

WH1MH WHOLE HOUSE WATER FILTER

Heavy metal reduction whole house water filter system. To remove any chemicals and metals from the water. This filter will need the media replacing every 2 years the cost of the replacement media is £223.80. The activated carbon element of the filters removes/reduces many volatile organic chemicals (VOC), as well as benzene, trihalomethane (THM) compounds, radon, solvents and hundreds of other man-made chemicals found in tap water. Activated carbon is another method of reducing Heterotrophic bacteria. Activated carbon adsorbs dissolved organics, which heterotrophs use as food, essentially starving them.

STANDARD PH CORRECTION UNIT WITH NO BACKWASH HEAD PSPH

This filter is designed to neutralize acidic water it will bring the pH up to 7.2 but no higher. This will prevent the acidic water damaging the copper plumbing in your house. This unit will need the media replacing every 1-2 years depending on how much water is used the cost of the replacement media is £120.00.

REVERSE OSMOSIS SYSTEM 5 STAGE PUMPED ROSYP5

Reverse Osmosis system with pump. Sediment, particle and chlorine prefiltration, membrane separation and polishing filter with pump. With the exception of filter changes there is virtually no maintenance.

The prefilters should be changed every 6 months as these protect and prolong the life of the membrane.

The post filter should be changed yearly.

The membrane life will vary depending on water quality and volume treated. The more work the membrane must do the shorter its life hence the value of regular prefilter replacement. Expectancy is 2 to 5 years.

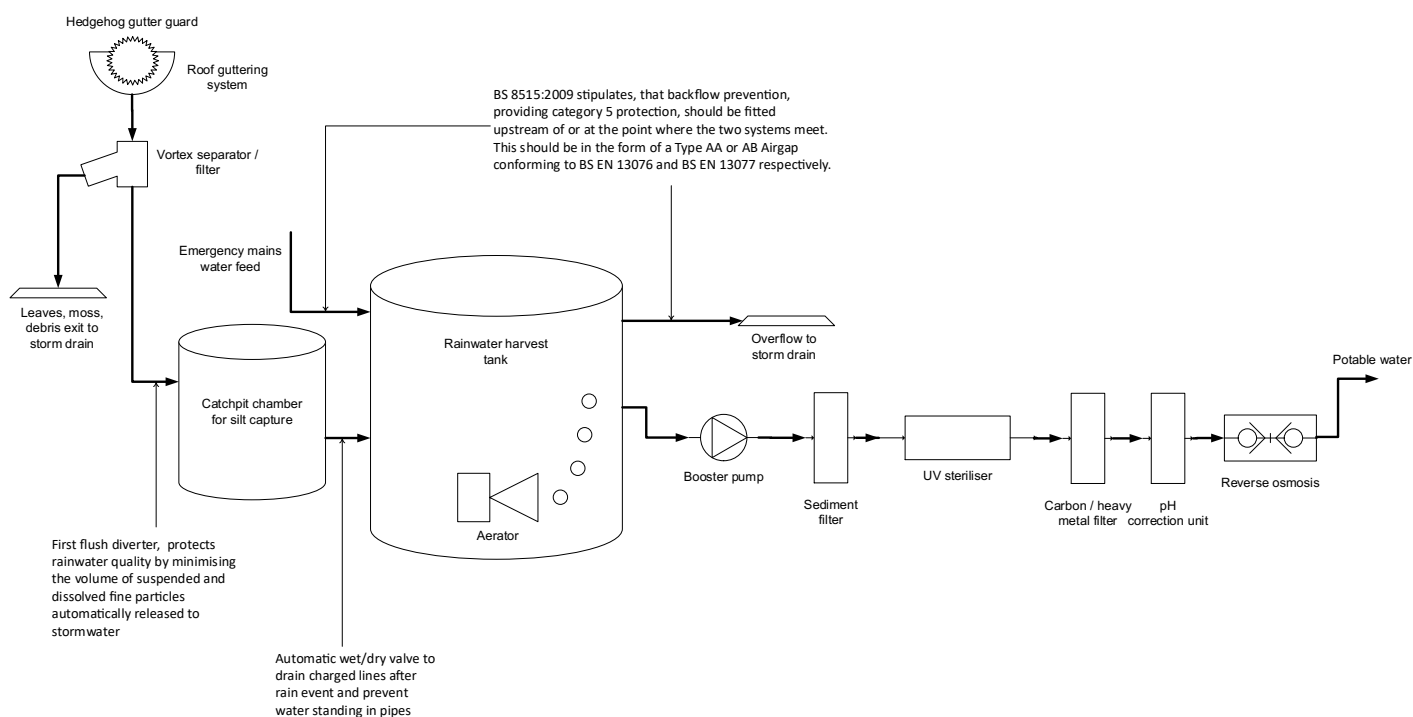
Supply Schematic

The schematic for the private water supply is shown below.

A final stage reverse osmosis unit feeds the kitchen and non-kitchen taps with potable water. This will be reviewed at final design stage risk assessment to determine if it is necessary.

A feed for toilet flushing is taken off before the reverse osmosis unit since this treatment (final stage potable readiness) is not required for water flushing. Note ref BS EN 16941-1:2018 the critical need to keep non-potable supplies separate and distinct from drinking water. Not only are separate circuits and pipes required but there must be no possibility whatsoever of cross contamination. Very clear labelling is also stressed as being important, both of pipework and of outlets.

A water meter is fitted prior to the treated water supply points (point of use) to monitor and record the volume of water being used, this can be cross-checked against the designed system capacity to ensure compliance.



Sampling / testing regime

Drinking water, or potable water, means water that is safe to drink and to use in food preparation, referred to as “wholesome”.

Drinking water regulations

The UK standard of drinking water is among the best in the world. There are strict standards applied, including The Water Supply (Water Quality) Regulations 2016. This legislation includes specific standards for a range of substances, organisms and properties of water.

Around 1% of the UK population receive their water from a private supply. This is generally the case in rural or remote locations. Private water companies must adhere to The Private Water Supplies (England) 2018 and The Private Water Supplies (Wales) 2017 regulations.

The Drinking Water Inspectorate (DWI) is an independent body which works with utility companies and local authorities to ensure all drinking water is safe for consumers.

Drinking water sampling

Regular potable water sampling is important whatever the original source. The Microbiology of Drinking Water (2010) - Part 2 - Practices and procedures for sampling (archived and superseded by The Standing Committee of Analysts (SCA) Methods for the Examination of Waters and Associated Materials), will be used to inform the sampling protocol. This sampling is often carried out by water treatment companies and the samples analyzed in UKAS accredited laboratories.

Regular sampling provides a picture of the quality of a water supply system over time. It is good practice to trend results, particularly on TVC (Total Viable Count). An upward trend in TVC may indicate the need for further investigation and may point to problems in a system. The sampling regime will implement data collection for trend analysis.

Drinking water testing and interpretation of microbiological results

The standard microbiology tests carried out on potable water samples taken from inside commercial buildings are TVC 22oC, TVC 37oC, Coliforms and E. coli.

TVC 22oC = the number of live bacteria per ml of water at ‘ambient’ temperature. The count will therefore predominantly be composed of harmless environmental bacteria.

TVC 37oC = the number of live bacteria per ml of water at body temperature. The bacteria that grow are more likely to cause some harm to consumers.

There is no standard acceptable value for TVC results in potable water. Guidelines say that if on-going testing indicates a significant increase in numbers over time, then a system may be contaminated or may need cleaning.

Coliforms are a group of environmental bacteria that have originated from the intestines of animals. They tend to grow in the environment and are known as indicator organisms, i.e. they are used as a guideline of possible contamination. In the majority of cases where coliforms are picked up in water samples taken from a tap, the cause is that the tap needs cleaning. Acceptable levels = ND (Not Detected) in 100ml.

E. coli is itself a coliform bacteria. Again, it is used as an indicator organism, but E. coli does not live for very long in water so it can be an indication of recent contamination. There are certain species of E. coli which cause infection, such as E. coli 0157, which is generally found in uncooked meat rather than water. The E. coli species found in water are generally harmless bacteria but are used as an indication of the possibility of other similar bacteria being present which may cause problems. Acceptable levels = ND (Not detected) in 100ml.

Risk assessment (at design, commissioning, and periodic)

Private Water Supply (England) Regulations

The Private Water Supplies Regulations 2009 came into force on 1st January 2010 and seek to further safeguard public health by ensuring that private water supplies are 'wholesome' and 'safe to drink'. These new regulations aimed to protect health and they require quality standards similar to those of mains water supply. They require each supply to undergo a 'Risk Assessment'. The 2009 Regulations have since been replaced by the Private Water Supply (England) Regulations 2016 and The Private Water Supplies (England) (Amendment) Regulations 2018.

Risk assessment is a proactive approach identifying potential hazards to human health. The information analysed in the assessment will be recorded in a report specific to the private water supply. It allows action to be taken to manage risks through a multi-barrier approach, involving source protection, treatment of the source water and management of the distribution network to prevent contaminants entering the supply system. The regulations cover all private supplies, although those serving a single dwelling will only be risk assessed and sampled upon request of the owner or occupier.

A baseline risk assessment will be carried out on commissioning of the system. Thereafter a rolling programme of risk assessments will take place at an interval no more than 5 years as per The Private Water Supplies (England) Regulations 2016 "Part 2 Water Standards 6. Requirement to carry out a risk assessment".

We will register the private water supply with the local authority if required so that they can:

1. Carry out risk assessment and monitoring if required under the Private Water Supply Regulations 2016
2. Advise the appropriate agencies to ensure there is no risk to our supply's catchments area (for example, advising persons undertaking bio-solid spreading on land that there are private water supplies which may be affected)
3. Inform us of potential contamination threats to aquifers that may serve our supply
4. Notify us of any updates of legislation involving private water supplies and our responsibilities

All parts of the supply should be routinely monitored and inspected to ensure that it is in good working order and has not been interfered with or damaged. The supply needs to be appropriately protected throughout, from source to point-of-use. This should include a maintenance programme to clean the distribution system and storage tanks or header tanks, and to ensure all treatment works are working as they should according to manufacturer's guidelines.

We will align our water supply management with the guidance provided by BS 8680:2020 Water quality. Water safety plans. Code of practice.

A risk assessment will be undertaken when the system is being designed and follow a recognized process, as detailed in BS 31100 for example. The design, installation, testing, commissioning, operation and maintenance of the system are considered within the risk assessment along with water quality, electrics and access. The manufacturers and/or supplier's reputation, experience, knowledge and compliance with BS 8515:2009 should also offer reassurance.

Sampling and testing (at commissioning and ongoing)

Sampling and testing will be outsourced to Somerset Scientific Services (accredited by the United Kingdom Accreditation Service (UKAS) for water and asbestos services).

Routine sampling and testing at commissioning of the system and ongoing at the specified frequency and at the relevant supply points will be carried out. For the appropriate parameters as advised by Somerset Scientific Services. Testing to the appropriate standards set out in The Standing Committee of Analysts (SCA) "Methods for the Examination of Waters and Associated Materials" and comply with the guidance from The Private Water Supplies (England) Regulations 2016 "Schedule 2 Monitoring", "Schedule 3 Sampling and analysis", and The Water Supply (Water Quality) Regulations 2016 "Schedule 3 Monitoring" for the tested subset.

The Standing Committee of Analysts (SCA) now sits outside of the Environment Agency and of government. See the SCA website for authoritative information on methods of sampling and analysis. The Standing Committee of Analysts (SCA) exists to provide authoritative guidance on methods of sampling and analysis of waters and effluents, sewage sludges and biota.

Sampling and testing schedule with parameters

Following advice from Darren Clarke, Somerset Scientific Services. Somerset Scientific Services provide a bespoke, reliable and cost-effective solution for all water testing requirements. The team has extensive experience of analysing drinking, environmental, industrial, recreational, and waste waters for chemical and microbiological parameters, and work for domestic, commercial and public sector clients to address health and safety concerns and to ensure compliance with legislation.

Note, under advice from Somerset Scientific Services our sampling and monitoring frequency will be carried out quarterly and will exceed the Private Water Supplies (England) Regulations 2016 guidance. Sampling and testing will be carried out on a quarterly basis. £178 + VAT chemistry suite, £72 + VAT microbiology suite.

Samples collected from point of use via Somerset Scientific Services sample collection kit and transported at between temperature 2-8°C within 8 hours of collection. Temperature controlled courier service.

Results available ≤ 14 days from Somerset Scientific Services LIMS by automated email transcript. Reports list all parameters and measures with sample values vs. water regulations values and highlighted discrepancies with an indicator of whether the water is potable or not.

Chemistry parameters:

Electrical conductivity

pH

Odour

Turbidity

Nitrite

Ammonia

Nitrate

Aluminium

Copper

Iron

Manganese

Zinc

Hardness

Chloride

Fluoride

Phosphate

Sulphate

Total dissolved solids

Calcium

Potassium

Magnesium

Sodium

Arsenic

Lead

Microbiology parameters:

E.Coli
Coliforms
TVCs @ 37
TVCs @ 22
Pseudomonas
Clostridium Perfringens

Not required but may be added annually:
Legionella

Testing regulations

Under advice from Somerset Scientific Services, not all the regulatory parameters in the reference texts are appropriate / required for potable rainwater harvesting test regimes based on our point of collection source which is “roof captured” rather than boreholes or surface run-off. The references are provided below for information only.

As per guidance from DWI Private Water Supplies and in discussion with Kevin Beer, HDC, this is a Regulation 10 supply. The supply provides water to a work premises where employees use the water only for domestic purposes (where consumption is <10m³ per day).

Our usage as calculated in the CGS Civils Denver C2182 P3 22/06/2023 Water Neutrality Report states; The proposed development will use on average 143 l/day. This water demand can be reduced to 72.5 l/day through the installation of water reducing appliances. <1m³ per day.

Guidance at: <https://www.dwi.gov.uk/private-water-supplies/guidance-documents/pws-regulations/information-note-on-regulation-10/>

Regulation 10 (Other Private supplies)

Regulation 10 applies to all supplies other than those where water from a public supply is further distributed (regulation 8), or where water is used as part of a commercial or public activity, or when volume supplied is >10m³/day (regulation 9).

Regulation 10 supplies include:

- (a) Those where the supply is <10m³/day, where the water is NOT used as part of a commercial or public activity¹.
If >10m³/day see regulation 9.

¹ Where the supply is not metered, this equates to approximately up to 50 persons using a supply for normal domestic purposes. These supplies include those that provide water to a work premises where employees use the water only for domestic purposes (where consumption is <10m³ per day).

Guidance at: <https://www.dwi.gov.uk/private-water-supplies/guidance-documents/pws-regulations/information-note-on-regulation-9/>

Information note on Regulation 9

Is a private supply serving a business or commercial organisation a regulation 9 supply?

A supply serving a business office, which is used for commercial purposes is not, in most cases, deemed a public building, and therefore NOT a regulation 9 supply unless the water being consumed is part of a commercial or public activity. If the business workers are consuming the private supply for any domestic purposes, without being charged a fee (for example, where beverages are made in a staff rest area or free canteen) the supply is subject to the requirements of regulation 10 of the Regulations (unless the volume consumed is >10m³ per day).

The Private Water Supplies (England) Regulations 2016

Volume m³/day

≤ 10

Sampling frequency per year

Minimum 1 / year (as per The Private Water Supplies (England) Regulations 2016).

Note, under advice from Somerset Scientific Services our sampling and monitoring frequency will be carried out quarterly and will exceed the Private Water Supplies (England) Regulations 2016 guidance. Our usage as calculated in the CGS Civils Denver C2182 P3 22/06/2023 Water Neutrality Report states; The proposed development will use on average 143 l/day. This water demand can be reduced to 72.5 l/day through the installation of water reducing appliances. <1m³ per day.

The Private Water Supplies (England) Regulations 2016

SCHEDULE 1 Prescribed concentrations or values

PART 1 Wholesomeness

Table A MICROBIOLOGICAL PARAMETERS

Table B CHEMICAL PARAMETERS

PART 2 Indicator parameters (excluding radioactive substances)

Table C

The Water Supply (Water Quality) Regulations 2016

SCHEDULE 1 Prescribed concentrations and values

Table A Microbiological parameters

Table B Chemical parameters

SCHEDULE 2 Indicator parameters

SCHEDULE 3 Monitoring

Table 1 Parameters and circumstances for check monitoring

Table 2 Annual sampling frequencies: water supply zones

Table 3 Annual sampling frequencies: treatment works or supply points

Sample Failure Management

If a sample fails testing, then the water supply will be isolated. All equipment at all stages of collection and treatment will be inspected as per manufacturer guidelines in consultation with the supplier Silverline. A review of the maintenance schedule and the maintenance records will be carried out and documented. All treatment media will be replaced as appropriate based on the category of sample failure and the failed parameters.

The originating tank will be chlorinated / disinfected as per manufacturer guidelines in consultation with water technicians at Somerset Scientific Services (accredited by the United Kingdom Accreditation Service (UKAS) for water and asbestos services). If necessary, the tank may also be drained, and disinfectant flushed.

Sample failures will be reported to the local authority where appropriate a revised risk assessment will be carried out. The cause of sample failure will be identified, documented, and the remedial action documented and recorded.

Sampling and testing regime may be changed accordingly if appropriate, and standard operating procedures reviewed, amended, and reissued.

Maintenance procedures may be reviewed, amended, and reissued.

Resampling to pass levels and a reactivation of the system will be carried out and documented in line with standard operating procedures.

Maintenance schedule

Routine and ongoing maintenance, in line with manufacturer's recommendations is the best way to ensure a system is reliable and effective.

Periodic maintenance

Based on BS EN 16941-1:2018 On-site non-potable water systems - Systems for the use of rainwater and BS 8515:2009+A1:2013 Rainwater harvesting systems. Code of practice (replaced by BS EN 16941-1:2018).

Lone worker risk assessment will be in place for any "at-risk" maintenance task where work is carried out alone.

Maintenance by component at monthly frequencies							
Component	1	3	6	12	24	36	60
Hedgehog gutter guard	Visual check for debris, clean as required			Check that there are no leaks or blockages due to build-up of debris; clean the gutters if necessary			
Vortex separator		All WISY filter inserts are designed for very low maintenance. It is virtually impossible for debris or dirt to stick to their smooth, stainless-steel surface. As a result, the filter inserts are virtually self-cleaning. When necessary, the filter insert can easily be lifted out of the housing by means of the supplied lifting handle for cleaning, either by hand or using a high-pressure cleaner					
First flush diverter	As per manufacturer guidelines, check operation						
Catchpit chamber	Check wet/dry valve has removed standing water			Water jetting, vacuumation, using a jet vac tanker to remove any silt built up at the bottom of the chamber			
Wet/dry valve	Manually drain wet system as precaution even if set to automatic drain		Ensure that wet dry valve outlet remains clear of any debris. If outlet becomes blocked, the chamber will not empty and the wet system will not drain down. (Remove primary filter and clean if required).				

Air/gap mains			Check and clear any debris obstructing the air gap				
Air/gap overflow			Check and clear any debris obstructing the air gap				
Rainwater tank	Check access hatch is sealed, check breathers, visual and olfactory inspection of surface water and airspace, visual inspection of all fittings and pipes and surfaces. Report suspicion of contamination and take action.			Dip tank to check for any silt / sludge build-up, siphon sediment from the tank as required until clear. Water jetting, vacuumation, if necessary.			Drain tank. Water jetting, vacuumation, using a jet vac tanker to remove any silt built up at the bottom of the chamber
Water level gauge	Visual check on levels, report, document, and top up if necessary. Monitor for repeat issues, overuse, or leaks			Check that the gauge indication responds correctly to the water level in the tank			
Aerator	As per manufacturer guidelines, check operation. In normal operation the aerator does not require any type of maintenance. Visual check on operation.						
Booster pump	As per manufacturer guidelines, check operation			As per manufacturer guidelines, check and service impellor and mechanical seals			
Sediment filter	As per manufacturer guidelines, check operation and condition, replace if required			As per manufacturer guidelines, replace media			
UV steriliser	As per manufacturer guidelines, check operation, check visual and audio alarms plus hour counter, replace bulbs as necessary			As per manufacturer guidelines, replace bulbs			
Carbon / heavy metal filter	As per manufacturer guidelines, check operation				As per manufacturer guidelines, replace media		
pH correction unit	As per manufacturer guidelines, check operation			As per manufacturer guidelines, replace media			

Reverse osmosis unit	As per manufacturer guidelines, check operation		As per manufacturer guidelines, prefilters should be changed every 6 months as these protect and prolong the life of the membrane.	As per manufacturer guidelines, post filter should be changed yearly.	As per manufacturer guidelines, the membrane life will vary depending on water quality and volume treated. The more work the membrane has to do the shorter its life hence the value of regular prefilter replacement. Expectancy is 2 to 5 years.		
Back-up water supply				Check that the back-up supply is functioning correctly, that there are no leaks and that the air gaps are maintained			
Water meter	Check volumes against capacity, take action if necessary						
Wiring				Visually check that the wiring is electrically safe			
Pipework				Check that there are no leaks, that the pipes are watertight and that overflows are clear			
Markings				Check that warning notices and pipework identification are correct and in place			
Support and fixings				Adjust and tighten, where applicable			
Maintenance records	Spot check records						
Sample records	Spot check records						

System reactivation

If the system has been unused beyond the manufacturer guidelines for one or more components then the media for those components will be replaced and tested. A sampling and testing run will be carried out and the baseline documented as a reactivation point.

Note that primary components such as the tank aerator run continuously to ensure the base water supply maintains oxygenated. There is no deactivation in this layer.

Record keeping

Sampling / testing records

All sampling and test results are received from the testing lab LIMS by automated email, recorded and stored. Where trend analysis is required then this is carried out after each analysis and where remedial action is required then this is documented.

Sampling and testing records will be archived and be available for inspection on request from the local authority.

See example “3month/sample/v01/20221113” 3 sample and testing report in Appendix.

Maintenance records

Commissioning and reactivation records are kept for the system to maintain an accurate length of service record.

Periodic maintenance records are documented onsite, written up against the maintenance plan and schedule which sets out the maintenance tasks required and their frequency.

A register of tasks carried out is kept for each maintenance interval from monthly to 5 yearly.

All periodic maintenance tasks are documented at the appropriate interval for each component with dates and signature in the maintenance records along with any action required.

Any non-scheduled maintenance is documented in the ad-hoc maintenance register.

Maintenance records are cross checked weekly to ensure the maintenance is complete for the period.

See example “week/check/v01/20221113” weekly maintenance checklist in Appendix.

Supply continuity

Drought supply

In the event of drought, the 5000 litre rainwater storage tank is oversized by 9 days to supply emergency demand for 69 days. The standard 60 day drought protection requirement is extended to 69 days.

Mains

An emergency connection to the mains water supply is recommended by CGS Civils. This should not affect the water neutrality issue as there is no expectation for needing to use this bearing in mind that the harvesting system proposes a 5000 litre rainwater storage tank oversized by 9 days supply beyond the 4350 litre requirement calculated in the CGS Civils Denver C2182 P3 22/06/2023 Water Neutrality Report.

System failure

A support contract with appropriate service levels will be maintained with the suppliers of the system components and where appropriate spare components will be held onsite. This will facilitate the fast reinstatement of the water supply. Beyond this the emergency mains connection may be utilized.



Appendix – example maintenance and sample/test records

Quarterly Tank Sample Checklist

Year	Quarter	Sample date	Tank	By	Initial	Courier collected date	Results received date	Passed (Y/N)	Action
2023	Commission	04/01/2023	1	Jeff Smith	JS	05/01/2023	16/01/2023	Y	Activated
2023	1	31/03/2023	1	Jeff Smith	JS	03/4/2023	10/4/23	Y	None
2023	2	30/06/2023	1	Jeff Smith	JS				
2023	3	29/09/2023	1	Jeff Smith	JS				
2023	4	31/12/2023	1	Jeff Smith	JS				
2023	Commission	04/01/2023	2	Jeff Smith	JS	05/01/2023	16/01/2023	Y	Activated
2023	1	31/03/2023	2	Jeff Smith	JS	03/4/2023	10/4/23	Y	None
2023	2	30/06/2023	2	Jeff Smith	JS				
2023	3	29/09/2023	2	Jeff Smith	JS				
2023	4	31/12/2023	2	Jeff Smith	JS				
2023	Commission	04/01/2023	3	Jeff Smith	JS	05/01/2023	16/01/2023	Y	Activated
2023	1	31/03/2023	3	Jeff Smith	JS	03/4/2023	10/4/23	Y	None
2023	2	30/06/2023	3	Jeff Smith	JS				
2023	3	29/09/2023	3	Jeff Smith	JS				
2023	4	31/12/2023	3	Jeff Smith	JS				
2023	Commission	04/01/2023	4	Jeff Smith	JS	05/01/2023	16/01/2023	Y	Activated
2023	1	31/03/2023	4	Jeff Smith	JS	03/4/2023	10/4/23	Y	None
2023	2	30/06/2023	4	Jeff Smith	JS				
2023	3	29/09/2023	4	Jeff Smith	JS				
2023	4	31/12/2023	4	Jeff Smith	JS				

Quarterly Tank Sample Checklist

Year	Quarter	Sample date	Tank	By	Initial	Courier collected date	Results received date	Passed (Y/N)	Action
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				
2023	Reactivation			Jeff Smith	JS				

Enter details of any reactivation samples and tests.

Weekly Rain Harvesting Maintenance Checklist

	Example	Actual
Year	2023	
Week number	1	
Check date	2/1/23	
Checked by	GL	
Unit	1	
Weather -5	Varied, rain, frost	
Weather now	Clear, cold	
Weather +5	Staying clear, frost expected	
Temperature °C	5	
Observations	Usage lower Xmas?	

Checklist item	Inspect / maintain	Findings	Actions	Initialled
Hedgehog gutter guard	Visual check for debris, clean as required			

Weekly Rain Harvesting Maintenance Checklist

Checklist item	Inspect / maintain	Findings	Actions	Initialled
First flush divertor	As per manufacturer guidelines, check operation			
Catchpit chamber	Check wet/dry valve has removed standing water			
Wet/dry valve	Manually drain wet system as precaution even if set to automatic drain			
Rainwater tank	Check access hatch is sealed, check breathers, visual and olfactory inspection of surface water and airspace, visual inspection of all fittings and pipes and surfaces.			

Weekly Rain Harvesting Maintenance Checklist

Checklist item	Inspect / maintain	Findings	Actions	Initialled
Water level gauge	Visual check on levels, report, document, and top up if necessary. Monitor for repeat issues, overuse, or leaks			
Aerator	As per manufacturer guidelines, check operation. Visual check on operation.			
Booster pump	As per manufacturer guidelines, check operation			
Sediment filter	As per manufacturer guidelines, check operation and condition, replace if required			

Weekly Rain Harvesting Maintenance Checklist

Checklist item	Inspect / maintain	Findings	Actions	Initialled
UV steriliser	As per manufacturer guidelines, check operation, check visual and audio alarms plus hour counter, replace bulbs as necessary			
Carbon / heavy metal filter	As per manufacturer guidelines, check operation			
pH correction unit	As per manufacturer guidelines, check operation			
Reverse osmosis unit	As per manufacturer guidelines, check operation			

Weekly Rain Harvesting Maintenance Checklist

Checklist item	Inspect / maintain	Findings	Actions	Initialled
Water meter	Take reading. Record up or down. Check volumes against capacity, take action if necessary			
Maintenance records	Spot check records, check all maintenance periods are up to date			
Sample records	Spot check records, check all sample periods are up to date			