Consulting Civil Engineers

Rainwater Harvesting Tank Maintenance Schedule

Firsland Park Estate, Henfield Road, Albourne, West Sussex

Planning Ref: DC/23/2037

For

Brett Incorporated Ltd

Rev – **P2**

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1 Maintenance

1.1 Introduction

1.1.1 The purpose of this report is to provide a maintenance plan for the proposed rainwater harvesting tank which is to be fitted with the necessary treatment equipment in order to provide drinking water to the proposed development at Firsland Park Estate in Albourne. All maintenance and testing should be recorded.

1.1.2 This report should be read in conjunction with the water neutrality statement produced by Brett Incorporated Ltd. The water neutrality statement confirms the details and size of the proposed rainwater harvesting tank in addition to other water saving measures to ensure the site is water neutral.

1.2 Rainwater Harvesting Tank Maintenance Specification

1.2.1 Rainwater Harvesting Tank

In order to maintain the functioning of the rainwater harvesting tanks, the following maintenance requirements should be adhered to:

Operation and maintenance requirements for rainwater harvesting tanks		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Ensure that all inlets and outlets are clear of debris and blockage	Weekly
	Remove debris inlets and outlets	Weekly
	Inspect first flush diverter to ensure it is working correctly and not clogged	Weekly – Clean if necessary
	Clean Filter screens	Monthly – Replace if damaged
	Inspect the tank for sediment build-up and any signs of algae	Monthly
	Inspect roof and gutters and clear of all debris	Every 3 months
	Inspect pump for any signs of wear or damage and test to ensure it is functioning correctly	Every 3 months
	Check bottom of the tank for sediment build-up and clear if necessary	Every 6 months
	Ensure all downpipes are clear and functioning correctly and clear if necessary	Every 6 months
	Test water	Every 6 months
	Thorough tank cleaning – drain tank, scrub interior and rinse	Annually or as required
	Service the pump and filtration system and replace any worn parts	Annually
	Inspect overflow to ensure it is working correctly and clear any obstructions	Annually
Monitoring	Monitor Water levels	Annually
	Inspect for pests e.g mosquitoes and take measures to prevent	As required

1.2.2 The harvesting tank is to be fitted with the following equipment in order to get the rainwater to a level safe for human consumption.

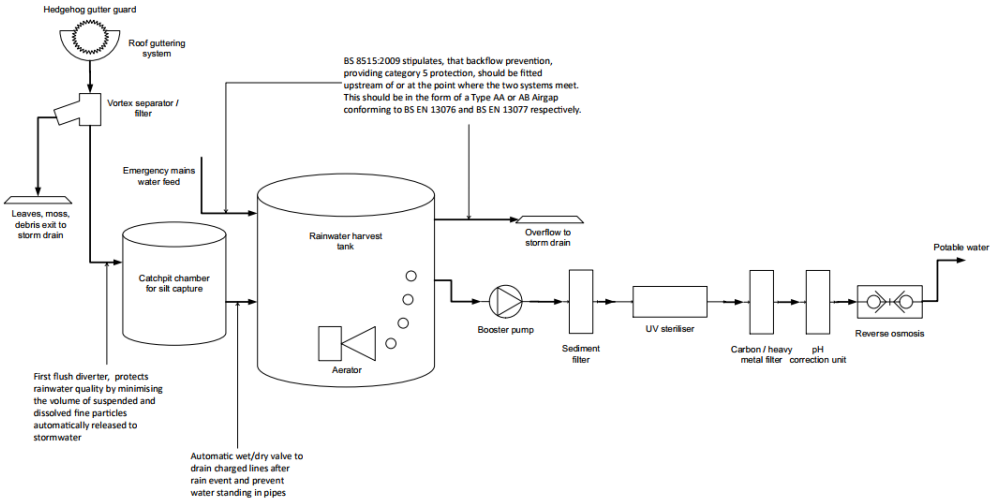
- Aerator
- Lowara 0.55 kW variable speed booster set
- PREFILT103/4 10" prefilter housing
- CRT10SW-05 5 micro sediment filter
- UV-CS165 ultraviolet steriliser
- WH1MH Whole house water filter
- 10" x 54" pH correction unit
- The reverse osmosis unit – This is fitted as a precaution only to treat just the drinking water point and not the entire house.

1.2.3 The likely contaminants associated with rainwater harvesting systems and how to treat them are:

- Dust – Sediment Filter
- Bacteria, including Clostridium Prefringers – High dose of UV treatment
- Nitrates – Heavy Metal reduction filter
- Organics – Carbon Filter

1.2.4 It is suggested that the supply is tested once the equipment is initially fitted to ensure effective operation then test the water every 6 months to ensure continued performance. The water treatment equipment will need to be maintained as per the manufacturers guidelines which are all laid out clearly in the equipment quote from Silverline Ltd. They will also send the end user reminders when the equipment needs servicing. The water is to be tested every 6 months, and results kept, there should be a record kept of all maintenance undertaken on the equipment as per the manufacturer's guidelines.

Fig. 1 Schematic view of treatment system



1.2.5 Sampling rainwater for analysing, especially for regulatory or compliance purposes, requires adherence to specific regimes and parameters to ensure accuracy and reliability. When undertaken by a Drinking Water Inspectorate (DWI) certified sampler and analysed by a United Kingdom Accreditation Service (UKAS) accredited laboratory, the following regime and parameters should be considered:

- **Frequency of Sampling**:
  - Regular monitoring: Every 6 Months.
  - Event Based Monitoring: After significant rain events, storms or potential contamination incidents.
- **Location of Sampling:**
  - A singular point should be identified as there where the rainwater is to be collected or stored for testing purposes.
- **Timing of sampling:**
  - Post rainfall: To sample stored rainwater within a short period after collection to avoid contamination from storage.
- **Sample Volume:**
  - Typically, 1 – 2 litres of rainwater is collected per sample, ensuring that there is sufficient volume for all required tests.
- **Sampling Methods:**
  - Use clean, sterilised sampling bottles provided by a laboratory.
  - Avoid contamination by wearing gloves and using proper handling techniques.
  - Label samples clearly with time, date, location and any other relevant information.

1.2.6 The specific parameters that are to be analysed depend on the intended use of the rainwater and regulatory requirements. In this case, the following contaminants are to be tested for:

- **Microbiological**
  - Total Coliforms, which are an indicator of general bacterial contamination.
  - Escerichial coli (E. Coli), which is a specific indicator of fecal contamination.

- **Chemical**
  - pH, measuring for acidity and alkalinity
  - Turbidity, which is an indicator of suspended particles.
  - Total Dissolved Solids (TDS)
  - Heavy Metals, such as lead, copper, zinc and cadmium.
  - Nutrients, including nitrates, nitrites and ammonia
  - Organic compounds, such as pesticides, herbicides and hydrocarbons

- **Physical Parameters**
  - Colour
  - Odour
  - Temperature, which is measured at the time of sampling

- **Other**
  - Conductivity, indicates if there is a concentration of ions
  - Chloride and Sulfates
  - BOD (Biochemical Oxygen Demand) and COD (Chemical Oxygen Demand) which are indicators of organic pollution.

1.2.7 It has been confirmed by Silverline UK Ltd that the only maintenance of the system that is required is to replace filters are certain intervals. It is recommended that the:

- Aerator
- Lowara 0.55 kW variable speed booster set
- PREFILT103/4 10" prefilter housing
- CRT10SW-05 5 micro sediment filter is to be replaced every 6 months, or more frequently if it reduced water flow is experienced.
- UV-CS165 ultraviolet steriliser will need the lamps replacing every 12 months. It is also recommended that the quartz sleeve is removed and cleaned every 12 months to ensure light can get to the water.
- WH1MH Whole house water filter will require having the filter media replaced every 12 months.
- 10" x 54" pH correction unit will be required having the media topped up every year.
- The reverse osmosis unit will require the prefilters replacing every 6 months and the post filter every 12 months. In addition to this, the membrane will need replacing when the water production slows, however, this is dependent on the water used but it is generally every 3-6 years.

1.2.8 During a drought period that surpasses the 35-day protection period, mains water can be fed into a rainwater harvesting tank by utilising an automatic top-up system that will ensure there is a consistent water supply. Here is how it typically works:

- **Float Valves or sensor systems:** The rainwater tank is equipped with a float valve or an electronic sensor system that monitors the water levels. When the water level falls below a certain threshold, it triggers the system to allow mains water to top up the tank.
- **Control Unit**: The system will include a control unit that manages the operation of the float valve or sensors. This unit ensures that the mains water only flows into the tank when necessary, preventing overfilling and unnecessary use of mains water.
- **Mains Water connection**: A pipe connects the mains water supply to the harvesting tank. This pipe is typically fitted with a backflow prevention device to prevent any contamination of the mains water supply.
- **Topping up process:** When the water level in the tank is low, the control unit opens a valve to allow mains water to flow into the tank. Once the desired water level is reached, the valve closes.
- The system is designed with an overflow mechanism to handle excess water if the tank becomes too full, ensuring that any surplus water is safely directed away from the tank.

1.2.9 Ensuring the reliability of the rainwater harvesting system, especially during drought periods, requires having a robust contingency plan. This plan should address the potential failures and outline procedures for investigation and rectifications. Here is a detail plan with steps and timeframes:

- **Monitoring and Early Warning System:**
  - Sensors can be installed to monitor water levels and an alarm system can be set up to alert personnel of any anomalies such as unexpected low water levels or system malfunctions.

- **Routine Maintenance Schedule**
  - Follow the maintenance schedule listed above in section 1.2.1.

- **Contingency Procedures for failure events:**
  - **A:** Minor Issue (E.g. small leaks, sensor malfunctions). Response Timeframe: Within 24 hours.
    - **Immediate Response:** Activate backup water supply if necessary to maintain water availability and notify maintenance personnel.
    - **Inspection and diagnosis:** Inspect the system to identify the issue (e.g. leak location, faulty sensor). Use a diagnostic tool to assess the extent of the problem.
    - **Rectification:** Repair minor leaks with sealant or replace faulty sensors. Reset or recalibrate control unit and sensors.
    - **Verification:** Verify that the issue is resolved, and the system is functioning normally. Log the incident and the actions taken for future reference.

- **B:** Major Issue (E.g. Tank rupture, significant control unit failure). Response Timeframe: Within 2-4 hours.
    - **Immediate Response:** Shut off mains water supply to prevent flooding or further damage. Notify emergency maintenance team.
    - **Inspection and diagnosis:** Conduct a thorough inspection to identify the cause and the extent of the failure
    - **Rectification:** Replace damaged components. Implement temporary solutions if immediate full repair is not possible (e.g. temporary water bowser)
    - **Verification:** Test the system extensively to ensure the repair/replacement is effective. Monitor the system closely for the next 48 hours. Log the incident and the actions taken for future reference.

1.3 General Drainage Maintenance Specification

1.3.1 Inlet Structures and Inspection Chambers

- Inlet structures such as rainwater downpipes, road gullies and channel drains should be free from obstruction at all times to all free flow through the SuDS
- Inspection Chambers and Rodding Eyes are used on bends or where pipes come together. They allow access and cleaning to the system if necessary.

Inlet Structures and Inspection Chambers	
Regular Maintenance	**Frequency**
Inlet Structures **Inspect rainwater downpipes, channel drains and road gullies, removing obstructions and silt as necessary. Check that there is no physical damage.** **Strim vegetation 1m min surround to structures and keep area free from silt and debris**	Monthly
Inspections Chambers and below ground control chambers. **Remove cover and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.** **Undertake inspection after leaf fall in Autumn**	Annually
Occasional Maintenance **Check topsoil levels are 20mm above edges of chambers to avoid mower damage.**	As necessary
Remedial Work **Repair physical damage if necessary**	As required

1.3.2 Below ground drainage pipes

- Below ground drainage pipes convey water to the SuDS system. They should always be free from obstruction to allow free flow.

Below Ground Drainage Pipes	
Regular Maintenance	**Frequency**
Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months then annually
Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually or as required
Maintain vegetation to designed limits within the vicinity of below ground drainage pipes and tanks.	Monthly or as required
Remedial Work **Repair physical damage if necessary**	As required
Monitoring **Inspect all inlets, outlets and vents to ensure that they are in good conditions and operating as designed.**	Annually
Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required