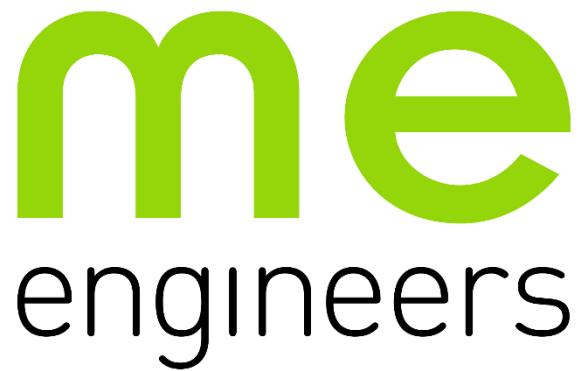




OVG Manchester

**Mechanical & Public Health Services
Specification**

BRA-MEE-ZZ-ZZ-SP-ME-7002

Stage 4a

Revision: P02

OVG Manchester

Mechanical & Public Health Services Specification

Issue and Revision Record

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OVG Manchester

Mechanical & Public Health Specification

2020-10-06

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Extract

Ss_55_70_97_70

[P] Rainwater reclamation systems **ADDED**

Systems

Ss_55_70_97_70 [P] Rainwater reclamation systems **ADDED**

1. Description:

The building will be provided with a **rainwater harvesting system to BS EN 16941-1:2018 (On-site non-potable water systems)** and BS 8515:2009+A1:2013 (Rainwater harvesting systems - Code of practice). The system will comprise of below ground storage installation (combined with attenuation storage) situated below the Level 00 Service Yard, pre-tank rainwater filters, dye injection system, and all required valving and controls.

All below ground elements of the rainwater harvesting system (including Filters, Storage tank, Submersible pump, overflows, pipework) are designed and specified by the Civil engineer. For details of these items refer to the civils package.

Above ground elements of the rainwater harvesting system (Hybrid Controller, Storm Control system panel, above ground harvested rainwater pipeline) are covered in the ME drawings and equipment schedules.

Description of the overall harvesting system is described here for convenience, however operation of the system with regards to all elements of the below ground drainage design and attenuation strategy is the responsibility of the below ground drainage designer and is to be detailed in their package of information.

The contractor is to engage a rainwater harvesting specialist to develop the Stage 4A information to contractor information.

Stage 4A scheme is based on an "Aquality" system. Installed scheme to be Aquality, or better and approved.

A volume of 200m³ harvesting storage has been allowed for and comprises part of the larger below ground attenuation installation. The rainwater will be pumped by means of Duty/Standby submersible pumps which will be located in the underground rainwater attenuation tank and will be supplied by others.

A 108mm harvested RW supply rises to high level in Open Store L00 E009, and runs to the Level 00 PH plantroom. This supply fills the 30m³ CAT5 tank. The tank also receives a fill from the BCWS system.

Filling of this tank is controlled by a Hybrid controller unit, which monitors levels in the below ground harvesting tank, and draws on this source, or BCWS system, as required.

Control and interaction of the harvested and attenuation aspects of the below ground installation is provided by a **Storm control centre** located in the Level 00 PH plantroom utilising weather data via a wall-mounted aerial connected to the DAS network.

Details and specification of this system is to be covered in the civil engineers package. The real time flow control system using continuous monitoring and adaptive control shall be Aqua Storm Control Lite by Aquality Ltd, Wadsworth Rd, Perivale, London UB6 7JJ. The system shall comprise of Control panel with GSM aerial, actuated valve type A/B , level sensor, GSM Aerial, site controller, and connected to geocellular data capable of reading and predicting weather data to manage flow rates out of the drainage structure. The Aquality Storm Control Lite system allows any rainwater harvesting tank volume to count towards the sites storm attenuation volume requirement. Alternatively, the system can be installed within a storm attenuation system to allow any attenuation tank to act as a rainwater harvesting system.

The system works by linking the tanks to a rainfall forecast algorithm. This allows the tanks to be drained down at the allowable discharge rate (Greenfield runoff or otherwise agreed with the lead local flood authority) prior to significant rainfall events (above a 1:5 year event typically).

The control centre receives site specific rainfall predictions from various sources including the British Met office. The controller runs this data through an algorithm estimating the likely runoff volume for the upcoming rain events. The site controller then automatically takes action to ensure civil infrastructure is adequately prepared to deal with the predicted runoff.

The design and supply of the associated equipment will be undertaken by the specialist contractor.

The Non Potable "CAT5" system will feed all WC and Urinal cisterns, washdown points and the irrigation system. Pipework distribution to all outlets routed in copper (thermally insulated)

Contractor to include for chlorination of the entire water system and all valves, fittings, bracketry & accessories necessary to make a complete and working installation.

Provide dedicated pipework for the rainwater system that is free-draining to avoid stagnation.

The rainwater harvesting systems will shall be provided with the manufacturers comprehensive integral control system. The various control devices serving this plant will be provided with a full interface to the BMS for alarm notifications and critical faults with regards to pump flow failure.

The system shall be as supplied by:

Aquality Trading & Consulting Ltd.
6 Wadsworth Road
London UB6 7JJ

(or better & approved)

1.1. Design Parameters for Performance (D&B) Specification:

This specification is written based on legislation, standards and guidance in force in the UK generally, and within England by default.

Comply fully with the edition (including amendments) of each of the following, current at the time of tender:

The Water Supply (Water Fittings) Regulations
The Water Supply (Water Quality) Regulations
British Standards (inc. BS.EN... as detailed within this specification)
BSRIA AG 4/94 Guide to legionellosis - temperature measurements for hot and cold water services
BSRIA TN 6/2002 Water reclamation guidance. Design and construction of systems using greywater
BSRIA TN 7/2002 Water reclamation standard. Laboratory testing of systems using greywater
CIBSE Guide G Public health engineering.
CIRIA C539 Rainwater and greywater use in buildings
HS(G) 70 The control of legionellosis including legionnaires disease
HTM 04-01 The control of legionella, hygiene, 'safe' hot water, cold water and drinking systems
CIPHE Plumbing engineering services design guide
EU Bathing Water Guideline 2006/7/EC
NHBC Guidance

2. System performance: [Ss_55_70_97/230 Design of rainwater harvesting \(recovery\) system](#); [Ss_55_70_97/240 Controls](#)
3. Rainwater collection system: Gravity rainwater systems. Refer to civils package for contributory sections of below ground rainwater pipework system.
4. Mains water supply pipelines: [Pr_65_52_63_17 Copper pipelines](#)
5. Backflow prevention: [Pr_65_54_95_05 Backflow prevention devices](#)
6. Collection tank:
7. Pump: [Pr_65_53_24_86 Submersible pumps](#)
8. Meter: [Pr_80_51_51_97 Water meters](#)
9. Distribution pipelines: [Pr_65_52_63_17 Copper pipelines](#)
10. Water treatment
 - 10.1. Filtration: [Pr_65_57_96_53 Mesh water filters](#); [Pr_65_57_96_30 Floating tank water filters](#); [Pr_65_57_96_35 Gravel water filters](#); [Pr_65_57_96_09 Bottle brush water filters](#); [Pr_65_57_96_86 Subsurface vortex water filters](#); [Pr_65_57_96_70 Rapid gravity water filters](#)
 - 10.2. Disinfection method: [Pr_60_55_97_93 Ultraviolet \(UV\) disinfection devices](#)
11. Plant and equipment identification: [Pr_40_10_57_78 Self-adhesive colour pipe bands](#); [Pr_40_10_57_26 Engraved mechanical plant and equipment identification labels](#)
12. Controls: [Pr_75_50_46_30 Float switches](#); [Pr_75_50_18_94 Valve actuators](#); [Pr_65_54_95_53 Motorized valves](#); [Pr_75_50_18_51 Mechanical services control panels](#)
13. Execution: [Ss_55_70_97/620 Mains water top up connection](#); [Ss_55_70_97/640 Installing rainwater harvesting systems](#); [Ss_55_70_97/650 Installing reclaimed water identification](#)
14. System completion: [Ss_55_70_97/810 Testing and setting to work](#); [Ss_55_70_97/820 Documentation](#); [Ss_55_70_97/830 Maintenance](#)

System performance

Ss_55_70_97/230 Design of rainwater harvesting (recovery) system ADDED

1. Design: Develop the Stage 4A scheme to contractor information for the rainwater harvesting system.

2. Standards: In accordance with [BS 8515](#), WRAS [9-02-04](#) and [Information and Guidance Note 9-02-05](#).
3. Parameters
 - 3.1. Proposed usage: Non-potable, internal and external use.
 - 3.2. Storage capacity: Refer to civils package.
 - 3.3. Back-up water supply: Required.
 - 3.4. Feed to fittings: Pumped.
 - 3.5. Controls
 - 3.5.1. Units: Control unit with system status monitor.
4. Requirement: Submit proposals, including detailed design drawings, technical information, calculations and manufacturers' literature.

Ss_55_70_97/240 Controls ADDED

1. Visual indicators : System powered. System supplying mains water. System locked out.
2. Fail safe operation circumstances: Loss of disinfection process. Interruption of power.
3. Pump control unit: Operate pump to match demand. Protect pumps from running dry. Protect the motor from over heating and electric overload. Permit manual override.
4. Functions: Signal consumable items need replenishment or replacement. Ensure rainwater is not stored over the permitted period. Ensure applications receive water from the back-up supply on failure of the rainwater system. Indicate system failure. Control pumps and minimize their use. Provide volt-free output for connection to building management system.
5. General Requirements:

Rainwater Harvesting control panel:

Provide a central electronic control panel (requiring a 230V/50Hz/16A supply) to the tank room, with micro-processor and LCD display for operation status, settings and fault indication, in an IP65 rated case.

Configure the control module for operation of two process streams independently, with pressurised distribution and fully automatic water management.

Provide controls for the BCWS water back-up and the booster pump set.

Configure the control panel to monitor the water level in the below ground harvesting tank, the water level within the CAT5 tank, and leakage.

Install a pulsed meter to the pipe feeding the CAT5 tank, providing a signal to the BMS to enable monitoring of rainwater consumption.

Install a level switch or electronic/ultrasonic level probe, located in the tank, to inhibit operation of the pump on low water level via the BMS.

Ensure that faults are communicated to the BMS via volt-free contacts.

Control panel to include:

level sensors with switchable colour LED display, power on, water level indication for below ground storage and CAT5 tank, operation mode, supply pump on/off, BCWS water top-up on/off, CAT5 tank overflow alarm, supply pump alarm, manual alarm/fuse reset, main switch, dual chamber control and maintenance setting

- Fully automatic water management for rainwater use with automatic, house internal BCWS-water top-up via AA or AB type air gap according to EN BS 16941-1 and BS EN 1717
- BCWS water supply into GRP CAT5 tank via two servo-assisted solenoid valves (normally closed), duty cycle 100% continuous rating
- Electronic control for submersible supply pump incl. on/off switch, dry run protection and motor protection
- Visible and audible alarm signals in case of malfunction of submersible pump or BCWS water top-up and volt-free contact for general fault message (connection to BMS)
- 3 no level sensors and LED level indication for external underground rainwater storage tank and 2 for building internal dual chamber CAT5

Storm Control Centre:

• Automated control – the system will automatically control the water level in the buried tank through the operation of an actuating valve (binary open/ close state). • Proportional tank draw down at 20 levels in 5% increments • Manual control – remote, online manual control for overriding automation from a web-dashboard. • Housing type – the controller is IP66 moisture ingress protected and has on-board temperature sensors to enable charging boosts in sub-zero conditions. • In case of piped overflows, pump can be operated by ASC • Fail-safe system: Issues SMS warning messages to ASC and site operators; - System is capable of outputting to BMS system for general fault alarms; - The control panel has a built-in battery backup to allow the system to continue working in the event of power failure; - Within all the failure scenarios, the system defaults back to a storm attenuation system (actuator valve open);

5.1. Rainwater Systems:

Configure the control unit to flush the mains water pipe and dump the backup stored

water every 10 days to avoid stagnation.

Locate a two-position float switch or electronic/ultrasonic level probe in the break tank, to control the submersible rainwater pump via the BMS. Arrange the controls so that in the event of surplus water in the below ground tank, a second level switch will operate through the BMS, to override the break tank switch and allow water to be pumped to high level. When the day tank is full and the associated level switch signals a high limit, stop the pump. Only at this point will the excess rainwater discharge from the below ground tank, via the high level overflow into the surface water drains.

Products

See [Pr_40_10_57_26](#) Engraved mechanical plant and equipment identification labels in [Ss_55_20_34_57](#) [M] Natural gas supply systems

See [Pr_40_10_57_78](#) Self-adhesive colour pipe bands in [Ss_50_30_02_40](#) [P] Internal gravity rainwater drainage systems

See [Pr_60_55_97_93](#) Ultraviolet (UV) disinfection devices in [Ss_55_70_38_65](#) [P] Pumped cold water supply systems

See [Pr_65_52_62_09](#) Brazing compounds in [Ss_55_20_34_57](#) [M] Natural gas supply systems

See [Pr_65_52_62_29](#) Flange jointing rings for copper flanges in [Ss_55_20_34_57](#) [M] Natural gas supply systems

See [Pr_65_52_62_81](#) Solders in [Ss_55_20_34_57](#) [M] Natural gas supply systems

See [Pr_65_52_63_17](#) Copper pipelines in [Ss_55_20_34_57](#) [M] Natural gas supply systems

See [Pr_65_52_63_18](#) Copper pipeline fittings in [Ss_55_20_34_57](#) [M] Natural gas supply systems

Pr_65_53_24_86 Submersible pumps ADDED

1. General requirements: [Pr_65_53_86/320 Pumps generally](#)
2. Duties
 - 2.1. Operation: Duty/standby.
3. Accessories: Anti-vibration mountings. Flexible connections. Float switch.
4. Execution: [Pr_65_53_86/610 Installation of pumps generally](#)

See [Pr_65_53_86/320 Pumps generally](#) in [Ss_55_70_38_42](#) [P] Unvented Indirect hot water storage supply systems

See [Pr_65_54_95_05](#) Backflow prevention devices in [Ss_55_70_38_65](#) [P] Pumped cold water supply systems

See [Pr_65_54_95_53](#) Motorized valves in [Ss_55_70_38_42](#) [P] Unvented Indirect hot water storage supply systems

Pr_65_57_96_09 Bottle brush water filters ADDED

1. Initial filters
 - 1.1. Filters: As manufacturers recommendations

Pr_65_57_96_30 Floating tank water filters ADDED

1. Initial filters
 - 1.1. Filters: As manufacturers recommendations

Pr_65_57_96_35 Gravel water filters ADDED

1. Initial filters
 - 1.1. Filters: As manufacturers recommendations
2. Biological: Reed beds. Membrane. Activated carbon.

Pr_65_57_96_53 Mesh water filters ADDED

1. Initial filters
 - 1.1. Filters: As manufacturers recommendations

Pr_65_57_96_70 Rapid gravity water filters ADDED

1. Initial filters
 - 1.1. Filters: As manufacturers recommendations

Pr_65_57_96_86 Subsurface vortex water filters ADDED

1. Initial filters
 - 1.1. Filters: As manufacturers recommendations

See [Pr_75_50_18_51 Mechanical services control panels](#) in [Ss_55_70_38_42 \[P\] Unvented Indirect hot water storage supply systems](#)

See [Pr_75_50_18_94 Valve actuators](#) in [Ss_55_70_38_42 \[P\] Unvented Indirect hot water storage supply systems](#)

Pr_75_50_46_30 Float switches ADDED

1. Third party certification: WRC approved.
2. Housing: Polypropylene . Stainless steel .
3. Operating mechanism: Float with integral roller ball and micro-switch.
4. Contact rating
 - 4.1. Nominal voltage: 230 V a.c.
5. Ingress protection (minimum): Continuous immersion
6. Operation in specific gravities: 0.8—1.3.
7. Fluid: Potable water.
8. Execution: [Pr_75_50_18/605 Installing control components](#)

See [Pr_80_51_51_97 Water meters](#) in [Ss_55_70_38_65 \[P\] Pumped cold water supply systems](#)

Execution

See [Pr_40_10_57/611 Installing mechanical plant and equipment identification](#) in [Ss_55_20_34_57 \[M\] Natural gas supply systems](#)

See [Pr_40_10_57/660 Installing identification on pipework](#) in [Ss_50_30_02_40 \[P\] Internal gravity rainwater drainage systems](#)

See [Pr_65_52_63/610 Pipelines installation generally](#) in [Ss_55_20_34_57 \[M\] Natural gas supply systems](#)

See [Pr_65_52_63/615 Installing pipeline fittings](#) in [Ss_55_20_34_57 \[M\] Natural gas supply systems](#)

See [Pr_65_52_63/620 Installing anchors generally](#) in [Ss_55_20_34_57 \[M\] Natural gas supply systems](#)

See [Pr_65_52_63/625 Installing slide guides](#) in [Ss_55_20_34_57 \[M\] Natural gas supply systems](#)

See [Pr_65_52_63/631 Installing copper pipelines](#) in [Ss_55_20_34_57](#) [M] Natural gas supply systems

See [Pr_65_52_63/635 Brazed joints in copper and copper alloy pipes](#) in [Ss_55_20_34_57](#) [M] Natural gas supply systems

See [Pr_65_52_63/690 Spacing of pipelines](#) in [Ss_55_20_34_57](#) [M] Natural gas supply systems

See [Pr_65_52_63/710 General inspection and testing](#) in [Ss_55_20_34_57](#) [M] Natural gas supply systems

See [Pr_65_53_86/610 Installation of pumps generally](#) in [Ss_55_70_38_42](#) [P] Unvented Indirect hot water storage supply systems

See [Pr_65_54_95/610 Installation of valves generally](#) in [Ss_55_20_34_57](#) [M] Natural gas supply systems

See [Pr_65_54_95/641 Installing motorized valves](#) in [Ss_55_70_38_42](#) [P] Unvented Indirect hot water storage supply systems

See [Pr_75_50_18/605 Installing control components](#) in [Ss_55_70_38_42](#) [P] Unvented Indirect hot water storage supply systems

See [Pr_75_50_18/610 Installing valve actuators](#) in [Ss_55_70_38_42](#) [P] Unvented Indirect hot water storage supply systems

See [Pr_75_50_18/631 Installing control panels](#) in [Ss_55_70_38_42](#) [P] Unvented Indirect hot water storage supply systems

See [Pr_80_51_51/670 Installing water meters](#) in [Ss_55_70_38_65](#) [P] Pumped cold water supply systems

Ss_55_70_97/620 Mains water top up connection ADDED

1. Backflow prevention method: Refer to system schematic

Ss_55_70_97/640 Installing rainwater harvesting systems ADDED

1. Standards: In accordance with [BS 8515](#).
2. Tanks: Fit tanks with a method to prevent floating debris entering tank.

Ss_55_70_97/650 Installing reclaimed water identification ADDED

1. Standards: In accordance with WRAS [Information and Guidance Note 9-02-05](#).
2. Pipelines
 - 2.1. Grey water: Green/ black/ green bands and the words GREY WATER.
 - 2.2. Reclaimed water: Green/ black/ green with white band in the centre and the words RECLAIMED WATER.
3. Outlets: Label according to quality and end use.

System completion

Ss_55_70_97/810 Testing and setting to work ADDED

1. Standards
 - 1.1. Greywater systems: In accordance with [BS 8525-1](#).
 - 1.2. Rainwater harvesting systems: In accordance with [BS 8515](#).

Ss_55_70_97/820 Documentation **ADDED**

1. Operating and maintenance instructions
 - 1.1. **Scope:** Submit for the system giving optimum settings for controls.
 - 1.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
 - 1.3. **Format:** Electronic. Paper copy.
 - 1.4. **Number of copies:** Two.
2. Record drawings
 - 2.1. **Content:** Location and arrangement of plant. Location, size and route of pipelines. Location, route and depth of underground services. Location and identification of regulating, isolation and control valves. Location of outlets.
 - 2.2. **Format:** A1 paper print. Electronic.
 - 2.3. **Number of copies:** Two.
3. Submittal date: At handover.

Ss_55_70_97/830 Maintenance **ADDED**

1. Servicing and maintenance: Undertake for 12 months after completion.

Ω End of System