Consulting Civil Engineers

Water Neutrality Report

Squash Court, Camelia Botnar Foundation, Maplehurst Road, Horsham RH13 8DQ

For

The Camelia Botnar Foundation

Rev – **P3**

Reference **C3359**

Date **30th January 2025**

Revision	Date of Issue	Comments	Prepared By	Checked By
P	16/08/2024	Initial Issue	LH	CS
P1	18/11/2024	Revised	LH	CS
P2	27/01/2025	Revised	LH	CS
P3	30/01/2025	Revised	LH	CS

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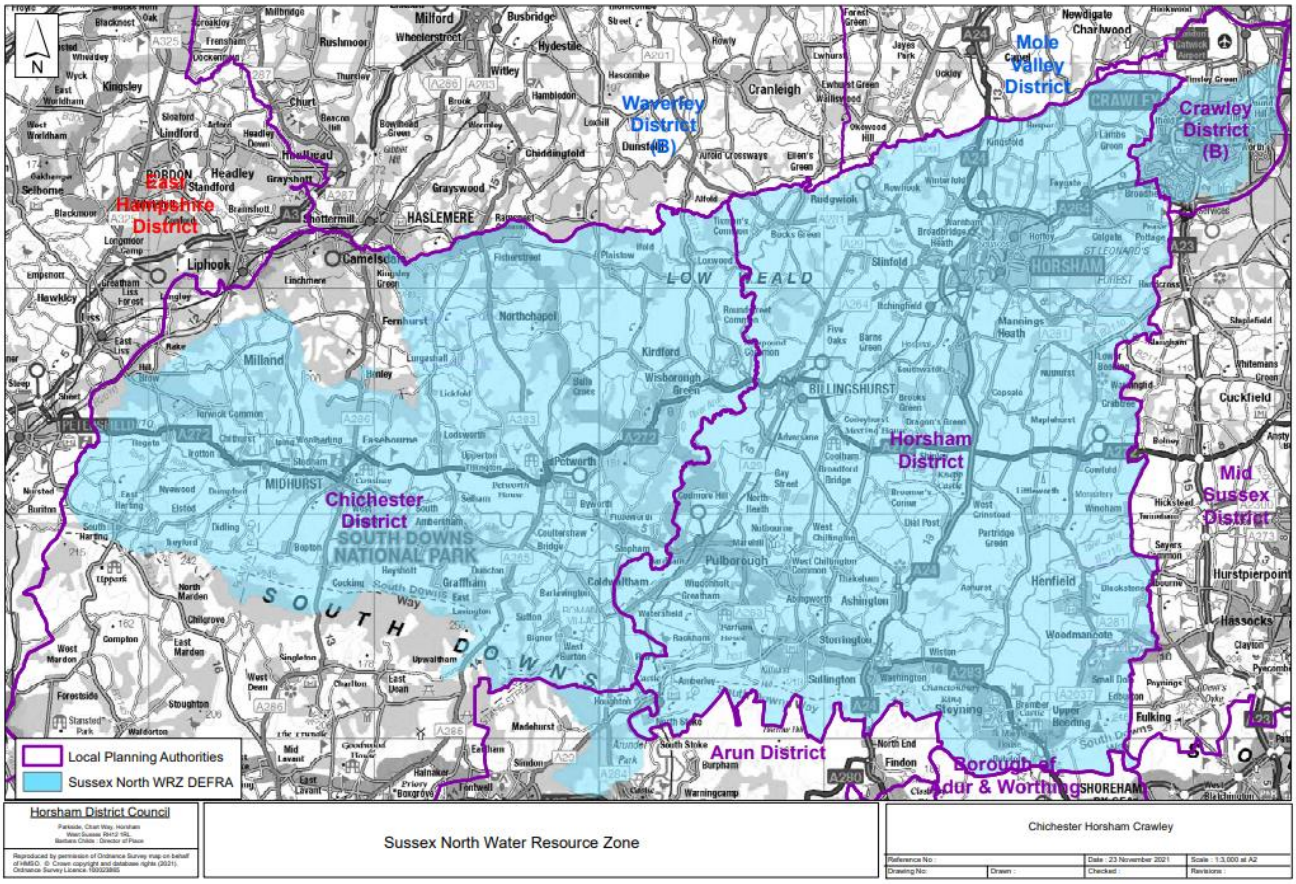
1 Introduction

1.1.1 CGS Civils Ltd has been appointed by The Camelia Botnar Foundation to undertake a Water Neutrality Report for a proposed development at The Camelia Botnar Foundation, Maplehurst Road in Horsham, West Sussex. The proposed scheme will consist of the conversion of an existing squash court in order to form an office block which has space for up to 13.73 employees.

1.1.2 The site falls within the Sussex North Water Supply Zone, in which Natural England have written to all authorities within the zone providing a position statement for applications which may place increased pressure on this zone. This explains that recent case law has established that abstraction from the Supply Zone may be having an impact on protected sites (Arun Valley Special Area of Conservations (SAC), Special Protection Area (SPA) and Ramsar site).

1.1.3 As a result, developments within this zone must not add to this impact, as such, the purpose of this report is to therefore provide an overview on the potential water usage changes on the site because of the proposed development, and to confirm that the site is water neutral.

Fig 1. Sussex North Water Supply Zone Area



1.1.4 The proposed development is located at OS Grid Reference TQ 19874 23898 and has the post code RH13 8DQ

Fig 2. Site Location



1.1.5 Waterwise defined Water Neutrality as:

'For every new development, total water use in the region after the development must be equal to or less than the total water uses in the region before the new development.'

1.1.6 Achieving water neutrality involves using a three-step approach. First, the demand for water from the new development must be reduced as far as is practicable, followed by the re-use of water; then the remaining demand should be offset within the region. Following this three-step approach allows the volume that requires offsetting to be reduced which ultimately reduces the cost of the overall scheme. This is noted within the Waterwise neutrality definition, which defines the three steps which should be undertaken in order to achieve water neutrality in their recent review dated January 2021.

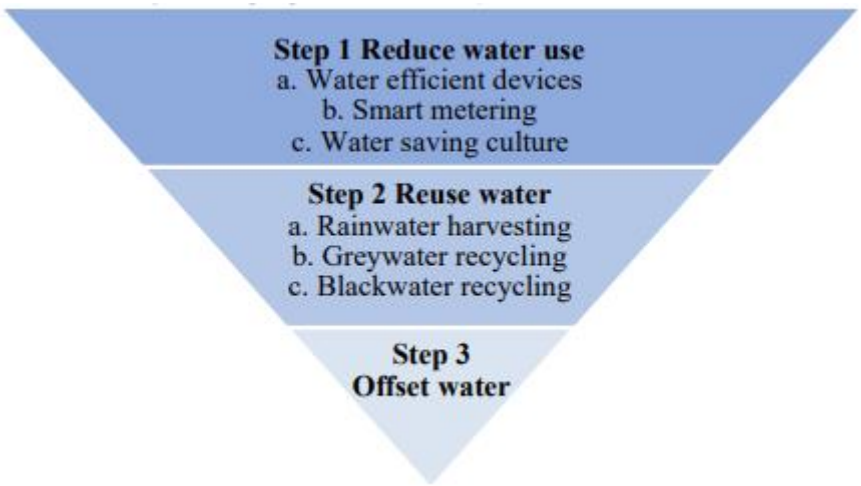
- Reduce water demand in the new development through improvement in efficiency.
- Re-use water, wherever possible.
- Offset the remaining water demand from the new development if required.

1.1.7 The report will be split into the following sections:

- A Review of Water Neutrality demand reduction
- A calculation of estimate water usage from proposed development
- Identification of measures that can be first used to reduce this demand
- Identification of measures that can be used to re-use water
- Establish solutions to offset that demand in order to achieve neutrality.

1.1.8 This report will follow the methods documented within *'A Review of Water Neutrality in the UK'* carried out by Waterwise in January 2021. The document provides details on how developments can achieve water neutrality by utilising the 3-stage approach.

Fig 3. 3-stage approach



1.1.9 Some increase in water demand within the region from planned development during the local plan period is inevitable. However, it can be minimised by making the site as water efficient as possible.

1.1.10 The benefits of water neutrality are wide ranging, from financial and reputational to environment and social. For a new domestic building, they could include:

- **Saving Water** – Over 100,000 litres of water can be saved per year for each water neutral home built
- **Saving Carbon** – A significant CO2 saving can be achieved by reducing the demand for hot water for baths, showers, basins, dishwashers and washing machines
- **Saving Money** – Both water and energy bills will reduce
- **Reducing environmental impact** – Decreasing water abstracted from rivers and groundwater sources
- **Improved Resilience** – For the future by minimising the additional pressure on water resources
- **Enabling future housing growth** – In water scarce areas by reducing the impact of new homes and buildings
- **Reducing discharge to sewage** – by using less water, collecting rainwater and recycling greywater, less water is discharged to the drainage network
- **Short pay-back time** – After approximately 5 years the saving of water neutrality will outweigh the costs of doing so.

2 Executive Summary

2.1.1 The existing site is currently a squash court with a viewing platform and the water usage for the site is **167.8 l/day.** The Proposed scheme will consist of the conversion of the squash court to form an office block. The library on the top floor is to be retained, but not used by Camelia Botnar; instead, it is to be rented out to the occupiers of the offices as a rental unit.

2.1.2 As proven within this report, the use of water efficient fittings and rainwater harvesting following the conversion will result in a water neutral site.

Table 1 Water Usage Comparison

Existing Water usage	**167.8 l/day**
Proposed Scheme water usage prior to mitigation	374.4 l/day
Proposed Scheme water usage with water efficient fittings and rainwater harvesting	76.06 l/day
Proposed Scheme water usage equal to or lower than existing site	Yes

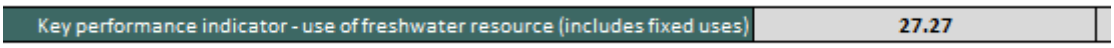
3 Calculation of estimated water usage from the proposed development

3.1.1 Before any necessary steps to achieve water neutrality can be determined, the total water demand for the proposed development must first be calculated. The proposed scheme consists of the conversion of an existing squash court to form an office block that will be used by 13.73 employees per day (Based upon OffPat figures). As the proposed site consists of a proposed office block, BREEAM's guidance should be followed when calculating the water demand of the site.

3.1.2 The proposed building will be fitted with toilets, basin taps and kitchen sink taps, which all 13.73 of the employees will have access to. The water demand for each of these fittings will be **18.00 l/p/day, 4.06 l/p/day** and **3.63 l/p/day** respectively. The BREEAM calculator also includes a Fixed Use of **1.58 l/p/day** for vessel filling. This results in a total water demand of **27.27 l/p/day**. **(Appendix A)**

3.1.3 The office block will be able t accommodate up to 13.73 employees, as such the total water demand can be calculated to be **374.4 l/day**.

Fig 4. BREEAM Calc for proposed water usage



4 Step 1 – Identifying measures that can be used to reduce this demand

4.1.1 The first and most important step in achieving water neutrality will be to ensure that the water used by the proposed development is used as efficiently as possible; the smaller the water demand of the building due to the design and fittings, the less water is needed to be reused and offset. There are a number of ways of achieving a smaller water demand.

- Fitting buildings with efficient products, such as:

  - Aerated Taps

  - Aerated Shower heads

  - Low Flush Toilets, or air flush toilets

Table 2 Water efficient fittings consumption

Water Fitting	Consumption Level
WC	4/2.6 litres dual flush
Shower	7 l/min
Bath	145 litres
Basin Taps	2.5 l/min
Sink Taps	5 l/min
Dishwasher	0.67 l/place setting
Washing Machine	5.5 l/kilogram

Table 3 Practical Summary of Step 1

Step 1: Reduce Water				
Toilets	Cistern displacement devices (toilet hippos)	Retrofit flush devices to dual flush	Fix leaky toilets	
Taps	Tap inserts (aerators)	Low flow restrictors	Push taps	Infrared Taps
Showers/baths	Low flow shower heads (less than 8litres/min)	Shower timers	Reduced bath frequency & volume	
Outdoors	Hosepipe flow restrictors	Hosepipe siphons	Water butts	Mulches and composting to keep soil moist
Smart Metering	Leakage information	Encourage behavioural changes	Innovative tariffs	Savings estimates

4.1.2 By installing the water efficient devices listed above, it is possible to reduce the water demand on site from **374.4 l/day** down to **295.7 l/day (Appendix B).**

13.73 x 21.54 l/p/d

= **295.7 l/day**

Fig 5. BREEAM Calc for proposed water usage with water efficient fittings

Key performance indicator - use of freshwater resource (includes fixed uses)	21.54

5 Step 2 – Identify measures that can be used to re-use water

5.1.1 Once the water demand has been reduced via the installation of water efficient products, water reuse should be considered. The term 'water reused' refers to the capture, treatment (if it is required) and the use of alternative water supplies for non-potable purposes. It includes:

- Rainwater and surface water harvesting

5.1.2 In this instance, rainwater harvesting is proposed to provide water to the toilets within the offices. The installation of water reusing technologies will further reduce the water demand on site, depending on the harvesting tank installed. The proposed roof area is sufficient to provide the required water to the property via a rainwater harvesting tank as well as has sufficient capacity for a 35-day drought period. **See Appendix C**.

5.1.3 By installing the water efficient devices listed above as well as the rainwater harvesting technologies listed above, the total demand will be reduced to:

13.73 x 5.54

= 76.06 l/day

Fig 6. BREEAM Calc for proposed water usage with water efficient fittings and rainwater harvesting

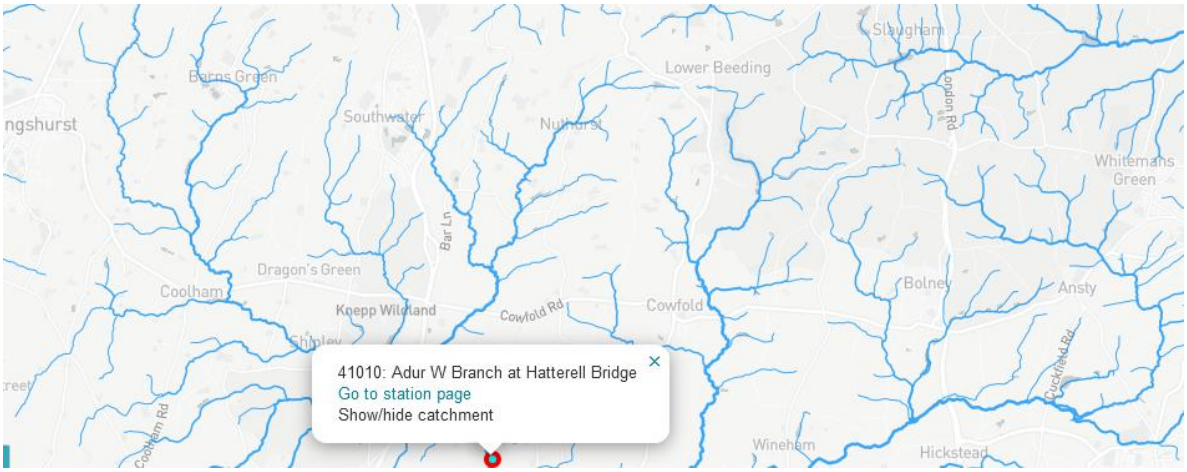
Key performance indicator - use of freshwater resource (includes fixed uses)	5.54

Table 4 Part G rainwater collection calculator

Rainwater Collection Calculation	
Collection Area (m^2)	157
Yield Coefficient	0.8
Depth of rainfall (mm/year)	793
Daily rainwater collection (litres)	272.7
Number of occupants	13.73
Daily Rainwater per person (litres)	19.9

5.1.4 A calculation is to be made to ensure that the rainwater harvested is greater than the rainwater demand within the dwelling. The following is a calculation for 5% of the annual rainwater yield and has been calculated using Rainfall data from the National River Flow Archive which provides annual rainfall data as recorded by the Met office and follows the intermediate approach as detailed within BS 8515:2009.

5.1.5 Using the rainfall catchment data provided by the National River Flow Archives, the closest station point to the site is 41010 – Adur W Branch at Hatterell Bridge:



5.1.6 The latest data available for this station is SAAR 1961-1990, which shows that the depth of rainfall in the area is 793mm.

$$Y_R = A \times e \times h \times n \times 0.05$$

Where:

Y_R = the annual rainwater yield (l)
A = The collecting area (m^2)
e = yield coefficient (%)
h = depth of rainfall (mm)
n = hydraulic filter efficiency

$$\underline{\mathbf{4731}} = 157 \times 0.8 \times 793 \times 0.95 \times 0.05$$

5.1.7 In order to ensure there is sufficient roof area, another calculation from BS 8515:2009 must be carried out in order to calculate the annual demand within the property. The following is a calculation for 5% of the annual non-potable water demand.

$$D_N = P_d \times n \times 365 \times 0.05$$

Where:

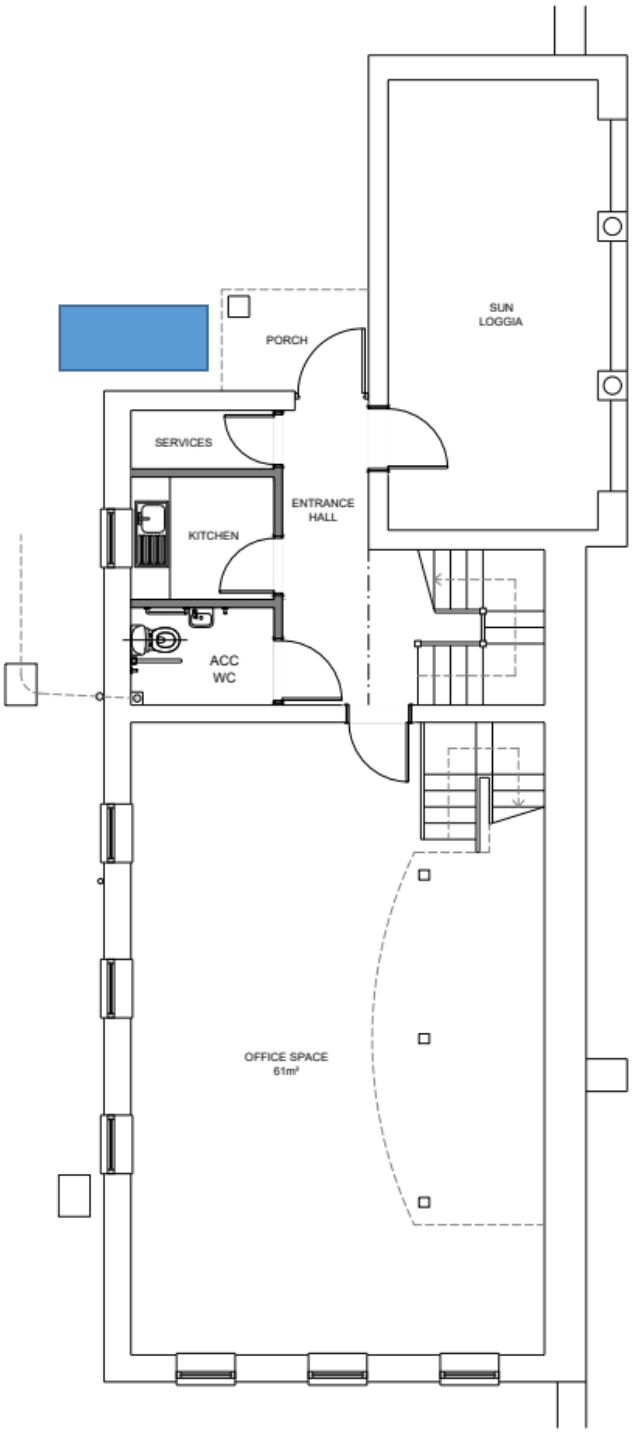
D_N = the annual non-potable water demand (l)
P_d = The daily requirement per person (l)
n = number of persons

$$4009.16 = 13.73 \times 16 \times 365 \times 0.05$$

5.1.8 To ensure there is sufficient area to allow a 35-day drought storage, an extra 35 days is to be included:

$$\underline{\mathbf{4393.6}} = 13.73 \times 16 \times 400 \times 0.05$$

Fig. 7 Potential Rainwater Harvesting tank locations



5.1.9 The client is willing to install a 7,500 l rainwater harvesting tank that is to be fitted with the following filters:

- PREFILT103/4 10" prefilter housing
- CRT10SW-05 5 micro sediment filter
- WH1MH Whole house water filter

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

- Dust – Sediment Filter
- Nitrates – Heavy Metal reduction filter
- Organics – Carbon Filter

5.1.11 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.

5.1.12 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:

- 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.
- WH1MH Whole house water filter will require having the filter media replaced every 12 months.

5.2 Rainwater Harvesting Tank Maintenance Specification

5.2.1 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

5.2.2 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.

5.2.3 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.

6 Step 3 – Offsetting remaining water demand

6.1.1 Finally, the remaining water requirements for new homes or developments which cannot be satisfied with non-potable sources must be offset. Offsetting can generally be done by investing in schemes that save water within the local region such as retrofitting existing buildings with water efficient devices or water reuse systems.

6.1.2 In this instance however, the squash court that is to be removed is to be removed as part of the proposed works whilst the library is to be retained on the top floor. The library is not to be used by Camelia Botnar, instead, it is to be rented out to the occupiers of the offices as a rental unit The library, which has a single daily worker, 7 days a week will have access to the new WC within the proposed offices. Therefore, this will result in a reduction in of **4 l/day** in water usage (Appendix C - Appendix B).

6.1.3 The squash court has on average, 28 users a week or 4 users a day. The use of the BREEAM calculator indicated that there is on average a daily water demand of **41.94 l/p/day** for the fittings within the squash court, which results in a total water demand of **167.8 l/day**. It is therefore clear that the removal of the squash court will result in the site being water neutral. See **Appendix D** for an Existing Fittings Survey for photographs of all existing fittings.

Fig 8. BREEAM Calc for existing water usage within squash court

Key performance indicator - use of freshwater resource (includes fixed uses)	41.94

7 Conclusion

7.1.1 To summarise:

- The proposed development will use on average **374.4 l/day** prior to any mitigation techniques.
- This water demand can be reduced to **295.7 l/day** through the installation of water reducing appliances
- Re-using the water through rainwater harvesting tanks can further reduce the water demand down to **76.06 l/day**
- The existing squash court, which is open 7 days a week, has a calculated water usage of **41.94 l/p/day.** There are on average 28 users a week or 4 users a day, which results in an existing demand of **167.8 l/day**. The site will be water neutral following the conversion of the property and the installation of water efficient fittings and rainwater harvesting.

8 Appendices

8.1 Appendix A:

BREEAM Calculator for Standard Fittings

BREEAM 2018 Wat 01 Water consumption: Water efficiency calculator for new non domestic office buildings

BREEAM® UK delivered by bre

Building type	Description of building type	Default occupancy	Default annual days/operation	Default daily hours of operation
Office	Offices and workshop business (including those with a basic (category 1) laboratory area)	13.431	253	10

Main building activity areas	Description of activity area	Activity area present in building?	Net Floor Area (m^2)
Office - Office areas	Cellular or open plan office space, including staff kitchen where present/adjacent and reception areas. Exlcude meeting rooms, visitor waiting or circulation areas.	Yes	121
Office - Small workshop / laboratory space	Small scale workshop or category 1 laboratory area	No	
Office - Staff canteen dining area	Seated dining areas that accompany a permanently staffed kitchen preparing food for consumption on the premises (excludes small un-staffed kitchen's used by office staff to re-heat food, make tea etc.)	No	
Office - Fitness suite/gym (with changing facility and showers)	A fitness suite or gym that is part of the office building/development and used by the building's employees only. The gym will have its own changing facility with showers.	No	

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Water consumption - building microcomponent

WC component - all activity areas	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
WC - male (no urinals installed)	Effective flush volume (Litres)	4.50	4.00	1.00	9.00
WC - female	Effective flush volume (Litres)	4.50	4.00	1.00	9.00

Note: W
6 litres
ratio of

Urinal component - all activity areas	units	Specification	No. of cisterns	Flushing frequency (flushes/hour)	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

Taps components (personal hygiene) - all activity areas					
Wash hand basin taps	Flow rate (litres/min)	6.00	4.00	0.25	4.06
Shower use	Flow rate (litres/min)		0.030	5.60	0.00
Fixed use - vessel filling	Litres/person/day	-	-	-	1.58
Tap components (cleaning) - staff kitchenette					
Kitchen taps - kitchenette	Flow rate (litres/min)	8.00	1.00	0.67	3.63
Dishwasher	Litres/cycle		0.04	1.00	0.00
Tap components (cleaning and food preparation) - staff canteen food preparation area					

	Microcomponent consumption (L/person/day)
Total	27.27

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Minimum requirements according to EU taxonomy for sustainable finance	
Do all the installed wash hand basin taps and kitchen taps have a maximum water flow of 6 litres/min?	No
Do all the installed showers have a maximum water flow of 8 litres/min?	System not specified
Do all WCs, including suites, bowls and flushing cisterns, have a full flush volume of a maximum of 6 litres and a maximum average flush volume of 3,5 litres?	No
Do all urinals use a maximum of 2 litres/bowl/hour and flushing urinals have a maximum full flush volume of 1 litre?	System not specified
Is all the EU taxonomy requirements for sanitary equipment met?	No

Non potable water yield - greywater system

>	Has, or will, the greywater system be specified and installed in compliance with BS8525-1:2010 Greywater Systems - Part 1 Code of Practice	Please select

Greywater source (building components)		Greywater collected	Proportion of components collected from (%)	Greywater yield (L/person/day)
Greywater source (other components)	**Typical greywater yield (litres)**	**Frequency of yield (days)**	**Greywater yield (litres/day)**	**Greywater yield (L/person/day)**

	Greywater yield (L/person/day)
Total	0.00

Non potable water yield - rainwater system

Has, or will, the rainwater system be specified and installed in compliance with BS EN 16941-1:2018 Rainwater Harvesting Systems - Code of practice	System not specified
How has the storage capacity for the proposed system been calculated?	

Rainwater yield if basic approach:

Collection area (m2)	Rainfall (average mm/yr)	Hydraulic filter efficiency (%)	Yield co-efficient (%)	Annual rainwater yield (Litres)	Rainwater yield (L/person/day)

Rainwater yield if detailed:

Daily rainfall collection (litres)	Rainwater yield (L/person/day)

Non Potable Water Demand - Building Components

	Greywater and/or rainwater yield (L/person/day)
Total	

Component	Greywater and/or rainwater utilised for component	Proportion of components using greywater and/or rainwater yield (%)	Maximum permissible demand (L/person/day)

	Demand met by yield (L/person/day)
Total	

Other permissible components

	Maximum permissible demand (L/day)

	Demand met by yield (L/person/day)
Total	

Greywater and/or rainwater demand met by yield (L/person/day)

Total	

Water consumption calculation results

	Litres/person/day	m^3/person/yr
Water consumption - modelled baseline performance benchmark (excludes fixed uses)	**35.31**	**8.93**
Microcomponent water consumption - modelled performance (excludes fixed uses)	**25.69**	**6.50**
Modelled water demand met via greywater and rainwater sources	**0.00**	**0.00**
If greywater/rainwater systems specified has the minimum % efficiency improvement for component specifications been met	**Not applicable**	
Net modelled water consumption (excludes fixed uses)	**25.69**	**6.50**
Percentage improvement	**27.23%**	
Total Wat 01 BREEAM credits achieved, before checking minimum requirements according to EU taxonomy for sustainable finance.	**2 credits**	
Total Wat 01 BREEAM credits achieved	**1 credit**	
Total Wat 01 BREEAM Exemplary credits achieved	**Exemplary level not achieved**	
Key performance indicator - use of freshwater resource (includes fixed uses)	**27.27**	**6.90**

8.2 Appendix B:

BREAAM Calculator for Proposed water efficient fittings

BREEAM 2018 Wat 01 Water consumption: Water efficiency calculator for new non domestic office buildings

BREEAM® UK delivered by bre

Building type	Description of building type	Default occupancy	Default annual days/operation	Default daily hours of operation
Office	Offices and workshop business (including those with a basic (category 1) laboratory area)	13.431	253	10

Main building activity areas	Description of activity area	Activity area present in building?	Net Floor Area (m^2)
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Office - Staff canteen dining area	Seated dining areas that accompany a permanently staffed kitchen preparing food for consumption on the premises (excludes small un-staffed kitchen's used by office staff to re-heat food, make tea etc.)	No	
Office - Fitness suite/gym (with changing facility and showers)	A fitness suite or gym that is part of the office building/development and used by the building's employees only. The gym will have its own changing facility with showers.	No	

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Water consumption - building microcomponent

WC component - all activity areas	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
WC - male (no urinals installed)	Effective flush volume (Litres)	4.00	4.00	1.00	8.00
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Note: W
6 litres
ratio of

Urinal component - all activity areas	units	Specification	No. of cisterns	Flushing frequency (flushes/hour)	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

Taps components (personal hygiene) - all activity areas					
Wash hand basin taps	Flow rate (litres/min)	2.50	4.00	0.25	1.69
Shower use	Flow rate (litres/min)		0.030	5.60	0.00
Fixed use - vessel filling	Litres/person/day	-	-	-	1.58
Tap components (cleaning) - staff kitchenette					
Kitchen taps - kitchenette	Flow rate (litres/min)	5.00	1.00	0.67	2.27
Dishwasher	Litres/cycle		0.04	1.00	0.00
Tap components (cleaning and food preparation) - staff canteen food preparation area					

	Microcomponent consumption (L/person/day)
Total	21.54

Note: T
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specific

Minimum requirements according to EU taxonomy for sustainable finance	
Do all the installed wash hand basin taps and kitchen taps have a maximum water flow of 6 litres/min?	No
Do all the installed showers have a maximum water flow of 8 litres/min?	System not specified
Do all WCs, including suites, bowls and flushing cisterns, have a full flush volume of a maximum of 6 litres and a maximum average flush volume of 3,5 litres?	No
Do all urinals use a maximum of 2 litres/bowl/hour and flushing urinals have a maximum full flush volume of 1 litre?	System not specified
Is all the EU taxonomy requirements for sanitary equipment met?	No

Non potable water yield - greywater system

>	Has, or will, the greywater system be specified and installed in compliance with BS8525-1:2010 Greywater Systems - Part 1 Code of Practice	Please select

Greywater source (building components)		Greywater collected	Proportion of components collected from (%)	Greywater yield (L/person/day)
Greywater source (other components)	**Typical greywater yield (litres)**	**Frequency of yield (days)**	**Greywater yield (litres/day)**	**Greywater yield (L/person/day)**

	Greywater yield (L/person/day)
Total	0.00

Non potable water yield - rainwater system

Has, or will, the rainwater system be specified and installed in compliance with BS EN 16941-1:2018 Rainwater Harvesting Systems - Code of practice	System not specified
How has the storage capacity for the proposed system been calculated?	

Rainwater yield if basic approach:

Collection area (m2)	Rainfall (average mm/yr)	Hydraulic filter efficiency (%)	Yield co-efficient (%)	Annual rainwater yield (Litres)	Rainwater yield (L/person/day)

Rainwater yield if detailed:

Daily rainfall collection (litres)	Rainwater yield (L/person/day)

Non Potable Water Demand - Building Components

	Greywater and/or rainwater yield (L/person/day)
Total	

Component	Greywater and/or rainwater utilised for component	Proportion of components using greywater and/or rainwater yield (%)	Maximum permissible demand (L/person/day)

	Demand met by yield (L/person/day)
Total	

Other permissible components

	Maximum permissible demand (L/day)

	Demand met by yield (L/person/day)
Total	

Greywater and/or rainwater demand met by yield (L/person/day)

Total

Water consumption calculation results

	Litres/person/day	m^3/person/yr
Water consumption - modelled baseline performance benchmark (excludes fixed uses)	**35.31**	**8.93**
Microcomponent water consumption - modelled performance (excludes fixed uses)	**19.96**	**5.05**
Modelled water demand met via greywater and rainwater sources	**0.00**	**0.00**
If greywater/rainwater systems specified has the minimum % efficiency improvement for component specifications been met	**Not applicable**	
Net modelled water consumption (excludes fixed uses)	**19.96**	**5.05**
Percentage improvement	**43.46%**	
Total Wat 01 BREEAM credits achieved, before checking minimum requirements according to EU taxonomy for sustainable finance.	**3 credits**	
Total Wat 01 BREEAM credits achieved	**1 credit**	
Total Wat 01 BREEAM Exemplary credits achieved	**Exemplary level not achieved**	
Key performance indicator - use of freshwater resource (includes fixed uses)	**21.54**	**5.45**

8.3 Appendix C:

BREAAM Calculator for Proposed water efficient fittings and rainwater harvesting

BREEAM 2018 Wat 01 Water consumption: Water efficiency calculator for new non domestic office buildings

BREEAM® UK delivered by bre

Building type	Description of building type	Default occupancy	Default annual days/operation	Default daily hours of operation
Office	Offices and workshop business (including those with a basic (category 1) laboratory area)	13.431	253	10

Main building activity areas	Description of activity area	Activity area present in building?	Net Floor Area (m^2)
Office - Office areas	Cellular or open plan office space, including staff kitchen where present/adjacent and reception areas. Exlcude meeting rooms, visitor waiting or circulation areas.	Yes	121
Office - Small workshop / laboratory space	Small scale workshop or category 1 laboratory area	No	
Office - Staff canteen dining area	Seated dining areas that accompany a permanently staffed kitchen preparing food for consumption on the premises (excludes small un-staffed kitchen's used by office staff to re-heat food, make tea etc.)	No	
Office - Fitness suite/gym (with changing facility and showers)	A fitness suite or gym that is part of the office building/development and used by the building's employees only. The gym will have its own changing facility with showers.	No	

Note: tl
large, to
present

Note: O
kitchen,

Water consumption - building microcomponent

WC component - all activity areas	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
WC - male (no urinals installed)	Effective flush volume (Litres)	4.00	4.00	1.00	8.00
WC - female	Effective flush volume (Litres)	4.00	4.00	1.00	8.00

Note: W
6 litres
ratio of

Urinal component - all activity areas	units	Specification	No. of cisterns	Flushing frequency (flushes/hour)	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

Taps components (personal hygiene) - all activity areas					
Wash hand basin taps	Flow rate (litres/min)	2.50	4.00	0.25	1.69
Shower use	Flow rate (litres/min)		0.030	5.60	0.00
Fixed use - vessel filling	Litres/person/day	-	-	-	1.58
Tap components (cleaning) - staff kitchenette					
Kitchen taps - kitchenette	Flow rate (litres/min)	5.00	1.00	0.67	2.27
Dishwasher	Litres/cycle		0.04	1.00	0.00
Tap components (cleaning and food preparation) - staff canteen food preparation area					

	Microcomponent consumption (L/person/day)
Total	21.54

Note: T
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specific

Minimum requirements according to EU taxonomy for sustainable finance	
Do all the installed wash hand basin taps and kitchen taps have a maximum water flow of 6 litres/min?	No
Do all the installed showers have a maximum water flow of 8 litres/min?	System not specified
Do all WCs, including suites, bowls and flushing cisterns, have a full flush volume of a maximum of 6 litres and a maximum average flush volume of 3,5 litres?	No
Do all urinals use a maximum of 2 litres/bowl/hour and flushing urinals have a maximum full flush volume of 1 litre?	System not specified
Is all the EU taxonomy requirements for sanitary equipment met?	No

Non potable water yield - greywater system

>	Has, or will, the greywater system be specified and installed in compliance with BS8525-1:2010 Greywater Systems - Part 1 Code of Practice	Please select

Greywater source (building components)		Greywater collected	Proportion of components collected from (%)	Greywater yield (L/person/day)
Greywater source (other components)	**Typical greywater yield (litres)**	**Frequency of yield (days)**	**Greywater yield (litres/day)**	**Greywater yield (L/person/day)**

	Greywater yield (L/person/day)
Total	0.00

Non potable water yield - rainwater system

Has, or will, the rainwater system be specified and installed in compliance with BS EN 16941-1:2018 Rainwater Harvesting Systems - Code of practice	Yes
How has the storage capacity for the proposed system been calculated?	BS EN 16941-1 'detailed approach'

Rainwater yield if basic approach:

Collection area (m2)	Rainfall (average mm/yr)	Hydraulic filter efficiency (%)	Yield co-efficient (%)	Annual rainwater yield (Litres)	Rainwater yield (L/person/day)

Rainwater yield if detailed:

Daily rainfall collection (litres)	Rainwater yield (L/person/day)
272.7	20.30

Non Potable Water Demand - Building Components

	Greywater and/or rainwater yield (L/person/day)
Total	20.30

Component	Greywater and/or rainwater utilised for component	Proportion of components using greywater and/or rainwater yield (%)	Maximum permissible demand (L/person/day)
WC flushing	Yes	100%	16.00

	Demand met by yield (L/person/day)
Total	16.00

Other permissible components

Are there other permissible components present which demand greywater and/or rainwater yield?	No

Maximum permissible demand (L/day)
58

Proportion of maximum permissible demand utilised by other permissible components (%)	

	Demand met by yield (L/person/day)
Total	0.00

Greywater and/or rainwater demand met by yield (L/person/day)

Total	16.00

Water consumption calculation results

	Litres/person/day	m^3/person/yr
Water consumption - modelled baseline performance benchmark (excludes fixed uses)	**35.31**	**8.93**
Microcomponent water consumption - modelled performance (excludes fixed uses)	**19.96**	**5.05**
Modelled water demand met via greywater and rainwater sources	**16.00**	**4.05**
If greywater/rainwater systems specified has the minimum % efficiency improvement for component specifications been met	**Yes**	
Net modelled water consumption (excludes fixed uses)	**3.96**	**1.00**
Percentage improvement	**88.78%**	
Total Wat 01 BREEAM credits achieved, before checking minimum requirements according to EU taxonomy for sustainable finance.	**5 credits**	
Total Wat 01 BREEAM credits achieved	**1 credit**	
Total Wat 01 BREEAM Exemplary credits achieved	**1 innovation credit achieved**	
Key performance indicator - use of freshwater resource (includes fixed uses)	**5.54**	**1.40**

8.4 Appendix D:

BREEAM Calculator for existing fittings

BREEAM 2018 Wat 01 Water consumption: Water efficiency calculator for new non domestic office buildings

BREEAM® UK delivered by bre

Building type	Description of building type	Default occupancy	Default annual days/operation	Default daily hours of operation
Office	Offices and workshop business (including those with a basic (category 1) laboratory area)	0.111	253	10

Main building activity areas	Description of activity area	Activity area present in building?	Net Floor Area (m^2)
Office - Office areas	Cellular or open plan office space, including staff kitchen where present/adjacent and reception areas. Exlcude meeting rooms, visitor waiting or circulation areas.	Yes	1
Office - Small workshop / laboratory space	Small scale workshop or category 1 laboratory area	No	
Office - Staff canteen dining area	Seated dining areas that accompany a permanently staffed kitchen preparing food for consumption on the premises (excludes small un-staffed kitchen's used by office staff to re-heat food, make tea etc.)	No	
Office - Fitness suite/gym (with changing facility and showers)	A fitness suite or gym that is part of the office building/development and used by the building's employees only. The gym will have its own changing facility with showers.	Yes	

Note: tl
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present

Note: O
kitchen,

Note: N

Water consumption - building microcomponent

WC component - all activity areas	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
WC - male (no urinals installed)	Effective flush volume (Litres)	6.00	4.00	1.00	12.00
WC - female	Effective flush volume (Litres)	6.00	4.00	1.00	12.00

Note: W
6 litres
ratio of

Urinal component - all activity areas	units	Specification	No. of cisterns	Flushing frequency (flushes/hour)	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)

Taps components (personal hygiene) - all activity areas					
Wash hand basin taps	Flow rate (litres/min)	6.00	4.00	0.25	4.06
Shower use	Flow rate (litres/min)	10.00	0.154	5.60	8.62
Fixed use - vessel filling	Litres/person/day	-	-	-	1.63
Tap components (cleaning) - staff kitchenette					
Kitchen taps - kitchenette	Flow rate (litres/min)	8.00	1.00	0.67	3.63
Dishwasher	Litres/cycle	0.00	0.04	1.00	0.00
Tap components (cleaning and food preparation) - staff canteen food preparation area					

	Microcomponent consumption (L/person/day)
Total	41.94

Note: T
a more
improv
specific

Minimum requirements according to EU taxonomy for sustainable finance	
Do all the installed wash hand basin taps and kitchen taps have a maximum water flow of 6 litres/min?	No
Do all the installed showers have a maximum water flow of 8 litres/min?	System not specified
Do all WCs, including suites, bowls and flushing cisterns, have a full flush volume of a maximum of 6 litres and a maximum average flush volume of 3,5 litres?	No
Do all urinals use a maximum of 2 litres/bowl/hour and flushing urinals have a maximum full flush volume of 1 litre?	System not specified
Is all the EU taxonomy requirements for sanitary equipment met?	No

Non potable water yield - greywater system

> Has, or will, the greywater system be specified and installed in compliance with BS8525-1:2010 Greywater Systems - Part 1 Code of Practice	Please select

Greywater source (building components)		Greywater collected	Proportion of components collected from (%)	Greywater yield (L/person/day)
Greywater source (other components)	Typical greywater yield (litres)	Frequency of yield (days)	Greywater yield (litres/day)	Greywater yield (L/person/day)

	Greywater yield (L/person/day)
Total	0.00

Non potable water yield - rainwater system

Has, or will, the rainwater system be specified and installed in compliance with BS EN 16941-1:2018 Rainwater Harvesting Systems - Code of practice	System not specified
How has the storage capacity for the proposed system been calculated?	

Rainwater yield if basic approach:

Collection area (m2)	Rainfall (average mm/yr)	Hydraulic filter efficiency (%)	Yield co-efficient (%)	Annual rainwater yield (Litres)	Rainwater yield (L/person/day)

Rainwater yield if detailed:

Daily rainfall collection (litres)	Rainwater yield (L/person/day)

Non Potable Water Demand - Building Components

	Greywater and/or rainwater yield (L/person/day)
Total	

Component	Greywater and/or rainwater utilised for component	Proportion of components using greywater and/or rainwater yield (%)	Maximum permissible demand (L/person/day)

	Demand met by yield (L/person/day)
Total	

Other permissible components

	Maximum permissible demand (L/day)

	Demand met by yield (L/person/day)
Total	

Greywater and/or rainwater demand met by yield (L/person/day)

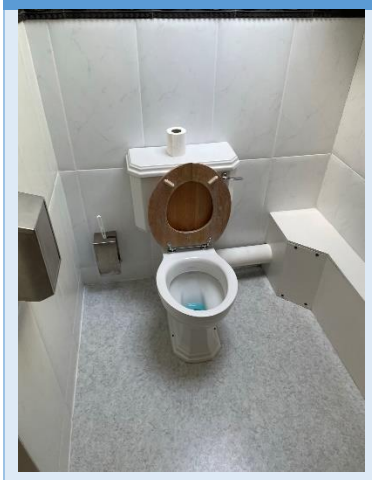
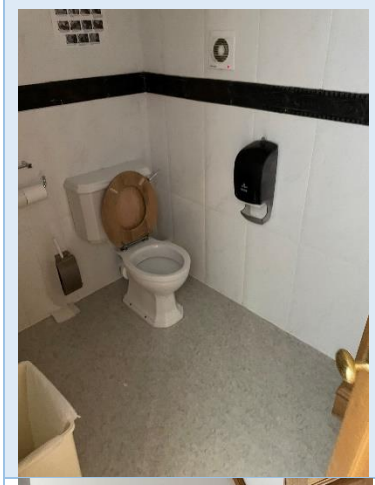
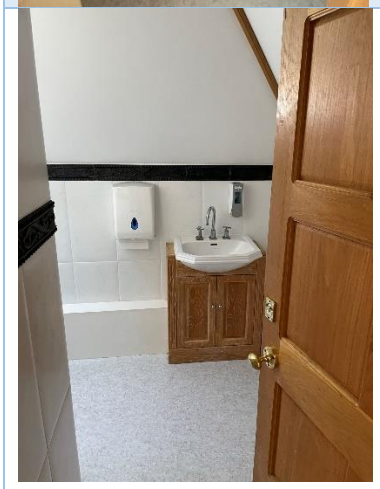
Total

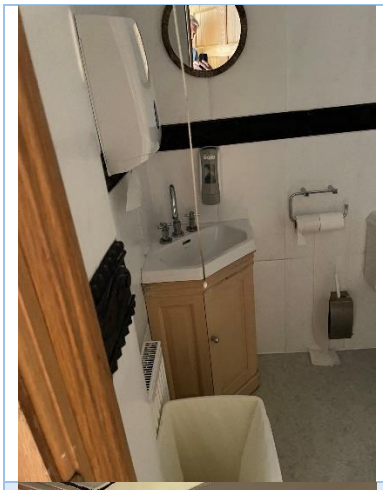
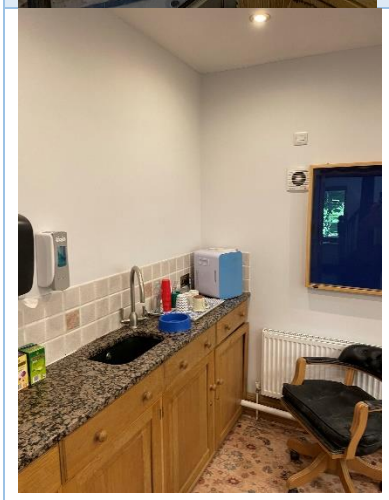
Water consumption calculation results

	Litres/person/day	m^3/person/yr
Water consumption - modelled baseline performance benchmark (excludes fixed uses)	**46.33**	**11.72**
Microcomponent water consumption - modelled performance (excludes fixed uses)	**40.31**	**10.20**
Modelled water demand met via greywater and rainwater sources	**0.00**	**0.00**
If greywater/rainwater systems specified has the minimum % efficiency improvement for component specifications been met	**Not applicable**	
Net modelled water consumption (excludes fixed uses)	**40.31**	**10.20**
Percentage improvement	**12.99%**	
Total Wat 01 BREEAM credits achieved, before checking minimum requirements according to EU taxonomy for sustainable finance.	**1 credit**	
Total Wat 01 BREEAM credits achieved	**1 credit**	
Total Wat 01 BREEAM Exemplary credits achieved	**Exemplary level not achieved**	
Key performance indicator - use of freshwater resource (includes fixed uses)	**41.94**	**10.61**

8.5 Appendix E:

Existing Fittings Survey:

Fittings	Type of Fitting	Existing Water usage (l/p/day)
 	Toilets	Single Flush: 12.00 (WC – Male) 12.00 (WC – Female)
	Taps (excluding kitchen)	4.06

		
	Shower (Only)	8.62
	Kitchen sink taps	3.63
	Total (l/p/day) from BREEAM Calculator with 1.63l/p/day added for vessel filling (refer to appendix C):	41.94
	Total water demand (l/day) based on an average of 4 users a day:	167.8