App PoE, Water Resources, Appendix C – Quantitative Assessment

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Technical Note

Project: Cambridge North

Subject: Quantitative Water Demand Assessment

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1 Introduction

1.1.1 This technical note has been prepared on behalf of Brookgate Ltd to demonstrate that the proposed development at Cambridge North has incorporated effective site specific water reduction and reuse measures, appropriate for the proposed use and layout of the development, as far as reasonably practicable.

1.1.2 This quantitative assessment aims to establish the baseline water demand based on the proposed use of each building and identifies where water efficiencies will be made, in addition to the integration of suitable reuse measures to enable the final water usage rate of the proposed development to be determined.

1.1.3 The purpose of this technical note is to support the current hybrid planning application ref. 22/02771/OUT and address the comments made by the Environment Agency as set out in their letter of objection dated 27th February 2023 ref. AC/2022/131348/02 (Appendix A).

2 Background

2.1 Proposed Development

2.1.1 The site forms part of the wider Cambridge North redevelopment, the first phase of which has been completed and comprises Cambridge North Railway Station, a new hotel and a new commercial building (also known as building S3). The site is located on previously developed land to the north of the first phase of the Cambridge North redevelopment and is allocated as a Major Development Site as set out in the South Cambridgeshire Local Plan (2018) under Policy SS/4: Cambridge Northern Fringe East and Cambridge North Railway Station.

2.1.2 Overall, the scheme aims to deliver a high quality, mixed use development, primarily for employment within Use Classes B1, B2 and B8 as well as a range of supporting uses, commercial, retail, leisure and residential uses ensuring environmental, economic, and social sustainability throughout.

2.1.3 The proposed development is described as follows:

"An outline application (all matters reserved apart from access and landscaping) for the construction of three new residential blocks, providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)), and two commercial buildings for Use Classes E(g) i (offices), ii (research and development) providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)), construction of basements for parking and building services, car and cycle parking and infrastructure works;

A full application for the construction of three commercial buildings for Use Classes E(g) I (offices) ii (research and development), providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)), with associated car and cycle parking, a multi storey car and cycle park, construction of basements for parking and building services, car and cycle parking and associated landscaping, infrastructure works and demolition of existing structures."

2.1.4 A masterplan of the proposed development, identifying the different building uses within each floor of each building is provided in Appendix B. A development layout is shown in Figure 1 with simplistic building use schedule provided in Table 1.

Figure 1: Development Layout

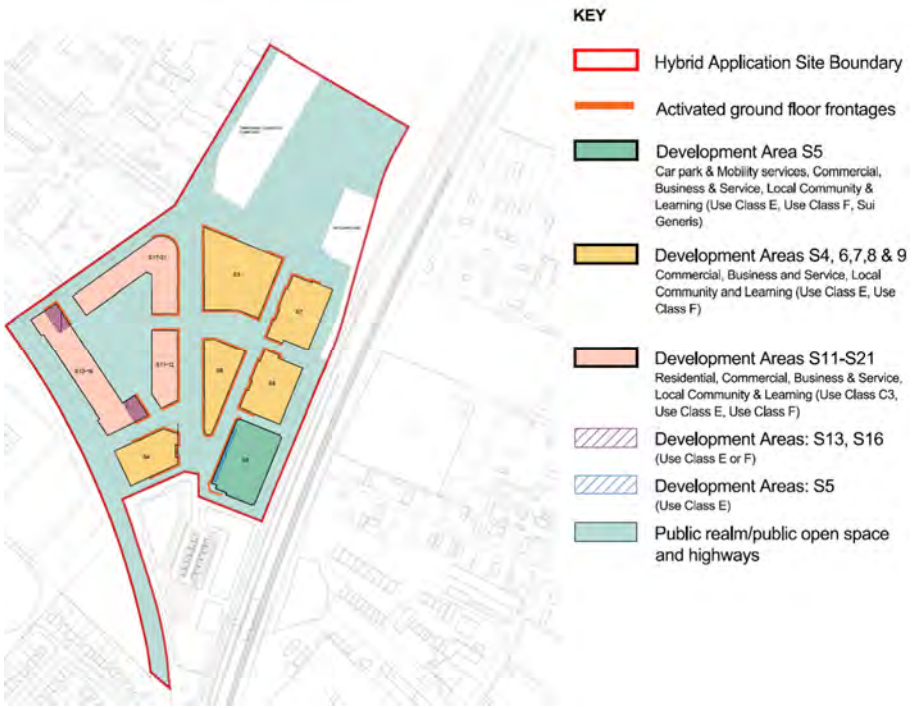

Table 1: Development Schedule

Building Ref.	Building Use
S11 – S21	Residential
S4 (1 Milton Ave)	Office/Retail
S5	Mobility Hub/Retail
S6	Office/Laboratory
S7	Office/Laboratory
S8	Office
S9	Office/Laboratory

2.2 Water Resources within the Greater Cambridge Area

2.2.1 The Environment Agency has reviewed the current and future water usage and climate change scenarios to provide a water stress situation for each water company area within England. As identified in the Environment Agency's Report 'Water Stressed Areas – Final Classification 2021', Cambridge Water's operational area has been classified by the Secretary of State to be an area of serious water stress.

2.2.2 Within the Water Stressed Areas – Final Classification 2021 Report, the Environment Agency sets out how Local Authorities may use the water stress determination to inform whether the tighter standard of 110 litres per head per day in new developments should it be required. Otherwise the use of the water stress determination is to allow water companies to consider compulsory metering in their water resource management plans. The Report states that this status '*must not be used for other purposes such as development planning or water resources planning.*'

2.2.3 The requirement of new developments meeting a more stringent water consumption rate of 110 litres per head per day has been transposed into local policy[1] (refer to Section 3.3 and 3.4 for relevant local policy requirements) and is listed as one of Cambridge Water's Demand Management measures within their draft 2024 Water Resource Management Plan.

3 Legislation, Local Policy & Guidance

3.1.1 The national legislative framework which governs the water supply industry and natural resources which support this supply is extensive. As such the below focuses on the most salient pieces of legislation relevant to the governance of water supply in the context of the environment:

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
- The Water Industry Act (1991)
- National Planning Policy Framework (NPPF) and Guidance (PPG):
  - NPPF Paragraph 20 – Strategic Policies
  - NPPF Paragraph 174(e) – Conserving & Enhancing the Natural Environment
  - PPG Chapter 34 – Plan Making

[1] Policy CC/4 of the South Cambridgeshire Local Plan adopted September 2018 and Policy 28 of Cambridge City Council's Local Plan adopted October 2018 respectively

3.2 Cambridge City Council Local Plan

Policy 28 – Water Efficiency Requirements

3.2.1 Under Section 4 of Cambridge City Council (CCC) Local Plan (October 2018), the council sets out its response to climate change and managing resources, requiring all development to take available opportunities to integrate the principles of sustainable design and construction into the design of proposals.

3.2.2 To ensure that growth of Cambridge does not exacerbate Cambridge's severe water stress status, Policy 28 of the Local Plan requires all new development to meet the minimum standards of sustainable construction and water efficiency, unless it can be demonstrated that such a provision is not technically or economically viable. Figure 2 provides an excerpt of Policy 28 and water efficiency standards, where new homes must target a water consumption rate of 110 l/h/d and non-residential development must achieve full credits (5 credits) for category Wat01 of BREEAM.

3.2.3 In order to ensure that the growth of Cambridge supports the achievement of national carbon reduction targets, and does not exacerbate Cambridge's severe water stress, all new development will be required to meet the following minimum standards of sustainable construction, carbon reduction and water efficiency, unless it can be demonstrated that such provision is not technically or economically viable.

Figure 2: Cambridge City Council's Policy 28 – Water Efficiency Requirements

New Homes:

Year*	On-site reduction of regulated carbon emissions relative to Part L 2006	Water efficiency
2014	44%	110 litres/person/day
2016 onwards	44% - note this requirement will only apply until commencement of the amendments to Section (1) (c) of the Planning and Energy Act 2008	110 litres/person/day

New Non-Residential Development:

Year*	Minimum BREEAM Level	On-Site carbon reduction	Water efficiency
2014	Very good	In line with 2014 Part L	Full credits to be achieved for category Wat 01 of BREEAM
2016 onwards	Excellent	In line with the minimum requirements associated with BREEAM 'excellent'	Full credits to be achieved for category Wat 01 of BREEAM

* Application subject to financial year

Allocation Policy 15 - Cambridge Northern Fringe East and New Railway Station

3.2.4 The proposed development site is also allocated for development under Policy 15: Cambridge Northern Fringe East and new railway station – Area of Major change (AoMC). This policy is not

specific in its requirements for water efficiency, but it does state that all proposals should take into account existing site conditions and environmental and safety constraints.

3.3 South Cambridgeshire Local Plan

Policy CC/4 – Water Efficiency

3.3.1 The South Cambridgeshire Local Plan adopted in September 2018 recognises the water stressed nature of the area and that without additional resources or greater efficiency the need for water to serve development will be greater than current available supply. As such clear guidance is given with regard to water efficiency measures and requirements for all proposed development within the South Cambridgeshire area.

3.3.2 Policy CC/4 of the Local Plan sets out water efficiency requirements for all new development where:

- *All new residential developments must achieve as a minimum water efficiency equivalent to 110 litres per person per day.*
- *Proposals for non-residential development must be accompanied by a water conservation strategy, which demonstrates a minimum water efficiency standard equivalent to the BREEAM standard of 2 credits for water use levels unless demonstrated not practicable.*

Policy CC/7 – Water Quality

3.3.3 In South Cambridgeshire the majority of rivers are currently of moderate or poor ecological status. Most failures are considered to be due to phosphates and man-made alterations to river and bank form. In much of the south east of the district the underlying geology is chalk, providing

a significant source of groundwater which is used for the public drinking water supply. The Local Plan seeks to ensure that development does not result in a deterioration of water quality and recommends that opportunities are taken to enhance and support the achievement of the Water Framework Directive standards.

3.3.4 Therefore in order to protect and enhance water quality, all development proposals must demonstrate that:

a There is adequate water supply, sewerage and land drainage systems (including water sources, water and waste water infrastructure) to serve the whole development, or an agreement with the relevant service provider to ensure the provision of the necessary infrastructure prior to the occupation of the development. Where development is being phased, each phase must demonstrate sufficient water supply and waste water conveyance, treatment and discharge capacity;

b The quality of ground, surface or water bodies will not be harmed, and opportunities have been explored and taken for improvements to water quality, including renaturalisation of river morphology, and ecology;

c Appropriate consideration is given to sources of pollution, and appropriate Sustainable Drainage Systems (SuDS) measures incorporated to protect water quality from polluted surface water runoff.

Allocation Policy SS/4 - Cambridge Northern Fringe East and Cambridge North Railway Station

3.3.5 The site is also allocated for development under Local Policy SS/4 Cambridge Northern Fringe East and Cambridge North railway station, stating the same requirements as those listed under CCC's Local Allocation Policy 15.

3.4 Cambridge Water – Water Resource Management Plan

Cambridge Water Supply Area & Water Resource Zone

3.4.1 Cambridge Water operate a single Water Resource Zone (WRZ) and the zone is supplied by 26 groundwater sources (mainly abstracted from the chalk aquifer in the southern and eastern part of the supply area) which are linked by a highly integrated pipe network. Storage reservoirs are linked with large diameter mains, booster stations and remotely controlled valves to allow the transfer of water throughout Cambridge Water's supply area.

3.4.2 The network comprises five supply zones – the Cambridge zone being the largest of these in terms of both supply and demand. Sources which supply water direct into this zone provide more water than is needed there to meet demand, so the surplus water is transferred to other zones as required. Supply zones in the north of the WRZ do not have direct supplies and rely solely on this transfer. Other supply zones have direct input from sources and only rely on transfer from the Cambridge zone at times of peak demand or outage. Some zones are highly flexible in terms of water transfer options and connectivity, with a number of options to transfer water between zones.

Figure 3: Cambridge Water WRZ and Supply Zones

3.4.3 This highly interconnected supply system enables Cambridge Water to effectively balance supply and demand across the region and therefore the risk of shortages of water is equalised across the whole area of supply.

Water Resource Management Plan

3.4.4 Water Resource Management Plans (WRMP) set out in detail how each water company plans to deliver a secure and reliable water supply in an affordable and sustainable way over the next 25 years. These plans are reviewed every 5 years in accordance with the Asset Management Plan (AMP) cycle. Cambridge Water's latest Water Resource Management Plan (WRMP) published in

2019, is in the process of being updated by their draft 2024 WRMP which covers a 25 year period between 2025 and 2050.

3.4.5 The draft 2024 WRMP, which has just been reviewed by the Environment Agency, introduces some significant changes to their last 2019 WRMP, mainly due to the effects of climate change and population growth and the impact this is already having on the availability of water in the region. In response to the impacts of climate change, population growth and the pressure these place on natural water resources throughout England, the Environment Agency has reviewed its abstraction licensing strategy and issued abstraction licence capping guidance to all water companies in November 2021. The purpose of this guidance was to manage the risk of ecological deterioration if abstraction were to increase within the licensed headroom.

3.4.6 The fundamental implication of this guidance is that there is less water available than was originally budgeted for as part of Cambridge Water's 2019 WRMP and as such may be reliant on unsustainable sources of water. Consequently, Cambridge Water has reassessed the water available under the new licensing regime to determine its ability to supply water to its existing customers along with planned growth, whilst protecting the environment as part of its draft 2024 WRMP.

3.4.7 The draft 2024 WRMP states that Cambridge Water has accounted for reductions in volume of water that can be abstracted from certain sources. These reductions are significant and are included over different timescales in the planning period as the scale of reduction is refined. It is anticipated however that the capped licensed levels will be enforced as of 2030. Cambridge Water also state that the need to address the risk of causing deterioration to the environment has driven an immediate deficit in Cambridge Water's baseline supply demand balance.

3.4.8 To plan for this potential deficit, and ensure that a sustainable supply of water for the greater Cambridge area can be secured, the draft 2024 WRMP sets out an extensive demand management strategy, in addition to a number of side supply options which will be delivered in partnership with neighbouring water companies, to provide the following measures and interventions:

Reducing the Demand for Water

- Rollout of universal smart metering between 2025 – 2035
- A 50% reduction in leakage by 2050 and triple the rate of leakage reduction in AMP8
- Per Capita Consumption (PCC) of 110 litres per person per day by 2050
- Reductions in non-household consumption of 9% by 2037

Supply Side Options

- Imports from Anglian Water
- Optimising our sustainable licences
- Re-use and storage from water recycling works
- A partnership with Anglian Water to develop Fens Reservoir, a regional winter storage reservoir. Supply to be provided between 2035 and 2037.
- Cambridge Consultation with Cambridge Water

Innovation & Partnership Working

3.4.9 In addition to the above mitigation measures, Cambridge Water are also seeking to explore new and innovative approaches to water resources planning, such as working with developers to re-use and recycle water and make new dwellings highly efficient.

Cambridge Consultation with Cambridge Water

3.4.10 A number of meetings (held on the 20th March and 5th April) have been held with Cambridge Water to ascertain whether they have made an allowance for the proposed development within their WRMPs and if they could confirm whether a sufficient allowance of water supply has been safeguarded for the development. During this consultation process Cambridge Water confirmed that the proposed development has been accounted for in both WRMPs, where initially a consumption rate of 125l/h/d was specified for the 2019 WRMP which has now reduced to 110l/h/d as part of the demand/supply assessment for the draft 2024 WRMP.

3.4.11 As such consultation with Cambridge Water has confirmed that the proposed development has been accounted for as planned growth within the 2019 WRMP and draft 2024 WRMP as per the site's allocation. They are also confident that a sustainable water supply can be provided to the development without causing deterioration to the environment.

3.4.12 Discussions with Cambridge Water confirmed that the proposed development was seeking to achieve BREEAM Excellent accreditation and to be as water efficient as reasonably practicable, potentially reducing the development's footprint further than 110l/h/d. This assessment has demonstrated that following the implementation of water efficiency and reuse measures, the

development's average water demand can be reduced further still to an approximate average consumption rate of 89l/h/d.

3.5 Environment Agency Planning Objection

3.5.1 The Environment Agency has objected to the proposed development (refer to Appendix A for the Environment Agency's letter ref AC/2022/131348/02 dated 27th February 2023) on the grounds that the proposed development may, through the additional demand for potable water use, increase abstraction and risk deterioration to water bodies in the Greater Cambridge area.

3.5.2 The Environment Agency has confirmed that they will maintain their objection until evidence is provided to demonstrate that an adequate and sustainable water supply can be provided, or that site-specific measures shows that the risks posed by the development can be mitigated or removed, in the context of the evidence.

3.5.3 This technical note does provide a site specific assessment of the potential water demand this development will have and the onsite mitigation that will be implemented to ensure that strong water efficiency and conservation measures are delivered. Such an approach will minimise the potential harm to waterbodies until alternative supplies are available or Cambridge Water can demonstrate that there is sufficient headroom to supply all planned growth up to 2030.

4 Site Specific Quantitative Assessment

4.1.1 To address the Environment Agency's objection and demonstrate that the proposed development is compliant with local policy within the capacity of the developer's duty, the following quantitative assessment of the development's water demand has been undertaken.

4.1.2 In summary this site specific assessment looks at the following:

- Baseline water demand for both the residential development and commercial;
- The development's water demand following the implementation of water efficiency measures for both the residential and commercial development in accordance with Building Regulations Part G and BREEAM respectively;
- The development's water demand following re-use measures (greywater recycling facilities) being installed;
- Mitigation measures to reduce residual demand and offsetting.

4.2 Baseline Demand

Residential Development

Development Parameters

4.2.1 A number of development parameters have been established for the both the non-domestic and residential elements of the development to enable the water demand or usage of each building proposed.

4.2.2 To determine the baseline demand of the residential quarter of the development, a consumption rate of 141 l/hd/day was adopted and applied to the occupancy rate of each apartment block. The baseline consumption rate of 141 litres/head/day (l/h/d) has been derived

from Cambridge Water's April 2022 Technical Assurance Report[2] which states a Per Capita Consumption (PCC) performance level in the Cambridge region of 141 l/h/d in 2021-2022. The accepted method of defining PCC is defined by Ofwat as the 'annual average per capita consumption is defined as the sum of measured household consumption and unmeasured household consumption divided by the total household population.'[3]

4.2.3 To determine the water usage of each residential apartment block, a schedule of development setting out the number of each unit type and occupants has been provided by the scheme's architect ACME. This is summarised in Table 2 below and in Appendix C.

Table 2: Schedule of Apartment Types & Occupancy

Unit Types	No. of Occupancy Rate Person/Apartment	No. of Units	Total No. of Occupants
Studio	2	12	24
1 Bedroom	2	177	354
2 Bedroom	4	213	852
3 Bedroom	6	23	138
TOTAL	-	**425**	**1368**

Baseline Residential Water Demand

[2] South Staffordshire Water PLC Annual Performance Report for the year ended 31 March 2022): Page 13 - https://www.cambridge-water.co.uk/media/3687/annual-performance-report-2022-final-cam.pdf
[3] Final Reporting Guidance for PR19 – Per Capita Consumption (Ofwat): https://www.ofwat.gov.uk/wp-content/uploads/2018/03/Reporting-guidance-per-capita-consumption.pdf

A conservative approach in the number of occupants to each apartment type has been taken, where it is assumed that every bedroom specified in each apartment is fully occupied. The consumption rate of 141 l/h/d has then been applied to the total residential head count to determine the baseline water consumption rate. This is set out in Table 3 and broken down into a water footprint per apartment block.

Table 3: Development's Domestic Water Demand

Building Ref.	Studio (2p)	1 Bedroom (2P)	2 Bedroom (4P)	3 Bedroom (6P)	Building Headcount	Baseline Consumption Rate (l/d)*	Baseline Consumption Rate (m^3/day)
S11	0	14	26	0	132	18,612	18.6
S12	0	18	20	0	116	16,356	16.4
Sub Total	**0**	**32**	**46**	**0**	**248**	**35,968**	**35**
S13	5	28	26	2	182	25,662	25.7
S14	0	5	17	7	120	16,920	16.9
S15	0	9	18	5	120	16,920	16.9
S16	0	15	18	0	102	14,382	14.4
Sub Total	**5**	**57**	**79**	**14**	**524**	**73,884**	**73.9**
S17	0	15	14	4	110	15,510	15.5
S18	0	20	9	5	106	14,946	14.9
S19	7	21	20	0	136	19,176	19.2
S20	0	14	26	0	132	18,612	18.6
S21	0	18	19	0	112	15,792	15.8
Sub Total	**7**	**88**	**88**	**9**	**596**	**84,036**	**84.0**

Building Ref.	Studio (2p)	1 Bedroom (2P)	2 Bedroom (4P)	3 Bedroom (6P)	Building Headcount	Baseline Consumption Rate (l/d)*	Baseline Consumption Rate (m^3/day)
TOTAL	**12**	**177**	**213**	**23**	**1,368**	**93,888**	**192.9**

*based on a consumption rate of 141 l/h/d

Commercial Development

Development Parameters

4.2.4 The baseline water demand for the proposed non-domestic buildings has been determined using the BREEAM Standard WAT01 method. This method uses each building's actual component specification and default usage patterns for the building type and its activity areas to determine the baseline water demand measured in litres/person/day for each building. The same methodology is then applied when determining the water efficiency of a building and this is discussed further in Section 4.2.15.

Building Type & Activity Areas

4.2.5 At this stage of design, it should be noted that the exact distribution of floor space use and occupancy within each commercial building has not yet been determined. However each of the scheme's architects (MAKE & ACME) have provided a set of parameters to determine the Net Internal Area (NIA) for each activity use, based on the parameter plan (Appendix D). Given this the following parameters have been used to determine the floor space of each use and occupancy rate:

- 40%/60% distribution between office and laboratory floor space respectively for buildings S6, S7 and S9.
- The occupancy rate is specified by the WAT01 Calculator based on the type of use. This was apportioned based on the 40%/60% split between office and laboratory space.

4.2.6 Table 4 provides a summary of the proposed commercial development, the activity area for each building and occupancy based on the above information and assumptions.

Table 4: Commercial Building Schedule & Proposed Uses

Building Ref.	Office NIA (m^2)	Occupancy	Laboratory NIA (m^2)	Occupancy	Retail NIA (m^2)	Occupancy
S4	10,732	1,191	-	-	-	-
S5 (Mobility Hub)	-	-	-	-	207	10 (Staff) 563 (Customers)/day
S6	3,077	262	4,615	393	-	-
S7	3,194	272	4,792	408	-	-
S8	8,604	955	-	-	-	-
S9	6,120	522	9,180	781	-	-
TOTAL	**31,727**	**3,202**	**18,587**	**1,582**	**207**	**573**

4.2.7 A detailed commercial buildings area schedule is provided in Appendix D.

4.2.8 The occupancy of each activity area is determined by BREEAM's WAT01 calculator which is summarised in Table 4.

Building Component Specification

4.2.9 The baseline component specification is equivalent to the water efficiency of industry standard components steered by the minimum levels required by the Water Supply (Water Fittings) Regulations[4] and Part G of the Building Regulations[5]. To establish the baseline consumption of each commercial building, the 'Base' flow rate and volume for each component type specified within Table 5 has been used.

Table 5: Baseline Component Consumption

	WC (litres)	Wash-hand basin taps (l/min)	Showers (l/min)	Urinal (l/bowl/hr)	Kitchenette – Kitchen Tap (l/min)	Kitchen Tap (l/min)	Dishwasher (l/rack)
Consumption rate	6	10	12	7.5	10	10.3	8

4.2.10 These parameters are then applied to BREEAM's WAT01 calculator to determine the baseline consumption rate for each commercial building. The full WAT01 calculator outputs for each building are included within Appendix E and summarised below in Table 6.

[4] The Water Supply (Water Fittings) Regulations 1999 No. 1148
[5] HM Government: The Building Regulations 2010: Part G Sanitation, hot water safety and water efficiency (2015 edition) with 2016 amendments

Table 6: Commercial Baseline Water Demand

Building Ref.	Baseline Water Usage (l/p/d)
S4	37.46
S5	5.2
S6	40.52
S7	40.44
S8	34.37
S9	43.17

4.2.11 Based on the findings set out in Table 6, it can be reasoned that the average baseline water consumption rate from the proposed commercial development is 39.19 l/p/d. Building S5 has been removed from this calculation due to its low consumption rate being unrepresentative and atypical of the commercial development proposed due to its use as a mobility hub.

4.3 Proposed Water Reduction & Efficiency Measures

Residential Development

4.3.1 To ensure that the proposed residential development becomes as water efficient as possible and reduces its demand on potable mains water as far as reasonably practicable, the first step is to introduce water efficient components and appliances. These will be installed within each residential dwelling.

Proposed Water Efficient Components and Appliances

4.3.2 It is the intention that the residential development (Buildings S11-S21) is built to the Home Quality Mark (HQM) Standard. This certification scheme recognises new homes where performance meets best practice standards that are often significantly above those required by regulations. To achieve this standard specific criteria must be achieved for a number categories, water efficiency being one of them. Table 52 (extracted in below) of the HQM One Manual SD239 (Bre Group, Aug 2018) lists the minimum water consumption that each component and appliance installed in a household must achieve.

Figure 4: Water Fitting Standards (taken from HQM One Manual – Table 52)

Water fitting	Optional fittings standard
WCs	≤ 4/2.6 litres dual flush
Showers	≤ 8L/min
Baths	≤ 170 litres
Basin taps	≤ 5L/min
Kitchen sink taps	≤ 6L/min
Dishwashers	≤ 1.25L/place setting
Washing machines and washer dryers	≤ 8.17L/kilogram

4.3.3 The accredited calculation methodology set out in HM Government's Building Regulations 2010 Part G – Appendix A: Water Efficiency Calculator for New Dwellings has been used to determine the reduction in water demand through the specification of water efficient components and appliances. The full outputs of the water efficiency calculation for each residential block can be referred to in Appendix F and a comparison of water demand provided in Table 7.

Table 7: Domestic Water Usage following Water Efficiency Measures

Building Ref.	Baseline (l/h/d)	Water Efficiency Measures (l/h/d)
S11	141	105
S12	141	105
S13	141	102
S14	141	112
S15	141	112
S16	141	112
S17	141	105
S18	141	105
S19	141	105
S20	141	105
S21	141	105
Average	**141**	**106**

4.3.4 The water efficiency calculation demonstrates that on average the domestic water consumption rate within the proposed development reduces from 141 l/h/d to 89 l/h/d, a difference of 35 l/h/d once water efficiency measures are employed. This not only exceeds Cambridge Water's ambitious target of achieving a consumption target of 110 l/h/d by 2050, as set out in their draft 2024 WRMP, but also South Cambridge Local Policy CC/4 minimum water efficiency requirement of 110 l/h/d.

4.3.5 The final specification to be used on site to achieve this daily water target will be confirmed later in the design process. Nonetheless, Table 8 provides an example of what could be installed on site to achieve this reduction in water demand.

Table 8: Example of Water Efficiency Fixtures & Fittings Performance Standards

Fitting/Appliance	Example Product (Model No.)	Water Use
Shower (l/min)	Armitage Shanks – Contour 21 (A4129AA)	8
Bath (l capacity)	Armitage Shanks – Sandringham 21 (E0282)	170
Wash Basin Tap (l/min)	Grohe – Allure Brilliant (20346000)	5
Kitchen Sink Tap (l/min)	Roca – ONA (A5A851F)	6
Low/dua flush WC (l capacity)	Ideal – Concept Air (E079701) coupled with Aquablade technology (E080801)	4/2.6
Washing Machine (l/kg dry load)	Siemens iQ700 (WI14W501GB)	5.63
Dishwasher (l/place setting)	Siemens iQ500 (SN95ZX61CG)	0.98

4.3.6 Alongside these water efficiency measures, it is important that smart metering is installed in addition to water saving behaviours being encouraged. This can be implemented through a mandatory water efficiency labelling system for water using products, similar to the scheme already in place for energy using products, which would enable a quick and easy identification of the most efficient water appliances and underpin minimum product and building design standards.

Greywater Recycling

4.3.7 To further mitigate the impact of the residential development demand on mains water, additional opportunities to reduce the average consumption rate of the development have been explored and integrated within the development as far as practicable. It is proposed that water reuse measures are employed as the next step in the water management hierarchy. Greywater recycling facilities will be provided within the basements or ground floor of all residential blocks.

4.3.8 A typical manufacturer's grey water recycling data sheet and specification has been used to inform the additional reduction in water demand is included in Appendix G. Each grey water recycling unit typically comprises the following items of plant:

- Greywater storage tank
- Disc Filter
- Oxidant Dosing
- Control Panel
- Ultrafiltration Membrane (if required)
- Sodium Hypochlorite Dosing
- Treated Greywater Tank with Mains Top-up
- Booster pump for distribution back into supply

4.3.9 In accordance with BS 8525:2011 and BS8525 1:2010 – Greywater Systems Part 1: Code of Practice, the percentage volume of waste water collected (and reused) from the following fixtures and appliances:

- Wash hand basins
- Showers and baths
- Kitchen sinks
- Dishwashers
- Washing machines

4.3.10 The grey water generated from the above activities are then stored, treated and resupplied to the household to flush toilets, providing a significant reduction to the overall water demand on mains supply. This water saving has been calculated for each residential block which is summarised in Table 9 . The detailed outputs are saved in Appendix F.

Table 9: Domestic Water Demand following Water Efficiency Measures & Grey Water Recycling (taken from Table 8.3 of BREEAM Wat01 Calculator Methodology)

Building Ref.	Baseline (l/h/d)	Water Efficiency Measures (l/h/d)	Grey Water Recycling – Average Water Recovery (l/h/d)	Net Consumption Rate (l/h/d)
S11	141	105	59	88
S12	141	105	59	88
S13	141	102	59	85
S14	141	112	59	94
S15	141	112	59	94
S16	141	112	59	94
S17	141	105	59	88
S18	141	105	59	88

Building Ref.	Baseline (l/h/d)	Water Efficiency Measures (l/h/d)	Grey Water Recycling – Average Water Recovery (l/h/d)	Net Consumption Rate (l/h/d)
S19	141	105	59	88
S20	141	105	59	88
S21	141	105	59	88
Average	**141**	**106**	**59**	**89**

4.3.11 From this assessment it can be determined that the domestic water demand on mains supply is significantly reduced, from an observed average consumption rate of 141l/h/d to a final consumption rate of 89 l/h/d, following the installation of water reduction and reuse measures. This demonstrates that the proposed water strategy for the residential development is not only compliant but significantly exceeds the expectations of local policy as prescribed by South Cambridge and Cambridge City Council, where a consumption rate of 110l/h/d should be met.

4.3.12 Greywater harvesting tanks to be provided throughout the development are shown on the Water Management Strategy Plan PJA Drawing 05425-C-1021 included as Appendix I to this Technical Note. A specification of a typical greywater harvesting system is also included in Appendix G.

Commercial Development

4.3.13 All proposed commercial buildings will aim to be designed to meet the requirements of Local Policy, where in terms of water efficiency, full BREEAM credits should be achieved for the WAT 01 category.

4.3.14 As previously discussed in Section 4.1.5 the WAT01 calculator which determines the performance of a non-domestic buildings water efficiency based on:

- Building component specification
- Building type
- Activity areas

4.3.15 The modelled output is then compared with the same output for a baseline component specification (summarised in Table 5 and 6) and the water demand saving determined as a percentage improvement. The BREEAM percentage improvement benchmarks are based on progressively more efficient standards and product market availability for water consuming components. The percentage improvement then determines the number of BREEAM credits achieved. Table 10 prescribes a BREEAM performance level based on the water efficiency of each component type.

Table 10: BREEAM - Water Efficient Component Levels by Component Type

Component	Performance Levels (quoted number are minimum performance required to achieve the level)						
	Base	1	2	3	4	5	Unit
WC	6	4.5	4	3.75	3.5	3	Effective Flush Volume (l)
Wash Hand Basin Tap	10	8	6	5	4	3	l/min
Shower	12	10	8	6	5	3.5	l/min
Bath	200	180	160	140	120	100	litres
Urinal (>2)	7.5	6	3	1.5	0.75	0	l/bowl/hr

Component	Performance Levels (quoted number are minimum performance required to achieve the level)						
Urinal (1 Only)	10	8	4	2	1	0	l/bowl/hr
Greywater & Rainwater System	0%	0%	0%	25%	50%	75%	% of WC or urinal flushing demand met using recycled non-potable water
Kitchenette Tap	10	8	7	6	5	5	l/min
Kitchen Tap: Restaurant	10.3	9	8.3	7.30	6.3	6	l/min
Domestic Sized Dishwasher	17	13	13	12	11	10	l/cycle
Domestic Sized Washing Machine	90	60	50	40	35	30	l/load
Waste Disposal Unit	17	17	0	0	0	0	l/min
Commercial Sized Dishwasher	8	7	6	5	4	3	l/rack
Commercial Sized Washing Machine	14	12	10	7.5	5	4.5	l/kg

4.3.16 Based on the activity area of each building and above performance level of each component type, the WAT01 calculator determines the water demand of each building following the installation of water efficiency measures which is summarised in Table 11 under the water efficiency heading. Outputs for each building show that either 3 or 4 BREEAM credits are achieved once water efficiency measures are installed.

4.3.17 To achieve the highest levels of performance, the use of greywater recycling is proposed as a facility within each commercial building. The provision of greywater recycling significantly reduces the water footprint of each building, providing an overall betterment of 62% on average as demonstrated in Table 11, which summarises the findings of the full WAT01 calculator outputs in Appendix H.

4.3.18 The WAT 01 calculator outputs also show that for each building, over 75% of the water required for toilet flushing is met by water supplied by grey water harvesting as specified by Table 10 . As such the proposed commercial development achieves the full 5 BREEAM credits and is therefore compliant with local policy requirements.

Table 11: Commercial Water Demand following Water Efficiency Measures & Grey Water Recycling

Building Ref.	Baseline Water Usage (l/h/d)	Water Efficiency (l/h/d)	Grey Water Recycling – Average Water Recovery (l/h/d)	Net Consumption Rate (l/h/d)	Overall Percentage Improvement (%)
S4	37.46	16.90	3.55	11.77	68
S5	5.2	3.26	-	-	-
S6	40.52	22.69	6.19	14.92	63
S7	40.44	22.68	6.12	14.97	63

Building Ref.	Baseline Water Usage (l/h/d)	Water Efficiency (l/h/d)	Grey Water Recycling – Average Water Recovery (l/h/d)	Net Consumption Rate (l/h/d)	Overall Percentage Improvement (%)
S8	34.37	19.13	3.55	14.00	59
S9	43.17	25.48	6.12	17.77	59

4.3.19 Due to the Mobility Hub (S5) mainly comprising car parking spaces and a minimal floor space for retail, the water demand of the Mobility Hub is too low for the Wat01 calculator to determine the net consumption rate once grey water recycling measures have been introduced. Nonetheless this is not to say that the development will not still be committed to installing BREEAM Performance Level 4 fittings and appliances in addition to a grey water recycling unit within the mobility hub.

4.3.20 Greywater harvesting tanks to be provided within each of the commercial buildings are shown on the Water Management Strategy Plan PJA Drawing 05425-C-1021 included as Appendix I.

Rainwater Harvesting

4.3.21 A combined rainwater harvesting/grey water recycling facility has been considered for the proposed development. However building specific rainwater harvesting has been discounted, given that Cambridge is located within the driest area of the UK[6] with an Average Annual Rainfall of 559mm[7] (monitored by the MET Office between 1991 and 2020), which would provide an uncertain and unreliable source of water supply especially during the spring and summer

[6] Cambridge University Botanic Garden – Climate & Soils (2012)
[7] https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/u1214qgj0

months. In order to mitigate this potential unreliability of water supply, a reservoir system would be required to store a more substantial quantity of rainfall and offset this shortfall. Given the space available within the proposed development layout and within the wider urban setting, the provision of an area to store significant volumes of rain water is not viable.

4.3.22 Given this, following discussions with sustainability consultants Hoare Lea and a meeting with the Environment Agency (held on the 22nd March) the installation of a rainwater harvesting system to provide greywater to the buildings has been discounted, with development proposals incorporating greywater recycling systems.

4.3.23 Nonetheless, it is proposed that a rainwater harvesting facility is coupled with the Sustainable Drainage System (SuDS) basin, located within the northern extents of the development, that will collect roof and highway runoff. This water will receive a minimum level of screening and treatment before being used to irrigate the landscaped areas of the development. The location of a rainwater harvesting facility is indicatively shown on the Water Management Strategy Plan, PJA Drawing 05425-C-1021 in Appendix I.

Sustainable Drainage Systems

4.3.24 In addition to the water efficiency and reuse measures, a number of SuDS will be incorporated throughout the development including an attenuation basin, swale, green roofs, rain gardens, tree pit attenuation and permeable paving which will significantly contribute toward the urban cooling of the development in addition to hydrating the local landscape. These measures are shown on the Water Management Strategy Plan PJA Drawing 05425-C-1021 included as Appendix I.

4.4 Phasing

4.4.1 It should be noted that this level of water demand from the proposed development will not be required with immediate effect but rather over a period of approximately five years as the construction and occupation of the development is phased over that time. As such the demand of water will come on line in accordance with the phasing of the development. Table 12 provides a phasing schedule of which buildings will be delivered when, and the associated water demand. A phasing plan of the proposed development is provided in Appendix J. Phase 1 and 2 which include a hotel and office building have already been completed.

Table 12: Development Phasing & Water Demand

Phase – Build Completion Date	Potential Full Occupation Date	Water Demand (l/h/d)	Occupancy*	Water Demand Per Phase (l/d)	Cumulative Water Demand (l/d)
Phase 3 (2026 – 2027):					
Mobility Hub	2026	3.26	573	1,867.98	1,867.98
S06	2028	14.92	655	9,772.60	11,640.58
S07	2028	14.97	680	10,179.60	21,820.18
Phase 4 (2027):					
S04	2028	11.17	1191	14,018.07	35,838.25
Phase 5 (2028 - 2029):					
Block S17-21	2029	88	589	51,832	87,670.25
Block S11-12	2030	88	248	21,824	109,494.25
Block S13-16	2030	94	519	48,786	158,280.25
Phase 6 (2028):					

Phase – Build Completion Date	Potential Full Occupation Date	Water Demand (l/h/d)	Occupancy*	Water Demand Per Phase (l/d)	Cumulative Water Demand (l/d)
S09	2030	17.77	1303	23,154.31	181,434.56
Phase 7 (2029):					
S08	2030	14	955	13,370	194,804.56
TOTAL	**-**	**-**	**6,713**	**194,804.56**	

*As determined by BREEAM's Wat01 calculator based on NIA & usage

4.4.2 This phasing schedule demonstrates that the development will have a potential total water demand of 194.8m^3/d or 0.19 mL/d once complete and fully occupied in 2030. It should be noted that the occupancy rate for the residential quarter of the development is highly conservative, assuming that all bedrooms are fully occupied for 24 hours, 7 days a week. Furthermore this calculation assumes that the commercial development will be operational at weekends. As such in reality, this joint probability of both the residential and commercial development being fully occupied 24 hours a day, 7 days a week is highly unlikely. Given this, the consumption rate can be reasonably assumed to be lower than that calculated within this technical note, approximately 10% - 15% lower than the calculated 0.19mL/d.

4.4.3 As the development begins construction, it is anticipated that Cambridge Water will also start to implement its demand management measures as set out in its 2024 WRMP (refer to Section 2.3.4), which will start to offset the demand for water further. Once the development is complete and potentially fully occupied, Cambridge Water's supply side options, including bulk imports from Anglian Water and the construction of a regional winter storage reservoir, should also be completed. Based on the phasing of the development and Cambridge Water's programme for implementing its supply side measures, it can be determined that effectively

45% of the development's occupants will require a water demand of 87,670 l/day (0.08Ml/d) in advance of Cambridge strategic interventions measures coming online.

4.4.4 However, the remaining 55% of potable water required for the proposed development, should come online once Cambridge Water's strategic measures are in operation in 2030. These supply side schemes will secure a sustainable water supply for the Greater Cambridge area, enabling Cambridge Water to operate within capped licensing levels and mitigate the potential impact that further growth will have on waterbodies within the East Anglia region at risk of deterioration.

5 Additional Opportunities

5.1 Residual Demand Management

5.1.1 There is always a risk that water efficiency fittings and appliances will be replaced by less efficient ones, whether this is intentional or not by residents and thereby increasing the water footprint of the development. To deter this from occurring and to encourage water saving behaviour, a variable tariff could be introduced in partnership with Cambridge Water to incentivise lower water usage and mitigate against the residual demand of water. This will be explored further prior to the occupation of each phase of the proposed development.

5.2 Offsetting

5.2.1 Based on the above assessment and the phasing of the development, there is a potential for the proposed development to have a residual demand on water supply before strategic alternative supplies are introduced. Offsite mitigation, offsetting and/or compensation measures could be

explored, which could potentially include retrofitting water saving measures to existing development or contributions to funding towards a river restoration project targeting waterbodies (rivers and chalk streams in the Greater Cambridge area) that would otherwise potentially deteriorate as a result of over-abstraction.

6 Conclusion

6.1.1 The Greater Cambridge area has been identified as one of the driest areas in the UK and has therefore been designated as an area of water stress by the Environment Agency given the increasing pressures of climate change a population growth in the region. To mitigate the potential impact of growth on water supply and natural resources Cambridge City Council and South Cambridge Council have set out a number of water efficiency measures required by all developments. These specifically include:

- Achieving 110l/h/d for residential development;
- Achieving full (5) BREEAM credits for non-residential development in terms of water efficiency; and a
- BREEAM Performance Level of Excellent (however this only requires 2 BREEAM credits for water efficiency).

6.1.2 Proposals include a mixed use development, delivering up to 425 residential apartments, a mobility hub and five commercial buildings offering a mix of different uses including office, laboratory and retail. As part of the supporting planning documents (planning application ref. 22/02771/OUT) for this development, a water management strategy has been set out to achieve the requirements of local policy as set out above.

6.1.3 Nonetheless the Environment Agency has objected to the development on the basis that the proposed development may, through the additional demand for potable water use, increase abstraction and risk deterioration to water bodies in the Greater Cambridge area. In response to the Environment Agency's objection, this assessment has been undertaken to quantitatively determine the development's final water demand or footprint.

6.1.4 The development proposes to commit to a robust water efficient strategy with resilient water conservation measures to ensure that the development's water footprint is minimised as far as practicable and the potential impact on sensitive water bodies within the Greater Cambridge area is abated. Furthermore the proposed phasing of the development alongside Cambridge Water's draft WRMP 24 programme indicates that approximately over half (55%) of the development's water demand of 107,134 l/day (0.1Ml/d) will be required once Cambridge Water's strategic supply side measures are in place and online in 2030.

6.1.5 The quantitative assessment determines that through the implementation of Home Quality One water efficiency measures, the water demand from the residential development reduces to an average of 106l/h/d, which meets the requirements of local policy. However to reduce this consumption rate further it is proposed that grey water recycling units are installed within the basement of each apartment block. The assessment shows that the greywater recycling units will meet over 75% of the water required for toilet flushing, resulting in a final average consumption rate of 89l/h/d. This is a significant reduction from the actual consumption rate of

a 145l/h/d reported in the Greater Cambridge area by Cambridge Water[8] and far in excess of that required by local policy (110l/h/d).

6.1.6 The same mitigation measures have also been adopted for the commercial buildings within the development, where both water efficient fittings and appliances have been specified in combination with grey water recycling. The BREEAM Wat01 methodology has been used to determine performance level of each building where on average the water consumption rate has been improved by 62%, achieving the full 5 BREEAM credits.

6.1.7 Further water conservation measures are proposed, including a rain water harvester unit which will store an amount of rainwater in addition to utilising surface water runoff attenuated within the SuDS basin, should this be available. This water will be used to irrigate the landscaped areas within the development. Other SuDS features such as swales, green roofs and rain gardens and tree pit attenuation are proposed throughout the development which will significantly contribute toward urban cooling in addition to hydrating the local landscape.

6.1.8 It can be concluded therefore that as part of this site specific assessment all reasonable measures have been taken to ensure that the proposed development is as water efficient as reasonably practical and promotes a water conservative strategy which meets and exceeds the requirements of local policy.

6.1.9 The issues of water availability and planned growth is considered to be a strategic and complex matter that is the responsibility of the regulator and statutory undertaker and that such an assessment of the cumulative impact of existing and planned development has already been

[8] South Staffordshire Water PLC Annual Performance Report for the year ended 31 March 2022): Page 13 - https://www.cambridge-water.co.uk/media/3687/annual-performance-report-2022-final-cam.pdf

undertaken as part of Cambridge Water's Strategic Environment Assessment (Appendix P4 to the draft 2024WRMP). There are substantial technical challenges in undertaking a cumulative impact assessment at a development scale due to the integrated nature of Cambridge Water's supply system, it is not possible to pin point which abstraction borehole would serve which development and therefore identify which waterbody that particular development would potentially cause deterioration to.

6.1.10 The development will continue to work in partnership with Cambridge Water to develop innovative water demand solutions, variable tariff measures and whether an offsetting scheme could be progressed.

Appendix Index

- Appendix A – Environment Agency Letter of Objection (ref. AC/2022/131348/02 dated 27th Feb 2023)
- Appendix B – Illustrative Masterplan & Parameters Plan
- Appendix C – Residential Build Schedule
- Appendix D – Commercial Build Schedule
- Appendix E – Baseline BREEAM WAT01 Calculator Outputs
- Appendix F – Building Regs – Part G: Water Efficiency Calculations
- Appendix G – Grey Water Recycling Facility – Manufacturer's Specification
- Appendix H – Design BREEAM WAT01 Calculator Outputs
- Appendix I – Proposed Water Management Strategy Plan
- Appendix J – Phasing Plan

Appendix A Environment Agency Letter of Objection

creating a better place
for people and wildlife

Environment Agency

Fiona Bradley
Greater Cambridge Shared Partnership

Our ref: AC/2022/131348/02-L01
Your ref: 22/02771/OUT

Date: 27 February 2023

Sent by email

Dear Fiona

A hybrid planning application for:
a) An outline application (all matters reserved apart from access and landscaping) for the construction of: three new residential blocks providing for up to 425 residential units and providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)); and two commercial buildings for Use Classes E(g) i(offices), ii (research and development) providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)),together with the construction of basements for parking and building services, car and cycle parking and infrastructure works.
b) A full application for the construction of three commercial buildings for Use Classes E(g) i (offices) ii (research and development), providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)) with associated car and cycle parking, the construction of a multi storey car and cycle park building, together with the construction of basements for parking and building services, car and cycle parking and associated landscaping, infrastructure works and demolition of existing structures.

Land North of Cambridge North Station Milton Avenue Cambridge Cambridgeshire

Thank you for your letter dated 16 February 2023 to notify us that the applicant for the above planning application has appealed against the non-determination of the application.

We have been considering the impact of changes to abstraction licences in Greater Cambridgeshire. The changes will reduce the amount of water that can be abstracted in order to protect the environment. This action is underpinned by evidence that groundwater abstractions are causing a risk of ecological deterioration of some water bodies.

In November 2022 we provided comments on water resources as interim advice while we considered our position taking into account Cambridge Water's draft Water Resources Management Plan 2024 (WRMP24). The local planning authority recently asked us for an

update on our position in the light of the recent appeal and given current circumstances we would like to now formally **object** to this proposed development, as it may, through the additional demand for potable water use, increase abstraction and risk deterioration to water bodies in the Greater Cambridge area.

The planning application does not demonstrate that the potential impact on water resources and Water Framework Directive environmental objectives has been assessed and appropriate mitigation considered.

This objection is supported by the following legislation, policy and evidence:

- Under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WFD Regulations), Regulation 33, public bodies must have regard to the relevant RBMP in exercising their functions which affect a river basin district. The Anglian River Basin Management Plan (RBMP) sets out the environmental objectives for the river basin district, including statutory objectives for water bodies and protected areas. It also includes a summary programme of measures required to achieve these objectives.

- Paragraph 174 (e) of the National Planning Policy Framework (NPPF), which recognises that the planning system should enhance the environment by preventing development from contributing to, or being put at unacceptable risk from, water pollution. The WFD Regulations also require that all water bodies are protected from deterioration.

- This position is also in accordance with Policy CC/7 ‘Water Quality’ of the South Cambridge Local Plan 2018 which specifies that all development proposals must demonstrate that there are adequate water supplies to serve the whole development, or an agreement with the relevant service provider to ensure the provision of the necessary infrastructure, in order to protect and enhance water quality. The policy specifies that the quality of ground, surface or water bodies will not be harmed and opportunities have been explored and taken for improvements to water quality.

Some water bodies in East Anglia are at risk of ecological deterioration if abstraction increases within the licensed headroom. The upper River Cam and River Granta are examples of surface water catchments where river flows are failing to support Good Ecological Status/Potential and there is a risk of deterioration should abstraction increase above historic levels.

The Environment Agency issued abstraction licence capping guidance to all water companies in November 2021. The purpose of this guidance is to set out licence caps required to manage the risk of ecological deterioration. The implication of this guidance is that licence caps will be required for some licences meaning that there is less licensed water available than that reflected in the Water Resource Management Plan 2019 (WRMP19) for Cambridge Water. Consequently, some of the growth included in local plans based on WRMP19 may be reliant on unsustainable sources of water, because the water abstracted and used for growth risks causing environmental harm. Cambridge Water’s draft WRMP24 is

soon to be published for consultation. Our review of the draft WRMP24 will allow us to assess if the required changes to licences have been included and sufficient water supplies are available for growth and the environment. The Agency will maintain its objection until we have sufficient confidence in its ability to sustainably supply growth and prevent deterioration of water bodies, or the applicant demonstrates that the risks can be mitigated or removed, in the context of the evidence.

The Agency will make its views on the draft WRMP24 public when we have provided our representation to Defra. Our position is subject to change depending on the outcome of our review of the draft WRMP24. Should the draft WRMP24 demonstrate it can sustainably supply growth, we may be able to remove our objection.

Both the Environment Agency and the local planning authority must have regard to the risk of deterioration when exercising their functions under Regulation 33 of the WFD Regulations. This includes the advice the Environment Agency gives as a planning consultee and the local planning authority in determining planning applications. It is reasonable to expect the local planning authority to be confident it has exercised its planning powers to ensure developments it approves have taken reasonable steps assess and mitigate the deterioration risk, in order to comply with Regulation 33. Currently the application does not demonstrate the risk posed by the development has been sufficiently assessed or mitigated accounting for the impact of the licence capping on water supply.

Overcoming our objection:

We will maintain our objection until evidence is provided to demonstrate that an adequate and sustainable water supply can be provided, or that site-specific and/or off-site measures show that the risks posed by the development can be mitigated or removed, in the context of the evidence.

Advice to applicant

In considering this matter we have reviewed the following planning application submissions:

- Environmental Statement Vol 1 Main Report, Chapter 10, Flood Risk and Drainage
- Water Resources Addendum (PJA dated 21/09/2022)
- Sustainability Strategy Addendum (Brookgate dated 28/10/2022)
- Utilities Statement (Noveus dated 25/05/2022)
- Sustainability Strategy (Hoare Lea dated June 2022)

The Sustainability Strategy and Addendum seeks to reduce water use through water efficiency and rainwater harvesting for irrigation. The Water Resources Addendum (dated 21/09/2022) explores the water resource challenges (including water neutrality). However, the applicant needs to assess the potential risks to waterbodies from potable water demand both individually and in combination with other developments requiring water within the Cambridge Water resource zone. It should then identify mitigation measures to prevent the risk of ecological deterioration from water demands. This should consider development

phasing, water efficiency, water re-use and water offsetting. The assessment should be informed by the draft WRMP24 We can advise further on the scope of assessment required.

Advice to local planning authority

We advise the Local Planning Authority should work with the water company to establish water available for growth based on the draft WRMP24 and reflecting required caps to abstraction licences, and to establish the timeline for and the timing for sustainable alternative water supplies to be in place (for example bulk water transfer or a new reservoir). It will then be possible for the local planning authority to determine how much housing is planned up to the point in time that sustainable water supplies will be in place, and understand how much mitigation (e.g., using efficiency and re-use) is needed to avoid levels of water abstraction that will trigger risk of deterioration.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me.

Yours sincerely

Keira Murphy
Planning Specialist

Direct dial 0203 025 5560
E-mail planning.EastAnglia@environment-agency.gov.uk

Appendix B Development Masterplan & Parameters Plan

KEY

- Application Site Boundary
- Proposed Buildings

rev no	date	issue description	drawn / checked
-	27.05.22	Planning Submission	TS / LH

revisions

notes

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project	CAMBRIDGE NORTH
number	239
drawing title	ILLUSTRATIVE MASTERPLAN ROOF
scale	1:1250
format	A1
status	PLANNING APPLICATION
date	27 MAY 2022
drawn by	TS
checked by	LH
drawing no	239-ACME-PLA-S00-0012
rev no	-

KEY

- Application Site Boundary
- Train Station
- Hotel
- Office / Laboratory
- General Retail
- F&B
- External Cycle Parking
- Internal Cycle Parking
- Plant
- 1 Bedroom Apartment
- 2 Bedrooms Apartment
- 3 Bedrooms Apartment
- Residential Amenities

rev no	date	issue description	drawn	checked
-	27.05.22	Planning Submission	TS	LH

revisions

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project: CAMBRIDGE NORTH

number: 239

drawing title: ILLUSTRATIVE MASTERPLAN GROUND FLOOR

scale: 1:1250 format: A1

status: PLANNING APPLICATION

date: 27 MAY 2022

drawn by: TS checked by: LH

drawing no: 239-ACME-PLA-S00-0013 rev no: -

KEY

- Application Site Boundary
- Train Station
- Hotel
- Office / Laboratory
- 1 Bedroom Apartment
- 2 Bedrooms Apartment
- 3 Bedrooms Apartment

rev no	date	issue description	drawn	checked
-	27.05.22	Planning Submission	TS	LH

revisions

notes

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project: CAMBRIDGE NORTH

number: 239

drawing title: ILLUSTRATIVE MASTERPLAN TYPICAL FLOOR

scale: 1:1250 format: A1

status: PLANNING APPLICATION

date: 27 MAY 2022

drawn by: TS checked by: LH

drawing no: 239-ACME-PLA-S00-0014 rev no: -

KEY

- Hybrid Application Site Boundary
- Activated ground floor frontages
- Development Area S5
  Car park & Mobility services, Commercial, Business & Service, Local Community & Learning (Use Class E, Use Class F, Sui Generis)
- Development Areas S4, 6,7,8 & 9
  Commercial, Business and Service, Local Community and Learning (Use Class E, Use Class F)
- Development Areas S11-S21
  Residential, Commercial, Business & Service, Local Community & Learning (Use Class C3, Use Class E, Use Class F)
- Development Areas: S13, S16
  (Use Class E or F)
- Development Areas: S5
  (Use Class E)
- Public realm/public open space and highways
- Building projections

rev no	date	issue description	drawn / checked
A	12.10.22	Planning Application	LLZ / LH
-	27.05.22	Planning Application	KZ / LH

revisions

notes

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project	CAMBRIDGE NORTH
number	239
drawing title	PARAMETER PLAN 07 PROPOSED USES - GROUND FL
scale	1:1250
format	A1
status	PLANNING APPLICATION
date	27 MAY 2022
drawn by	KZ
checked by	LH
drawing no	239-ACME-PLA-S01-0107
rev no	A

Appendix C Residential Build Schedule

239-Cambridge North Residential Quarter (S11-S21)

DATE 04.04.2023

Tyical Unit Types Water Fittings

Water Fittings	ST.2P	1B.2P	2B.4P	3B.6P	TOTAL
WC's	1	1	2	2	**717**
Showers	0	0	0	0	**0**
Baths	1	1	2	2	**717**
Basin Taps	1	1	2	2	**717**
Kitchen Sink Taps	1	1	1	1	**453**
Dishwasher	1	1	1	1	**453**
Washing Machine and Washer Dryers	1	1	1	1	**453**
Additional Tap On Balcony for Planters	*1*	*1*	*1*	*1*	*453*

S13 (Affordable / Shared)

Water Fittings	ST.2P	1B.2P	2B.4P	3B.6P	TOTAL
No. Of Units	**5**	**28**	**26**	**2**	**61**
WC's	5	28	56	56	***145***
Showers	0	0	0	0	***0***
Baths	5	28	56	56	***145***
Basin Taps	5	28	56	56	***145***
Kitchen Sink Taps	5	28	28	28	***89***
Dishwasher	5	28	28	28	***89***
Washing Machine and Washer Dryers	5	28	28	28	***89***
Additional Tap On Balcony for Planters	*5*	*28*	*28*	*28*	*89*

S14-16 (Private)

Water Fittings	ST.2P	1B.2P	2B.4P	3B.6P	TOTAL
No. Of Units	**0**	**29**	**53**	**12**	**94**
WC's	0	29	106	24	***159***
Showers	0	0	0	0	***0***
Baths	0	29	106	24	***159***
Basin Taps	0	29	106	24	***159***
Kitchen Sink Taps	0	29	53	12	***94***
Dishwasher	0	29	53	12	***94***
Washing Machine and Washer Dryers	0	29	53	12	***94***
Additional Tap On Balcony for Planters	0	29	53	12	***94***

S11-12, S17-21 (Build to Rent)

Water Fittings	ST.2P	1B.2P	2B.4P	3B.6P	TOTAL
No. Of Units	**7**	**120**	**134**	**9**	**270**
WC's	7	120	268	18	**413**
Showers	0	0	0	0	**0**
Baths	7	120	268	18	**413**
Basin Taps	7	120	268	18	**413**
Kitchen Sink Taps	7	120	134	9	**270**
Dishwasher	7	120	134	9	**270**
Washing Machine and Washer Dryers	7	120	134	9	**270**
Additional Tap On Balcony for Planters	7	120	134	9	270

TOTAL No. Of Apartment Units		**425**

* All numbers are indicative only as the Residential Quarter, S8 and S9 are part of the Outline Planning

Appendix D Commercial Build Schedule

CAMBRIDGE NORTH SOUTHERN PLOT
COMMERCIAL BUILDINGS AREA SCHEDULE

acme
310323 – **REV A**

Level		S05 – Mobility Hub								S08 (Outline Planning)								S09 (Outline Planning)									
		GEA		GIA		NIA (Parking)		NIA (Retail)		GEA		GIA		NIA (Office)		NIA (Retail)		GEA		GIA		NIA (Lab)		NIA (Office)		NIA (Retail)	
		m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²
Above Ground Only	05	-	-	-	-	-	-	-	-	63	678	50	538	-	-	-	-	133	1,432	114	1,227	-	-	-	-	-	-
	04	3,510	37,781	3,480	37,458	3,340	35,951	-	-	2,310	24,865	2,195	23,627	1,856	19,978	-	-	3,910	42,087	3,740	40,257	1,956	21,054	1,304	14,036	-	-
	03	3,510	37,781	3,480	37,458	3,340	35,951	-	-	2,310	24,865	2,195	23,627	1,856	19,978	-	-	3,910	42,087	3,740	40,257	1,956	21,054	1,304	14,036	-	-
	02	3,510	37,781	3,480	37,458	3,340	35,951	-	-	2,310	24,865	2,195	23,627	1,856	19,978	-	-	3,910	42,087	3,740	40,257	1,956	21,054	1,304	14,036	-	-
	01	3,510	37,781	3,480	37,458	3,340	35,951	-	-	2,310	24,865	2,195	23,627	1,856	19,978	-	-	3,910	42,087	3,740	40,257	1,956	21,054	1,304	14,036	-	-
	GF	3,510	37,781	3,447	37,103	3,084	33,196	207	2,228	2,122	22,841	2,008	21,614	327	3,520	790	8,503	3,910	42,087	3,740	40,257	-	-	1,684	18,126	575	6,189
	Total	**17,550**	**188,906**	**17,367**	**186,937**	**16,444**	**177,002**	**207**	**2,228**	**11,425**	**122,978**	**10,838**	**116,659**	**7,751**	**83,431**	**790**	**8,503**	**19,683**	**211,866**	**18,814**	**202,512**	**7,824**	**84,217**	**6,900**	**74,271**	**575**	**6,189**
Incl. Basement	B1	3,423	36,845	3,217	34,627	3,094	33,304	-	-	2,328	25,058	2,218	23,874	-	-	-	-	5,450	58,663	5,285	56,887	-	-	-	-	-	-
	Total	**20,973**	**225,751**	**20,584**	**221,564**	**19,538**	**210,305**	**207**	**2,228**	**13,753**	**148,036**	**13,056**	**140,533**	**7,751**	**83,431**	**790**	**8,503**	**25,133**	**270,529**	**24,099**	**259,399**	**7,824**	**84,217**	**6,900**	**74,271**	**575**	**6,189**
Typical Floor Efficiency				**-**								**85%**										**87%**					
Overall Floor Efficiency				**-**								**79%**										**81%**					

Appendix E Baseline BREEAM WAT01 Calculator Outputs

S4 - BREEAM Wat 01 calculation (BREEAM base flow rates) - With Greywater harvesting

BREEAM 2018/Version 6 Wat 01 Water consumption: Water efficiency calculator for new 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	TCP Classification B1: Offices and workshop business (including those with a basic (category 1) laboratory area)	1191.252	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	10732
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: the activity areas defined opposite are used to estimate the assessed building's default occupancy and therefore water consumption benchmark. These areas are chosen as they are deemed, by in large, to represent the permanently occupied spaces in the building and therefore reflect the number of building occupants/users. As a result it is not necessary to include all areas of the building that may be present, as the areas not defined are assumed to be used by the occupants of the building already accounted for by those areas that are listed.

Note: Only select this activity if there is a permanently staffed kitchen that will prepare hot and cold meals for the building's staff (and visitors). Enter the area of the seated dining area only (not kitchen/servery areas), this is used to estimate the number of covers per day for the restaurant and subsequently the number of kitchen staff and water consumption from food preparation activity area.

Water consumption - building microcomponent

WC component - all activity areas	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
WC - male (urinals installed)	Effective flush volume (Litres)	6.00	1.00	1.00	3.00
WC - female	Effective flush volume (Litres)	6.00	4.00	1.00	12.00

Note: Where the WC facilities are non-gender specific, please still enter the WC specification against both WC male and WC female categories i.e. if there are two WCs with a 6 litre effective flush, then enter 6 litres against both male and female categories. The calculation will not double count water consumption in this instance as the consumption figure calculated for each WC component is adjusted by the ratio of male to female users for this building type.

Urinal component - all activity areas	units	Specification	No. of cisterns	Flushing frequency (flushes/hour)	Consumption (L/person/day)
Automatically operated flushing cistern	Cistern capacity (Litres)	7.50	20.00	6.00	7.56
	No. of urinal bowls	20.00			
	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
Manual/automatic operated pressure flushing valve (all activity areas)	Flush volume (litres)		3.00	1.00	0.00
	No. of urinal bowls	0.00			
	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
Waterless urinals (all activity areas)	Flush volume (litres)	Waterless urinals - not specified	3.00	1.00	0.00
	No. of urinal bowls				

Note: This consumption total accounts for the ratio of male users for this building type i.e. the ratio of building users who will operate the flush. Where more than one type of urinal flushing control is specified in the building, this consumption figure is adjusted by a ratio of use. the ratio is determined according to the proportion of urinals bowls in the building operated using this type of control.

	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)	10.00	4.00	0.25	6.77
Shower use	Flow rate (litres/min)	12.00	0.030	5.60	2.02
Fixed use - vessel filling	Litres/person/day	-	-	-	1.58
Tap components (cleaning) - staff kitchenette					
Kitchen taps - kitchenette	Flow rate (litres/min)	10.00	1.00	0.67	4.54
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	37.46

Note: This total includes the contributions from fixed uses, including where applicable vessel filling, kitchen cleaning and food preparation. Default fixed use totals are included with the calculations to provide a more accurate reflection of the buildings total water consumption. The fixed use totals are not however included in the water consumption total used to determine the assessed buildings percentage improvement and the number of BREEAM credits achieved. The percentage improvement is based only on the consumption of water from uses that can be heavily influenced by the microcomponent specification e.g. WC flushing.

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	Yes

Greywater source (building components)	Greywater collected	Proportion of components collected from (%)	Greywater yield (L/person/day)
Wash hand basin taps	Yes	100%	6.77
Showers	Yes	100%	2.02
Kitchen taps - kitchenette	No		
Dishwasher - staff kitchenette	No		
>			
>			

Greywater source (other component(s))	Typical greywater yield (litres)	Frequency of yield (days)	Greywater yield (litres/day)	Greywater yield (L/person/day)
Other source of greywater				0.00

Note: If greywater is collected from a component/source not accounted for above i.e. their consumption is not estimated, then the amount of greywater collected can be added here so that it may be accounted for. This can include wastewater from active hygiene flushing, i.e. a regular hygiene flushing programme to minimize poor water quality in a potable cold or hot water system.

	Greywater yield (L/person/day)
Total	8.79

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	8.79

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%	15.00
Urinal flushing	Yes	100%	7.56
		Total	Demand met by yield (L/person/day)
			8.79

Other permissible components

>	Are there other permissible components present which demand greywater and/or rainwater yield?	Please select
		Maximum permissible demand (L/day)
	Proportion of maximum permissible demand utilised by other permissible components (%)	
		Demand met by yield (L/person/day)
	Total	

	Greywater and/or rainwater demand met by yield (L/person/day)
Total	8.79

Water consumption calculation results

	Litres/person/day	m^3/person/yr
Water consumption - modelled baseline performance benchmark (excludes fixed uses)	**29.58**	**7.48**
Microcomponent water consumption - modelled performance (excludes fixed uses)	**35.88**	**9.08**
Modelled water demand met via greywater and rainwater sources	**8.79**	**2.22**
If greywater/rainwater systems specified has the minimum % efficiency improvement for component specifications been met	**FALSE**	
Net modelled water consumption (excludes fixed uses)	**37.75**	**9.55**
Percentage improvement	**0.00%**	
Total Wat 01 BREEAM credits achieved	**0 credits**	
Total Wat 01 BREEAM Exemplary credits achieved	**Exemplary level not achieved**	
Key performance indicator - use of freshwater resource (includes fixed uses)	**28.67**	**7.25**

Building S5 - BREEAM Wat 01 calculation (BREEAM base flow rates) - With Greywater harvesting

BREEAM 2018/Version 6 Wat 01 Water consumption: Water efficiency calculator for new retail buildings

BREEAM UK
Delivered by bre

Building type	Description of building type	Default annual days/operation	Default daily hours of operation
Retail - Shop / retail unit(s) / retail warehouse	TCP Classification A1 Shops: shop/retail unit(s)/retail warehouse(s).	362	8.5
	Does the retail development contain sanitary facilities for use by visiting customers?		Yes
		Default daily occupancy visiting customers	563
		Default daily occupancy staff	10

Note: If this retail development contains one of or a combination of restaurants/cafes (for customer use), gym or cinema then please ensure you undertake separate water consumption calculations for such building functions using the appropriate building type calculator. You must then determine the number of BREEAM credits achieved for the development as a whole in accordance with the guidance given in the compliance note: "Building is a mixture of different types", contained within the Wat 01 issue in the BREEAM New Construction technical guide.

Main building activity areas	Description of activity area	Activity area present in building?	Net Floor Area (m^2)
Retail - sales areas for display of bulky items	A retail sales/display area trading predominantly in bulky items, e.g. furniture, floor coverings, cycles, prams, large domestic appliances or other bulky goods, or trading on a wholesale self-selection basis.	No	
Retail - sales areas for display of non bulky items and/or customer service area.	A general sales/display areas in department stores, supermarkets, shops and/or customer service waiting and/or collection areas e.g. in banks, post office, bookmakers etc.	Yes	165.6
Retail - concourse/shopping mall	The central (shared) area within a shopping centre used for access by shoppers (typically a covered area containing one or more of benches, cafes, escalators etc.)	No	
Retail - Staff office area and staffroom	Staff office space and staffroom, often located in 'back of house' areas.	No	
Retail - Staff canteen dining area	Seated areas in a staff canteen that accompany a food preparation areas where food and drink is consumed by staff on the premises.	No	
Retail - Goods-in and storage area	Internal areas for receiving and storing goods.	Yes	41.4
Retail - Workshop	A workshop / vehicle servicing area within a car showroom or general workshop in other type of retail development.	No	

Note: the activity areas defined opposite are used to estimate the assessed building's default occupancy and therefore water consumption benchmark. These areas are chosen as they are deemed, by in large, to represent the permanently occupied spaces in the building and therefore reflect the number of building occupants/users. As a result it is not necessary to include all areas of the building that may be present, as the areas not defined are assumed to be used by the occupants of the building already accounted for by those areas that are listed.

Note: Only select this activity if there is a permanently staffed kitchen that will prepare hot and cold meals for the building's staff. Enter the area of the seated dining area only (not kitchen/servery areas), this is used to estimate the number of covers per day and subsequently the default number of kitchen staff and water consumption from food preparation activity area.

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	0.86	1.00	1.81
WC - female	Effective flush volume (Litres)	6.00	0.86	1.00	3.33

Note: Where the WC facilities are non-gender specific, please still enter the WC specification against both WC male and WC female categories i.e. if there are two WCs with a 6 litre effective flush, then enter 6 litres against both male and female categories. The calculation will not double count water consumption in this instance as the consumption figure calculated for each WC component is adjusted by the ratio of male to female users for this building type.

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		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)	10.00	0.86	0.25	Requires building information
Shower use	Flow rate (litres/min)		0.001	5.60	0.03
Fixed use - vessel filling	Litres/person/day	-	-	-	0.03
Tap components (cleaning) - staff kitchenette					
Tap components (cleaning and food preparation) - staff canteen food preparation area					

	Microcomponent Consumption (L/person/day)
Total	5.20

Note: This total includes the contributions from fixed uses, including where applicable vessel filling, kitchen cleaning and food preparation. Default fixed use totals are included with the calculations to provide a more accurate reflection of the buildings total water consumption. The fixed use totals are not however included in the water consumption total used to determine the assessed buildings percentage improvement and the number of BREEAM credits achieved. The percentage improvement is based only on the consumption of water from uses that can be heavily influenced by the microcomponent specification e.g. WC flushing.

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	Yes

Greywater source (building components)	Greywater collected	Proportion of components collected from (%)	Greywater yield (L/person/day)
Wash hand basin taps	Yes	100%	Requires building information
Showers	No		
Bath			0.00
Washing machine			0.00

Greywater source (other components)	Tyscical greywater yield (litres)	Frequency of yield (days)	Greywater yield (litres/day)	Greywater yield (L/person/day)
Other source of greywater				0.00

	Greywater yield (L/person/day)
Total	0.00

Note: If greywater is collected from a component/source not accounted for above i.e. their consumption is not estimated, then the amount of greywater collected can be added here so that it may be accounted for. This can include wastewater from active hygiene flushing, i.e. a regular hygiene flushing programme to minimize poor water quality in a

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	0.00

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%	5.14

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

Other permissible components

> Are there other permissible components present which demand greywater and/or rainwater yield? — Please select

Maximum permissible demand (L/day)

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

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

	Greywater and/or rainwater demand met by yield (L/person/day)
Total	0.00

Water consumption calculation results

	Litres/person/day	m^3/person/yr
Water consumption - modelled baseline performance benchmark (excludes fixed uses)	Requires building information	Requires building information
Microcomponent water consumption - modelled performance (excludes fixed uses)	5.17	1.87
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	Requires building information	
Net modelled water consumption (excludes fixed uses)	Requires building information	Requires building information
Percentage improvement	Requires building information	
Total Wat 01 BREEAM credits achieved	Requires building information	
Total Wat 01 BREEAM Exemplary credits achieved	Requires building information	
Key performance indicator - use of freshwater resource (includes fixed uses)	5.20	1.88

Building S6 - BREEAM Wat 01 calculation (BREEAM base flow rates) - With Greywater harvesting

BREEAM 2018/Version 6 Wat 01 Water consumption: Water efficiency calculator for new 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	TCP Classification B1: Offices and workshop business (including those with a basic (category 1) laboratory area)	655.367	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	3077
Office - Small workshop / laboratory space	Small scale workshop or category 1 laboratory area	Yes	4615
> 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.)	Please select	
> 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.	Please select	

Note: the activity areas defined opposite are used to estimate the assessed building's default occupancy and therefore water consumption benchmark. These areas are chosen as they are deemed, by in large, to represent the permanently occupied spaces in the building and therefore reflect the number of building occupants/users. As a result it is not necessary to include all areas of the building that may be present, as the areas not defined are assumed to be used by the occupants of the building already accounted for by those areas that are listed.

Note: Only select this activity if there is a permanently staffed kitchen that will prepare hot and cold meals for the building's staff (and visitors). Enter the area of the seated dining area only (not kitchen/servery areas), this is used to estimate the number of covers per day for the restaurant and subsequently the number of kitchen staff and water consumption from food preparation activity area.

Water consumption - building microcomponent

WC component - all activity areas	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
WC - male (urinals installed)	Effective flush volume (Litres)	6.00	1.00	1.00	3.00
WC - female	Effective flush volume (Litres)	6.00	4.00	1.00	12.00

Note: Where the WC facilities are non-gender specific, please still enter the WC specification against both WC male and WC female categories i.e. if there are two WCs with a 6 litre effective flush, then enter 6 litres against both male and female categories. The calculation will not double count water consumption in this instance as the consumption figure calculated for each WC component is adjusted by the ratio of male to female users for this building type.

Urinal component - all activity areas	units	Specification	No. of cisterns	Flushing frequency (flushes/hour)	Consumption (L/person/day)
Automatically operated flushing cistern	Cistern capacity (Litres)	7.50	20.00	1.00	2.29
	No. of urinal bowls	20.00			
	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
Manual/automatic operated pressure flushing valve (all activity areas)	Flush volume (litres)		3.00	1.00	0.00
	No. of urinal bowls	0.00			
	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
Waterless urinals (all activity areas)	Flush volume (litres)	Waterless urinals - not specified	3.00	1.00	0.00
	No. of urinal bowls				

Note: This consumption total accounts for the ratio of male users for this building type i.e. the ratio of building users who will operate the flush. Where more than one type of urinal flushing control is specified in the building, this consumption figure is adjusted by a ratio of use. the ratio is determined according to the proportion of urinals bowls in the building operated using this type of control.

	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)	10.00	4.00	0.25	6.77
Shower use	Flow rate (litres/min)	12.00	0.154	5.60	10.35
Fixed use - vessel filling	Litres/person/day	-	-	-	1.58
Tap components (cleaning) - staff kitchenette					
Kitchen taps - kitchenette	Flow rate (litres/min)	10.00	1.00	0.67	4.54
Dishwasher	Litres/cycle		0.04	1.00	0.00
Tap components (cleaning and food preparation) - staff canteen food preparation area					
Kitchen taps - pre-rinse nozzle	Flow rate (litres/min)		-	60.00	0.00
Dishwasher	Litres/rack	8.00	-	0.217	0.00
Waste disposal unit	Flow rate (litres/min)		-	30.00	0.00
Fixed use - food preparation	Litres/person/day	-	-	-	0.00
Fixed use - kitchen cleaning	Litres/person/day	-	-	-	0.00

	Microcomponent consumption (L/person/day)
Total	40.52

Note: This total includes the contributions from fixed uses, including where applicable vessel filling, kitchen cleaning and food preparation. Default fixed use totals are included with the calculations to provide a more accurate reflection of the buildings total water consumption. The fixed use totals are not however included in the water consumption total used to determine the assessed buildings percentage improvement and the number of BREEAM credits achieved. The percentage improvement is based only on the consumption of water from uses that can be heavily influenced by the microcomponent specification e.g. WC flushing.

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	Yes

Greywater source (building components)	Greywater collected	Proportion of components collected from (%)	Greywater yield (L/person/day)
Wash hand basin taps	Yes	30%	2.03
Showers	Yes	100%	10.35
Kitchen taps - kitchenette	No		
Dishwasher - staff kitchenette	No		
Kitchen taps - pre-rinse nozzle	No		
Dishwasher - food preparation area	No		

Greywater source (other components)	Typical greywater yield (litres)	Frequency of yield (days)	Greywater yield (litres/day)	Greywater yield (L/person/day)
Other source of greywater				0.00

	Greywater yield (L/person/day)
Total	12.38

Note: If greywater is collected from a component/source not accounted for above i.e. their consumption is not estimated, then the amount of greywater collected can be added here so that it may be accounted for. This can include wastewater from active hygiene flushing, i.e. a regular hygiene flushing programme to minimize poor water quality in a potable cold or hot water system.

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	12.38

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%	15.00
Urinal flushing	Yes	100%	2.29

	Demand met by yield (L/person/day)
Total	12.38

Other permissible components

Are there other permissible components present which demand greywater and/or rainwater yield?	No
	Maximum permissible demand (L/day)
	0
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	12.38

Water consumption calculation results

	Litres/person/day	m^3/person/yr
Water consumption - modelled baseline performance benchmark (excludes fixed uses)	**38.94**	**9.85**
Microcomponent water consumption - modelled performance (excludes fixed uses)	**38.94**	**9.85**
Modelled water demand met via greywater and rainwater sources	**12.38**	**3.13**
If greywater/rainwater systems specified has the minimum % efficiency improvement for component specifications been met	**Not applicable**	
Net modelled water consumption (excludes fixed uses)	**38.94**	**9.85**
Percentage improvement	**31.78%**	
Total Wat 01 BREEAM credits achieved	**2 credits**	
Total Wat 01 BREEAM Exemplary credits achieved	**Exemplary level not achieved**	
Key performance indicator - use of freshwater resource (includes fixed uses)	**28.14**	**7.12**

Building S7 - BREEAM Wat 01 calculation (BREEAM base flow rates) - With Greywater harvesting

BREEAM 2018/Version 6 Wat 01 Water consumption: Water efficiency calculator for new 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	TCP Classification B1: Offices and workshop business (including those with a basic (category 1) laboratory area)	680.39	253	10

Main building activity areas	Description of activity area	Activity area present in building?	Net Floor Area (m²)
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	3194
Office - Small workshop / laboratory space	Small scale workshop or category 1 laboratory area	Yes	4792
> 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.)	Please select	
> 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.	Please select	

Note: the activity areas defined opposite are used to estimate the assessed building's default occupancy and therefore water consumption benchmark. These areas are chosen as they are deemed, by in large, to represent the permanently occupied spaces in the building and therefore reflect the number of building occupants/users. As a result it is not necessary to include all areas of the building that may be present, as the areas not defined are assumed to be used by the occupants of the building already accounted for by those areas that are listed.

Note: Only select this activity if there is a permanently staffed kitchen that will prepare hot and cold meals for the building's staff (and visitors). Enter the area of the seated dining area only (not kitchen/servery areas), this is used to estimate the number of covers per day for the restaurant and subsequently the number of kitchen staff and water consumption from food preparation activity area.

Water consumption - building microcomponent

WC component - all activity areas	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
WC - male (urinals installed)	Effective flush volume (Litres)	6.00	1.00	1.00	3.00
WC - female	Effective flush volume (Litres)	6.00	4.00	1.00	12.00

Note: Where the WC facilities are non-gender specific, please still enter the WC specification against both WC male and WC female categories i.e. if there are two WCs with a 6 litre effective flush, then enter 6 litres against both male and female categories. The calculation will not double count water consumption in this instance as the consumption figure calculated for each WC component is adjusted by the ratio of male to female users for this building type.

Urinal component - all activity areas	units	Specification	No. of cisterns	Flushing frequency (flushes/hour)	Consumption (L/person/day)
Automatically operated flushing cistern	Cistern capacity (Litres)	7.50	20.00	1.00	2.20
	No. of urinal bowls	20.00			
	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
Manual/automatic operated pressure flushing valve (all activity areas)	Flush volume (litres)		3.00	1.00	0.00
	No. of urinal bowls	0.00			
	units	Specification	Usage/person/day	Usage factor	Consumption (L/person/day)
Waterless urinals (all activity areas)	Flush volume (litres)	Waterless urinals - not specified	3.00	1.00	0.00
	No. of urinal bowls				

Note: This consumption total accounts for the ratio of male users for this building type i.e. the ratio of building users who will operate the flush. Where more than one type of urinal flushing control is specified in the building, this consumption figure is adjusted by a ratio of use. the ratio is determined according to the proportion of urinals bowls in the building operated using this type of control.

	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)	10.00	4.00	0.25	6.77
Shower use	Flow rate (litres/min)	12.00	0.154	5.60	10.35
Fixed use - vessel filling	Litres/person/day	-	-	-	1.58
Tap components (cleaning) - staff kitchenette					
Kitchen taps - kitchenette	Flow rate (litres/min)	10.00	1.00	0.67	4.54
Dishwasher	Litres/cycle		0.04	1.00	0.00
Tap components (cleaning and food preparation) - staff canteen food preparation area					
Kitchen taps - pre-rinse nozzle	Flow rate (litres/min)		-	60.00	0.00
Dishwasher	Litres/rack	8.00	-	0.217	0.00
Waste disposal unit	Flow rate (litres/min)		-	30.00	0.00
Fixed use - food preparation	Litres/person/day	-	-	-	0.00
Fixed use - kitchen cleaning	Litres/person/day	-	-	-	0.00

	Microcomponent consumption (L/person/day)
Total	40.44

Note: This total includes the contributions from fixed uses, including where applicable vessel filling, kitchen cleaning and food preparation. Default fixed use totals are included with the calculations to provide a more accurate reflection of the buildings total water consumption. The fixed use totals are not however included in the water consumption total used to determine the assessed buildings percentage improvement and the number of BREEAM credits achieved. The percentage improvement is based only on the consumption of water from uses that can be heavily influenced by the microcomponent specification e.g. WC flushing.

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	Yes

Greywater source (building components)	Greywater collected	Proportion of components collected from (%)	Greywater yield (L/person/day)
Wash hand basin taps	Yes	28%	1.90
Showers	Yes	100%	10.35
Kitchen taps - kitchenette	No		
Dishwasher - staff kitchenette	No		
Kitchen taps - pre-rinse nozzle	No		
Dishwasher - food preparation area	No		

Greywater source (other components)	Typical greywater yield (litres)	Frequency of yield (days)	Greywater yield (litres/day)	Greywater yield (L/person/day)
Other source of greywater				0.00

	Greywater yield (L/person/day)
Total	12.24

Note: If greywater is collected from a component/source not accounted for above i.e. their consumption is not estimated, then the amount of greywater collected can be added here so that it may be accounted for. This can include wastewater from active hygiene flushing, i.e. a regular hygiene flushing programme to minimize poor water quality in a potable cold or hot water system.

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	12.24

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%	15.00
Urinal flushing	Yes	100%	2.20
			Demand met by yield (L/person/day)
		Total	12.24

Other permissible components

Are there other permissible components present which demand greywater and/or rainwater yield?	No
	Maximum permissible demand (L/day)
	0
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	12.24

Water consumption calculation results

	Litres/person/day	m³/person/yr
Water consumption - modelled baseline performance benchmark (excludes fixed uses)	**38.86**	**9.83**
Microcomponent water consumption - modelled performance (excludes fixed uses)	**38.86**	**9.83**
Modelled water demand met via greywater and rainwater sources	**12.24**	**3.10**
If greywater/rainwater systems specified has the minimum % efficiency improvement for component specifications been met	**Not applicable**	
Net modelled water consumption (excludes fixed uses)	**38.86**	**9.83**
Percentage improvement	**31.50%**	
Total Wat 01 BREEAM credits achieved	**2 credits**	
Total Wat 01 BREEAM Exemplary credits achieved	**Exemplary level not achieved**	
Key performance indicator - use of freshwater resource (includes fixed uses)	**28.19**	**7.13**

Building S8 - BREEAM Wat 01 calculation (BREEAM base flow rates) - With Greywater harvesting

BREEAM 2018/Version 6 Wat 01 Water consumption: Water efficiency calculator for new 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	TCP Classification B1: Offices and workshop business (including those with a basic (category 1) laboratory area)	955.044	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	8604
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: the activity areas defined opposite are used to estimate the assessed building's default occupancy and therefore water consumption benchmark. These areas are chosen as they are deemed, by in large, to represent the permanently occupied spaces in the building and therefore reflect the number of building occupants/users. As a result it is not necessary to include all areas of the building that may be present, as the areas not defined are assumed to be used by the occupants of the building already accounted for by those areas that are listed.

Note: Only select this activity if there is a permanently staffed kitchen that will prepare hot and cold meals for the building's staff (and visitors). Enter the area of the seated dining area only (not kitchen/servery areas), this is used to estimate the number of covers per day for the restaurant and subsequently the number of kitchen staff and water consumption from food preparation activity area.

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: Where the WC facilities are non-gender specific, please still enter the WC specification against both WC male and WC female categories i.e. if there are two WCs with a 6 litre effective flush, then enter 6 litres against both male and female categories. The calculation will not double count water consumption in this instance as the consumption figure calculated for each WC component is adjusted by the ratio of male to female users for this building type.

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)	10.00	4.00	0.25	6.77
Shower use	Flow rate (litres/min)	12.00	0.030	5.60	2.02
Fixed use - vessel filling	Litres/person/day	-	-	-	1.58
Tap components (cleaning) - staff kitchenette					
Kitchen taps - kitchenette	Flow rate (litres/min)		1.00	0.67	0.00
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	34.37

Note: This total includes the contributions from fixed uses, including where applicable vessel filling, kitchen cleaning and food preparation. Default fixed use totals are included with the calculations to provide a more accurate reflection of the buildings total water consumption. The fixed use totals are not however included in the water consumption total used to determine the assessed buildings percentage improvement and the number of BREEAM credits achieved. The percentage improvement is based only on the consumption of water from uses that can be heavily influenced by the microcomponent specification e.g. WC flushing.

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	Yes

Greywater source (building components)	Greywater collected	Proportion of components collected from (%)	Greywater yield (L/person/day)
Wash hand basin taps	Yes	100%	6.77
Showers	Yes	100%	2.02
Kitchen taps - kitchenette	No		
Dishwasher - staff kitchenette	No		

vv

Greywater source (other components)	Typical greywater yield (litres)	Frequency of yield (days)	Greywater yield (litres/day)	Greywater yield (L/person/day)
Other source of greywater				0.00

	Greywater yield (L/person/day)
Total	8.79

Note: If greywater is collected from a component/source not accounted for above i.e. their consumption is not estimated, then the amount of greywater collected can be added here so that it may be accounted for. This can include wastewater from active hygiene flushing, i.e. a regular hygiene flushing programme to minimize poor water quality in a potable cold or hot water system.

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	8.79

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%	24.00

	Demand met by yield (L/person/day)
Total	8.79

Other permissible components

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

	Maximum permissible demand (L/day)
	0

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	8.79

Water consumption calculation results

	Litres/person/day	m^3/person/yr
Water consumption - modelled baseline performance benchmark (excludes fixed uses)	**32.79**	**8.29**
Microcomponent water consumption - modelled performance (excludes fixed uses)	**32.79**	**8.29**
Modelled water demand met via greywater and rainwater sources	**8.79**	**2.22**
If greywater/rainwater systems specified has the minimum % efficiency improvement for component specifications been met	**Not applicable**	
Net modelled water consumption (excludes fixed uses)	**32.79**	**8.29**
Percentage improvement	**26.79%**	
Total Wat 01 BREEAM credits achieved	**2 credits**	
Total Wat 01 BREEAM Exemplary credits achieved	**Exemplary level not achieved**	
Key performance indicator - use of freshwater resource (includes fixed uses)	**25.58**	**6.47**

Building S9 - BREEAM Wat 01 calculation (BREEAM base flow rates) - With Greywater harvesting

BREEAM 2018/Version 6 Wat 01 Water consumption: Water efficiency calculator for new 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	TCP Classification B1: Offices and workshop business (including those with a basic (category 1) laboratory area)	1303.56	253	10

Main building activity areas	Description of activity area	Activity area present in building?	Net Floor Area (m²)
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	6120
Office - Small workshop / laboratory space	Small scale workshop or category 1 laboratory area	Yes	9180
> 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.)	Please select	
> 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.	Please select	

Note: the activity areas defined opposite are used to estimate the assessed building's default occupancy and therefore water consumption benchmark. These areas are chosen as they are deemed, by in large, to represent the permanently occupied spaces in the building and therefore reflect the number of building occupants/users. As a result it is not necessary to include all areas of the building that may be present, as the areas not defined are assumed to be used by the occupants of the building already accounted for by those areas that are listed.

Note: Only select this activity if there is a permanently staffed kitchen that will prepare hot and cold meals for the building's staff (and visitors). Enter the area of the seated dining area only (not kitchen/servery areas), this is used to estimate the number of covers per day for the restaurant and subsequently the number of kitchen staff and water consumption from food preparation activity area.

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: Where the WC facilities are non-gender specific, please still enter the WC specification against both WC male and WC female categories i.e. if there are two WCs with a 6 litre effective flush, then enter 6 litres against both male and female categories. The calculation will not double count water consumption in this instance as the consumption figure calculated for each WC component is adjusted by the ratio of male to female users for this building type.

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)	10.00	4.00	0.25	6.77
Shower use	Flow rate (litres/min)	12.00	0.154	5.60	10.35
Fixed use - vessel filling	Litres/person/day	-	-	-	1.58
Tap components (cleaning) - staff kitchenette					
Kitchen taps - kitchenette	Flow rate (litres/min)		1.00	0.67	0.00
Dishwasher	Litres/cycle		0.04	1.00	0.00
Tap components (cleaning and food preparation) - staff canteen food preparation area					
Kitchen taps - pre-rinse nozzle	Flow rate (litres/min)	10.30	-	60.00	0.47
Dishwasher	Litres/rack	8.00	-	0.217	0.00
Waste disposal unit	Flow rate (litres/min)		-	30.00	0.00
Fixed use - food preparation	Litres/person/day	-	-	-	0.00
Fixed use - kitchen cleaning	Litres/person/day	-	-	-	0.00

	Microcomponent consumption (L/person/day)
Total	43.17

Note: This total includes the contributions from fixed uses, including where applicable vessel filling, kitchen cleaning and food preparation. Default fixed use totals are included with the calculations to provide a more accurate reflection of the buildings total water consumption. The fixed use totals are not however included in the water consumption total used to determine the assessed buildings percentage improvement and the number of BREEAM credits achieved. The percentage improvement is based only on the consumption of water from uses that can be heavily influenced by the microcomponent specification e.g. WC flushing.

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	Yes

Greywater source (building components)	Greywater collected	Proportion of components collected from (%)	Greywater yield (L/person/day)
Wash hand basin taps	Yes	28%	1.90
Showers	Yes	100%	10.35
Kitchen taps - kitchenette	No		
Dishwasher - staff kitchenette	No		
Kitchen taps - pre-rinse nozzle	No		
Dishwasher - food preparation area	No		

Greywater source (other components)	Typical greywater yield (litres)	Frequency of yield (days)	Greywater yield (litres/day)	Greywater yield (L/person/day)
Other source of greywater				0.00

	Greywater yield (L/person/day)
Total	12.24

Note: If greywater is collected from a component/source not accounted for above i.e. their consumption is not estimated, then the amount of greywater collected can be added here so that it may be accounted for. This can include wastewater from active hygiene flushing, i.e. a regular hygiene flushing programme to minimize poor water quality in a potable cold or hot water system.

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	12.24

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%	24.00

	Demand met by yield (L/person/day)
Total	12.24

Other permissible components

Are there other permissible components present which demand greywater and/or rainwater yield?	No
	Maximum permissible demand (L/day)
	0
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	12.24

Water consumption calculation results

	Litres/person/day	m³/person/yr
Water consumption - modelled baseline performance benchmark (excludes fixed uses)	**41.59**	**10.52**
Microcomponent water consumption - modelled performance (excludes fixed uses)	**41.59**	**10.52**
Modelled water demand met via greywater and rainwater sources	**12.24**	**3.10**
If greywater/rainwater systems specified has the minimum % efficiency improvement for component specifications been met	**Not applicable**	
Net modelled water consumption (excludes fixed uses)	**41.59**	**10.52**
Percentage improvement	**29.43%**	
Total Wat 01 BREEAM credits achieved	**2 credits**	
Total Wat 01 BREEAM Exemplary credits achieved	**Exemplary level not achieved**	
Key performance indicator - use of freshwater resource (includes fixed uses)	**30.93**	**7.82**

Appendix F Building Regs - Part G: Residential Water Efficiency Calculations

HOARE LEA

PROJECT DETAILS	
Office of origin	Cambridge
Address	Hoare Lea Ground Floor, Botanic House 100 Hills Road Cambridge, CB2 1LD
Telephone	01223 556 820
Project name	Cambridge North
Project number	2323544
Creation date	30/03/2023

CALCULATION DETAILS	
Calculation title	Water Demand Calculation
Discipline	Mechanical
System	Rainwater drainage systems
Uniclass code	Ss_50_30_02
Calculation number	← Reference for the calculation filing index

REVISION DETAILS	
Revision	1
RIBA Work Stage	2
Reason for revision	Initial
Layouts & area schedule used	
Link to layouts used	
Date	30/03/2023
Prepared by	SG
Reviewed by	JO
Authorised by	JO

REFERENCE DETAILS	
Calculation references	

SUMMARY	
Results summary:	
Filing Point:	\\hoarelea.local\Specialists\London\Sustainability\Projects\2323544 Cambridge North\3 Calculations\[BREEAM\20230316 - Wat 01 calc\]20230330 - Residential Building Water demand calc.xlsx]S17-21 - Water Demand Advanced

Cambridge North Building S13

Building Type	Residential	
Building Area	TBC	m²

Appartment Types

	Occupancy	Number of Appartments in Building	WCs (Single Flush)	WCs (Dual Flush)	WCs (Multiple Fittings)	Shower only	Shower (with Bath)	Bath (with shower)	Bath only	Wash hand Basin	Kitchen Sink Tap	Tap (non kitchen)	Dishwasher	Washing Machine	Waste Disposal Unit	Water Softener
ST.2P	2	5	0	1	0	0	0	1	0	1	1	1	1	1	0	0
1B.2P	2	28	0	1	0	0	0	1	0	1	1	1	1	1	0	0
2B.4P	4	26	0	2	0	0	0	2	0	2	1	1	1	1	0	0
3B.6P	6	2	0	2	0	0	0	2	0	2	1	1	1	1	0	0

Fit Out Areas

	Unit	Capacity/flow rate	Use Factor	Fixed use L/p/day	Total Usage L/p/day
WCs (Single Flush)	Litres	3.75	4.42	0	16.58
WCs (Dual Flush - full)	Litres	4	1.46	0	5.84
WCs (Dual Flush - part)	Litres	2.6	2.96	0	7.70
WCs (multiple fittings)	Litres	3.75	4.42	0	16.58
Tap (non kitchen)	Litres/min	5	1.58	1.58	9.48
Bath (with shower)	Litres (capacity to overflow)	170	0.11	0	18.70
Shower (with Bath)	Litres/min	8	4.37	0	34.96
Bath Only	Litres (capacity to overflow)	170	0.5	0	85.00
Shower Only	Litres/min	8	5.6	0	44.80
Kitchen Sink Tap	Litres/min	6	0.44	10.36	13.00
Washing Machine	Litres/kg dry load	8.17	2.1	0	17.16
Dishwasher	Litres/place setting	1.25	3.6	0	4.50
Waste Disposal Unit	Litres/use	3	3.08	0	9.24
Water Softener	Litres/p/day	1	1	0	1.00

Usage Summary

	Water Usage L/p/day
ST.2P	86
1B.2P	86
2B.4P	128
3B.6P	128
Whole building average	105
Whole building after greywater recovery	85

Greywater Harvesting

	Wash hand Basin	Bath (with shower)	Shower (with Bath)	Bath Only	Shower Only	Washing Machine	Water Recovery L/p/day
ST.2P	9	19	0	0	0	17	45
1B.2P	9	19	0	0	0	17	45
2B.4P	19	37	0	0	0	17	74
3B.6P	19	37	0	0	0	17	74
Whole building average	14	28	0	0	0	17	**59**

Cambridge North Building S13

Building Type	Residential	
Building Area	TBC	m²

Appartment Types

	Occupancy	Number of Appartments in Building	WCs (Single Flush)	WCs (Dual Flush)	WCs (Multiple Fittings)	Shower only	Shower (with Bath)	Bath (with shower)	Bath only	Wash hand Basin	Kitchen Sink Tap	Tap (non kitchen)	Dishwasher	Washing Machine	Waste Disposal Unit	Water Softener
ST.2P	2	5	0	1	0	0	0	1	0	1	1	1	1	1	0	0
1B.2P	2	28	0	1	0	0	0	1	0	1	1	1	1	1	0	0
2B.4P	4	26	0	2	0	0	0	2	0	2	1	1	1	1	0	0
3B.6P	6	2	0	2	0	0	0	2	0	2	1	1	1	1	0	0

Fit Out Areas

	Unit	Capacity/flow rate	Use Factor	Fixed use L/p/day	Total Usage L/p/day
WCs (Single Flush)	Litres	3.75	4.42	0	16.58
WCs (Dual Flush - full)	Litres	4	1.46	0	5.84
WCs (Dual Flush - part)	Litres	2	2.96	0	5.92
WCs (multiple fittings)	Litres	3.75	4.42	0	16.58
Tap (non kitchen)	Litres/min	5	1.58	1.58	9.48
Bath (with shower)	Litres (capacity to overflow)	170	0.11	0	18.70
Shower (with Bath)	Litres/min	6	4.37	0	26.22
Bath Only	Litres (capacity to overflow)	170	0.5	0	85.00
Shower Only	Litres/min	6	5.6	0	33.60
Kitchen Sink Tap	Litres/min	6	0.44	10.36	13.00
Washing Machine	Litres/kg dry load	8.17	2.1	0	17.16
Dishwasher	Litres/place setting	1.25	3.6	0	4.50
Waste Disposal Unit	Litres/use	3	3.08	0	9.24
Water Softener	Litres/p/day	1	1	0	1.00

Usage Summary

	Water Usage L/p/day
ST.2P	84
1B.2P	84
2B.4P	124
3B.6P	124
Whole building average	102
Whole building after greywater recovery	85

Greywater Harvesting

	Wash hand Basin	Bath (with shower)	Shower (with Bath)	Bath Only	Shower Only	Washing Machine	Water Recovery L/p/day
ST.2P	9	19	0	0	0	17	45
1B.2P	9	19	0	0	0	17	45
2B.4P	19	37	0	0	0	17	74
3B.6P	19	37	0	0	0	17	74
Whole building average	14	28	0	0	0	17	**59**

Cambridge North Building S14-16

Building Type	Residential	
Building Area	TBC	m²

Appartment Types

	Occupancy	Number of Appartments in Building	WCs (Single Flush)	WCs (Dual Flush)	WCs (Multiple Fittings)	Shower only	Shower (with Bath)	Bath (with shower)	Bath only	Wash hand Basin	Kitchen Sink Tap	Tap (non kitchen)	Dishwasher	Washing Machine	Waste Disposal Unit	Water Softener
ST.2P	2	0	0	1	0	0	0	1	0	1	1	1	1	1	0	0
1B.2P	2	29	0	1	0	0	0	1	0	1	1	1	1	1	0	0
2B.4P	4	53	0	2	0	0	0	2	0	2	1	1	1	1	0	0
3B.6P	6	12	0	2	0	0	0	2	0	2	1	1	1	1	0	0

Fit Out Areas

	Unit	Capacity/flow rate	Use Factor	Fixed use L/p/day	Total Usage L/p/day
WCs (Single Flush)	Litres	3.75	4.42	0	16.58
WCs (Dual Flush - full)	Litres	4	1.46	0	5.84
WCs (Dual Flush - part)	Litres	2.6	2.96	0	7.70
WCs (multiple fittings)	Litres	3.75	4.42	0	16.58
Tap (non kitchen)	Litres/min	5	1.58	1.58	9.48
Bath (with shower)	Litres (capacity to overflow)	170	0.11	0	18.70
Shower (with Bath)	Litres/min	8	4.37	0	34.96
Bath Only	Litres (capacity to overflow)	170	0.5	0	85.00
Shower Only	Litres/min	8	5.6	0	44.80
Kitchen Sink Tap	Litres/min	6	0.44	10.36	13.00
Washing Machine	Litres/kg dry load	8.17	2.1	0	17.16
Dishwasher	Litres/place setting	1.25	3.6	0	4.50
Waste Disposal Unit	Litres/use	3	3.08	0	9.24
Water Softener	Litres/p/day	1	1	0	1.00

Usage Summary

	Water Usage L/p/day
ST.2P	86
1B.2P	86
2B.4P	128
3B.6P	128
Whole building average	115
Whole building after greywater recovery	94

Greywater Harvesting

	Wash hand Basin	Bath (with shower)	Shower (with Bath)	Bath Only	Shower Only	Washing Machine	Water Recovery L/p/day
ST.2P	9	19	0	0	0	17	45
1B.2P	9	19	0	0	0	17	45
2B.4P	19	37	0	0	0	17	74
3B.6P	19	37	0	0	0	17	74
Whole building average	14	28	0	0	0	17	**59**

Cambridge North Building S14-16

Building Type	Residential	
Building Area	TBC	m²

Appartment Types

	Occupancy	Number of Appartments in Building	WCs (Single Flush)	WCs (Dual Flush)	WCs (Multiple Fittings)	Shower only	Shower (with Bath)	Bath (with shower)	Bath only	Wash hand Basin	Kitchen Sink Tap	Tap (non kitchen)	Dishwasher	Washing Machine	Waste Disposal Unit	Water Softener
ST.2P	2	0	0	1	0	0	0	1	0	1	1	1	1	1	0	0
1B.2P	2	29	0	1	0	0	0	1	0	1	1	1	1	1	0	0
2B.4P	4	53	0	2	0	0	0	2	0	2	1	1	1	1	0	0
3B.6P	6	12	0	2	0	0	0	2	0	2	1	1	1	1	0	0

Fit Out Areas

	Unit	Capacity/flow rate	Use Factor	Fixed use L/p/day	Total Usage L/p/day
WCs (Single Flush)	Litres	3.75	4.42	0	16.58
WCs (Dual Flush - full)	Litres	4	1.46	0	5.84
WCs (Dual Flush - part)	Litres	2	2.96	0	5.92
WCs (multiple fittings)	Litres	3.75	4.42	0	16.58
Tap (non kitchen)	Litres/min	5	1.58	1.58	9.48
Bath (with shower)	Litres (capacity to overflow)	170	0.11	0	18.70
Shower (with Bath)	Litres/min	6	4.37	0	26.22
Bath Only	Litres (capacity to overflow)	170	0.5	0	85.00
Shower Only	Litres/min	6	5.6	0	33.60
Kitchen Sink Tap	Litres/min	6	0.44	10.36	13.00
Washing Machine	Litres/kg dry load	8.17	2.1	0	17.16
Dishwasher	Litres/place setting	1.25	3.6	0	4.50
Waste Disposal Unit	Litres/use	3	3.08	0	9.24
Water Softener	Litres/p/day	1	1	0	1.00

Usage Summary

	Water Usage L/p/day
ST.2P	84
1B.2P	84
2B.4P	124
3B.6P	124
Whole building average	112
Whole building after greywater recovery	94

Greywater Harvesting

	Wash hand Basin	Bath (with shower)	Shower (with Bath)	Bath Only	Shower Only	Washing Machine	Water Recovery L/p/day
ST.2P	9	19	0	0	0	17	45
1B.2P	9	19	0	0	0	17	45
2B.4P	19	37	0	0	0	17	74
3B.6P	19	37	0	0	0	17	74
Whole building average	14	28	0	0	0	17	**59**

Cambridge North Building S11-12, S17-21

Building Type	Residential	
Building Area	TBC	m²

Appartment Types

	Occupancy	Number of Appartments in Building	WCs (Single Flush)	WCs (Dual Flush)	WCs (Multiple Fittings)	Shower only	Shower (with Bath)	Bath (with shower)	Bath only	Wash hand Basin	Kitchen Sink Tap	Tap (non kitchen)	Dishwasher	Washing Machine	Waste Disposal Unit	Water Softener
ST.2P	2	7	0	1	0	0	0	1	0	1	1	1	1	1	0	0
1B.2P	2	120	0	1	0	0	0	1	0	1	1	1	1	1	0	0
2B.4P	4	134	0	2	0	0	0	2	0	2	1	1	1	1	0	0
3B.6P	6	9	0	2	0	0	0	2	0	2	1	1	1	1	0	0

Fit Out Areas

	Unit	Capacity/flow rate	Use Factor	Fixed use L/p/day	Total Usage L/p/day
WCs (Single Flush)	Litres	3.75	4.42	0	16.58
WCs (Dual Flush - full)	Litres	4	1.46	0	5.84
WCs (Dual Flush - part)	Litres	2.6	2.96	0	7.70
WCs (multiple fittings)	Litres	3.75	4.42	0	16.58
Tap (non kitchen)	Litres/min	5	1.58	1.58	9.48
Bath (with shower)	Litres (capacity to overflow)	170	0.11	0	18.70
Shower (with Bath)	Litres/min	8	4.37	0	34.96
Bath Only	Litres (capacity to overflow)	170	0.5	0	85.00
Shower Only	Litres/min	8	5.6	0	44.80
Kitchen Sink Tap	Litres/min	6	0.44	10.36	13.00
Washing Machine	Litres/kg dry load	8.17	2.1	0	17.16
Dishwasher	Litres/place setting	1.25	3.6	0	4.50
Waste Disposal Unit	Litres/use	3	3.08	0	9.24
Water Softener	Litres/p/day	1	1	0	1.00

Usage Summary

	Water Usage L/p/day
ST.2P	86
1B.2P	86
2B.4P	128
3B.6P	128
Whole building average	108
Whole building after greywater recovery	88

Greywater Harvesting

	Wash hand Basin	Bath (with shower)	Shower (with Bath)	Bath Only	Shower Only	Washing Machine	Water Recovery L/p/day
ST.2P	9	19	0	0	0	17	45
1B.2P	9	19	0	0	0	17	45
2B.4P	19	37	0	0	0	17	74
3B.6P	19	37	0	0	0	17	74
Whole building average	14	28	0	0	0	17	**59**

Cambridge North Building S11-12, S17-21

Building Type	Residential	
Building Area	TBC	m²

Appartment Types

	Occupancy	Number of Appartments in Building	WCs (Single Flush)	WCs (Dual Flush)	WCs (Multiple Fittings)	Shower only	Shower (with Bath)	Bath (with shower)	Bath only	Wash hand Basin	Kitchen Sink Tap	Tap (non kitchen)	Dishwasher	Washing Machine	Waste Disposal Unit	Water Softener
ST.2P	2	7	0	1	0	0	0	1	0	1	1	1	1	1	0	0
1B.2P	2	120	0	1	0	0	0	1	0	1	1	1	1	1	0	0
2B.4P	4	134	0	2	0	0	0	2	0	2	1	1	1	1	0	0
3B.6P	6	9	0	2	0	0	0	2	0	2	1	1	1	1	0	0

Fit Out Areas

	Unit	Capacity/flow rate	Use Factor	Fixed use L/p/day	Total Usage L/p/day
WCs (Single Flush)	Litres	3.75	4.42	0	16.58
WCs (Dual Flush - full)	Litres	4	1.46	0	5.84
WCs (Dual Flush - part)	Litres	2	2.96	0	5.92
WCs (multiple fittings)	Litres	3.75	4.42	0	16.58
Tap (non kitchen)	Litres/min	5	1.58	1.58	9.48
Bath (with shower)	Litres (capacity to overflow)	170	0.11	0	18.70
Shower (with Bath)	Litres/min	6	4.37	0	26.22
Bath Only	Litres (capacity to overflow)	170	0.5	0	85.00
Shower Only	Litres/min	6	5.6	0	33.60
Kitchen Sink Tap	Litres/min	6	0.44	10.36	13.00
Washing Machine	Litres/kg dry load	8.17	2.1	0	17.16
Dishwasher	Litres/place setting	1.25	3.6	0	4.50
Waste Disposal Unit	Litres/use	3	3.08	0	9.24
Water Softener	Litres/p/day	1	1	0	1.00

Usage Summary

	Water Usage L/p/day
ST.2P	84
1B.2P	84
2B.4P	124
3B.6P	124
Whole building average	105
Whole building after greywater recovery	88

Greywater Harvesting

	Wash hand Basin	Bath (with shower)	Shower (with Bath)	Bath Only	Shower Only	Washing Machine	Water Recovery L/p/day
ST.2P	9	19	0	0	0	17	45
1B.2P	9	19	0	0	0	17	45
2B.4P	19	37	0	0	0	17	74
3B.6P	19	37	0	0	0	17	74
Whole building average	14	28	0	0	0	17	**59**

Reference Link		Description
1	Waste disposal unit based on 3 litres/use	Assumption
2	Water Softener based on 1 litre/person/day	Assumption

Checklists, Tables & Illustrations

Table 52 Water fittings standards.

Water fitting	Optional fittings standard	Advanced fittings standard
WCs	≤ 4/2.6 litres dual flush	4/2 litres dual flush (maximum 3 litres effective flushing volume)
Showers	≤ 8L/min	≤ 6L/min
Baths	≤ 170 litres	≤ 170 litres
Basin taps	≤ 5L/min	≤ 5L/min
Kitchen sink taps	≤ 6L/min	≤ 6L/min
Dishwashers	≤ 1.25L/place setting	≤ 1.25L/place setting
Washing machines and washer dryers	≤ 8.17L/kilogram	≤ 8.17L/kilogram

3	Home Quality Mark ONE - Technical Manual, England	

G APPENDIX A – WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS

Table A1: **The water efficiency calculator**

Installation type	Unit of measure	(1) Capacity/ flow rate	(2) Use factor	(3) Fixed use (litres/ person/ day)	(4) Litres/ person/day = [(1) × (2)] + (3)
WC (single flush)	Flush volume (litres)		4.42	0.00	
WC (dual flush)	Full flush volume (litres)		1.46	0.00	
	Part flush volume (litres)		2.96	0.00	
WCs (multiple fittings)	Average effective flushing volume (litres)		4.42	0.00	
Taps (excluding kitchen/utility room taps)	Flow rate (litres/minute)		1.58	1.58	
Bath (where shower also present)	Capacity to overflow (litres)		0.11	0.00	
Shower (where bath also present)	Flow rate (litres/minute)		4.37	0.00	
Bath only	Capacity to overflow (litres)		0.50	0.00	
Shower only	Flow rate (litres/minute)		5.60	0.00	
Kitchen/utility room sink taps	Flow rate (litres/minute)		0.44	10.36	
Washing machine	Litres/kg dry load		2.1	0.00	
Dishwasher	Litres/place setting		3.6	0.00	
Waste disposal unit	Litres/use	If present = 1 If absent = 0	3.08	0.00	
Water softener	Litres/person/day		1.00	0.00	
	(5)	**Total calculated use = (Sum column 4)**			
	(6)	Contribution from greywater (litres/person/day) from Table 4.6			
	(7)	Contribution from rainwater (litres/person/day) from Table 5.5			
	(8)	Normalisation factor			0.91
	(9)	Total water consumption = [(5) – (6) – (7)] × (8)			
	(10)	External water use			5.0
	(11)	**Total water consumption = (9) + (10) (litres/person/day)**			

4	Approved document G Appendix A	

Appendix G Grey Water Recycling Facility - Manufacturer's Specification

GREY WATER RECYCLING

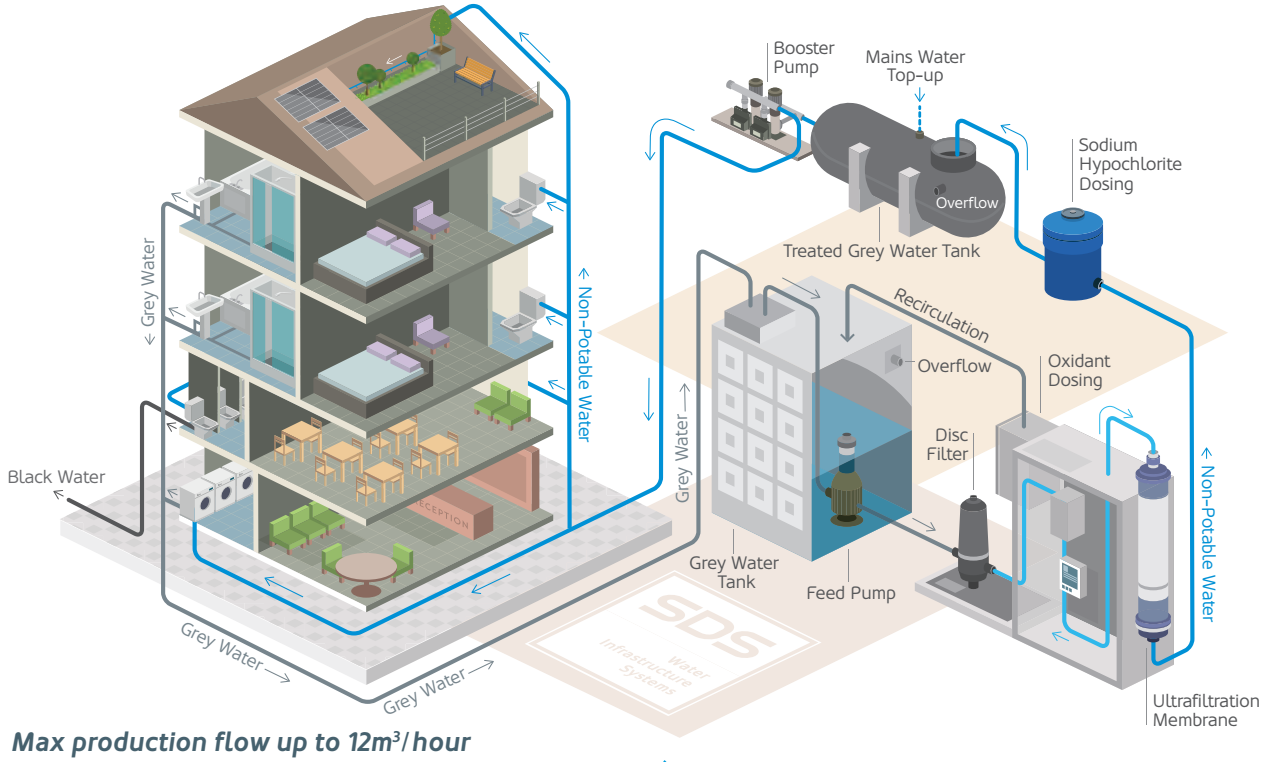
SDS
Water Infrastructure Systems

SDS WATERBANK® GWR SYSTEM

Grey Water On Demand System (Large Scale)

SDS WaterBank® GWR (LS) is a fully automated recycling system which is designed to deliver a consistent supply of treated grey water to best meet a larger development's required daily volume.

SDS WaterBank® GWR operates on a fast treatment principle to meet demand quickly and reduce the need for large water storage tanks. It is ideal for large installations but where space is at a premium, and for combined grey water and rainwater recycling systems.



- *Max production flow up to 12m³/hour*
- *Automated function*
- *Adaptable to varying grey water supply and demand volumes*
- *Mains water back-up (on treated water tank)*
- *Includes distribution pumping*
- *Volt-free BMS output capability*
- *Smart design including capacity for IoT-ready interface*
- *Complies with BS8525 requirements*

SDS WaterBank® GWR (LS) uses a 2-stage treatment of disc filtration to 100 microns, followed by a hollow fibre ultrafiltration membrane to 0.05 microns.

Both stages incorporate an automatic backwash process to ensure the highest level of water quality, which is further enhanced and maintained by the carefully controlled dosing of low-level chlorine.

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