

inenco

Edge Hill University

Water Audit Report

Opportunity for water use optimisation

Edge Hill University Ormskirk Campus

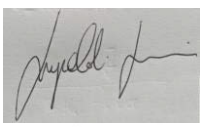
Wednesday 15 August 2024

Quality Review and Approval Record

Inenco Group is committed to delivering the highest possible standard of service and operates a Quality Management System certified to ISO 9001: 2015.

As part of this process, your deliverable has been checked and authorised for issue, as evidenced by the approval record below.

Customer Name:	Edge Hill University
Project No:	149499
Document Ref. No:	149499 – Edge Hill Water Audit – v1.0
Document held at INENCO	Lytham

Author:		Giovanni Lupaldi	27/08/2024
	Signature	Name	Date
Technical Approval:		Giovanni Maio	27/08/2024
	Signature	Name	Date
Approved for Issue:		Bethany Fleetwin	27/08/2024
		Name	Date
Edge Hill University Sign Off:			
	Signature	Name	Date

DISCLAIMER: This report is the opinion of Inenco and provided for information purposes only. Inenco will not be held liable for your subsequent use of the information. The report remains the copyright of Inenco.

1.0

Introduction

Inenco have undertaken a water audit for the Edge Hill University campus using as a baseline the water consumption information provided by the Facility Management team over the year 2023.

The results of the site audit are based on on-site spot measurements, meter readings (where available), inspection of public facilities, teaching areas and student accommodations, and site occupancy based on the building inventory as provided by the facility management team. Absence of building specific hourly data and measured building occupancies made an accurate calculation of the water maps unfeasible. Therefore, the results included in this report could be ±50% of the actual water consumptions presented in this report.

It is recommended to re-connect the water sub-metering system to a M&T platform to measure with accuracy the real use of water across the entire campus and calculate the building specific water consumption based on building occupancy. The use of an M&T system will also help spotting leaks and reduce manhours to manage water usage.

Some water savings identified in this report will also have a positive impact in the reduction of heating energy, but the energy savings have not been included in the results of this audit.

A conservative water unit cost of £3.1/m3 has been used to calculate the payback of the water efficiency initiatives summarised in this report. This value was used to consider the impact of non-commodity prices associated to the water bills and to reduce the risk of overestimating the financial savings achievable by the implementation of the water efficiency measures identified by the audit.



2.0 Executive Summary

Inenco have visibility of three live water accounts for this campus (all metered). Based on the information we have sight of Edge Hill University is currently spending in the region of £528K per annum on water, this incorporates clean water, wastewater, surface water drainage and fixed charges across the campus.

It should be noted that our survey found that total use across all meters had reduced from 167,266m³ to 154,226m³ (8%) in 2023 compared to 2022 which is a positive trajectory so some measures may already be working. Urinal IR detectors for example are already fitted in most toilets, and providing consumption reduction benefits.

The three metered supply:

SPID	Address	Annual Consumption
3002692514W11	57 St Helens Rd	22m³
3200069201W12	Edge Hill University Campus	153,675 m³
3001963425W18	41 Ruff Lane	529 m³



The opportunities to save water identified in this report are listed in the table below:

	Water efficiency measure	Savings	%	Savings	Cost	Payback
	Manage pool filter backwash on system pressure	114m³	0.1%	£353	£-	0.00
	Activate steam room on demand	1m³	0.0%	£3	£-	0.00
	Irrigate fields at night	1,530m³	1.0%	£4,721	£-	0.00
	Reconnect drain water system for irrigation	1,071m³	0.7%	£3,305	£1,00	0.30
	Reduce flushing volumes on 9ltr to 6 ltr	2,669m³	1.7%	£8,236	£5,000	0.61
	Implement photocell taps in public toilets where missing and reduce flows	9,578m³	6.2%	£29,551	£20,000	0.68
	Water awareness	2,742m³	1.8%	£8,458	£15,000	1.77
	Optimise pool access showers	200m³	0.1%	£617	£3,000	4.86
	Re-connect water metering system	2,010m³	1.3%	£6,202	£15,000	2.42
	Totals	**19,916m³**	**12.9%**	**£61,445**	**£59,000**	**0.96**



3.0 Survey Results

This site is a large multi-occupancy university campus, encompassing a sports centre and irrigated external grassed sports areas, teaching buildings, student accommodation and shared facilities with catering.

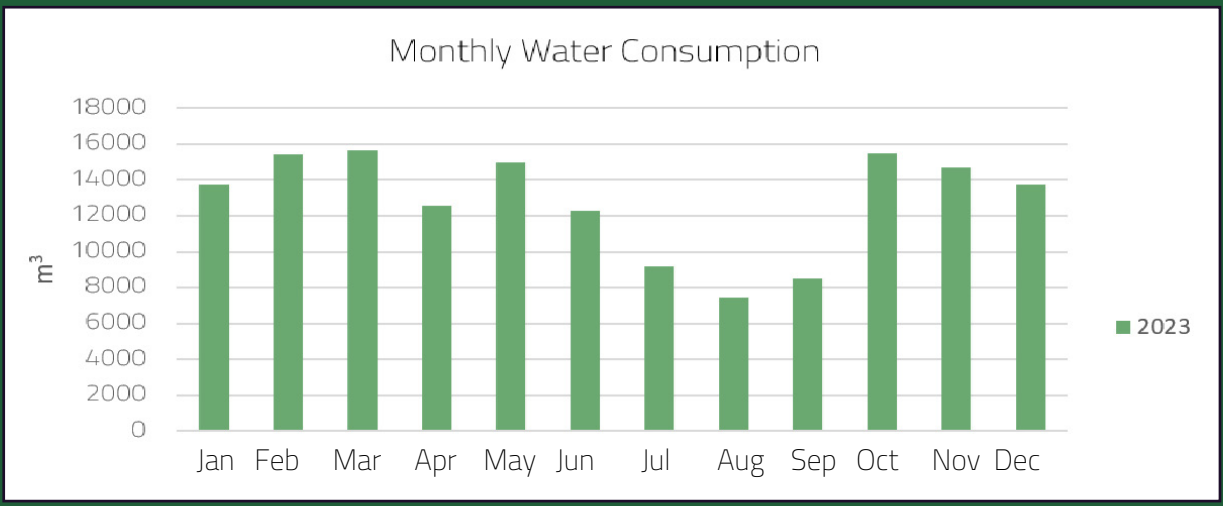


Figure 1 – Water consumption by use
The monthly water consumption information provided shows that during the summer months, the campus water consumption decreases, which is expected as there is a lower presence of students on site. It is estimated that university students account for 58% of the annual water consumption with the other 42% used by the teaching and administration personnel, open and operational community buildings and summer students.

The entire campus is served via a large external supply. From here, the supply expands throughout the site.

Water for irrigation is stored in a 200m3 tank and there is a widespread presence of sub-meters that could measure specific water consumption in the sport centre and for each building on site. The metering system is physically hardwired and, therefore, can collect consumption information but is unfortunately not currently connected to any collection system. The reinstatement of a metering platform is a crucial project as you can only manage what you can measure. Due to the lack of this submetering data, our results included in this report could be ±50% of the actual water consumptions, we have had to make best estimates. Inenco can provide support in this task and offer a platform to gather consumption information and analytics.

The estimated water maps by usage and buildings are reported below:

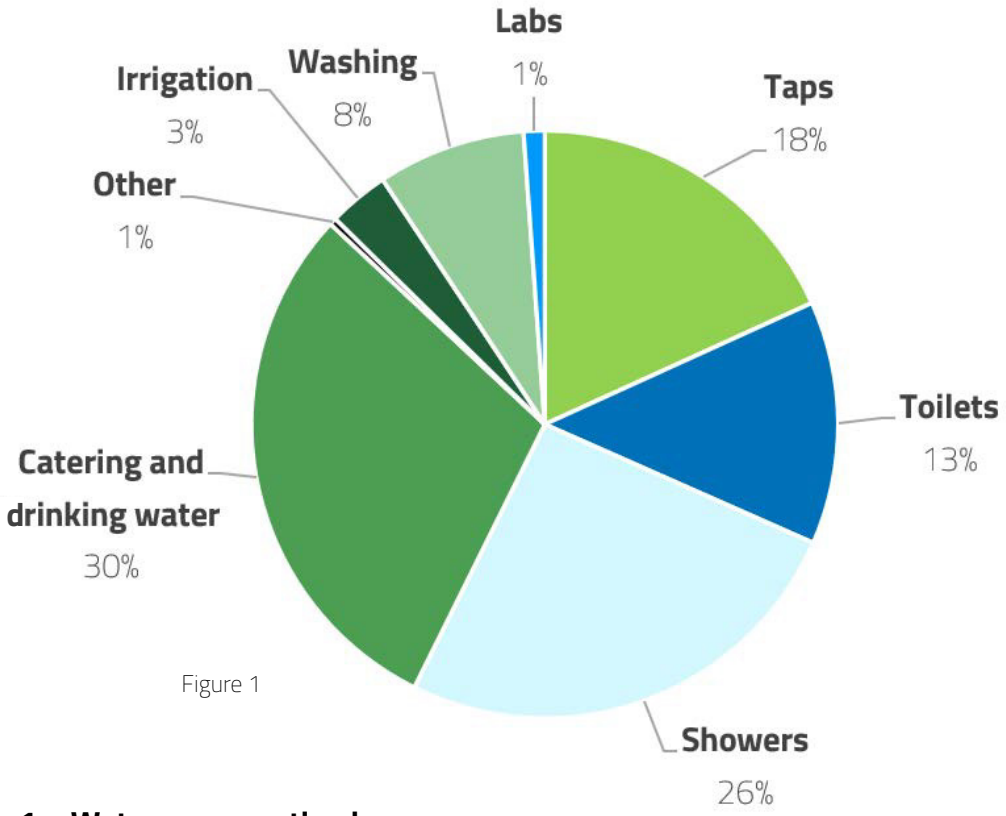


Figure 1

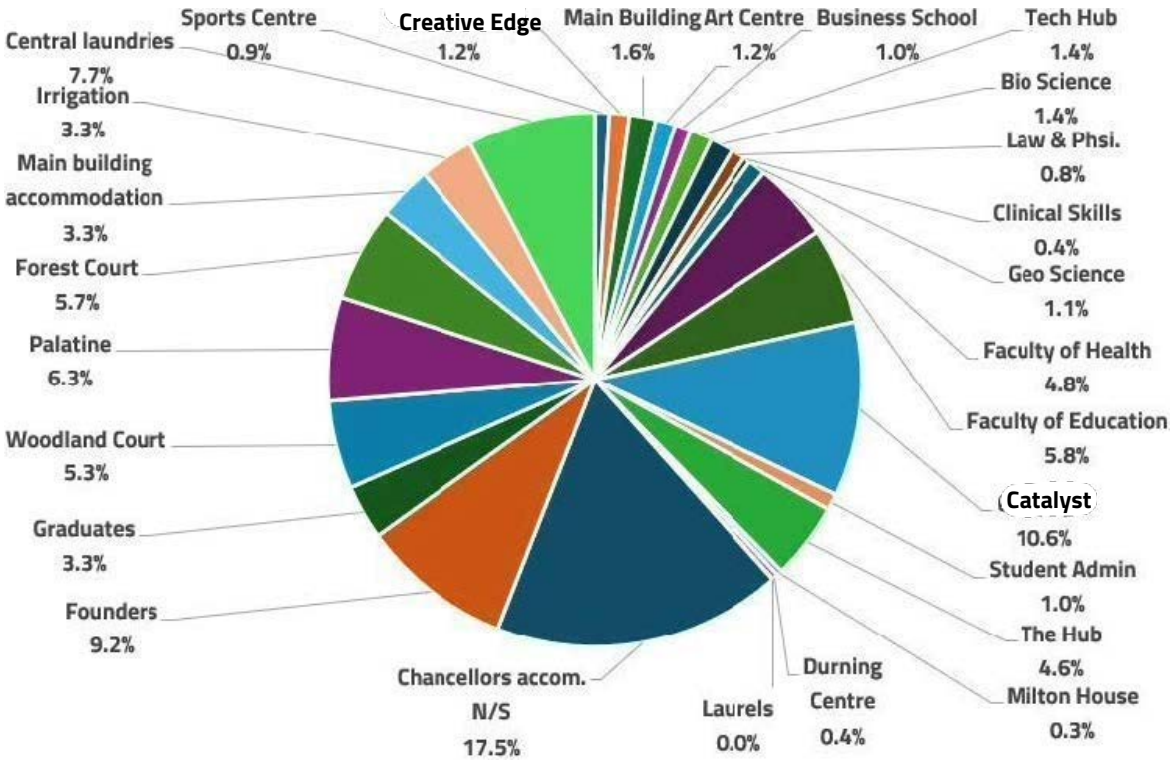
Figure 1 – Water consumption by use

We estimate that the biggest contributors to the site water consumption are the catering and drinking water associated with facilities and student accommodations, followed by showers used by students and staff, toilets and taps. Washing for clothing is also a considerable use of fresh water and accounts for 8% of the total site water consumption.



Figure 2 – Water consumption by building

Based on the site survey, spot measurement of water flow rates, flushing volumes and nominal building occupancies, it is estimated that the highest water consumer buildings are Chancellor's student accommodation blocks (17.5%) followed by the Catalyst building (10.6%). Laundries account for 7.7% of the total site water consumption.





Across the buildings there are a variety of water flow rates and water efficiency technologies. In Appendix A, a summary table of the audit findings and assumptions used in the calculations is provided.

The typical use of water by the building is represented in the following water maps.

Figure 3 – Teaching building water consumption

The presence of water fountains, coffee machines and catering, where present, contribute to a significant use of water for a building. Taps and toilets in restrooms combined are the biggest users of fresh water.

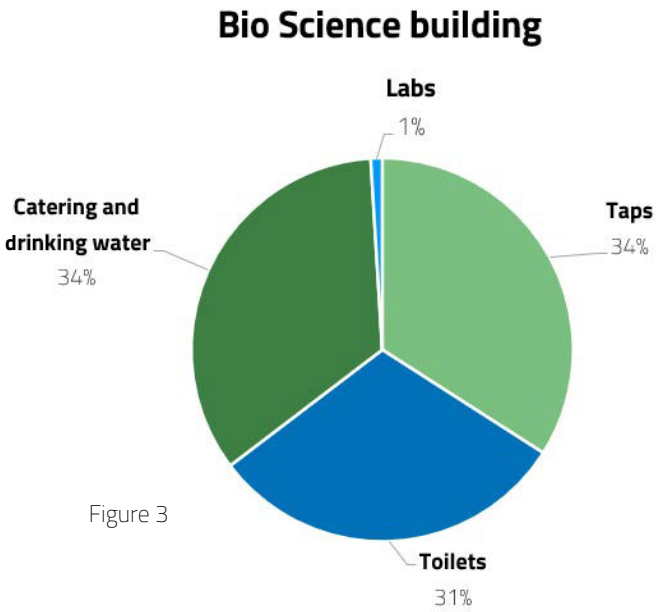


Figure 3

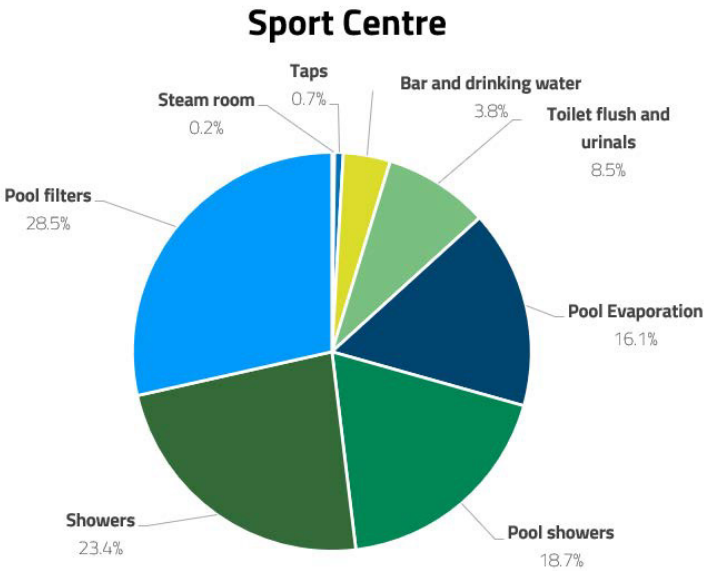


Figure 4

Figure 4 – Sport Centre water consumption

In the Sport Centre, the backwash of the pool filters is estimated to account for 28% of the building total water consumption. The showers used by the pool users when accessing the pool accounts for 19% of the building water consumption and here there is an opportunity for considerable water and heating energy savings as described in section 4.0.

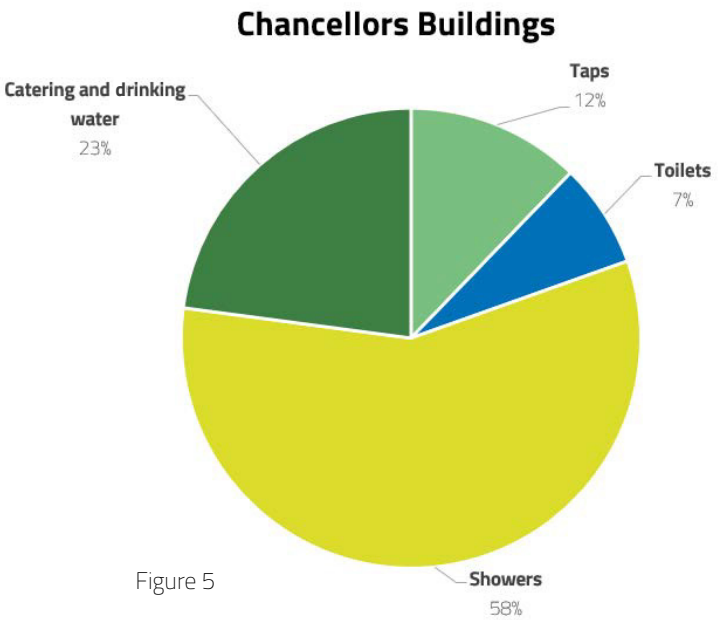


Figure 5

Figure 5 – Chancellors Buildings water consumption

In student accomodation, showering is estimated to use most of the water consumption followed by catering (cooking, washing up and drinking water). The proportion of the various water uses depends on the specific flowrates and flushing volumes of the building.

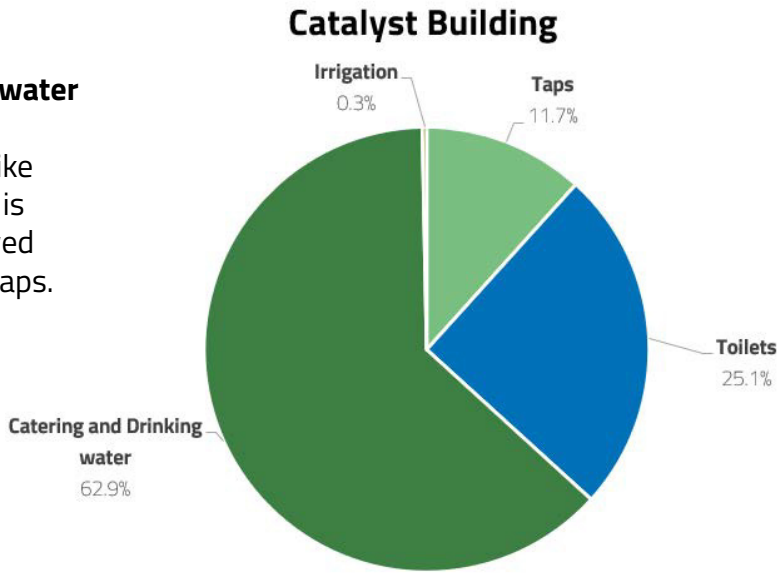


Figure 6

Figure 6 – Catalyst Building water consumption

In shared facilities buildings like Catalyst, water consumption is dominated by catering followed by water used in toilets and taps.



RECOMMENDATIONS/ CONCLUSIONS 4.0

The calculations associated to the water saving opportunities are assuming a water unit cost of £3.1/m3 and are not factoring in the impact that a reduced water usage has on heating energy consumption. Given the absence of detailed sub-metering information and occupancy data, the calculations provided are only ±50% accurate. We highly recommend submetering data be obtained prior to finalising payback periods and projects to undertake.

Water efficiency measure	Savings	%	Savings	Cost	Payback
Implement photocell taps in public toilets where missing and reduce flowrates	**9578** [m3]	**6.2%**	[redacted]	[redacted]	**0.68**
	Newer public restrooms are equipped with low flowrate photocell activated taps. Replace all taps in public restrooms with the same technology. The replacement of manual faucets with sensor controlled one implies a higher maintenance effort that will have an impact on the facility management team workload. Installation costs may impact the feasibility of this opportunity and a number of quotes should be fully explored.				

Water efficieny measure	Savings	%	Savings	Cost	Payback
Water awareness	**2,742** [m3]	**1.8%**	[redacted]	[redacted]	**1.77**
	It is possible to reduce water consumption by training and communication in non-rented catering areas. By applying water pressure relief restrictors to kitchen taps with high water flowrates and training staff on an efficient use of water, we are expecting water savings in the region of 2%. The cost associated to this measure is to purchase the pressure relief tap and to finance a communication campaign to train the campus catering personnel. It is difficult to change how water is used in student accomodations as their users do not have an incentive in reducing their water consumption as all bills are included in rental costs - however a training/awareness campaign may still be worthwhile implementing in student residences in addition.				

Water efficieny measure	Savings	%	Savings	Cost	Payback
Reduce flushing volumes in 9ltr tanks to 6ltr	**2669** [m3]	**1.7%**	[redacted]	[redacted]	**0.61**

In old buildings there are toilets with a flush tank of 9ltr capacity. Replacing these tanks with a more efficient 6ltr one with dual flush would be financially too onerous. Therefore, we recommend putting in the 9ltr flusing tank a volume restrictor to reduce the effective water volume to 6ltr. Many of these are available on the market, such as Hippo Bags.

Water efficieny measure	Savings	%	Savings	Cost	Payback
Re-connect water metering system	**2,010** [m3]	**1.3%**	[redacted]	[redacted]	**2.42**

A working sub-metering system will optimise the time needed by the Facility Management team to manage water and provide a more granular and accurate quantification of the water used across the campus buildings. Presence of hourly consumption data will also help spot possible water leaks in the network and identify losses in water use efficiency if consumption is analysed together with building occupancy levels.

Net of the savings achieved by the previous water efficency measures, the reactivation of the water metering system is estimated to save 2% of the remaining water usage, but this is just a parameter to qunatify the working hours savings and the reduced risk of undetected possible water leaks.

Water efficieny measure	Savings	%	Savings	Cost	Payback
Irrigate fields at night	**1530** [m3]	**1.0%**	[redacted]	[redacted]	**0.00**

The grassed areas around the Sport Centre used for training are watered during daytime during periods of drought. To reduce the amount of irrigation water lost to evaporation, irrigation should be switched to occurring during the night, dawn or dusk. This is estimated to reduce water loss by up to 30%.

Water efficieny measure	Savings	%	Savings	Cost	Payback
Reconnect drain water system for irrigation	**1071** [m3]	**0.7%**	[redacted]	[redacted]	**0.30**

There is infrastructure in place to recover the fraction of irrigation water that drains through the soil. However, as the UV sanitising filter is out of order, this method to recover unabsorbed irrigation water is not in use. Evaluate the risks and hazards associated to the absence of the UV filter in the irrigation water system and, if appropriate, start using again the recoverable drain water for irrigation. It is estimated that 30% of the irrigation water can be saved this way.

Water efficieny measure	Savings	%	Savings	Cost	Payback
Optimise pool access showers	**200** [m3]	**0.1%**	[redacted]	[redacted]	**4.86**

The showers that are used for washing up before accessing the pool activate on a motion sensor in the corridor and all the 4 showers in place get activated as well. Applying motion taps to each individual shower head will reduce the wastage of water and heating energy.

Water efficieny measure	Savings	%	Savings	Cost	Payback
Manage pool filter backwash on system pressure	**114** [m3]	**0.1%**	[redacted]	[redacted]	**0.00**

It is understood that the backwash of the pool filters is managed upon a fixed schedule. We recommend that you change the backwash regime to carry out the backwash when the pressure across the filter reaches a level that still guarantees good water quality. This will reduce the amount of water used in the filter backwash by an estimated 30%. There is no cost associated to this opportunity, but attention should be paid to the pool water quality when applying this measure to ensure settings are correct.

Water efficieny measure	Savings	%	Savings	Cost	Payback
Activate steam room on demand	**1** [m3]	**0.0%**	[redacted]	[redacted]	**0.00**

The steam room is activated at the opening of the Sports Centre and switched off on a time schedule. However, the steam room is not constantly in use during the Sports Centre opening hours. We recommend activating the steam room only when there is a request from the Sports Centre users. It is understood that the steam room would be ready for use from cold in 15 minutes, which we believe is an acceptable waiting time compared to the water and energy savings that can be acheived using this approach. The only risk associated to this measure is the possible complaints by the Sports Centre users in not always having the steam room ready.

Whilst this has negligible water cost savings, the energy savings would be significant at a zero cost to implement.



Appendix A

Buildings	People	Admin	Teaching	Occupancy	Taps with photocells	Dual Flush	Flushing volumes	Kitchenette	Catering	Dishwasher	Washing machine	Drinking Fountains	Showers	Irrigation	Lab	Consumption
Sports Centre	51			156,235	V	V	6	V	Cafe			V	Timer + Sensor	V		1336
Creating Edge	1067	112	955	126,077	V	V	6	V				V				1853
Main Building	835	373	462	122,205	V		9	V	Cafe	V	V	V				2469
Art Centre	630	10	620	69,810			9		Bar	V		V	V			1850
Business School	685	124	561	85,238	V	V	6	V				V				1489
Tech Hub	741	186	555	96,485	V	V	6	V				V			V	2101
Bio Science	396	370	26	73,887			9	V				V			V	2171
Law & Phsi.	519	188	331	72,341	V		6	V				V				1302
Clinical Skills	219	113	106	33,303	V		6	V				V	V			630
Geo Science	353	31	322	41,211			7	V				V			V	1638
Faculty of Health	1607	373	1234	206,739	V		9	V	V	V		V	V			7375
Faculty of Education	1736	692	1044	247,182			9	V	V	V		V				8960
Catalyst	0			680,652	V	Sensor	6	V	V	V		V		V		16296
Student Admin	246	246		47,232		V	6	V								1511
The Hub	391	391		75,072	V		6	V	V	V		V				7124
Milton House	59	59		11,328			9		V							529
Durning Centre	128	128		24,576		V	9	V	V				V			553
Laurels	10	10		1,920			9	V			V					43
Chancellors accom. N/S	754			82,563		V	6		V				V			27009
Founders	395			43,253		V	6		V				V			14149
Graduates	142			15,549		V	6		V				V			5087
Woodland Court	264			28,908		V	6		V		1		V			8211
Palatine	312			34,164		V	6		V				V			9704
Forest Court	296			32,412			9		V				V			8780
Main building accommodation	188			20,586			6		V				V			5044
Irrigation											V			V		5101
Central laundries																11909



Edge Hill Water Audit Report

Opportunity for water use optimisation

August 2024

inenco

