Water use in University Halls of Residence

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Cohesion and adhesion (water droplets) (Harcombe, 2013)

Introduction

- This project represents a follow-up based on the audit carried by Ricardo-AEA as part of Waste and Resource Action Plan and Rippleffect project (Ricardo – AEA, 2012).
- At a national level, Universities across the UK use 16 million m^3 of water annually (People and Planet, 2006).
- The recommendations and measures all comply with the Government's White Paper 'Water for life, 2011' which encourages voluntary water efficiency measures.

Introduction

- The fact that fitting a tap aerator for 5 pounds could result in a cost saving of £13/tap/year is ignored, mainly when compared with energy savings which have a greater impact (Ricardo – AEA, 2007).

- Among other studies, Oduro-Kwarteng *Et al*., (2009) revealed that installing devices which reduce water usage in taps and toilet cisterns for schools could mean saving water by 30%.

Introduction

- On the St John's campus, the Ricardo report estimated the water demand at 130 L/ student/ day. This is less than the national average use of 150-160 L /per day, however, if compared with the EA figures of 170 litres per capita/ day, the situation on campus can be considered acceptable (Yu, 2011; Environment Agency, 2008).

Aims & objectives

- Evaluate student views on water saving measures in halls of residence (O1).
- Create and publish a database on the distribution of eco-shower heads in the halls of residence. (O2)
- Analyse and evaluate the costs and benefits of the possible introduction of percussion taps. (O3)

Water saving devices distribution and abundance in halls of residence.

- 50 flats were sampled covering 6 halls.
- Questionnaires and visual surveys were conducted.
- The results gained during the site visits are summarized in table 1 and figure 1, figure 2.
- 25 flats have dual flush devices fitted.

Water saving devices distribution and abundance in halls of residence.

Table 1: Percentage of halls with water saving measures and response to question 2							
%	**Ankerdine**	**Avon**	**Pershore**	**E.B.B**	**V.T**	**Wulfstan**	**Total**
DF	33	0	100	100	100	33	50
E-sh	33	6	0	0	0	100	24
Q1	0	0	0	0	0	0	0
Q1B	83	63	33	75	83	0	60
Q2 Kitchens (S)	10	21	15	17	27	18	18
Q2 Washbasins (S)	8	10	7	7	7	11	8
Q2 shower (S)	60	91	90	78	85	65	76
Q3 Neither	33	44	33	0	33	33	28
Q3 Percussion	17	13	33	0	50	67	22
Q3 Eco-shower	50	50	33	100	17	0	50

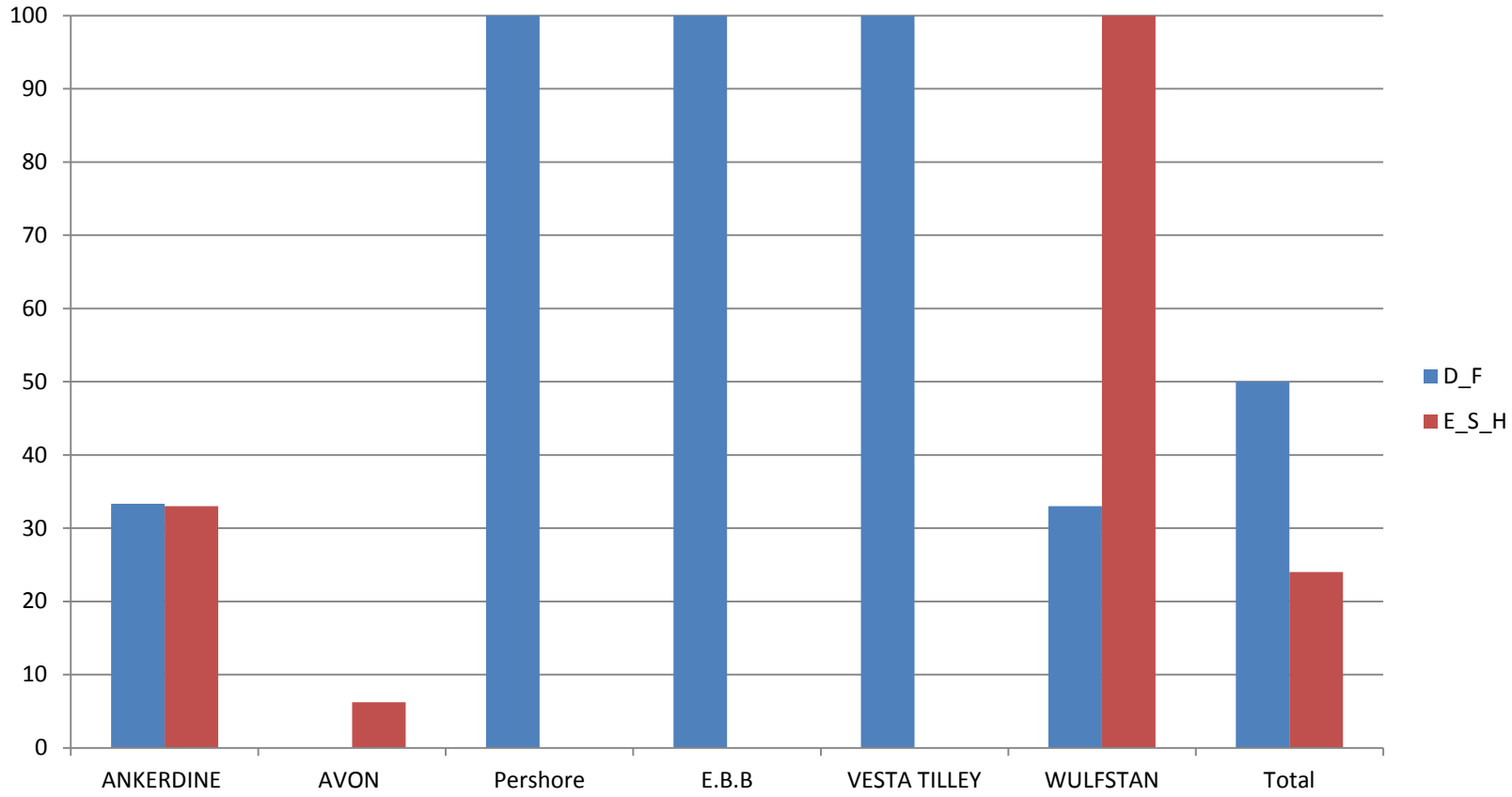

Figure 1: Distribution and abundance of Duel flush (DF) and Eco-showerhead devices in sampled halls of residence.

Pershore, E.B.B and V.T have 100% presence of duel flushes, whereas there are no dual flush devices fitted. Furthermore only 25% of flats have eco-shower heads fitted.

- No student surveyed were aware of any water saving devices been fitted in halls despite 50% of flats having dual flush devices and 24% having eco shower heads.
- Student perception for the implantation of eco shower heads or percussion showers was mixed with all student in Wulfstan preferring normal shower heads with or with out percussion taps over eco shower heads.
- Overall 50% of students stated they would prefer eco shower heads.

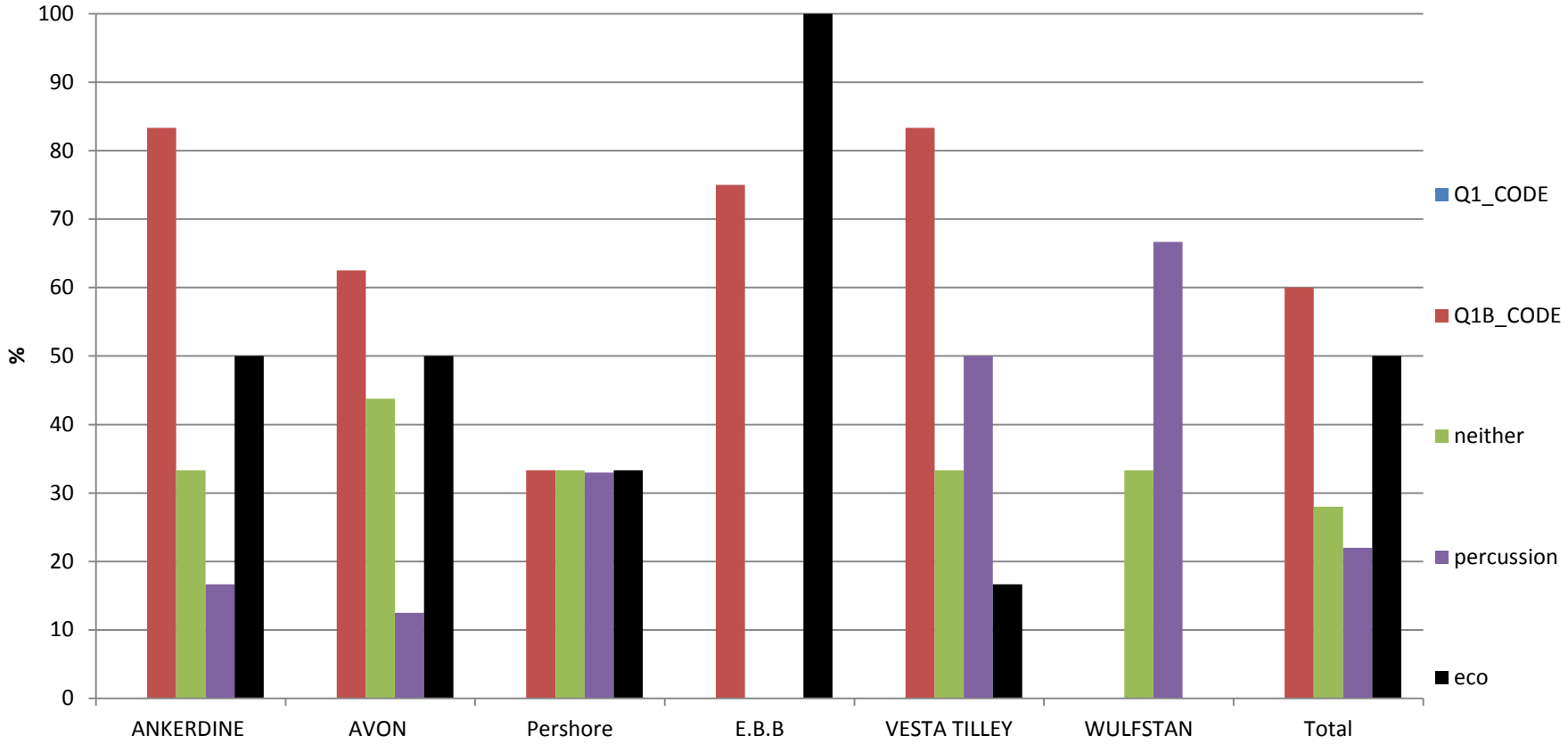

Figure 2: Responses gained for Q1, Q1B and Q3 represented as a percentage of responses per hall.

- Based on the findings of this study it can be noted that students would prefer a mean delay period of 18s (in kitchens), 8s (for washbasins) and 76s (for showers), however, 33% of students didn't want percussion taps fitted or preferred long delay periods.

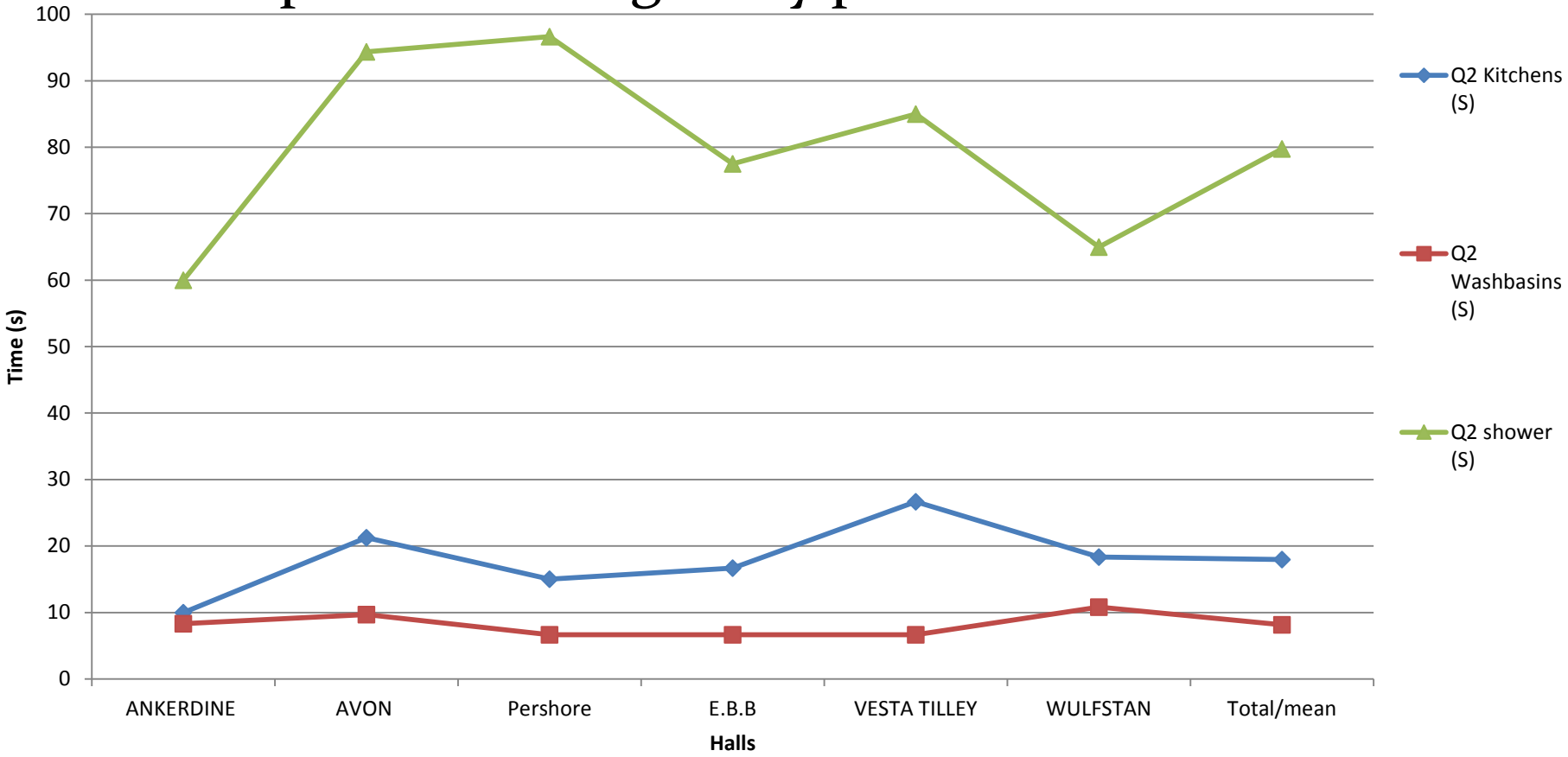

Figure 3: Responses gained for Q1, Q1B and Q3 represented as a percentage of responses per hall.

Water meter data

- Wuflstan and Ankerdine were chosen as they are both within the same accommodation level.
- However, despite this there are many differences within the abundance of water saving devices within Ankerdine (DF= 33% and Esh= 33%) and Wulfstan (DF=33% Esh=100%).
- Water meter data was obtained from the 3/9/13 to 31/10/13, over this period Wulfstan used 1183 m^3 of water whereas Ankerdine used 1645.36 m^3
- Wulfstan used 463.36 m^3 less than Ankerdine.

Water meter data

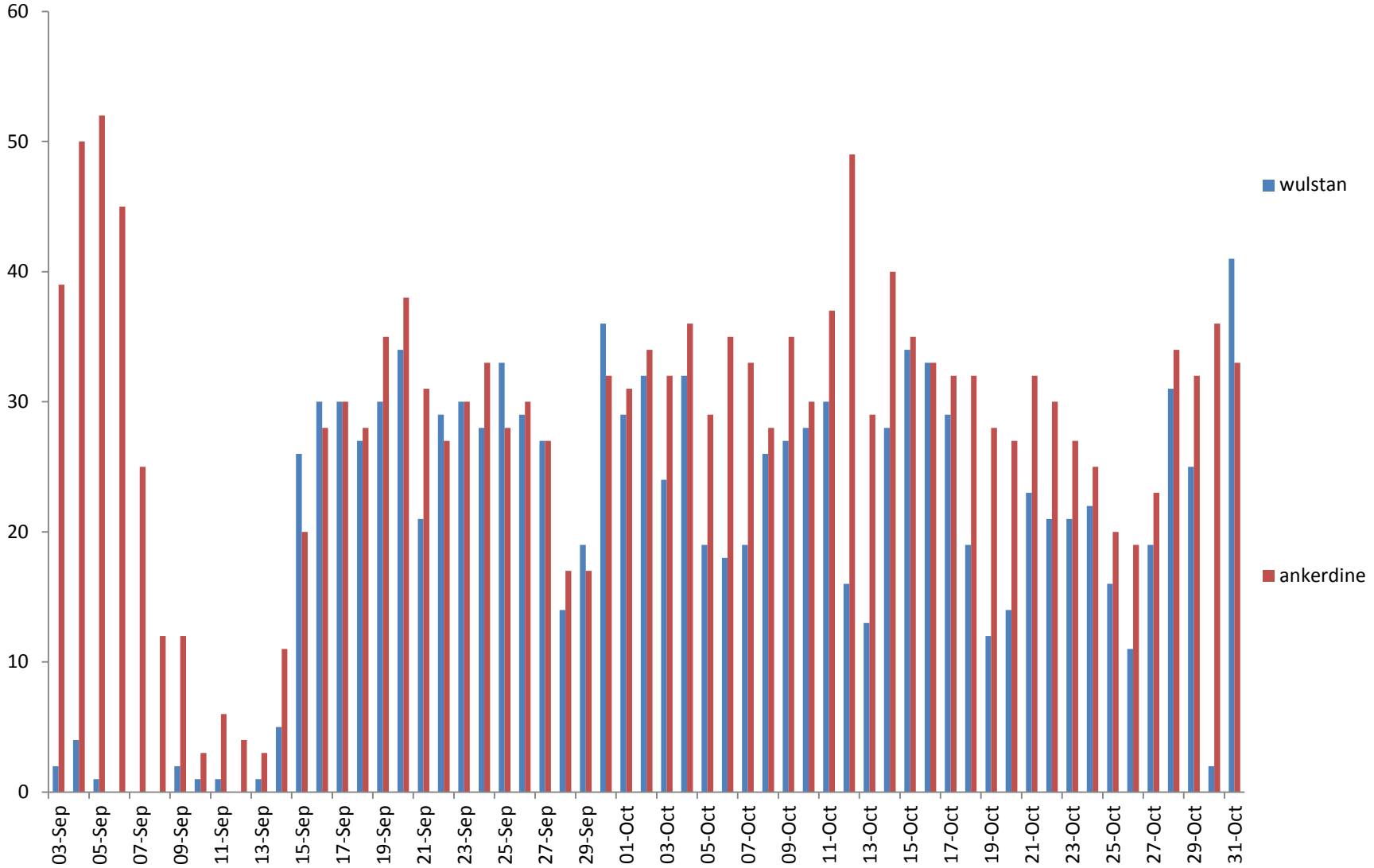

Figure 4: Water meter data.

Student views

- This project shows that, the fitting of water efficient devices is the best approach.
- Even more significant, Campbell *Et al.*, (2004) reported that when people do not know that the engineering retrofits are in place, such engineering devices do succeed in saving significant amounts of water.
- Our project found that this was also the case at the U of W therefore it can be concluded that the mass-reaction of new devices can be avoided by making the necessary changes before the next academic year.

Desk based research

- The taps currently in Halls of residence are standard (monobloc) taps (Plumb Centre, 2013: Envirowise, 2007).
- Percussion taps are generally installed as a way of reducing water consumption as they can reduce the average flow rate from approximately 5l/min to 2.3L/min.
- Percussion taps 'auto-shut off' function stops excessive water use and waste caused by leaving monoblock taps running (Green Building Store,2012; Envirowise, 2007; Waterwise, 2014; Pimental et al., 1997).

- Due to the large amount of flats and heavy usage many factors need to be taken into consideration:
- Installation time.
- Individual cost.
- lifespan of the taps.
- Cost per year.
- Ease of fitting.
- Style

Consequently desk based research was conducted on monobloc taps, percussion taps and percussion mixers.

Table 2: Desk based research summary.

Tap Type	*Company*	*Product Description*	*Average flow rate (L/min)*	*Preset running time (in seconds & if applicable)*	*Cost -per tap (without VAT) (£)*	*Cost -per tap(with VAT)(£)*	*Life expectancy (years)*	*Whole life costing - cost of tap per year based on life expectancy (£)*	*Timeframe for instalation (mins)*
Monobloc (standard)	BES	Basin acrylic	1.7- 10		12.70	15.24	5 12	31	30-60
	BES	metal head	1.7 - 10		17.70	21.24	512	4 2	30-60
Percussion	Tap shop	Chrome basin	2.3 - 8	8	41.67	50.00	512	10 4	30-60
	Pts Plumbing	Chrome plated	2.3 - 8		35.50	42.60	512	8 4	30-60
	Taps4less	'Deva' - pillar	2.3 - 8		24.96	29.95	12	2	30-60
percussion mixer	Pts Plumbing	'Rada'- mixer	2.3 - 8		34.50	41.40	512	8 3	30-60
	BES	'Inta'- slimline	2.3 - 8		102.67	123.20	512	24 10	30-60
	Taps 4 Less	'Ultra Water'	2.3 - 8	9	61.50	73.80	5	14.76	30-60

- Although there are cheaper taps the Taps4less ‘Deva’-Pillar (cost price with VAT at 20%= £34.80) has been recommended due the long life expectancy of 12 years and the thus a low cost per year (£2).
- Only one model of tap has been selected so that storage space, repair time can be reduced and training can be standardised (Child 2013; Taps4less, 2014; Hall and Hitch, 1939).

Figure 5: Taps4less ‘Deva’ - pillar (Taps4less, 2014).

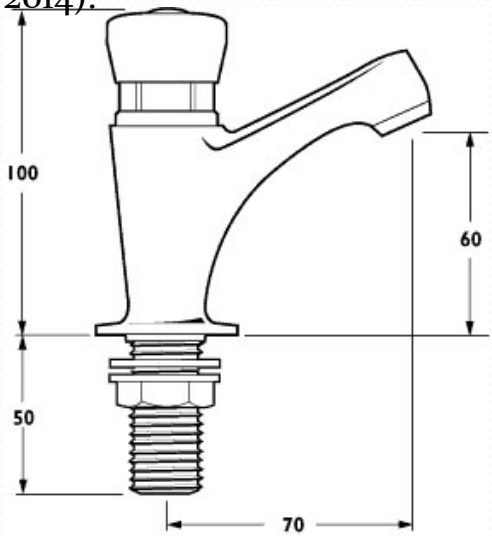

Figure 6: Taps4less ‘Deva’ - pillar (Taps4less, 2014).

Recommendations

- Only 50% of flats have dual flush devices
- Only 24 % of halls contained eco-shower heads.
- Student awareness of the presence of water saving devices was very low (0%).
- The majority of students want more information about water saving devices (60%)
- The majority of students would prefer eco-showerheads over normal showerheads with or without percussion taps (50%)

Recommendations

- Students would also prefer a mean delay period of 18s (in kitchens), 8s (for washbasins) and 76s (for showers) and that standard percussion taps would be most ideal for installation .
- Despite the implementation of dual flush devices and eco-showerhead devices most halls are still without any water saving devices at all even with the recommendations made in the previous water efficiency review.
- Wulfstan used 463.36m^3 of water less than Ankerdine through having eco-showerheads fitted in every flat.

Recommendations

- Complete installation of dual flush devices to all toilets in halls
- Continue installation of eco-showerheads in halls.
- Introduction of the recommended percussion tap (Taps4Less 'Deva' - pillar) to all washbasins and kitchens sinks.
- Student awareness campaign.
- Improved publications *e.g.* stickers, posters, leaflets about the different devices.
- Full usage of the rainwater harvesting system.
- Improved staff training.
- Further/follow up project to evaluate success of student awareness campaign and installation of percussion taps in addition the installation of percussion taps and water saving devices throughout academic/administrative buildings.

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