



# Water Efficiency Audit Report

**Organisation Name:** London Metropolitan University

**Site Address:** Tower Building, 166-220 Holloway Road, N7 8DB

**Date:** 19<sup>th</sup> June 2014

**Version:** 1.2



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On behalf of Thames Water Utilities Limited

**Key Account Manager:** Ollie Arthurs Thames Water, Water Efficiency Project

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## 1 Site Summary

### 1.1 Introduction

This report has been prepared by Aqualogic (WC) Ltd on behalf of Thames Water Ltd. The report details findings from our recent water efficiency audit at London Metropolitan University. The report covers the Tower Complex of the university and has a total of 14 blocks.

Below shows the number of washroom fittings, measured flow rates of taps, showers and uncontrolled waste. Also recorded were WC type, cistern size and the status of any uncontrolled use, leaks and urinal flush controllers were checked. During the survey our auditor made recommendations to change or upgrade any fittings in each of the floors that would benefit and become more efficient. The report uses various collected information on site to provide a breakdown of potential monetary & water savings.

The combined sewage and supply water tariff for the purpose of this report is Thames Water £2.44 per cubic metre (m<sup>3</sup>).

### 1.2 Site Details

**Date of Audit:** 3<sup>rd</sup> June 2013

**Site Address:** Tower Building, 166-220 Holloway Road, N7 8DB

**Contact Details:** Rachel Ward, 0207 133 3305, [R.Ward@londonmet.ac.uk](mailto:R.Ward@londonmet.ac.uk)>

The site is open all year around 6 days a week and 13 hours Monday – Friday and 7 hours on a Saturday. On site there is 690 combined staff and students. The building/blocks surveyed are the following:

- G Block
- J Block
- P Block
- Benwell Extension
- Benwell road
- C Block
- S Block
- D Block
- Tech Tower
- Tower Block
- Graduate Centre
- F Block
- Harglenis
- Admin Building

## 2 Site Audit Findings

During the audit we counted the number of WC's, taps, urinals, showers and took flows for each to establish whether a device could be fitted to reduce the flow and calculated the consumption used per area utilising staff and student numbers.

The table below shows the sites current assets, volumes and flows:

### 2.1 Asset Findings

| WC                                    |     | TAPS                                 |     |
|---------------------------------------|-----|--------------------------------------|-----|
| Quantity of Male toilets:             | 65  | Quantity of Hot taps:                | 235 |
| Average size Male Cistern (litres):   | 6.3 | Average Hot flow rate (litres/min):  | 6.3 |
| Quantity of Female/Mixed toilets:     | 156 | Quantity of Cold taps:               | 137 |
| Average size Female Cistern (litres): | 6.2 | Average Cold flow rate (litres/min): | 6.8 |
| URINAL                                |     | SHOWERS                              |     |
| Quantity Uncontrolled Cisterns:       | 30  | Quantity Of Wall Mounted:            | 0   |
| LPM (litres/min):                     | 0.3 | Average flow rate:                   | 0.0 |
| Quantity Controlled Cisterns:         | 2   | Quantity Of Handheld:                | 0   |
| FPH(flushes/hour):                    | 1.5 | Average flow rate:                   | 0.0 |

Table: Current Asset Findings

### 2.2 Additional Information

None.

## 2.3 Water Use of Site

### General Information

|  |                             |
|--|-----------------------------|
| Is there a Swimming Pool?  | No                          |
| Is there a Rain Water Harvesting/ Water Re-Cycling system on site? | Unknown                     |
| Is there a laundry on site?  | No                          |
| Is there any future Refurbishment Plans?                           | Unknown                     |
| Number of Meals Cooked on Site:                                    | Yes (No. Unknown)           |
| Site Activities:   | Teaching, lectures, offices |

### Billing Information

|   |       |
|---|-------|
| Billed water usage (m <sup>3</sup> /year) | 4652  |
| Billed water usage (m <sup>3</sup> /day)  | 12.78 |
| PCC (m <sup>3</sup> /year)                | 6.74  |

### Unaccounted for Water Information

|   |      |
|---|------|
| Leakage found on site?                        | No   |
| Leakage Measured Litres/min:                  | 0.00 |
| Estimated Water waste per annum (Litres/Year) | 0.00 |

No underground leak exercise was undertaken

### Meter Information

| Serial (s)  | Type (s) | Location(s) | Reading(s) |
|---|----------|-------------|------------|
| See readings on page 9 2.7 Meter Analysis section |          |             |            |

Table: Water Use Information

## 2.4 Recommendations

During the survey, a number of products were recommended to reduce flow and consumption.

The products recommended are as follows:

### PRODUCT RECOMMENDATIONS AVAILABLE FROM THAMES WATER

| PRODUCT                             | PRODUCT DESCRIPTION   | TOTAL APPLICABLE |
|-------------------------------------|---|------------------|
| <b>Dual Flush Devices</b>           | This device will reduce flush volume by converting a single flush WC siphon to a dual flush siphon with full/half flush option and can reduce flush volume up to 50% when the user select to deliver a half flush by releasing the lever. | 80               |
| <b>Cistern Displacement Devices</b> | A cistern displacement device that reduces WC flush volume by 1.2 litres. The bag is added to the cistern   | 14               |
| <b>Tap Inserts (aerators)</b>       | Reduces tap flow rate if exceeding 10 litres/min to 4.0 litres/min  | 27               |
| ADDITIONAL PRODUCT RECOMMENDATIONS  |   |                  |
| <b>Retrofit Push Tap Conversion</b> | This will convert existing twist taps to push taps (Headwork Only) and eliminates the potential of leaving taps running for long periods of time  | 11               |
| <b>Urinal Control</b>               | Urinal Control Device that eliminates continual flushing of urinal cisterns when not controlled. The urinal control detects occupancy and allows flushing when the urinals are in use.  | 27               |

Table: Recommendations

## 2.5 Potential Savings and Payback

The Audit Analysis findings indicate that the most benefit will be gained by fitting urinal control devices. We would classify these recommendations as priority as they show the highest water savings in both m<sup>3</sup> and monetary terms. However installing WC dual flush conversions and tap inserts will contribute to the overall costs savings, further details can be found in the savings and payback table below.

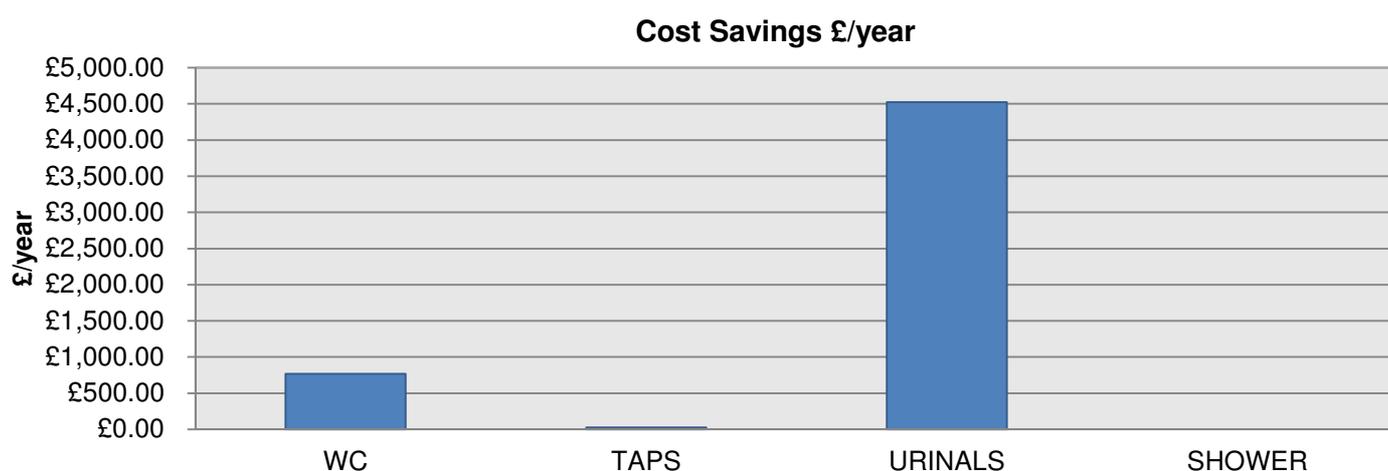
In summary these measures offer potential saving of 37% overall and a potential cost savings achievable of **£5316** a year with a payback or (return on investment) period of 19.1 months.

|   | Estimated Use m <sup>3</sup> /year | Estimated Cost £/year |
|---|------------------------------------|-----------------------|
| <b>Current Usage (As surveyed)</b>                        | 5910.41                            | £14,421.41            |
| <b>Potential Usage (With all recommendations applied)</b> | 3731.73                            | £9,105.42             |
| <b>Potential Saving</b>                                   | <b>2178.68</b>                     | <b>£5,315.99</b>      |

| Analysis by Product Category |                              |                |                  |                  |               |
|------------------------------|------------------------------|----------------|------------------|------------------|---------------|
| Interventions                | SAVINGS m <sup>3</sup> /year | SAVINGS %/year | SAVINGS £/year   | PRODUCT £        | PAYBACK Month |
| WC                           | 314.03                       | 5.6%           | £766.24          | £2,903.70        | 45.5          |
| TAPS                         | 10.34                        | 0.2%           | £25.23           | £583.50          | 277.5         |
| URINALS                      | 1854.31                      | 28.2%          | £4,524.52        | £4,995.00        | 13.2          |
| SHOWER                       | 0.00                         | 0.0%           | £0.00            | £0.00            | 0.0           |
| <b>OVERALL</b>               | <b>2178.68</b>               | <b>37%</b>     | <b>£5,315.99</b> | <b>£8,482.20</b> | <b>19.1</b>   |

Table: Potential Savings



## 2.6 Comparable Data

This is calculated by the overall usage and the number of students in the buildings measured. Table below shows per person consumption per year in cubic meters and average litres per day.

|  | <b>m<sup>3</sup>/year</b> | <b>litres/day</b> |
|--|---------------------------|-------------------|
| <b>Current per person consumption:</b>   | 8.6                       | 26.5              |
| <b>Potential per person consumption:</b> | 5.4                       | 17.7              |
| <b>Saving</b>                            | 3.2                       | 10.3              |

Table: Per Person Consumption

The Water Industry is in the process of developing sector specific benchmarking for these types of organisations. Per Capita Consumption is a measure that can be used to compare these sites against others within your sector.

## 2.7 Meter Analysis

### 2.7.1 Meter Reads

The table below provides the readings from April and May for each meter located at London Met University:

| Serial (s)             | Area Meter Covers              | Location(s)                     | April          | May            | Usage                               |
|------------------------|--------------------------------|---------------------------------|----------------|----------------|-------------------------------------|
| 96W132969              | G,J,K,& L Block                | Left of courtyard gate          | 48911          | 49516          | 605                                 |
| 96A170990              | G,J,K,& L Block                | Left of courtyard gate          | 36587          | 36587          | 0                                   |
| 110091636              | P Block                        | MH end of light well            | Unable to read | Unable to read | Unable to read                      |
| 110098193              | P Block                        | MH end of light well            | 2              | 2              | 0                                   |
| 96W134713              | P Block                        | MH end of light well            | Meter removed  | Meter removed  | Meter Removed                       |
| 96A109339              | P Block                        | MH end of light well            | Meter Removed  | Meter Removed  | Meter Removed                       |
| 12166531AA             | 81a Benwell Road               | TMG-146                         | 44             | 50             | 6                                   |
| 92A648934              | Benwell Extension              | Box end of light well           | 35             | 35             | 0                                   |
| 92W025074              | Benwell Extension              | Box end of light well           | 18298          | 18352          | 54                                  |
| 03A128620              | Old Benwell Road               | MH left of fire exit            | 75228          | 75363          | 135                                 |
| 6615934                | C Block                        | To the left rocket Rec          | Meter Removed  | Meter Removed  | Meter Removed                       |
| 120007156              | C Block                        | To the left rocket Rec          | 64             | 64             | 0                                   |
| 12060700               | C Block                        | To the left rocket Rec          | 5926           | 6293           | 637                                 |
| 97W009016              | D Block                        | MH outside fire exit            | 9556           | 9556           | 0                                   |
| 97A229519              | D Block                        | MH outside fire exit            | 39060          | 39060          | 0                                   |
| New Meter<br>11476271  | T/B T/T G/C<br>E&Fblock&rocket | MH to the left T/T<br>Reception | 825            | 956            | 131                                 |
| New Meter<br>110178817 | T/B T/T G/C<br>E&Fblock&rocket | MH to the left T/T<br>Reception | 585            | 997            | 412                                 |
| 12166503AA             | Harglenis Building             | Store with roll shutter         | 1233           | 1291           | 58                                  |
|                        |                                |                                 |                | <b>Total:</b>  | <b>1768<br/>m<sup>3</sup>/month</b> |

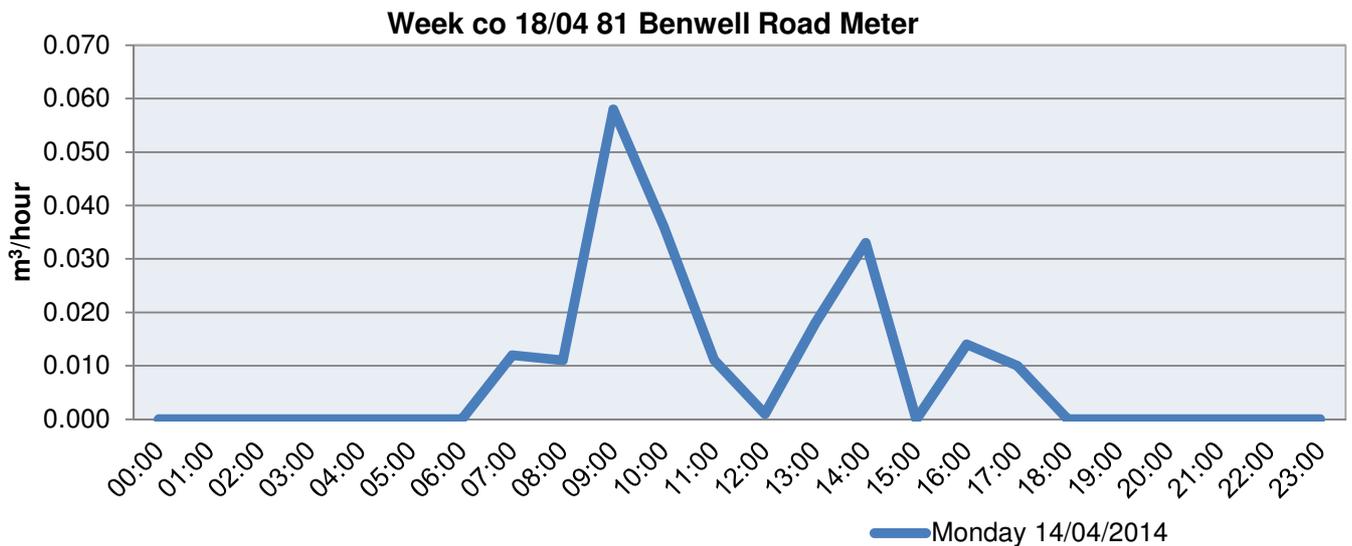
Table: Meter Readings

## 2.7.2 Meter Graph Comparisons

Some data has been extracted to examine the consumption pattern on the meters. This helps indicate if there is unusual changes in usage and constant demand which could either identify uncontrolled usage or leaks in the particular areas which either require further investigation or devices fitted/fixed to control the usage. Although data for all the meters was unavailable, there are areas on site which contain uncontrolled urinals which will contribute to a considerable amount of consumption as they will be continual flowing throughout the day. The total uncontrolled usage on site is on average 7.22 litres per minute suggesting night flow of 0.43 m<sup>3</sup>/hour. The 3 areas extracted to represent the finding are in Benwell road, P Block and Harglenis Buildings.

### 2.7.2.1 82296125 81 Benwell Road Meter Data

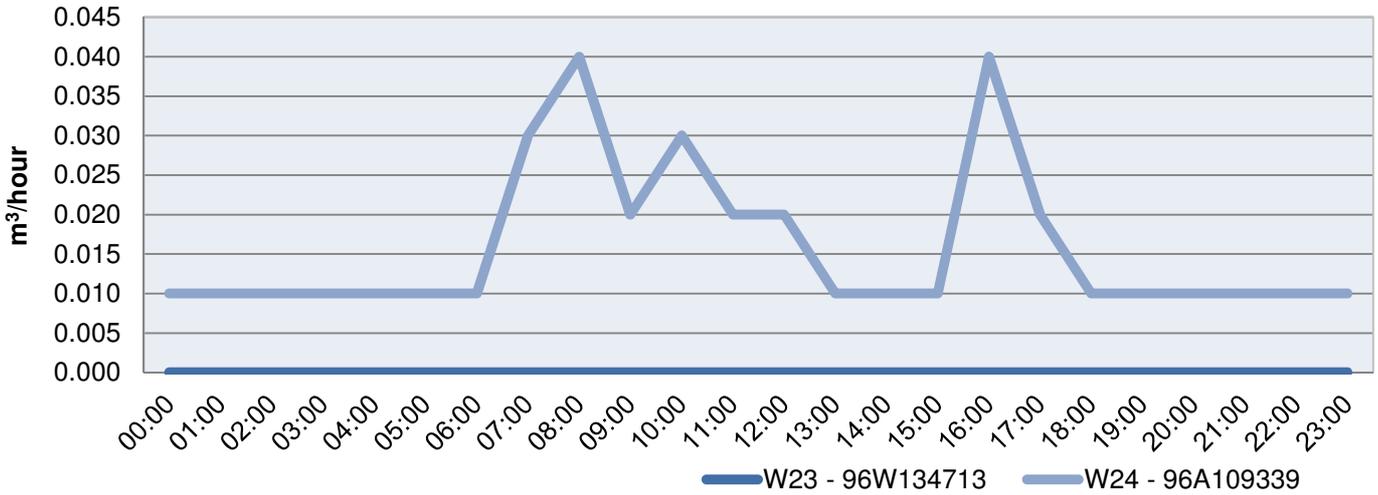
The graph shows that during the weekend or bank holidays usage for this meter decreases to 0.00 m<sup>3</sup>/hour and there is no constant use evident.



**2.7.2.2 96W134713 and 96A109339 Meter Data**

The graph below shows that there is a constant usage of 0.010. These meters cover P block area of the building which currently have 2 uncontrolled urinals.

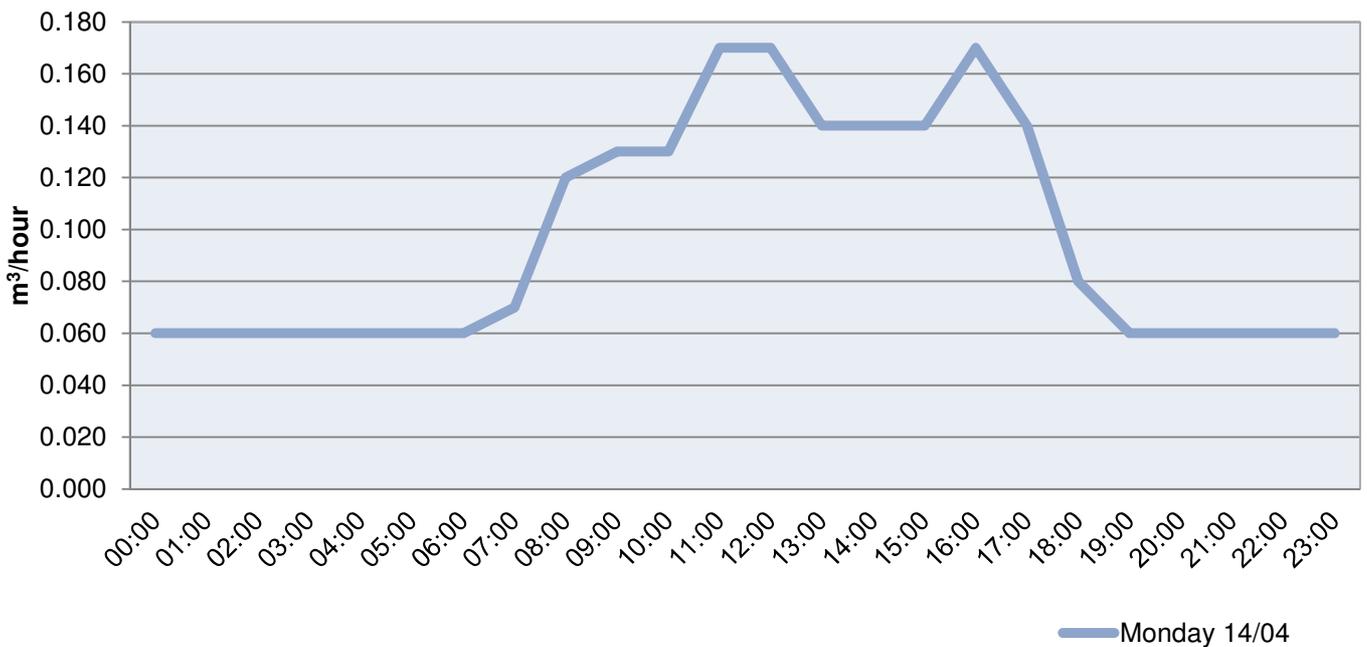
**Monday 14/04 Usage 96W134713 and 96A109339 Meters**



**2.7.2.3 85140872 Harglenis Meter Data**

The graph below shows that there is a constant use of 0.060. The constant demand is present due to an existing control not working efficiently and is continually flushing throughout the day on average 6 flushes per hour.

**14/05 Usage Meter 85140872**



### 2.7.3 Billing Vs Our Estimate

The Annual billing data provided calculates to an average 4652 of m<sup>3</sup>/year.

The estimated consumption calculated using the audits standard assumptions and typical usage patterns suggest that the yearly usage for this site would be 5910 m<sup>3</sup>/year. There is a 21% difference between the total estimated consumption and annual billing. This is worth bearing in mind when it comes to payback periods for water efficiency interventions.

There are a number of reasons why there could be a change in daily consumption. These could be:

- Events and activities during weekends, half term and during week
- Food preparation in kitchens
- Sporadic faulty fittings/devices which were not identified on site at time of survey
- Students/Staff leaving taps running over different days
- Use of hosepipes and watering gardens
- Failed urinals after billing period

Limited data was available from the sites data logger/AMR. From the data provided it was evident that there was some constant flow present. The uncontrolled urinals being located in the 2 buildings surveyed and the graphs in 2.7.2 and 2.7.3 clearly indicate this.

## 2.8 Report Summary

This site can achieve a potential **saving of 37%** and a payback of 19.1 months payback, or return on investment (based on the cost of supplying the approved water saving devices) if all recommendation are adopted and installed in the areas recommended.

The findings suggest that there is a considerable amount of savings which can be achieved.

Urinals were examined and found that uncontrolled usage was measuring at an average of 0.3 litres per minute. Urinals were either on a drip feed, low flow, isolated or had disconnected 3<sup>rd</sup> party units. It is recommended to have controls installed even in the areas isolated/disconnected as no flow presents potential hygiene issues. This will however increase the demand.

Taps examined had relatively low flows measuring between 4 - 8 litres per minute, the majority being retro fit push taps and therefore minimal requirements needed. The areas which had high flows measuring between 10-14 litres minute it is recommended to have tap inserts installed. This will reduce the flow to 4.0 litres per minute.

The WC's examined were found to have cistern volumes of 6.0–7.5 litres. Whilst the majorities are single flush systems there are a number which are existing dual flush systems. In the areas suitable a number of dual flush devices and cistern displacement devices are recommended which will reduce flush volume and consumption.

There was no evidence of dripping taps, overflowing WCs or leaks found on site at time of survey.

From analysis of the billing, audit findings and the data provided it is clear that there has been an increase in consumption since the previous billing. This could be due to the urinals failing in a number of areas which will have a continual usage as shown in the findings in the meter analysis chapter.

Additional activities on site including kitchen usage & food preparation and cleaning facilities are not calculated in the report but will contribute to the overall water consumption.

The potential savings and consumption can vary by +/- 10% depending on the fluctuation of site numbers and usage as various activities could increase or decrease.

### 3 Appendix A

#### 3.1 Assumptions

Assumptions are used to generate calculations to estimate the current consumption and potential savings.

The table below shows the assumptions used within this report:

##### WC Usage Assumptions

| Per Person Use Ratio     |   | Products fitted             |                              |
|--------------------------|---|-----------------------------|------------------------------|
| Male/Urinal              | 1 | Dual Flush Device           | Minus 66% per 2/3 half flush |
| Female /Unisex/No Urinal | 3 | Cistern Displacement Device | Minus 1.2 Litres             |

##### Tap Usage Assumptions

| Per Person Use Ratio |     | Products fitted |                              |
|----------------------|-----|-----------------|------------------------------|
| Hot Tap              | 0.5 | Retrofit Push   | Minus 50% usage time         |
| Cold Tap             | 1.5 | Tap Insert      | Reduced to 4.0 Litres/Minute |
| Seconds              | 5   |                 |                              |

##### Shower Usage Assumptions

| Use Ratio  |    | Products Fitted |                   |
|--|----|-----------------|-------------------|
| Calculated by people and number of showers with shower ratio |    | Handheld Shower | 8.0 Litres/Minute |
| Usage Ratio  | 5% | Wall Mount      | 8.0 Litres/Minute |
| Minutes  | 8  |                 |                   |

##### Urinal Usage Assumptions

| Uncontrolled                          | Controlled                            | Products fitted   |
|---------------------------------------|---------------------------------------|---|
| Calculated by flushes/volume measured | Calculated by flushes/volume measured | Urinal Control - set intervals default 30 minutes- 2 flushes per hour |
| 24 hours                              | Days Open                             |   |
| 7 days a week                         | Hours Open                            |   |
| 365 days a year                       |                                       |   |

##### Comparable Data

|   |
|---|
| Total water consumption for year divided by the total number of students on site - per person -m <sup>3</sup> /year |
| Total per person m <sup>3</sup> /year * 1000 / Total days - is average litres per day - per person litres/day       |

### 3.2 Product Costs

The following table details the costs of the full range of products that are recommended within this report:

#### Thames Water Recommended Water Saving Devices\*

| Product                       | Estimated Installation Cost £ |
|-------------------------------|-------------------------------|
| <b>WC RECOMMENDATIONS</b>     |                               |
| Dual flush Device             | £35.50                        |
| Cistern displacement device   | £4.55                         |
| <b>TAP RECOMMENDATIONS</b>    |                               |
| Tap Inserts (aerators)        | £10.00                        |
| <b>SHOWER RECOMMENDATIONS</b> |                               |
| Handheld Shower               | £10.00                        |

\*Products available via Thames Water Key Account Manager.

#### Additional Recommended Water Saving Devices\*

| Product                                   | Estimated Supply and Install Cost £ |
|---|-------------------------------------|
| <b>WC RECOMMENDATIONS</b>                 |                                     |
| Cistern Dams                              | £10.00                              |
| <b>TAP RECOMMENDATIONS</b>                |                                     |
| Retrofit Push Tap Conversions             | £28.50                              |
| Complete Push Taps                        | £70.00                              |
| Inline Flow (6ltr)                        | £16.00                              |
| <b>URINAL RECOMMENDATIONS</b>             |                                     |
| Service existing non third party controls | £52.50                              |
| Urinal Controls                           | £185.00                             |
| Isolation Valve                           | £22.00                              |
| <b>SHOWER RECOMMENDATIONS</b>             |                                     |
| AV Wall Mount                             | £100.00                             |
| Wall Mount                                | £45.00                              |

Table: Product Costs \*Prices provided are an average cost to supply and fit the recommended devices

### 3.3 Enhanced Capital Allowance

#### What is the ECA water scheme?

The ECA water scheme encourages businesses to invest in technologies that save water and improve water quality.

The scheme lets your business claim 100% first-year allowances, for example, tax relief, on investments in certain technologies and products.

Claiming an ECA means you can write off, for example, deduct, the whole cost of buying a qualifying water-efficient technology against your taxable profits in the year you bought it. For more information, see the section below on how to claim an ECA for water efficient products.

Only new plant and machinery are eligible for an ECA, used or second-hand plant and machinery do not qualify. Eligible equipment is found in the WTL. The criteria may be reviewed annually to keep pace with technological progress. See the section below on technologies covered by the ECA water scheme.

#### Benefits of the scheme to buyers

Claiming ECAs for buying water efficient equipment will enable your business to reduce investment costs and its environmental impact. Benefits include the first year tax relief. This will reduce the time it takes to pay back your investment. Your water bills will also be reduced long-term by installing water-saving equipment. Organisations which are not eligible for tax relief (including capital allowances) such as local authorities, schools and non-profit organisations, can still use the WTL as a source of information on equipment that may save water and reduce water costs.

For general enquiries about the WTL, you can call the WTL Advice Line on Tel 0844 875 5885. Alternatively, you can email your questions to [wtl@aeat.co.uk](mailto:wtl@aeat.co.uk).

### 3.4 Liability Disclaimer

*This report is prepared solely for the confidential use of the customer named in the report and solely for the purpose of providing an overview of the efficiency of the customer's use of water at the site identified in the report, together with recommendations as to how the customer might increase such efficiency. It may not be relied upon by any third party. While steps have been taken to ensure its accuracy, neither Thames Water nor agents acting on its behalf Aqualogic (WC) Ltd owe or cannot accept responsibility or can be held liable for any loss or damage arising out of, or in connection with the information within this report being inaccurate, incomplete or misleading. Neither Thames Water nor the agents acting on its behalf Aqualogic (WC) Ltd makes any representations or warranties as to the accuracy or completeness of information within this report. The information within this report is based upon data available at the date on which the customer's site was inspected. Any suggested savings arising from Thames Waters agent's recommendations are estimates and as such are not guaranteed.*

*Installation of any products or plant modifications following recommendations detailed in this report should always be carried out by a qualified technician in compliance with water regulations. It is the responsibility of the audited commercial customer to commission any further works and the customer does so at its own risk.*