

## Water Efficiency Strategy 2020-2023



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## Introduction

This Water Efficiency Strategy (WES) seeks to formalise the University's approach to reducing water consumption on campus. One of the major challenges of operating the UK's largest single campus University is managing the private utility networks that provide gas, electricity, heat and water to the more than 300 commercial, academic and domestic properties.

The provision of potable water has been problematic in recent years, with more than 16km of pipework, much of which was laid more than 50 years ago reaching the end of its usable life. As the infrastructure ages we have developed tools and processes that have helped us to make considerable savings both through water leak detection and through reductions within buildings themselves. We've also invested in water efficiency equipment like water-less urinals and rain water harvesting systems as well as putting in place stringent water based specifications in all new developments.

We know however that we need to do more therefore the purpose of this document is to build on the strong current position and support the ambition for Keele to be one of the most environmentally sustainable University's in the UK.

This Strategy specifically serves to provide:

1. An appropriate and accurate water baseline from which progress can be measured
2. Targets which are Specific, Measurable, Achievable, Realistic and Timely
3. An assessment of the resources required to meet the targets
4. A process detailing how progress against the target will be measured and reported
5. The approach to achieving the targets including an action plan
6. Details of the roles and responsibilities for those involved

## Keele University's Sustainable Vision

At Keele University, we aim to be a beacon for environmental sustainability in how we live, work and play. It is one of the core values of our Strategic Vision and we are serious about making it happen.

We are consistently seeking to improve the way that we work to decrease the University's impacts on both the environment and the wider community. Through our teaching, research, spending power and commercial activities we can have a significant positive effect on society and help to deliver a sustainable community in which our staff and students live, work and study.

We have in place a robust Environmental and Social Sustainability Policy which outlines our aims and ambitions. Agreed and approved at the highest level of the organisation by our Vice Chancellor we commit within it to:

***'Develop a Water Efficiency Strategy to reduce overall water consumption year on year'***

This document fulfils the first part of that goal and provides us with a clear approach to achieving continual improvement going forward.




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### Sustainable Development Goals

The Keele University approach to environmental issues is directed by the 17 UN Sustainable Development Goals, a series of targets and objectives agreed by all United Nations Member States in 2015. The SDGs provide a blueprint for all organisations and individuals to understand what they



need to do now and in the future to deliver a better environment for everyone. Particular to water, we have considered the following goals and aspects when developing our approach:

<p><b>6 CLEAN WATER AND SANITATION</b></p> 	<p><b>13 CLIMATE ACTION</b></p> 	<p><b>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</b></p> 
<p>6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity</p>	<p>13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries</p>	<p>9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities</p>

### Aims & Objectives

The Aim of this strategy is to contribute to the Universities sustainability objectives by minimising water consumption.

Objectives:

- To have in place a specific, measurable, agreed, realistic and time-bound target for water consumption per student head
- To encourage staff and students to reduce water usage
- Increase water efficiency through the deployment of new and existing technologies
- Comply with all applicable Legislation
- Operate an efficient and effective leak detection system to decrease the number of water leaks on campus each year
- Install and maintain metering on all significant assets to help manage and monitor consumption
- Implement where appropriate water capture and generation systems

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## Scope, Baseline, Targets and Resources

### Scope

This Strategy is applicable to the Keele University Campus in its entirety, including the operation of Keele Science Park, Keele Park Developments and Keele University Science and Business Park. It however only monitors consumption reported against the metered water usage that results from either the commercial tenants or the domestic staff housing. As the consumption in these properties is not directly controllable by the University, they are excluded from the baseline and targets.

The Halls of Residence on campus are included within the scope as although consumption in these buildings is primarily controlled by students and they use it as they wish, the University is able to heavily influence through behavioural change and asset improvement.

The off campus facilities at the University Hospital of North Staffordshire and the Royal Shrewsbury Hospital, where the energy and water provision is managed by the respective NHS Trust and supporting PFI Agreement, is also not included within the Plan, although it is anticipated that best practice and working standards will be implemented in these areas.

Document KW03 shows the campus meter tree for water, clearly showing those which are included as part of the WES and those that are not.

### Baseline

Water consumption in the 2019/20 academic year is determined as the baseline year, with a modification to allow for the impact of Coronavirus. The in-scope water consumption is identified by taking the metered values at the two main campus supply points and then subtract the commercial (those that meet the EMR criteria) and domestic tenanted metered water consumption over this period. The 2020/21 April to July consumption has been replaced by the 2019/20 consumption to account for the lower level of activity seen on campus due to Covid-19.

### Absolute Water Consumption

In the 2019/20 year (April 2019 to March 2020) the actual consumption is as follows:

Total Campus Consumption	248,633 m3
Metered commercial tenants	- 26,643 m3
Metered domestic tenants	- 10,745 m3
<b>Total in-scope water</b>	<b>211,245 m3</b>

Table 1 - Total in-scope water consumption

### Relative Water Consumption

Monitoring absolute water consumption is essential as this is the key factor that impacts on the cost to the University and the resultant scope 3 carbon emissions that the University must report and in the near future potentially offset. It is clear however that a relative target can be more appropriate to demonstrate and understand how efficiency is changing over time as the University expands or contracts.

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The consumption of water as a proportion of the number of full time equivalent students is seen as the most appropriate measure at this time as it would be expected that as the University's activity increases, the size of the student body would also. The number of FTE students is derived using the EMR definition and is provided by Student and Academic Services.

This figure is the primary Water Performance Indicator within the WES (WPI01).

The baseline is therefore set as below:

	Consumption	FTE Students	<b>m3/Student FTE</b>
2019/20 Baseline	211,245 m3	9,483.1	<b>22.28</b>

**Table 2 - Water baseline**

The water consumption per Gross Internal Area (GIA) of campus buildings, a common metric to measure efficiency, is not currently used as not only is it not necessarily representative of changes in activity levels of long periods, but also the accuracy of such figures is difficult to determine with a high level of confidence at this point.

### Targets

In 2019, the University put in place at a strategic level Key Performance Indicator for water efficiency for the first time. This is representative of the goal of the University to continue to be a beacon for sustainability in the sector and the increasing focus on water consumption as a key responsibility. The original target was ambitious however the significant advances that we achieved in the subsequent 12 months, particularly in leak detection and repair, reduced campus water consumption by more than 35% and therefore the long term targets were achieved far earlier than anticipated. We have therefore set out to revise this target to further reduce campus water consumption.

### Water Efficiency Target

To ensure a challenging yet realistic target, an in-depth assessment has been carried out analysing factors that are likely to affect performance over the period. These include:

- Continued funding for deployment of the water meter programme to increase the ability to find opportunities for water saving
- Continued investment in the water network as per the Backlog Maintenance Programme
- Natural improvements from replacement of equipment (such as the Halls Improvement Project)
- Improvements to behavioural change

In addition, consideration has been given to the benchmark comparison group within the HESA EMR data and it is seen to be challenging yet achievable to be able to break into the top 75 percentile from the current position in the bottom 25%.

There are several large-scale infrastructure projects that are at the various stages of completion which would result in an increase in water consumption before 2022. The construction of these new buildings, such as the vet school, has been considered although as their completion is expected to lead to a commensurate increase in student numbers it will not significantly impact on the target.

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With the above considerations taken into account, the target is declared as:

***Water efficiency will increase by 17% by 2023 against the 2019/20 baseline.***

***This equates to a target of 18.5m<sup>3</sup>/FTE per year***

### Resources

Defined responsibility for water management exists within the Estates Team with the Energy Manager, the Principal Mechanical Engineer and the Plumbing Team Leader involved in both proactive and reactive works.

Specific budget lines are in place to deal with leak detection and to improve metering provision throughout campus. Behaviour change initiatives are funded from the wider Estates budget as required by the Team in conjunction with the Environment Manager.

There is in place specific funding for reactive capital works within the backlog maintenance budget. Projects are typically identified by the Estates Planning Team and appraised for approval within the annual programme and it is through this that the majority of the larger pipework replacement works are carried out.

In cases where projects are identified which require a large capital investment, the costs being outside the scope of those budgets already available, then these will be considered on a case-by-case basis with thorough feasibility proposals and business plans being submitted to senior management for consideration.

### Achieving the Target

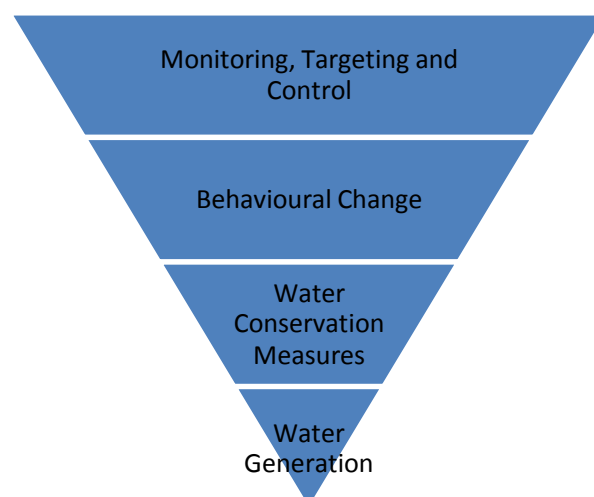
The University has adapted the basic planning principles detailed within the ISO50001:2018 Energy Management Standard to define the specific requirements and processes that take place improve water efficiency. The opportunities are appraised against the hierarchy shown in figure 4 to ensure that the resources available to increase water efficiency are targeted against those solutions which can deliver the highest return on investment.

An Action Plan is included as KW02 which details how each area will be improved going forward and is subject to review annually.

#### Monitoring targeting and control

The University has deployed more than 300 high quality water meters, many of which are automated and which deliver precise measurements of water consumption both at a fiscal level and for individual areas or buildings throughout the campus.

The ability for the university to see where water is actually being used is key to ensuring that efforts and resources are targeted at the areas that represent the best potential for water savings. Whilst



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the installation of meters is important, the ability to collect, process and display this data in meaningful ways is paramount.

With such a high number of meters on campus, the quantity of data can quickly become overwhelming. For this reason a monitoring and targeting software package is employed to provide up to date and on demand consumption and exception reports and logging of data. This naturally leads to savings, and is particularly helpful in identifying erroneous consumption which is often the result of equipment failure which may not have been detected otherwise. With this software package already in place, the installation of further sub metering in appropriate places should lead to significant savings and cost avoidance.

Despite the widespread deployment of water meters on campus, there are still buildings which do not yet have a water meter, or would benefit from additional metering being put in place to provide better data which could identify opportunities for greater efficiency. An overview of campus metering, detailing the buildings/areas that would benefit from additional monitoring, is found within document KW04 and forms the basis of the Metering Installation Programme. Using existing dedicated financial resource from within the Estates budget, those buildings that consume the highest volumes of water are prioritised for installation.

The provision of water meters on to the domestic housing stock has been a priority over recent years, allowing people to better understand and control their usage. Although a relatively small proportion of the water consumption, the greater the quantity of domestic metering that is in place, the more consumption that the University can remove from its scope.

Fast and efficient water leak detection and repair is essential to achieving the targets, as experience has shown that even large leaks on the network can be difficult to pinpoint and fix. A specific Standard Operating Procedure exists within the associated Water Management Plan and this is employed by University officers to both detect and leak and then identify its precise location. The cost of leak detection is typically met within the reactive maintenance budget.

We will monitor our success in this area against the following EnPIs:

- Percentage of campus water consumption which is metered at building level (WPI02)
- Number of core sub meters which are reporting data automatically (AMR) (WPI03)

### Behaviour Change

The role that University staff and students have to play in managing water consumption on site cannot be understated. The University has invested much time and effort increasing energy and water literacy on campus, including for example the integration of sustainability throughout the undergraduate curriculum, ensuring that those people that use our buildings know how to reduce their impact. This approach to behaviour change helps in making a significant impact on total consumption with comparatively low levels of investment.

To ensure that staff and students are engaged and aware of the impact that they have on our utility consumption and associated carbon emissions a Behavioural Change Strategy has been implemented. Focusing on specific actions which promote energy and water saving habits and

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behaviours, the strategy includes provision for an annually updated action plan and progress is reported separately to the Environmental Sustainability Steering Group.

The relationship between the Estates Team and the building users is incredibly important as staff that are employed specifically to reduce water demand can only be in one place at a time. The easy flow of information back and forth is paramount to allow building users to feed back when opportunities for saving water are missed and for the Estates Team to provide feedback information showing that actions are resulting in progress. A portal is available on the Keele website to allow both students and staff to feedback opportunities for improvement.

### Water efficiency

Water conservation measures are identified primarily through building audits which are routinely undertaken in campus buildings but are typically targeted at those buildings where metering indicates that there is an opportunity for saving. These projects can include water conservation measures such as water flow regulators, low flow fittings and waterless urinals and are listed in priority order based on factors including payback period, maintenance benefits and secondary advantages. Measures are also identified through routine engineer visits and staff/student suggestions.

A list of all initiatives that could deliver water savings is kept centrally on the 'Potential Project List' found within the Energy Management System. Each proposal includes, where relevant, an estimate of the capital investment cost and the projected water, cost and carbon savings.

Dedicated funds are provided for by the Estates & Development Directorate budget for projects that meet specific cost/carbon saving criteria and the performance of each project is formally monitored through a set measurement & verification procedure.

To ensure that all new building projects or refurbishments consider whole life costs and environmental best practice, the Energy Manager and Environmental Manager are key consultees at design stage. A specific design review code of practice is in place and a design statement has been created to specify the University's aspirations for all new developments that are under the direct ownership and operation of the University.

### Water generation

It is clear that it is better to ensure that the wastage of water on campus is minimised before any priority is given to creating water from ground sources (such as boreholes) or from rainwater harvesting. It is therefore not a key priority however, consideration will be given to longer-term projects where cost effectiveness can be proven.

Typically, where implemented these will have to be of sufficient size and quality as to provide a real environmental benefit. Experience on campus has shown that often the cost and maintenance of smaller systems is outweighed by the relatively small quantities of fresh water that is displaced.

All feasible water generation projects will be included in the centrally managed 'Potential Project List' for consideration where funding becomes available.

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## Reporting

### *Monthly*

A review of performance is provided each month as part of the budget review process, detailing the total water consumption, spend and deviation from forecast. Trend analysis is provided to allow the comparison between preceding months and previous years to help identify anomalies and performance trends.

### *Quarterly*

Quarterly updates are provided to the Environmental Sustainability Steering Group (ESSG). The ESSG is the management reporting group which is chaired by the Vice Chancellor and is the link between senior management and day to day operation of utilities management.

### *Annual*

Annual updates are provided as part of the University wide sustainability report which is typically provided bi-annually. This includes an overview of the water performance for the preceding period including an overview against the target. Water consumption data is also submitted each academic year to the Higher Education Statistics Authority (HESA) for publication in the Estates Management Record. Water consumption metrics are reported within public annual league tables such as the People & Planet and UI Green Metric.

## Review

This Strategy should be reviewed once per year under consultation with the ESSG as part of the reporting process. This will include an assessment of how appropriate the target remains, particularly on review of major projects which are in the pipeline.

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