Case study: Water efficiency

Delivering water efficiency on the London Olympic Park

Water efficiency measures are the most cost effective and sustainable method of reducing water consumption. This case study describes how the Olympic Delivery Authority set an agenda for water efficiency and embedded this in design briefs, the procurement process and contracts for buildings on the Olympic Park.

Project details
The Olympic Delivery Authority (ODA) is the client responsible for the design and construction of the Olympic Park in London, with a strong commitment to sustainability. ODA research conducted at the beginning of the project concluded that a 30-35% reduction in potable (drinking) water use could be achieved compared to industry standards at the time, primarily through the use of best practice water efficient fittings. The ODA also had non-potable supply opportunities on the Park, so a challenging yet achievable target to reduce potable water consumption by 40% potable water consumption against a 2006 baseline was established. The target was included in the ODA’s Sustainable Development Strategy and enforced as a planning condition.

The 40% target was applied across permanent venues and infrastructure on the Park, which included permanent sporting venues (Stadium, Aquatics Centre, Velodrome, Handball Arena, Eton Manor Sports Complex), the Media Hub, irrigation of Parklands and sports pitches, and the Energy Centre.

Focus on water efficiency
The ODA’s water strategy to meet the 40% target focussed on primarily reducing water demand on all projects through efficient fittings, controls and appliances. This was the most cost effective and sustainable water saving method. Non-potable water supply options were then considered by each venue, and taken forward where technically and financially feasible.

Delivery
To ensure water efficiency measures were delivered, the ODA embedded requirements into design briefs, the procurement process and contracts, and put in place a rigorous review process throughout design and construction. The actions taken at each of these phases is outlined below.

<table>
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<tr>
<th>Strategy and Targets</th>
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<tr>
<td>Design brief and design guidance</td>
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<tr>
<td>Procurement documentation and contracts</td>
</tr>
<tr>
<td>Construction management and close-out review</td>
</tr>
</tbody>
</table>
Design Briefs
The ODA integrated high level objectives and targets related to sustainable water use into the venue design briefs so that design teams were aware of their requirements from the outset. An extract is provided below.

<table>
<thead>
<tr>
<th>Water objective</th>
<th>Overview</th>
<th>Specific requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>To optimise opportunities for efficient water use, reuse and recycling</td>
<td>A proactive and practical approach to water management will be taken throughout the Olympic Park site. The ODA proposes to minimise the demand for potable water by using water efficiency technologies and management practices.</td>
<td>Achieve a 40% reduction in potable water compared to current industry practice. Reduce demand through management techniques and behavioural change. Reduce demand via water saving technologies. Use alternative sources of non-potable water, such as rainwater and greywater, where feasible and cost effective to do so. Water supply pipework and pumps to meet demand until 2025.</td>
</tr>
</tbody>
</table>

Market research
In order to gain a clear understanding of the current market and latest innovations in water efficient fittings and controls, the ODA organised a Water Efficiency Presentation Day where companies presented their products to project teams. This day demonstrated that the sanitaryware industry has significantly developed in recent years in response to policy drivers, BREEAM and the Code for Sustainable Homes; and that historic issues of functionality, aesthetics and user interface are becoming less problematic.

Design guidance and workshops
To drive best practice and consistency across all projects, the ODA produced Implementation Guidance for Project Teams on Water, and held workshops with project teams. This helped raise awareness of the ODA’s water efficiency requirements at an early stage.

The ODA also developed a recommended specification for water efficient fittings, which included ‘preferred requirements’ and ‘minimum requirements’. These are shown in the table on the final page, along with a comparison against WRAP’s (Waste & Resources Action Programme) ‘practice levels’ of water efficiency.

Design development
At RIBA Stage C, venue teams were required to provide an initial water model to the ODA and commit to water efficient fittings in design reports. At RIBA Stage D, teams were required to update the water model, carry out a feasibility study of non-potable opportunities and produce a Water Use Statement for the buildings’ planning permission. At RIBA Stage E final updates to project water models were made, a building-specific target was set, and specifications for sanitary fittings were produced.

The ODA reviewed design reports and the venue’s water models from RIBA Stages C-E. Water use data was amalgamated into an overall water model for the Olympic Park, to track and report progress against the 40% target.

Procurement and contractor appointment
At pre-qualification questionnaire (PQQ) stage, Tier 1 contractor’s environment and sustainability policies and experience were assessed. At the Invitation to Tender (ITT) stage, contractors were required to answer a number of sustainability questions and typically only one would be on water. The questions were tailored for specific contracts.

The contractual Employer’s Requirements were included in the tender documentation. This outlined the ODA’s expectations for water efficiency and specified compliance with the Implementation Guidance for Project Teams on water.

The contract formed one of the most important tools for assuring that contractors delivered against their intended designs. A key learning point is to include detailed requirements and specific design-stage targets for water efficiency in contracts.

Each Tier 1 contractor had its own process for procuring their own sub-contractors and ensuring the requirements for water efficiency were transferred down the supply chain.

Construction management and review
During construction, the ODA carried out audits and site inspections with contractors to ensure they were procuring and installing the correct specification.
**Outcome**
All permanent buildings on the Olympic Park have specified low flush toilets, low flow showers and low flow taps. The Stadium, Handball Arena and the Media Hub have also specified waterless urinals. As a result, buildings on the Park achieved an average 33% water saving (against 2006 industry standards) through water efficiency measures which is a significant achievement. When non-potable sources of water are taken into account, the Olympic Park is expected to reduce potable water consumption by at least 57% (compared to the 40% target).

The process of driving water efficiency requirements through from design to installation has been fundamental to this success. The ODA’s process has informed the development of WRAP’s guidance on Procurement requirements for water efficiency.

**Key learning for future projects**
The key learning from the ODA’s experience, which is consistent with WRAP guidance, is to:

- set a clear objective for water efficiency early in the project;
- put processes in place to deliver the water efficiency objective through design, procurement and construction;
- assess the current market for water efficient fittings and engage the design team, suppliers and contractors to pursue the most appropriate solutions;
- specify performance and flow rates, rather than percentage reductions. This provides greater clarity to the contractor throughout design and procurement and reduces the ambiguity of targets;
- remember that there is a practical limit to water efficiency; the ODA’s key driver was always to reduce consumption as far as possible without compromising performance or placing onerous maintenance burdens on Legacy owners;
- produce a Water Efficiency Plan with clear specifications for water efficient fittings; and
- put processes in place to ensure the design intent and performance requirements are understood even when the project reaches the facilities management stage – through a Water Efficiency Plan or similar.

The ODA has produced a sustainability learning legacy research paper on the Olympic Park’s water strategy, which readers should refer to for more detail. This is available from: [http://learninglegacy.london2012.com/publications/the-olympic-park-water-strategy.php](http://learninglegacy.london2012.com/publications/the-olympic-park-water-strategy.php)
Comparison of ODA’s specification for water efficient fittings to WRAP’s Procurement Requirements for Water Efficiency.

<table>
<thead>
<tr>
<th>Fitting</th>
<th>Flow rate</th>
<th>Fitting</th>
<th>Flow rate</th>
<th>Comparison to WRAP’s ‘practice levels’ of efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinals*</td>
<td>Low flush urinal with individual PIR controls</td>
<td>1 l/flush</td>
<td>Fan assisted waterless urinal</td>
<td>Waterless</td>
</tr>
<tr>
<td>Toilets</td>
<td>Cistern valve flush with spring mechanism or delay valve siphon flush mechanism Manual</td>
<td>4.5 l/flush</td>
<td>Cistern valve flush with spring mechanism or delay valve siphon flush mechanism with PIR</td>
<td>4.5 l/flush</td>
</tr>
<tr>
<td>Taps**</td>
<td>Push controls with aerated flow</td>
<td>5 l/min</td>
<td>Passive infrared detector (PIR) with aerated flow</td>
<td>5 l/min</td>
</tr>
<tr>
<td>Showers***</td>
<td>Push controls with aerated flow</td>
<td>9 l/min</td>
<td>Passive infrared detector (PIR) with aerated flow</td>
<td>6 l/min</td>
</tr>
</tbody>
</table>

* Waterless urinals that rely on consumables for hygiene are considered less sustainable than low flush urinals with PIR controls
** PIR sensor should be located under the tap-head, operational only whilst hands are in position
*** A thermostatically balanced mixer with integrated aeration device will improve shower performance