Water Management Case Study

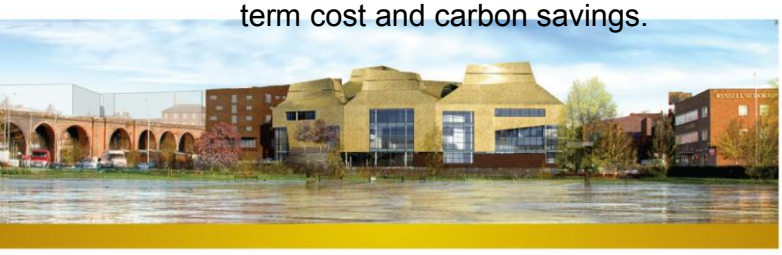
The Hive is a partnership between Worcestershire County Council, the University of Worcester and Worcester City which will provide a fully integrated public and university library, customer service centre, historic archive and archaeological services. These services will be provided in a development of high design and environmental standards. The project is due for completion in January 2012.

The project has been procured using the PFI Competitive Dialogue Process. To ensure that the partners design and environmental ambitions were met the procurement documentation included a unique 160 page detailed design statement, evaluation criteria weighted towards environmental performance and measurable operational requirements for energy and water consumption through the life of the PFI contract. The detailed Design Statement required the adoption of the BREEAM water use calculator, offers good practice examples of water management within the County and also encourages bidders to consider the energy potential of the River Severn. The importance of water management in all its aspects was emphasised throughout the competitive dialogue process. The selected design, construction of which will be completed in January 2012 includes a number of significant features related to water management.

The flood risk assessment for the development identified a flood storage compensation net gain of 1136m3. This was achieved in spite of the restricted nature of the site, by the careful location and planning of the building itself. Subsequent discussions with the city of Worcester led to the introduction of soft landscaped areas in public car parks adjoining the site which further assist with flood mitigation.

An ecologically based soft landscaped zone has been created on the western side of the site. This serves also to mitigate the impact of floods.

The energy potential of the River Severn is captured by using river water throughout the year. Water is extracted, pumped to the building then returned to the river with minimal impact upon the downstream temperature. In the summer this provides cooling and in the winter some heat to closed circuits of embedded pipe work in the floor slabs. Adoption of this technology is a major contributor in the project achieving an overall carbon emission of only 15.8 kgCO2/m2. The system involves the extraction and return to the river of 32 liters of water per second. A 5m deep chamber located within the river bank so as not to disrupt flow, contains the pumps and filter mechanisms. The 180mm diameter, 300m long flow and return pipes were installed using directional drilling to avoid disturbance to the roads and car park above. The electrical energy used per year will be 1/3 of the energy used by standard air cooled chillers, generating long term cost and carbon savings.



Rainwater harvesting from the extensive roof area feeds a 70m3 underground storage facility. This, combined with the use of reduced flow appliances has enabled consumption of potable water to be reduced by 40%. Periodically large volumes of harvested water are also used for the washing on site of archaeological finds. Conventional underground water storage would require a very large tank which would involve major disturbance of significant environmental archaeology with attendant costs. The contractor adopted the AquaSpira system which provides the equivalent capacity in linked 1350mm diameter pipes without the need for deep excavation, thereby leaving the archaeology un disturbed.

Meters with digital pulse outputs, connected to the BMS will monitor main incoming water consumption and rainwater consumption. Sub meters, monitor consumption by the buildings cafe and also the archaeologists' finds washing facility. These metering arrangements are an essential part of the strategy for managing ongoing utilities costs. The data provided will also assist the County Council in managing the environmental impact of its wider estate. The University of Worcester will also use the data as part of the monitoring process required to maintain its Eco campus status.

The concern for good water management extended to the construction process its self. The in-situ reinforced concrete structure required large volumes of concrete, much of it pumped to the point of use. This process generated large amounts of contaminated water from the cleaning of plant and equipment. A proprietary system was adopted which filtered out the cement based sediments and then used CO2 to neutralised the filtered water before its disposal.

- Client: Worcestershire County Council with the University of Worcester.
- PFI provider: Galliford Try Investments
- Construction: Galliford Try Construction
- Design: Feilden Clegg Bradley Studios, Grant Assciates, Hyder Consulting, Max Fordham. (RWC system is contractor designed by Briggs & Forrester/Hydro X as is the rainwater harvesting tank by AquaSpira).

Iain Paul
The Hive Design Manager