

## SWG Awards 2013: The Triangle, Swindon – integrated water management system

Studio Engleback and Curtins Consulting, architects GHA, energy Max Fordham LLP, client HAB Oakus

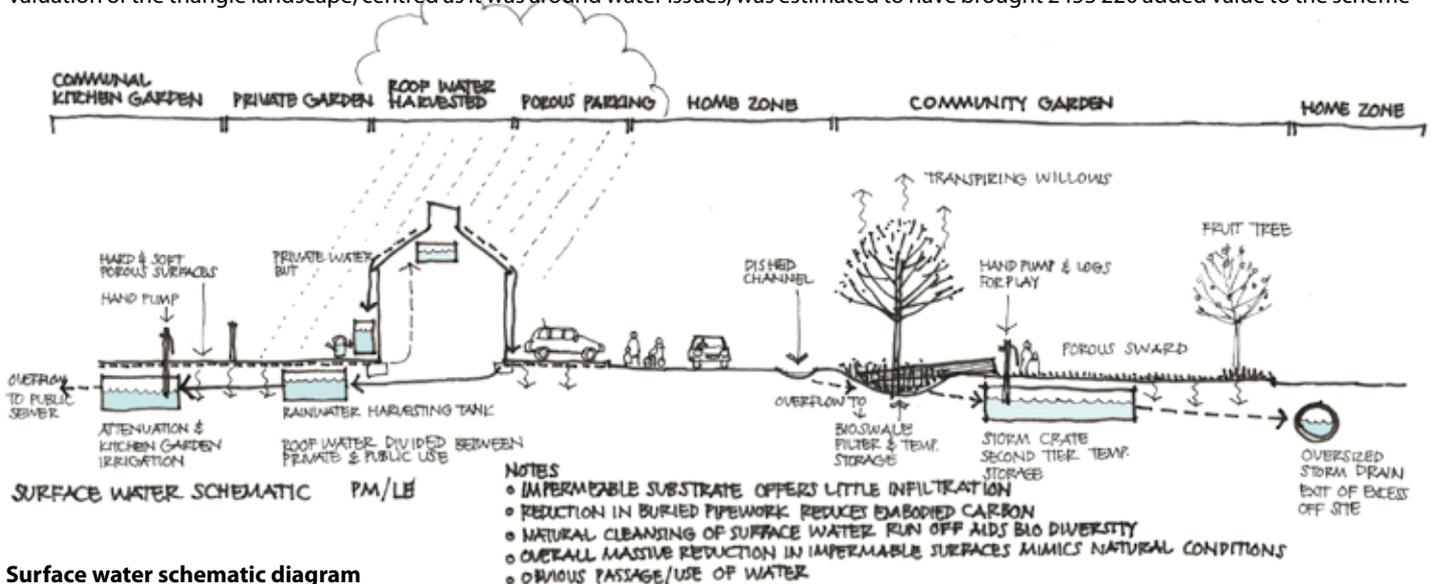


Dished channel collects surface water, bioswale is first tier of retention and cleaning, storm crates under the green is second tier of storage, oversized pipes under road is third tier. Green space and porous parking reduce run off. Roof water is harvested.

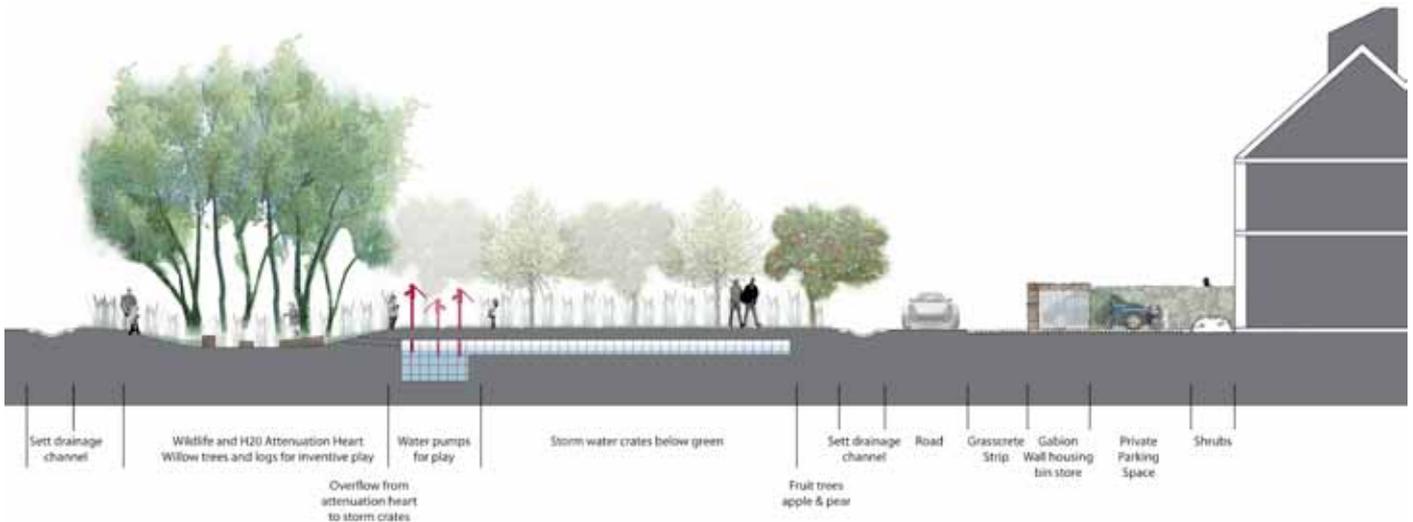
**What:** The Triangle is an award winning development of 43 code 4 low cost homes (2, 3 and 4 bedrooms) by TV presenter Kevin McCloud's company HAB in association with the local RSL, Green Square. The Plan was developed jointly by GHA, Studio Engleback, and Curtins Consulting. The GHA houses are low carbon, using Hemcrete, passive ventilation and heat recovery. The plan retains over 50% of the area for contiguous multifunctional open space. The integrated plan combined social requirements with water attenuation and storage, biodiversity, edible streets and gardens, to aid *conviviality*. Water was a driver for the deceptively simple plan. Roof water is harvested in private gardens for reuse in the houses, & overflows the communal tanks in two kitchen gardens accessed by hand pumps to irrigate vegetables and fruits. Porous surfaces maximised to reduce flows to sewers and retain on site moisture during drought for evaporative cooling. A wide dished channel on the surface within the adopted road width conveys surface water & eliminated the need for any drainage pipes under the carriageway reducing site CO<sub>2</sub> related to drainage pipes by 420kg. The design also provided easy inspection of the drainage system from the surface, any repairs are simple and do not require digging through the carriageway. It issues to a bioswale on two sides of the central triangular green. The base of the swale is planted with white willows and damp meadow species for biodiversity, water cleansing, air improvement, urban thermal regulation, and aesthetic amenity - making reference to the landscape signature of this clay lowland. It is a place for playing in, with stepping and balancing logs and bridges, and it forms a barrier for cars that might be tempted to park on the green. Water filtered by vegetation is conveyed to storm crates under the green, a hand pump linked to a rill carved in a tree trunk allows kids to play with water. Finally, any excess water from the storm crates can be stored in oversized storm drains under the road, a requirement of Thames Water. Despite the wettest summer on record, this system, conceived to hold onto water where the rain drop fell, worked well.

**Why:** Studio Engleback has long promoted a *whole system* approach to city building which we term Ecurbanism. Working with Curtins helps us attain our goals. Our philosophy combines the need to *design for future climate change* and to reduce excessive resource use. We need to show that it is possible to *do more with less*. The design is informed by the cultural identity of 'place making' using local plant associations, and promotes biodiversity. Growing food & having the water to irrigate it is part of design for future climate change and of resource stress that may occur as the global supply chain is disrupted in unexpected ways. Making these processes visible and understandable is a key part of our work. We wrote a book, distributed with packets of seeds to all residents, about the edible landscape that explained why we should conserve water, grow some of our own food to reduce carbon emission in food miles, and conserve biodiversity needed to pollinate the food.

**How :** The Swale is designed to hold over 50 cubic metres of water, the amount from a heavy rain event that has to be retained on site according to EA rules, before it dissipates into storm crates that form a second layer of attenuation and temporary storage, and then the Thames Water requirement of oversized pipes as a third tier. Battling to reduce car parking by providing sheltered cycle storage for all homes, a car club, proximity to bus services and an innovative tablet located in each home called a Shimmie that gives information ranging from bus and train times to energy or water use, or local events and services, is part of this whole system approach. Roof water, less likely to be contaminated is collected for watering fruit and vegetables. The average house uses 43kgCO<sub>2</sub> per day in relation to water usage. With rainwater harvesting we could reduce this by approx. 50% (toilet flushing, garden watering and washing machine). Therefore occupiers save up to £210/year on water rates. Each person saves 75 litres of water a day, approx. 300 litres per day per household. Private tank is cost about £2k so has 10yr payback. The Valuation of the triangle landscape, centred as it was around water issues, was estimated to have brought £453 220 added value to the scheme



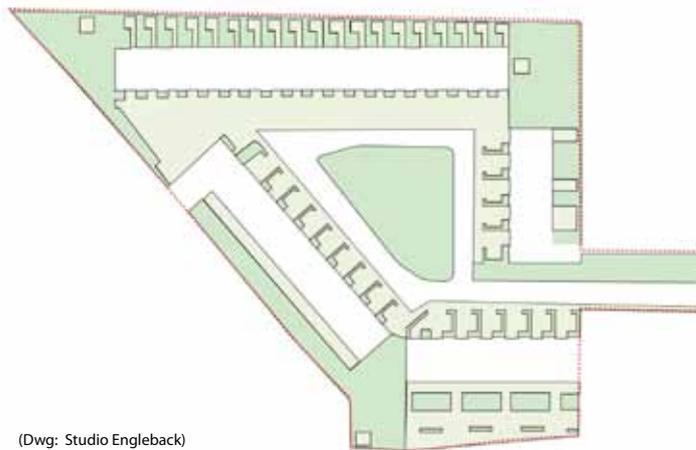
Surface water schematic diagram



**Section showing bioswale & willows, storm crates and water pump, dished channel & porous paved parking bays** (Dwg: Studio Engleback)



**Play pump fun with Kevin McCloud**



(Dwg: Studio Engleback)

**Plan: All hard & soft porous areas + water harvested from roofs**



**Hand pump in kitchen garden**



**Porous paved parking allows moisture to percolate espalier apple fences - water & food connected**



**Porous parking reduces water flows to street, dished channel connect site visually and hydraulically and issues to bioswale with a temporary holding capacity of just over 50m<sup>3</sup>, willows in base of swale transpire water and giver summer cooling + biodiversity benefits. Wet meadow vegetation in swale will filter/clean water before it is sotred some more in storm crates. Overall the capacity of the to hold ontl water is greatly increased.**



**Roof water is first stored for use in houses to reduce water use, excess to tanks under kitchen garden to irrigate food. porous surfaces also reduce water runoff.**

Significantly, the scheme was used as an example in the pioneering CABI initiated study completed by the HTA that looked at the monetised value of landscape, published in October 2011. Green engineering is not new, but the value placed upon it is gradually being recognized, and this can be a driver for creating better integrated more attractive multifunctional places for living in. Dealing with water is central to this, weather in excess or in deficit. The Valuation of the triangle landscape, centred as it was around water issues, was estimated to have brought £453 220 added value to the scheme, which was greatly in excess of the cost of installing the green infrastructure. Of this, the value of stored carbon was estimated at £1470/year, harvesting from locally grown food of between £14-25 000 per year depending on crops raised ( an estimated 900-1800kg), a saving on pollution control measures and up to 8°C lower peak surface temperatures.