

**EXPERT
VIEW**

Go with the flow

How do you plant along a river's edge, knowing millions of people could be passing through the site in the near future? The engineers of the wetlands and river edges for the London 2012 Olympic Park have been tasked with finding the answers to these questions

Covering more than 100 hectares of formerly derelict industrial land, London's new Olympic Park for the 2012 Olympic and Paralympic Games is one of Europe's biggest ever urban greening projects. As river edge and wetland engineers for the project, Atkins' remit includes design of the soft river edges and wetlands, including riverbank restoration and bioengineering. More than 8km of riverbanks are being restored as part of the project; in tandem with this, two hectares of reed beds and ponds are being created, along with 9,000 sq m of rare wet woodland. The masterplan for the park is the brainchild of two companies, LDA Design and landscape architects Hargreaves Associates.

According to David Thompson, director of Oxford-based LDA Design: "The challenge from a landscape point of view is about getting people

both visual and physical access down to the river. This was the main change that the design team brought into the project – to actually make the rivers more accessible and more open and therefore the centrepiece of the park." Mike Vaughan, who heads Atkins' multidisciplinary design team, said: "The idea is to open up the river corridor by making the steep slopes that line the river flatter. By dropping the slopes, we've brought the river into the park and made it much more accessible – people can get close to the river and see what's going on there." Getting the riverbank geometry just right was a balancing act – too steep and the banks would need costly artificial reinforcement; too shallow and they would start to eat into valuable space on the site. An optimum slope of 1 in 2.5 – about 22 degrees – was chosen.

One of the Lea Valley's best-known

landmarks, until recently, was the notorious Hackney fridge mountain. And until the Olympic Delivery Authority (ODA) took possession of the site in 2006, many of the river channels that criss-cross the site were clogged with invasive weeds, along with the predictable detritus of urban decay: abandoned shopping trolleys and car tyres. The Lea Valley's neglected river network wasn't only an eyesore but also an obstacle – a gulf separating Hackney and Tower Hamlets in the west from Waltham Forest and Newham in the east. "Before we started work on the site, there were really only three crossings," says John Hopkins, ODA project sponsor, Parklands and Public Realm. "But we'll be leaving behind more than 30 bridge connections across the Lea Valley and Lea Navigation." These new crossings will be vital not only during the Games, but also after 2012: they will stitch the

new Park and its waterways into the wider fabric of east London.

The process of transforming the Park's rivers from weed and rubbish-infested gulches into pristine watercourses has been long and tough. Flows and velocities were measured by Atkins at different points over a period of time, with data used to construct a detailed hydraulic model to predict flood risk. The modelling exercise was made more complicated by the impoundment of the river system during the course of 2008; in effect, this eliminated the direct tidal influence of the Thames. But its indirect influence is still felt. "When the tide comes in on the Thames, it stops water flowing out of the river Lea," says Vaughan. "So the river levels fluctuate by 400mm a day." Atkins' modelling calculations correctly predicted this phenomenon and also the increased risk of flooding.

The first step in the river restoration process was to "lay back" the banks, many of which were precipitously steep. This re-profiling was necessary as much of the surrounding land was "made" ground, the result of centuries of tipping that had raised the ground level by as much as 10m in places. Materials on the banks included rubble, glass, animal bones and more recently, war time demolition materials from London's east end.

Another challenge facing the Atkins team was the prevalence of invasive weeds. These included Himalayan balsam, Japanese knotweed and giant hogweed. All are fast-growing non-native plants introduced to Britain in the 19th century as garden curiosities; all have prospered on the wrong side of the garden wall. Invasives are bad news for riverbanks. They reproduce and grow with prodigious speed, driving out native plant species and they're highly resilient. Knotweed can force its way through solid concrete, while giant hogweed contains furocoumarins, sun-activated toxins that can cause skin ulceration. Elimination was a priority – soil was treated throughout the site and the banks stripped of all remaining vegetation. Deciding what to re-plant presented a challenge; new planting would have to fulfil not only ecological and aesthetic demands but engineering imperatives too. The Atkins design team chose bioengineering techniques rather than culverting and hard engineering for the project. That means protecting and consolidating riverbanks by using vegetation and natural products instead of concrete.

An added challenge was that the river network is semi-tidal. The twice-daily rise and fall of around 400mm had the potential to play



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havoc with new planting and the river's high sediment loads threatened to smother anything planted from seed or plugs. To find out which plants would fare best, Atkins conducted a riverbank planting trial along a 50-metre section of the Lea in the Olympic Park. The trial revealed that plug plants would be just too vulnerable. But plants pre-grown in coir – coconut fibre matting – resisted being washed away or swamped. Coir has other benefits too – it's easy and quick to install in rolls and pallets two metres long and a metre wide.

Creating a sustainable riverbank ecosystem means using native species. So before the banks were scraped back, seed was collected from suitable native aquatic species and stored in a seed bank. Some of this seed was then used by bioengineering and nursery specialists, Salix, who were appointed by the Olympic Delivery

Authority to cultivate plants offsite in what's believed to be one of Britain's biggest-ever nursery contracts.

Planting and earthworks are being managed by construction engineers BAM Nuttall. Over the coming months, the plants on their coir mats will arrive at the Olympic Park, 300 lorry loads of them.

Visitors to the Olympic Park will encounter one of the greenest and most environmentally friendly parks ever to be created for the Olympics. "We're pulling that really difficult trick of putting in infrastructure that's good for the Games but will work in legacy," says Hopkins. "This will be a great place to live and work, with rivers and parklands at the heart. Socially, economically and environmentally, there will be a terrific legacy – it's a new landscape powering a new piece of city." ■

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