



# THE ENVIRONMENT

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## The art of engineering

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Climate models  
vindicated

Why it's important to  
understand the variables

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Olympic legacy

Making space for nature

**CIWEM**





Transporting reeds

# OLYMPIC WETLAND LEGACY

**Debbie Walker** describes how London's Olympic Park is benefitting biodiversity



Restoring Olympic waterways



Planting reeds



Coconut husk



## PROJECT TIMELINE

**2005** London was announced as the venue for the 2012 Olympic & Paralympic Games

**2007** CRT and partners began the £20million construction of Three Mills Lock on Prescott Channel and a new sluice on Three Mills Wall River. This excludes the tide and creates an impounded, controlled water level above the lock. The lock has two water control gates, a 62-metre by eight metre tidal lock, a footbridge, lock control building, fish pass and fixed weir.

**2008** Salix was awarded the contract to install on site a Wetland Planting Trials Scheme.

**2009** Following the success of this trial, Salix was awarded the contract to deliver the largest ever native wetland and wildflower plant order ever seen in the UK. Three Mills Lock, fish pass and weir was completed.

**2010** Planting began at Salix Thetford Forest nurseries into 23,000-metres of pre-established coir rolls and pallets.

**2011** Salix began transplanting coir rolls and pillows in both the north and south of the Park. Each unit was tagged with a unique reference code to ensure it was installed in the correct location.

**2012** Salix installed soft engineering bank protection on the waterways in the north of the Park and won the contract to grow the plants needed for the floating water purification wetlands in the East Village, the former Athletes Village.

**2013** Two further contracts were awarded to Salix to continue soft river edge works in the legacy phase.

**F**ollowing the largest single bioengineering project ever seen in the UK, new wetland habitats are establishing well in Queen Elizabeth Olympic Park.

As part of the work to prepare the 560-acre park, Salix River & Wetland Services and the Canal & River Trust (CRT) helped transform the area's rivers from contaminated industrial waterways, into a mosaic of wetlands, restored river banks and rare wet woodlands.

The area that has become home to the Queen Elizabeth Olympic Park was once bisected by a series of interconnected industrial waterways and forgotten rivers, known as the Bow Back Rivers, all backwaters of the River Lea.

Ahead of the London 2012 Olympic and Paralympic Games, the Canal & River Trust (then British Waterways) worked with Olympic delivery agencies to build a new lock at Three Mills to control the water levels on this network of rivers and create an environment where new wetlands could establish.

To improve the waterways for navigation, the waterways also needed to be widened and deepened to allow 350 tonne barges through. More than 30,000 tonnes of silt, gravel and rubbish were dredged from the rivers and recycled or reused in construction works.

Lead designers, Atkins, produced a scheme of inter connecting wetland features including reed beds, ponds, wet woodlands and six kilometres of restored riverbanks. To ensure the successful establishment of the wetlands in time for the games, Salix and Atkins worked together to trial various plant establishment techniques in order for Atkins to develop the final wetland planting plans.

Ian Morrissey of Atkins, explains: 'Salix played a very important role in verifying our detailed designs for the Olympic wetlands through their support with the planting trials. Coupled with their expert knowledge of bioengineering and experience of establishing wetland planting in difficult conditions, their team proved invaluable in us realising a sustainable wetland design for the park.'

As part of the work to prepare the park for the games and its legacy, Salix was commissioned to plant 400,000 wetland plants alongside six kilometres of riverbank and new wetland habitats. The planting trials demonstrated that

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plants that were pre-established into the coir pallets and rolls established far better than through any other technique applied. This approach also meant that the planting could be installed rapidly in the run up to the Games.

Games venue construction work – including the need to remove large areas of alien invasive plants, like Japanese knotweed and Himalayan balsam, and decontaminate more than two million tonnes of soil, led to bare soil on many of the riverbanks.

To protect the river banks from erosion and allow the new plants to establish, Salix planted 400,000 wetland plants into 11,000 pallets and rolls made from coir fibres. Thirty species of water plants, including reeds, rushes, irises, grasses, sedges and wild flowers, were grown at their nursery in Thetford Forest.

David Holland, technical director for Salix, explains: 'Each coir roll or pallet was tagged with a unique reference code to ensure quality control and the exact layout of each planted unit was installed in the correct location within the Olympic Park. Amazingly only four out of nearly 11,000 units had to be replaced during the installation and establishment period. This is testament to the forethought of the plant species selection and the quality and maturity of the plants within the coir pallets.'

### THE BENEFITS OF USING COIR

Coir fibre is the outer husk of the coconut, which was traditionally a waste product. It is often used as a stuffing for bed mattresses or burnt as a cheap fuel.

Working directly and exclusively with ethical and sustainable suppliers in Sri Lanka, Salix imports compressed





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coir fibres and turns them into planting pillows called 'coir pallets' and large 'coir rolls' at its Thetford nursery. Salix has developed a close relationship with one particular village, helping to support the local community.

The 'woody' characteristics and high lignin content of the coir fibres mean it takes five to ten years for them to rot away - enough time for plants to root and protect the soil.

The fibres are pH neutral so most plants can grow in them. The coir is inert and doesn't release any toxic tannins or compounds as it biodegrades.

## BIOENGINEERING

Plants established in coir pallets can control erosion on new riverbanks and help manage flood risk.

Historically, large stone and concrete revetments (sloping structures) have been the usual method of riverbank erosion control on our UK waterways. But these soil bioengineering techniques can directly replace old fashioned 'hard' engineering, more often than not with greener and more sustainable 'soft' bioengineering.

Ecologist for CRT, Leela O'Dea, explains: 'Over the last decade the Canal & River Trust has transformed its engineering approach and has been at the forefront of applying soft bioengineering techniques to repair its waterways, including the Olympic waterways.'

'Soft bioengineering solutions were incorporated into the major dredging scheme as a sustainable way to re-use clean material, create new wetlands and help tackle water quality naturally.'

Wildlife is benefitting from the new wetlands established. Habitat has been created for invertebrates, amphibians, fish, birds and eventually, waterway mammals like otters and water voles.

Studies are underway to assess the success of this major habitat

enhancement project, including an invertebrate report and eel survey.

## THE LEGACY

The waterways of Queen Elizabeth Olympic Park became a key part of the London 2012 Games, from bringing in construction materials by barge to David Beckham's famous journey into the opening ceremony, where thousands of people sat on the riverside watching as sporting memories were made. The rivers can now host all manner of activities, from recreational boating and tour boat trips to canoeing and rowing in the shadows of the iconic sporting venues.

Leela O'Dea says: 'The Trust's role in the sustainable delivery of the Olympic Park was so much bigger than the building of Three Mills Lock, dredging and habitat work we led on. Throughout the planning stages we supported numerous authorities with technical engineering and environmental advice to ensure that there was no detriment to the navigation and improvements in habitat and water quality were made.'

'The Canal & River Trust environment team brought together technical and scientific disciplines from engineering, ecology, waste, contaminated land and water quality to find the most sustainable solutions. The transformation of these interconnecting waterways is apparent for everyone to see and we look forward to seeing them continually evolve and mature.'

David Holland, technical director for Salix, says: 'The legacy of the Olympic contract for Salix was to retain our growing beds at our nursery to create the largest such nursery in the world. Investment in holding greater stock for a longer period means that we can grow for two years and develop a product that is really mature and provides instant habitat.' ●



## FACT BOX

**300,000**  
tonnes of silt, gravel and rubbish dredged

**6km** of riverbanks replaced or enhanced

**8km** of waterways, including the River Lea, Channelsea River & Bow Back River

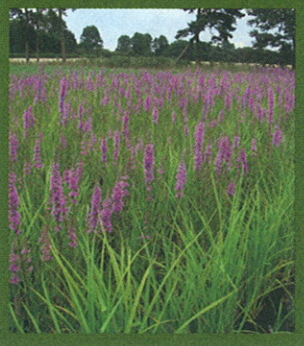
**560 acres** of parkland

**£20million** new lock

**400,000** wetland and wildlife plants grown

**23,000** metres of coir rolls and pallets

**30** species of water plants



Reeds growing at Thetford nursery