Olympic Park, London

Location

Olympic Park, Stratford, East London

Description

The Olympic development covers an area approximately of 250 hectares and houses the Olympic Stadium, Aquatics Centre, Velodrome, Copper Box, BMX Track, Eton Manor and Riverbank Arena together with sponsors hospitality, the international broadcast centre/main press centre complex, the Orbit Tower, extensive public access areas (landscaped & paved), transport malls and operational facilities.

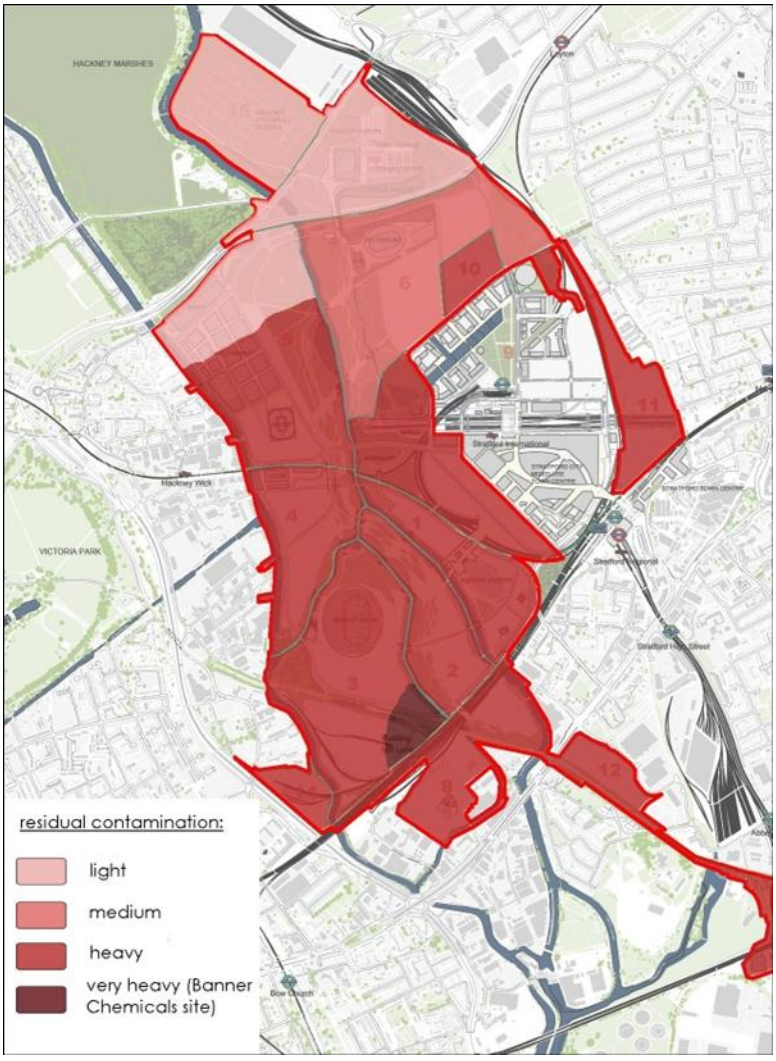

Figure 1 Anticipated residual level of contamination post remediation works (Barry Plowright)

The site was formerly industrial/commercial development together with Lea Valley Park and was a known depository for building rubble from properties demolished during the Second World War. The site was known to be contaminated throughout and overlays the river terrace gravel and chalk aquifers. Following completion of enabling works and remediation, the site will still contain significant areas of residual contamination. Figure 1 qualitatively depicts the expected level of residual ground contamination following remediation.

This limited the opportunity for employing infiltration drainage systems across the site. A number of strategic watercourses traverse the Park, these being:

River Lea

River Lee Navigation

Waterworks River

City Mill River

Old River Lea

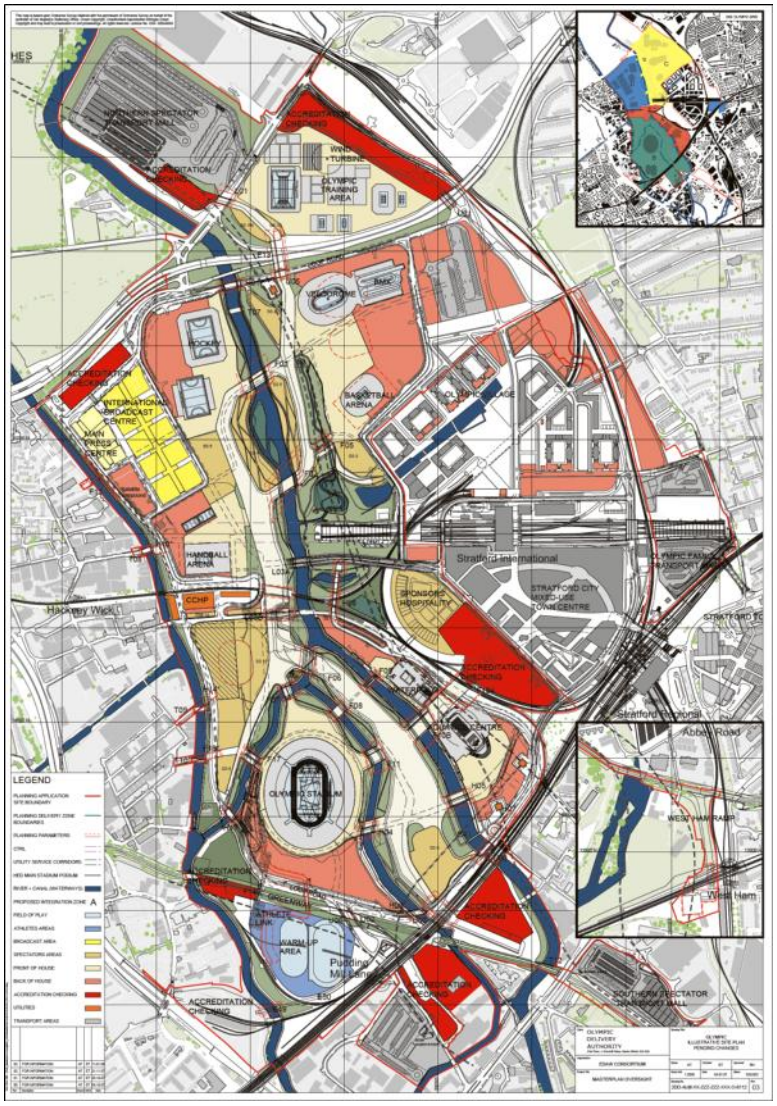

Figure 2 Masterplan of Olympic & Paralympic Park (games phase) (Barry Plowright)

The Park is protected against fluvial flooding and actively manages flooding generated by a 100 year return period rainfall event plus Climate Change allowance. Furthermore, the fluvial peak within the River Lea catchment was approximately 24 hours after a rainfall event and in negotiation with the Environment Agency and British Waterways it was agreed that surface water runoff generated should be collected and discharged to the watercourses in advance of the river peak flow (not providing the attenuation normally required on a SuDS scheme).

The site topography was dramatically changed during the course of the development with some areas of the Park being raised in the order of 9m. Similarly forming the wetland bowl within the River Lea required significant widening of the river channel reducing existing levels to suit. Plateaus have been formed for the venues and associated facilities above the river flood level with access routes to towpath level (4.5m AOD) adjacent to the watercourse. Figure 3 illustrates the proposed topography scheme for the Park covering both Games and Legacy phases.

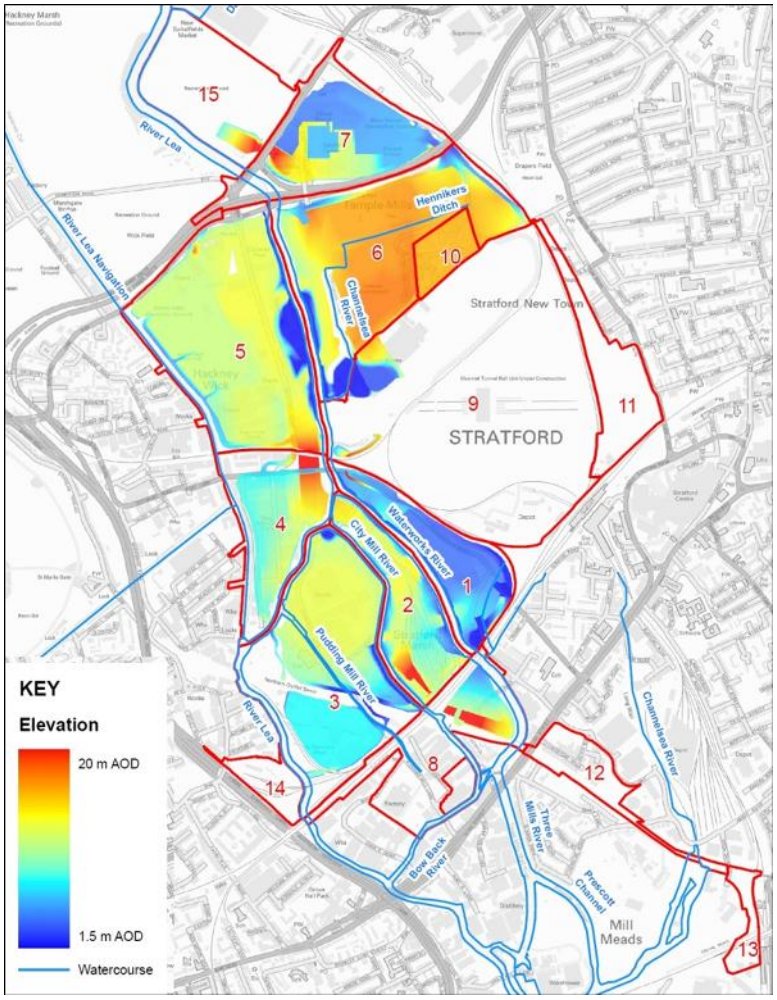

Figure 3 Olympic & legacy topography scheme (Barry Plowright)

Following completion of the Games the Park is to be transformed into the Queen Elizabeth II Olympic Park to form a mixed use development and significant landscaped area together with a number of retained venues converted for legacy usage.

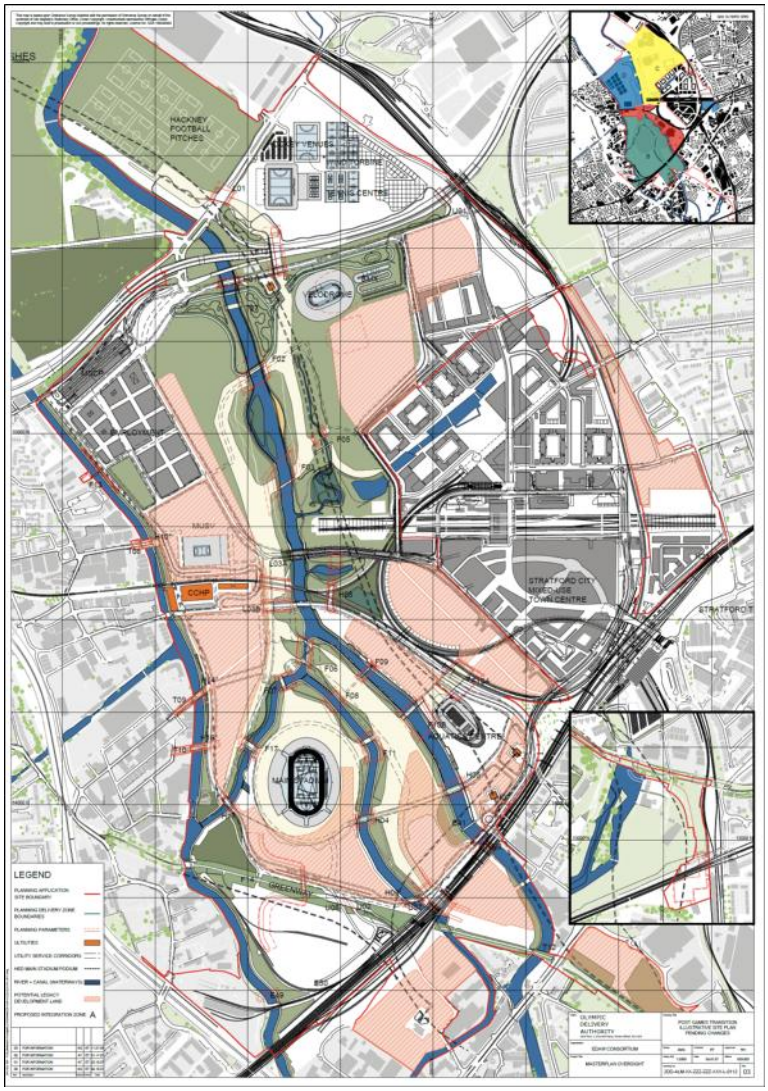

Figure 4 Masterplan of Olympic & Paralympic Park (legacy phase) (Barry Plowright)

SuDS used

This case study details the SuDS components specifically implemented within Areas 5, 6, 7, 10 & 15 as detailed within Figure 3. Although the methods described below were consistent throughout the development.

Porous asphalt strips are extensively employed throughout the pedestrian concourse area of the Park. These strips act as collection systems for overland runoff generated and convey waters into granular trenches below the strips which contain perforated pipes. The perforated pipes drain to catchpits and thence into the spine network system into watercourses.

Within the wetlands area located adjacent to the Basketball Arena/Velodrome and Riverbank Arena further SuDS components have been employed that include swales, filter strips/drains and small volume balancing ponds.

Finally, rainwater harvesting has been installed at two permanent venues; Velodrome and Copper Box.

How it works

The loop road network together with spine surface water sewers and outfall structures was installed in advance of the design for the landscaping areas and venues. The design standards adopted for surface water drainage (SWD) were outlined within the Olympic Park SWD Technical Design Strategy, a requirement of which was to ensure all assets installed were adoptable by an appropriate authority. In line with this strategy and the requirement to discharge flows from the Park in advance of the fluvial peak in the River Lea, the spine networks were designed and installed as carrier pipes and manholes adoptable by Thames Water or Local Highway Authority and were sized accordingly.

Specific details

Within the highways of the Park, traditional road gullies and combined kerb drainage collection systems were used. In addition, accreditation areas, back of house operational areas and transport malls were afforded similar systems supported by linear drainage channels.

Figure 5 Photograph of Park taken looking south (Barry Plowright)

The public access areas and landscaped regions provided greater opportunity to incorporate SuDS components focussing on water quality and amenity/diversity parameters.

It was intended that the north park wetland feature will form a wildlife haven for plants and animals with habitats created for otters, kingfishers, grey herons and water voles.

Runoff generated within the public access paved areas of the Park is collected by the porous asphalt strips.

Figure 6 Overhead photograph of wetlands during construction (Barry Plowright)

Filter strips/drains were installed adjacent to the wetland pathways to treat and capture runoff generated. The collected waters were discharged through catchpits into downstream networks ultimately outfalling into adjacent watercourses. Within the soft landscape areas the filter drains were generally formed from a new product-tomarket manufactured from recycled thermoplastic material. The material was selected following a review of previous successful high profile installations and independent testing assessment the manufacture of the product was accredited as being carbon positive.

Swales are included within the wetlands area as conveyance devices. The swales incorporate check dams at intervals to reduce velocities and provide open water features alongside wetland pathways. Swales located west of the River Lea convey flows from the upper concourse to the river towpath level transmitting waters to an outfall structure.

Figure 7 Photograph along planted swale (Barry Plowright)

On the east of the watercourse, the swales deliver runoff again from high to low level but discharge into habitat ponds and a wet woodland area adjacent to the River Lea. These habitat ponds and wet woodlands act as attenuation ponds installed with weirs limiting outflows whilst maintaining a minimum depth of water. Details of the above features are shown within figures 8, 9 and 10 below.

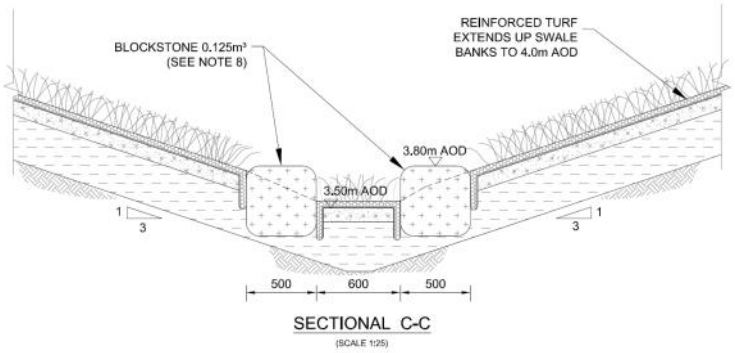

Figure 8 Cross Section through swale & check dam (Barry Plowright)

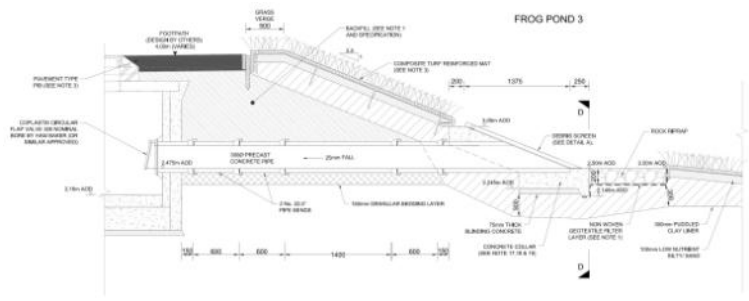

Figure 9 Cross Section through habitat pond outlet (Barry Plowright)

Figure 10 Completed wetland area photograph (Barry Plowright)

Benefits & achievements

Surface Water Drainage systems designed and installed within the north park take account of criteria requirements agreed with Environment Agency as detailed below:

The existing and proposed site characteristics including topography, hydrology (surface and ground), soil and ground conditions including infiltration potential and contamination.

The standards of service adopted in the design of the drainage system taking into account potential impacts of climate change.

The management of extreme flood events taking into account potential impacts of climate change.

Sources of surface water contamination and the identification of appropriate methods of interception and treatment.

The need to protect both groundwater and the local watercourses from pollution associated with surface water run-off.

The opportunities to enhance the biodiversity and amenity of the public realm through appropriate specification of drainage infrastructure.

Effective integration between project teams

The specification of materials for use in the construction and maintenance of the drainage infrastructure.

The whole life energy requirements of the system.

The safe operation and maintenance of the drainage system through its operational life.

The efficient transfer from Games to Legacy minimising waste.

Whole life costs were managed

Challenges & lessons learned

The following challenges were overcome during the project:

Design & implementation of the SuDS scheme with client/stakeholder buy-in

Ensure all systems are adoptable

Design criteria differed for elements

Integration and coordination of SWD discharges from numerous inputs

Interaction with the Local Authority/team

A number of internal and external stakeholders contributed to the design and implementation of the SWD systems within the Park and these are listed below:

London Organising Committee for the Olympic Games (LOCOG)

ODA Delivery Partner ? CLM

Olympic Park Legacy Company

Designers ? Arup/AECOM/Buro Happold/Expedition/LDA Hargreaves/Stanton Williams

Environment Agency

British Waterways

Thames Water

London Boroughs of Newham/Waltham Forest/Hackney/Tower Hamlets

Team and details

Contractors: Skanska/BAM Nuttall/ISG/Buckingham Group/Bovis Lend Lease/Mansell Construction Services/John Sisk & Sons Ltd/Carillion

Stage: Construction 2012

This case study has been compiled by the ODA Delivery Partner Surface Water Drainage (SWD) Coordinator (Barry Plowright ? Senior Engineer, Atkins) author of the SWD Technical Design

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