Learning legacy

Lessons learned from the London 2012 Games construction project

Sustainable material use in paving and seating

The selection of materials for the construction of the Olympic Park made a significant contribution to meeting the Olympic Delivery Authority's (ODA's) ambitious sustainability targets. This report concentrates on the selection of hard paving materials for the concourse and the choice of timber for the seating. Lessons learned include the need to push for innovation in sustainable design, while respecting the constraints of budget and programme. The project also showed that the best solutions were achieved through early engagement and collaboration with the supply chain.

Introduction

The selection and use of sustainable materials within the Park covers a number of aspects including responsible sourcing, embodied impacts such as energy and recycled content, health impacts, waste and transportation.

Concourse

During the London 2012 Olympic and Paralympic Games, the Park concourse will cover approximately 18 hectares. In transformation, over half will be converted to soft landscape or development platforms.

Early in the design process, manufacturers and contractors were invited to demonstrate innovative surfacing solutions to deliver the established design criteria. This allowed the client and design teams to assess architectural quality, accessibility and ease of construction, and conduct a full sustainability appraisal for each option.

Following trials, a pavement build-up was recommended to optimise cost, quality, programme and sustainability. The agreed solution consisted of a recycled Type 1 sub-base, a cold-foamed bitumen base course, a standard hot asphalt wearing course, and surface dressing of UK sourced gravel chips in a vegetable-based emulsion.

Initial analysis indicated this solution could save around 350 tonnes of embodied carbon and 80,000 tonnes of primary material in comparison to standard construction. However, changes to the proposals were made as a consequence of further trials conducted by the Tier One contractors for the North and South Park:

- The use of recycled sub-base was restricted to the permanent hard landscape due to planning conditions. These conditions required stringent human health criteria to be met for imported materials above the marker layer, and clarification on future use after the Games in some areas of temporary paving.
- For economy and sustainability, the thickness of asphalt in temporary areas was reduced as far as reasonably practical. Trials combining cold-foam bitumen and a hot-mix wearing course demonstrated that an appropriate finish quality could not be achieved with these thin courses. It was considered more sustainable to construct the temporary hard standing from the minimum material possible. This dictated the use of primary materials in selected temporary areas. All temporary materials used are intended to be

Various paving trials for the concourse being assessed for quality and durability

Paving paternation trials being tested for the concourse

Timber seating installed in the North Park

recycled and reused on site after the 2012 Games.
– The vegetable-based emulsion (utilised in the surface dressing) could only be laid in temperatures of 10°C and above. As it was not possible to guarantee that no surface dressing would not be laid in the winter months some elements of paving had to use resin in the surface dressing process.

For the temporary paving, a low-embodied impact solution was created by reducing the quantity of materials as far as practical, while embodied impacts of the permanent construction were reduced by using recycled and low-embodied energy materials.

Seating

With over 2.2 kilometres of seating in the Park, combining bespoke and proprietary elements, the selection of materials was given considerable focus.

The specification of tropical hardwoods was challenged by the planning authority on the grounds of sustainability and appropriateness. An extensive evaluation, prioritising sustainability criteria, was completed analysing all seating alternatives including steel, concrete, imported hardwood timber, UK softwood timber and UK-sourced recycled plastic. A simplified life-cycle analysis over a 120-year period, considering carbon footprint, waste generation, emissions/ecotoxicity in disposal and growth rate and renewability, formed part of the full evaluation.

The study concluded that a Forest Stewardship Council (FSC) certified hardwood timber was the most appropriate material. An additional outcome of this process, which included extensive discussions with the supply chain, was the identification of a limited quantity of suitable reclaimed timber. As a consequence, 86 metres of reclaimed Basralocus timber from Dutch flood defences was used on the Park.

Lessons learned

The design of the seating and concourse was not driven by the most sustainable material option; rather, the most sustainable material option was sought for the element that had been designed. As awareness and a more comprehensive technical understanding of sustainability develops, so too will the process of sustainable design and construction.

The material selection for the concourse and seating demonstrates how sustainability must be considered against the broader, more conventional, set of construction criteria including programme, quality and buildability. Appropriate solutions have to recognise and balance trade-offs within the boundaries of sustainability and broader project constraints.

There was a continual need to engage early with the supply chain, clearly communicate requirements and undertake trials to demonstrate effectiveness. It cannot be assumed that the supply chain fully understand, for example, the complexities around the chain of custody for timber. An element of technical support and review is required to ensure success.

Even with early engagement, sometimes the supply chain is unable to respond within the timeframe required, as demonstrated by the challenge of obtaining plants that were grown in peat-free media. However, far from considering this as a failure, one of the major successes of the construction of the Park is that it has provided the impetus in a number of areas for further research to be undertaken by suppliers to enable them to deliver truly sustainable solutions in the future.

Examples of timber seating in the Park

Project

Programme: Landscape and Public Realm

Supplier

LDA Design and Hargreaves Associates: Landscape Architects
Atkins and Arup: Landscape Engineers

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