

# Ruislip green roof retrofit on a tube depot, London

## SuDS used

- Green roofs



## Benefits

- Enhancement of local biodiversity.
- Amelioration of air quality.

## 1. Location

Ruislip garden, London Borough of Hillingdon, HA4 6NS

## 2. Description

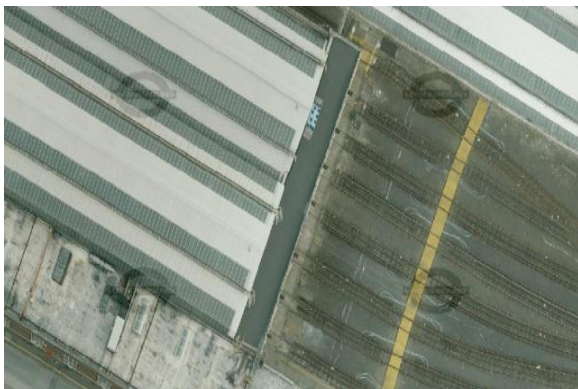


Figure 1 Site plan

A retrofit of a green roof on operational railway at a small-scale trial complete with monitoring against a control area will allow us to evaluate the effectiveness of this system for a London Underground (LU) depot environment, and ascertain from the results if LU will benefit by a broader application.

### 3. The aim of the development

Depot roofs provide an ideal area for experimentation in environmental friendly engineering solutions providing opportunities to better manage drainage. Main characteristics of the development are:

1. type of structure (corrugated sheets on large spans, where the type of material and connections are vulnerable to weather elements);
2. size (where the combination of their length and inclination to the down pipes is failing to meet the requirements for effective drainage during a storm event);
3. age (corrugated sheets have a short lifespan);
4. maintenance (maintenance on these extended areas are requiring a significant amount of annual expenditure).

A green roof will assist in alleviating the drainage problems by attenuating a large proportion of rainfall. This idea is also in accordance with the Mayor's policy for SUDS.

### 4. Main SuDS used

Two adjacent biodiverse extensive green roofs types each 18.5m x 3.3m (total of 122m<sup>2</sup>) have been installed on a flat roof section at the eastern end of the Long Shed RD2. One section (South) has a drainage board with 65mm of extensive green roof substrate and the other section is using an experimental approach. Both roofs are vegetated with sedum cuttings and seeded/planted with annual and perennial wildflowers. The two sections are separated by an impermeable barrier to facilitate the measurement of run off. Total saturated loading is less than 100kg/m<sup>2</sup> which should enable widespread retrofitting across various London Underground buildings.

### 5. Specific project details

The original concept to improve drainage in an operational area was driven by London Underground who engaged the Green Roof Consultancy to deliver the design and enlist University of East London to undertake monitoring. Monitoring devices have been installed in two down pipes of a green roof and two down pipes of a conventional control roof to measure the water attenuation.

The Greater London Authority (GLA) through Drain London scheme also support this trial project as they allow LU a small fund in order to monitor the drainage performance.

### 6. Benefits

There are noticeable benefits in terms of biodiversity, with bumble bees and lady birds being observed as the roofs work as biodiversity bridges between green infrastructure for a number of insects and birds.

LU will examine the process of installation, maintenance and performance in an operational environment and the cost-benefit analysis in terms of waterproofing performance and drainage control for a larger scale application.

Other benefits include:

- The longevity of the waterproofing layer and of the roof;

- Improved working environment;
- Structure insulation;
- Improved air quality;
- Enhanced biodiversity of the area;
- Opportunity to understand the delivery process and identification of potential areas for improvement (and understanding and overcoming challenges and failures).

## 7. Challenges

Retrofitting on operational railway had to follow the rigorous assurance and safety procedures of London Underground without any interruption of service. Logistics during installation and performance of the experimental approach were the important outcomes so far. Monitoring of water attenuation has not been completed.



Figure 2 Green roof in September 2012



Figure 3 Green roof in June 2013

## 8. Interaction with local authority

Groundwork London has worked in partnership with the London Borough of Hammersmith & Fulham to deliver the project. The Councils Housing Department and Flood Risk team were involved in the realisation of the project.

## 9. Project details

**Construction completed:** 2012

## 10. Project funders and partners

**Client:** London Underground Limited ([MelinaKakouratou@tube.tfl.gov.uk](mailto:MelinaKakouratou@tube.tfl.gov.uk)), Greater London Authority

## 11. Project team

**Consultant:** Green Roof Consultancy

**Monitoring:** University of East London