

**Roundhay Park Lane CSO – Water Quality Improvement
Roundhay, Leeds, West Yorkshire, United Kingdom**

Mott MacDonald Bentley on behalf of Yorkshire Water Services and Leeds City Council

BIG Biodiversity Challenge Award Category: *Habitat Creation: Project of the Year Award (<5ha)*

Project overview

A sustainable urban drainage system and further surface water separation from the combined sewer has been implemented in the residential area of Roundhay, Leeds, to reduce the frequency of sewage spills from the downstream combined sewer overflow into a local beck, which feeds into lakes at the city’s largest park.

What were the biodiversity conditions on site, prior to the enhancement?

The site consisted of residential roads, with mown grassed verges and sporadic trees separating the carriageway from the pavements.

An open watercourse was present to the south of Roman Avenue, becoming a culvert further downstream. The area was poorly maintained, with a small area of overgrowth and trees to the south of watercourse, though dead trees and evidence of fly-tipping was found along the northern bank.

The scheme was assessed to the National Planning Policy Framework alongside the Leeds Unitary Development & Leeds Core Strategy Plans, with Biodiversity Improvement (G9) and Managing Flood Risk (EN5) particularly applicable in the latter.

What were the reasons behind this project ?

Sewage spills into the local beck were found to be the cause of high ammonia levels and biochemical oxygen demand in the watercourse, exceeding EA water quality targets. A traditional ‘grey’ construction solution was not viable as it risked the destruction of ancient woodland within the park. With potentially sensitive white-clawed crayfish in the downstream lakes and Yorkshire Water (YW) requiring a continued discharge consent from the EA , alongside recent societal pressures surrounding sewage spills to open water, YW realised an opportunity following investigative works to implement a pilot scheme incorporating SuDS features – in the form of sixteen rain gardens.



Rains gardens have been planted with a combination of shrubs, grasses and a lowland meadow mix.

What were the biodiversity measures taken?

Surface water from the carriageway and driveways along Roman Avenue has been redirected through multiple inverts into a combined area of 390m² of rain gardens, replacing equivocal areas of mown grass and tarmacked carriageway – effectively doubling the planted area and encouraging biodiversity.

The rain gardens were planted in March 2022 with a combination of self-maintaining shrubbery and a lowland meadow mix, requiring cutting twice a year. Yellow Rattle has been incorporated into the mix to keep grasses down and ensure flowers are dominant, improving habitats for insects and other wildlife.

The existing trees were retained by constructing the rain gardens and pipework around them.

Cobblestones extracted from the road excavation were re-used as dissipation blocks at the inlets.

Maintenance has been agreed between YW and Leeds City Council (LCC), with the council agreeing to a 25-year maintenance plan for the rain gardens following an initial 12 months of monitoring by YW. Arisings from cuttings are to be taken away, removing nutrients from the ground to maintain a balance of flowers and grasses.

The system has been designed to cope with and slow the flow of surface and storm water that falls on the catchment's impermeable surfaces as per N39A: Sustainable Drainage Systems of the Leeds Unitary Development Plan, whilst reducing storm water entering combined sewers, achieving requirements set out in policies G9 Biodiversity improvement and EN5: Managing Flood Risk of the Leeds Core Strategy.

The project has a huge potential to be used by LCC, YW and the residents of Roundhay as an example on what will become a standard in dealing with stormwater runoff by utilising existing resilience and mitigating by use of retrofitted blue-green infrastructure, with typical rain garden details and an understanding of the challenges the scheme has posed enabling all parties to consider replication of the scheme in similar networks.



Rain gardens convey surface water via a gravity system for 190m along each side of Roman Avenue.



Rain garden installed around existing trees, preventing root damage and in keeping with the sustainability drive of the scheme.

Further information

The rain gardens were formed from standard construction materials, as the density of existing utilities in the road and pavement were not suited to the use of modular elements. A 450mm-750mm layer of loamy sand conforming to CIRIA's SuDS Manual was infilled above the transition layer and perforated pipework, with the same local supplier fulfilling the planting of the shrubbery and lowland meadow mix over a two-week period in March 2022.

The management of the gardens will be undertaken by MMB, Yorkshire Water and then Leeds City Council, all of whom have attended on-site progress meetings, taking a keen and active interest in the successful outcome of the works, and agreed to a maintenance and monitoring schedule of the SuDS features spanning 25 years.

The scheme has provided an area just shy of 400m² that even in its initial stages can be seen to provide a habitat for insects and bees, with the client's ecology team expected to monitor both the rain gardens and the downstream lakes for confirmation of improved biodiversity.

The BIG Biodiversity Challenge presented all teams, particularly those based on site, with an appreciation for how 'day-to-day' water industry schemes can be modified relatively simply to improve the biodiversity and aesthetics of urban environments.

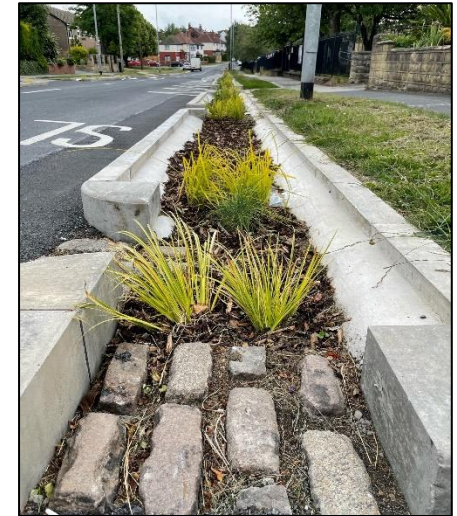
Going forwards, collaborating early-on with stakeholders, particularly residents, has found to be an imperative part of the scheme's success, invoking positivity and optimism throughout construction and with the final product.

Project Team

- Client / Funders – Yorkshire Water and Leeds City Council
- Design and Construction – Mott MacDonald Bentley
- Concept Design – Stantec
- Planting – G Clarke Landscaping Ltd.

What was the motivation for carrying out the enhancement?

The scheme aimed to return a bettered environment for the local community upon completion of the sewer diversions than had previously been present. The client could have replicated traditional techniques and return the carriageway and verge to its existing condition, though all parties actively sought to push for a solution that could showcase advancements in retrofitting infrastructure, whilst improving an area's biodiversity and local people's access to an improved local environment. The project showcases the realised importance from clients, designers and contractors of providing biodiversity net gains on a local level, with project fundamentals advanced and encouraged in other schemes.



The rain gardens provide attenuation for 1-in-30-year flood events whilst decreasing siltation maintenance downstream.



The dissipation blocks at the rain garden inlets utilised cobblestones extracted from the initial road excavations