ACO Water Management



Root, Branch and Boulevard

An innovative use of ACO StormBrixx and SuDS in the Rushden Lakes retail development



Bordering the Nene Valley Wetlands in Northamptonshire, Rushden Lakes is a retail development designed to seamlessly integrate the man-made structures into their natural surroundings. The first phase, which opened to the public in 2017, saw over 200 trees from 13 different species embedded throughout the 400,000 sq ft retail development; and supported by a unique application of ACO StormBrixx used as tree pits.

ACO Water Management has provided expertise and support for many Sustainable Drainage systems (SuDS), with ACO StormBrixx geocellular attenuation and infiltration crates regularly used as a vital part of the sustainable water cycle. However, in the Rushden Lakes project UBU, the landscape architects for the project, identified a different use.

Trees offer numerous environmental, amenity, as well as attenuation benefits, and Mark Johnson

from UBU saw some key attributes in using ACO StormBrixx:

"The high void capacity crates were ideal in allowing root growth and were strong enough to protect against load stresses from trafficked areas above. The flexible construction also meant we could put together various designs for different areas of the site."

Project:

Rushden Lakes Retail Development, Northamptonshire

Objective:

Provide a tree pit solution to integrate the surrounding environmental wetlands into a retail development design

Solution:

ACO StormBrixx HD geocellular crates used as tree pits in the car parking and boulevard design

Part of a SuDS project

The project as a whole utilises a Sustainable Drainage System (SuDS) supported by channel drainage and oil interceptors, in order to effectively and safely manage surface water that would need to drain into the surrounding wetlands. This area includes four Wildlife Trust nature reserves with sites of special scientific interest. Given the site's proximity to the lakes, flood risk was higher, meaning it was critical to mitigate any pollution risk from surface water run-off from the car park and other hardstanding areas.

The principal aim of SuDS is to provide effective surface water drainage by mimicking nature within the urban environment, and the planted trees on site contributed to the four key pillars of SuDS: *Amenity, Biodiversity, Water Quality* and *Water Quantity.*

The boulevard and car park

Working closely with architects HPW, landscape architects UBU produced detailed designs for the landscaped areas of the site, built on the landscape strategy previously prepared for the planning application. A key element of the design sees 13 types of tree, as well various other plants, sensitively incorporated into the retail park design. Trees are positioned throughout the car park and the central boulevard; a pedestrian corridor from the retail area to the waterfront lined with trees that needed supporting.

StormBrixx as a tree pit

In essence, a tree pit is the hole in the ground in which a tree is planted; however, as outlined by the Landscape Institute, it is quite common for trees to be planted with insufficient space for full mature root growth, thanks to soil compaction. Over-compaction can prevent oxygen reaching the roots, as well as inhibit drainage, both of which can severely limit long-term tree growth.

Structural support and void ratio

ACO StormBrixx has good vertical load and horizontal load strength. The vertical load strength is integral to the Rushden Lakes car park, where the supporting tree pits jut out and are subject to site traffic. In all areas, the strength of the structure prevents soil compaction and allows largely unrestricted root growth through the open geocellular structure which as a void ratio of 95%.

Soil protection

A geotextile wrap and the structural strength of ACO StormBrixx protected the soil from the many dangers of soil contamination during construction. By filling the StormBrixx tank void with clean and fertile soil, and then wrapping the whole installation in a geotextile material, the landscape architects were able to keep all the soil in place and free from contamination to promote healthy root growth.

Flexible construction

Thanks to its easy snap-lock construction various tree pit configurations were able to be installed at Rushden Lakes using the ACO StormBrixx system. These included a cross design in a car park node where one instalment of StormBrixx protected four trees in one construction, as well as a half-lap concentric ring pattern around some trees, aided by the system's brick-bonding for extra stability.









The four pillars of SuDS - A truly sustainable solution

1st pillar of SuDS – Amenity

Trees play a fundamental role in enhancing the amenity of Rushden Lakes, both linking the retail and leisure facilities and brightening the environment. They have also been documented to improve air quality, with particulate levels on tree-lined streets up to 60% lower than those without trees.

2nd pillar of SuDS – Biodiversity

The 200 trees, as well as varied shrubs and plants incorporated into the landscape strategy at Rushden Lakes, helps create a new habitat for native fauna. The trees partially mitigate pollutants from the necessary retail trade traffic, as a single mature tree can absorb carbon at a rate of 47.5 lbs (21.6 kg) per year. They also act as a pathway to the greater biodiversity bordering the developments, with the central boulevard leading visitors to the Nene Valley Wetlands and its four wildlife reserves.

3rd pillar of SuDS – Water Quality

Trees are one of the most effective forms of vegetation to intercept particulate aerial pollution that can potentially contaminate water supply from trafficked zones. They can also intercept silts

and suspended solids through attenuation. Given the large surface area provided by a canopy of leaves, trees used in the car park help to reduce the effects of traffic on the site's water quality, working alongside oil interceptors integrated into the drainage network.

4th pillar of SuDS - Water Quantity

The planning process had identified Rushden Lakes as a flood-risk area due to the site's proximity to the adjoining lakes. The design had to demonstrate adequate capacity to cope with extreme weather events and a rainfall intensity of 205mm, nearly double the usual measurement. In order to relieve this capacity and fulfil SuDS principals, the site surface water management system is designed to release run-off into the adjoining Skew Bridge Lake. First, it is cleaned by the oil interceptors before passing through vortex flow controls that throttle the discharge rate, before moving on into the environmentally sensitive Nene valley wetlands.

The trees also have natural attenuation abilities and act as an additional buffer to stormwater in the event of an extreme weather episode, as 100 mature trees can capture over 300,000 gallons (1,130,000 litres) of rainwater each year.







Looking to the future – Phase 2

The second phase of the Rushden Lakes development is set be completed by early 2019. This will see the existing retail site supplemented by a 14-screen multiplex cinema, as well as further restaurant openings and a leisure complex complete with a trampoline park, climbing centre and adventure golf.

Additional car parking will be included as part of Phase 2, and ACO StormBrixx will continue to be used to accommodate further tree pits throughout the site. ACO's wider water management expertise will also be called upon, with ACO's high-capacity Qmax slot drainage system due to be installed throughout the site's new car park. ACO KerbDrain – a combined kerb drainage system – will also be installed along a new access road, which will link Phase 2 to the wider Rushden Lakes development.

Conclusions

The Rushden Lakes project saw just under 10,000m2 of ACO StormBrixx HD geocellular stormwater storage tanks used as an innovative tree pit solution throughout the 400,000 sq ft site. The installation reflects the intrinsic sustainability woven into the design from the initial planning stage, through to installation and community use, seamlessly integrating the newly created urban environment with its natural surroundings. The tree pits supported by StormBrixx HD play a pivotal role, not only in contributing to the site's amenity and biodiversity, but also helping improve the water quality, and managing the water quantity to deliver a truly sustainable solution.

StormBrixx HD and new StormBrixx SD

ACO has now launched its StormBrixx SD solution. This is a general-purpose extension to the range, which benefits from the core characteristics of StormBrixx HD such as stackability and high porosity but without the need for integrated 'man access' options that some projects require. To find out more about ACO's range of stormwater control options, please visit: www.aco.co.uk/products/stormbrixx



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