

Flexible Factory Soakaway

ACO StormBrixx soakaway supports efficient infiltration and BREEAM 'Excellent' rating in a narrow on-site construction



When the Welsh Government committed to constructing a new facility at Offa's Dyke Business Park, Welshpool, in late 2017, to support the growth of a local manufacturer of electro-mechanical variable frequency drives, they turned to ACO Water Management's revolutionary StormBrixx attenuation and infiltration stormwater management system.

With a view to providing a sustainable yet long-lasting solution in a small footprint to protect against a one in a hundred-year rainfall event, and achieve a BREEAM 'Excellent' rating, ACO StormBrixx and ACO S Range channel drainage were essential components in the plan.

Variable frequency drives are a vital component in a wide variety of industrial process control and energy-saving applications, as they are able to

reduce running costs by offering greater control over the speed of electric motors. With Welshpool-based Invertek Drives working towards its target of selling one million variable frequency drives throughout the world, the Welsh Government proposed to construct a new 5,500m² facility at Offa's Dyke Business park, adjacent to Invertek's main production facility and headquarters, to help the company realise its ambition.

Project:

Invertek Drives, Welshpool, Powys

Objective:

Attenuation and infiltration solution for a large roof run-off and restricted curtilage, with accessibility to achieve BREEAM maintenance requirements

Solution:

ACO StormBrixx HD geocellular soakaway tanks in a flexible construction, combined with surface water drainage including ACO S Range



Keeping the new facility and surrounding area free from excess surface water, as well as future-proofing it from the effects of extreme flash-flooding, was an essential element of the structural engineering work on site. The inclusion of SuDS technologies in new developments is a key Welsh Government policy and, given the business park is owned by the Welsh Government, sustainable best practice design principals had to be at the heart of the proposed surface water management strategy.

However, as the new facility would result in a significant reduction in the business park's natural infiltration ability, the proposed solution needed to not only meet the required infiltration levels of planning, but be flexible enough to fit into the limited available footprint around both pre-existing and planned infrastructure.

The finished system would also need to ensure no surface water flooding would be generated in the event of a one in a hundred-year rainfall event and take into account a projected 30 per cent increase in rainfall intensity attributed to climate change over the course of the development's design life. Crucially, any significant rainfall could not impact the existing infrastructure or adjoining watercourses.

ACO's StormBrixx system proved to be the answer.

GREEN HISTORY

Paul Bradley, of Bradley Associates, was the lead consultant engineer on the project: *"We had initially undertaken some work on the business park in 2011, when the Welsh Government first expanded the site. The extension saw the creation of a number of mid-sized production and office sites supported by porous parking and generously landscaped areas. As such, aside from road drainage, there were very few positive drainage systems on the site, as soakaway tests undertaken at the time confirmed that the ground porosity was sufficient to provide the required levels of infiltration."*

Paul continues: *"However, the construction of the new production facility, coupled with other site expansions at the business park, meant that a significant supplementary stormwater soakaway attenuation strategy was required to accommodate the reduction in naturally-infiltrating land. The main challenge was designing a system that would offer the required storage capacity in line with the Welsh Government SuDS policy, while fitting into the space available."*

SUSTAINABLE STORM-PROOF SOLUTION

Bradley Associates' design revolved around the principal of collecting the surface water run-off, conveying it for cleaning to remove any potential contaminants, such as oil or petrol from carparks and service areas, holding it in a series of soakaways located throughout the site, before allowing the water to be naturally released back into the subsoil at a controlled rate via infiltration.

Working closely with the site's appointed contractor, PaveAways, to find a high-capacity infiltration system that would not only offer the flexibility of design, but also embrace SuDS best practice, a decision was made to use ACO Water Management's StormBrixx HD system.

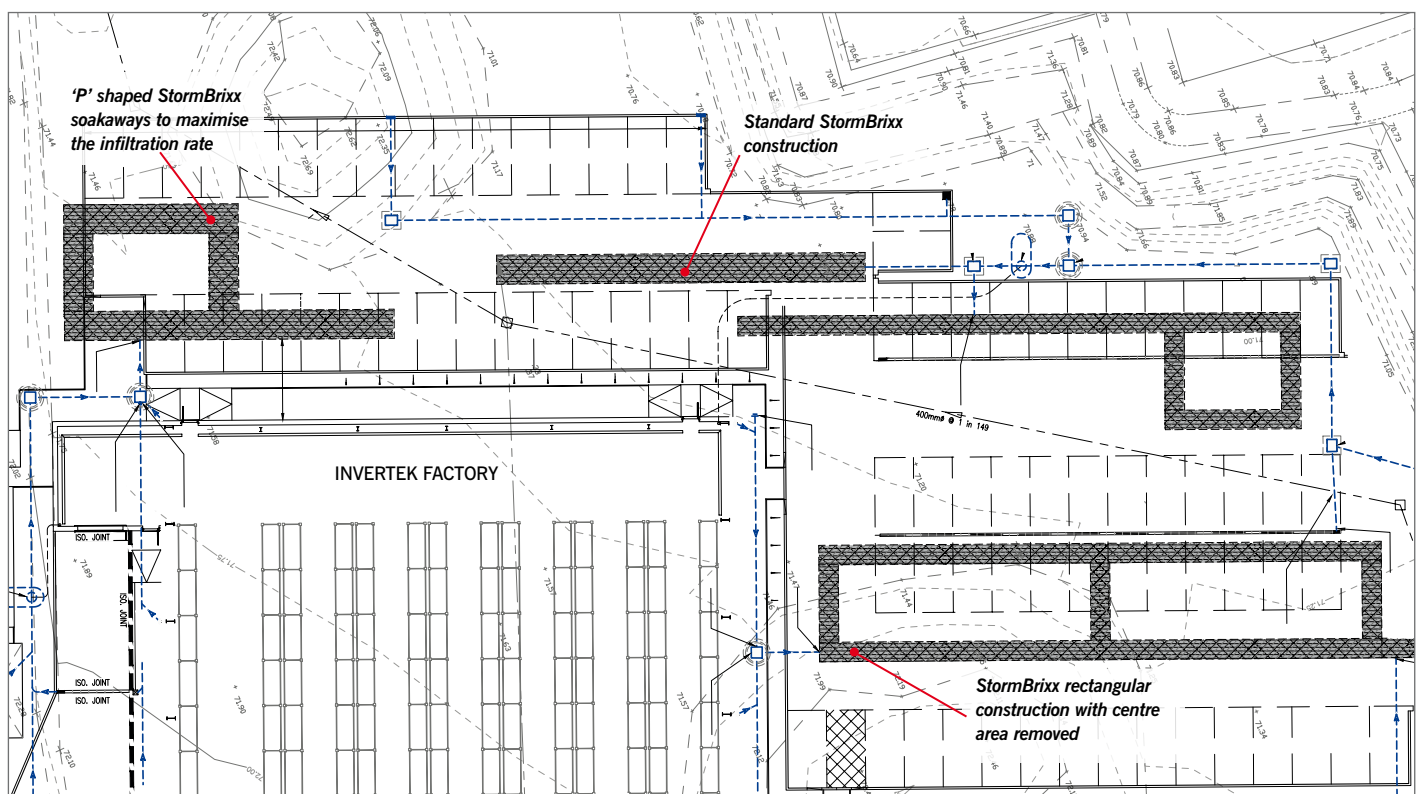
ACO STORMBRIXX SYSTEM

ACO StormBrixx HD is a patented plastic geocellular stormwater management system with a high void ratio of 95% thanks to its unique pillar configuration. This minimises the excavation required to achieve a specified storage capacity, reduces the aggregate needed for backfilling, and improves the flow characteristics of runoff through the installed tank. The patented brickbonding and cross bonding feature provides a strong, long term installation and allows flexible designs to be quickly constructed.

A total of six soakaways were required for the project and were installed in two phases: the first in late 2017 during the principal construction on the new facility, and the second once in early 2018, once the bulk of the structural building work had been completed.

FLEXIBILITY TO THE FORE

Martin Smith, Business Development Manager at ACO, worked closely with Bradley Associates throughout the project: *"The flexibility of the StormBrixx system allowed a variety of configurations to be factored into the design, including a number of 'P' shaped soakaways. This enabled a crate-free zone to be included in the eye of the 'P', leading to a greater surface area in contact with the soil to maximise infiltration rates."*





S RANGE CHANNEL

THE WATER MANAGEMENT PROCESS

Surface water run-off from the hardstanding areas is collected and conveyed via channel drainage in the service yard and car parking areas. Given the high load demands of the service area, 30m of ACO S100 channel drainage was used. S100 is a system specifically designed for heavy-duty applications, and is accredited to Load Class F900 – meaning it can withstand vertical loads of up to 900kN.

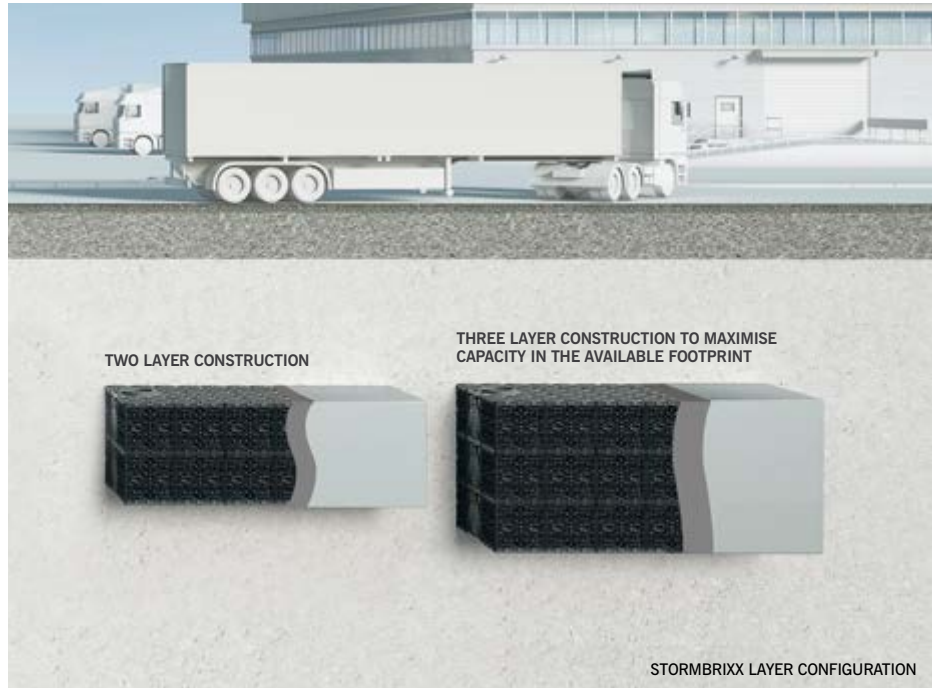
The channels were installed with sumps to retain grit and debris as the water is conveyed into a Class One bypass interceptor which removes any oil or petrol from those areas. It then enters the ACO StormBrixx HD soakaways, where it is joined by water from the building's roof, which drains directly into them.

STORMBRIXX SAVINGS

Given the high void ratio of the system, five of the soakaways comprised of just two layers of crates, keeping excavation – and the associated labour costs – to a minimum. The final soakaway was made-up of three levels of interlocking crates at a greater depth (see StormBrixx Layer Configuration diagram, top right), to ensure the required capacity could be met from a smaller available footprint.

Further cost savings were made thanks the unique stackable design of the StormBrixx HD system, as a single truck could carry up to 309m³ of crates, up to 75 per cent more than other prefabricated systems. This helped keep associated logistics costs to a minimum throughout the project.

The StormBrixx system was fitted with surface vents to aid airflow, and lined with ACOTex, a non-woven polypropylene geotextile with excellent filtration and drainage properties. This would ensure any stormwater collected in the soakaway tank could infiltrate back into the surrounding soil at a natural rate, without surcharging the immediate area.



STORMBRIXX LAYER CONFIGURATION

MAINTENANCE MATTERS

Martin Smith continued: *“In line with Welsh Government policy, the new facility was earmarked as a project that could achieve a BREEAM ‘Excellent’ rating, upon completion. The water management system was included in the assessment, so it would need to be cleaned – along with the supporting gullies and catch-pits – every six months.*

“The open cell structure of the StormBrixx systems allows easy access for CCTV and jetting equipment, enabling the whole system, including all the extremities, to be inspected and maintained from just a few access points. The ACO StormBrixx HD range, which was used for the Invertek installation,

can also be configured to include a 1200mm x 1200mm concrete man-access unit to facilitate maintenance requirements on some projects.

Paul Bradley concludes: *“The ACO StormBrixx system proved to be a competitive offering which helped us to secure the tender. It offered the flexibility needed to accommodate the required capacity, and facilitated a stormwater management system design in line with sustainable drainage best practice principals mandated by the Welsh Government.”*

For more information on the ACO StormBrixx range, including the new StormBrixx SD, please visit: www.aco.co.uk/products/stormbrixx



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