

# Bentofix® - Penilee Park Drainage Basins - UK

Lining of drainage channels and shallow basins for surface water management

- **Project Name**  
Penilee Park Drainage Basins, Glasgow, UK
- **Date**  
November 2022
- **Client**  
Glasgow City Council
- **Designer/Consultant**  
Sweco UK
- **Main Contractor**  
Covanburn Contracts
- **Installer**  
CT Lining Ltd
- **Product**  
Bentofix® NSP 4300





As part of the Hillington and Cardonald Surface Water Management Plan (SWMP), construction works have been carried out at Penilee; a small housing scheme and suburb on the western outskirts of Glasgow, Scotland, bounded to its east by the Glasgow suburbs of Cardonald and Hillington, with the Renfrewshire border and Paisley suburbs to the west.

## Challenge

Designed to reduce flood risk and improve greenspace, the work at Penilee is just one phase of a £1.2M Glasgow City Deal project designed to help manage surface water. Shallow basins and grassed channels have been created to store surface water run-off and slowly release it into the below-ground drainage network. The improvements will help to better manage rainfall events in the area – reducing flood risk for the local community, as well as communities downstream, easing pressure on the sewer network, and improving local water quality by filtering out pollutants. When completed, the scheme will enhance the attractiveness and biodiversity of Penilee Park and provide natural play areas with improved access.

Main contractor on the project, Covanburn Contracts, and subcontractor CT Lining Ltd, a specialist geomembrane installer, both have extensive experience of ground engineering works for flood alleviation schemes. The client's brief specified the use of a Geosynthetic Clay Liner (GCL) for the project at Penilee, and Covanburn Contracts had responsibility for procuring a product that would meet all the technical requirements. Naue's Bentofix® GCL was selected and, as Ciaran Tierney, managing director at CT Lining, explains: "Bentofix® is tried and tested and, in our experience, its self-sealing properties, and high resistance to damage, coupled with its ease of installation on shaped and contoured excavations, made it the ideal choice."

## Solution

Naue's Bentofix® GCL is a needle-punched, reinforced composite comprising a core layer of high-swelling sodium bentonite powder, which is encapsulated between two durable, geotextile outer layers. The composite geotextile is needle-punched with over 2 million fibres per square metre, and this unique construction creates a uniform, multi-directional, shear-resistant hydraulic barrier with self-sealing and re-healing characteristics. The bentonite layer swells to create a low permeability barrier which exhibits a hydraulic performance equal to, or better than, a thick layer of compacted clay and, in addition, a 50cm wide overlap area along the liner's longitudinal edges is impregnated with bentonite powder to ensure an immediate seal once hydrated.

Naue's Bentofix® is extremely robust and, although just 6mm in thickness, has a very high resistance to puncture; making it ideally suited for installation directly over uneven subsoils or, as at Penilee, where it was overlaid with angular rock material, as any accidental puncture damage that may occur during installation will self-heal. Bentofix® is also quick, easy and cost-effective to install – the GCL is simply rolled out in place with the aid of a spreader bar attachment and can be trimmed to length, or to fit around structures, with standard cutting tools.

The work at Penilee benefitted from the Scottish Government's Nature Restoration Fund, which is managed by NatureScot. Head of Biodiversity at NatureScot, Dr Katherine Leys, commented: "This Glasgow City Deal project is an excellent example of nature-based solutions being used to manage flood risk and enhance greenspace, bringing many benefits to the local environment and the people of Penilee."