

# World-Class Water Management at the World Expo

## CASE STUDY

### Project

Dubai Expo 2020

### Client

Expo 2020 Bureau & Dubai  
World Trade Centre Authority

### Application

Polystorm (PSM1 and PSM3),  
Permavoid, Terrain Above  
Ground and Terrain Below  
Ground Drainage Systems

Polypipe Middle East supplies Dubai Expo 2020 with signature water management solutions to enhance sustainability and performance.

Expo 2020 Dubai continues to make history with a number of unprecedented achievements. Not only is it the first to be hosted in the Middle East, Africa and South Asia (MEASA) region, but it also aspires to deliver one of the most sustainable World Expo's ever. From design and construction right through to the lasting legacy, sustainable practices and solutions have been integrated into every facet of this spectacular exhibition.

A key goal for Expo 2020 has been to consume 40% less water than the Dubai Electricity and Water Authority (DEWA) baseline. Most structures are actually achieving

reductions of 50% or more. Such impressive levels of success have been made possible in part due to Polypipe Middle East's contribution, namely the provision of our smart and efficient water management solutions.

## PERMAVOID

Permavoid is our shallow, geocellular water management system, designed to capture and manage storm and surface water as close to where it falls as possible, a method known as a source control strategy.

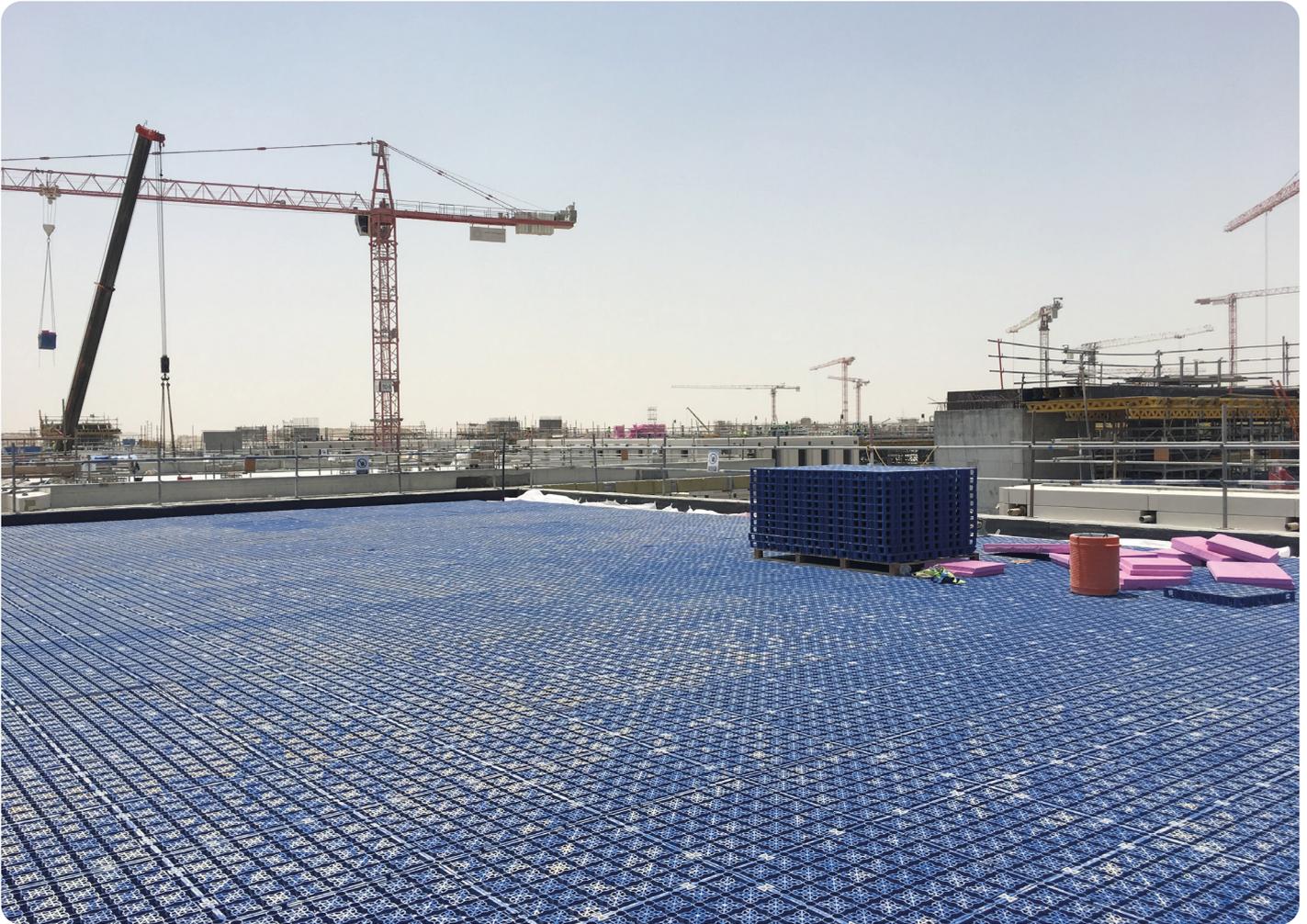
Permavoid was integrated into movable tree planters across the Expo site as a net-zero, self-irrigating solution. This cleverly engineered solution helped to overcome MEP design complications by eliminating the need for conventional drip lines, pumps and water tanks used in standard irrigation networks. This allows for the tree planters to be easily relocated, without having to consider an entire irrigation system redesign, or relocation.

Permavoid's modular structure allows plants to consume water on a demand-basis, relying entirely on transpiration, with zero energy requirements. By mimicking the natural water cycle, Permavoid delivers the perfect volume of water each day, meaning no water is wasted through evaporation, over-irrigation, or spillages. This innovative approach helped the pavilions where the system was integrated to gain LEED, Mustadam and Estidama rating points for sustainable water



management. SIA Contracting initially approached Polypipe Middle East in need of a solution that would ensure the healthy growth of the vegetation on site. Permavoid's innovative use of capillary cones at the heart of the geocellular system help to maintain a constant level of moisture. Combined with the aeration present at the bottom of the planters, Permavoid offers an environment for tree roots to grow that replicates authentic conditions.

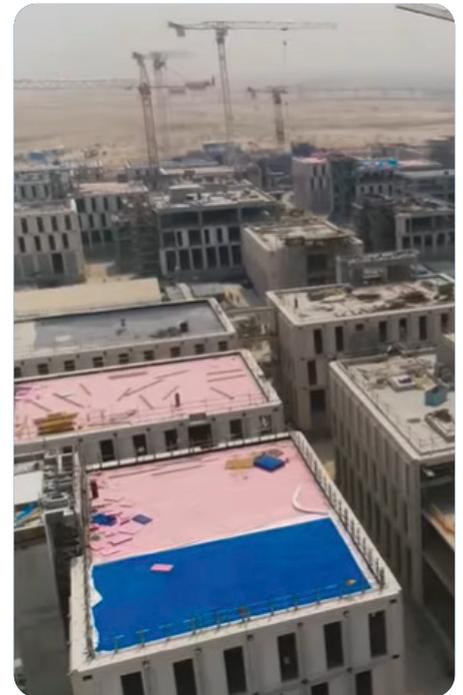




Working closely with main contractor Al Futtaim Carillion, the MEP consultant Hoare Lea and the subcontractors Al Shafar United, James L William and Al Futtaim Engineering, Permavoid was also strategically placed on the roof of the Opportunity and Mobility pavilions. The shallow system - wrapped in the geomembrane to make it watertight for attenuation - was specified due to its ability to work perfectly as a sub-base replacement system. The purpose of the installation was to control and manage storm and surface water at the source, and channel it to the units below the surface to create an attenuation solution and reduce risk of flooding.

More than 20,000 m<sup>2</sup> of Permavoid was supplied to the Expo 2020 Dubai site, providing 1.65 million litres of stormwater storage.

This was the first time Polypipe's sustainable water management solutions have been used in the installation and upkeep of blue-green roofs within the region. Blue-green roofs refer to roof surfaces being partially or completely covered with a lightweight growing medium and plants, planted over the Permavoid system. The structure of a blue-green roof increases sustainability by imitating the Earth's natural water cycle, helping to better manage resources and save costs.



### POLYSTORM

In addition to Permavoid, a total of 29 Polystorm tanks were installed across three Expo pavilions: the UAE, Sustainability, and Mobility pavilions. Polystorm is another versatile, geocellular water management system, designed for both trafficked and non-trafficked applications.

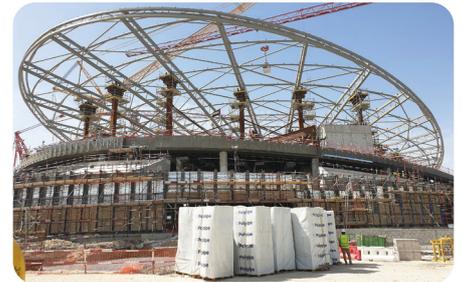
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**The Polystorm tanks on site capture a total volume of 1,780m<sup>3</sup> of water, equivalent to 1.78 million litres!**

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The tanks sit below hard surfaces, collecting and storing storm water and surface water channeled from buildings' rainwater outlets and surface drains. Instead of this water running directly into sewer systems as waste, potentially causing them to flood, the collected water can be reused for irrigation or other sustainable purposes. Polystorm tanks are used as a localised solution for achieving a zero-discharge strategy. This works by sizing them for large storm events so that they can be effectively used for infiltration, eliminating the need to connect to the main network and reducing water stress. Each cell has a 95% void ratio for maximum water capture and retention. The Polystorm geocellular range is cost-effective, durable, lightweight, and fast to install, and helps developers meet ambitious sustainability targets.

Permavoid and Polystorm are two of Polypipe's Sustainable urban Drainage Systems (SuDS). SuDS are a collection of water management practices that closely mimic the natural water cycle. Through allowing the water to percolate back into the earth rather than flowing freely into drains, SuDS help to reduce flood risk by up to 80%, a common challenge in the region. They also support the creation of greener environments. These systems can be incorporated into blue/green roofs that manage stormwater at the source and use it to irrigate vegetation.



“We're thrilled to have worked on one of the most significant projects the Middle East has ever seen. One of the three Expo 2020 Dubai themes is Sustainability, which is one of our brand values, so we feel really passionate about the work we did to capture and store stormwater at source through the use of Permavoid and Polystorm.”

————— Lina Abolail, Regional WMS Director —————

Given the lack of natural water resources in the Middle East, it is even more vital that heavily trafficked areas such as Expo 2020 Dubai implement efficient SuDS to prevent water wastage and to reuse water as much as possible. Polypipe's enviable international reputation as innovators in attenuation solutions explains why their two geocellular systems were selected as an eco-conscious alternative to artificial drainage methods. In addition to Polystorm and Permavoid, Polypipe Middle East has supplied several of its other solutions to the exact specification of the Expo 2020 Dubai, including Terrain Above Ground and Terrain Below Ground Drainage Systems.

Terrain is an engineered, high-performing drainage system that can help to mitigate the risk of failures, which can be harmful to life in and of the buildings. It is recognised across the Middle East as being the market leading range of PVC-u soil and waste drainage systems suitable for both commercial and residential applications.

