PLASTIC PAVING ENABLES SUSTAINABLE STORMWATER CONTROL

The employment of plastic cellular grid pavers for stormwater management is gaining ground in South Africa, led by the pioneering work of Gqeberha based manufacturer and supplier, Sudpave.

"Traditionally, this field has been dominated by interlocking precast concrete open cell paver ("hard lawn") systems employed as part of a sustainable urban drainage system. Our pavers function in the same way. However, the key difference is that they are locally manufactured using high-density polyethylene (HDPE) UV stabilised materials," explains Gary Bergesen, head of Sudpave.

Around 80% is composed of virgin HDPE; the balance sourced from non-polluted recycled HDPE. These materials are non-toxic and chemically inert to the chemicals naturally found in soils and have a life expectancy exceeding 25 years. At their end of life, these pavers can then be completely recycled, making them highly sustainable.

In terms of Sudpave's honeycomb-type paver design, around 95% of the surface area is permeable, allowing most of the rain to infiltrate into the ground. This significantly reduces the risk of soil erosion caused by stormwater run-off velocities that are exacerbated by the increase in hard surface areas due to urban development. Applications include car parks, channels, driveways, roads, aircraft taxiways and helipads, and pedestrian walkways.

"Aside from their equivalent vehicle load-bearing capacity – when gravel filled and supported by applicable layer works – our grids are much lighter and easier to transport and install compared to precast concrete systems," Bergesen continues.

Individual units are supplied in 1 m x 1 m grid configuration comprising four (500 x 500 mm) preconnected pavers (each weighing around 1 kg), which further speeds up construction.

The thickness of the gravel bedding material and sub-base will determine their weight carrying ability following a geotechnical

GIBSON BAY WIND FARM

Installation of Sudpave V-drain sections at the Gibson Bay Wind Farm

The V-drain sections at Gibson Bay Wind Farm comprise a sand/soil fill together with seeded topsoil designed to promote vegetation

V-drain installations under way at the Tsitsikamma Community Wind Energy Facility

assessment of the underlying ground conditions, plus anticipated rainfall patterns. The overall system can be further strengthened with the use of geogrid mesh beneath the sub-base layer.

Gravel versus sand/soil fill

For gravel filled applications, the sub-base would typically comprise 100 mm to 300 mm of well compacted G5 type material. This is followed by the placement of a 100 mm layer of reduced fines – generally 3 mm to 10 mm, depending on drainage requirements and on-site ground conditions – compacted to an even finish. Thereafter, a 40 mm layer of compacted sand is laid onto a geotextile separation layer to form the bedding.

Once this phase has been completed, it's time to position the paving grids. Each paver has integrated ground spikes that are pressed firmly into the bedding, with each paving grid locked in place with integrated snap-fit clips. Thereafter, it's a simple matter of filling the voids with gravel. The latter should comprise 6 to 10 mm angular stone.

The sub-based preparation for a grass-filled system – intended more for parking and occasional vehicle usage – follows a similar approach. The key difference is the bedding layer. In this case, a 70 mm to 100 mm layer of compacted growing medium – a mixture of river sand and top-soil – is laid on top of the geotextile separation layer. Once the grids have been laid and compacted with a vibrating plate, they are then loose filled with clean friable seeded topsoil.

Construction in progress on a drainage channel at the Fairview Sports Centre in Gqeberha

Sudpave's gravel filled systems are designed to support a weigh of up to 3 000 tonnes per m² (as tested by the CSIR), while sand/soil filled structures can support loads up to 2 500 tonnes per m².

V-drains and stormwater channels

"Within the roads market we believe there's significant opportunity for the application of our systems for low volume rural road access, as well as the installation of V-drains within the municipal, provincial and national roads environment," says Bergesen. "Within the leisure and commercial market, we already have a well-established track record for internal road and parking area layouts."

Past V-drain project examples include the supply of Sudpave systems for the Gibson Bay Wind Farm, located within the Kouga Municipality, Eastern Cape.

"Brian Paddey of Bay Projects Coastal called me to enquire about Sudpave as an alternative option to precast for the run-off V drains for the road network within the development. We completed a trial section which was approved, together with the fact that we could manufacture and deliver within a short time frame," Bergesen explains.

In total some 6 000 m² of Sudpave's system was installed in the prepared and compacted earth V drains designed to limit erosion. Sand/soil filled, the design incorporated seeded topsoil to promote vegetation growth to further reinforce the overall structures. Subsequently, Bay Projects Coastal adopted the same approach for V-drain construction at the Wesley-Ciskei Wind Farm, located within Ngqushwa Local Municipality, and the Tsitsikamma Community Wind Energy Facility in the Koukamma Local Municipality, both in the Eastern Cape.

"The feedback from Bay Projects Coastal confirms that they are very happy using the Sudpave system as it provides a more manageable solution from ease of transport and installation perspectives, especially in remote areas where they operate," Bergesen continues.

In terms of other general examples, an earlier project for drainage channel reinforcement was successfully installed at the Fairview Sports Centre in Gqeberha. This was completed in 2015 and is still functioning well today. A range of similar projects are ongoing.

"Whether it's to support traffic, or for specific stormwater attenuation tasks, Sudpave delivers. Another plus is that the system is ideal for community-based employment on construction projects since unskilled labour can be quickly trained up. Plus, the system has the added benefit of blending seamlessly with the environment," Bergesen concludes. ■

A soft landscaped lawn channel constructed using the Sudpave system provides an eco-friendly stormwater solution