

NAYLOR
ENVIRONMENTAL

Sustainable
Urban Drainage
Systems

SuDS



Stormwater
Management Systems
Infiltration &
Attenuation Crates

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Naylor Aquavoid-Metro
Heavy Duty

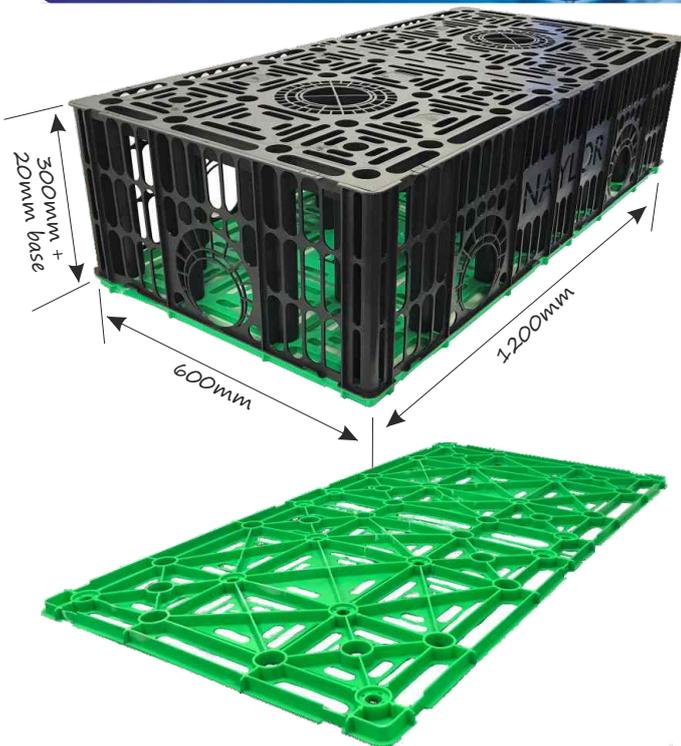
Aquavoid-Metro

About Naylor Environmental

Naylor Environmental is an innovative company specialising in multi-product systems for environmental protection projects within the Construction Industry. The principal activities of the company are concentrated within the Sustainable Drainage Systems arena and are split into four distinct areas:

- **Porous Paving** - Naylor Integra & AdPave grid systems
- **Surface Water Storage & Infiltration** - Naylor Aquavoid crates
- **Sports drainage & Filtration** - Naylor Enviroflow
- **Stormwater Quality Systems** - Naylor Smart Sponge®

Aquavoid-Metro



Nominal crate size	1.2m (L) x 0.6m (W) x 0.3m (H)
Nominal base size	1.2m (L) x 0.6m (W) x 0.02m (H)
Coverage Rate	4.63 crates / m ³
Volume of crates	0.216 m ³
Capacity of crates	0.2063 m ³ (void ratio 95.5%)
Volume of bases	0.0144 m ³
Capacity of bases	0.0138 m ³ (void ratio 95.5 %)
Weights	Crate 9.0 kg, Base 2.0 kg
Short Term Compressive Strength	400 kN/m ² Vertical 85 kN/m ² Lateral
Maximum Cover	2.5m
Minimum Cover	0.4m landscape, 0.6m Cars, 0.8m HGV

Stormwater Management - The Concept

The Naylor Aquavoid-Metro range of storage crate provides an economic versatile storage system for general use.

Used as a soakaway the rainwater collected through pipes from the roof and/or road can be slowly infiltrated into the soil. By infiltrating relatively clean water into the soil, the drainage system is relieved and drying out of the sub-surface can be prevented. Infiltration of rainwater is part of sustainable construction as advocated by the UK Government.

Used as an attenuation system when the normal drainage systems cannot cope with the volume of surface water this is diverted into the Naylor Aquavoid-Metro storage system and released slowly after the storm has passed avoiding localised flooding.

Advantages of the Naylor Aquavoid-Metro:

- High Bearing Capacity, suitable for traffic & HGVs
- Large Storage Capacity, 95.5% voids
- Economic to install & maintain
- Suitable for high and low groundwater situations
- Inlets/Outlets: 6 No 110/160mm on sides & 2 No 110/160/200mm on top surface with access up to 300mm via adapter.

Features

Hand Holds

These enable the lightweight units to be picked up and positioned easily on site and allow accurate positioning onto the base plate (for the bottom layer) and onto other units (for multi-layer projects).

Clips and shear connectors

Connecting clips allow the crates to be clipped onto the base plates and also allow unit to unit connections. The integrated shear connectors locate in the top of each unit to prevent displacement of the layers during backfilling operations.



Half Units for Brick Bonding

The standard Aquavoid-Metro units can be carefully cut down the centre to create a 0.6m x 0.6m x 0.3m module – this allows a brick bond to be created in any structure for additional stability if required.

Features (Continued)

Inspection & Maintenance

The integral 110/160mm knockouts allow for a clear inspection route to be created in either direction through a structure. There is also the ability to create a 160/200mm dia vertical route for inspection & maintenance if required. These three routes also allows for maintenance procedures via jetting if required

Structural Testing

The Naylor Aquavoid-Metro has been subjected to testing by an independently accredited testing laboratory.

Compressive tests were carried out using both a circular platen and full plate to establish deflection under load and ultimate compressive strength at failure in both a vertical and lateral plane.



How it all works

These underground storage units are wrapped in a special non woven, needle punched geotextile (Naylor GT1900) to allow water discharge to the subsurface, but does not allow any soil or sand particles to go through. The box has a high bearing capacity and can easily be expanded in all directions

The construction of the storage void is achieved by the use of the Naylor Aquavoid-Metro, a geocellular high-quality rectangular box with dimensions 1.2m x 0.6m x 0.3m (LxWxH) with a storage capacity of 206.3 litres (95.5% void ratio). The standard vertical load capacity of 400 kN/m² is sufficient for most situations. The first layer of units are installed onto the green base plate with subsequent layers locked into the crate below.

Why use Naylor Aquavoid-Metro?

- Prevents peak flows to main drainage and surface water systems.
- Rainwater is "cleaned" by geotextile surround.
- Decreases inconvenience of flooding during heavy rain falls.
- Promotes the balance in the groundwater position.
- Decreases environment problems caused by development.

Applications

Naylor Aquavoid-Metro is ideal for the bulk storage of stormwater in both attenuation and infiltration schemes. Buried with 0.5m of cover for non vehicular or 0.6m for car park use, the Naylor Aquavoid-Metro can also be used with 0.8m of cover under HGV areas (subject to design calculations). Connections of any diameter can be made to the system.

Design Criteria

Equally suited to both soakaway & attenuation schemes the structure can be designed as follows:

Following detailed assessment of the required volume of stormwater to be stored (see CIRIA C522, R156 & BRE 365). The total number of Naylor Aquavoid-Metro units can be calculated using the volumes and capacities shown in the table on page 2. Decide on the best configuration for the characteristics of the site in question and create the "box" accordingly using the length and width dimensions (don't forget to allow an additional layer of 20mm to allow for the base plate at the bottom of the structure).

Design

1. Decide if the system needs to be either attenuation or infiltration bearing in mind the following parameters.

Cover over units: 0.5m to 0.8m (depends on use)
Maximum depth to base 3.5m*

(*based on 38° Shear under light traffic load).

2. Decide on the location and quantity of storage systems: Locate the best site position to minimise excavation and pipe runs (normally at low point).
3. Decide the surfacing above the structure: Parking or leisure etc (this will decide the unit loading).
4. Calculate required capacity: This is based on storm intensity, duration, porosity of soil, EA restrictions etc.
5. Calculate quantity of Aquavoid-Metro units.
6. Based on the layer depth of Naylor Aquavoid-Metro of 300mm calculate the dimensions of the tank to suit local site conditions (adding the 20mm base plates).
7. Decide on silt trap positions and inflow locations: Water entering any storage device is best passed through a silt trap prior to storage. For infiltration systems this can be the geotextile barrier. If hydrocarbons are present (car parks etc) a Smart Filter may also be required - see the Naylor Smart Sponge® brochure.
8. Decide on outflow locations (if required - attenuation systems): This would normally be at the base of the unit for attenuation systems and should be of a size required to suit the outflow requirements.
9. Select a suitable Naylor liner: If a permeable infiltration system is required choose a single layer of Naylor GT 1900 needle punched non woven type. If an attenuated system is required a Geomembrane (Naylor GM0.75) would envelope the units with a Naylor GT 1900 protective fleece around it.
10. Decide position of maintenance access: Although systems of this type require virtually no maintenance, it is advisable to provide for visual inspection to all types of system. The Aquavoid-Metro has several options.
11. For attenuation systems decide on the position of a vent: This can be a simple 100mm dia pipe per 5,000m² of drained area.

Inspection & Maintenance route

A 160mm dia route can be provided at the base of the structure to allow visual inspection and mechanical jetting if required across the full length & width of the structure (standard Aquavoid-Metro units). A 200mm dia vertical inspection route can also be accommodated.

Installation

General: The Naylor Aquavoid-Metro system MUST be installed onto the green base plates and clipped into place with the clips provided.

Connections: A 110/160mm dia cut out is provided in six positions around each unit for ease of connections, if a larger diameter connection is required a suitable adapter can be selected from the range.

Clips & Shear Connectors: Clips are provided for unit to unit connections (12 per crate), these clip into the recesses provided. The crates have multiple integral shear connectors built into each unit that locate into the crate below. This provides both unit to unit and layer to layer stability.

Pre-installation notes:

For brick bond installations: The Aquavoid-Metro units can be simply cut in half using the guide provided to create 2 No 0.6m x 0.6m x 0.3m units. These can then be used to create a brick bond pattern to a layer

For attenuation systems: Position the inflow and outflow connections level with the base of the Aquavoid-Metro structure. For infiltration systems: Position the inflow connection at the top of the Aquavoid-Metro structure.

Installation Instructions:

- 1/. Excavate to the required length, width and depth and level the base. Ensure area is enough to allow plant access around sides to compact the backfill material (500mm minimum). Ensure base is smooth and level with no sharp protrusions. Cut back slopes to a safe angle or adequately support and allow safe access for site personnel.
- 2/. Inspect the base for soft spots and if any are present, excavate and replace with compacted granular fill material.
- 3/. Lay 75mm sharp sand bedding layer to the base of the excavation and level off. Lay the geotextile protection fleece (non woven, needle punched type GT1900), ensuring a minimum 150mm overlap. This is required for both attenuation and infiltration structures.
- 4/. Lay the geomembrane (if attenuation) over the geotextile and sand bedding layer and up the sides of the excavation. Examine the geomembrane for damage and test all welds if apparent.
- 5/. Install the Aquavoid-Metro base plates to the required length and width, securing them with the supplied clips to form the base layer. Install the first layer of Naylor Aquavoid-Metro units onto the base plates ensuring that inlet/outlet points are correctly positioned. If inspection/maintenance routes are required, ensure that the relevant cut outs are removed to allow free passage of jetting equipment. In multi layer installations care should be taken during backfill to avoid displacement around the edges of the structure.
- 6/. Complete the geotextile and/or geomembrane encapsulation to the sides and top of the installation, ensuring 150mm min overlap for the protection fleece. Geomembrane should be welded with double seams and inspected for damage, testing the welds as required.
- 7/. Make connections using end plates or top hats; end plates are attached to the crates with self tapping screws. For attenuated systems, it is recommended that all connections and air vent installations are installed using sealed drainage connections into a preformed socket with proprietary seals.
- 8/. Backfill the installation with Type 1 or 2 sub base, compacting in 150mm layers, in accordance with Specification for Highway Works.
- 9/. Place a 75mm sharp sand protection layer if required over the top of units and continue to backfill as follows:
- 10/. Finalise the pavement construction / landscaping over the Aquavoid-Metro system prior to over run.



Available throughout
the UK

Product manufactured in the EU

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Typical Installations

For trafficked areas (car parks etc): Type 1 or 2 sub base material compacted in 150mm layers in accordance with the Specification for Highway Works. Compaction equipment on top of the system not to exceed 2,300kg per metre width.

For landscaped and non-trafficked areas: Selected "as dug" material with a unit size no more than 75mm compacted to 90% maximum dry density. Compaction equipment on top of the system not to exceed 2,300kg per metre width.

Installation Types:

Soakaway

Photo shows a multi layer soakaway being installed with geotextile surround. This large soakaway has high level entry points, inspection routes to ensure no silt build up and is positioned beneath a very large car park.



Off-Line Attenuation

This attenuation structure is used as an overflow storage with a single in/out access at base level. Surface water is diverted into the system when the flow in the main sewer reaches capacity. The picture shows the system surrounded by geomembrane with the geotextile protection fleece about to be installed.



On-Line Attenuation

Photo is taken during a multi layer installation with a central porous pipe distribution within the bottom layer. Surface water is fed through the system to a Vortex Flow Control at the exit which when operational backs up the flow to fill the attenuation structure. Hydrocarbon removal is through Naylor Smart Filters.



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