



# drening

eco-friendly management of water resources



- INFILTRATION SURFACE
- RESISTANT
- LIGHTWEIGHT





# DRENING VISION

*Every day in Europe we cement 250 acres of land. The consequences are obvious for everyone: disastrous floods, prolonged droughts and violent rainstorms.*

*Water is vital to humans, but if we do not respect Nature, it may turn into a source of grave danger.*

## WATER AND MANKIND, THE QUEST FOR A NECESSARY BALANCE: THIS IS OUR TASK

DRENING is made of HDPE (high density regenerated polyethylene), a plastic polymer with high resistance to shocks, extreme solidity and robustness combined with elasticity and flexibility.

This material is chemically inert so it maintains its peculiarities unchanged over time and guarantees long-lasting results of the system and its related functionality.

Geoplast S.p.A. in Green Building Council Italia,  
The Network of Green Building.





# DRENING THE SOLUTION

**DRENING** is a modular element in HDPE. It is designed for the creation of underground retention ponds used for "in-situ" rainwater management. Depending on the type of installation, **DRENING** can be used to facilitate subsoil drainage in order to prevent surface overflowing while refilling the aquifers, but it is also useful to reuse of collected water to save water resources.



**DRENING** can be used also for sewage disposal from settlements which are not connected to the sewer system. The material and the structure of **DRENING** are particularly designed for the creation of high capacity systems which can be placed under high traffic areas with a minimum digging depth, for minimally invasive interventions.

- DRAINAGE OF CAR PARKS
- WATER DISPOSAL IN INDUSTRIAL AREAS
- WATER DISPOSAL IN RESIDENTIAL AREAS
- DRAINAGE OF ROAD INFRASTRUCTURES
- PHYTODEPURATION
- RECOVERY AND REUSE OF RAINWATER
- WASTEWATER

# DRENING ADVANTAGES



High resistance modular system for the creation of retention ponds and high capacity accumulation basins

## lightweight



**DRENING** weight just 11 kg and can be moved manually without the need of mechanical devices

## fast



Its lightweight and easy installation allow a fast and safe creation of the basin

## excavation



Thanks to the modularity of the panels and the overlapping locking systems, installation is extremely easy

## resistant



The arch structure of **DRENING** produce high mechanical resistance, which allows to place it also under high traffic areas

## capacity



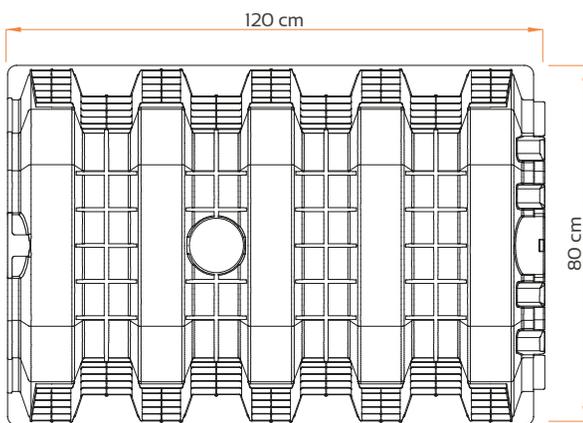
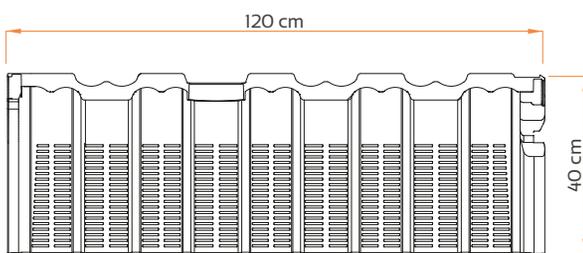
**DRENING** chambers can contain up to 310 liters of water per m<sup>2</sup>

## draining



**DRENING** high dispersion surface guarantees the fast and efficient disposal of the collected water

# DRENING TECHNICAL DETAILS



**MAXIMUM LOAD WITH SUITABLE  
FINISHED STATIGRAPHY:  
up to CLASS SLW60**



## DRENING

Actual size (cm)  
material  
weight (kg)  
capacity (l)  
Lateral infiltr. surface (cm<sup>2</sup>)  
Package dim. (cm)  
No. items per pallet

120 x 80 x 40  
HDPE  
11  
310  
2.800  
120 x 80 x 230  
40

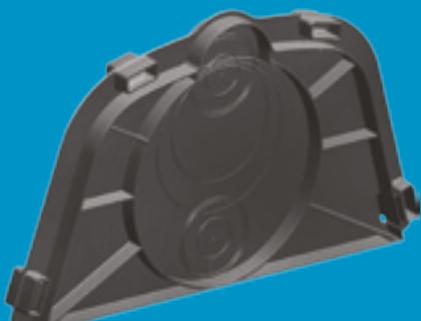


## CAP

Actual size (cm)  
material  
weight (kg)  
Package dim. (cm)  
No. items per pallet

70 x 40  
HDPE  
1.810  
according to the  
project requirements

## The closing cap

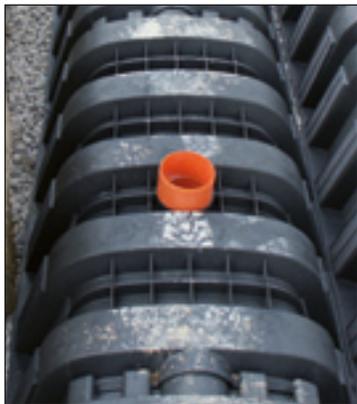
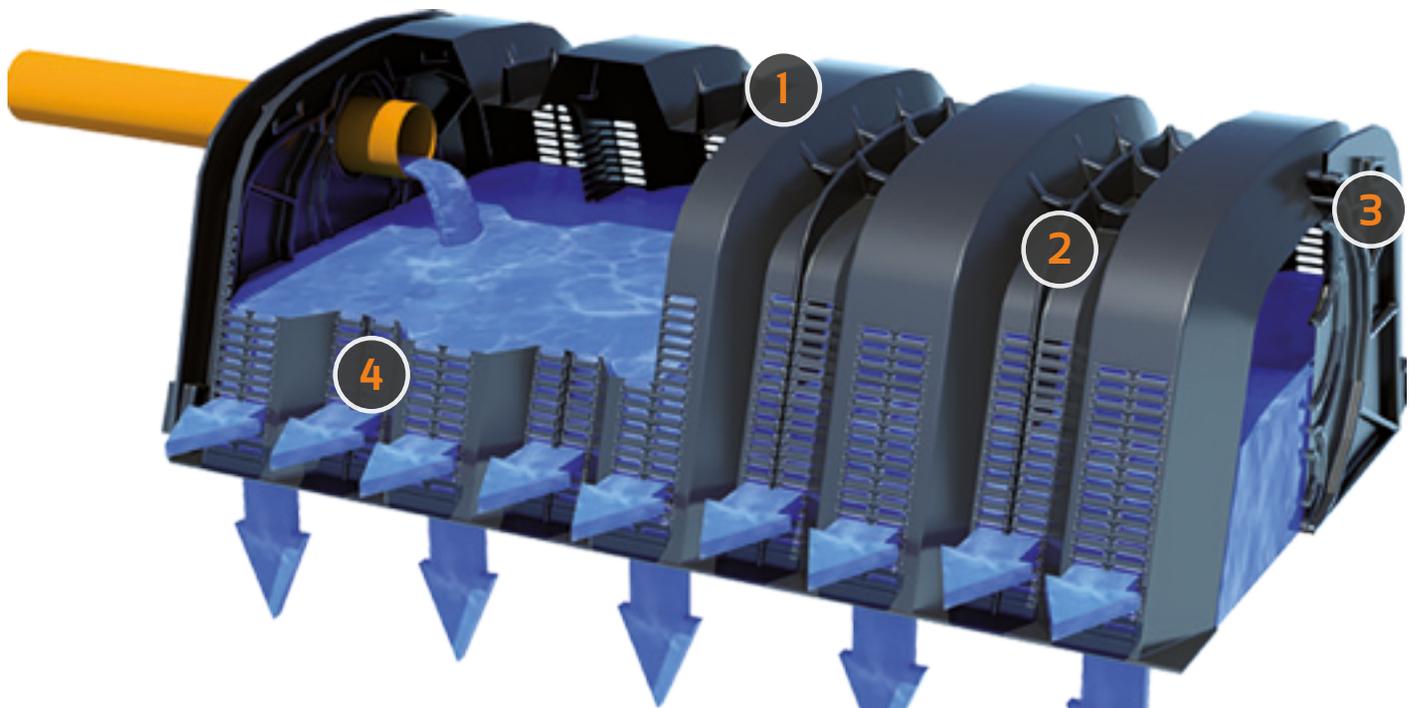


This cap has to be placed at the end of each line of elements in order to close the system.

It is already designed to be drilled in order to insert the pipes (diameters from 60 to 320 mm).

Sizes: 70 x 40 cm  
Thickness: 6 cm

# DRENING SYSTEM DETAILS



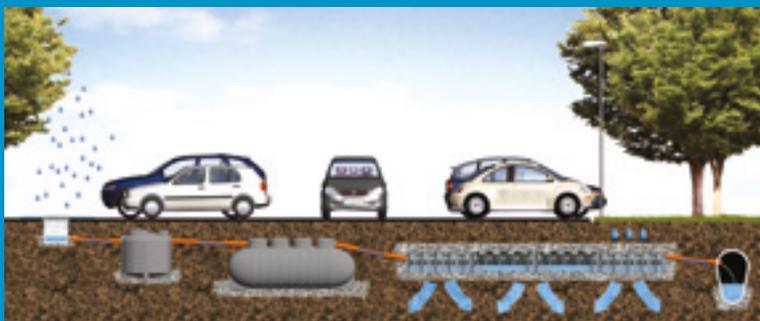
① Upper side designed to insert a vent or inspection duct

② Reinforced arch structure for high load-bearing capacity

③ Double overlapping locking system for a snap-fit place with stable connection between the elements

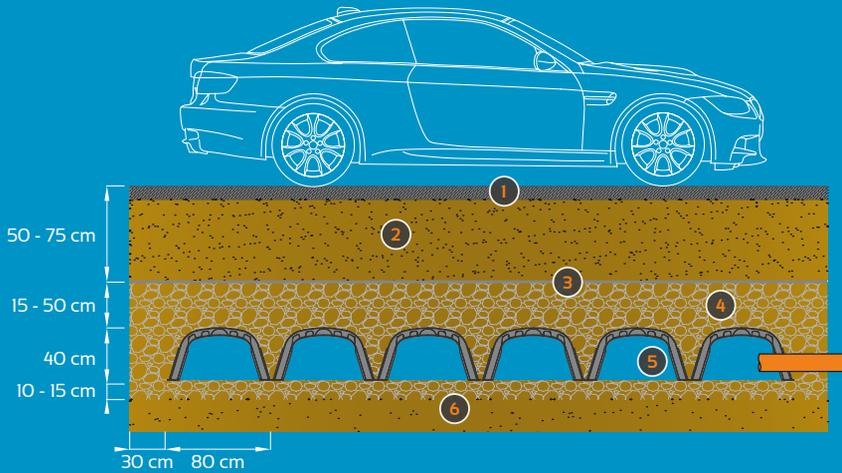
④ Completely open lower side with fissured lateral sides (infiltration surface equal to 12.400 cm<sup>2</sup> per element)

## Restoration of the hydrological balance



DRENING isn't only a flood prevention measure, but as it facilitates water infiltration in the subsoil, it is also useful to refill the aquifers, one of the main water supply sources men usually exploit. In this way, the natural water balance that is otherwise subverted by the waterproofing of the subsoil, remains intact.

# INSTALLATION OF DRENING



## LEGEND

- |                  |                          |
|------------------|--------------------------|
| ① Road finishing | ④ Washed gravel 20/40 mm |
| ② Covering       | ⑤ DRENING                |
| ③ Geotextile     | ⑥ Existing ground        |



## ① GRAVEL LAYING

Construction excavation and laying of washed gravel 20-40 mm with thickness 10-15 cm.



## ② INSTALLATION

Manual installation of DRENING (estimated speed: 1 element per minute).



## ③ CONNECTIONS

Closing of the system with the specific caps and insertion of the power source pipes and the overflow ones (if required by the project).



## ④ COVERING

Backfill of at least 30 cm and covering with washed gravel 20-40 mm for a minimum thickness of about 15 cm (this can change depending on the provided stratigraphy).



## ⑤ GEOTEXTILE

Place a geotextile all over the contact surface between the gravel and the natural ground.



## ⑥ FINISHING

Finished surface (road, carpark or vegetated) as required by the project

# SIZING PARAMETERS

Essential data for a proper calculation of the basin



## RAINFALL

This data refers to a heavy yet short rainfall (30 minutes are recommended)



## DRAINING SURFACE

Evaluation of the draining surface with application of the suitable flow coefficients



## GROUND PERMEABILITY

Evaluation of the basin emptying times and the suitability of the positioning of the system



## LEGISLATION

Discharge limits, first rains treatment, return time to consider



## APPLIED LOADS AND SELECTION OF THE INSTALLATION STRATIGRAPHY

Evaluation of the loads placed on the system for the selection of the installation stratigraphy. Depending on the chosen thickness of the gravel, the specific water storage capacity will be also evaluated.

## ■ Example of preliminary sizing

PROJECT DATA		CALCULATION	
DRAINING SURFACE	5.000 m <sup>2</sup>	AMOUNT OF RAINWATER TO DISPOSE	225 m <sup>3</sup>
FLOW COEFFICIENT	1	STORAGE CAPACITY PER M <sup>2</sup> OF BASIN (considerating the stratigraphy for 1st category loads)	0.51 m <sup>3</sup> /m <sup>2</sup>
RAINFALL (30' duration)	45 mm	NUMBER OF DRENING (minimum quantity of items to support completely the required volume)	440
APPLIED LOADS	1ª categoria	SURFACE OCCUPIED BY THE DRAINING BASIN	422 m <sup>2</sup>
INFILTRATION SPEED	10 <sup>-4</sup> m/s	HYDRAULIC RESISTANCE TIME (required time for the emptying of the basinh)	7.4 h

# DRAINAGE OF CAR PARKS



## Flood prevention

**DRENING** is the ideal solution to deal with rainwater in car parks as it significantly reduces the water volume in the drainage system, facilitating the infiltration in the subsoil in order to prevent surface floods. The easy

and fast installation allows to build also very large basins in a very short time. In this way **DRENING** is a very competitive solution in comparison with other traditional drainage systems.

**Fast installation**  
**Excellent infiltration**  
**High load-bearing capacity**



# WATER DISPOSAL

## in industrial areas



## Protection of industrial buildings

**DRENING** allows the construction of underground basins to dispose efficiently and rapidly the water flowing from loading and unloading areas or from the roofs of the warehouses. Thanks to its high resist-

ance, **DRENING** can also be installed under high traffic areas, such as manoeuvring yards and truck parks. Moreover, the modularity of the product permits an excellent adaptation to the available surfaces.

**High load-bearing capacity**  
**Minimally invasive intervention**  
**Versatile**



# WATER DISPOSAL

## in residential areas



## Protection of residential buildings

**DRENING** is a solution with low environmental impact useful to prevent floods in the new urbanization areas while respecting the local legislations about the unloading of water into the sewage system. It guarantees excellent water drain-

age and allows in-situ water management, thus avoiding the inconveniences and safety issues of an open-air basin. Thanks to its modular structure, **DRENING** adapts to every available surface and guarantees minimally invasive intervention.

Minimally invasive intervention  
Adaptable to every surface  
Low environmental impact



# DRAINAGE OF ROAD INFRASTRUCTURES



## Prevention of traffic issues

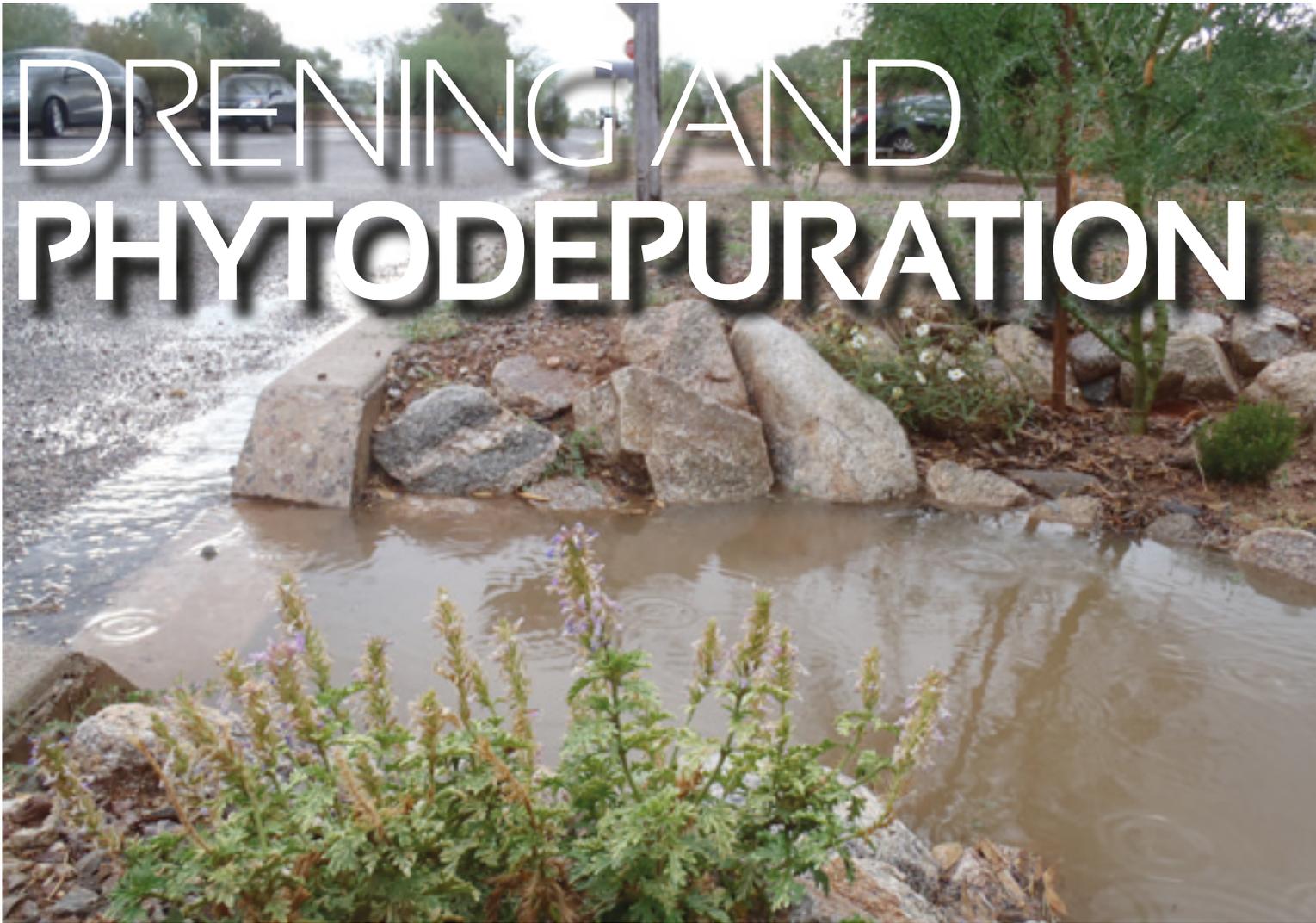
**DRENING** can be used to build drainage systems such as dugouts near the roadside and retention basins in the roundabouts, that can be useful to eliminate rainwater and avoid traffic issues. Thanks to the

compact volume and the fast installation, **DRENING** is easy to move in narrow areas like road construction sites. Furthermore, thanks to its high resistance, it can be installed in high traffic areas.

Compactness  
Fast disposal  
High load-bearing capacity



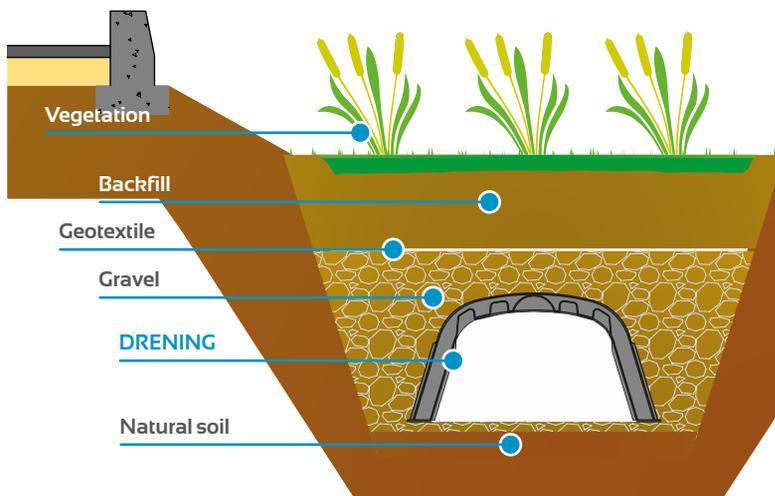
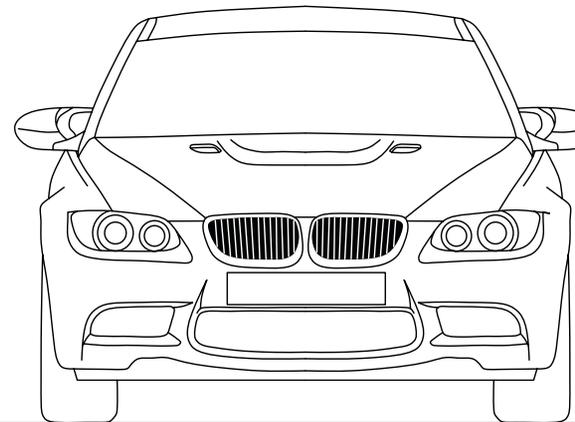
# DRENING AND PHYTODEPURATION



## Improvement of the quality of disposed water

**DRENING** can be used as a supporting element to the lower vegetated and permeable areas that can be found at the edge of the roads or car parks, where rainwater flows. In this way pollutants contained in road run-off water are thus removed through phy-

to-depuration: clean rain-water then seeps into the subsoil, where it is stored in the underground basin and then disposed. In this way not only a large quantity of rainwater can be easily managed, but cleaner water is also returned to the environment.



Minimally invasive intervention  
 Pollutant removal  
 Versatility

# DRENING RECOVERY AND REUSE OF RAINWATER



## Eco-friendly use of water supply sources

Through the waterproofing of the excavation, in order to avoid leakage in the subsoil, **DRENING** can be used to create accumulation basins to collect and store rainwater that can be reused for irrigation. In this way not only drain-

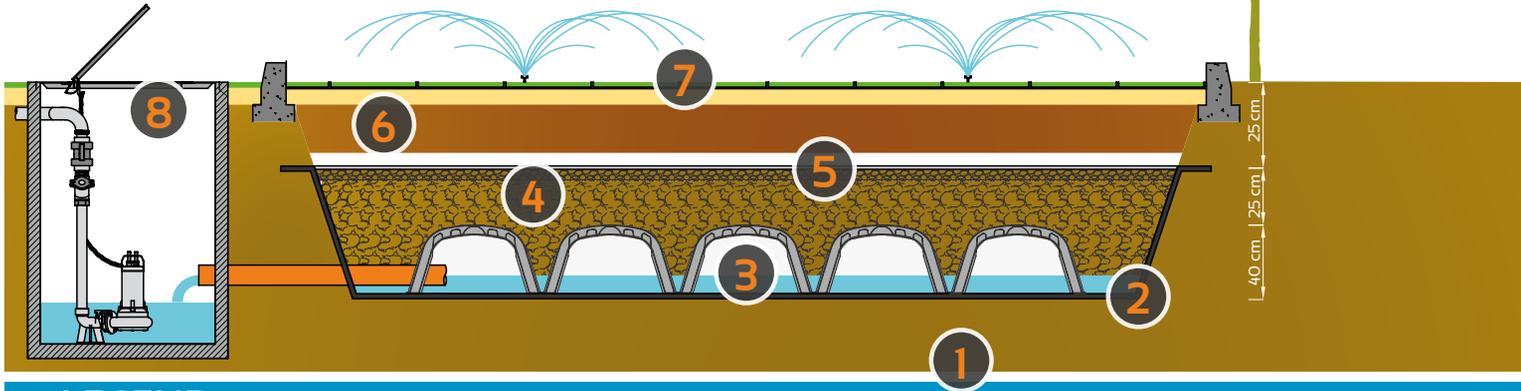
age issues are solved, but also water can be saved and later reused in many different ways. **DRENING** chambers modularity and high capacity allow the creation of systems of any size in order to obtain good storage volumes.

**High capability**  
**Limited depth**  
**Water saving**





# INSTALLATION INSTRUCTIONS



## LEGEND

- |                   |                       |                 |                                                     |
|-------------------|-----------------------|-----------------|-----------------------------------------------------|
| ① Existing ground | ② Waterproof membrane | ③ DRENING       | ④ Lapillus gravel 3-5 mm and volcanic mixture (5cm) |
| ⑤ Geotextile      | ⑥ Covering            | ⑦ Drivable lawn | ⑧ Water pumps                                       |



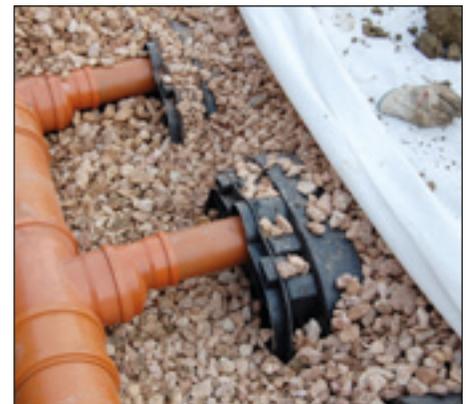
### ① SHEATH LAYING

Place a waterproof layer (warp/weft cloth, PVC sheath, heavy heat-sealed geotextile).



### ② INSTALLATION

Manual installation of DRENING (estimated speed: 1 element per minute).



### ③ CONNECTIONS

Closing of the system with the specific caps and insertion of the power source pipes and the overflow ones (if required by the project).



### ④ COVERING

Backfill of at least 30 cm and covering with washed gravel 20-40 mm for a minimum thickness of about 15 cm (this can change depending on the provided stratigraphy).



### ⑤ GEOTEXTILE

Place a geotextile all over the contact surface between the gravel and the natural ground.



### ⑥ FINISHING

Final stratigraphy (road infrastructure or green surface) as required in the project.

# DRENING REFLUE



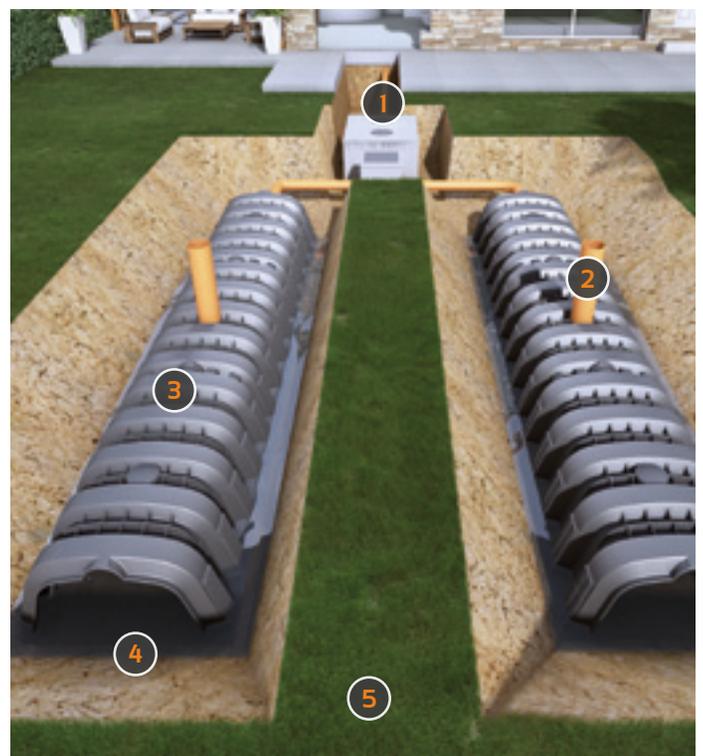
## Domestic sewage disposal respecting the environment

**DRENING** can be used to dispose domestic wastewater through sub-irrigation following primary treatment. This is the ideal solution for residential areas which are not connected to the sewage system. Thanks to its large infiltration surface, **DRENING** guarantees fast and uniform infiltration

in the subsoil. Moreover, it is possible to install ventilation ducts in the system in order to prevent bad smells and to return cleaner water to the environment. **DRENING** is also easier to clean and inspect in comparison with the micro-perforated pipe which is traditionally used.

### LEGEND

-  Primary treatment
-  Ventilation
-  **DRENING**
-  Infiltration
-  Installation in trenches



# DRENING REFLUE ADVANTAGES

Modular and compact system for the disposal into the subsoil of pre-depurated wastewater

## excavation



**DRENING** allows a reduction of the depth of the dugout up to the 50% and guarantees a more compact installation, ideal for limited surfaces

## dispersion



**DRENING** has a bigger permeable surface in comparison with the micro-perforated pipe, so it guarantees a more uniform infiltration in the subsoil

## inspectionable



**DRENING** system is very easy to inspect and clean

## ventilation



**DRENING** wide section allows a great ventilation from the outside for a better biological purification process

## resistant



**DRENING** is less subjected to obstruction problems and guarantees a high efficiency over time

## eco-friendly



**DRENING** is system with low impact both for the environment and the living comfort

# INSTALLATION OF DRENING REFLUE



## ① EXCAVATION

Excavation of a dugout 90 cm wide at the base.



## ② GRAVEL LAYER

Gravel layer of 20/40 mm (min. thickness 10 cm).



## ③ INSTALLATION

Installation of DRENING chambers.



## ④ COVERING

Insertion of the supply and ventilation pipes.  
Cover with min. 15-20 cm of gravel 20-40 mm.



## ⑤ GEOTEXTILE

Place of the geotextile over the whole surface.

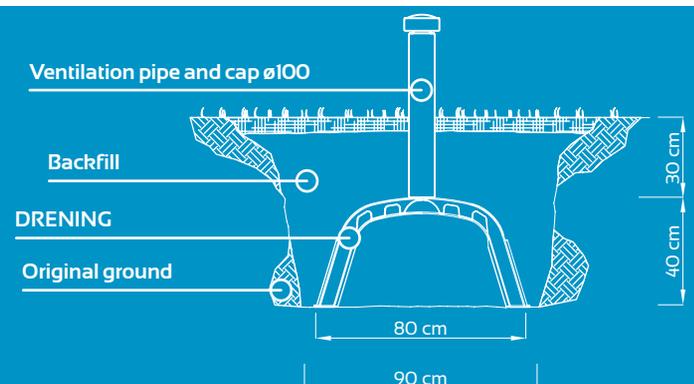


## ⑥ BACKFILL

Backfill until reaching the ground level.

## THE VENTILATION

The ventilation of the system is fundamental to avoid the diffusion of smell and to improve the purification of wastewater. The lack of air causes the bacterial degradation of the organic compounds that can be found in the wastewater and produces foul smells.



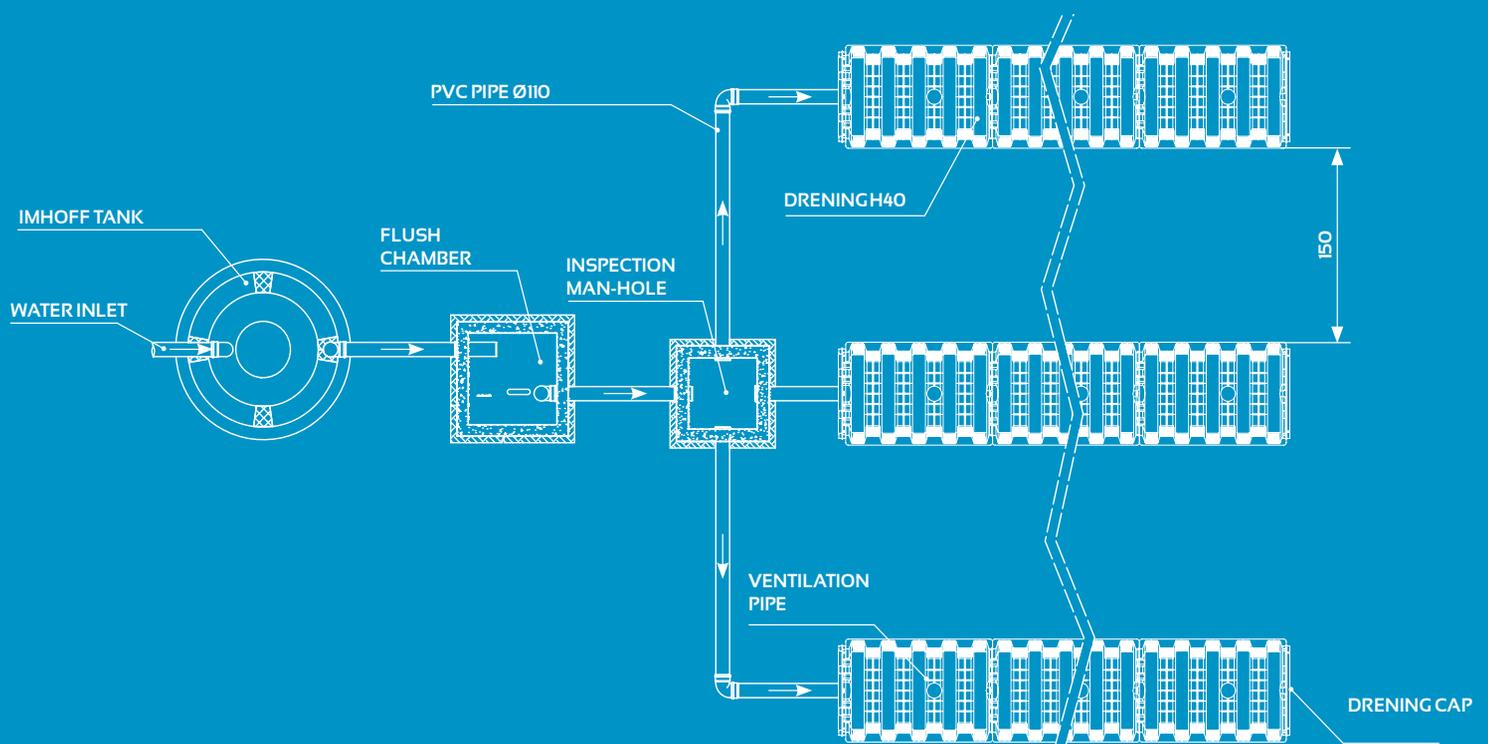
# DRENING REFLUE SIZING PARAMETERS

Type of soil	No. Drening per equal environment*	Percolation volume (l)	Infiltration surface (cm <sup>2</sup> )
ROUGH SAND, STONES, GRAVEL OR MIXED	1	300	12400
FINE SAND	1.5	450	18600
SAND, GRAVEL OR STONES WITH SILT	2	600	24800
CLAY OR SILT WITH A LOT OF SAND OR STONES	3	900	37200
CLAY OR SILT WITH FEW SAND OR STONES	6	1800	74400
COMPACT IMPERVIOUS CLAY	Not suitable	-	-

\*This parameter indicates the pollution level produced per environment, by convention equal to a BOD of 60kg of oxygen per day.

The number of DRENING elements for a wastewater disposal system must be calculated on the type of soil within the area where it will be placed, and the amount of equivalent inhabitants. To obtain this data it is necessary to multiply the number of inhabitants to the multiplicative coefficient concerning the type of soil, as in the table above.

## INSTALLATION SCHEME





**GEOPLAST S.p.A.**

35010 Grantorto PD - Italia - Via Martiri della Libertà, 6/8

tel +39 049 9490289 - fax +39 049 9494028

e-mail: [geoplast@geoplast.it](mailto:geoplast@geoplast.it) - [www.geoplast.it](http://www.geoplast.it)



rev000 - 06/2014