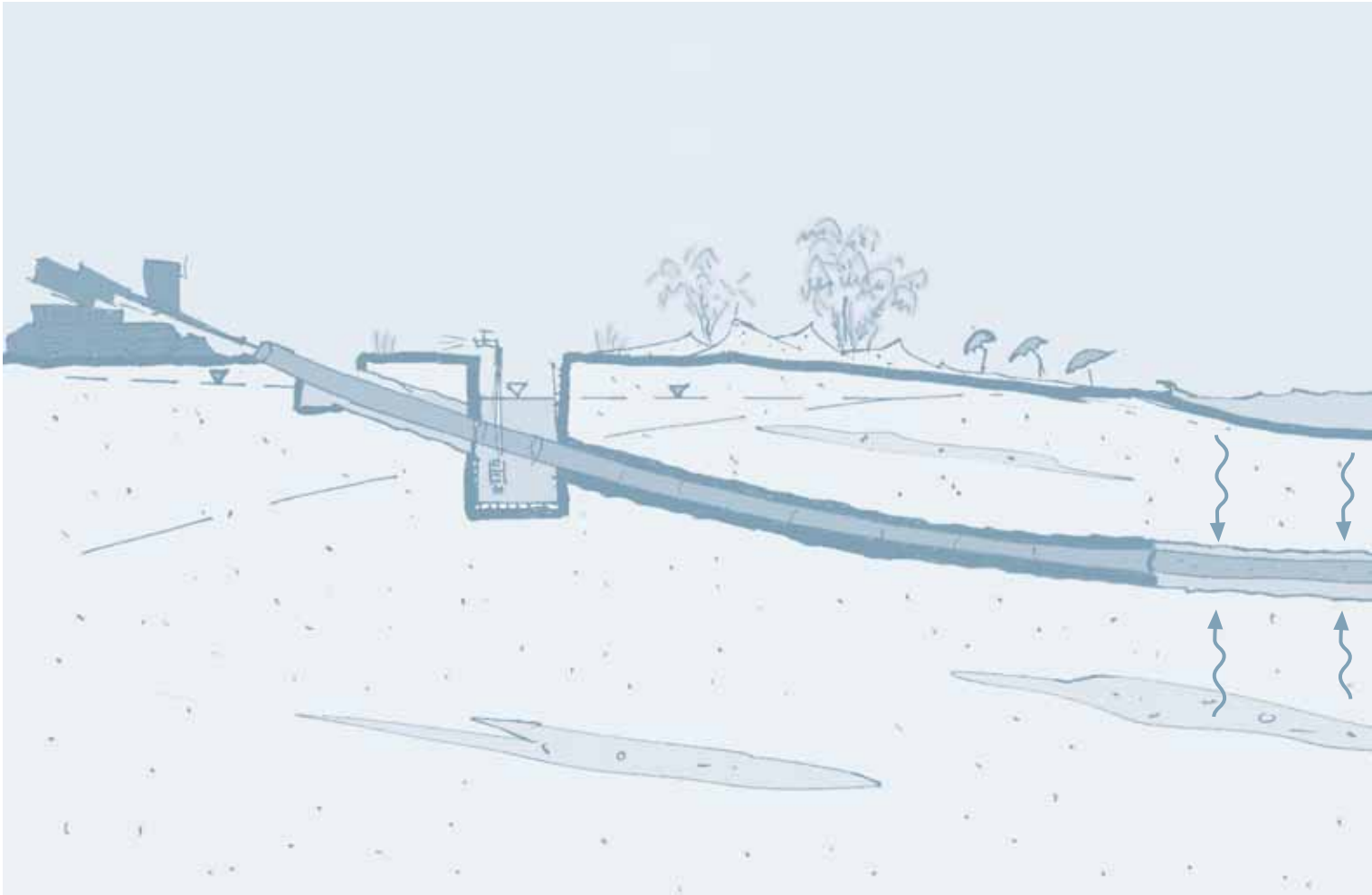


SEAWATER INTAKE BY HORIZONTAL
DIRECTIONAL DRAINS

SEAWATER INTAKE BY HORIZONTAL DIRECTIONAL DRAINS



A NEW TECHNOLOGY OF SEA
WATER HARNESS, WHICH MINIMI-
ZES THE ENVIRONMENTAL IM-
PACT AND PROVIDES EXCELLENT-
QUALITY WATER.



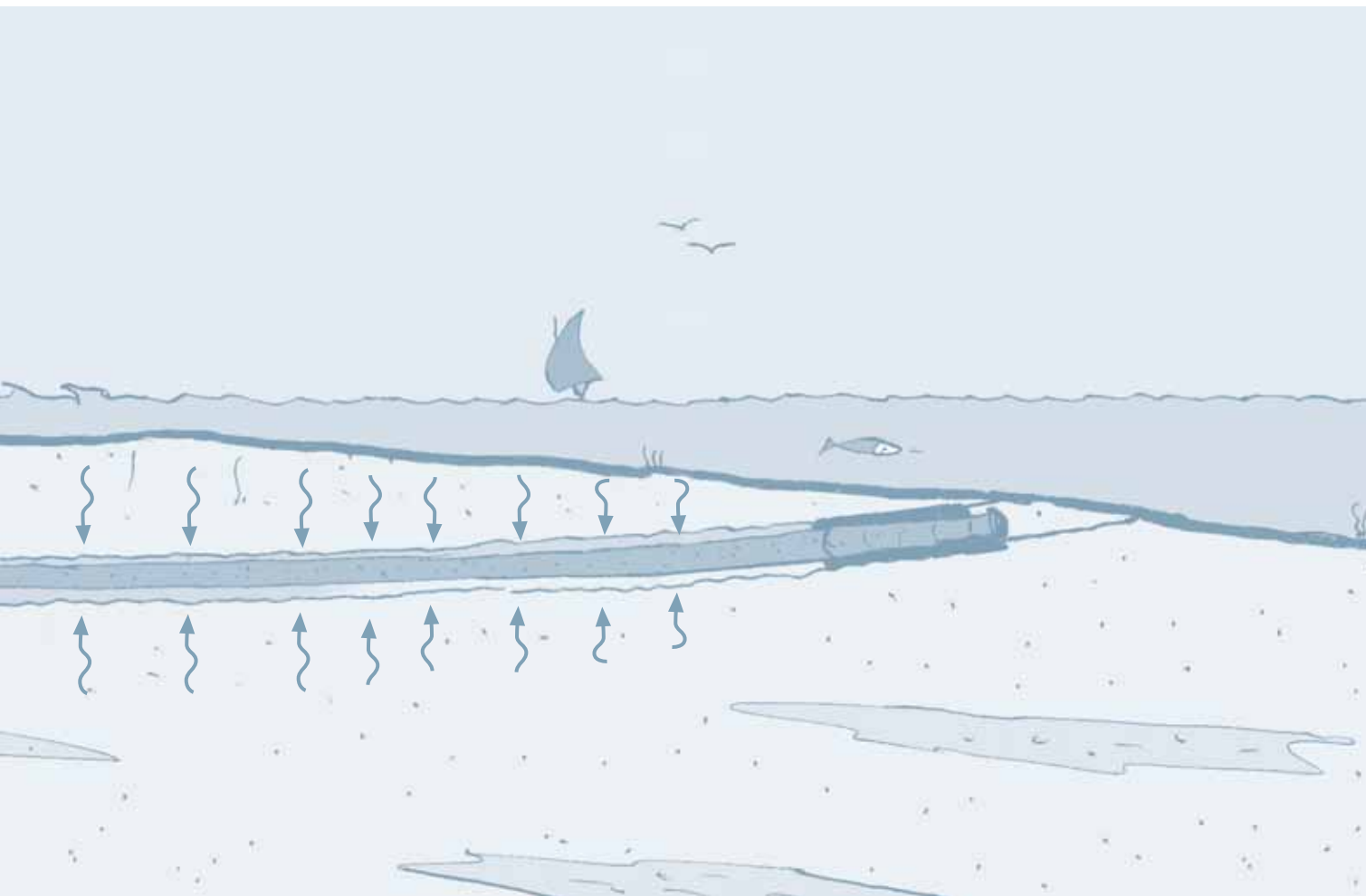
Neodren® is a seawater intake system developed by Catalana de Perforacions, S.A. to give solution to developing a good-quality water source from seawater.

In most cases, the seawater intake technologies are very complex, expensive or simply not feasible in the area where the exploitation plant is located.

Neodren® constitutes an innovation in the seawater intake creating a water inflow with no turbidity and with a constant flow. Horizontal techniques are used to install horizontal drains in a permeable stratum of the marine subsoil, with a direct recharge from the sea.

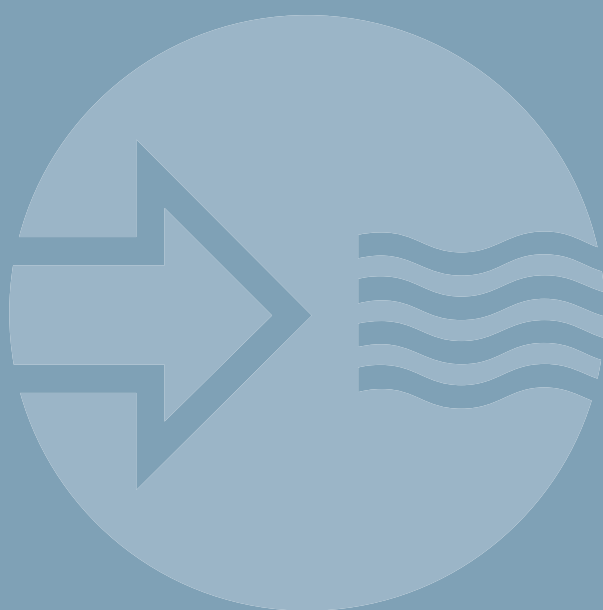
This system obtains the desired flow rate thanks to its very efficient intake method and it is specifically indicated for desalination plants, fish-farms, refrigeration systems and any other application which requires excellent-quality seawater and high flow viability.

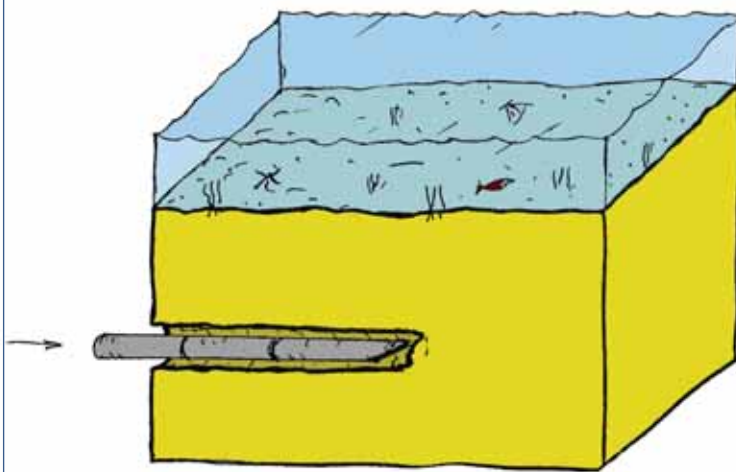
The filtrating pipes are installed in different boreholes, executed from the back of the coastline, by drilling the subsoil and going into the sea, entering, thus, the aquifer geological formation previously selected. This formation permeable for porosity and fracture, ensures the permanent recharge from the marine aquifer and the large flows continual extraction.



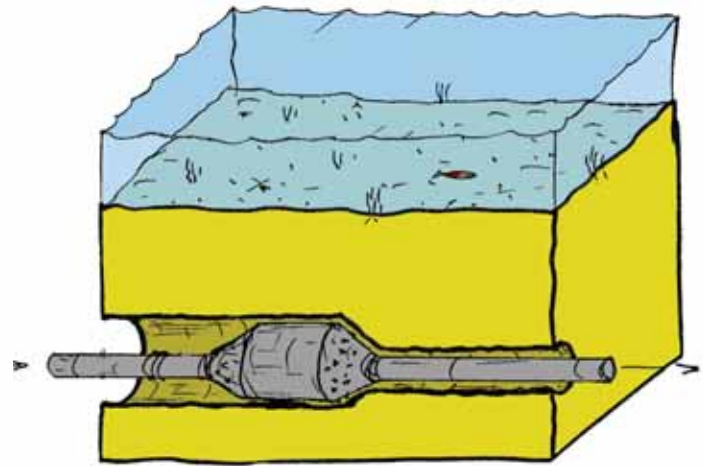
Applications

- Desalination
- Cooling
- Fish-farms
- Water harness in general



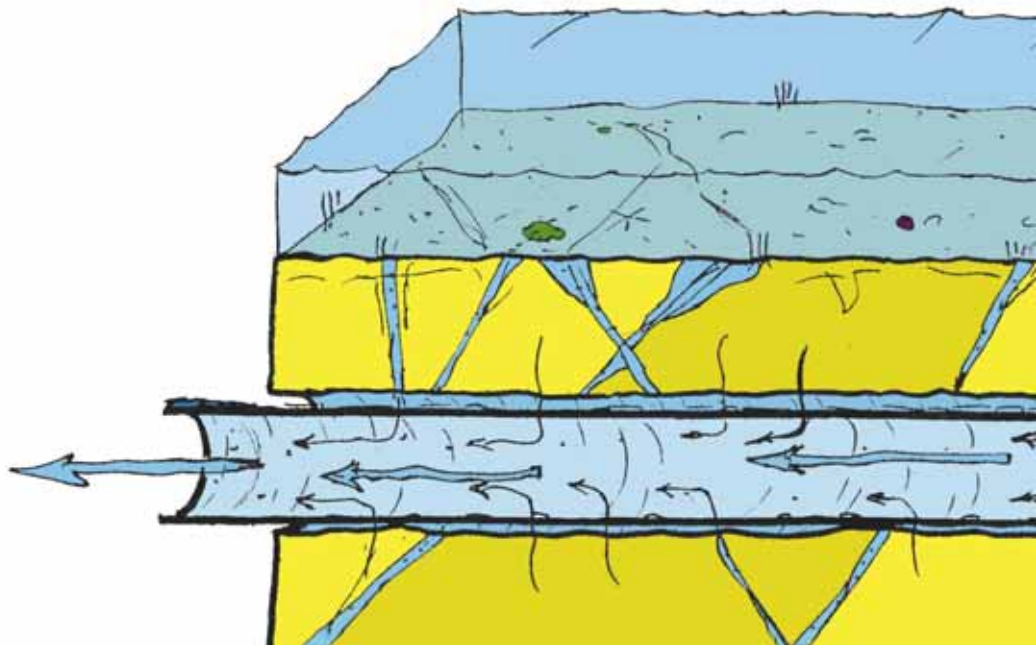


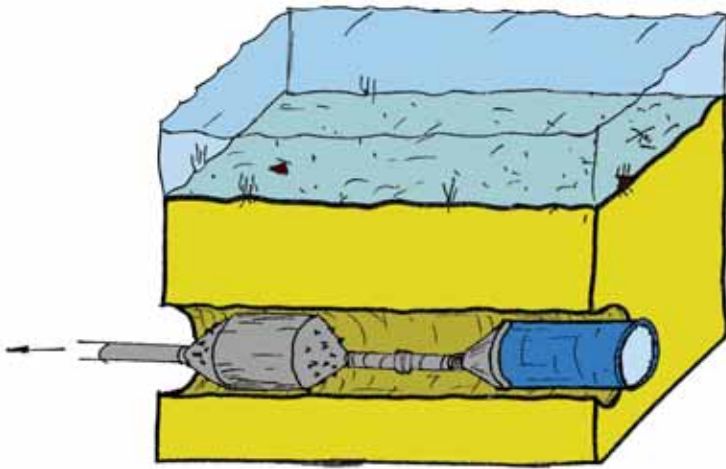
Pilot



Reaming

Harness system

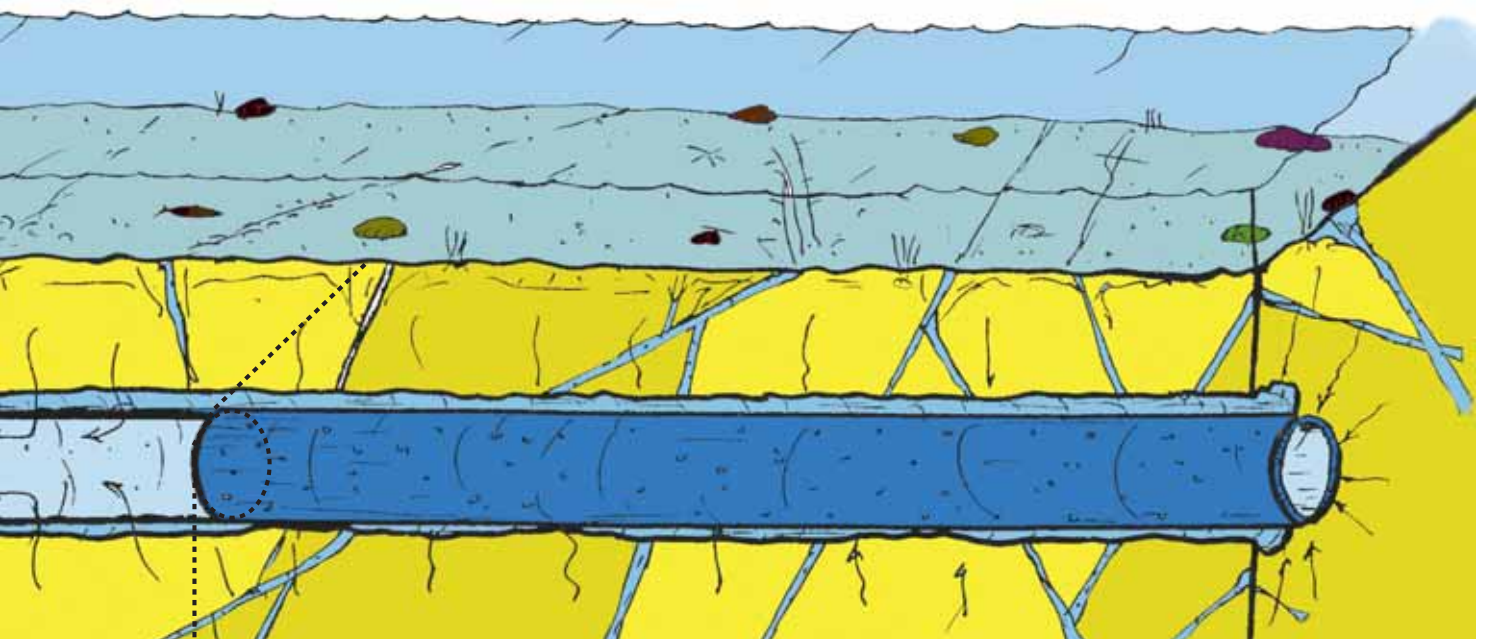




Pipe installation

The filtrating pipes are installed in different bores executed from the backside of the coastline, drilling the subsoil and reaching out to the sea, by penetrating the geological aquifer formation previously selected. This permeable formation by porosity and fracture ensures the marine aquifer permanent recharge and the continual extraction of large flows.

This innovating harness system allows the installation of drain-pipes in any geological formation, both rocky and granular-type (sand or gravel). The development of new drilling systems has achieved new technologies capable of stabilizing the drilled ground and, at the same time, allowing a later surround cleaning to be able to have very efficient drains.







The drilling equipment

Drilling Equipment Location



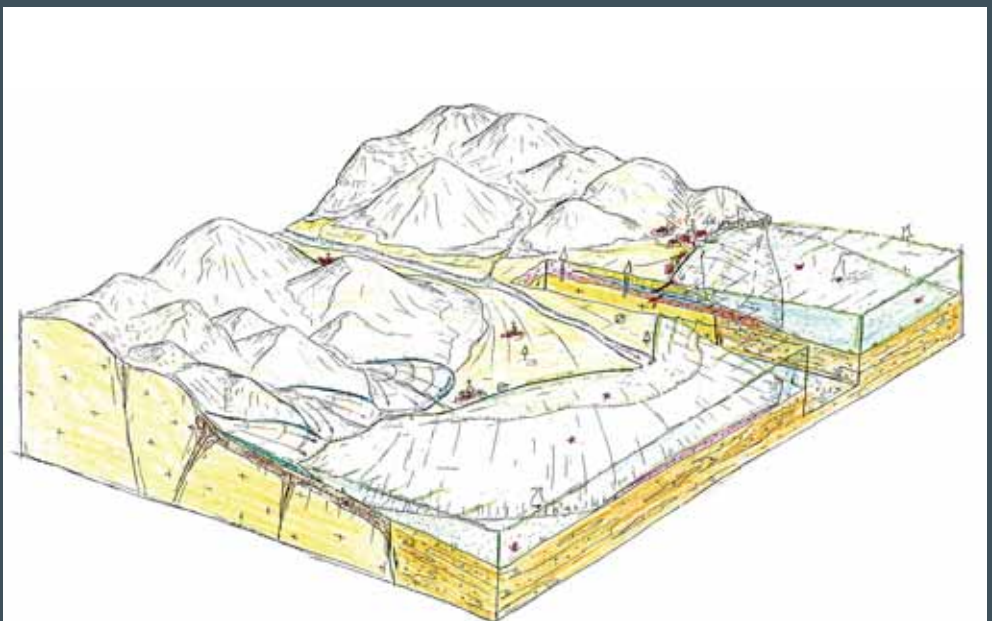


Productive drains stage,
where the water is harness
through the seabed.

Intake design

Neodren[®] system, potentially expandable in capacity and with possibility of reinforcing other existing intake systems, allows the achievement of large flows with the construction of drains batteries. From a location placed on the ground, so many drillings as needed are executed towards the sea, properly separated between themselves, so as not to cause any affectation to the hydraulic stream towards the other drains.

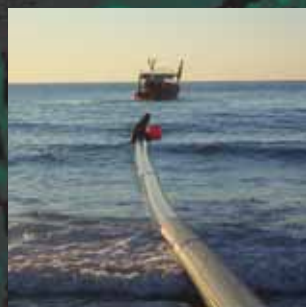
Thus, it is possible harnessing large flows (from 1 m³/ s to 5 m³/ s) from a small location in the continent, separated from the coastline the distance specified by the administrative and urban orders, and also the geological and logistic conditions.



Subaquatic tasks

It is necessary executing maneuvers and tasks inside the sea, located in the exit point from each drain; subaquatic personnel is in charge of these sea maneuvers control and the pipe-filter final introduction.

These maneuvers are executed at the final point of each constructed drain, minimizing the affectation to the marine habitat.





Environment impact

In many cases, the existing poseidonia prairies, highly protected by the environmental legislation, mean an environmental obstacle for those intake forms which may affect them.

Neodren[®] is an innovatory harnessing technique which respects the ecosystem. The drains are installed in the subsoil by means of horizontal directional drillings, below the seabed surface.

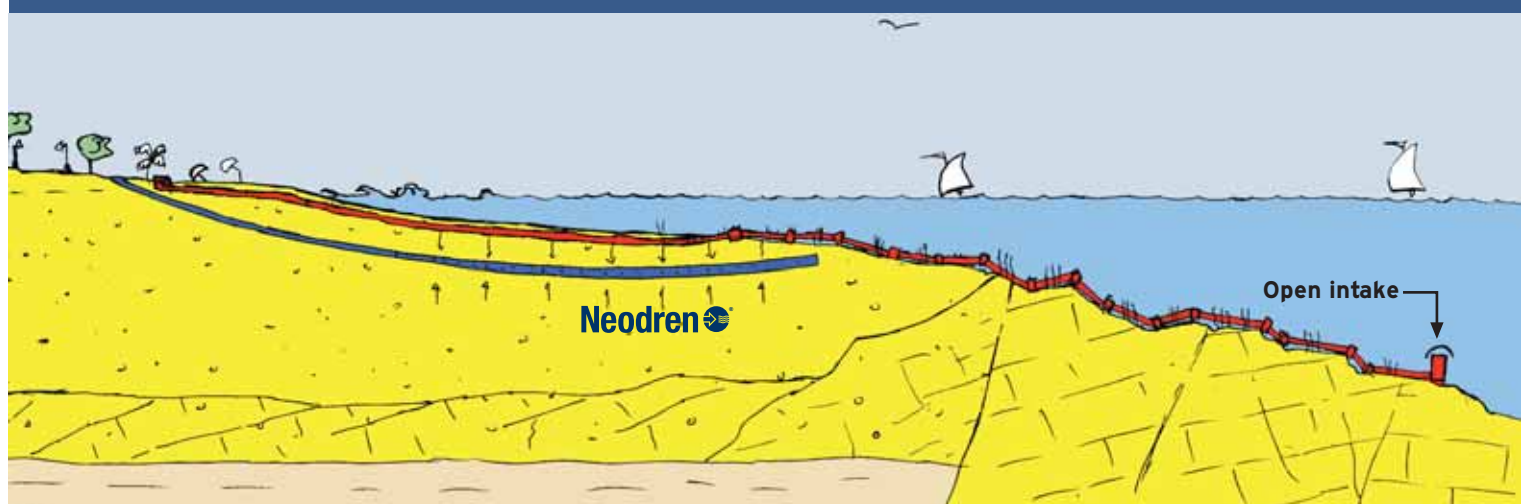
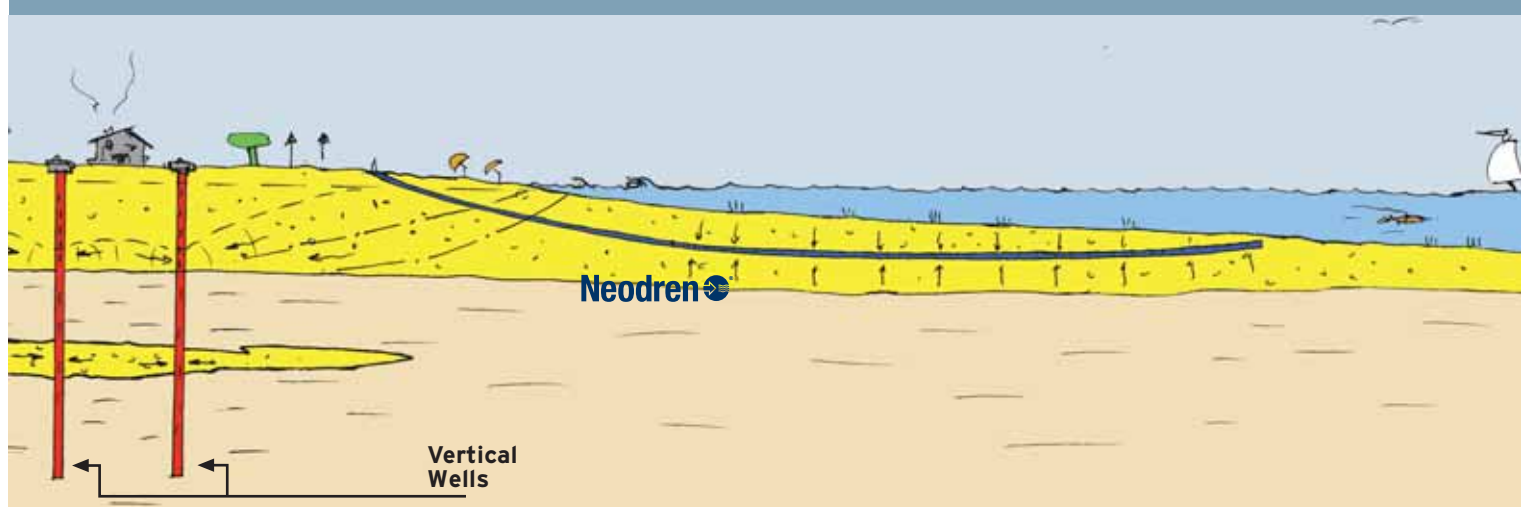
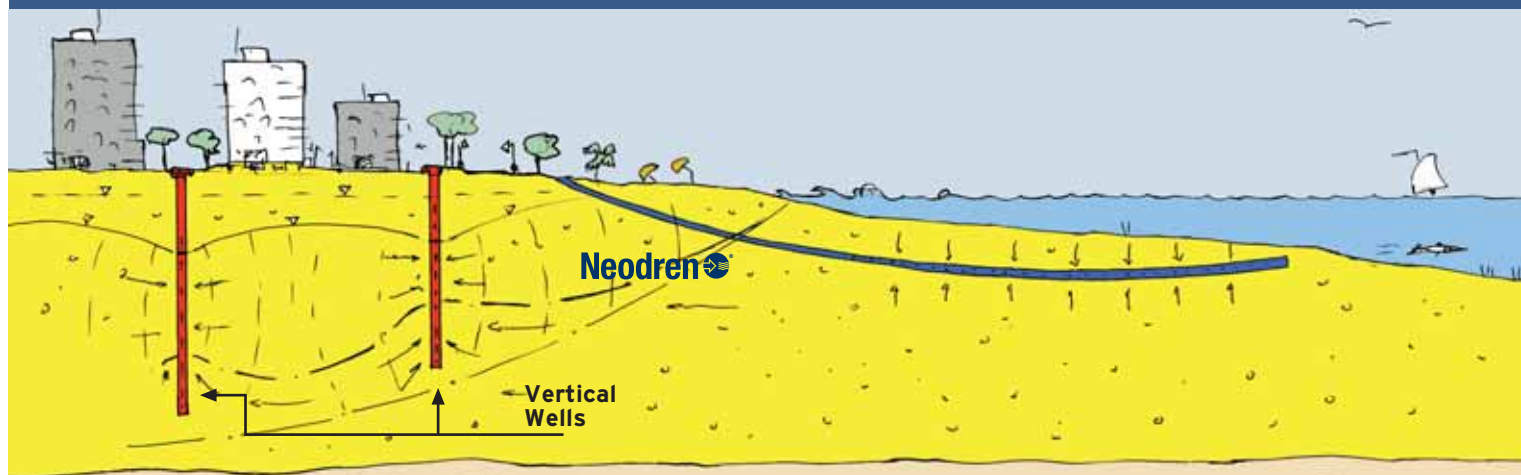


Permeable
stratum



Impermeable
stratum

LEGEND (KIND OF STRATUM)



Neodren® advantages over the intakes by vertical wells and open intake construction

1. Intake in coastal aquifers

The demographic and thickly populated urban pressure makes that the fresh water aquifers, placed around the coast, are submitted to strong extractions by means of many vertical wells in an overexploitation process, which causes the seawater intrusion and salinity, with the resulting failure in the drinking water harnessing system.

This generalized salinity is aggravated by the seawater intake, destined to desalination plants by vertical wells in the coastline, with defective constructive design which causes alterations and movements from the fragile subterraneous contact surface between continental fresh water and seawater.

Neodren® avoids fresh water intake and affectation, because the filtrating sections are placed in the sea subsoil, properly separated from the fresh water – seawater interface surface.

2. Intake in low-permeability coastal area

Seawater intake in low-permeability aquifers (slight thickness in saturated area), makes that large flows harness becomes unfeasible, though the amount of vertical wells is multiplied.

Neodren®, installed in the seabed with constant recharge from the seawater, maximizes the output in the submerged aquifer flow

3. Open Sea Intake

The open intake allows the seawater harness by means of inmissary pipes with large diameters and, usually, very long (several kilometers), to be able to get to the bathymetry from 30 to 60m, depth where water has excellent physicochemical qualities suitable for its treatment, being exposed to any external pollution.

The presence of Posidonia prairies and other protected biotopes will be an obstacle for the excavation and draining tasks execution in the seabed.

Neodren® and the Horizontal Directional Drilling technology are an alternative for the intake and, even, for the inmissary installation, required in case of seabeds in steep orographies.





Pumping

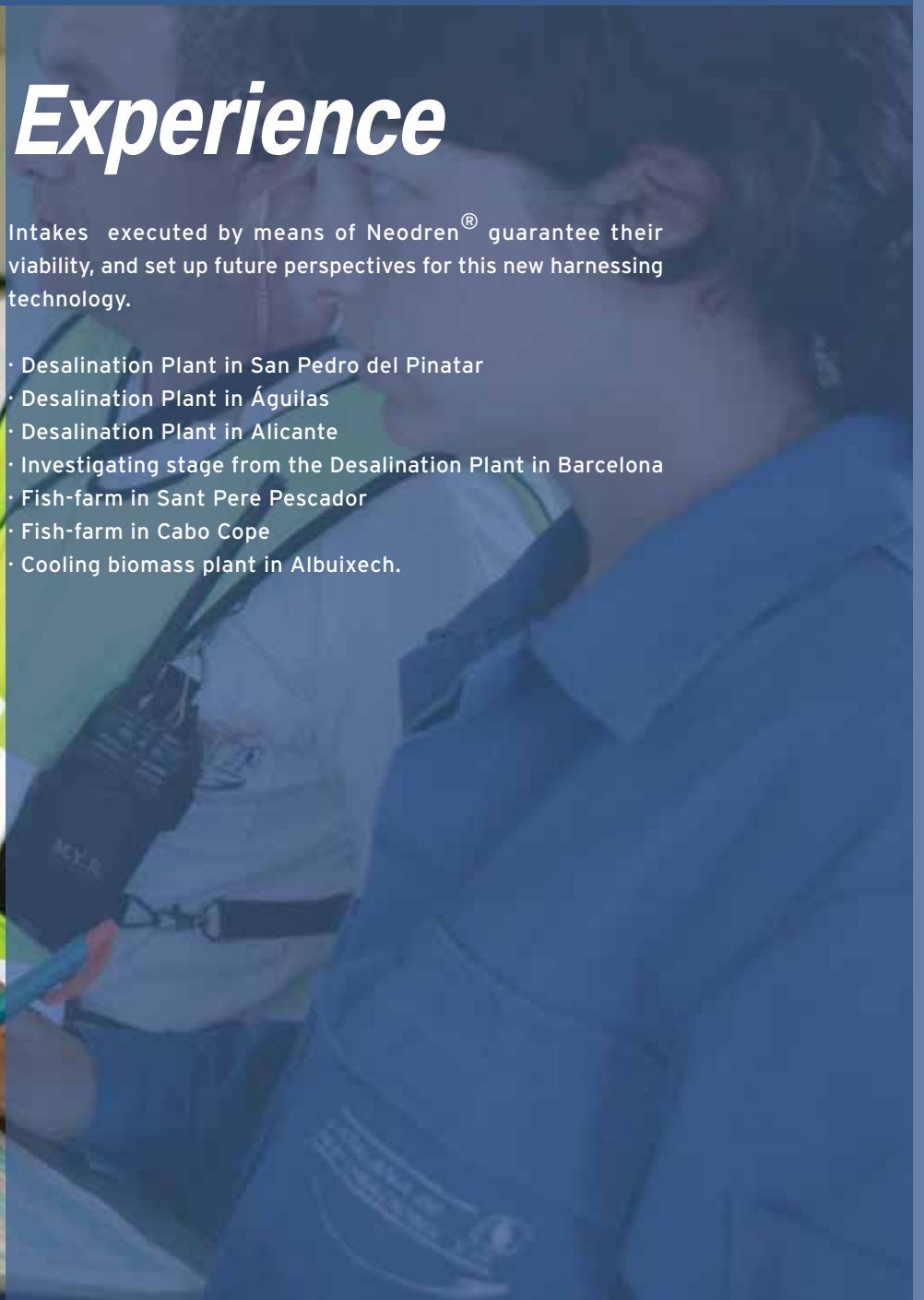
Pumping intends to know the drain output by means of a constant flow record, altogether with a physicochemical periodical analysis of water samples.



Experience

Intakes executed by means of Neodren[®] guarantee their viability, and set up future perspectives for this new harnessing technology.

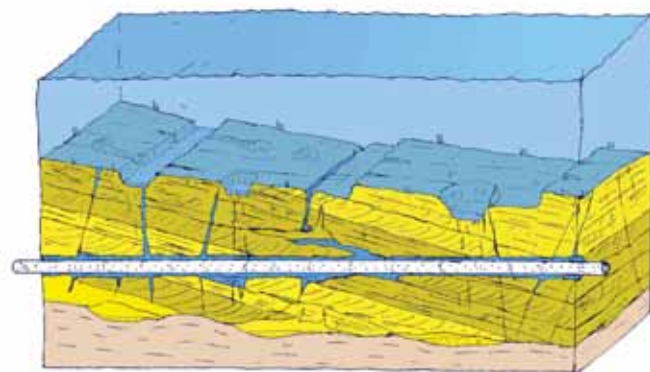
- Desalination Plant in San Pedro del Pinatar
- Desalination Plant in Águilas
- Desalination Plant in Alicante
- Investigating stage from the Desalination Plant in Barcelona
- Fish-farm in Sant Pere Pescador
- Fish-farm in Cabo Cope
- Cooling biomass plant in Albuixech.



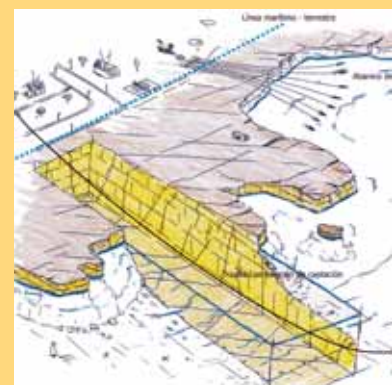
Intake in the sea subsoil

The procedure consists of executing a horizontal directional drilling (HDD), previously designed by hydrogeological and geo-technical studies.

It starts on the coasting border and runs along the sea subsoil, reaching out to sea after having crossed the geological aquifer formation previously selected; this formation will have to have enough permeability, for fissure, porosity and fracture, to enable its constant recharge and continuous extraction of the required seawater flow.



Viability study



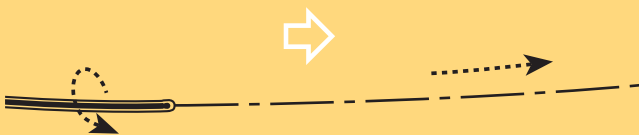
For the proper design of the seawater intake, a hydrogeological study from the site is carried out, including geological continental and marine cartography, bathymetry and the execution of vertical inspection drillings, with continual sample extraction.

Once the ground "anatomy", the most favorable layout is considered. An experimental horizontal directional drilling is executed, in order to verify the work hypothesis and make the pumping tests and water chemical analysis.

Having obtained the results, and once the harness viability is confirmed, the amount of drains is designed, mesh or parallel, which will allow the required flow extraction.

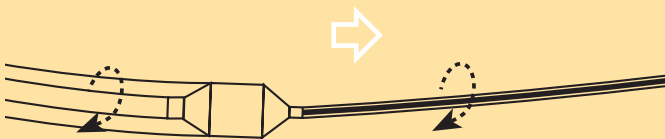
HARNESS JOB PROCESS

Pilot drilling



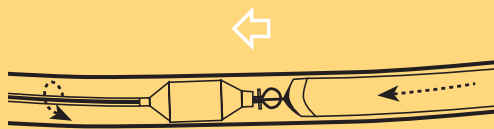
The system HDD allows to steer the drill head to make very long drains (more than 600m) inside the productive aquifer stratum. This technology enables man to execute drillings from the ground and come out in the sea, without affecting the intermediate path. To locate the drill head, magnetic guidance systems (MGS) are used, with a centimetric location precision, allowing the bore to be brought back, to obtain optimum results.

Reaming operation



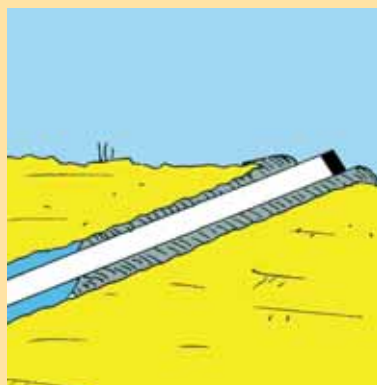
The pilot drilling is reamed by means of a pushing-reamer, provided with a front guidance system to verify its right positioning in the pilot boring, enlarging it to the required diameter to install the filter. When pushing, the detritus coming from the bore is carried out to the exit point, on land, preventing, therefore, the affectation in the water extraction productive areas. A drilling fluid reuse is obtained improving, thus, the procedure.

Pipe installation



In the bore a tubular drain is placed, punched or grooved in the productive section, according to the soil conditions. It is carried to the sea by a boat, up to the point where it will be connected to the push-reamer. Once the connection has been completed, the assembly will move backwards to land, in order to leave the filter properly installed.

Cleaning and cementation



A cleaning is carried out, absorbing the drilling fluids and the existing detritus; some dispensers are used, so as the pumping equipments can have a better performance. The cleaning is feasible by inserting a high-pressure cleaning caliber (over 50bar) in the drain. It is sealed with sulphurresistant cement the gap between the tunnel and the drain, in the areas planned as non-productive, especially at the initial and final sections, with the purpose of preventing the harness in these areas. Thus, the filtering area is protected from non-desired intrusions of continental fresh water coming from the coastal discharge, or from the seawater next to the exit point in the seabed.

HARNESS JOB PROCESS

Pumpings



Once the Neodren[®] has been finished, it is pumped to determine the intake flow and output, and also to take water samples for their analysis.

It may be recommendable for the improvement of the harness efficiency, the cleaning and development of the tunnel environment by means of air or water injection or acidifications procedures, and other additives which penetrate through the existing fractures and porosities in the drilled stratum, both granular or porous-type.

Sea tasks



Both in the drilling execution and drains installation work, it is crucial having the sea-equipments support, such as boats and divers specialized in subaquatic tasks.

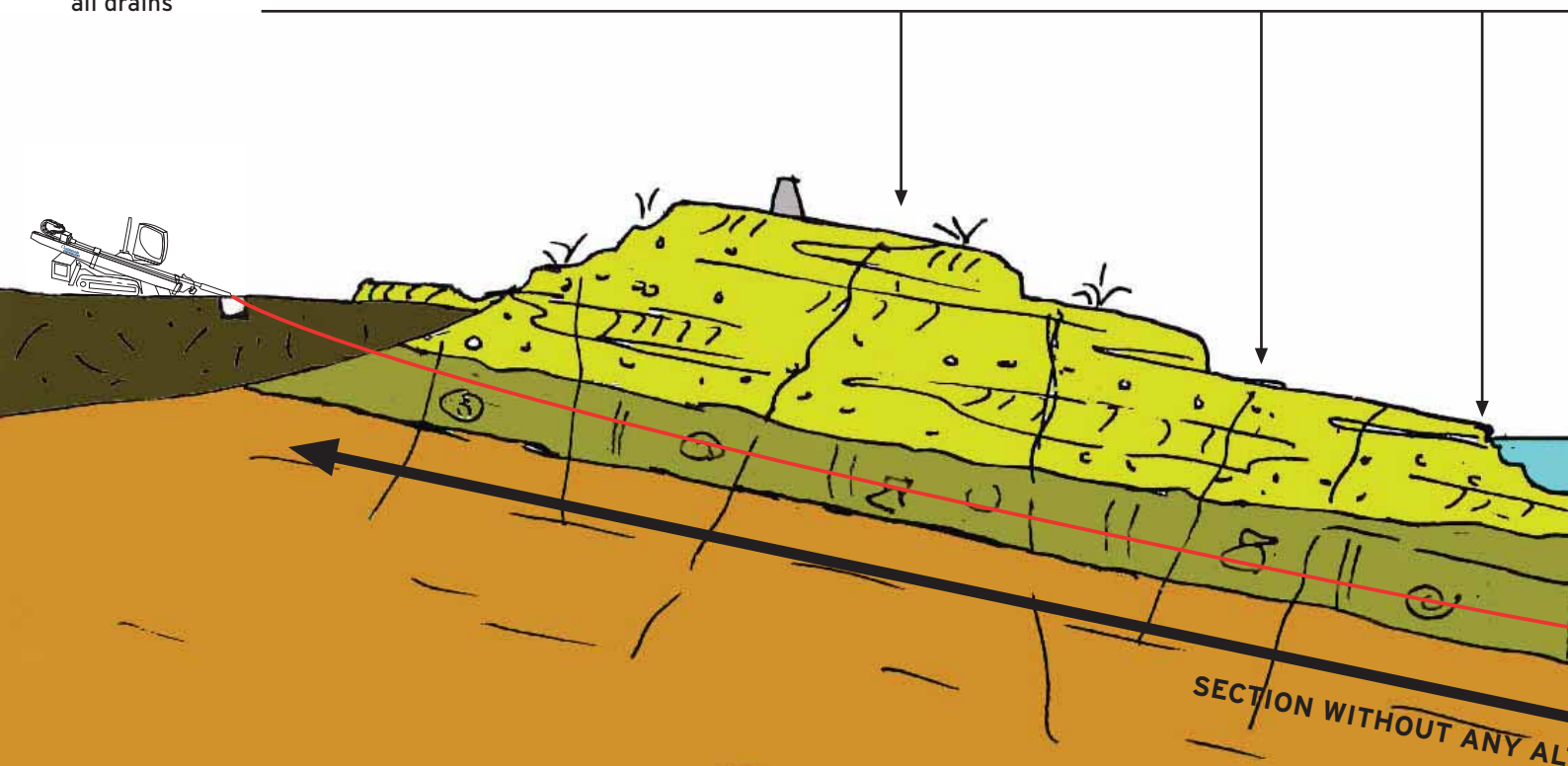
Neodren[®] reduces the sea tasks, minimizing the execution time and getting, therefore, a quicker and more effective drilling.

**SMALL
LOCATION,**
common among
all drains

With no alteration
of the protected areas

Without bothering
the bathers

With no
coastline
modification



System advantages

Neodren® system gives solution to the seawater harness problem, existing to date, with flow and quality guaranties.

Drains features:

Specific flow: 120 - 150 l/s/drain

Lengths over 600m

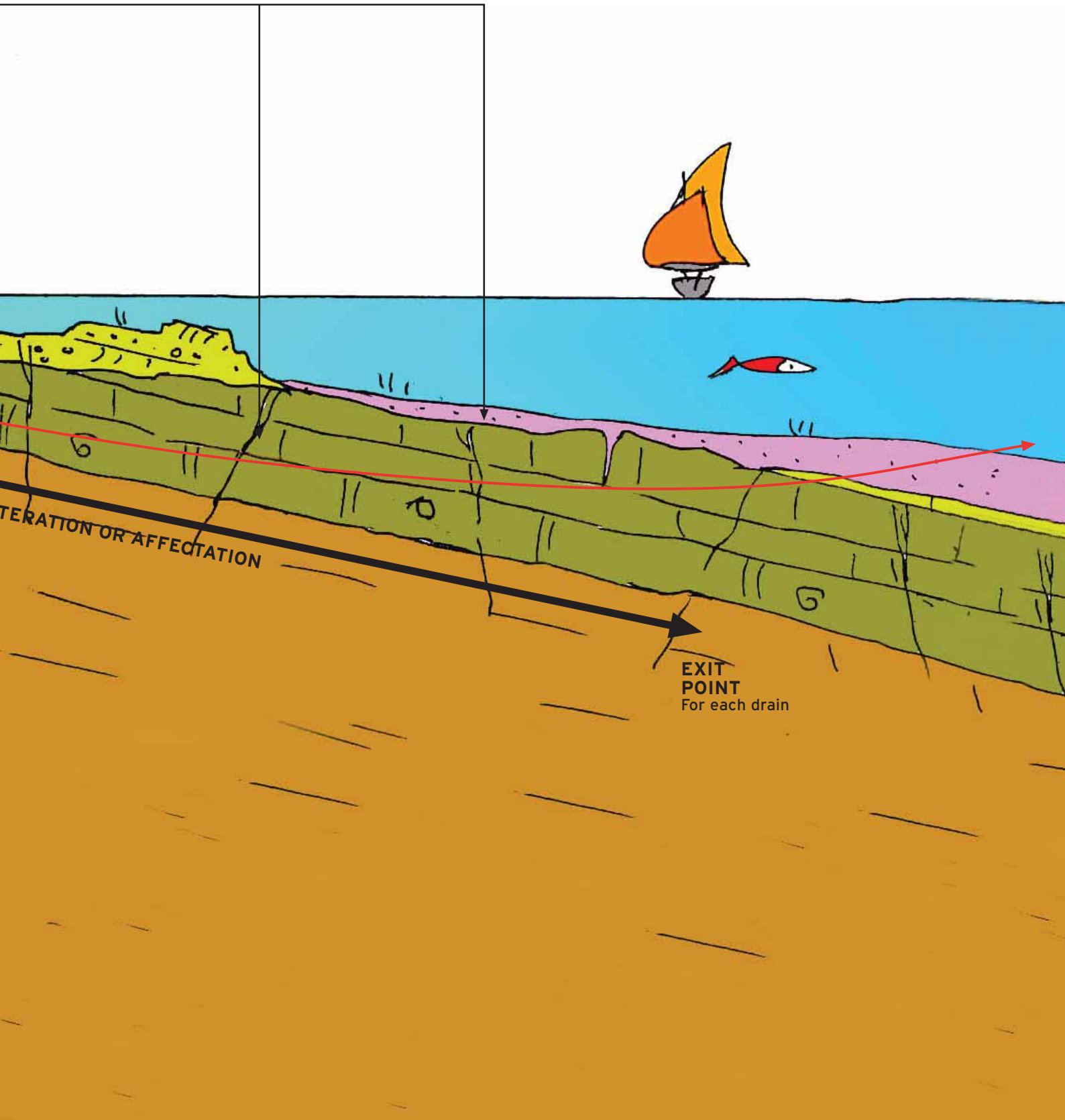
Diameters up to Ø710mm

Productive sections over 150m

Flow speed in the ground <10m/h

Without any
seabed excavation

With no alteration
of the
subaquatic life



EFFECTIVE

Obtaining water with the same quality as sea's.
Non-affectation of the drain due to the sea dynamic action, thanks to its subterranean condition.
Cloudiness elimination characteristic of the seawater.
Homogeneous temperature of the harnessed water.
Constant recharge of the submarine aquifer.

ECOLOGICAL

It does not cause any marine intrusion shocks to the continent.
Non-physic affectation of the coastline. Absence of any affection to the sea habitat.
Elimination of the dig excavation necessity in the seabed
No affectation of the physical and biological sea environment.
It does not affect the freshwater aquifers.
Fixation side effect of the sandy spots and submerged beaches in the seabed.

QUICK

Superficial location of the drilling equipment, with no need of any ground disturbance.
Positioning of the intake point in a reduced space.
Two reduced working areas, one on land and the other on the sea.
No blasting, breakwaters construction or seabed dredging.



the experienced drilling



Neodren[®]

*Seawater harness
by horizontal
directional drains*



PV

*Vertical
Drilling*



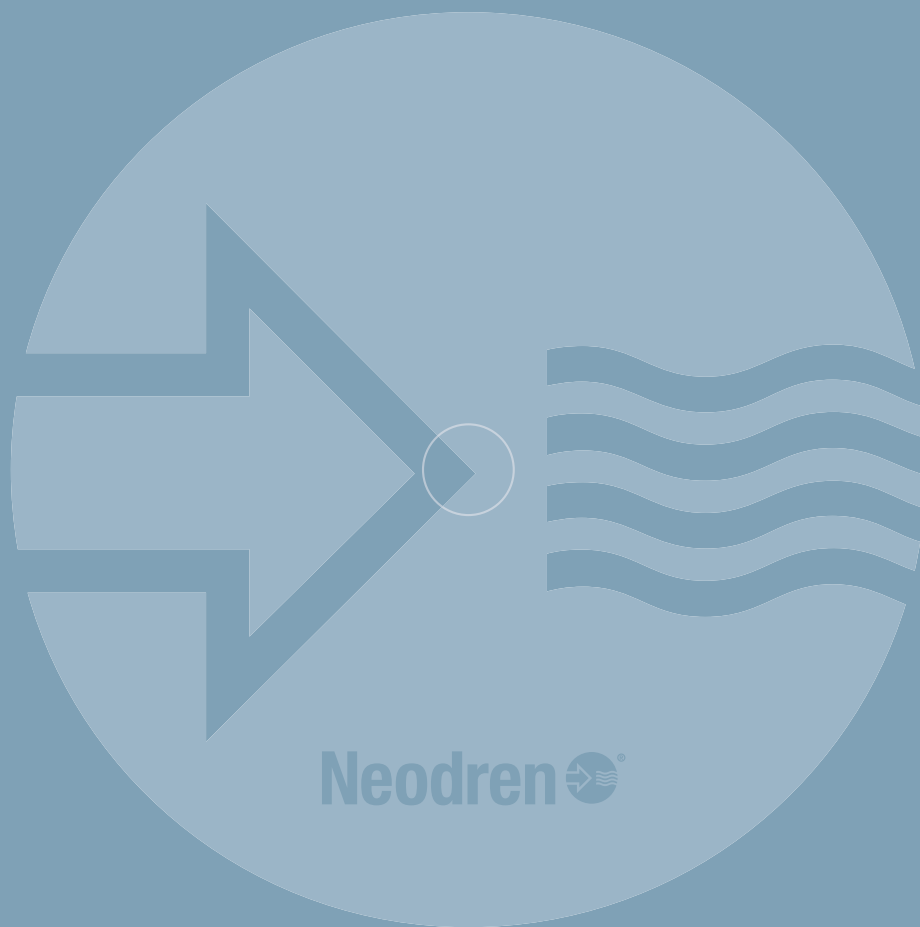
PHD

*Horizontal
Directional
Drillings*



GR

Georadar



WHO ARE WE?

A technicians and specialists equipment in the drilling world.

Catalana de Perforacions, S.A. is a company founded in 1984, belonging to the group Aquacenter®, specialized in vertical wells for subterranean water harness and horizontal directional drilling.





Legal diposit **B-49067-2004**

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