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# BUENAS PRÁCTICAS

## Operaciones Cofinanciadas

**CONSTRUCTION OF THE NEW  
WASTEWATER TREATMENT PLANT  
(WWTP) OF FERRERIES**

**Balearic Agency for Water and  
Environmental Quality (ABAQUA)**

# Programa Operativo de Illes Balears

**Fondo Europeo de Desarrollo Regional**

**Año 2017**



GOBIERNO  
DE ESPAÑA

MINISTERIO  
DE HACIENDA  
Y FUNCIÓN PÚBLICA

SECRETARÍA DE ESTADO DE  
PRESUPUESTOS Y GASTOS  
DIRECCIÓN GENERAL  
DE FONDOS EUROPEOS



## CONSTRUCTION OF THE NEW WASTEWATER TREATMENT PLANT (WWTP) OF FERRERIES

### Basic description of the project.

Ferrerries is a municipality that extends from north to south of the island of Menorca, with an area of just over 66 km<sup>2</sup> and a population that slightly exceeds 4,600 inhabitants. At the end of the 80s, a sewage treatment plant was built which, due to the urban growth registered in recent years and also of its industrial activity of product transformation, became obsolete.

This has caused that those facilities could not respond to the purification needs of the wastewater system that is discharged from the productive fabric, as well as the residential sector, giving rise to serious pollution problems due to the existence of active sludge and obsolete systems of the previous treatment plant.

For this reason, the Balearic Agency for Water and Environmental Quality (ABAQUA) developed a project and awarded the construction of a new WWTP to replace the previous one and solve the existing problem. The total investment was **€2,222,032.86**, with an eligible cost of **€1,666,524.65** and ERDF aid of **€ 833,262.32**.

The project is part of the ERDF **OP 6** which aims to conserve and protect the environment and promote the efficiency of resources, more specifically in the **specific objective 6.2.1**, aimed at completing the requirements of the Water Framework Directive through investment in sanitation infrastructures, purification and reuse of wastewater, and improvement of water quality.

The plant has been built in one of the five old lagoons, already in disuse, and represents an increase in the expected water flow of 71.4%, that is, about 1,200 cubic meters of water per day.

It consists in a **biological treatment** facility that incorporates a first tertiary phase, which allows the elimination of phosphorus and nitrogen, which makes it possible to return the water to the Trebalúger torrent with a minimum degree of contamination and without any risk to the environment.



*Aerial image of the new Ferreries wastewater treatment plant (WWTP)*

In addition, during the construction of the plant a space has been reserved for future extensions of the facilities. The system used to depurate is by active sludge. Overages are reduced and dehydrated and accumulated in a tank. These sludges can be used for agricultural use or to recover degraded areas, such as quarries. Thanks to this investment, purified water can be reused; whose most common uses are irrigation or road cleaning.

In summary, it is a treatment plant whose operation is based on the active sludge system, which allows occupying less space, improving the quality of the affluent and optimizing the tasks of management, exploitation and maintenance. The main actions contemplated in the project are:

- Complete remodeling of the pumping station (WWTP), renewal of electromechanical equipment and electrical installation on the road, before reaching the treatment plant.
- New electrical connection to the treatment plant and pumping.
- New piping of impulsion to the purifier.
- New treatment plant located in the lands of the current lagoons nº 3, 4 and 5, with the following elements:
  - Pre-treatment with roughing or filtering equipment.
  - Biological reactor for active sludge, air system and sludge recirculation.
  - Secondary decay with sludge, foam and floating collection system.

- Recirculation, purging and thickening of sludge.
- Chemical conditioning and dehydration by centrifuge of the generated sludge
- Dehydrated sludge accumulation silo
- Natural refining system of treated water to artificial humid zone
- Construction of a green filter in lagoon number 5 that further improves the quality of the outgoing water.

Below are the arguments that make this action a Good Practice, according to the criteria defined for these purposes.

**Criterion 1. High dissemination among the beneficiaries and the public in general.**

This action has been widely disseminated through the different information and advertising measures developed. In the first place, the **publication of the tender for the work** and the documentation of the administrative file of the same have made reference to the co-financing of the works by the EU through the ERDF.

This visibility has been reinforced by the information contained on the **ABAQUA website** about the different projects promoted within the framework of the 2014-2020 Balearic Islands ERDF PO, among which is the Ferreries WWTP (<http://abaqua.es/es/esdepuracion/Fondos-Europeas/>).

Likewise, information regarding the project has been published on the **website of the Balearic Government**.



*Website of ABAQUA dedicated to inform about the projects co financed by the ERDF*

In addition, during the execution of the work a **mandatory informative poster** has been placed identifying the developed works, as established by the Regulations of application, as it is an investment with a public contribution of more than € 500,000.



*Informative poster of the construction works of the new Ferreries treatment plant*

Likewise, several **communication media**, both in their traditional versions and in their online versions, have collected information on the development of the project and its completion (Menorca, 20 minutos, IB3tv, El Mundo, etc.).

This high impact has been empowered by the **institutional visits** made to know the status of the action, highlighting the one carried out in November 2016, after the completion of the work, which was attended by a delegation of the Government, led by the Minister of Environment, Vicenç Vidal, accompanied by the manager of ABAQUA, Antoni Garcías. The visit was also attended by the president of the Consell, Maite Salord and the mayor of the municipality, Josep Carreres, as well as members of the temporary union of companies that has taken over the works.

24 Depuradora de Ferreries | 2016

**Con Lupa**  
Inyectar oxígeno para garantizar el funcionamiento y bajar el ruido

El trabajo necesario para mantener el proceso biológico aeróbico, se reduce en el sistema mediante el empleo de microorganismos aerobios, colectores y partículas de diferentes microorganismos de diferentes tipos de algas, que garantizan la supervivencia de los microorganismos. Estos microorganismos están ubicados en el fondo del reactor biológico, con una zona de aireación adyacente, se controla en un solo lugar toda la regulación de los reactores, el mantenimiento del sistema, permitiendo además el control de las actividades de la planta, con un potencial foco de ruido.

La nueva planta depuradora de Ferreries es una rehabilitación histórica del municipio. © FOTO GALIÀ ANDRÉS

## Biología al servicio del medio

La nueva planta utiliza **microorganismos aerobios** para depurar el agua que proviene del alcantarillado

**Las claves**

**Contaminación**  
El proceso de depuración permite reducir al máximo los elementos contaminantes y retomar el agua sin riesgo de afectar al medio ambiente.

**Sin mal olor**  
El uso de microorganismos aerobios evita la emisión de malos olores, causados por microbios anaerobios como sucede en el sistema de lagunas.

**Caudal**  
La planta tiene capacidad para depurar 1.500 metros cúbicos de agua al día, lo que supone 7.300 habitantes equivalentes, lo que permite comparar capacidades.

**Residuos**  
Todo el proceso de depuración genera fangos orgánicos, que se destinan para reducir su contaminación y su impacto ambiental.

**El decantador permite separar el agua clara de los fangos orgánicos.** El proceso de depuración se realiza en un decantador que separa los fangos que se precipitan al fondo, y el agua clara, que se reutiliza por gravedad. El uso de bombas para vertidos de nuevo al terreno de Trablagar. Los fangos orgánicos se pegan en un espesador y se deshidratan de nuevo, que genera más fangos y es necesario para los procesos de biología aeróbica como transportar los residuos.

El uso de un sistema de depuración biológica ha permitido reducir al máximo los elementos contaminantes y retomar el agua sin riesgo de afectar al medio ambiente.

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Depuradora de Ferreries

El conseller de Medio Ambiente, Vicenç Vidal, el presidente del Consell, Maite Salord, y el alcalde de Ferreries, Josep Carreres, atienden a las explicaciones del técnico. © FOTO GALIÀ ANDRÉS

## Nueva planta, doble capacidad

La depuradora de Ferreries puede dar servicio a **7.300 habitantes** y no contamina el torrente

**Pendientes 335.000 euros para poder reutilizar el agua**

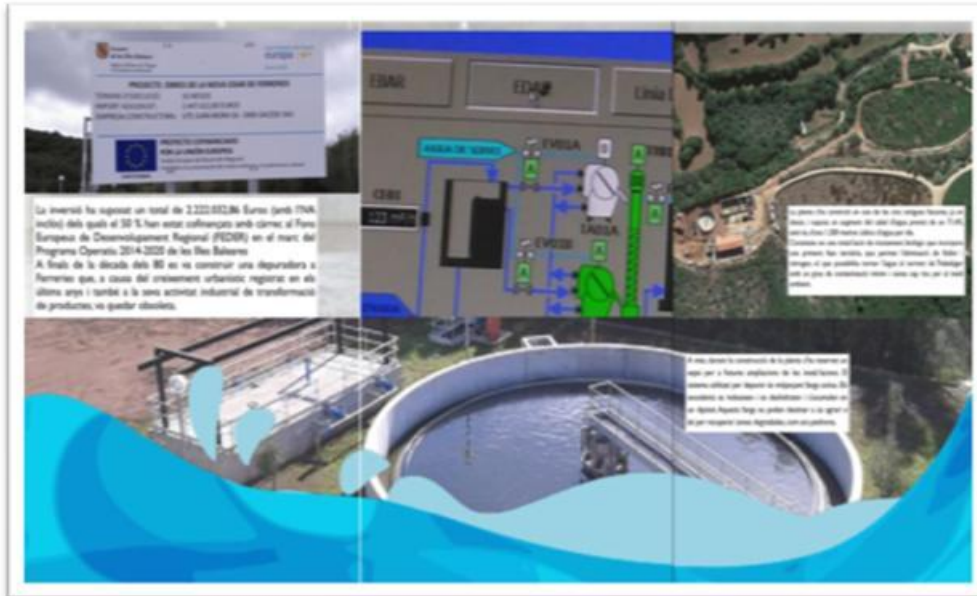
El sistema utilizado para depurar es mediante lagunas aerobias, cuya mayor parte se realizó en el propio terreno. Los reactores se rodean y se acoplan en un depósito. Estos lagos pueden destinarse a uso agrícola o bien para recuperar aguas de depuración como por ejemplo, canales, fresa o para su posterior tratamiento en una planta especializada.

Una delegación del Govern, con el conseller de Medio Ambiente, Vicenç Vidal, la cartera, acompañado por el gerente de ABAQUA, Antoni Garcías, visitaron ayer las instalaciones que el pasado 28 de septiembre entraron en fase de pruebas hasta el fondo de la visita contó también con la presencia de la presidenta del Consell, Maite Salord, y del alcalde del municipio, Josep Carreres, entre otros miembros de la unidad temporal de empresas que se ha beneficiado de las obras.

Depósitos e instalaciones de la depuradora. © FOTO GALIÀ ANDRÉS

*Press news related to the new Ferreries water treatment plant*

The information about the project and its co-financing by the ERDF has also been disseminated through other information channels. Thus, **explanatory leaflets** have been designed with the most relevant data of the investment and the community contribution, which have been distributed by the different points foreseen in the Communication Strategy of the ERDF and FSE OP of the Balearic Islands 2014-2020.



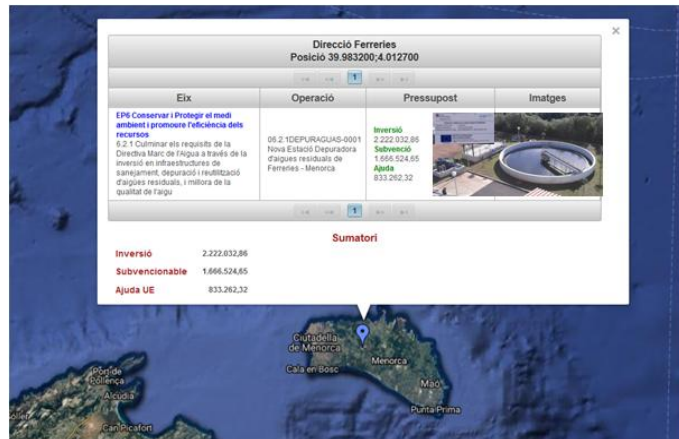
*Informative triptych about the Ferreries treatment plant*

Another means of dissemination is the **mapping system** of co-financed projects of the DG European Funds, located on its website ([http://www.caib.es/sites/fonseuropeus/ca/portada\\_2016/?campa=yes](http://www.caib.es/sites/fonseuropeus/ca/portada_2016/?campa=yes)). This online application, which is accessible to anyone, allows us to visualize, not only the geographical location of the investment, but also offers systematized data on the name, scope of intervention, co-financing fund, EU aid, total eligible cost and even images of the investment made.

Finally, the first issue of the **Bulletin of European Funds in the Balearic Islands** has also included a reference of the project and the ERDF contribution in its execution, paying special attention to the results achieved thanks to this investment.

All these actions have allowed all the target groups of the investment (the population of the municipality and the whole of the island, as well as other interested entities such as environmental organizations) to have first-hand information about the development and results of the project.





Bulletin of European Funds in the Balearic Islands (Nº 1, Dec. 2017)

Image of the location system for co-financed projects of the Balearic Islands

## Criterion 2. Incorporation of innovative elements.

This WWTP co-financed by the ERDF OP of the Balearic Islands is known as a **biological treatment plant**. This means that the plant uses microorganisms to eliminate the existing contamination and thus return the water to the torrent, generating the minimum environmental impact.

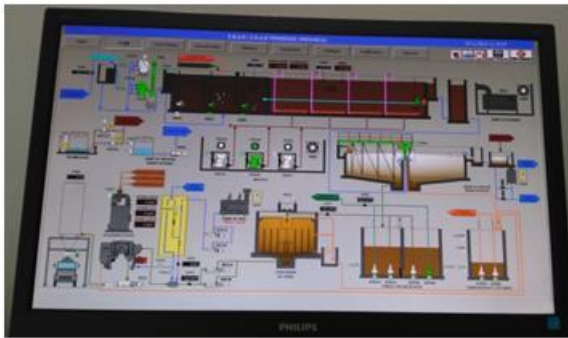
In fact, among the innovations implemented in this installation, a new primary treatment system with an anaerobic device and a secondary treatment system with a line of biological filters that produce a **higher quality purified treated water**.

Thus, the main part of the process is, precisely, the biological treatment of the active sludge, which is carried out in a biological reactor, projected in the form of prismatic vat geometry and built on one of the old lagoons that was part of the previous sewage treatment plant.

It is there where the cultivation of aerobic microbes that feed on contaminants, which allows them to grow and reproduce. In addition, as a positive aspect, this system guarantees that no odours are released during the purification process.

Taking the biological oxygen demand in five days (BOD5) as a reference for measuring water pollution, water quality improves substantially thanks to the new purification system. In particular, the quality of the incoming water contains 365

milligrams per litre, while after the whole process is carried out, the treated water contains less than 25 milligrams per litre.



*Elements and control devices established in the Ferreries WWTP*

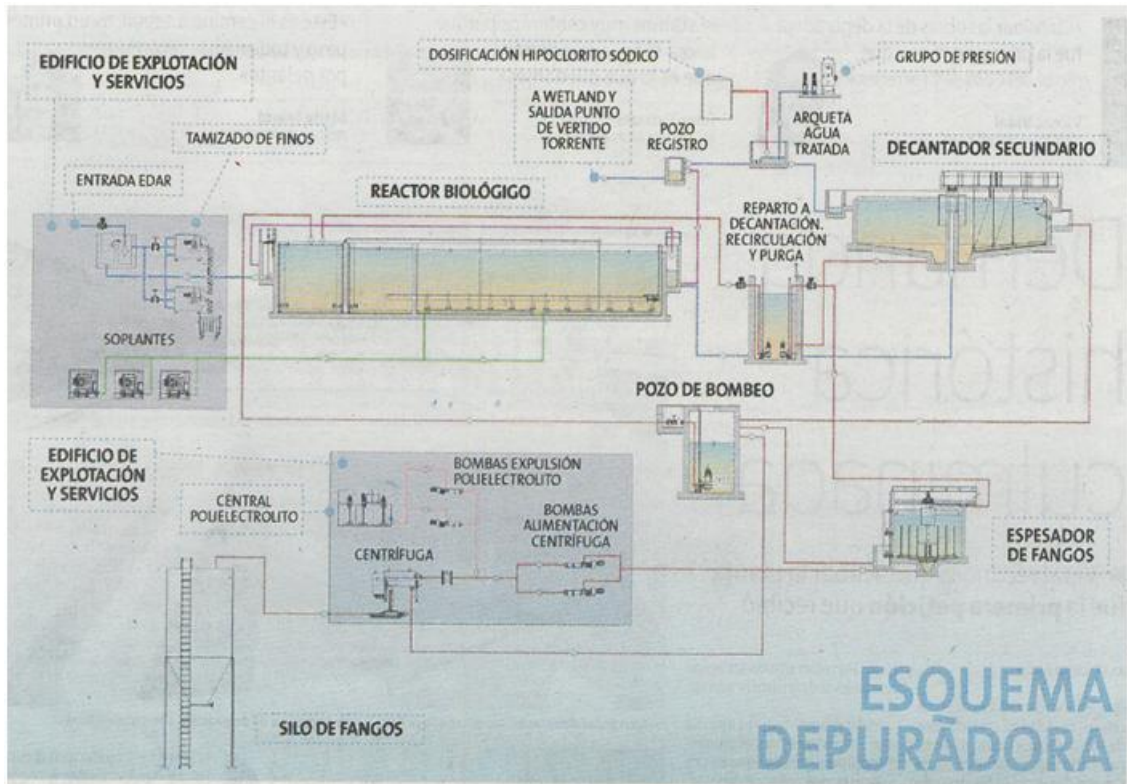
It should be noted that before the circuit starts, a pre-treatment is done with a sieve that separates the solids and accumulates them in a container. Subsequently, the clarification process is carried out. Through a decanter the sludge is separated, which falls to the bottom, and the clear water returns by gravity to the pumping station to pour it back into the Trebalúger stream.

The leftover sludge is purged in a thickener and dehydrated, so that they remain more concentrated. In this way it is easier and cheaper to store and transport them to a treatment plant or, as the case may be, to use them in the agricultural sector for later use as fertilizer. During this purification process, existing nutrients, especially nitrogen and phosphorus, are considerably reduced.

This is fundamental to avoid what is known as eutrophication, that is, an overpopulation of plant species in the torrent caused by excess nutrients in the water and causing lack of oxygen for the fish. It could be affirmed, therefore, that the biological purifier does the same as a river, but in a time and in a smaller space.

Another of the most important innovative elements is the fact of **insufflating oxygen to guarantee the operation and isolate the noise**. The oxygen necessary to maintain the aerobic biological process is introduced into the system by means of motosplants, collectors and grills of high-performance membrane diffusers, which guarantee the survival of the organisms.

These mechanisms are located at the bottom of the biological reactor. With this system of adopted aeration, the maintenance needs of the system are centralized in a single place (room of blowers), allowing to isolate a potential focus of noises from the rest of the installations of the plant.



Outline of the operation of the new Ferreries biological treatment plant

### Criterion 3. Adaptation of the results obtained to the established objectives.

The objectives pursued with this action have been to increase the capacity of wastewater treatment and, in this way, also improve the quality of the effluent.

From this perspective, the results achieved allow us to affirm that the planned objectives have been achieved. In particular, the new plant significantly increases the capacity of wastewater treatment, reaching up to **438,000 cubic meters per year**, which is about 1,200 cubic meters per day.

In addition, we must highlight the great advantage of **reducing pollutant discharges to the environment**, since the fluids that are produced are purified and, therefore, do not pose any risk to the ecosystem. In parallel, the purified water can be used for other possible alternative uses.

To this we must add the benefits of the system used, which lowers costs and at the same time is beneficial to the environment. This is because the biological treatment of wastewater uses bacterial processes to eliminate waste, which is

effective, economical and ecological, since it does not use chemical elements or require the use of electricity or other fuels to feed the purification stations.

This low energy consumption is reflected, on the one hand, in significant **economic savings** and, on the other, in a **reduction in CO2 emissions** due to the cost of electricity.



The disappearance of bad odours should not be underestimated during the whole process of purification, which is a factor for improving the quality of life of the population and the numerous visitors that Menorca receives, especially during the tourist season.

Consequently, the ERDF aid has made possible the realization of this Ferreries treatment plant, which has allowed offering an improved service and greater capacity.



#### **Criterion 4. Contribution to the resolution of a regional problem or weakness.**

Among the main challenges that the island of Menorca must face is the care of existing aquifers in its territory. For this, it is fundamental, among other issues, to avoid the contamination of them by nitrates. In this sense, one of the factors that explain this problem has its origin in the poorly purified waters poured into the streams for many years and that have been infiltrating the subsoil.

Therefore, the improvement of sanitation and water treatment infrastructures is a priority need. In this sense, it is necessary to reinforce investment in the construction and rehabilitation of WWTPs, collectors, interconnectors, etc. so that the wastewater treatment is guaranteed. It is about increasing the coverage of the service and complying with the requirements of the Water Framework Directive.

In the specific case of Ferreries, the old treatment plant has been receiving for a long time **uncontrolled spills** of the bisuter industry, which have often reached the sea through the torrent that flows into the virgin beach of Trebalúger. In fact, the presence of heavy metals, such as mercury, arsenic and zinc in the Trebalúger beach (where wastewater from the Ferreries wastewater treatment plant is dumped) has been verified.

Thus, the analyzes carried out by ABAQUA in the sludge deposited in one of the five lagoons of the Ferreries treatment plant detected a high presence of these heavy metals, which have a strong **polluting power**. The calculations that have

been worked on in recent years indicated that almost 9,000 tons of toxic sludge had accumulated.



*Aerial image of the old Ferrerías treatment plant and the pollutant sludge from the same*

All this has motivated that for a decade since Menorca was claiming the start-up of new treatment plants that put an end to this situation and, with this, avoid the risk of arrival of these substances to the aquifers or the subsoil.

With this, in addition to solving the referred problem of contamination derived from the malfunction of the old treatment plant, the sustainability of one of the most important virgin natural places of tourist attraction that Menorca has, such as Trebalúger, is guaranteed.

The new Ferrerías treatment plant is part of the actions that ABAQUA has developed (and is still developing) to improve the water treatment system and provide coverage to the entire population.

#### **Criterion 5. High degree of coverage of the target population.**

The **additional population benefited** by a better wastewater treatment thanks to the investment made is 2,567, in terms of population-equivalent, in accordance with Royal Decree-Law 11/1995.

In this way, the new Ferrerías treatment plant doubles the previous capacity with respect to the lagooning system used previously, allowing to serve **7,300 equivalent inhabitants**.

Thus, the new EDAR allows satisfactorily meet the needs of the entire population resident in the municipality.

### **Criterion 6. Consideration of the horizontal criteria of equal opportunities and environmental sustainability.**

In relation to **sustainable development**, the project has a clear positive environmental impact, insofar as it contributes to solving the existing problems in relation to the treatment of wastewater, as well as to the use of the sludges derived from the process.

It is obvious that the purification of wastewater is a necessary and legally required reality, which directly affects the quality of the waters of the rivers, by preventing environmental and landslide deterioration. In fact, with this investment Balearic Islands progress in the fulfillment of the objectives established in the *Water Framework Directive*.

However, the environmental improvement of the purification implies not only the reduction of pollutant discharges to the receiving channels, but it also raises interesting collateral improvements as a consequence of the purifying process. In fact, there is a cycling of matter and energy that allows several uses, such as the reduction of the polluting waste, the maintenance of the ecological flow, energy production through cogeneration, agricultural use, among others.

In this sense, the construction of this wastewater treatment plant (WWTP) in Ferreries has been a very important factor for the maintenance of the aquatic environment, acting as a waste reduction system. In this way, the pollution of the waters of a landscape of first order scenic interest is being stopped, such as the beach and the Trebalúger ravine, which is also a Natural Area of Special Interest (ANEI), which is included in the Natura 2000 Network.

From the point of view of **equal opportunities** between women and men, due to the characteristics of the project there are no direct repercussions in this area.

In fact, the project is aimed at promoting access for the entire citizenry. From this perspective, the female population residing in Ferreries amounts to 2,300 women, which represents 49.8% of the total. In any case, it should be noted that the use of sexist language has been avoided throughout the project management cycle

## Criterion 7. Synergies with other policies or instruments of public intervention.

The project is part of the **Hydrological Plan of the Balearic Islands** that was approved by the Council of Ministers held on July 17, 2015, at the proposal of the Minister of Agriculture, Food and Environment.



This project allows the completion of the requirements of the **Water Framework Directive** through investment in sanitation infrastructure, purification and reuse of wastewater, and improvement of water quality.

In this sense, it is also complementary with another series of actions that ABAQUA is developing in order to improve wastewater treatment systems, as well as to comply with the requirements of the Water Framework Directive.

In the same way, this action is coherent with the objectives of the **Special Plan of actions in situation of alert and eventual drought in the Balearic Islands (PESIB)**, currently in process of audience and participation. These objectives are related to guaranteeing the supply of water to the population with sufficient quality, and to avoid or minimize the negative effect on aquatic ecosystems, the masses of groundwater and the economic activities themselves.

Likewise, the investment made complements those foreseen in the **Promoting Sustainable Tourism Plan** in the Balearic Islands, which includes among its priorities the development of water cycle optimization projects, such as improvements to the drinking water network, purification or desalination and water reuse.