Puerto de Huelva

Autoridad Portuaria de Huelva

"RECOVERY OF HABITATS AND SEABIRDS THROUGH THE BENEFICIAL USE OF DREDGING AND BIO-TOOLS IN THE PORT OF HUELVA"

Project report

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INDEX

LINK TO VIDEO OF THE PROJECT:

Port of Huelva WwN_EN.mp4

1. INTRODUCTION

The Port of Huelva is located in the Southwest of the Peninsula, a strategic position with respect to the main international maritime routes. Specifically, its land and inland water service area is located in the estuary of the Odiel and Tinto rivers, making it a longitudinal port and most of the Port's facilities and service piers are located along the left bank of the Odiel and Ría de Huelva estuaries.

The origins of the Port of Huelva are closely linked to the province's wealth of minerals. That is why the first civilizations (Tartessians, Phoenicians, Romans...) exploited mineral deposits in Huelva, and settled in the area since there was a natural port with a strategic location on the shores of the Atlantic that allowed the maritime transport of minerals.

Later, great events throughout history such as the mining operations of English companies in Huelva with advanced techniques, and the settlement of the Industrial Promotion and Development Pole in the mid-20th century, shaped and laid the foundations of the current Port.

From then until today, the Port of Huelva has continued growing in facilities and traffic, consolidating itself as one of the first Ports of General Interest in Spain.

The Port of Huelva has the largest land area in the Spanish port system, 1.700 hectares, where port activity coexists with that of one of the main industrial centres in Spain, with more than 245.000 hectares of land and water in protected areas.

Consequently, in the Port of Huelva exists sites of international importance for migratory waders, natural habitats and wild protected fauna and flora, mainly: Estuaries (1130), Mudflats and sandflats not covered by seawater at low tide (1140), Coastal lagoons (*1150), Salicornia and other annuals colonizing mud and sand (1310), Spartina swards (Spartinion maritimae) (1320), Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi) (1420), Embryonic shifting dunes (2110), and Shifting dunes along the shoreline with Ammophila arenaria (‘white dunes’) (2120). These areas are home to a wealth and variety of habitats and landscapes, which are ideal for the breeding of a variety of species of birds protected places. Highlights include: *roseate spoonbill*, *ardea cinerea*, *ardea purpurea*, *circus aeruginosus*, *pandion haliaetus*, *ciconia nigra*, *plegadis falcinellus*, *grus grus, lutra lutra*, among others. The ecological uniqueness of these spaces in the Port of Huelva has coexisted and have been sustained with industrial, logistics, commercial and port activity settled in the Service Area for over 140 years.

Moreover, the urban development of the city of Huelva is concentrated along the left bank of the river Odiel, where the infrastructure of the Inner Harbor is located, as well as facilities of an important basic chemical industrial complex settled since the 1960s.

Nowadays, the magnitude of the economic activity of the Port of huelva is reflected in the fact that port traffic in recent years has exceeded 32 million tons/year (more than 2,000 ships/year), with the most important movements being those of liquid bulks linked to the industrial energy sector. This sector constitutes a node of energy infrastructures.

In this sense, it is of great importance to highlight the fact that Huelva, thanks to its energy sector and the infrastructures, facilities and services of the Port of Huelva, will become the main clean fuel energy cluster in Europe, and will be essential to achieve the decarbonization objectives set by the European Union and climate neutrality, an essential element for the medium and long term mitigation of the effects of climate change.

This has been made clear by the Spanish Government at the COP 28 of December 2023, announcing the scope of the projects to be developed in Huelva, such as the construction of the largest green methanol

plant in Europe, and one of the five largest in the world, with a production of 300,000 tons of green methanol, which will reduce CO2 emissions by 1.5 million tons/year.

This project, together with many others with similar objectives (CEPSA's Andalusian Green H2 Valley, and others for the production of clean fuels promoted by Iberdrola, Fertiberia, ENAGAS, etc) are also supported at the highest level by the Regional Government of Andalusia and, several of them have been declared of strategic interest, being promoted by the project accelerator unit, attached to the Ministry of the Presidency.

These projects contribute to the autonomy and energy security of Spain and the EU as a whole, also contributing to the commitment that by 2030 81% of Spain's electricity generation will come from renewable sources, constituting, as has been indicated, one of the main tools for the development of strategies linked to climate change. These projects together amount to approximately 4,000 million euros, more than 12,000 jobs and, as a whole, a reduction of more than 10 million tons of CO2/year.

Sustainability is therefore for the Port Authority of Huelva, one of the pillars of its activity and its environmental, economic, social and institutional strategy. In this context, the Port of Huelva, aware of the needs of environmental conservation, has executed projects such as the one we present, based on Working with Nature and beneficial use of sediments.

2. DESCRIPTION OF THE SUBMITTED PROJECT

PROJECT:

"Recovery of habitats and seabirds through the beneficial use of dredging and bio-tools in the Port of Huelva".

2.1 PROJECT DESCRIPTION

The management of dredging in the Port of Huelva due to its pollutant load (this pollution comes from natural acid drainage and mines upstream of the Tinto and Odiel rivers) became a problem for the environmental administration due to the ecological values of the area.

In this sense, we began to develop studies of chemical, physical, toxicological, biological, habitat, species and their behavior in that area in order to incorporate those criteria that would allow:

- Guarantee the correct development of the existing ecological functions.
- To complement these ecological functions by increasing the area of contaminated material management, near the Biosphere Reserve, which would increase the area of habitats for nesting and breeding.

In this way, the management of contaminated material has become an opportunity both for environmental protection and for the Port because this methodology positions us favorably in the environmental administration to authorize the management of dredging.

We firmly believe that the results have been very beneficial for all parties.

It is true that it requires higher costs of design and execution, as well as monitoring because we do it very periodically. But in the Port of Huelva we know very well that developing in an environmentally sensitive environment requires approaches and approaches for subsistence and that it is much better to plan considering the behavior of nature in our estuary, than to do it against it.

We believe this is a clear win-win success story.

Specifically, annually the Port of Huelva obtain approximately 500,000 m^3 of dredged material (maintenance dredging). Approximately 300,000 m3 is contaminated and 200,000 m^3 is clean material, and the management carried out is as follows:

- Confinement of the contaminated dredged material in emerging enclosures next to the Marismas del Odiel Biosphere Reserve.
- Once the enclosures are filled (4-5 m deep filled with contaminated material), they are restored with a 1 m thick surface layer of clean dredged material.
- In this way, we have created 80.5 hectares of free surface that has been conditioned for the nesting and breeding of seabirds. Additionally, we are planning to create 22.2 hectares more.

The importance of this use of dredged materials is due to the following:

- The dredged material management projects have been carried out considering the ecological values that needed to be promoted in the port area.
- This means that all our projects are planned considering how to enhance the ecological values of these areas, as we voluntarily form part of their conservation objectives.
- This way of acting is part of our strategic plan, where one of the 3 lines of action has been focused solely, for decades, on environmental aspects and conservation of ecological values.
- We are aware of the sensitivity of the area where we are located, as well as the contrast due to sediment contamination and environmental liabilities. Therefore, we work in such a way that we can turn factors that could otherwise increase its degradation into opportunities for the environment.

All this entails a major monitoring plan, the last one carried out exceeded 1 million euros. The purpose is precisely to evaluate and report to the environmental administration that manage protected areas, that the results have been very satisfactory, even, the environmental administration has come to consider in different protection plans that the way in which the management of dredged material is done in the Port of Huelva, has become an essential element to ensure the quality of the waters protected by Red Natura 2000 and Biosphere Reserve areas, as well as the ecological connectivity.

2.2 ORIGINAL AND INNOVATIVE CHARACTER

The project develop the Working with Nature metodology of PIANC:

***Working with Nature**, which is explained in a PIANC Position Paper, calls for an important shift in thinking in our approach to navigation development projects to help deliver mutually beneficial, 'win-win' solutions. It promotes a proactive, integrated philosophy which focuses on achieving the project objectives in an ecosystem context rather than assessing the consequences of a predefined project design and focuses on identifying win-win solutions rather than simply minimising ecological harm.*

***Working with Nature** considers the project objectives from the perspective of the natural system rather than from the perspective of technical design. However, **Working with Nature** does not mean that we no longer achieve our development objectives: rather it ensures that these objectives are satisfied in a way which maximises opportunities and – importantly – reduces frustrations, delays and associated extra costs.*

In essence, adopting the Working with Nature philosophy means doing things in a different order. Instead of developing a design and then assessing its environmental impacts – an approach which inevitably revolves around damage limitation and is ultimately not sustainable – Working with Nature advocates the following steps:

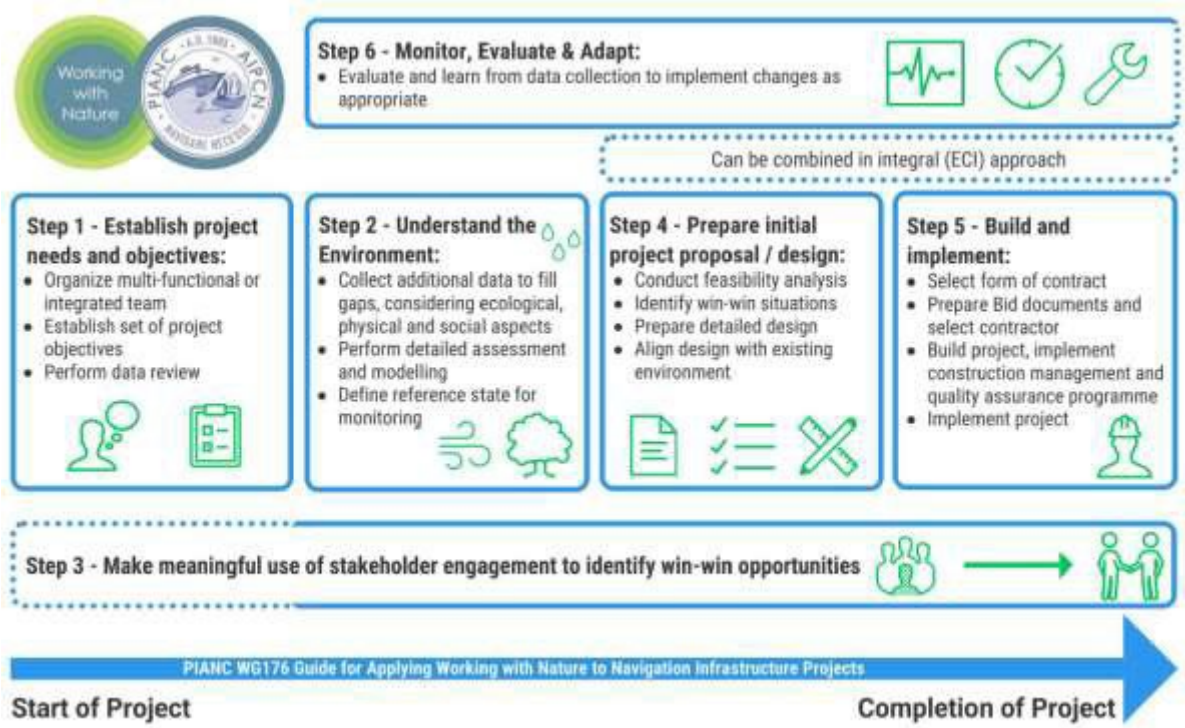

Image 1: Working with Nature methodology..

Why is Working with Nature metodology specially important in the Port of Huelva?

The reason that makes more important and special the application of the Working with Nature

methodology, is that the Port of Huelva is located in an stuary of great environmental and biological wealth, with more than 245,000 ha of protected areas both, within and adjacent to the Por area. All the inner waters, navigation channel and part of the land area of the port are protected areas, with a total of 16 protected areas, from regional to international level, including the Marismas del Odiel Biosphere Reserve (partially included in the Port of Huelva) and the areas of the European Nature 2000 Network, such as:

Name	**Protection**	**Surface (ha)**
Marismas del Odiel	MAB RAMSAR Nature 2000 ZEPA/LIC (ES0000025) Nature Park	6,618.09
Estero Domingo Rubio	Nature 2000 ZEPA/LIC (ES6150003) Nature Park	343.66
Laguna de Palos y las Madres	RAMSAR Nature 2000 LIC (ES6150004) Nature Park	648.95
Isla de Enmedio	Nature Reserve	480
Marismas del Burro	Nature Reserve	597
Estuario del Tinto	Nature 2000 ZEC (ES6150029)	1.1,67
Espacio Marino del Tinto y del Odiel	Nature 2000 ZEPA marina (ES0000502)	4,934.91
Marismas de Riberas del Tinto	Nature 2000 ZEC (ES6150014)	3,016.66
Golfo de Cádiz	Nature 2000 marine ZEPA (ES0000500)	23,420.41
Dunas del Odiel	Nature 2000 ZEC (ES6150013)	64.44
Marismas y Ribera del Tinto	Nature 2000 ZEC (ES6150014)	3,016.66
	Total	251,140.78

MAB: Biosphere Reserve. UNESCO
RAMSAR: Wetland of International Importance.
SPA: Special Area of Conservation for Birds. European Natura 2002 Network.
SCI: Site of Community Interest. European Natura 2000 Network.
SAC: Special Area of Conservation. European Natura 2000 Network.

All these areas are located totally or partially in the Port of Huelva Service Area, or border with it, as shows the next image:

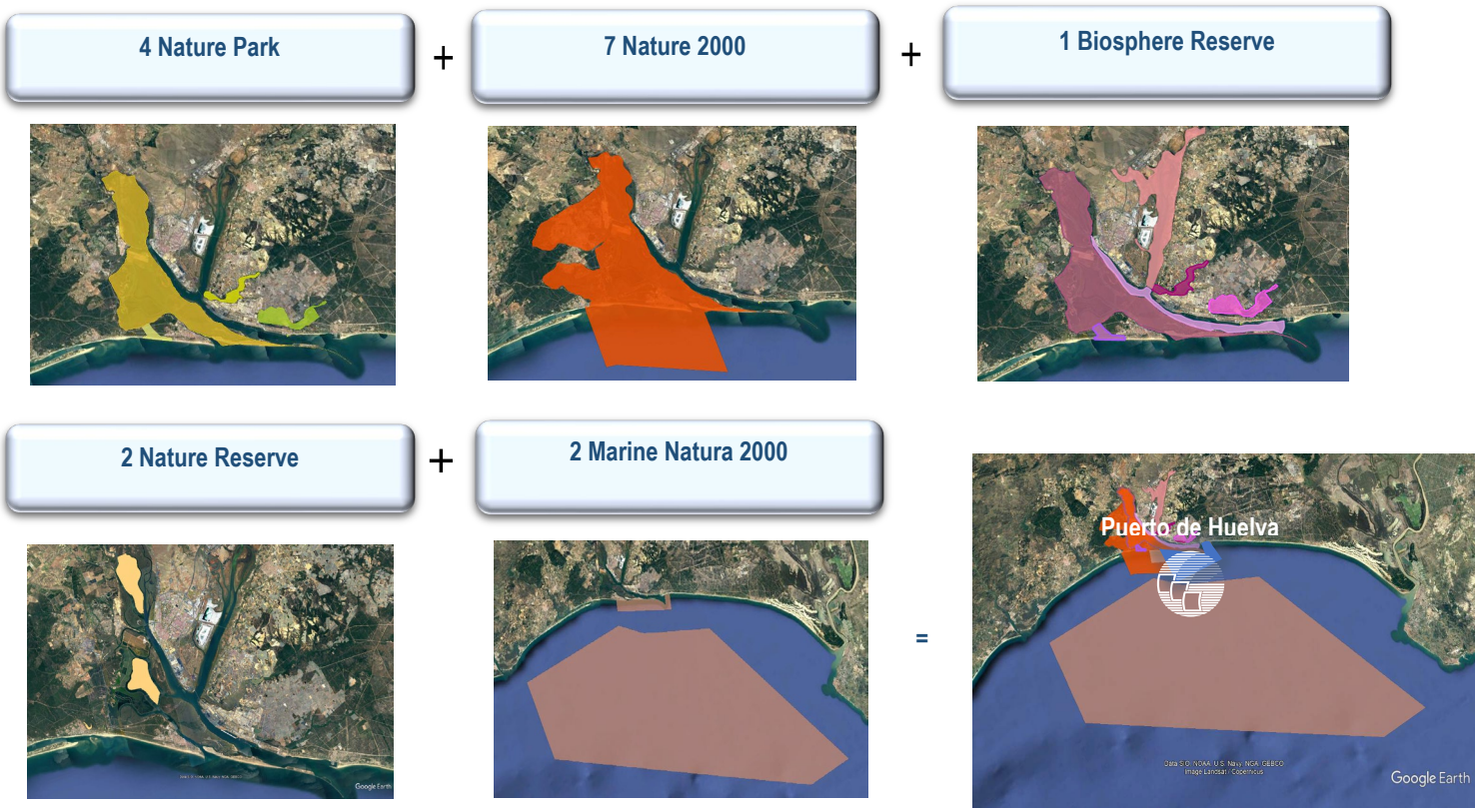

Image 2: Protected areas in the Port of Huelva. Google Earth and own elaboration.

In addition to these areas, there are other protected areas within a 20 km radius, including Doñana, internationally known due to its relevant importance.

The main ecological value of these areas lies in the fact that they are ecosystems of estuarine, tidal and continentalised marshes, as well as highly productive coastal sandy ecosystems, which constitute a strategic point for nesting and breeding migratory birds and are home to a wide variety of habitats and landscapes.

The project has been the winner of the Working with Nature Award on 35th PIANC World Congress 2024.

2.3 VISION AND LEADERSHIP DEPLOYED BY THE PORT´s MANAGEMENT

The estuary of the Port of Huelva is formed by the mouth of two rivers: the Tinto and Odiel river. These rivers run north-south through the province of Huelva, crossing the Iberian Pyritic Belt, which is characterised by one of the largest number of massive sulphide deposits in the world.

This makes it an area rich in minerals whose deposits have been exploited since the earliest civilisations.

This has historically led to the existence of two acid drainages. On the one hand a natural acid drainage called acid rock drainage, and on the other hand, an acid mine drainage caused by runoff from unrestored mining deposits that have existed since the earliest civilisations. These acidic drainages mean that the

Tinto River has been classified as the most acidic river in the world, with pH 1, capable of harbouring colonies of unique bacteria that live in these extreme environments, a characteristic that has been studied in recent years by NASA as exceptional and unique conditions that could even represent the conditions for life on Mars.

For this reason, both rivers transport thousands of tons of heavy metals per year (Olías, 2010) to the estuary. Once acidic water and seawater come into contact, the pH of the river water increases, causing a significant precipitation of metals into the port estuary. Therefore, the pollution is transferred to the sediments that are dredged and it is necessary to carry out a correct environmental management.

In addition to the above, the Port of Huelva has had an industrial tradition since the 1960s. At that time, the lack of environmental regulations generated a strong impact on the port area, leaving environmental liabilities that have had to be restored.

The Port of Huelva is located in this estuary and therefore requires constant maintenance dredging, as well as occasional deepening dredging to meet the demand for new traffic. This generates a minimum of 500,000 m^3/year, of which approximately 300,000 m^3 are contaminated due to the reasons explained before.

Why is it important the vision and leadership of the Port applying the Working with Nature methodology in an integrated way?

In contrast to the above, from an ecological point of view, the estuary of the Port of Huelva is subject to a highly dynamic tidal influence that favours a continuous renewal and exchange of nutrients, giving this space a high biodiversity and biological productivity. The predominant habitat is the estuary, with tidal marsh ecosystems of great ecological richness. In addition, due to its proximity to the main migratory routes, the Port of Huelva and its marshes play an important role in the North-South migratory flows, as transit, wintering or nesting sites for birds.

As it is explained after, the Port of Huelva is located in an stuary of great environmental and biological wealth, with more than 245,000 ha of protected areas both, within and adjacent to the Por area. All the inner waters, navigation channel and part of the land area of the port are protected areas, with a total of 16 protected areas, from regional to international level, including the Marismas del Odiel Biosphere Reserve (partially included in the Port of Huelva) and the areas of the European Nature 2000 Network.

Among the most numerous birds with very important populations are the little tern (Sterna albifrons), the spoonbill (Platalea leucorodia), the pink flamingo (Phoenicopterus ruber), the osprey (Pandion haliaetus), etc., which makes the marshes an internationally important feeding and breeding site. Other waders include sandpipers (Calidris spp.), grey plovers and plovers (Pluvialis squatorola, Charadrius spp.), sandpipers (Tringa spp.) and curlews (Numenius spp.). Ardeidae are also characteristic of this area, with significant populations of purple heron (Ardea purpurea), great egret (Ardea alba), little egret (Ardeola ralloides) and grey heron (Ardea cinerea). As a result of this ecological activity, numerous protected areas have been created within the port area and in the surrounding area, which are protected at regional, European and international level.

These ecological values coexist with the development of the port area, with dredging, with the creation of port infrastructures, with traffic and the activity of the logistics-industrial sector.

That makes absolutely necessary and essential to have an integral and strategic management project that conceives the component of nature applied to infrastructures and dredging. Furthermore, this project must last over time from a methodological (WwN) and technical point of view, because this is the only way to turn elements that could pose a threat to the Port of Huelva, into an opportunity.

Image 3: Projects images.

2.4 CONTRIBUTION TO SUSTAINABILITY AND THE UN SDGs

As has been explained, the project contributes directly to sustainability. The project has facilitated compliance with the conservation objectives of the protected areas, with ecological connectivity being fundamental. For this reason, the management of dredging and the creation of infrastructures has been conceived not only in a way that is integrated into nature but also based on its natural processes for the

success of the compatibility between port activity and the conservation of the ecological values of the protected spaces existing in the Port of Huelva.

In addition, this project has a clear component of improving the integration of the port in the city of Huelva, the social use of the port areas, the improvement of the quality of life, as well as the dissemination and environmental awareness.

Related to SDGs, the project contributes to following ones (red circle):

Image 4: SDGs and project contribution.

2.5 ENGAMENT OF SOCIETAL AND COMMERCIAL STAKEHOLDERS

As far as the Huelva Port Authority team is concerned, the project has required a multidisciplinary team, mainly made up of engineers and environmentalists. However, the collaboration of external agents specialised in dredging operations, research biologists, ornithologists, etc. has been necessary.

Likewise, collaboration with the environmental administration, Port Community, University, Council of Huelva and ecological organisations such as Seo BirdLife, has been necessary, and also key to achieve:

- The integration of Working with Nature criteria in the management of the Port of Huelva, considering biodiversity conservation actions into dredging operations in order to Valorise contaminated dredged material enclosures and to create new habitats for birds and wildlife of European protected species.
- The autorizations to use polluted dredging materials to obtain ecological benefits for the creation of nesting and breeding habitats for different populations of seabirds protected under the European Birds Directive.
- The development of actions to enhance ecological connectivity in the estuary of the Port of

Huelva, as well as Habitats of Community Interest of the European Habitats Directive.

- The enhancement of the 16 protected areas within the Port of Huelva and its immediate surroundings: 1 UNESCO Biosphere Reserve, 7 Natura 2000 Network, 2 marine Natura 2000 Network, 4 Nature Reserves and 2 Nature Reserves.
- Port-City and better quality of life.
- Scientific and technical dissemination of the results.

That is why the project is one of the clearest examples of:

- Minimising the impact on the environment of dredging and port infrastructure.
- Working with nature to provide the basis for the design of the project.
- Incorporating natural processes as part of the solution.