



Application of the Environmental Assessment Matrix in Port Contexts: Practical Experiences, Sampling Activities, Key Takeaways and Critical Challenges

Port of Piraeus

3° Transfer Webinar «Environmental Impact Assessment: the TREASURE experience», 7 May 2026



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Intro of PPA SA

- ❑ The central port of Piraeus holds significant geographical relevance due to its **strategic location near Athens** (~10Km), Greece's capital city. Situated on the eastern coast of the Saronic Gulf, Piraeus serves as the **principal maritime gateway to the country**.
- ❑ Piraeus Port connects continental Greece with the islands, is an international cruise center and a commercial hub for the Mediterranean, providing services to ships of any type and size.
- ❑ The port's geographical positioning at the crossroads of Europe, Asia, and Africa enhances its importance as a **major hub for maritime activities**. Its accessibility to major shipping lanes in the Mediterranean Sea facilitates the movement of goods and people between Greece and various destinations worldwide.
- ❑ Today P.P.A. S.A. employs more than 1.000 people and annually provides services to more than 24.000 ships. P.P.A. S.A contributes towards the local and national economic growth and is further developed by upgrading both the infrastructure and the services provided.
- ❑ Situated close to the international trade routes, the port is a hub of international trade being the only European port in the East Mediterranean with the necessary infrastructure for the accommodation of transshipment cargo.



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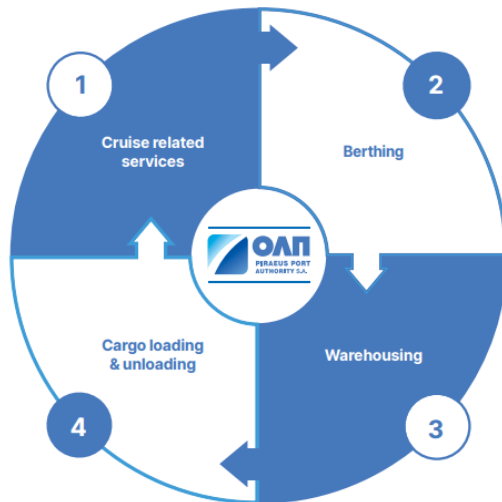


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Services and Infrastructure

An extensive range of services is offered that make the Port of Piraeus a strategic maritime transport hub in the Mediterranean and which are all fundamental to our operation, strategy and economic performance.



The Port comprises **5 business units**
and a **logistic terminal**

Container Terminal



The **Container terminal** at Pier I operates a critical hub for containerized cargo, offering services that support the smooth handling of global trade. It has an annual capacity of 1,100,000 TEUs and operates 24 hours, 365 days per year. The infrastructure within can accommodate the largest container carriers, with a total pier length of 1,150 meters, a maximum depth of 18 meters and a total storage area of 72,400 m². Moreover, the pier holds advanced port electromechanical equipment, promoting operational efficiency and capacity. It features 8 Ship to Shore Cranes, 5 Over Super Post Panamax Twinlift and 3 Panamax Twin-lift, 1 Harbor Mobile Crane, 8 Rail Mounted Gantries (RMGs), 22 Straddle Carriers (1 over 2 high), 36 Terminal Tractors, 2 Reach Stackers and 4 Empty Container Handlers.

Cruise Terminal



The **Cruise Terminal** is supported by three terminals, Terminal A – Miaoulis, Terminal B – Themistocles, and Terminal C – Alkimos. It holds 11 positions for berthing, while two additional berths are under construction to host larger vessels. The cruise terminal is essential for the economic development of both the port and the wider region, through the tourist exchange currency and the relevant services developed to cover tourism needs, such as arrival halls, parking areas for buses, taxis, X-ray machines and immigration desks.

Ferry Terminal



The **Ferry Terminal** supports regional connectivity, providing critical transport links for passengers and vehicles. The terminal supports the national mobility network, while several measures to enhance security have already been completed and investments are planned to strengthen infrastructure and security.

Ro-Ro Terminal



The **Ro-Ro Terminal** is one of the biggest hubs for local, transit and transshipment cars of the Eastern Mediterranean, Black Sea and North Africa. In addition to loading/unloading and storing new vehicles, all kinds of wheeled cargo are handled, heavy machinery, trucks, low roll trailers (mafi), trailers, etc., as well as general cargo. The Ro-Ro is located in Terminal G2 in the area of Keratsini – Drapetsona and has a storage capacity of 6,700 vehicles. The expansion of Herakleous Pier, has recently been completed by 40,000 m² to host up to 5,100 cars in a total area of 110,000 m². All major automakers transfer through the terminal more than 260,000 vehicles per year.

PPA SA key insights



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Piraeus Port



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Passenger Port / Central Port



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Cruise Port



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Container & RO-RO Terminals



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PPA SA Environmental Challenges & IROs

Environmental IROs (Impact Risk Opportunities)

TOPIC	IRO	TYPE	ACTUALITY/ POTENTIALITY
Climate Change	Energy Consumption and GHG Emissions	Negative	Actual
	Energy Mix (opportunity)	-	-
	Climate Change Adaptation	Negative	Actual
	Climate change mitigation	Negative	Actual
Pollution	Pollution of Air	Negative	Actual
	Pollution of Coasts, Water Column and Sediments (Company Specific)	Negative	Actual
	Noise pollution (Company Specific)	Negative	Actual

To manage significant impacts, risks and opportunities PPA S.A. has developed an integrated management system which has been certified with ISO 9001:2015, ISO 14001:2015 and ISO 50001:2018, since 2022. Currently, Scope 1 and 2 emissions are certified annually, in line with ISO 14064-1:2018 standard and the requirements of the Greek Climate Law (4936/2022).

ENVIRONMENTAL CHALLENGES OF THE CENTRAL PIRAEUS PORT



Air Pollution

Ship emissions and port-related exhaust



Water Quality

Urban pollution, risk of spills



Urban Environmental Pressure

Air quality, green spaces, living conditions



Noise, Light, and General Pollution

Nuisance pollution



Climate-Related Risks

Energy and infrastructure pressures



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Challenges to be tackled with pilot solution

Main challenges to be tackled are the **urban run-off** and **cruise ship discharges**.

These pollutants **degrade sediments & water quality**, harm marine ecosystems, and affect port operations. Addressing these sources of pollution will ensure sustainable port operation.

For those reasons, PPA SA decided to choose **LoE 1 & LoE 2**



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Environmental Challenges & Actions undertaken in Treasure

Sea Water & Sediments Quality Monitoring

- ❑ PPA S.A. has established a formal cooperation Agreement with the National Technical University of Athens (NTUA) for the collection and analysis of water and sediment samples in the Port of Piraeus.
- ❑ The NTUA carries out sampling and analysis missions in two selected port zones, the first sample was taken and examined in May 2025 and the second in May 2026, covering the full set of parameters defined in the accompanying matrix.
- ❑ The NTUA has draft a report and LoEs templates that will be used in project's tool Sediqua soft tool for the monitoring the quality of the Sediments & Water in Piraeus Port (Cruise terminal)
- ❑ PPA S.A. is planning to implement a pilot activity at the Cruise Terminal, focusing on the reduction of pollutant loads from stormwater discharges.



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Lines of evidence and specific parameters applied in the matrix tool

LoE 1 – SEDIMENTS Chemistry / Quality

Parameter	Units	Method
Ex. Phosphates	Ex. mg/L	Ex. Colorimetry
SEDIMENTS		
Grain size gravel (> 2 mm); sand (2 mm < x < 0,063 mm); pelite (silt: 0,063 mm < x < 0,004 mm + clay: < 0,004 mm)	mm	Test Method for Elemental Analysis of Soil and Solid Waste by Monochromatic Energy Dispersive X-ray Fluorescence Spectrometry Using Multiple Monochromatic Excitation Beams" (ASTM D8064-16).
Metals and trace elements As, Cd, Cr tot, Cu, Hg, Ni, Pb, Zn , Fe, Mn	mg/kg	Test Method for Elemental Analysis of Soil and Solid Waste by Monochromatic Energy Dispersive X-ray Fluorescence Spectrometry Using Multiple Monochromatic Excitation Beams" (ASTM D8064-16).
PAHs	mg/kg DW	US EPA 8270D, US EPA 8082A, DIN EN 15527, ISO 18287, ISO 10382, DIN EN 15308).
PCBs	mg/kg DW	US EPA 8270D, US EPA 8082A, DIN EN 15527, ISO 18287, ISO 10382, DIN EN 15308).
Organic carbon (TOC)	% (DW)	ISO 8245:2015





Lines of evidence and specific parameters applied in the matrix tool LoE 2 – Water Column (Chemistry/Quality)

WATER COLUMN		
TSS - turbidity	NTU	ASTM D1889-88)
Physicochemical parameters (pH, Temperature, salinity, conductivity, TDS, transparency	pH,oC,ppt,S/m, g/L,m,NTU	
Metals (As, Cd, Cr tot, Cu, Hg, Ni, Pb, Zn , Al, Fe)	µg/L	APHA 3113 A, B, C Atomic Absorbtion Spectrometry (AAS)- Electrothermal –CS-AAS) – Hg ISO 17852 :2006_Fluoresce nce correlation spectroscopy



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Testing time-table

Period for collecting – analysing samples		
Start date	End date	Periodicity
27 May 2025	30 June 2025	~1M
End of May 2026	End of June 2026	~1M



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Pilot site locations



Sampling strategy

The coordinates of the sampling locations are presented in Table 1, while the location of sampling points is shown in Figure 4.

Table 1: Sample Coding and Coordinates

Code	Lat (°)	Long (°)	Sample type
T311S	37.939606	23.632694	Sediment
T311N	37.939606	23.632694	Seawater
T323S	37.939410	23.628193	Sediment
T323N	37.939410	23.628193	Seawater



Figure 4: Location of study area and sampling point locations



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Reason for site selection

- **Urban run-off:** Water from rainfall washes contaminants from industrial areas, roads, and port facilities into storm drains, which then discharge into the sea.
- **Cruise ship pollutants:** These pollutants, including wastewater, ballast water, and accidental discharges such as fuel or waste, are released directly into the water.





Analysis

The 1st sampling mission took place on **May 27th, 2025**, and included the collection of 2 water & 2 sediment samples, aiming to support the environmental assessment of targeted areas within the scope of the project's activities. More specifically, the following activities were implemented:

- ☐ Sampling and analysis of two seawater samples for dissolved and total organic carbon (DOC, TOC), total suspended solids, turbidity, total nitrogen (TN) and orthophosphates.
- ☐ Sampling and analysis of 2 sediment samples for grain size distribution, heavy metals (nickel, lead, copper, iron, chromium, zinc, cadmium, mercury, arsenic, vanadium, aluminum, hexavalent chromium), polychlorinated biphenyl congeners (Σ PCBs) (IUPAC No. 28, 52, 77, 81, 101, 118, 126, 138, 153, 156, 169, and 180), polycyclic aromatic hydrocarbons (PAHs) (Acenaphthylene, Benzo(a)anthracene, Fluoranthene, Naphthalene, Anthracene, ve Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Acenaphthene, Fluorene, Phenanthrene, Pyrene, Dibenzo(a,h)anthracene, Chrysene, Indeno(1,2,3-cd)pyrene, total PAHs), organotin compounds (Monobutyl, Dibutyl, Tributyl tin and their sum), and organochlorine pesticides (Aldrin, Dieldrin, Endrin, alpha-HCH, beta-HCH, gamma-HCH (Lindane), DDD, DDT, DDE (for each substance the sum of the 2,4 and 4,4 isomers), HCB, heptachlor epoxide).



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LoE 1 template – Sediments sample

N	O	P	V	W	Z	AB	AC	AD	AE	AF	AI	AJ	AO	AP	AV	AW	AX	AY
Pelite	Silt	Clay	Al	As	Cd	Cr tot	Cr VI	Cu	Fe	Hg	Ni	Pb	V	Zn	Acenaphtene	Acenaphtilene	Anthracene	Benzo(a)anthracene
6.8	6.2	0.6	9290	93.2	1.2	91.8	< LOD	260	27640	1.2	58.4	390	36.2	480	32	52	153	754
3.7	3.5	0.2	9130	25.6	0.4	75.2	< LOD	46	13320	0.4	54.6	61.4	25.8	88.6	10	10	10	61

LoE 2 template – Water sample

Latitude	Longitude	Area code	Site code	Sampling date	Sample code	N
37.939606	23.632694	Piraeus	Piraeus Port	27/05/2025	T311N	0.45
37.93941	23.628193	Piraeus	Piraeus Port	27/05/2025	T323N	0.45



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Analysis

Details	Sample code	L1 (D.Lgs. 173/16)	L2 (D.Lgs. 173/16)	SQA (D.Lgs. 172/2015)	PEL	TEL	ERM	ERL	Col A (D.Lgs. 152/06)	Col B (D.Lgs. 152/06)	ISQG Low ANZECC
	T311N	SEVERE	SEVERE		SEVERE	SEVERE	MAJOR	SEVERE	SEVERE	SLIGHT	SEVERE
	T323N	SEVERE	SLIGHT		SLIGHT	SEVERE	NEGLECTIBLE	MAJOR	MODERATE	ABSENT	NEGLECTIBLE

Showing 1 to 2 of 2 entries

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Bar Graph



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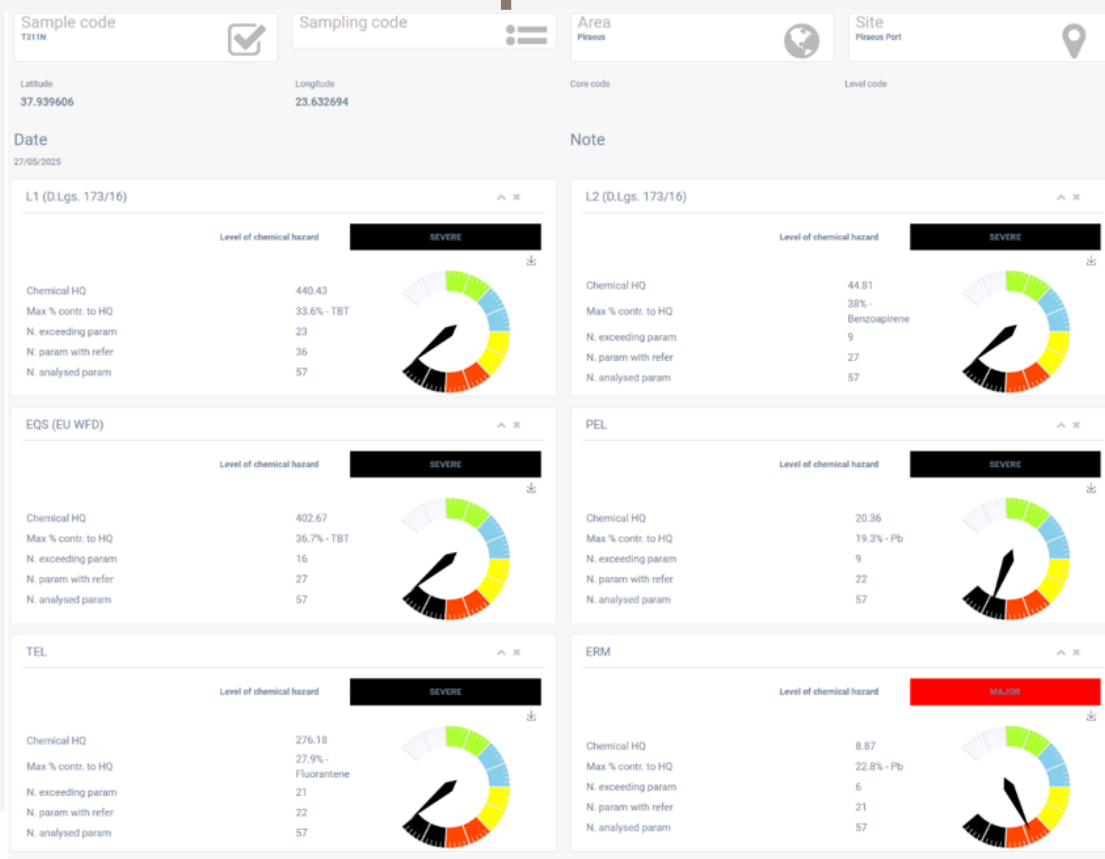


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Sediqualssoft® TREASURE: results



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Main outcomes & decision making

- The 1st sample analysis showed that the need for action is necessary in order to improve the quality of sediments and water chemistry in the cruise zone of PPA SA.
- By the end of May 2026, the PPA SA will conduct a pilot activity using 2 recovery skimmers in the sample zones, aiming to improve current situation.
- The data of the 2° sample mission will be inserted in sediqua software for monitoring and data evaluation in June 2026.
- The results and the comparative analysis report is estimated to be drafted by the end of June 2026.



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2 Oil Recovery Skimmers will be used in the cruise area as part of the pilot activity

- ❑ An oleophilic, free-floating skimmer designed for oil recovery operations in varying environments and scenarios.
- ❑ The modular system allows fast interchange from brush, to disc or drum recovery bank depending on the viscosity of the target oil.
- ❑ Proven oleophilic technology allows the system to achieve oil recovery rates of up to 99%.
- ❑ Designed with a shallow draft for portability, the skimmer is effective in operations to nearshore applications.





Thank you!

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