

INVESTOR: PORT OF PLOČE AUTHORITY

ENVIRONMENTAL MANAGEMENT PLAN
Container Terminal Ploče
in Port of Ploče



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Object: **Construction of container terminal Ploče in Port of Ploče**
Environmental Management Plan

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1. INTRODUCTION

1.1. GENERAL

Within Port of Ploče a realization of container terminal has begun. Within Phase I of a Main Design of container terminal, the obligation of IGH designers is the creation of Environmental Management Plan (EMP).

Environmental Management Plan of container terminal in Port of Ploče presents guidelines for environmental management. During the creation of Plan itself analysis of the Environmental Impact Study of Container Terminal in Port of Ploče (Rijekaprojekt d.o.o, 2004, 2005), the analysis of a relevant law regulation of the Republic of Croatia and also relevant acts of Port of Ploče Authority (*Fig. 1*) have been done. The result of the above mentioned analyses are the exact activities which should be followed during design stage, construction stage and operational work of a container terminal.

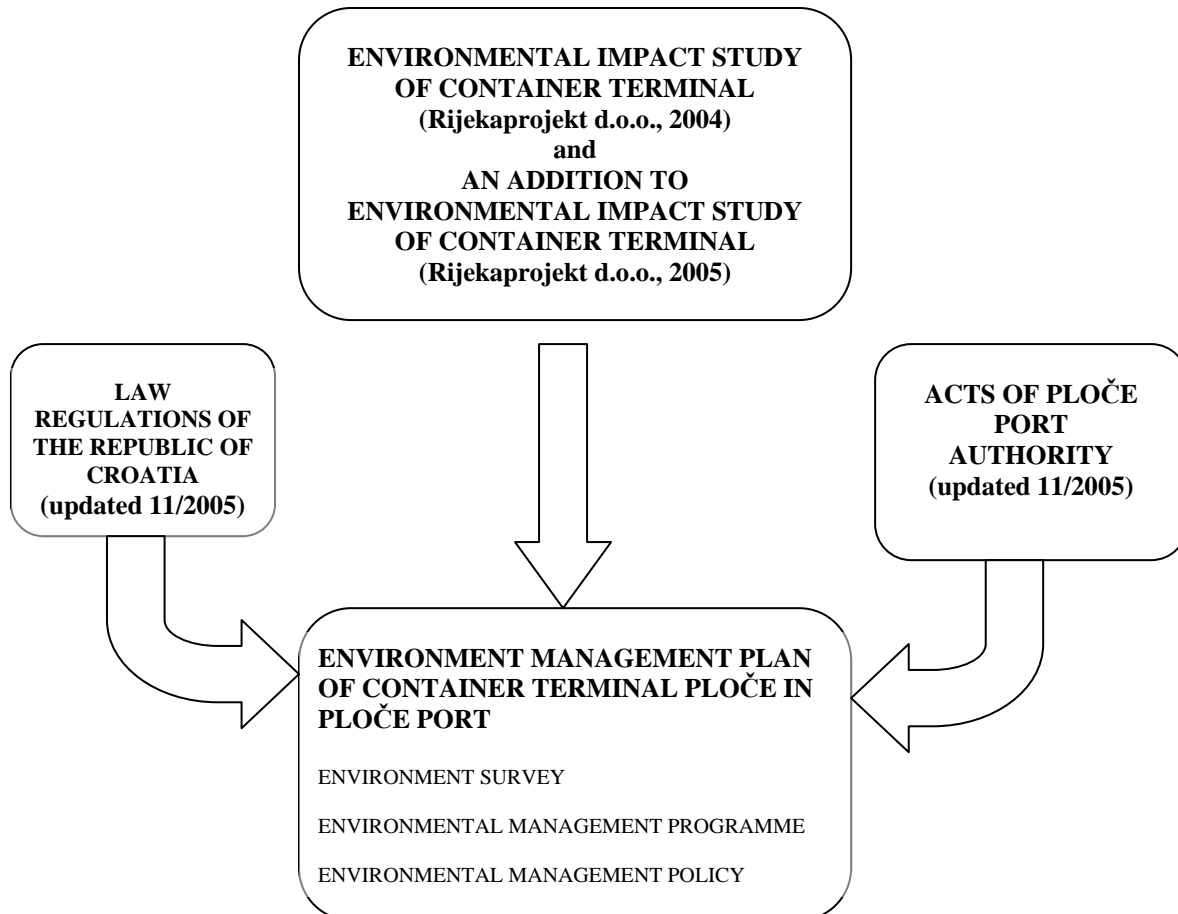


Figure 1. Input for creating the Environmental Management Plan of a Container Terminal in Port of Ploče

Beside system analysis an integral approach has also been used – a container terminal has been observed in much wider context of complete Port of Ploče. Since there isn't any Environmental Management Plan for Port of Ploče in whole, this Plan includes some activities that are not exclusively related to planned container terminal, but the whole area under the authority of Port of Ploče Authority.

1.2. BRIEF DESCRIPTION OF CONTAINER TERMINAL

Term "construction" stands for the construction of a container terminal in Port of Ploče.

The Port of Ploče is situated in the southern part of the Adriatic coast in the natural harbour to the northeast of the Neretva Estuary. Its clearly defined and large gravitation area includes the north-eastern part of Croatia, part of Serbia and Montenegro, Bosnia and Herzegovina, part of Austria, Hungary, the Czech Republic, the Slovak Republic, Romania and Poland. The navigation corridor Bosanski Šamac – Vukovar and the Pan European road corridor Vc Budapest – Osijek – Sarajevo – Ploče will enhance the importance of the Port of Ploče for the combined road transport among the Danube countries. The central Adriatic navigation corridor, the natural continuation of the Vc corridor will connect the Italian southern regions with the Central and East European countries in the most efficient way.

The long-term development program passed by the Parliament should create conditions for the Port of Ploče to provide high quality services to all users. The construction of the container terminal is therefore a priority project in the forthcoming investment cycle.

The primary transport corridors connecting the industrialized countries are containerized. There is at the same time a growing tendency in both developed and developing countries to containerize the traditional routes. Port Authorities in the developing countries must therefore consider containerization of both their own ports and the ports within their gravitation area as well as forecast changes that such a development would entail for the port planning, organization and implementation.

The main objective of the construction of container terminal in the port of Ploče is renewal, modernization and extension of cargo handling capacities and their furnishing with modern equipment of high technical efficiency and improvement of work organization which is the basis of the future port development.

This particularly refers to transit of goods from catchment areas and the return of general cargoes which are most cost-effective in terms of income, but because of bad technological equipment of our ports they are handled by better equipped and organized European ports.

The project contractor Lučka Uprava Ploče (the Port of Ploče Authority) proceeds with the construction of the container terminal with capacity 100 000 TEU a year in the Port of Ploče because the old port basin, intended for the line traffic with the use of the traditional technology, has gradually lost its classic traffic value and needs to be modernized.

During the construction of the new container terminal with capacity 100 000 TEU in the port of Ploče the following will be constructed within the existing port area:

- A new Quay No. 7 with mooring structure 340 m in length which will be used for receiving ships with highest maritime requirements, with cargo capacity up to 60,000 DWT and deep draft without restrictions. On planned Quay No. 7 one ship with mentioned cargo capacity or two ships half the size can be berthed simultaneously;
- Deepening of the port basin between the Quay 5 and the new Quay 7;
- New storage and cargo-handling areas about 22 ha which will be used as open storages for the container terminal with capacity about 100,000 TEU a year;
- Ro-Ro ramps with part of the Quay No. 6 for receiving Ro-Ro ships;
- Roads and railways at the terminal;
- Infrastructure facilities at the terminal: water supply, sewerage, electric power supply and telecommunications;

- Covered storage area at the terminal;
- Auxiliary terminal structures, entrance with shelter, control tower, auxiliary workshops and the auxiliary entrance to the terminal.

The refurbished container terminal will be covering the total surface of 154.000 m² (15.4 ha) onshore and 53,000 m² (5.3 ha) sea water, i.e. gross surface 209,000 m² (21 ha).

1. Statement of main surfaces

- Port operations surfaces	86.000 m ²
- Waterfront with onshore surface	17.000 m ²
- Roads and infrastructure structures	24.000 m ²
- Warehouse space	12.000 m ²
- Auxiliary structures	15.000 m ²
<hr/>	
- Total surface of pier	154.000 m²
(out of that roads and operative surfaces cover 127.000 m ²)	
- Aquatic waters (sea)	53.000 m²
<hr/>	
Grand total	209.000 m²

2. Pier capacity

- container terminal 100.000 TEU/year

3. Number of employees (evaluation)

40

The pier capacity and the number of employees (data elaborated in many studies) are subject to change and will depend on port modernization process and dynamics of implementation of modern technologies.

Planned project includes also the proposal for the connection of container terminal of the port of Ploče to the primary state roads and railways, new organization of the traffic in the port basin.

The project can be realized in stages depending on the investment plans and the potentials of the project contractor and also by respecting all technical and technological conditions of a stage.

The proposed project alternative is suitable for a number of reasons, the following ones being also the most important:

- The planning documentation which proclaims the port of Ploče to be of importance on the state, county and town level is unquestionable.
- It is indisputable that newly built capacities are not a new burden on the location, but that this is a realization of capacities in the port of Ploče foreseen by plan and for these capacities the port area has been formed and reserved by the plan.

The conclusion of the Environmental Impact Study (Rijekaprojekt d.o.o., 2004) is that the construction of a new container terminal within the existing and planned port-transport and industrial zone means the improvement of the present condition in basic and wider port area:

- the port basin of the port of Ploče will develop more significantly in its central part which will enable a part of the port to qualify for receiving of big ships up to 60,000 DWT which essentially improves the competitive ability of the port

- simultaneous construction of the line of communication from the entrance to the port of Ploče and connection to the Adriatic Highway, which will be grade-separated in relation to the railway will enable fast and uninterrupted transport of the port cargo from the town by the shortest way
- notable development of modern and technically better equipped and developed port basin between the Quay 5 and Quay 7, as well as the construction of Quay 7 in the central part of the port of Ploče will greatly improve the entire ecological situation and visual outlook of the port.

2. ENVIRONMENT SURVEY

2.1. DESCRIPTION OF PLOČE LOCATION

Port of Ploče is situated in the southern part of the Adriatic coast in a natural bay north-east from Neretva outlet (*Figure 2*).



Figure 2. Area Survey

It is possible to identify the following three global zones in the Town of Ploče, which are divided as to the characteristic designation:

- Working zones in the area of the Neretva Delta
- Residential zone on the lime-stone hills
- Tourist and recreational zone in the area of the Baćinska lakes

The central town spaces are to be found in the inner-town, at the junction of the delta and the residential zones. All relevant public spaces that shape the urban character of the town are also here and serve as the orientation point in the urban structure of the town.

Almost all working activities take place in remote, large, industrial zones, which ensure both the continuance of technological processes and the proper traffic connections.

The areas that are not built up but are designated for parks and other green zones affect the physical planning considerably.

The town is encircled by large water bodies (sea and lakes), which are partially categorized as protected areas.

The cargo Port of Ploče in the harbor basin Ploče is located to the south of the residential part of the town, in the remote cargo operating zone adjacent to which is the industrial zone.

A detailed description of location environment has been presented within the Environmental Impact Study of Container Terminal in Port of Ploče (further EIS) which has been created by Rijekaprojekt in 2004 and also its Addition in 2005. A brief extract from EIS is being presented here.

2.1.1. General data on meteorological, mareo-geographic and climatic conditions

Meteorological wind data

The most interesting winds are the strongest winds, which may cause problems related to the port facilities' operational functions. Most sensitive are the mobile portal crane (100 tons) and the container bridge, for which the operational criterion comes to the wind peak of 5 Bf (36 km/h or 10 m/s). The data show that such winds (≤ 6 Bf), making the loading activities impossible, blow ca 30 days or 8,2% per year.

Tides

The latest investigations of sea level fluctuations in the Port of Ploče are done by the Croatian Hydrographic Institute. On the basis of measurements conducted continuously from March 2002 to March 2003, calculations were made of the values of the sea mean level (SRM) and of the hydrographic zero (HN) in the area of the Port of Ploče, and these were compared with the geodetic zero (GN) and mareographic zero (MN) (mareograph measures the height of the sea level in relation to the mareographic zero). The relationships are as follows:

SRM - HN = 24.5 cm	SRM - MN = 121.1 cm
SRM - GN = 42.2 cm	HN - MN = 96.6 cm
HN - GN = 17.7 cm	GN - MN = 78.9 cm

It can be estimated that the period of standing waves in the port of Ploče is about thirty minutes, which is far above own frequencies of all motions of any vessels which will move or be berthed to the quay and there is no danger of resonant effects.

Sea currents

Currents within construction area are under the strong tidal influences and they have regular periodic alternating courses. As far as the execution of the project and its impact on the sea current is concerned, it is necessary to conclude immediately that this impact practically does not exist or if it exists then it is positive. Namely, the project is executed laterally, by preserving the existing coastline and deepening the basin, thus enabling better spatial circulation and eddying motion around the vertical edges of the basin. Besides, with the execution and maintenance of an appropriate access waterway of the constant depth, hydrodynamic resistances to current will be reduced, which will contribute to the safety of the waterway.

Sea waves

EIS shows that the Quay 7 itself, for which the Environmental Impact Study is being prepared, is very well protected from wind waves and its complete safety and operational level with regard to this parameter.

Within EIS, beside data mentioned above, data on air temperature, nebulousness, precipitations and relative air moisture are also being analyzed. So, it could be said that container terminal in Port of Ploče (quay 7) has very good climate conditions for work and, according to that, no problems related to operational activities and safety matters are to be expected.

2.1.2. Geotechnical evaluation of the location

Current state of relief on land and sea bed is a consequence of erection of the Adriatic sea level, alluvium from the river Neretva delta during the upper pleistocene and holocene, as well as embankment of the sea bed during the construction of the port.

The area where the Port of Ploče is located lies on the wide delta of the river Neretva. Therefore, this territory is formed mainly of sediment formations from the Quarternary age which in form of thick formations are accumulated over the karst paleorelief. On the area foreseen for container terminal and Quay 7 construction, the thickness of Quarternary formations exceeds 100 m. Sediment formations are of very different grain size content and are often intermixed. According to the research studies performed in 1989, for the phase I of the container terminal construction in the Quay 7 background, the following types of ground were established:

- From elevation 0 to elevation –20 mud and sand material
- From elevation –20 to elevation –35 clayey materials
- From elevation –35 to elevation –42 sand
- From elevation –42 to elevation –52 gravel

These research studies were elaborated in the text: Study on Engineering Geological and Geotechnical Ground Characteristics and Requirements for the Object Funding for the First Phase of Container Terminal in the «Port of Ploče» in Kardeljevo, Institute for Geotechnics and Funding of the Faculty of Civil Engineering in Sarajevo, Reference number D-1815, Sarajevo, I/1990 (cited from the quote in the Geotechnical Study of the IGH, project number Rn-03-033-04-IR-03).

According to EIS (Rijekaprojekt d.o.o., 2004) the ground where the container terminal shall be built is of extremely low carrying capacity and is subject to subsidence. In the geotechnical study for the preliminary design, the terms of construction and ground consolidation with gravel piles were determined, in order that foreseen loads from the container terminal could be taken over.

The river delta territory is seismically active. According to the valid data, the basic seismic intensity on the river Neretva delta is of 8⁰ of the MCS scale. The expected intensities with 63% probability of occurrence are: 6⁰ MSK-64 for the 50 year return period, 7⁰ MSK-64 for 100 and 200 year return period and 8⁰ MSK-64 for 500 year return period. According to the ground seismic stability analyses in the river Neretva delta zone since 1986, the maximum magnitude can be M = 6.1, while the basic seismicity degree I_{max} = 9.15 of MCS scale. The same analyses have shown the possibility of liquefaction in the mud and sand sediments of the delta.

The river Neretva delta area is under the influence of the river Neretva flow as well as of sea tides. The same is applicable to the underground water level within the sediment body of the delta. In the port area three levels of underground waters were established. The first or the upper level is found in surface sands. The channel flow is open, i.e. it is the freatic type of aquifer. The second and third channel flows, located lower, are found in gravel lenses. The lowest gravel level is connected with deep karst water-carrier.

2.1.3. Sea

The existing contaminants

In the planned construction area the main contamination sources are municipal waste waters and port activities (*Figure 3*). Waste waters of the main collector of a sewerage system of the Town of Ploče are being discharged into sea, by the quay outfall placed by the very ramp base for bulk cargo.

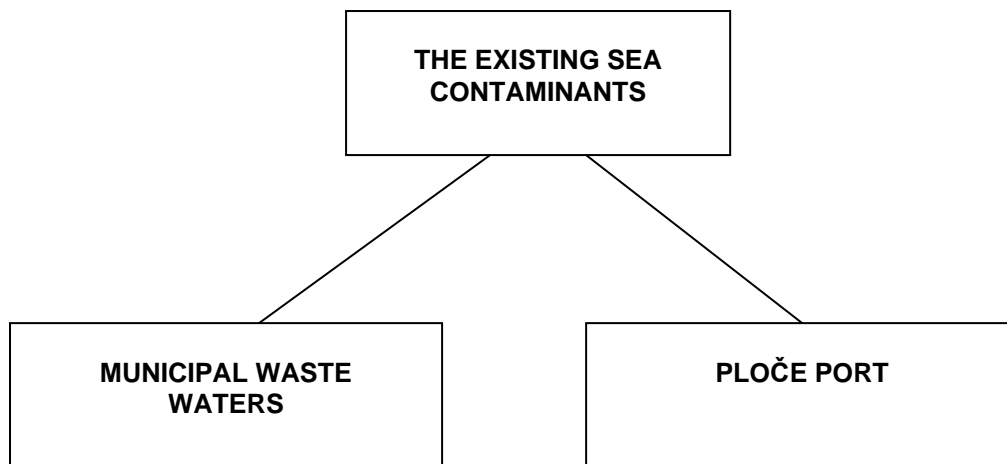


Figure 3. Main sources of contamination for planned construction area

The sea quality

Systematic researches of the coastal sea quality in the Neretvanski channel have been carried out for many years within the Project Vir – Konavle. The researches have been made by the Oceanography and Pisciculture Institute from Split for the requirements of the Hrvatske Vode («Croatian Waters») from Zagreb, Department for water and sea waters protection from pollution and contamination. The sea quality state is presented based on the results of the researches undertaken in the year 2002. The researches include the area from Gradac to the Malo More and the Prapatno cove. Investigations done on station located in front of the Ploče town port included climatological features of the area, physical and chemical properties of the sea water, biological properties and characteristic pollutants.

The Neretva channel is characterized by variable hydrographic properties (temperature, salinity, density) conditioned by an interaction with the atmosphere, the influence of fresh waters, first of all those from the river Neretva, as well as by exchange of water with other parts of the Adriatic (Table 1).

In the Neretvanski channel, influence of the gradient incoming stream of north-west direction is registered. The sea streaming in front of Ploče is under considerable influence of the river Neretva flow, whose estuary is situated south from the town. The river Neretva flow accelerates the sea streaming along the shore in north-west direction, so we can suppose that this fact is favourable for taking off the town and the port pollution from the Neretvanski

channel. The same favourable effect is achieved by mixing of water with seawater of the Hvarski and Brački Channel.

The limpidity ranges between 7 and 25 m. The lowest and very uniform limpidity is registered at the station P1 that is under most expressed influence of sweet waters: 7 – 9 m. A higher limpidity and its larger ranges are recorded at station P4 situated in front of the Prapatno bay on the Pelješac Peninsula, i.e. at the outer side of the Neretvanski Channel: 14 – 25 m.

Tablica 1. Ranges of main hydrographical parameters in the Neretvanski Channel (3 stations) during the year 2002

	April	July	September	December
Temperature, ° C	14.18 – 17.06	16.16 – 26.20	17.44 – 23.43	13.7 – 17.21
Salinity, psu	32.28 – 38.57	34.93 – 38.93	34.53 – 38.69	36.72 – 38.51
Density (σ_t) kg/m³	23.41 – 28.81	22.98 – 28.70	23.93 – 28.39	27.42 – 28.18

The presence of dissolved nutritious salts, i.e. salts of nitrogen, phosphorus and silicon are a precondition for primary production of organic matter. However, their excessive amount (brought by rivers or by waste waters) may cause eutrophication of a certain area, with unfavourable impact on the sea ecosystem and on aesthetical properties of the sea water.

The sea of the Neretvanski Channel in the year 2002, as well as in the preceding years, can be classified as an area of low concentration of nutritious salts. The sea, in the area influenced by the Neretva river contains higher concentrations of salts of inorganic nitrogen and orthosilicate in relation to the outer side of the Channel, while values are opposite for orthophosphate. The only exception is the station situated in front of the town port in Ploče, where the surface layer is often enriched by orthophosphate.

In the whole investigated area, water column saturation by oxygen was appropriate; it ranged within narrow limits. On the station in front of the Ploče town port vertical profile of saturation by oxygen shows a uniform distribution by depth, without enrichment in the surface layer or reduction in the bottom layer.

Trophic (nutritional) degree of an area is very well reflected through the height of primary production of organic matter (the first step in transformation of inorganic material into a living organic matter). Each disturbance of the sea ecosystem balance is first reflected at the first step of the food chain, so that, by following the primary production, an appropriate insight into the integral state of the sea ecosystem can be obtained. The primary production has been examined by determination of biomass (chlorophyll *a*) and the phytoplankton community structure.

In the area of Ploče, the overall situation can be considered very favourable, as chlorophyll concentrations (amount of biomass) range between values characteristics for channel waters and open waters of the Adriatic. Qualitative composition of the phytoplankton community is marked by predominance of diatomaceae, although in summer period dinoflagellates were proportionally well represented too. In this area no important water bloom was noticed in the year 2002.

Contamination by faecal waters was examined by determining bacteria indicators of the faecal pollution. The sea at the station in front of the Port of Ploče was only lightly polluted, i.e. it satisfied the criterion imposed for the sea intended for bathe and recreation.

There were no systematic researches of sea quality in the restricted site of the Project. Sea limpidity between the bulk freight ramp and the area planned for container terminal construction is reduced, and bigger waste floating matter was noticed as well. Having in mind that, in addition to the activities in the port, untreated waste waters of town Ploče are emptied into the sea by a coastal outlet, it is to be expected that the area of the Project has been considerably degraded.

Sanitary quality of the sea is being examined at Bačina and on the municipal beach close to the Port of Ploče. On both beaches microbiological pollution of faecal origin was detected. The beach close to the town port had been proclaimed unsuitable for bathe and recreation as early as 1999. but in spite of this, people keep bathing there. The pollution is the result of inappropriate drainage of waste water in the area of Ploče, where untreated waste waters are let into the sea close to the shore. Such a situation may have negative consequences for human health.

Sea sediment

Investigation of heavy metals shows that contents of cadmium, lead, copper and zinc in the sea sediment at the area in front of the Port of Ploče is higher than the values found in the sediment at the reference station (Vis – Stončica) (Table 2). Concentration of cadmium is above the level of «probable natural contents» of this heavy metal in sea sediments in the greater area of the Central Adriatic, which indicates a certain influence of anthropogenic sources of pollution (waste waters in the town port).

*Table 2. Average values of mass share of Cd, Pb, Cu and Zn in surface sediments in the area of Ploče and Stončica in the year 2002. The portions refer to dry sediments (Wsm (CD)*10⁶)*

Station	Wsm (Cd)*10⁶	Wsm (Pb)*10⁶	Wsm (Cu)*10⁶	Wsm (Zn)*10⁶
PLOČE	0.303	25,7	19.2	106.3
STONČICA	0.124	16.1	8.46	54,9

Chlorinated hydrocarbons (chlorinated insecticides and polychlorinated biphenyl) were examined in shells *Mytilus galloprovincialis*. Concentrations of these organic pollutants are considerably lower in the area of Ploče in relation to average values of chlorinated hydrocarbons for the Mediterranean area.

For the EIS purpose a testing on sediment in planned construction area has been performed (presented in Chapter 2.2. of this document).

Sea flora and fauna

The inspection of living communities of the sea bottom along two transects was performed in the area of the planned container terminal Ploče. The first transect is in the area where the extension foreseen by the design could affect the environment and the second one in the area of an unlikely possibility of impact by extension. Testing results have been presented in Chapter 2.2.

2.1.4. Air

Air Quality

On the port territory of the Port of Ploče there are no larger stationary, point air pollution sources. In several smaller boiler rooms designed for business premise heating, gas or light special liquid fuel is used, and the volume of pollutants emitted into the air are negligible. Reloading devices are categorized into diffusive air pollution sources, i.e. there is no specific discharge where the values of the emission of the pollutants could be controlled, but the

whole reloading device is an open source of air pollution, there is no exact data of the measurement of emission of particles from the Port of Ploče area.

Noise

The residential and business zone of the part of city under possible influence of noise from the port, as well as other susceptible zones, are predominantly loaded by traffic noise from the town streets, as well as by noise produced by railway traffic from the railway node.

The new container terminal is positioned in the centre of Port of Ploče basin. Terminal noise, once it has been built, will not have any impact to residential town area.

For the EIS purpose a testing on noise level in planned construction area has been performed (presented in Chapter 2.2. of this document).

2.2. DESCRIPTION OF CONTAINER TERMINAL AREA - BASELINE CONDITION

During creation the Environmental Impact Study (Rijekaprojekt d.o.o., 2004 and the Addition to the Study, Rijekaprojekt d.o.o, 2005) the measurements of «baseline condition» of the construction location have been performed, according to Table 3.

Table 3. Performed testing on "baseline condition" of construction location

TEST TYPE	TEST LOCATION	PARAMETRES	CONCLUSION ON CONTAMINATION
sea sediment (testing performed in 2003)	2 locations in construction area PLS01 and PLS02 – surface sediment 0-5 cm of depth	polycyclical aromatic hydrocarbonates (PAH)	Levels of polycyclical aromatic hydrocarbonates are very low in both locations and are characteristic for areas of weak contamination.
		heavy metals (Pb, Cd, Cr, Ni, V and Zn)	There is no significant difference in the concentrations of tested heavy metals between two locations. Stated concentrations are of the same level as those found in sediment in the location in front of Port of Ploče (testing performed within project Vir-Konavle). Concentrations of heavy metals are characteristic for areas under weak anthropogenic influence
		polychlorinated biphenyles (PCB)	No polychlorinated biphenyles found.
sea sediment (testing performed in 2005)	2 locations in construction areas (the same as in 2003) PLS01 (layer of 0-10 cm and 50-60 cm of depth and PLS02 (layer of 0-10 cm and 30-40 cm of depth)	Grain-size distribution	Grain-size distribution analysis has shown sediments which could be classified as sludge.
		Dry Matter	It is a material with a high level of solid matter.
		Fixed Remains	
		Mineral oils	Surface layer of sediment in both locations is more loaded with total and mineral oils than deeper sediment layers.
		polycyclical aromatic hydrocarbonates (PAH)	Surface layer of sediment in both locations is more contaminated than deeper layers as expected. Values gained by this testing (20,6 to 34,9 µg/kg S.T.) are slightly lower than those gained by testing in 2003 (104 – 112 µg/kg S.T.).
heavy metals (Pb, Cd, Cr, Ni, V, Zn and Hg)	When comparing the results of these testing with those in 2003, it could be said that the concentration level of tested materials are practically the same in both. When comparing the concentrations of tested metals within sediments in Port of Ploče with those characteristic for Adriatic area it could be concluded that stated lead, chromium and nickel concentrations are		

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			within referent concentrations. Concentrations of copper, zinc and cadmium are slightly increased so this sediment could be referred to as the one slightly contaminated by these metals. Only mercury concentrations are higher than those characteristic for Adriatic area.
		polychlorinated biphenyles (PCB)	No polychlorinated biphenyles found in any specimen (the same as in 2003)
sea biomasses (testing performed in 2003)	2 transects in construction area	plant species	1 plant species found
		animal species	10 animal species found
noise (testing performed in 2005)	2 measurement points in zone of "Port of Ploče" (B2 and B3) and 1 measurement point in outer area in point B1 nearby port basin in daytime and nighttime working conditions	daytime working condition	The existing noise level out of port at B1 during port activity during daytime does not go over permitted value. Measured noise levels within port at points B2 and B3 do not go over permitted values.
		nighttime working conditions	The existing external noise level out of port at B1 without port activity during nighttime does not go over permitted value. Measured noise levels within port at points B2 and B3 do not go over permitted values.

2.2.1. Sea

Sea Sediment

Sea sediment has been tested in 2003 and 2005. The results are discussed in the following part.

Sediment testing in 2003

For the purpose of the Study (Rijekaprojekt, d.o.o. 2004), sediment was examined in the Project area on two stations: PLS 01 and PLS 02, as shown on Fig. 4. Sediment sampling took place in September. Sediment was analyzed by the Public Health Institute of the County Primorsko-Goranska.

The examination included detection of heavy metals (cadmium, chrome, lead, copper, zinc, nickel, vanadium) and of organic, steady, hazardous matter: polychlorinated biphenyl and polycyclic aromatic hydrocarbons. The results are shown in the Table 4.

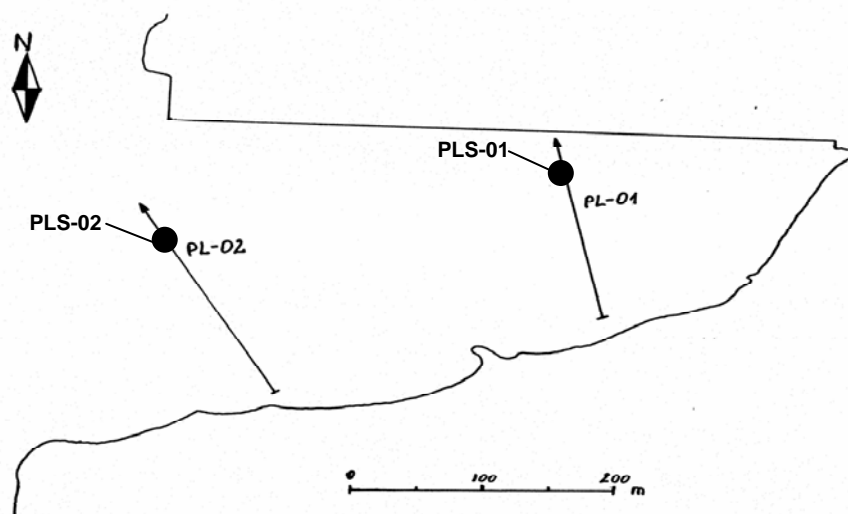


Figure 4. Sediment testing points

Table 4. Results of sediment testing for Port of Ploče area

Sample marking	PLS 01	PLS 02
Polycyclic aromatic hydrocarbons, µg/kg S.T.		
Phenanthrene	29	11
Anthracene	4	1
Fluorantrene	77	30
Pyrene	57	20
Benzo (a) anthracene + chrysene?	39	7
Benzo(b)fluoranthene + benzo(k) fluoranthene	19	8
Benzo(a)Pyrene	22	16
Indo(1,2,3-cd)Pyrene	29	7
Σ PAU	276	100
Heavy metals, mg/kg S.T.		
Pb	18.3	20.9
Cd	0.26	0.24
Cr	27.2	30.5
Ni	36.6	45.1
V	39.5	48.3
Zn	112	104
Polychlorinated biphenyl, ug/kgM.T.	<0.01	< 0.01

Sediment in the station PLS 01 is a bit more loaded with polycyclic aromatic hydrocarbons than sediment in station PLS 02. Levels of polycyclic aromatic hydrocarbons in both stations are low and characteristic for low loaded areas.

Presence of polychlorinated biphenyl has not been detected.

There is no considerable difference in concentration of examined heavy metals between the stations.

Established concentrations are at the level of those found in sediment in the station situated in front of the Port of Ploče (examinations carried out within the Project Vir - Konavle). Concentrations of heavy metals are characteristic for areas under lower anthropogenic influence.

On the investigated area the port basin has been recently deepened. When excavating the sediment, the surface layer was removed so that these investigations probably do not reflect the real situation of local sea water loading by these matters.

Sediment testing in 2005

The revision of the Environmental Impact Assessment for Container terminal at the Port of Ploče made by the World Bank has asked for to supplement the Assessment in the part referring to problems relating to deepening of the port maritime zone on the area planned for terminal construction. For the purpose of better assessment of sediment characteristics and contaminant content, a sample of sediment has been taken on the previous stations (PLS01 and PLS02) once again. By this occasion, the diver took the sample by corer : on the station PLS01 up to depth of 60 cm and on the station PLS02 up to depth of 40 cm.

Physical and chemical properties has determined done by the HIDRO.LAB.d.o.o Rijeka on following samples:

Sample Mark	Sampling Station	Analyzed Layer
Sample 1 st	PLS01	0 – 10 cm depth
Sample 2 nd	PLS01	50 - 60 cm depth
Sample 3 rd	PLS02	0 -10 cm depth
Sample 4 th	PLS02	30 - 40 cm depth

The analysis included following determinations:

- Physical parameters: grain size distribution, content of solid substances/water and portion of combustibles
- Chemical parameters: heavy metals (cooper, zinc, cadmium, chromium, nickel, lead and mercury), total and mineral oils, polycyclic aromatic hydrocarbon and polychlorinated biphenyls.

The *leaching test* has been carried out on the most critical samples in terms of contaminant content.

The Table 5 shows the sediment analysis results.

The grain size distribution shows that the sediment is mainly composed of particles smaller then (still waiting for results) mm, so according to these properties they can be classified as sludge.

Presence of polychlorinated biphenyls has not been identified in any sample as well as in the year 2003. Use of these organochlorine compounds as well as transformer and condenser oils and specially their use in open systems i.e. lubrication oils, colors etc. is forbidden therefore such finding has been obtained.

Comparing the results of these examinations with results of examination performed in the year 2003 it could be said that concentration levels of examined metals are practically the same at both examinations. It has to be noted that mercury examination has been not performed in the year 2003.

Table 5. Results of sediment testing at points PLS01 and PLS02 in Port of Ploče in November 2005

Parameter	Specimen mark			
	PLS01 0-10 cm	PLS01 50-60 cm	PLS02 0-10 cm	PLS02 30-40 cm
Grain-size distribution	still waiting for test results	still waiting for test results	still waiting for test results	still waiting for test results
Dra Matter, %	58,6	73,7	70,9	71,7
Fixed Remains, %	44,5	61,6	60,6	63,4
Copper, mg/kg dry matter (D.M.)	34,1	24,7	33,9	27,0
Zinc, mg/kg D.M.	157	72,7	82,6	81,3
Camium, mg/kg D.M.	0,47	<0.05	0,19	0,31
Chromium total, mg/kg D.M.	33,6	24,8	14,1	34,7
Nickel, mg/kg D.M.	43,4	36,8	30,7	42,2
Lead, mg/kg D.M.	35,4	22,1	25,4	34,2
Mercury, mg/kg D.M.	0,89	1,00	0,98	0,83
Oil total, mg/kg D.M.	52,0	28,3	40,4	33,7
Mineral oils, mg/kg D.M.	6,04	5,7	7,68	9,7
Total PAH, µg/kg D.M.	34,9	24,7	21,3	20,6
polychlorinated biphenyles, µg/kg D.M.	< 0.25	< 0.25	< 0.25	< 0.25

Sediment contamination estimate based on comparison with referent values for Adriatic area

In Croatia, there are not any standards or determined directions for sea sediment contamination estimate. For sea sediment estimate, a comparison with concentrations determined at referent points in the Adriatic or even Mediterranean is used.

By comparing the concentration of metals examined in the sediment at the Port of Ploče having concentrations characteristic for the Adriatic area, it can be concluded that the established concentrations of lead, chromium and nickel are on level of reference concentrations. Concentration of cooper, zinc and cadmium are a little bit higher, so the sediment poorly polluted with these metals can be taken into consideration. Only the mercury concentrations are higher then the concentrations characteristic for the Adriatic.

The concentration of PAH sum in the sediment of clear Mediterranean areas ranges from 3 to 60 µg/kg S.T. The concentrations established in the sediment of Port of Ploče are on this level.

Sediment researches on mineral oils performed on the Italian side of the North Adriatic Sea show that their concentrations in sediment are declining from the cost towards the high seas with values from 32.3 to 7.2 mg/kg (GEA Project - Snamprogetti, 2000). The authors consider that these values are within limits for areas with a low pollution rate. All values of mineral oils in the sediment of the Port of Ploče are below 10 mg/kg resulting that this sediment is not loaded with new contaminants.

Sediment classification according standards of some European Countries

There is a different approach to sea sediment pollution estimate being excavated to maintain ports, shipways and likely in the world. The comparison with contaminant concentration in sediments on the area being under no pollution effect (reference or background concentrations) is often used for estimate. Some members of ICES (International Council for the Exploration of the Sea), like Norway, Sweden and the Netherlands, regulated the sediment classification, which may be based on concentration of single contaminant. Norwegian and Swedish standards predict five-class sediment classification.

By comparing the defined maximum values of single contaminant in sediment to be dredged at the Port of Ploče with limit values in Norwegian standards the implication is as follows:

- cooper, chromium, PAH and PCB meet limit values for the 1st class
- zinc, cadmium, lead and nickel meet limit values for the 2nd class with observation that the set concentrations are just a little bit higher then the limit values for the 1st class
- mercury exceeds the limit value for the 2nd class by more then 50%.

The World Bank's counselor for funding construction of the Container terminal at Ploče suggested classifying sediments in the Port of Ploče according to criteria being considered on the EU level (not accepted yet) and being something more restrictive than the Norwegian standards. According to theses documents, sediments shall be classified in four classes depending on concentration of Cu, Pb, Zn, Ni, Cd, Cr, Hg and oil products (total oil):

- *Class 1 (pure sediment)* – maximum one parameter exceeds 50% of the limit value for the class 1
- *Class 2 (poorly contaminated)* – two or more parameters exceed 50% of the limit values for the class 1
- *Class 3 (contaminated)* – two or more parameters exceed 50% of the limit values for the class 2
- *Class 4 (very contaminated)* - two or more parameters exceed 50% of the limit values for the class 3.

Limit values of mentioned parameters are given in the Table 6.

Table 6: Sediment classification according to concentration of metals and total oils – EU approach being under consideration so far

Contaminant Class	Type of sediment	Concentration of Hazardous Substances mg/kg, dry weight							
		OP	Cu	Pb	Zn	Ni	Cd	Cr	Hg
I	Sand	<20	<10	<20	<60	<10	<0,5	<30	<0,1
II	Sand	20-200	10-40	20-50	60-100	10-20	0,5-1,0	30-50	0,1-0,2
	Sludge	<500	<100	<100	<300	<50	<0,2	<100	<0,5
III	Sand	200-1500	40-200	50-200	100-400	20-100	1-5	50-200	0,2-1,2
	Sludge	500-1500	100-200	100-200	300-400	50-100	2-5	100-200	0,5-1,2
IV	Sand, sludge	>1500	>200	>200	>400	>100	>5,0	>200	>1,2

OP- oil products;

In case more then 2 substances do not exceed the limit values by more then 50%, sediment shall be associated to lower class.

By comparing the set maximum values of single contaminants in sediment provided for dredging in the Port of Ploče under EU criteria, being still under consideration, the implication is as follows:

- Only cadmium concentration meet the class 1
- Total oil, cooper, zinc, lead, chromium and nickel concentrations meet the limit values for the class 2

- Mercury concentration exceeds the limit value for the class 2 by more than 50%.

The same proposal defines the limit values for PCB and PAH just for the class 3: for PCB this is 0.03 mg/kg dry weight and for PAH 1.0 mg/kg dry weight. We have already mentioned that there is no evidence of PCB presence in examined sediments (detection limit 0.25 µg/kg). For this parameter the PAH concentration are lower than the limit values by two orders of magnitude.

It can be concluded that sediment in the Port of Ploče can be classified in the class 2, i.e. poorly contaminated sediments. In addition, the comparison of concentration of examined hazardous substances with reference concentrations for the Adriatic area indicates poorly contaminated sediment.

Sediments of such characteristics may be deposit in the sea on specifically determined territorial sea area outside the coastal zone, i.e. on depth deeper than 30 m.

Estimate of Contaminant from Sediment

It is planned to use dredged material to embank quays. In respect to dredging technology with which sediment when extracting shall be mixed with specific water amount (app. 40 % sediment and app. 60 % water) water shall be leached from material deposited in land. For this reason, the leaching test for contaminants from sediment has been carried out. The surface sediment layer PLS01, proved as the most contaminated has been selected for testing. The table 7 shows the testing results. In addition, the same Table shows limit values for waste eluates that may, according to the Regulation on conditions for waste management (Official Gazette No. 123/1997 and 112/2001), be deposited in landfills of the 2nd category and limit values for hazardous substances that may, according to Regulations on Limit Values of Indicators of Hazardous and Other Substances in Waste Water (Official Gazette 40/1999 and 6/2001), be discharged into waters of the 2nd category.

Table 7: Testing Results of Eluate Sample PLS01

Parameter	Unit	Analysis Result	GVO for filling in landfill of the 2 nd category	GVV for discharging into waters of the 2 nd category
pH		7.35	5.5 - 13	
Electrical conductivity	mS/cm	3.570	<10000	-
TOC	mg/L	190	20	15
Phenols	mg/L	0.197	0.2	0.1
Cooper	mg/L	0.046	1.0	0.1
Zinc	mg/L	<0.01	2.0	1.0
Cadmium	mg/L	0.049	0.005	-
Chromium	mg/L	0.002	0.05*	1.0
Nickel	mg/L	<0.1	0.2	1.0
Lead	mg/L	0.005	0.2	0.2
Mercury	mg/L	0.002	0.005	-

GVO = limit values in eluate for landfills of the 2nd category according to the Regulations on Waste Treatment Conditions

GVV = limit values for hazardous substances to be discharged into waters of the 2nd category

*Values refers to Cr⁶⁺

By comparing obtained results with limit values in waste eluate that may be deposited in landfills of the 2nd category (the most severe category according to the said Regulations) conclusion is that TOC concentration exceeds limit values whereas concentration of all other examined hazardous substances are below these values.

Unfortunately, no sea categorization has been carried out in Croatia. Comparison with limit values for hazardous values in wastewaters being discharged into waters of the 2nd category (the most severe criteria for discharging into surface waters) has been done just to have an idea about levels of hazardous substances in sediment eluate. The Table 7 shows that sediment eluate at the Port of Ploče does not meet limit value for TOC and phenols.

It can be concluded that the set concentrations of hazardous substances in the sediment eluate at the Port of Ploče are relatively low.

Tests of sedimentation dynamics of sediment and sea water mixture in volume proportion 40:60 has been carried out in laboratory for the purpose of drawing up proposal for removal of leaching waters from deposit area on land. Tests has been carried out with sediment of various grain size distribution: with a layer of 20 to 30 cm depth of sediment sampled on the station PLS01 and a layer of 40-50 cm depth of sediment sampled on the station PLS02. The obtained results are given in the Table 8.

Table 8. Sedimentation dynamics of sediment mixture from the Port of Ploče and the sea (40 % sediment and 60% water)

Sedimentation time	10 min.	20 min.	30 min.	1 hour	2 hours	4 hours	24 hours
PLS01 volume of extracted water (mL)	220	310	330	370	410	450	540
PLS02 volume of extracted water (mL)	110	180	250	300	330	370	450

Different velocity of sedimentation of individual sediment layers is noticeable being caused by their different grain size distribution. Upon 24 hours of sedimentation, the extracted liquid in sediment sample PLS01 amounts to 90 % of added water volume and in the PLS02 75 %. Extracted water was almost clear. Concentration of suspended substances in extracted water amounts for the sample PLS01 = 7.3 mg/L and for the sample PLS02 = 8.0 mg/L representing low values. Namely, according to the Regulation on Limit Values for Indicators of Hazardous and other Substances in Waste Waters (Official Gazette 40/1999 and 6/2001) the maximum permissible concentration for discharge into waters of 2nd category (the most sensitive recipients in which discharge of waste waters is allowed) is 35 mg/L. Our opinion is that with retention of dredged material in settling basins for a period of 24 hours the possible adverse effects of its disposal to the sea and sea ecosystem quality can be largely reduced.

Sea Biomasses

The inspection of living communities of the sea bottom along two transects was performed in the area of the planned container terminal Ploče. The first transect is in the area where the extension foreseen by the design could affect the environment and the second one in the area of an unlikely possibility of impact by extension (Fig. 5.). The first transect (PL-01) is located on the internal side of the cove, opposite to the existing operative Quay 5. The second transect (PL-02) is placed outside the area of the extension planned in this phase, almost at the very west end of the quay.

Transect PL-01

Due to shallowness and soft sediment, the transect is withdrawn some 15 meters from the coastal line to the right edge of the hall (viewed from the beginning of cross-section) on Quay 5 in the direction 345°. Total transect length along the bottom is 182 meters.

The beginning of transect consists of the mixture of terrigenous mud and the finest river sand that looks like silt earth. The bottom is slightly slanted. After somewhat steeper transition part follows the inclination where gradually decreases the portion of sand and the bottom continues gradually to descent in depth. Sediment is pure soft sticky mud and the greatest depth of 13.9 m is recorded at the very end of the transect. In spite of a sunny day and relatively small depth, the visibility of the greatest part of transect was about 0.5 m. Along last fifty meters, the visibility more or less equaled zero!

Cross-section description:

The beginning of transect PL-01 covers infra-littoral part of sandy mud to the depth of 1.4 m. By subsequent exploration of transect surroundings, it was recorded that the tidal movements zone almost does not exist, so that neither flora nor fauna species are recorded. In the infra-littoral part, at depth of 0.7 and 1.0 m, a small "meadow" of *Zoostera noltii* sea grass is developed which is the only plant species recorded in the entire transect. With regard to animal species, numerous species of snails (*Cerithium vulgatum* i *Nassarius* sp.) as well as the hermit crabs (Paguridea indet.) in sub-fossil houses of these snails are registered. Numerous small holes in sediment most probably originated from the crabs Thalassinidea indet. but it was not possible to determine for sure by the used work method.

Between the 14th and 30th meter of transect, the depth relatively suddenly increases from 1.4 to 7.9 m. Portion of sand decreases more and more in the sediment content, the bottom is almost naked, and judging by small hole density in sediment, the number of crabs in sediment decreases as well. The oases of hard base make some discarded cable in depth of 6.8 m, which is colonized by a thick community of filtering organisms. The most frequent organisms are white sea squirts (*Styela plicata*), marine fanworms (*Sabella spalanzanii*) and tube worms (*Serpula vermicularis*), and colonies of bryozoas (*Schizobranchiella sanguinea*).

From the depth of 8.6 m, the bottom is naked and sediment consists of sticky terrigenous mud. The increase of depth is almost hardly noticeable, so that the greatest recorded depth is 13.9 m at the very end of transect. It should be emphasized that the visibility along the last 50 meters equaled zero, so that the absence of macro-organisms could not be determined with certainty. However, according to the description, terrigenous mud is the most frequent sediment.

By this preliminary review, only 1 plant and 10 animal macrobenthic species have been recorded on the transect PL-01 area. Considering this more than modest number of species, it is hard to talk about the prominent bottom biocenosis. The finding of *Zoostera noltii* sea grass indicates the muddy sands biocenosis of protected coasts of the shallowest part of the transect. The remaining explored bottom part contains a very poor terrigenous mud community. Real population could be evaluated only by using a grab and by studying possible infauna sediments. Anyway, great sedimentation of the smallest fractions of suspended materials resulting from intensive river inflows is obvious. The only hard based enclave is of antropogenic origin (discarded rope or cable) and is colonized by numerous sciaphilic filtering organisms (filtrators). Their density also indicates a strong and constant inflow of organic substances in suspension.

Fish fauna has not been specially examined and only two species (dragonet *Serranus hepatus* and mullet -*Mullus* sp.) are recorded along the transect. Not a single species that would be interesting for fishing has been noticed.

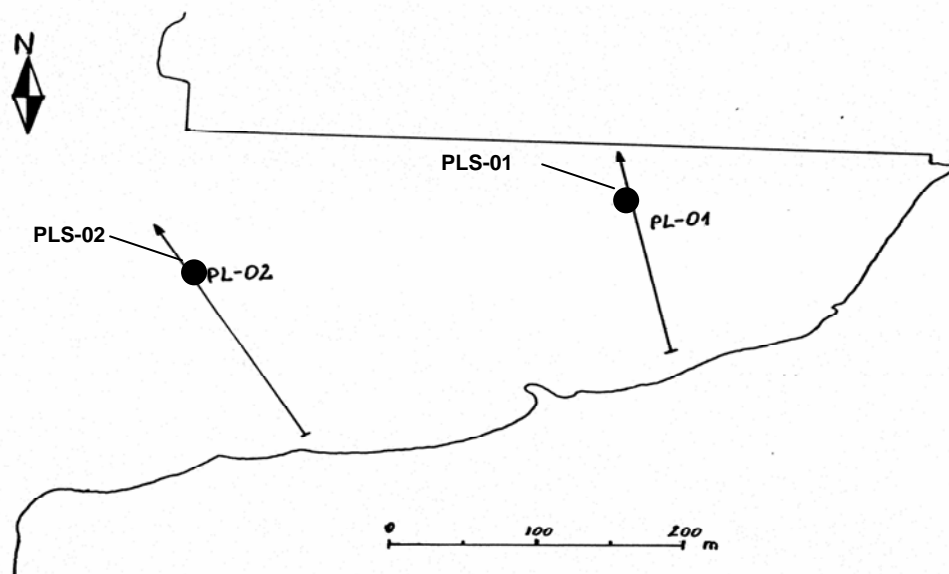


Figure 5. Chart of the area with drawn transects PL-01 i PL-02.

Transect PL-02

Due to shallowness and soft sediment, the transect is withdrawn some 20 meters from the coastal line to the red port light on the opposite coast in the direction of 330°. Total transect length along the bottom is 190 meters.

The beginning of the transect makes the mixture of terrigenous mud and the finest river sand with some black particles (coal dust?) while the bottom slowly descends into depth. After extremely steep transitional part in which sand portion diminishes more and more, the bottom continues very slowly to descend into the depth. Sediment is pure, soft, sticky mud and the greatest depth of 14.1 m is recorded at the very end of the transect. The visibility in the greatest part of transect is approximately 0.5 m.

Description of cross-section:

The beginning of the transect PL-02 covers the infralitoral part of sandy mud in depth from 0.6 to 2.4 m. Tufts of *Zoostera noltii* sea grass (the only plant species recorded in the entire transect) are recorded in depth of about 1 m. With regard to animal species, numerous species of snails (*Cerithium vulgatum*, *Nassarius* sp.) as well as hermit crabs (Paguridea indet.) in sub-fossil houses of these snails are recorded. Numerous small holes in sediment originate most probably from the crabs Thalassinidea indet. The oases of hard base make some discarded cable at depth of 2.4 m which is colonized by a thick community of filtering organisms. The most frequent organisms are white sea squirts (*Styela plicata*), marine fanworms (*Sabella spalanzanii*) and European flat oyster (*Ostrea edulis*), as well as the bryozoas (*Schizobranchiella sanguinea*)

Between the 20th and 40th meter of transect, the depth suddenly increases from 2.4 to 10.1 m. Even at the beginning of the slope the sand disappears and remains only terrigenous mud. The bottom is completely naked and deserted at least in the field of sight. After a prominent slope, the inclination decreases very fast so that the depth in the second part of the transect varies from 13.5 to 14.3 m the most. The sediment surface made of terrigenous mud is furrowed, full of holes and hillocks of unknown origin. Any macrobenthic organism is

noticed. ?

By this preliminary review, only 1 plant and 10 animal macrobenthic species were recorded on the transect PL-02 area. Considering such a small number of species, it is hard to define certain bottom biocenosis. The finding of *Zoostera noltii* sea grass indicates the biocenosis of muddy sands of protected coasts of the shallowest part of the transect, but compact settlement has not been recorded. Individual sea grass shoots indicate the last remnants of once developed settlement or to the initial phase of colonization. The remaining part of researched bottom should be a very poor terrigenous mud community. Real population could be evaluated only by using a grab and by studying possible infauna sediments. Anyway, great sedimentation of the smallest fractions of suspended materials resulting from intensive river inflows is obvious. The only hard based enclave is of antropogenic origin (discarded rope or cable) and is colonized by numerous sciaphilic filtrating organisms. Their density also confirms a strong and constant inflow of suspended substances with a very rich organic component.

Fish fauna has not been specially examined and no species have been recorded along the transect.

2.2.2. Noise

The object of the measurement is to determine noise on the characteristic and previously defined measuring points within the area of the Port of Ploče (points B2 and B3) and on the external area at the point B1 closed to the port under daily and night-time operating conditions. Noise sources at the Port of Ploče are: (1) Cranes, unloading and reloading devices and conveyors, (2) Means of internal transport, external vehicles and means of transport for loading/unloading of cargo, waggons and traction locomotives, (3) Other auxilliary plants, machines and devices.

Measuring results of equivalent external noise level are specified in the Tables 9 and 10 below:

Table 9. Results of noise measurements during daytime

MEASURING POINT (Measuring points – positions marked in the layout plan enclosed to the Record)	MEASURED EQUIVALENT NOISE LEVEL - L _{Aeq} u dB(A)	
	DAY	
POSITION B1 (outside the port area)	58	POSITION B1 (outside the port area)
POSITION B2 (within the area of the Port of Ploče)	52	POSITION B2 (within the area of the Port of Ploče)
POSITION B3 (within the area of the Port of Ploče)	57	POSITION B3 (within the area of the Port of Ploče)

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Table 10. Results of noise measurements during nighttime

MEASURING POINT (Measuring points – positions marked in the layout plan enclosed to the Record)	MEASURED EQUIVALENT NOISE LEVEL - L_{Aeq} u dB(A)	
	NIGHT	
POSITION B1 (outside the port area)	39	POSITION B1 (outside the port area)
POSITION B2 (within the area of the Port of Ploče)	34	POSITION B2 (within the area of the Port of Ploče)
POSITION B3 (within the area of the Port of Ploče)	33	POSITION B3 (within the area of the Port of Ploče)

As the Municipality of Ploče has not performed any acoustic zoning of this area, the Chief of Testing is of the opinion that the said area belongs to noise zone 4: Zone of mixed, predominantly business purpose with housing sector.

Pursuant to the Article 5 respectively Table No. 1 of the Rules on Maximum-allowed Noise Levels in Environment where People Work and Stay (Official Gazette No. 145/04) the allowed noise levels in the external area next to the Port of Ploče and in external space at the closest residential haouses amount 65 dB(A) in the daytime and 50 dB(A) in the nighttime.

The existing external noise level outside the Port of Ploče at the point B1 during business activity at the port in the daytime does not exceed the allowed value. The existing external noise level outside the Port of Ploče at the point B1 without business activity at the port in the nighttime does not exceed the allowed value. The measured noise levels within the Port of Ploče at the points B2 and B3 do not exceed the allowed values.

3. ENVIRONMENTAL MANAGEMENT PROGRAMME

3.1. SURVEY OF CONTAINER TERMINAL ENVIRONMENTAL IMPACTS

A container terminal in Port of Ploče will produce a certain amount of negative environmental impacts (*Table 11*). But those influences should be treated within a wider context (*Figure 6*). A container terminal is constructed in the existing Port of Ploče which already produces numerous environmental impacts itself. The implementation of a container terminal within such surrounding presents additional negative influences on already disturbed environment. Beside the fact that a container terminal is being constructed within the existing port, an important fact connected to environmental contamination is that waste waters from the main collector of a sewerage system of the Town of Ploče are discharged into port basin without previous purification which presents one of the most important problems in Port of Ploče related to sea contamination.

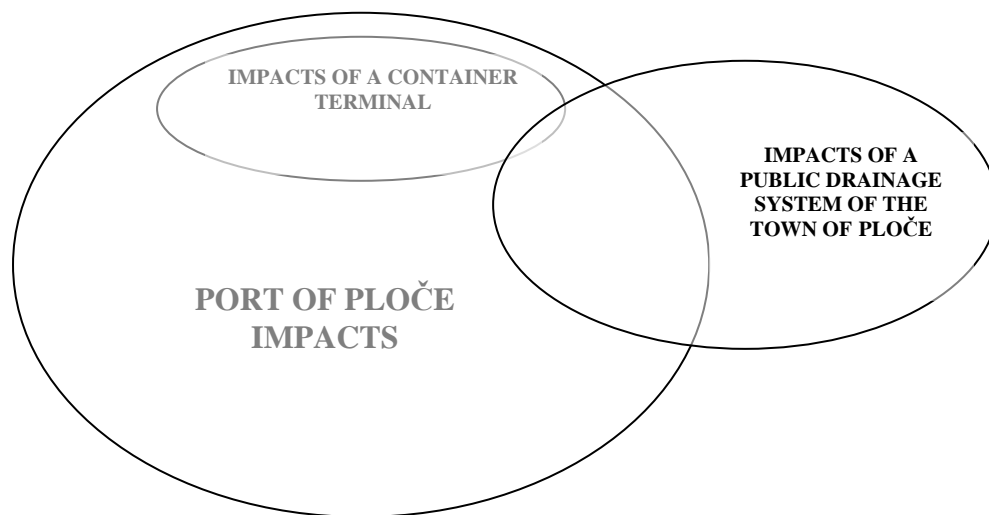


Figure 6. Environmental impacts of a container terminal compared to other significant contaminants in Port of Ploče area

Environmental impacts of a container terminal can generally be divided into:

- sea contamination,
- air contamination,
- noise,
- waste production,
- impact on traffic,
- impact on surrounding areas line of sight,
- impact on navigational safety,
- health impact.

Beside predictable negative impacts which probably occur during terminal construction and during its usage, there is also the possibility of incidents in port which also can produce additional negative impacts.

Impact survey is presented in Table 11.

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Table 11. Survey of negative environmental impacts

1. IMPACTS DURING CONSTRUCTION PHASE	
CONTAMINATION SUBJECT	ACTIVITY – IMPACT AS THE RESULT OF ACTIVITY
1.1. SEA CONTAMINATION	<p>1.1.1. Performance of deepening – Sea sludging</p> <p>Resuspension of a sediment increases water turbidity within port area but also suspended and colloidal particles can get into open sea. Water turbidity decreases the penetration of the light necessary for photosynthesis and resedimenting of suspended particles at the sea bottom can damage bentonite byocentoses. Sediment removal includes, only temporarily, the removal of sea bottom biomasses.</p> <p>1.1.2. Quay construction – Permanent loss of sea biomasses in the area in front of Quay 7 construction</p> <p>According to wide area and distance from the natural coastline, a part below quay construction will remain in a complete darkness. The perishing of organisms due to changed life conditions and also the loading of water pillar by suspended organic particles will result in increased oxygen consumption and most probably in anoxia.</p>
1.2. AIR CONTAMINATION	<p>1.2.1. Construction works – Air contamination during construction works</p> <p>Construction machines and vehicles contaminate the air during their performance.</p>
1.3. NOISE	<p>1.3.1. Construction works – Noise production during construction works</p> <p>Construction machines and vehicles produce noise during their performance.</p>
1.4. SOLID WASTE	<p>1.4.1. Construction works – Production of solid waste during construction works</p> <p>During construction works a construction waste is produced as a result of construction itself and municipal waste as a result of constructors being at construction site.</p>

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1.5. NAVIGATIONAL SAFETY	<p>1.5.1. Deepening and quay construction – Safety of sailing in and out of port basin between Quays 5 and 7 in Port of Ploče</p> <p>Construction works can influence sailing in and out of Quay 5 which causes additional procedures for navigational safety in basin.</p>
1.6. IMPACT ON LAND TRAFFIC DIRECTIONS	<p>1.6.1. Construction works – Safety of port and surrounding roads</p>
1.7. VISUAL OUTLOOK	<p>1.7.1. Construction works – Production of extra construction material and material from submarine excavations whose disposal influences the visual outlook</p>

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2. CONSTRUCTION IMPACT DURING USAGE	
CONTAMINATION SUBJECT	ACTIVITY – IMPACT AS THE RESULT OF ACTIVITIES
2.1. SEA CONTAMINATION	<p>2.1.1. Periodic port basin deepening for the purpose of depth maintenance</p> <p>New building will not include anything new in port basin between Quays 5 and 7 but only existing procedures for the purpose of depth maintenance of a basin and navigational direction.</p> <p>2.1.2. Discharge of waste waters into sea – Sea contamination by waste waters from container terminal area</p> <p><u>Precipitation waste waters</u> from traffic and operational port areas can be contaminated by suspended particles and mineral oils. The largest contamination intensity appears during periods of rain after long drought period. By constructing container terminal the problem of discharging oily, unpurified, waste waters from the plant for mechanization maintenance and waste waters from truck and wagon washing will be increased..</p> <p>Port mechanization (cranes, car cranes, fork lifts, tractors, trailers, loaders, trucks, container removers) is also a possible source of contamination of manipulation areas by hydraulic oils, oils for lubrication and fuel. Precipitation waters flush manipulation areas and take those contaminants into sea.</p> <p><u>Sanitary-faecal waste waters</u> are further possible source of sea contamination if not appropriately taken away by impermeable sewerage, purified and disposed into soil or sea.</p>
2.2. AIR CONTAMINATION	<p>3.1.1. Sailing in and out and vehicle usage – Air contamination due to ship's emission and vehicle's emission</p> <p>Container terminal will increase air contamination due to increased traffic.</p>
2.3. NOISE	<p>2.3.1. Terminal operational work – Noise production during daily usage of container terminal</p> <p>Noise during daily usage is produced by:</p> <ul style="list-style-type: none"> - means of transport: ships loading and unloading, truck traffic, rail traffic - port mechanization: cranes, container bridges and transtainers, tractors with trailers and container removers, other equipment, instruments and installations

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2.4. SOLID WASTE	<p>2.4.1 Terminal operational work – Production of solid waste during daily usage of container terminal: waste from ships and waste from shore</p> <p>Based on the origin and characteristics, waste materials produces in port can differ, but they can generally be divided into two categories: (1) harmful waste, (2) other waste.</p> <p>Harmful waste produced during normal port activity is:</p> <ol style="list-style-type: none"> 1. Waste motor and hydraulic oils produced by oil change in means of work 2. Waste packing of motor oils 3. Waste transformer oils 4. Batteries 5. Sludge from oil separator within device for purification of waste waters <p>Other waste produced in the container terminal area is:</p> <ul style="list-style-type: none"> - waste from operational quay cleaning (wood particles, plastic bags, rags, cartons...) - waste from internal sewerage maintenance (solid waste collected at gulley grate) - waste from ships and waste produced by constructors, similar to municipal waste.
2.5. NAVIGATIONAL SAFETY	<p>2.5.1. Terminal operational work – Safety of sailing in and out of basin between Quays 5 and 7 in Port of Ploče</p> <p>Construction of Quay 7 causes additional procedures for navigational safety within basin.</p>
2.6. VISUAL OUTLOOK	<p>2.6.1. Container terminal outlook – Container terminal can have some negative influence on a complete visual outlook of port and surrounding area.</p>
2.7. HELATH IMPACT	<p>2.7.1. Port operational works - Impacts on human health</p> <p>Impacts on human health can be broadly categorized as¹:</p> <ol style="list-style-type: none"> 1. Hazards/accidents both onshore and offshore from handling of hazardous materials such as flammables, explosives and toxics from vessel collisions²; 2. Communicable diseases; 3. Noise from construction equipment/activity, vehicles, cargo handling equipment and ship and port public address systems/sirens; 4. Respiratory illness from escaping dust and particulates. <p>Most health impacts (except communicable diseases) will generally be confined to the immediate port vicinity/work environment.</p>

¹ A.K. Gupta, S.K. Gupta i R.S. Patil, 2005

² According to EIS, anticipated port activities in the area of a container terminal station do not include the most problematic cargos and great hazards for sea and land related to them.

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3. POSSIBLE IMPACT DURING INCIDENTS	
CONTAMINATION SUBJECT	ACTIVITY – IMPACT AS THE RESULT OF ACTIVITIES
3.1. SEA CONTAMINATION	<p>3.1.1. Port operational work – Sea contamination due to damage of port mechanization*</p> <p>Sea contamination due to damage of port mechanization which causes oil/fuel leak. Problem is even greater if harmful oils are used.</p> <p>3.1.2. Port operational works – Sea contamination due to damage of power station*</p> <p>Power stations present great danger related to sea contamination if they contain transformer oils, especially those based on hazardous substances (polychlorinated biphenyles). Although those oils are within closed system, there is always the possibility of their leak, under unusual conditions.</p> <p>3.1.3. Port operational works – Sea contamination due to leak of sludge and ballast waters from ships*</p> <p>3.1.4. Port operational works – Sea contamination due to discharging ship waste</p> <p>3.1.5. Port operational works - Sea contamination due to soot from ships</p> <p>3.1.6. Port operational works – Sea contamination due to leakage of operating fuel from ships*</p> <p>Causes for leakage of operating fuel from ships can be: (1) fuel tank malfunction, (2) fire and/or explosion on the ship, (3) collision or turn over of ships.</p> <p>3.1.7. Port operational works – Sea contamination due to leakage of hazardous substances (cargos) during unpredicted events related to cargo manipulation**</p> <p>Causes for leakage of hazardous substances (cargos) during unpredicted events related to cargo manipulation can be: (1) collision caused by poor ship maneuvering; (2) ship's impact to other berthed ship or quay; (3) fire/explosions: fire break at a certain site presents the first step in chain that leads to a hazardous substances incident; (4) container drop into sea or on land, hazardous substances could leak from damaged container into sea or they could get into sea by rinsing the coast already covered by leaked hazardous substances from damaged container; (5) container disintegration for its weak features; (6) so called "domino effect": incident on one ship causes incident on a nearby ship or on a fixed quay installation.</p> <p>Many incidents related to cargo manipulation include two kinds of hazardous substances – inflammable liquids and corrosive materials. It is a certain thing that different kinds of ships will berth at this quay and so also ships for carrying hazardous substances: (1) container ships which carry containers with dry matter, some containers carry solid (e.g. dust detergent) or liquid chemicals in portable tanks; (2) ro-ro ships equipped for quick load/unload.</p>

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1.2. AIR CONTAMINATION	<p>1.2.2. Port operational works – Air contamination due to fire/explosions on vessels*</p> <p>In case of fire on vessel, beside main air contamination, there is also a great danger from fuel tank explosion or gas bottle explosion.</p>
1.3. SOLID WASTE	<p>1.3.1. Port operational works - Production of hazardous substances as a result of incident caused by poor handling hazardous substances</p>

* Oil spills would eventually pollute the harbor aquatorium and the vessels in it, but also the surrounding beaches in the bay and in the town. Such pollution would have negative impacts on the plankton, sea birds and other sea organisms. In case of unfavorable meteorological conditions (strong winds and storms), the pollution might spread to several beaches situated to the north and to the south of the harbor. This would temporarily make the use of the shoreline zone for swimming and large-scale recreation impossible. In addition, oil spills and sea pollution would produce an unpleasant aesthetic impression.

** Although prevention and intervention measures in case of contamination by hazardous substances are similar to those in case of oil spills, there are differences in terms of protection technology and security measures as well as with respect to the equipment used. They are: (1) oil is present on the water surface in the viscosity layer - this is the case with a limited number of dangerous goods; (2) oil spills are easily noticeable - leakage of dangerous substance is often difficult to spot.; (3) intervention technology for the case of oil spills is well developed - this is not so with dangerous substances.; (4) removing oil from water surface can be very successful - when it comes to dangerous substances, this is often not the case.; (5) consequences of a leakage are contingent on the type of hazardous substance as well as on the leakage size and duration.

3.2. MITIGATION PLAN

Table 12. Mitigation plan

COMPLETION PHASE OF MITIGATION PLAN	ACTIVITY/IMPACT	MITIGATION PLAN	INSTITUTIONAL RESPONSIBILITY	COMMENT
P R E P A R A T I O N P H A S E	➤ managing oily waters from ships in Port of Ploče	➤ creating a project of reception devices on land for disposal of oily waters from ships	Port of Ploče Authority	➤ obligation according to MEPPPC ³
	➤ managing waste oils from ships	➤ contracting a takeover of waste oils from ships with authorized company	Port of Ploče Authority	➤ obligation according to MEPPPC ➤ obligation according to Regulation on types of waste NN 27/96
	➤ managing waste waters from wagon and truck cleaning	➤ creating a project for system of wagon and truck emptying and cleaning with controlled evacuation of waste and oily waters and their purification for Port of Ploče area	Port of Ploče Authority	➤ obligation according to MEPPPC
	➤ managing waste waters from maintenance of port mechanization and means of transport	➤ creating a project for sewerage of plant for maintenance of port mechanization and means of transport so that all oily water is purified through a separator – coagulation tank before discharging into sea	Port of Ploče Authority	➤ obligation according to MEPPPC
	➤ managing sanitary-faecal and precipitation waters from container terminal station	➤ creating a project for sewerage system of container terminal station as a separated sewerage system for sanitary-faecal waste water, precipitation waste water from traffic and operational port areas and precipitation roof water	Port of Ploče Authority	➤ obligation according to MEPPPC
	➤ reduction of noise level produced by reloading	➤ choosing technological solutions for reloading devices so that, under normal conditions, they produce minimal noise levels	Port of Ploče Authority	➤ obligation according to MEPPPC

³ Decision of Ministry of Environmental Protection, Physical Planning and Construction (class UP/I351-03/04-02/0070, ur.br. 531-05/4-NM/AK-05-17, od 1.3.2005) on environmental acceptability of constructing a terminal station Ploče in Ploče Port

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P R E P A R A T I O N P H A S E	<ul style="list-style-type: none"> ➤ measuring a baseline noise level 	<ul style="list-style-type: none"> ➤ perform a baseline noise level measuring at construction borderline area towards residential areas 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ performed! (results in Chapter 2.2 of this Plan) 	
	<ul style="list-style-type: none"> ➤ managing waste produced in Port of Ploče area⁴ 	<ul style="list-style-type: none"> ➤ collecting and storing of waste according to Waste Act OG 178/04, Regulation on types of waste OG 27/96 	<ul style="list-style-type: none"> ➤ obligation according to Waste Act OG 178/04 ➤ obligation according to Regulation on types of waste OG 27/96 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to Ordinance on categories, types and classification of waste with a catalogue of waste and a list of hazardous substances OG 50/05
	<ul style="list-style-type: none"> ➤ store hazard-free waste according to Regulation on conditions for waste management NN 123/97 	<ul style="list-style-type: none"> ➤ obligation according to Regulation on conditions for waste management OG 123/97 			
	<ul style="list-style-type: none"> ➤ store hazardous waste according to Regulation on conditions for hazardous waste management OG 32/98 and Regulation on types of waste OG 27/96 	<ul style="list-style-type: none"> ➤ obligation according to Regulation on conditions for hazardous waste management OG 32/98 ➤ obligation according to Regulation on types of waste OG 27/96 			
	<ul style="list-style-type: none"> ➤ record data on the origin and flow of waste according to Waste Act OG178/04 and on a type and quantity of waste according to Regulation on types of waste OG 27/96 and Ordinance on categories, types and classification of waste with a catalogue of waste and a list of hazardous substances OG 50/05 	<ul style="list-style-type: none"> ➤ obligation according to Waste Act OG 178/04 ➤ obligation according to Regulation on types of waste OG 27/96 ➤ obligation according to Ordinance on categories, types and classification of waste with a catalogue of waste and a list of hazardous substances OG 50/05 			
	<ul style="list-style-type: none"> ➤ insert data on types, quantities, location of origin, way and place of storing, treating and disposing waste into appropriate forms according to Regulation on types of waste OG 27/96 	<ul style="list-style-type: none"> ➤ obligation according to Regulation on types of waste OG 27/96 			

⁴ environmental measures as a result of necessity for organized waste management are related to whole Ploče Port area and they should be used right after accepting this Plan and after constructing container terminal they should be included into waste management system in Ploče Port area

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		<ul style="list-style-type: none"> ➤ annually – till March, 31 of present year, for the period of previous year, recorded data are to be delivered in appropriate forms to authorized office according to Waste Act OG 178/04 		<ul style="list-style-type: none"> ➤ obligation according to Waste Act OG 178/04
		<ul style="list-style-type: none"> ➤ manage packaging waste according to Regulation on managing package waste OG 53/96 		<ul style="list-style-type: none"> ➤ obligation according to Regulation on managing package waste OG 53/96
		<ul style="list-style-type: none"> ➤ give waste away to authorized person for further managing according to Waste Act OG 178/04 		<ul style="list-style-type: none"> ➤ obligation according to Waste Act OG 178/04
		<ul style="list-style-type: none"> ➤ accept a Waste from Ships Management Plan of Port of Ploče (Port of Ploče Authority, 2005 draft) 		<ul style="list-style-type: none"> ➤ Waste from Ships Management Plan is in preparation phase ➤ obligation according to Ordinance on Requirements for Ports OG 110/04
		<ul style="list-style-type: none"> ➤ create Total Waste Management Plan for Port of Ploče according to Waste Act OG 178/04 		<ul style="list-style-type: none"> ➤ obligation according to Waste Act OG 178/04 ➤ Plan has to be in compliance with Waste from Ships Management Plan of Port of Ploče (Port of Ploče Authority, 2005 draft)
		<ul style="list-style-type: none"> ➤ announce a plan with locations of reception plants with description of waste types and waste remains from ships and instructions on usage of those reception plants, list of possible operators and services, description of procedure for unloading, procedure for reporting according to Ordinance on Requirements for Ports OG 110/04 		<ul style="list-style-type: none"> ➤ obligation according to Ordinance on Requirements for Ports OG 110/04
P R E P A R A T I O N P H A S E	<ul style="list-style-type: none"> ➤ safety of sailing in and out from basin between Quays 5 and 7 	<ul style="list-style-type: none"> ➤ create a Maritime Elaborate "Procedure and safety of sailing in of a ship 60000 DWT-a from Port of Ploče to basin between Quays 5 and 7 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ obligation according to Ordinance on Requirements for Ports OG 110/04
	<ul style="list-style-type: none"> ➤ safety of traffic in the port and around the port 	<ul style="list-style-type: none"> ➤ create a traffic project of a temporary traffic control during construction works with a special attention to the state of surrounding city roads, construction technology and environment 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC

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	<ul style="list-style-type: none"> ➤ damaging the visual outlook of the port and surroundings 	<ul style="list-style-type: none"> ➤ during designing main designs a special attention should be paid to aesthetic port outlook, especially sea outlook concerning city structure behind, and again with a special attention to physical structure of cargo port, its shape, colors and shades for each port element (quay, manipulation area, all buildings and all plants for cargo manipulation), therefore excluding all grey and related colors and shades ➤ during designing main designs it is necessary to determine a way of surface object, quay and quay area treatment ➤ main design should investigate and determine the most acceptable location for temporary disposal of extra construction material ➤ create a "Project of building site organization and mechanization maintenance" as a separate project within a project for construction permit 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC
	<ul style="list-style-type: none"> ➤ sudden contamination in Port of Ploče 	<ul style="list-style-type: none"> ➤ creation and acceptance of a detailed plan for the development of a system for measures that reduce environmental impact caused by sudden contamination in Port of Ploče 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ plan should be compatible with a project which will define organization and procedures in case of unpredicted events related to handling hazardous substances
		<ul style="list-style-type: none"> ➤ transformer stations should be designed with dry cooling 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC

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	<ul style="list-style-type: none"> ➤ unpredicted events during handling hazardous substances 	<ul style="list-style-type: none"> ➤ create a project which will define organization and procedures in case of unpredicted events related to handling hazardous substances. Project needs to define: system organization, preparation of plans for intervention measures, monitoring and reporting, place for keeping hazardous substances, operational procedures, training and education personnel 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ project should be compatible with Regulation on Handling Hazardous Substances, Defining Class and Quantity of Hazardous Substances, Locations in Port of Ploče for Handling Those Substances and Measures that Have to Be Undertaken by Port of Ploče Authority and Its Concessionaries in Order to Handle Hazardous Substances (Port of Ploče Authority, 2005 draft) ➤ project should be compatible with detailed plan for the development of a system for measures that reduce environmental impact caused by sudden contamination in Port of Ploče
	<ul style="list-style-type: none"> ➤ preventing and amortizing consequences of possible ecological incidents 	<ul style="list-style-type: none"> ➤ create Operational plan of interventions for Port of Ploče and deliver it to a regional environmental competent office 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to Intervention Plan for Environmental Protection OG 82/99
	<ul style="list-style-type: none"> ➤ loading/unloading hazardous substances 	<ul style="list-style-type: none"> ➤ while handling hazardous substances it is necessary to concern Transportation of Hazardous Substances Act OG 97/93 and Regulation on Handling Hazardous Substances, Defining Class and Quantity of Hazardous Substances, Locations in Port of Ploče for Handling Those Substances and Measures that Have to Be Undertaken by Port of Ploče Authority and Its Concessionaries in Order to Handle Hazardous Substances (Port of Ploče Authority, 2005 draft) 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to Regulation on Handling Hazardous Substances, Defining Class and Quantity of Hazardous Substances, Locations in Port of Ploče for Handling Those Substances and Measures that Have to Be Undertaken by Port of Ploče Authority and Its Concessionaries in Order to Handle Hazardous Substances (Port of Ploče Authority, 2005 draft) ➤ obligation according to Transportation of Hazardous Substances Act OG 97/93

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	<ul style="list-style-type: none"> ➤ realization of future projects in Port of Ploče 	<ul style="list-style-type: none"> ➤ creating a permanent cooperation with competent administration bodies for physical planning and environmental protection in the Town of Ploče and County Dubrovačko-neretvanska during creation and adoption procedures of all documents related to physical planning and environmental protection 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC
C O N S T R U C T I N G P H A S E	<ul style="list-style-type: none"> ➤ noise caused by construction works 	<ul style="list-style-type: none"> ➤ gain the authorization of a competent inspector service for all construction works which are technologically performed continuously during daytime, nighttime and holidays ➤ satisfy general measures of protecting surrounding area from noise produced in construction site (limitation of produced noise allowed for contractor's equipment) ➤ create plan of arranging and organizing construction site with clear and distinct cost estimate and specifications for environmental measures, all in accordance with regulations, conventions and other acts ➤ perform technical supervision and temporary or permanent supervision of inspector services during noise measurement by authorized companies ➤ term of usage of modern means of transport, road and railway in accordance with Road Transportation Act OG 16/04 to all transport companies which will perform transport in coming and leaving 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC
	<ul style="list-style-type: none"> ➤ waste managing 	<ul style="list-style-type: none"> ➤ packaging waste should be managed according to Regulation on Packaging Waste Handling OG 53/96 and Waste Act NN 178/04 ➤ municipal solid waste and other similar waste have to be collected in appropriate tanks and regularly removed by authorized legal person 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ obligation according to Regulation on Packaging Waste Handling OG 53/96 ➤ obligation according to Waste Act OG 178/04
	<ul style="list-style-type: none"> ➤ managing excavated material 	<ul style="list-style-type: none"> ➤ excavated material use for construction of container terminal, excess material landfill within Port of Ploče area ➤ material from submarine excavation during deepening port basin between Quays 5 and 7 should be landfill in port area, at location of container terminal and areas designed for further port development 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC

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	<ul style="list-style-type: none"> ➤ reduction of negative impact of sea slogging caused by deepening 	<ul style="list-style-type: none"> ➤ excavation should be performed in the shortest possible period when it causes the smallest damages to sea ecosystem. This is the period when there is neither fish migration nor spawning and in the summer time when development of phytoplankton is limited by nutrients. 		<ul style="list-style-type: none"> ➤ expert's recommendation (Addition to Environmental Impact Study, Rijekaprojekt d.o.o, 2005)
		<ul style="list-style-type: none"> ➤ excavating should be performed out of swimming period for avoiding possible damaging sea aesthetic outlook 		<ul style="list-style-type: none"> ➤ expert's recommendation (Addition to Environmental Impact Study, Rijekaprojekt d.o.o, 2005)
O P E R A T I N G P H A S E	<ul style="list-style-type: none"> ➤ noise caused by operational works of container terminal 	<ul style="list-style-type: none"> ➤ architectural measures for noise protection should be taken by technological distribution of cargo (containers) and reloading equipment so they present appropriately located barrier to noise spread from the strongest sources by their dimensions (these sources being road and railway traffic) ➤ use machines and devices with the lowest possible noise levels ➤ cause the usage of modern means of transport, road and railway in accordance with Road Transportation Act OG 16/04 transport companies which will perform transport in coming and leaving 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC
	<ul style="list-style-type: none"> ➤ waste management 	<ul style="list-style-type: none"> ➤ provide the space for handling hazardous waste with proper technical – technological conditions 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ obligation according to Ordinance on Requirements for Handling Hazardous Waste OG 32/98
	<ul style="list-style-type: none"> ➤ separately gather and mark packaging waste 	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ obligation according to Regulation on Packaging Waste Handling OG 53/96 ➤ obligation according to Waste Act OG 178/04 		

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		<ul style="list-style-type: none"> ➤ updating of Total Waste Management for Port of Ploče and Waste from Ships Management Plan for Port of Ploče if significant changes occur 		<ul style="list-style-type: none"> ➤ obligation according to Waste Act OG 178/04 ➤ obligation according to Regulation on Terms and Methods of Maintaining Order in Ports and Other Parts of the Internal Sea Waters and Territorial Sea of the Republic of Croatia OG 90/05
<ul style="list-style-type: none"> ➤ safety of traffic within port on land and sea 		<ul style="list-style-type: none"> ➤ I. phase of construction of container terminal in Port of Ploče should use the capacity up to 40.000 TEU/god. After that, the term for usage of II phase is the completion of construction of joint road which connects the port entrance and state road D8 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC
		<ul style="list-style-type: none"> ➤ all ships which berth in Port of Ploče should manage ballast waters in accordance to Guidelines for control and managing of ship ballast waters aiming to minimize transmission of harmful sea organism and pathogens (Resolution A.868(20)) until the publication of relevant law of Republic of Croatia 		<ul style="list-style-type: none"> ➤ obligation according to MEPPPC
		<ul style="list-style-type: none"> ➤ neatly maintain depths in the sea part of port area, anchorage points, maneuvering points and berthing points according to announced data in maritime publications 		<ul style="list-style-type: none"> ➤ obligation according to Ordinance on Requirements for Ports OG 110/04
		<ul style="list-style-type: none"> ➤ once in three years period file a report on depth situation certified by Croatian Hydrographic Institute to authorized Port Office 		<ul style="list-style-type: none"> ➤ obligation according to Ordinance on Requirements for Ports OG 110/04
		<ul style="list-style-type: none"> ➤ gather and announce meteorological and climate data from SHMD on daily basis ➤ in case of wind stronger than 5 Bf suspend the work of port crane 		<ul style="list-style-type: none"> ➤ expert's recommendation (Environmental Impact Study, Rijekaprojekt d.o.o, 2004)
<ul style="list-style-type: none"> ➤ prevention and amortizing the consequences of possible ecological incidents 		<ul style="list-style-type: none"> ➤ in case of sudden soil contamination act according to Intervention Plan for Environmental Protection OG 82/99 and/or Operational Plan of Interventions for Port of Ploče 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ obligation according to Plan for Environmental Protection OG 82/99

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		<ul style="list-style-type: none"> ➤ in case of sudden sea contamination act according to Intervention Plan in Case of Sudden Sea Pollution in the County Dubrovačko-neretvanska (OG of County Dubrovačko-neretvanska, no 6, XI, 11.12.2004) and/or Intervention Plan in Case of Sudden Sea Pollution in the Republic of Croatia OG 8/97 		<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ obligation according to Intervention Plan in Case of Sudden Sea Pollution in the County Dubrovačko-neretvanska (OG of County Dubrovačko-neretvanska, no 6, XI, 11.12.2004) ➤ obligation according to Intervention Plan in Case of Sudden Sea Pollution in the Republic of Croatia OG 8/97
		<ul style="list-style-type: none"> ➤ in case of sudden sea waters contamination coming from shore act according to National Waters Protection Plan OG 8/97 		<ul style="list-style-type: none"> ➤ obligation according to National Waters Protection Plan OG 8/97
O P E R A T I N G P H A S E	<ul style="list-style-type: none"> ➤ reduction of possible influence of port activities to workmen's health 	<ul style="list-style-type: none"> ➤ create a programmed for preserving workmen's health 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ EMP recommendation⁵
	<ul style="list-style-type: none"> ➤ monitoring 	<ul style="list-style-type: none"> ➤ conduct monitoring plan ➤ record data on conducted measurements 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ obligation according to Environment Protection Act OG 82/94
	<ul style="list-style-type: none"> ➤ Review Environmental Management Plan of 	<ul style="list-style-type: none"> ➤ every 5 years review of EMP is needed 	Port of Ploče Authority	<ul style="list-style-type: none"> ➤ EMP recommendation

Beside acts and regulations mentioned through environmental measures, during operational phase of container terminal it is obligation to follow other proceeding regulations:

- Regulations on Order and Terms of Operating in Port of Ploče area (Port of Ploče Authority) - draft, 2005
- International Convention for the Prevention of Pollution by Ships of 1973./1978. (MARPOL 73./78.) including 6 technical Annexes. Annex I. and II. deal with oil and mass hazardous liquid loads. Annex III., IV., V. and VI. deal with harmful substances in packaged form, sewage, garbage and air pollution.
- International Convention for the Safety of Life at Sea (SOLAS) – chapter 7 – Hazardous Goods Transport, 1974.
- International Maritime Organization Code of Hazardous and Dangerous Loads (IMCO).

⁵ A.K. Gupta, S.K. Gupta i R.S. Patil, 2005. Environmental management plan for port and harbour projects. Clean Techn. Environ. Policy (2005) 7: 133-141

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- Barcelona Convention on Protection of Mediterranean Sea Environment and Coastal Region and Protocol for Cooperation in Combating Pollution of the Mediterranean by Oil and Other Toxic and Hazardous Substances in Case of Accidents –1976., 1996.
- Maritime Code (Official Gazette, 17/94., 74/94 and 43/96.)
- Sea Ports Act, OG 158/03
- Regulation on Terms and Methods of Maintaining Order in Ports and Other Parts of the Internal Sea Waters and Territorial Sea of the Republic of Croatia, OG 90/05
- Act on Transport and Handling of Hazardous Substances in Inland Navigations (OG, 79/96.)
- Act on Transport of Hazardous Substances (OG, 97/93)
- Requirements and Manner of Loading and Unloading Hazardous Substances, Bulk and other Freight in Ports, and Manner of Preventing Spreading of Oil Leaks in Ports, OG 51/05
- Environmental Protection Act (Official Gazette, 82/84. and 128/99.)
- Water Act (Official Gazette, 107/95.)
- Water Classification Regulation (Official Gazette, 77/98)
- Regulation on Hazardous Substances in Waters (Official Gazette, 78/ 98)
- Regulation on Limit Values of Indices, Hazardous and Other Substances in Waste Water (Official Gazette, 40/99. and 6/2001.)
- Port Authorities Act (Official Gazette 124/97.)

During utilisation of the container terminal, it shall be applied all measures originating from other laws, regulations, normative acts and standards in force in the Republic of Croatia and that of international importance, particularly the measures originating from the following laws, regulations and international agreements:

- Constitution of the Republic of Croatia (OG 41/02-consolidated text)
- Declaration on Environmental protection of the Republic of Croatia (OG 34/92)
- Physical Planning Act (OG 30/94, 68/98, 61/00, 32/02)
- Nature Conservation Act (OG 70/05)
- Act on Protection and Preservation of Cultural Assets (OG 69/99, 151/03 and 157/03)
- Air Quality Protection Act (OG 178/04)
- Natural Disaster Protection Act (OG 73/97)
- Construction Act (OG 175/03)
- Fire Protection Act (OG 58/93)
- Public Utilities Act (OG 3/95, 70/97)
- Act on Inflammable Liquids and Gases (OG 108/95)
- Ordinance on Seawater Quality Standards on Beaches (OG 33/96)
- Ordinance on Protection of Buildings of Special Importance for the Republic of Croatia (OG 6/00)
- Ordinance on Requirements for Ports (OG 110/04)
- Resolution on Classification of Special Purpose Ports (OG 38/96)
- Environmental Impact Assessment Regulation (OG 59/00, 136/04)
- Regulation on Highest Permissible Noise Levels in Manned Working Environment (OG 37/90)
- Regulation on Inflammable Liquids (OG 54/99)
- List of specialized institutions authorized to issuing testing reports on waste physical and chemical properties (OG 32/98)
- Protocol on Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircrafts or by Incineration in the Sea (OG-IT 17/98)

ENVIRONMENTAL MANAGEMENT PLAN
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- Protocol Concerning Cooperation in Combating Suppressing Pollution of the Mediterranean by Oil and Other Hazardous Substances in Cases of Emergency (OG, IT 12/93)
- Protocol on Specially Protected Areas of the Mediterranean Sea (OG, IT 12/93)
- UN Law of the Sea Convention (OG, IT 11/95)
- Convention on Protection of Marine Environment and Coastal Area of the Mediterranean (OG-IT 17/98)
- International Convention on Oil Pollution Preparedness, Response and Cooperation of 1990 (OG-IT 2/97)
- International Convention on Intervention on High Seas in the Event of Accidents or Threatened Accidents Resulting from Oil Pollution (OG-IT 1/92)
- International Convention on Establishment of International Oil Pollution Compensation Fund (OG-IT 1/92)
- International Convention on Civil Liability for Oil Pollution Damage (OG-IT 1/92)
- International Safety Guide for Oil Tankers and Terminals, publisher: International Chamber of Shipping, London 1996.
- Convention on Prevention of Marine Pollution by Dumping (OG-IT 3/95)

3.3. INTERVENTION PLAN FOR SUDDEN INCIDENTS

In case of possible ecological incidents or sudden events which could impact the environment and endanger life and health of people an intervention plan for environmental protection and/or National Waters Protection Plan is used.

At the state level of the Republic of Croatia an *Intervention Plan for Environmental Protection* was created (OG 82/99). That Plan is applied in the whole territory of the Republic of Croatia except in the area where *Intervention Plan for Sudden Sea Contamination in the Republic of Croatia* (OG 8/97) and *National Waters Protection Plan* (OG 8/99) are applied.

In accordance with regional and local features and characteristics and real and potential risk and hazards, County Dubrovačko-neretvanska created an *Intervention Plan for Environmental Protection in County Dubrovačko-neretvanska* (accepted on County Dubrovačko-neretvanska Assembly in November 2005).

In case of contaminating land waters and sea waters if contaminated from shore, measures in accordance with *National Waters Protection Plan* (OG 8/99) is applied.

In case of contaminating sea, measures in accordance with *Intervention Plan for Sudden Sea Contamination in the Republic of Croatia* is applied (OG 8/97).

In case of sea contamination of smaller dimension and intensity an *Intervention Plan for Environmental Protection in County Dubrovačko-neretvanska* (OG of County Dubrovačko-neretvanska, No. 6, year XI, December, 11, 2004).

Intervention Plan for Environmental Protection (NN 82/99) defines kinds of hazards and risks. Production, storage, processing, handling, transport, collecting and other actions with hazardous substances from Plan's Enclosure present real or potential danger which could cause a sudden event. A certain amount of hazardous substance presents real or potential danger which is determined by hazard index. The need for creating Operational Intervention Plan for Environmental Protection for legal and personal entities arises from hazard index value and amount of hazardous substance. It is assumed that Port of Ploče needs unique Operational Intervention Plan for Environmental Protection. Application scheme of plans is presented in Figure 7.

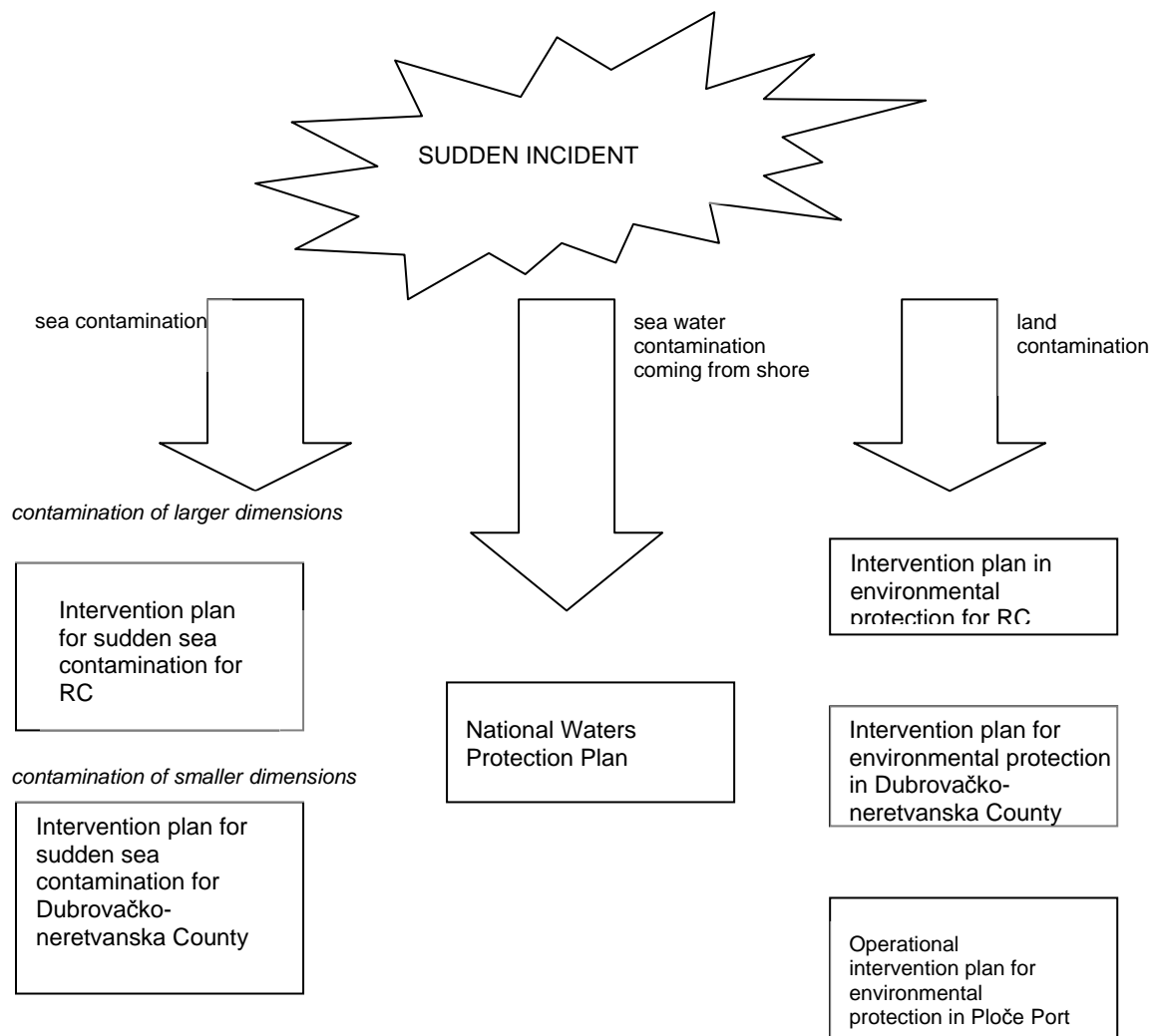


Figure 7. Scheme of application of intervention plans in case of a sudden incident

In the Environmental Impact Study for the construction of a container terminal Ploče in Port of Ploče (Rijekaprojekt d.o.o, 2004) the evaluation of risk from ecological incident has been created:

Managing a public port situated next to a town and protected shore is always associated with certain environmental hazards and in order to assess potential risks, it is necessary to assess:

- Probability of an unwelcome incident
- Consequences of such an incident
- Duration of the exposure to the consequences

Unwelcome incidents may occur in case of

- Force majeure
- Accidental emergency

Force majeure would be an earthquake stronger than expected, hurricanes, war or other deliberate damages of movables (vessels, vehicles) and immovables (buildings, facilities). “Accidental emergency” occurs in general because of the human factor, i.e. because of negligence or recklessness of either the ship or the port personnel, though sometimes also prepensely. Occurrence probability for an unwelcome incident is difficult to predict due to the nature of its source. Probability of a force majeure incident in peaceful condition in our ports is relatively low. Much higher is a probability of an “accidental emergency”. “Accidental emergency” may be a small-scale incident with spatially limited environmental impacts, when “the first level threat” occurs. In case of large-scale incidents bigger area is affected and “the second level threat” occurs, which is of equal relevance as a natural disaster.

Exposure to the consequences of the first level threat is considerably shorter than in case of the second level threat or in case of force majeure incidents.

The records of how the smaller Adriatic ports have been functioning so far support an assessment of a much lower occurrence probability for incidents causing the second level threat.

When it comes to the Port of Ploče, the risk, i.e. the probability of an ecological emergency, is assessed as follows:

- Relatively low risk produced by a force majeure emergency in peaceful circumstances
- Much higher risk produced by an “accidental emergency”
- Relatively low risk of ecological emergency with “the second level threat”
- Much higher risk of ecological emergency with “the first level threat”

It can be concluded that occasional, not frequent incidents of short lasting impacts and medium intensity may occur. Thus, the overall risk assessment would be “acceptable level of risk”.

The “**Unintentional accidents**” which can be classified in the “**first stage of endangerment**” can be mostly prevented by planned environmental protection measures and adequate port management, i.e. ecologic disasters caused by these accidents can be reduced to minimum.

Prevention of consequences caused by the “**Unintentional accident**” is possible and consequences can be mitigated in a relatively short period. The unintentional accidents which cause the “first stage of endangerment” can be mitigated by urgent actions of the port staff.

One of the most important measures for mitigation of consequences of ecologic disasters is to notify immediately the county information / monitoring center or harbour master’s office or police station during each even the least release of petroleum product and/or oil into the sea, so that the procedure for damage reduction could be applied. It is also necessary to remove the petroleum products and/oil from the sea surface and the land as soon as possible.

The port has to be equipped with a plastic sprayer for dispersant of so called “third generation”, i.e. it should be included in the “eco-set” for decomposition of smaller quantities of petroleum products that might spill in the accident.

The Port authority has also to provide an operation boat for placement of a floating wall and shall apply the fire fighting measures. The Port has to be equipped with a mobile foam and powder fire extinguishing devices in case of fire and/or explosion in the port. Plan of activities in case of the fire or explosion has to be applied immediately.

In case of more serious accidents, i.e. the accidents that give rise to the “**second stage of endangerment**”, the mitigation of consequences is in conformity with county plans of water protection, i.e. environmental protection.

In principle, occurrence of accidents and ecologic disasters caused by “**force majeure**” cannot be prevented and it takes more time to mitigate the consequences.

In case of more serious accidents, i.e. the accidents that give rise to the “**second stage of endangerment**”, the mitigation of consequences is in conformity with county plans of water protection, i.e. environmental protection.

In principle, occurrence of accidents and ecologic disasters caused by “**force majeure**” cannot be prevented and it takes more time to mitigate the consequences.

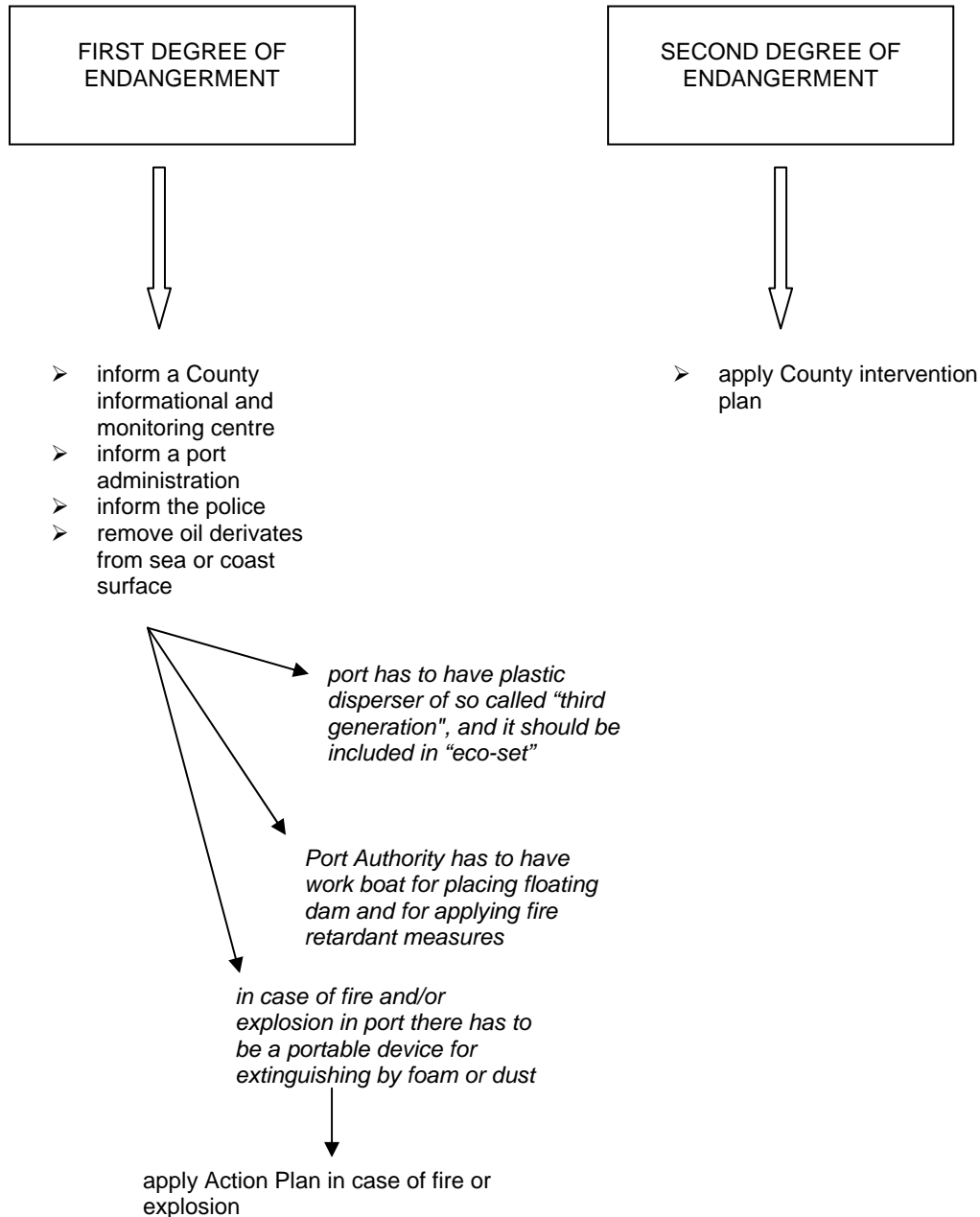


Figure 8. Scheme of actions in case of sudden event – present state

3.4. MONITORING PLAN WITH COST ESTIMATE

Predicted monitoring is presented in Table 13.

Table 13. Monitoring plan

Phase	What parameter is to be monitored?	Where is the parameter to be monitored?	How is the parameter to be monitored?	When is the parameter to be monitored	Limit values of measured parameters	Cost	Comment	Institutional Responsibility
Baseline	Sea quality: 1. transparency 2. temperature 3. salinity 4. dissolved oxygen 5. pH 6. mineral oils 7. ammonia 8. bacteriological testing (indicators of faecal contamination)	2 locations*, on both, bottom and surface layer: point KV1 within basin between Quays 5 and 7 point KV2 within basin between Quays 5 and 7	Rule on authorized laboratory according to authorized laboratories, OG 78/97	2 times during summer months before the beginning of operating phase	purpose of measurement is to establish referent values	40.000 kn	➤ obligation according to MEPPPC ⁶ is a testing in September, but in this Elaborate a recommendation from experts in EIS is accepted and it states that there should be two testing and that they should be performed during summer months	Port of Ploče Authority
Construction phase	-	-	-	-	-	-	-	Port of Ploče Authority

⁶ Decision of Ministry of Environmental Protection, Physical Planning and Construction (class UP/I351-03/04-02/0070, ur.br. 531-05/4-NM/AK-05-17, od 1.3.2005) on environmental acceptability of constructing a terminal station Ploče in Ploče Port

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Operating phase	<p>Sea quality:</p> <ol style="list-style-type: none"> 1. transparency 2. temperature 3. salinity 4. dissolved oxygen 5. pH 6. mineral oils 7. ammonia 8. bacteriological testing (indicators of faecal contamination) 	<p>2 locations*, on both, bottom and surface layer:</p> <p>point KV1 within basin between Quays 5 and 7</p> <p>point KV2 at the exit from basin between Quays 5 and 7</p>	<p>authorized laboratory according to Rule on authorized laboratories, OG 78/97</p>	<p>2 times a year during summer months</p>	<p>referent values from baseline condition measurement</p>	<p>40.000 kn/year</p>	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC is a testing in September, but in this Elaborate a recommendation from experts in EIS is accepted and it states that there should be two testing and that they should be performed during summer months ➤ if measured parameters deviate from referent values it is necessary to: <ul style="list-style-type: none"> identify the cause (among the other compare the results of measurement with measurements of sewage waters of Town of Ploče) if sea quality expert decides that Port of Ploče causes contamination, check implementation of mitigation plan if it shows that not all mitigation measures are implemented, check the Port of Ploče Authority system for EMP implementation if it shows that all mitigation measures are implemented, review EMP 	Port of Ploče Authority
	<p>Quality of waste waters:</p> <ol style="list-style-type: none"> 1. pH 2. suspended matter total 3. chemical oxygen consumption 4. biochemical oxygen consumption 5. total and mineral oils 6. anionic and no ionic detergents 	<p>3 locations*:</p> <p>at the exit from plants for dividing and treating waste waters from oily waters SZV 1</p> <p>at the exit from grease separator – precipitation sewerage trap SOK1 and SOK2</p>	<p>authorized laboratory according to Rule on authorized laboratories, OG 78/97</p>	<p>4 times a year</p>	<p>limit values are defined by Regulation on limit values of Indices, Hazardous and Other Substances in waste waters, OG 40/99, 6/01</p>	<p>25.000 kn/year</p>	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ if measured parameters are beyond limits defined by Regulation on limit values of Indices, Hazardous and Other Substances in waste waters, OG 40/99, 6/01, it is necessary to: <ul style="list-style-type: none"> check the functioning of waste waters treating plants and if malfunction appears fix it as soon as possible if it shows that there is no malfunction, review EMP 	Port of Ploče Authority
	<p>Sea bottom sediment state:</p> <ol style="list-style-type: none"> 1. Heavy metal contents: lead, copper, zinc, tin 2. polycyclical aromatic hydrocarbonates 	<p>2 locations, surface layer 0-2cm*:</p> <p>at transect PL-01 point PLS-01</p> <p>at transect PL-02 point PLS-02</p>	<p>authorized laboratory according to Rule on authorized laboratories, OG 78/97</p>	<p>every second year</p>	<p>EU regulation on sediment</p>	<p>50.000 kn/every second year</p>	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ if measured parameters deviate from baseline values it is necessary to act as in the case of negative results of sea water quality 	Port of Ploče Authority

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	Control of a process of inhabiting a macrobenthic organisms and recovery of sea bottom biomasses	2 locations: at transect PL-01 at transect PL-02	an expert for sea bottom biomasses	every fourth year	there are no limit values	35.000 kn/every fourth year	<ul style="list-style-type: none"> ➤ EIS expert's recommendation ➤ purpose of control is to note the trend of establishing general longterm condition of port basin since all other measurements shows shortterm conditions 	Port of Ploče Authority
	Noise level monitoring	3 locations where the measurement of zero noise level was performed	authorized company which has decision on fulfillment of condition for measurement performance and noise specifying in environment where people work and stay, issued by the Republic of Croatia – Ministry of Health	<ul style="list-style-type: none"> ➤ single measurement after the completion of construction ➤ after changes at present noise sources ➤ after implementation of new noise sources ➤ at the request of sanitary inspection ➤ after complaints of citizens affected by noise 	Regulation on Maximum-allowed Noise Levels in Environment where People Work and Stay, OG 145/04	25.000 kn/ measurement	<ul style="list-style-type: none"> ➤ obligation according to MEPPPC ➤ if measured parameters are beyond limits defined by Regulation on Maximum-allowed Noise Levels in Environment where People Work and Stay, OG 145/04, it is necessary to: check implementation of mitigation plan if it shows that not all mitigation measures are implemented, check the Port of Ploče Authority system for EMP implementation if it shows that all mitigation measures are implemented, review EMP 	Port of Ploče Authority
AVERAGE ANNUAL EXPENSE DURING OPERATING PHASE:						100.000 kn		

* testing location presented in Enclosure 2

3.5. REALIZATION DYNAMICS WITH COST ESTIMATE

Table 14. Realization dynamics for mitigation and monitoring plan

	BEGINNING	END	COST (kn)
ENVIRONMENTAL PROTECTION MEASURES			
preparation	11_2005	06_2006	649.500 ⁷
construction	12_2006	12_2008	16.450.000 ⁸
usage	12_2008	and further	165.000 kn/year ⁹
MONITORING			
preparation	11_2005	06_2006	40.000 kn
construction	12_2006	12_2008	0 kn
usage	12_2008	and further	100.000 kn/year

⁷ Cost includes: Maritime elaborate, sewage system project and wagon cleaning project, traffic project of temporary traffic control, construction site organization project, operational intervention plan

⁸ Cost includes construction of sewage system and plant for wagon maintenance and cleaning

⁹ Cost is determined as follows: based on present experience is it assumed that container terminal basin and navigational route will be maintained by sediment excavation once in 8 year period (submarine excavation of 10.000 m³ of sediment with a cost of 50 kn/m³) and waste excavation from a quay once in 2 year period (submarine excavation of 1.500 m³ of waste with a cost of 120 kn/m³); according to law it is mandatory to make a batimetric survey of access channel and basin every 3 year (38.000 kn). Stated costs are brought to average annual cost which should be assumed for depth maintenance.

3.6. INSTITUTIONAL INTERRELATION

Table 15. Institutional interrelation

Responsibility for implementation of mitigation and monitoring plan	Environment Data Flow (reporting – who to and how often)	Chain of Order for making decisions related to Environment Management	
		Activity	Competent Organization
Port of Ploče Authority	Dubrovačko-neretvanska County Office for Environmental protection – Environment Emission Cadastre	Once a year – till March 31 of present year, for previous year, deliver data from waste record	Port of Ploče Authority, Section for port safety and supervision of maritime traffic in port Environmental protection Inspector – County Administration for inspecting (MEPPPC)
		Applying environmental protection measures according to EIS	Port of Ploče Authority, Section for port safety and supervision of maritime traffic in port Environmental protection Inspector – County Administration for inspecting (MEPPPC)
		Taking records of monitoring according to EIS	Port of Ploče Authority, Section for port safety and supervision of maritime traffic in port Environmental protection Inspector – County Administration for inspecting (MEPPPC)
	County Office for Environmental protection	Operational Intervention Plan for Environmental protection – keeping it up-to-date as necessary	Port of Ploče Authority, Section for port safety and supervision of maritime traffic in port Environmental protection Inspector – County Administration for inspecting (MEPPPC)

4. ENVIRONMENT MANAGEMENT POLICY

4.1. EXPERT TEAM FOR CARRYING OUT EMP

Port of Ploče Authority is a non-profitable legal entity founded by Decision of the Government of the Republic of Croatia (OG 19/97) on February, 18, 1997.

With the decision of founding this Port Authority, also port area – maritime area under the Port of Ploče Authority was determined, then all port activities and support/raising in port area were determined for which Port Authority is concessionaire.

Administration bodies of Port of Ploče Authority are Administration Council and Manager (according to Figure 9).

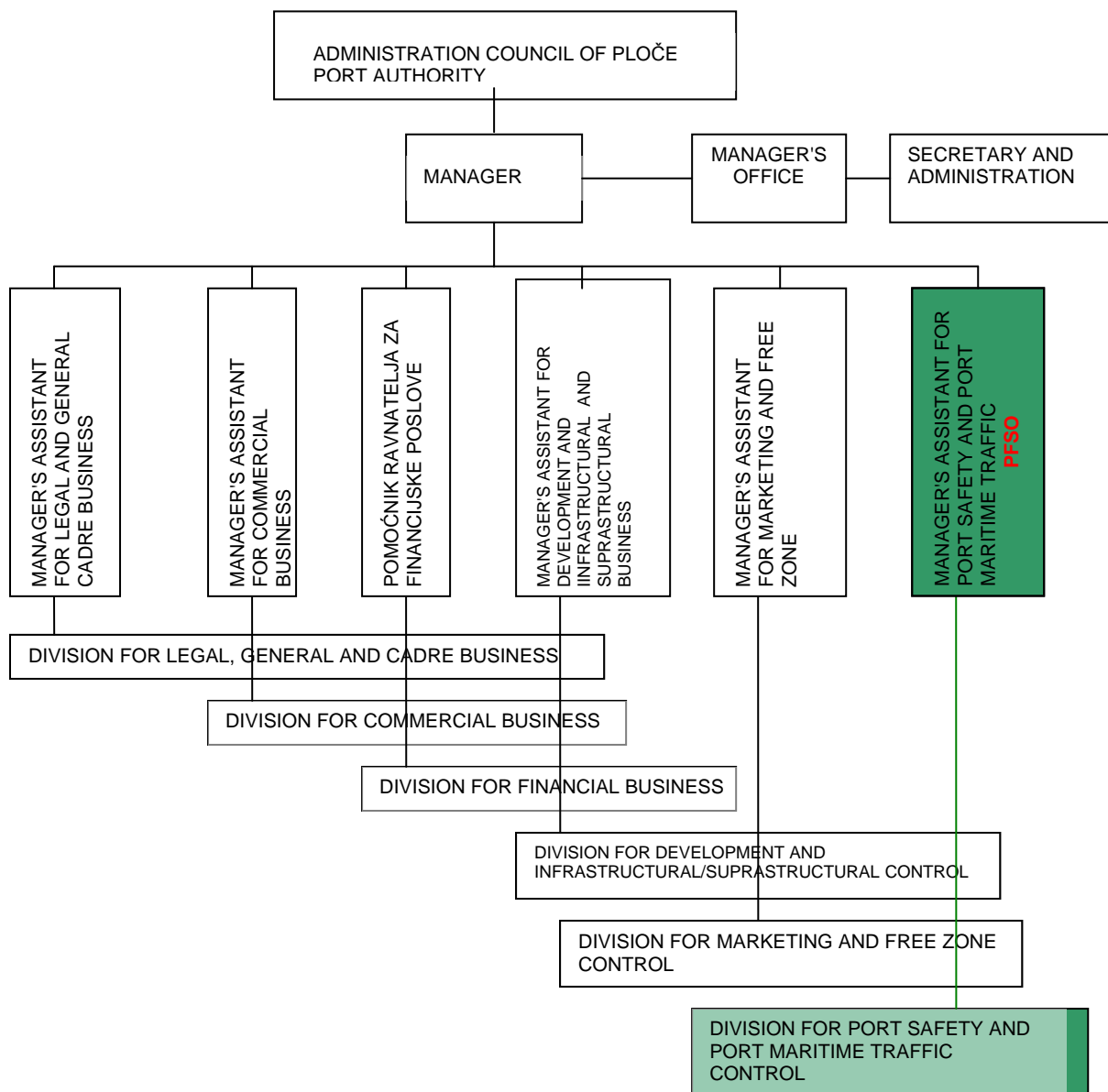


Figure 9. Organizational Scheme of Port of Ploče Authority

Division for port safety and supervision of port maritime traffic does the following:

- all kinds of work connected with port safety which includes supervision of maintenance and marking maritime routes and objects of safe navigation in port,
- supervision of preserving sea contamination from vessels in port,
- supervision of port order,
- supervision of handling hazardous substances and coordinating safety measures.

At this moment there is positive trend of the Port Authority related to new kind of environment treatment, including the usage of environmental protection principles arranged by the law of the Republic of Croatia and also by international conventions undersigned by the Republic of Croatia.

A further obligation of the Port Authority is to use mitigation and monitoring plan mentioned in this document. The recommendation is to expand the authorizations and duties of Division for port safety and supervision of maritime traffic to the following:

- to implement mitigation and monitoring plan stated in this document.

Revision of fulfilled results of mitigation and monitoring plan can be performed by certificate awarded by authorized and control institutions. Statement or certificate (Environmental Statement) for achieved improvements in Environmental Impact in all parts and functions of container terminal should especially refer to (EIS recommendation):

- Nature conservation
- Water resource management
- Waste management
- Energy efficiency and purchasing policies
- Education and working environment
- Communications and public awareness.

Desired goals in managing Port of Ploče are compatible with goals achieved in neighbor Adriatic ports.

Considering all norms presented by legal acts for environmental protection are another subject which should be accepted by Port of Ploče Authority.

4.2. INSTITUTIONAL STRENGTHENING

Plan for institutional strengthening is following:

- **strengthening links with County Dubrovačko-neretvanska department for environmental protection**
- **purchasing necessary equipment** after accepting the Main project
- **increasing human resources:** revision of sufficiency of human potential within Division for port safety and supervision of port maritime traffic in relation with new tasks of that Division presented in this EMP
- **educating employees** from Division for port safety and supervision of port maritime traffic in relation with new tasks of that Division presented in this EMP through seminars and workshops organized by Ministry of Environmental Protection, Physical Planning and Construction and/or professional institutions related to environmental protection

4.3. PUBLIC RELATIONS

Public relations plan and its dynamics are presented in Figure 10.

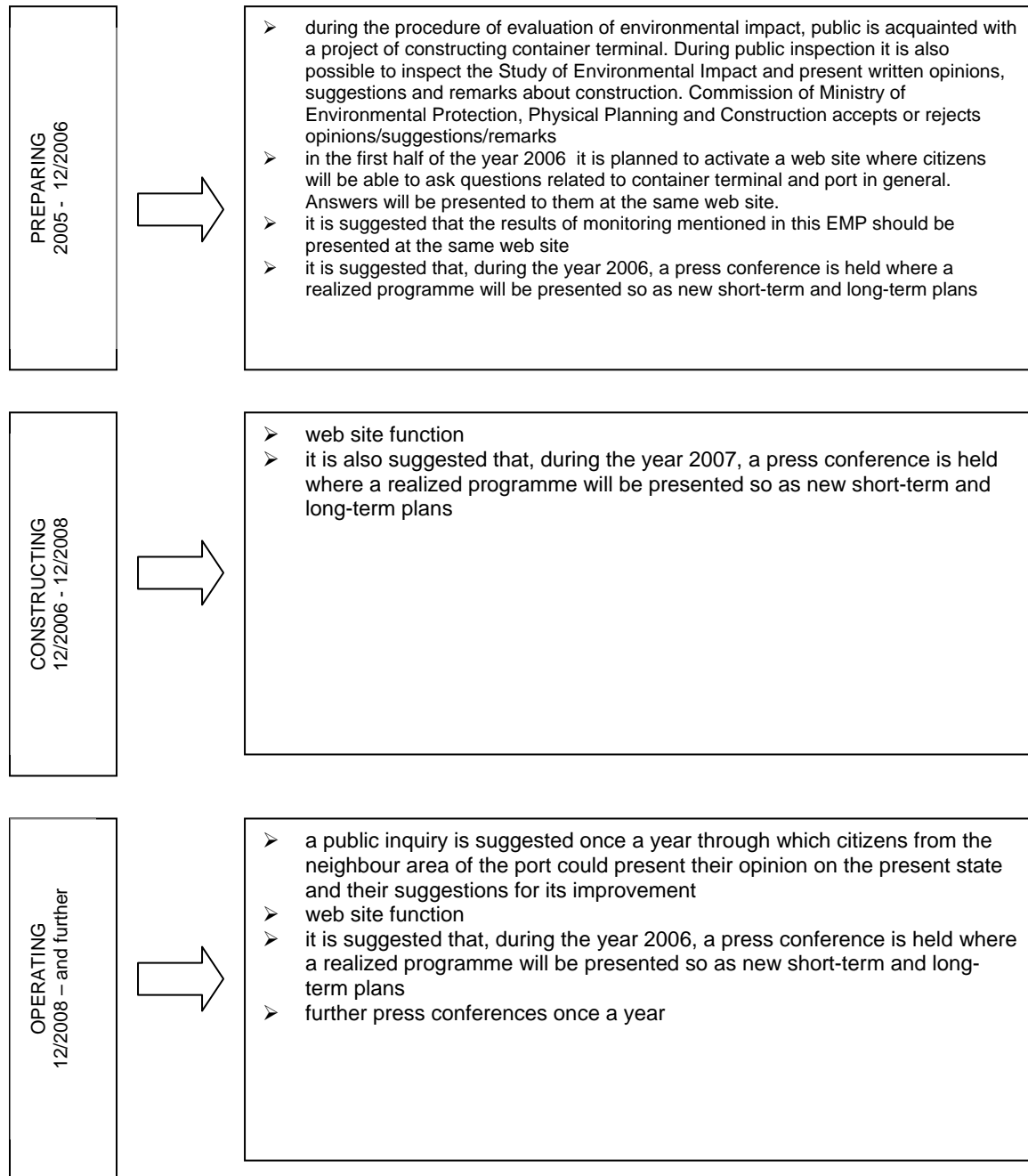


Figure 10. Public relations

Principles of active public relations should be accepted by the Port of Ploče Authority.

5. REFERENCES

1. Gupta, A.K., Gupta, S.K. i Patil, R.S. 2005. Environmental management plan for port and harbour projects. Clean Techn. Environ. Policy (2005) 7: 133-141
2. Rijekaprojekt d.o.o. 2004. The Study of Environmental Impact of Ploče Container Terminal Station in Port of Ploče
3. Rijekaprojekt d.o.o. 2005. An Addition to The Study of Environmental Impact of Ploče Container Terminal Station in Port of Ploče

Acts, regulations, ordinances

Republic of Croatia

1. Act on Inflammable Liquids and Gases (OG 108/95)
2. Act on Protection and Preservation of Cultural Assets (OG 69/99, 151/03 and 157/03)
3. Act on Transport and Handling of Hazardous Substances in Inland Navigations (OG, 79/96.)
4. Act on Transport of Hazardous Substances (OG, 97/93)
5. Air Quality Protection Act (OG 178/04)
6. Constitution of the Republic of Croatia (OG 41/02-consolidated text)
7. Construction Act (OG 175/03)
8. Declaration on Environmental protection of the Republic of Croatia (OG 34/92)
9. Environmental Impact Assessment Regulation (OG 59/00, 136/04)
10. Environmental Protection Act (Official Gazette, 82/84. and 128/99.)
11. Fire Protection Act (OG 58/93)
12. Intervention Plan for Environmental Protection (OG 82/99)
13. Intervention Plan in Case of Sudden Sea Pollution in the Republic of Croatia (OG 8/97)
14. List of specialized institutions authorized to issuing testing reports on waste physical and chemical properties (OG 32/98)
15. Maritime Code (Official Gazette, 17/94., 74/94 and 43/96.)
16. National Waters Protection Plan (OG 8/97)
17. Natural Disaster Protection Act (OG 73/97)
18. Nature Conservation Act (OG 70/05)
19. Ordinance on categories, types and classification of waste with a catalogue of waste and a list of hazardous substances (OG 50/05)
20. Ordinance on Protection of Buildings of Special Importance for the Republic of Croatia (OG 6/00)
21. Ordinance on Requirements for Ports (OG 110/04)
22. Ordinance on Seawater Quality Standards on Beaches (OG 33/96)
23. Physical Planning Act (OG 30/94, 68/98, 61/00, 32/02)
24. Plan for Environmental Protection (OG 82/99)
25. Port Authorities Act (OG 124/97)
26. Public Utilities Act (OG 3/95, 70/97)
27. Regulation on conditions for hazardous waste management (OG 32/98)
28. Regulation on conditions for waste management (OG 123/97, 112/01)

29. Regulation on Hazardous Substances in Waters (OG 78/ 98)
30. Regulation on Highest Permissible Noise Levels in Manned Working Environment (OG 37/90)
31. Regulation on Inflammable Liquids (OG 54/99)
32. Regulations on Limit Values of Indicators of Hazardous and Other Substances in Waste Water (OG 40/99, 6/01)
33. Regulation on managing package waste (OG 53/96)
34. Regulation on Terms and Methods of Maintaining Order in Ports and Other Parts of the Internal Sea Waters and Territorial Sea of the Republic of Croatia (OG 90/05)
35. Regulation on types of waste (OG 27/96)
36. Resolution on Classification of Special Purpose Ports (OG 38/96)
37. Requirements and Manner of Loading and Unloading Hazardous Substances, Bulk and other Freight in Ports, and Manner of Preventing Spreading of Oil Leaks in Ports (OG 51/05)
38. Sea Ports Act (OG 158/03)
39. Transportation of Hazardous Substances Act (OG 97/93)
40. Waste Act (OG 178/04)
41. Water Act (OG 107/95)
42. Water Classification Regulation (OG 77/98)

Conventions ratified and signed by the Republic of Croatia

1. Convention on Long-Range Transboundary Air Pollution, OG International treaties, 12/93
2. Protocol for Convention on Long-Range Transboundary Air Pollution of 1979., OG International treaties 12/93
3. Protocol for Convention on Long-Range Transboundary Air Pollution of 1979., OG International treaties 16/98
4. Convention for the Protection of the Mediterranean Sea against Pollution, OG International treaties 12/93, 16/98
5. Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources, OG International treaties 12/93
6. Convention on Assessment of Transboundary Impact on Environment, OG International treaties 1/6/96
7. International Convention for the Prevention of Pollution by Ships of 1973./1978. (MARPOL 73./78.) including 6 technical Annexes. Annex I. and II. deal with oil and mass hazardous liquid loads. Annex III., IV., V. and VI. deal with harmful substances in packaged form, sewage, garbage and air pollution.
8. International Convention for the Safety of Life at Sea (SOLAS) – chapter 7 – Hazardous Goods Transport, 1974.
9. International Maritime Organization Code of Hazardous and Dangerous Loads (IMCO).
10. Barcelona Convention on Protection of Mediterranean Sea Environment and Coastal Region and Protocol for Cooperation in Combating Pollution of the Mediterranean by Oil and Other Toxic and Hazardous Substances in Case of Accidents –1976., 1996.
11. UN Law of the Sea Convention (OG, IT 11/95)
12. Convention on Protection of Marine Environment and Coastal Area of the Mediterranean (OG IT 17/98)
13. Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircrafts (OG IT 17/98)

14. Protocol Concerning Cooperation in Combating Suppressing Pollution of the Mediterranean by Oil and Other Hazardous Substances in Cases of Emergency (OG, IT 12/93)
15. Protocol on Specially Protected Areas of the Mediterranean Sea (OG, IT 12/93)
16. International Convention on Oil Pollution Preparedness, Response and Cooperation of 1990 (OG, IT 2/97)
17. International Convention on Intervention on High Seas in the Event of Accidents or Threatened Accidents Resulting from Oil Pollution (OG, IT 1/92)
18. International Convention on Establishment of International Oil Pollution Compensation Fund (OG, IT 1/92)
19. International Convention on Civil Liability for Oil Pollution Damage (OG, IT 1/92)
20. International Safety Guide for Oil Tankers and Terminals, Publisher: The International Chamber of Shipping, London 1996.
21. Convention on Prevention of Marine Pollution by Dumping (OG, IT 3/95)

Conventions not ratified and signed by the Republic of Croatia

1. Protocol for Convention on Long-Range Transboundary Air Pollution of 1979, Geneva, 1991.
2. Protocol for Convention on Long-Range Transboundary Air Pollution of 1979, Sofia, 1998.
3. Protocol for Convention on on Long-Range Transboundary Air Pollution of 1979., Aarhus 1988.
4. Protocol for Convention on on Long-Range Transboundary Air Pollution of 1979, Goeteborg 1999.
5. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, Aarhus 1998.

County Dubrovačko-neretvanska

1. Intervention Plan in Case of Sudden Sea Pollution in the County Dubrovačko-neretvanska (OG of County Dubrovačko-neretvanska, no 6, XI, 11.12.2004)
2. Intervention Plan for Environmental Protection in County Dubrovačko-neretvanska (accepted on County Dubrovačko-neretvanska Assembly in November 2005).

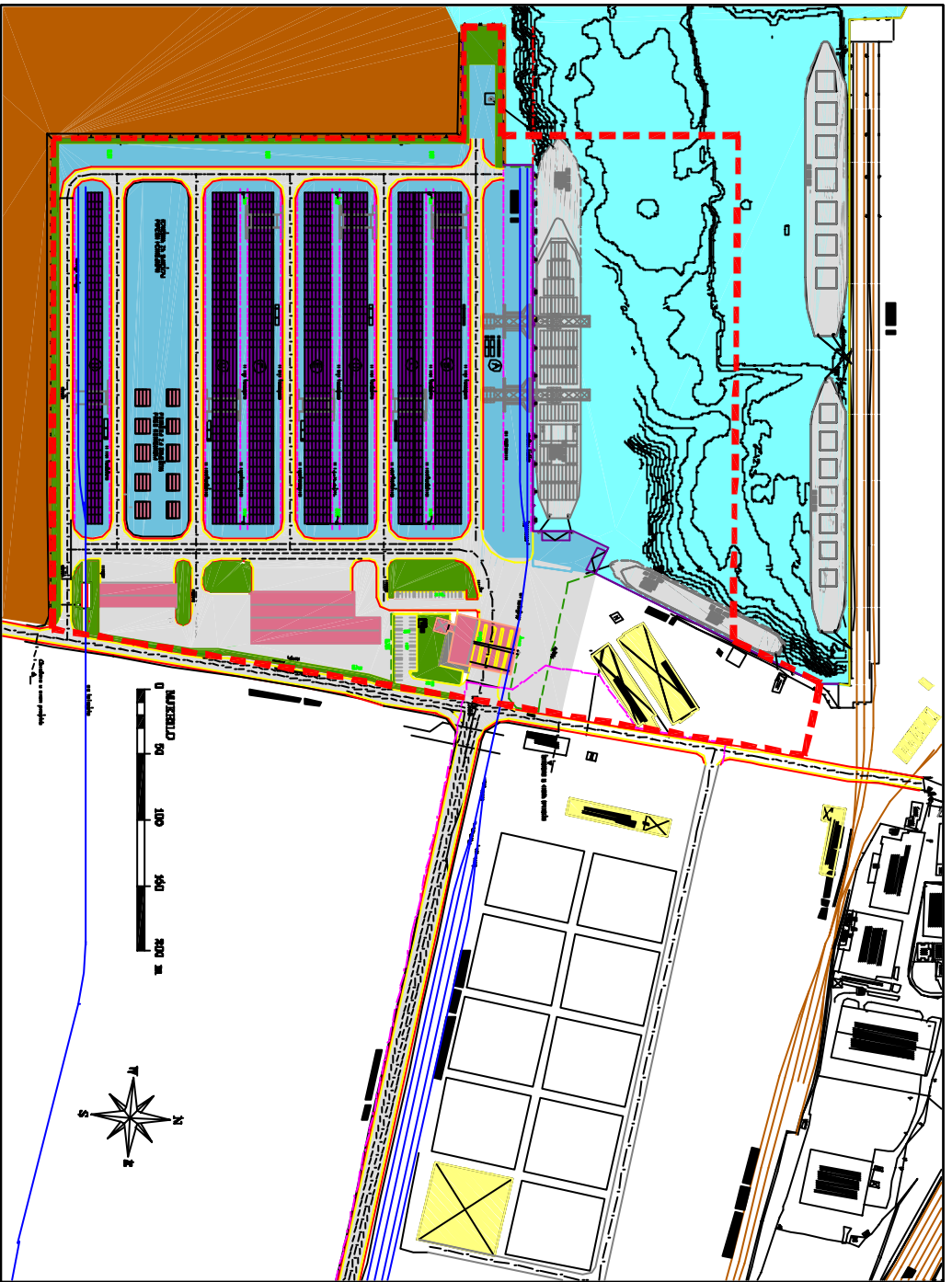
Port of Ploče Authority

1. Waste from Ships Management Plan of Port of Ploče (Port of Ploče Authority) - 2005 draft
2. Regulation on Handling Hazardous Substances, Defining Class and Quantity of Hazardous Substances, Locations in Port of Ploče for Handling Those Substances and Measures that Have to Be Undertaken by Port of Ploče Authority and Its Concessionaries in Order to Handle Hazardous Substances (Port of Ploče Authority) - 2005 draft
3. Regulations on Order and Terms of Operating in Port of Ploče area (Port of Ploče Authority) - 2005 draft

6. APPENDIX

APPENDIX A. Construction Scheme

APPENDIX B. Monitoring plan - locations



A1. PURPOSE OF PROJECT CONSTRUCTION UNDERTAKING

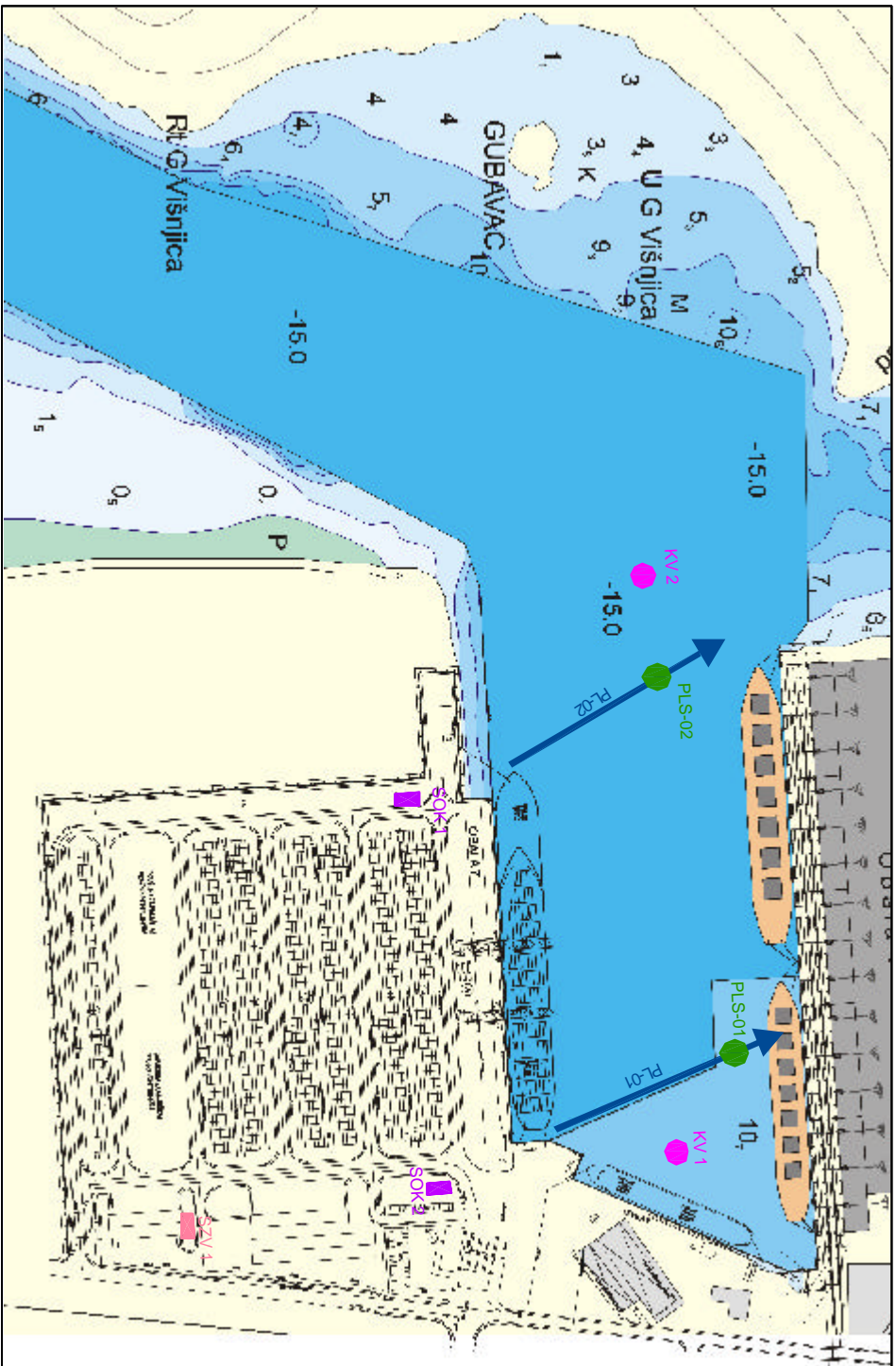
TECHNOLOGICAL LAYOUT - FINAL STATE
A1. SVRHA PODUZIMANJA I IZGRADNJE ZAHVATA
SITUACIJA TEHNOLOGIJE - KONACNO STANJE
SCALE (MJ) 1:2500

KEY (LEGENDA):

- PROJECT BOUNDARY (GRANICA ZAHVATA)
- LINE OF EXISTING WATERFRONT (LINIJA POSTOJEĆE OBALE)
- LINE OF NEW WATERFRONT (LINIJA NOVE OBALE)
- EXISTING RAILWAYS (POSTOJEĆE ŽELJEZNICE)
- DESIGNED RAILWAYS (PROJEKTIRANE ŽELJEZNICE)
- EXISTING ROADS (POSTOJEĆE CESTE)
- DESIGNED ROADS (PROJEKTIRANE CESTE)
- FENCE (OGRAĐA)
- EXISTING STRUCTURES (POSTOJEĆI OBJEKTI)
- SEA (MORE)
- STORAGE AREAS (POVRŠINE ZA SKLADIŠTA)
- CONTAINER DISPOSAL AREAS (POVRŠINE ZA ODLAGANJE KONTEJNERA)
- GREEN AREAS (ZELENE POVRŠINE)
- GROUND (TEREN)
- STRUCTURES (OBJEKTI)

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datum: 03-2023
 skica: 03-2023












D4. ENVIRONMENTAL STATE MONITORING PROGRAMME

POSITION OF CONTROL MEASURING POINTS FOR ENVIRONMENTAL STATE MONITORING

D4. PROGRAM PRACENJA STANJA OKOLIŠA POLOŽAJ KONTROLNIH MJERNIH TOČAKA ZA PRACENJE STANJA OKOLIŠA

SCALE (M) 1:2500

KEY (LEGENDA):

-  TRANSECTIONS PL-01 AND PL-02 (TRANSEKTI PL-01 I PL-02)
-  CONTROL POINTS OF SEA BOTTOM SEDIMENT STATE PLS1 AND PLS2
-  TOČKE KONTROLE STANJA SEDIMENTA MORSKOG DNA PLS1 I PLS2
-  SEA QUALITY TEST POINTS KV1 AND KV2
-  TOČKE ISPIJTIVANJA KAKOĆE MORA KV1 I KV2
-  PRECIPITATION INTERCEPTORS SOK1 AND SOK2
-  SEPARATORI OBOJINSKIH VODA SOK1 I SOK2
-  WORKSHOP WATER INTERCEPTORS SZV1
-  SEPARATOR RADI ONIČKIH VODA SZV1



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