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REPORT

ON

THE ENVIRONMENTAL IMPACT ASSESSMENT

OF INVESTMENT PROPOSAL
CONSTRUCTION OF

PORT – LOGISTICS CENTER VARNA
IN THE AREA OF BELOSLAV, VRANA REGION

Investor: T. B. Consult EOOD Sofia

VARNA
APRIL 2010

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I. GENERAL INFORMATION

1.1. Name of the Investment Proposal

The name of the project is **"PORT - LOGISTICS CENTER VARNA"** in the area of the town of Beloslav, Varna Region. The EIA Report was developed on the basis of the prescriptions of the Ministry of Environment and Water (MEW) Sofia as presented in letter Ref. No. OBOCY – 7727 dated 19 November 2009 – **Appendix 1,** and in accordance with Art. 96 (1) of the Environmental Protection Act (EPA) and Art. 7 (1) and Art. 8(1) of the *Ordinance on the Conditions and Procedures for Carrying out EIA on Investment Proposals for Construction, Activities and Technology* (State Gazette 25/2003). The Investment proposal is subject to mandatory environmental impact assessment pursuant to Art. 92(1) in conjunction with Appendix 1 to Art. 92 (1) of the EPA, (23b) *"Cargo Ports Connected to the Mainland with the Exception of Metal Quays Which Can Take Vessels of over 1350 GT."*

This report is a revised and further elaborated according to the instructions of the MEW presented by letter ref. No. OBOCY – 7727 dated 22 March 2010 – **Appendix 21.**

The proposal concerns the utilization of a terrain with industrial intended purpose (former Belopal Glass Factory), providing for the construction of a port logistics center in the former Belopal Glass Factory with the capacity of handling general cargo, cargo in bulk, bulky goods, packaged goods and containers. The plan is to build port facilities for handling about 1 million tons of general cargo per annum, including containers of 10-15 thousand TEU per annum and cargo in bulk. In the long run the containers will reach and surpass 100 thousand TEU.

1.2. Investor's data

The Contracting Authority of the investment proposal is **T. B. Consult EOOD Sofia,** 48, Alabin Street, Sofia, – **Appendix 2 – *Investor's Documents***. Contact person: Rositsa Ivanova Paunova, Manager, Ovcha Kupel District, bl. 423, 423, fl. 6, ap. 28, Sofia, Apostol Marinchev, Mobile: (0888) 407 694, (0898) 614 433.

At present the investment proposal is in the phase of preinvestment studies and the initiator does not have an already built organization and system related to environmental protection. After the implementation of the investment proposal, an order will determine the structure dealing with the activities of environmental management in connection with the operation of the site.

1.3. Data on independent experts (list of registered experts and the team leader with a personal signature on the developed sections; written declarations under Art. 11, /a(3) of the Ordinance, personally signed by the experts; copies of certificates of registration with the Register of MEW)

The team that developed the EIA Report consists of the following experts registered in the MEW:

RA Dipl. Eng. Apostol Yankov Marinchev - Team Leader, Certificates Nos. 287 and 1674 of 2006, and 1762 of 2008 of "Team Leader" and components "Ambient air" and "Harmful physical factors", "Waste" developed in sections 1, 2, and parts of sections 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13.

Palmira Radeva Petrova – Certificate No. 1666 of 2006, components "Ambient Air", "Underground water", "Hazardous waste", and "Noise", "Health risk", developed parts of sections 3 (Underground water), 4, 5, 6, 11, and 12.
Assoc. Prof. Dr. Zhivka Encheva Bekyarova – Certificate No. 1720 of 2007 "Flora", "Soils", "Surface Water", developed parts of section 3 (Biodiversity) and assessment of compatibility with the subject of protection of the protected areas.
Assoc. Prof., Dipl. Eng. Rozalina Zlateva Chuturkova – Certificate No. 1455 of 2007, components "Ambient air", "Hazardous Substances", developed section 3.4 and part of section 3.1.
Veselin Radev Petrov – Certificate No. 1667 of 2007, components "Quality of ambient air", "Surface waters", "Chemical substances", "Waste", developed parts of sections 3 (surface water), 4, 5, 6, 11, and 12.
Milcho Petrov Tsenkov – Certificate No. 1879 of 2009, component "Geological environment", "Waste", developed parts of sections 3 (geological environment), 4, 5, 6, 11, and 12.
Senior RA Margarita Ivanova Nankova – Certificate No. 1759 of 2008, components "Quality of ambient air", "Flora", "Soils", developed parts of sections 3 (soils), 4, 5, 6, 11, and 12
Dr. Dimcho Hristolov Tomov – Certificate No. 136 dated 2 August 2006, components "Health assessment" and "Hazardous substances", developed parts of sections 3 (health risk), 4, 5, 6, 11, and 12

List of registered experts and the team Leader with a personal signature on the developed sections is presented in **Appendix 3.**

Written declarations under Art. 11 (3) of the *Ordinance on the Conditions and Procedures for Carrying out EIA on Investment Proposals for Construction, Activities and Technology* are presented in **Appendix 4**. Copies of the registration certificates of experts are presented in **Appendix 5**.

II. ANNOTATION OF THE INVESTMENT PROPOSAL

2.1. Situational diagram, master plan, buildings and facilities, infrastructure, personnel

Port – Logistics Center Varna will be located on the north bank of Channel 2 connecting Varna and Beloslav lakes and will be developed entirely on the territory of the former Belopal Glass Factory – **Appendix 6 - *Situational Diagram***. The area is private property **Appendix 7 - *"Sketches"***. The investment proposal is included in the **National Programme for the Development of Ports of Public Transport 2008-2015**, as a port complex of regional importance.

The main objectives in the preparation of the investment project are:

- To achieve high returns for port operations and related activities – over 10%;
- Opportunities for cost optimization through management control and financial discipline;
- High performance efficiency, diversity, flexibility of port services and a variety of nomenclature of services rendered and activities performed by investing in modern port equipment allowing for quality and safe handling of ships and land vehicles. The introduction of new technologies and modern machines with much better

technology and environmental opportunities and technical and economic indicators is the basis for increasing the productivity and effectiveness of the proposed port services;

- To create conditions for increasing the nomenclature of the performed supporting activities and their provision to external customers;
- To improve the quality of port services offered to users as a result of the overall improvement of port technology and work organization;
- To refine the administrative and management structure as a component of the continuous improvement of the quality management system;

The intentions of the investor in perspective are primarily the following:

Strategic

To increase the effectiveness of the operation of the port, maintaining a high level of safety and environmental protection, while meeting the needs and expectations of customers and increasing their confidence in the capabilities on the basis of new technical, technological and organizational capabilities and the expertise of human resources.

Market

To create conditions to facilitate access to the market of port services in Port – Logistics Center Varna;

To introduce a quality management system;

To perform gradual reduction and restructuring of human resources with consideration of the new requirements.

Technological

Economic and financial provision of funds for technological and modern port superstructure to achieve the necessary competitiveness, safety and environmental protection;

High efficiency and flexibility in the implementation of port services and increasing their nomenclature;

To activate the performance of the supporting activities.

Financial

Economic and financial support of the operation of Port – Logistics Center Varna in terms of the required competitiveness by modern European market behaviour;

After the formation and development of the specialized areas in Port – Logistics Center Varna will be able to handle containers and a wide range of general and bulk cargo with conventional and specialized technologies in a direct and indirect variant. In the course of the ordinary operation of the quay front, the achieved clean and quay productivities will correspond the achieved productivity in the neighbouring ports in the Varna Region. The port will be gradually specialized for container handling (loading, unloading, containerization/decontainerization) and for grain loading.

Situational diagram of Port - Logistics Center Varna

The port entrance will be situated in the western part of the site. The existing small building south of the pedestrian gate is suitable for housing the security guards and the port security officer. The pedestrian, vehicle and rail entrance and exit will be located near each other and will allow for the arrangement of strict and effective access control and

implementation of the ISPS Code access regime in the port facility. The premises of the building allow for the arrangement of 24-hour security surveillance point. The pass issuance office and the border police office will be arranged here.

Access regime similar to that of the other terminals of Varna Port area will be arranged at the pedestrian gate. The video surveillance will be combined with computer registration system of the objects passing through the gates.

The vehicle gate is convenient as it is located near the pedestrian and the control point of the security guards on the one hand, and as all types of vehicles will pass through it, on the other hand. The traffic organization on both sides of the gate will be arranged so that to provide fast and flawless passing of vehicles. After entering the area, the vehicles will be directed to the weighbridge. There the vehicles will receive instructions from the duty traffic controller where to go and their tare will be taken, if the task at the port requires so.

The rail gate is located next to the other two gates. A solid door is provided for this gate providing for sufficient serious protection against forcible entry in the port area.

The weighbridge will be located on the platform in front of the gates.

There is space intended for the placement of **railway weighbridge**. This act will be implemented at the discretion of the port management because the equipment is expensive and must be delivered free of charge to the railway company according to their rules.

The administrative building is located in close vicinity south of the gate building. It is preserved from the time of the operation of the glass factory and is in good condition. The offices of the port management will be arranged there, as well as domestic and social premises and offices of partner companies which have entered into cargo handling contracts with the port for. Its proximity to the parking and the local Beloslav ferry quay are a prerequisite that part of this building is also used for social activities of the town in agreement with the municipality.

A building located adjacent to the gate will be converted to a warehouse of the platform for containerization and decontainerization. The transportation of cargo to and from it will be carried out using port equipment provided for the **area for containerization and decontainerization**. This area is situated there for several reasons. One of them is its immediate proximity to the container platform /stack/. That will reduce the internal port costs and allow for the operation of the containerization and decontainerization equipment inside the warehouse. The north end of the site is bordered by the railway line and the southern end – by the road. In addition, the area is in close proximity to the gate, which will also facilitate the customs monitoring of reloading of goods from and into containers. The platform will be paved with concrete cast in place slabs with load capacity of 20 tons per square meter. This strength is necessary because it is intended to accommodate the operation of machines such as "richstaker" with a very high weight. The platform will be furnished with fixed metal stands /bango/ where the containers will be placed during the direct reloading of goods from container into the vehicle and vice versa. Part of the platform will be covered as a shelter in order to be capable to operate in rain. The platform will have the required gradient for draining its surface and the water will be discharged at the treatment plant. Technology will be developed for the location of containers and vehicles on the platform and fields will be drawn for their situation on the area.

Container storage area /container stack/. The container storage area will be the largest specialized platform in Port - Logistics Center Varna. Its dimensions are determined by both the method of container handling, and the requirements for their arrangement. The practice in Bulgarian ports shows that an area of about 45-50 thousand square km is sufficient for handling of about 90-100 thousand TEU per annum in the port. For such a volume of containers, the technology can be built on the basis of universal forklifts of "richstaker" type and terminal tractors.

The main requirements to the container platform of Port – Logistics Center Varna include a requirement for load capacity of at least 20 t/sq. m, sufficient flatness to ensure fault-free operation of port equipment and arrangement of the containers, adequate gradient allowing for surface water drainage for discharge into a wastewater treatment plant, fitness for easy repair.

The platform will be built on the demolished buildings of the workshops of the former Belopal factory, which suggests that the area is of significant density. Additional alignment will be required in the course of the construction. The load capacity of the concrete slabs on the platform must withstand a minimum total of 111 tons; "richstaker" machine + 40-ft full container. **Asphalt pavement is not recommended for sites where container handling machines are to travel and operate**. The asphalt has the disadvantage to subside due to the heavy weight of the machine, to crumble as a result of the machines manoeuvring in the place, leading to sinking of containers in hot summer days. The asphalt is often corroded by leaked fuel and oil leaks from machinery and chemicals from leaking containers. The dimensions of the container storage platform allow it to be lined and identified by special markings corresponding to the container tracking system software adopted by the port. Port Varna EAD has developed software that is well received by the container lines. It is expected that this platform can store simultaneously about 3,000 containers. The area is sufficient for the development of a secure warehouse for containers with excise goods. It will border the containerization and decontainerization platform in the busy area and near the security guards of the gate. The excise platform will have a wire mesh fence and a separate lockable entrance. The entire container storage area will be equipped with CCTV cameras and lighting towers in accordance with the illumination standards on the territory and the working areas in ports.

The estimate of the number of machines required for the operation of the container platform depends on the number of ship handling technological sites. Considering the depth of the berth and its length, the technological accounts refer to a container-carrying vessel with a capacity of 3000 TEU.

The area of the container platform /stack/ also houses a Natural Gas Transfer Station through the channel to its south bank. It is planned around this station to build a concrete protection facility to protect the station from accidents relating to the operation of the shore cranes and machinery handling containers on the platform. During the construction of the second phase of the quay wall it should be calculated whether the boom of the western mobile crane will pass over the station. If this is confirmed, calculations should be make for a roof structure over the station to protect it from a fall or impact of a 40-foot container.

The situation of the container platform and the proximity of the port to Varna-Devnya road and the port equipment allow for processing of heavy and oversized cargo.

The only restrictions on the processing of this cargo can be the bridge structures of the approach to the ferry quay.

The container platform is situated in the most western end of the area, so that to avoid the disposition of bulk loads near the residential blocks in order to prevent the contamination of the environment. The background noise can be improved by planting appropriate vegetation along the platform and the fence of the port. It is considered that a distance of about 300m is sufficiently away from the residential buildings so that the sound cannot affect the residents. The noise effect will also be reduced by the prevailing west wind along the channel.

The existing asphalt road, located south of the containerization and decontainerization and container stacking platform, is to be maintained. It will be the easement approach to the berth, the two platforms, the buildings nearby, next to the gates of the port.

Operational zone. The parameters of the operational zone are determined by the length of the quay and the scope of the shore cranes. The platform is planned with dimensions of about 300m in length along the quay and about 30m wide. The operational zone is characterized by:

- dynamics of the handled vessels, vehicles, port terminal tractors, cargo located within the quay cranes;
- absence of cargo for long-term storage;
- quick access to berthed vessels;
- absence of people and equipment that are not related with the operations in this area.

The operational zone is the most important place in the port when there is a vessel on the quay. It should meet the following requirements:

- to be constructed as an integral part of the quay structure. The closer to the quay wall is the maximum platform load, the easier is the operation of the platform;
- to be with load capacity of 20 tons per sq. m so that to be able to handle heavy and oversized cargo;
- to have a minimum gradient for drainage rain water into the collectors of the treatment plant;
- be have a flat surface without any facilities which may present obstacles to the movement of vehicles and terminal tractors;
- the galleries of the underground infrastructure should not be the reason for disturbing the integrity of the platform or the prerequisite for subsidence of its surface;
- to allows for quick cleaning of bulk cargo with specialized machines;
- it is unacceptable to be with asphalt pavement.

The operational zone will have the main task to receive all the cargo arriving and departing by sea. The requirements to the operational zone are very high in relation to the

platform structure and the quality of the pavement. They are caused by the intensity of cargo handling involving multiple vehicles and port tractors. It will also serve as a buffer warehouse for high ship-night rates.

The open general cargo warehouse will be placed immediately behind the operational zone for a number of reasons. The first one is that it is a natural extension of the operational zone. This is performed in order to allow the handled cargo to be smoothly moved from the operational zone to the open warehouse. The conditions will allow this to be performed using lorry-mounted crane loaders. This will eliminate the need for cargo to be transported by internal factory transport means from the operational zone to the platform.

The platform of the open general cargo warehouse will have load capacity of 10 tons per m^2. The written technology (technological cards) for cargo handling and storage must specify the height limit for cargo storage in order not to avoid platform overloading and formation of subsidence. The platform will have a gradient allowing for drainage of rain water into the collectors of the treatment plant. Asphalt pavement of the site is unacceptable. The practice in the Bulgarian ports indicates that the asphalt wears quickly and compromises in cargo handling. The warehouse will be separated from the operational zone with road markings. No canvas covers or covers from other material have been provided for the open storage area as such are not needed.

The area of about 20,000 m^2 is sufficient for taking the cargo from one ship of Panamax type under the current constraints in Channel 2. Upon reaching the design parameters of the channel, the amount of cargo in vessels of this type will increase by at least one third. Then a variant can be implemented to keep part of load in the operational zone as well. The principle of operation in such cases is giving priority to dispatching cargo from the operational zone. Upon finding a stable cargo flow with shipping batches, an additional open warehouse may be constructed in the eastern end of the port area where there is space for development.

Silo group for grains. The grain silos are situated on the platform between the outer northern fence and the bulk cargo site for several reasons. Such an arrangement allows for the maximum separation of the grain carrying vehicle flow in this area so that it will not interfere with the internal port transport and container carriage. The location of the silos in this zone allows to open the second gate to the road to the village of Strashimirovo, where the grain carrying vehicles have to be directed. This road can also be used to equip the reception bunkers of the silos in the highest part. This will prevent the entry of vehicles in the port area, provide for the use of the northern rad along the fence and the vehicles will quickly go out on the road. The platform is with an area of 12,000 m^2. The project provides for the construction of metal silo cells, each with a volume of 2,000 m^3 – 14 cells with total volume of 28,000 m^3. They will probably be placed in stages. The first stage can involve the construction of a group of six metal silos with a capacity of approximately 12,000 tons in total. The system of rubber belt conveyors /RBC/ for removal of cargo to the quay will be constructed together with them. This will be one-way system intended for export of grain only. The RBC will be fixed until the beginning of the operational zone of the shore cranes, passing between the container platform /container stack/ and the open warehouse for bulk cargo. The RBC system must ensure the capacity of about 400 tons per hour and more.

The first stage of the silo group development aims to enter the grain export market by offering and storing grain in the silos, its drying, decontamination and other manipulations during storage and prior to loading on ships. The complex service will make the port attractive and it is possible to attract investment for the construction of additional silo groups.

Ordinance 16 does not prohibit the storage of goods and carrying out activities under power lines. The area under the power lines can be paved with concrete slabs with a load capacity of 10 t/m^2 and used as a storage space for equipment that is not currently in use or for other industrial purposes. This area can also be an open warehouse for small batches of bulk cargo, metals or other general cargo.

The existing warehouse at the eastern end of the area is a solid building structure that can be used now as a warehouse subject to the provision of reliable security. At the beginning of the construction and installation works it can be presented to the construction company to be used as warehouse. After the commissioning of the port after complete renovation, it can be used as a full port warehouse. It is necessary to examine the load capacity of the walls in order to determine whether it is suitable for storing weather sensitive bulk cargo. In all cases the renovation should include concrete pavement with load capacity of at least 10 t/sq. m, door sizes suitable for entry of trucks, fire alarm and fire extinguishing systems, CCTV and other port-specific requirements. It is also necessary to provide for the construction of administrative and sanitary part intended for the people working in this warehouse. It construction made from reinforced concrete makes it suitable to be sued as the core to build a different type of sheds or other warehouses around it. This complex of storage facilities will be convenient to service a small number of warehouse employees. It will also be suitable for ensuring its security as a separate object. Its remoteness from the other operations in the port will prevent any conflicts in carrying out the internal port operations. The complex of warehouses can be combined with the construction of repair facilities and garages for maintenance of port equipment. In any case, such facilities will be required at least for the daily maintenance of the machines. Garages for some of the machines will also be required, as well as parking lots for out-of-service equipment, as well as for damaged machines awaiting for repairs.

The location of the facility in this area is appropriate given its remoteness of the residential buildings and the heavy traffic of vehicles and port machinery. The practice in the ports indicates the need for e petrol station. In this area the project should provide for the construction of a small petrol station for fuelling port machinery. Usually they have no state license plates and do not leave the area of the ports. In this case, the port owner must decide whether to use the nearby petrol station of the town or to build its own one. If the port owner decides to provide services to the population outside the area of the port using its port machinery, the machines are required to be registered with the traffic police. Then there is no need to provide for own petrol station. The decision whether or not to construct a petrol station depends on the decision for the operation of the shore mobile cranes. If they have their own diesel generators, then the construction of the petrol station is required.

The area in the eastern part south of the covered warehouse is provided to be used as an area for the prospective development of the port. The area of this land will be developed as an extension of the open warehouse platforms. In this sense, it is a reserve for the development of warehouse areas. Here all types of weather non-sensitive cargo can be

stored. The area of a mineral spring is located adjacent to the platform. In the development of any activity near the fence in this area, attention should be paid to the availability of this water source and its potential for contamination. It is therefore extremely important to discharge surface water into the sewer system for discharging into the treatment plant. There is a sharp focus on the issue of dust pollution of the area due to the bulk cargo which is to be handled and stored within the port. Sprinkling the area and covering the stored bulk cargo will be mandatory measures to avoid any conflict points in the course of the operation of the port. They may occur with reference both to the use of the mineral spring, and the population of the town of Beloslav.

In keeping with the above limitation, and the requirements arising in the course of design, construction and operation of the port, the area area can be used for rental of land to local traders for distribution of goods and materials, and for the development of small industries. This will be facilitated by the well guarded area and the selection of workers.

Fence of the port facility (to ISPS code) – Pursuant to the requirements of SOLAS Convention, the port must comply with the requirements for the security of port facilities as descried in the ISPS code. One of the conditions requires that the port facility must have a solid fence. The concerned object has a corresponding fence, left from the former glass factory. It is built from reinforced concrete panels and encircles the entire north side of the site. Extension will be required in the eastern part from its north end to the shore, in order to separate the mineral spring from the rest of the port. An important issue is the security of the shore line outside of the borders of the berth.

The port area borders the channel for approximately 1250 m and it will create many difficulties for monitoring implemented by the posts of the security guards only.

It is necessary to provide for a suitable fencing facility that will also have an appropriate aesthetic appearance at the side of the channel. Strengthening of the fence on the west side between the channel and the panel fence to the north is also necessary. The gates need new doors and strengthen of the security facilities. The presence of lumps on the roadway, barriers, guard room, stopping structures /spikes/ will be planned for the renovation of the approaches to the port.

In the course of the detailed design of the platforms and warehouses, provisions will be made for the work lighting and for the security lighting for the time while there will be no re-loading operations in certain areas. The same towers can be also be used to mount CCTV cameras.

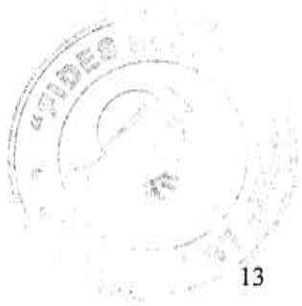
At a later stage, the future members of the Port Security Council /representatives of the Ministry of Interior, Fire Safety Service, Border Police and Maritime Administration/ will be required to give their current recommendations on issues concerning the security of the site.

Reasons for determining the required length of quay front - The main element that determines the parameters of all other port areas is the length of the quay front. It will be built in two stages, in accordance with the expected volumes of the expected cargo traffic types and the basic parameters of the designed vessels. A detailed analysis of vessels visiting the ports in the region is carried out in order to determine the working length of the quay front (mainly Varna East Port and Varna West Port) for the period 2001-2008. The possible changes of vessel traffic are also taken into account. Taking into

account the expected loads and vessel characteristics, different combinations of simultaneously handled vessels are considered. Thus, accounting for the necessary safety distances between vessels, the variants of the working length of the quay front are obtained. Below are the dimensions of the vessels in accordance with the ship's batches and the total lengths of the quay front for the first stage and the second stage.

Table 2.1. Analysis of the vessel lengths for the period of 2001 to 2008 in Varna East Port and Varna West Port.

Bulk cargo vessels		Container vessels		General cargo vessels	
length m	% of the total number	length m	% of the total number	length m	% of the total number
less than 50	0.49	less than 50	0.82	less than 50	5.14
50-60	0.80	50-60	0.41	50-60	4.18
60-70	2.77	60-70	0.82	60-70	6.43
70-80	4.73	70-80	0.82	70-80	12.86
80-90	12.66	80-90	7.41	80-90	16.56
90-100	7.31	90-100	10.29	90-100	11.09
100-110	10.08	100-110	5.76	100-110	10.13
110-120	8.17	110-120	8.23	110-120	8.68
120-130	6.15	120-130	18.93	120-130	3.86
130-140	8.17	130-140	16.05	130-140	5.63
140-150	5.10	140-150	9.88	140-150	5.79
150-160	3.44	150-160	10.70	150-160	3.22
160-170	5.84	160-170	5.35	160-170	2.89
170-180	7.19	170-180	2.88	170-180	1.93
180-190	11.19	180-190	1.65	180-190	0.96
190-200	3.38	190-200	0.00	190-200	0.48
200-210	0.61	200-210	0.00	200-210	0.00
210-220	0.06	210-220	0.00	210-220	0.00
220-230	1.60	220-230	0.00	220-230	0.16
230-240	0.06	230-240	0.00	230-240	0.00
240-250	0.06	240-250	0.00	240-250	0.00
250-260	0.12	250-260	0.00	250-260	0.00



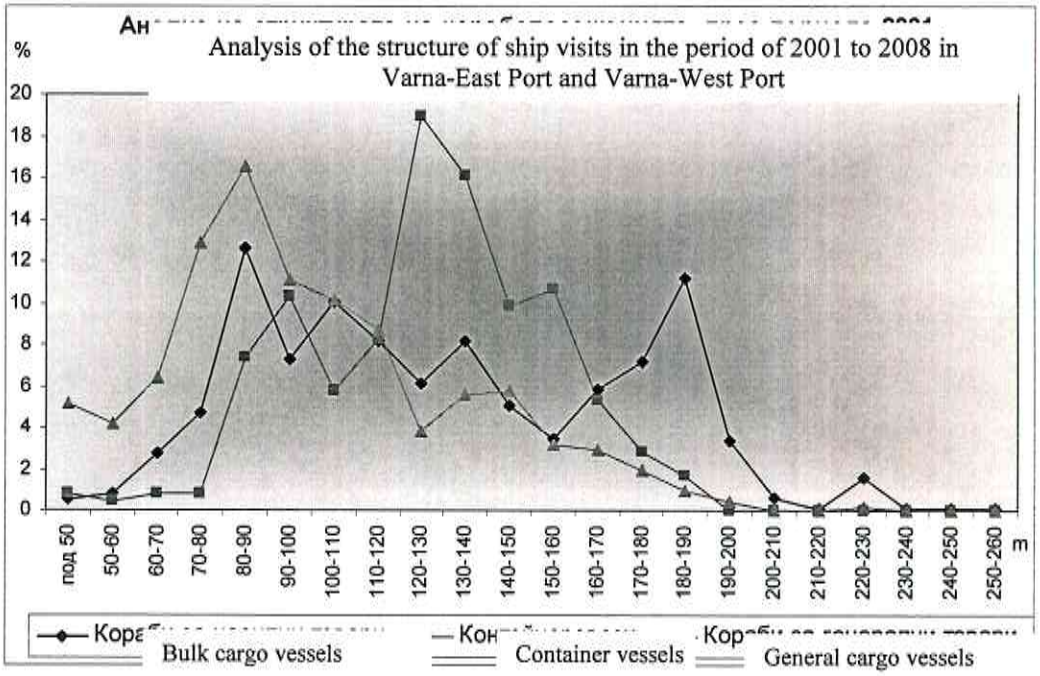


Fig. 2.1

The length of the quay front is determined based on these analyses for the first phase – 300 linear meters and option for the construction during the second phase of an additional quay front of 160 m or the port will have a quay front of 460 m in total.

Table 2.2. Basic parameters of designed vessels by types of cargo and determining the length of the quay front

First Phase

Variant	**Combinations to determine the length of the quay front**	Types and capacity of vessels	Approximate total DWT	Quay length
1	1x250m	Container vessel (approximate capacity of 3,000 TEU)/bulker Pnamax	50,000	300
2	2x125m	Container vessel (approximate capacity of 700 TEU) + Bulker / General cargo with approximate DWT 7,500	15,000	300
3	3x87m	Bulker, general cargo with approximate DWT 3,000	9,000	300
4	1x170m; 1x87m	Container vessel (approximate capacity of 1,500 TEU) / bulker Handysize + bulker / general cargo with approximate DWT 3,000	30,000	300

Note: For safe depth of Channel 2 – 12m.

The process of considering normal shipping batches and discussing various quay lengths resulted in the selection of such a quay length that allows for receiving and handling the biggest share of the mass vessel visits. The presented variability ensures batch handling in the busiest period by type and quantity

Table 2.3. Basic parameters of designed vessels by types of cargo and determining the length of the quay front

Second Phase

Variant	**Combinations to determine the length of the quay front**	Types and capacity of vessels	Approximate total DWT	Quay length
1	1x250m; 1x140m	Container vessel (approximate capacity of 3,000 TEU + 1,000 TEU / bulker Panamax + bulker DWT 14,000	64,000	460
2	2x220m	Container vessel (approximate capacity of 2,500 TEU) / Bulker, general cargo with approximate DWT 40,000	80,000	460
3	4x130m	Container vessel (approximate capacity of 700 TEU) / Bulker, general cargo with approximate DWT 8,000	32,000	460

Note: For safe depth of Channel 2 – 12m.

The enclosed figures graphically shows typical combinations of simultaneously handled vessels that justify the need to build a quay front of 300 meters in the first stage of construction.

The draft Master Plan specifies technical data of the vessels frequently visiting Varna region, including grouping of vessels - container vessels, different types of bulkers and general cargo vessels.

The draft Master Plan specifies the main parameters of the vessels actually used to determine the length of the quay front.

The following operations will be carried out during the construction of the port complex – dredging works, quay structure, warehouse facilities, completion and reconstruction of main internal road communications, equipment.

The listed elements includes virtually all the major parameters provided for the development of Port - Logistics Center Varna.

2.2. Use of natural resources and energy sources, raw materials and other materials (mainly electricity and drinking water)

During the **construction period** the following types and estimated quantities of resources, materials and energy sources will be used:

- concrete – for the construction of warehouse and work platforms, foundations and supporting structures of the buildings – about 20,000 m^3;
- reinforcing steel – for reinforcement of concrete structures and areas – about 15,000t;
- sand – for the preparation of land and grounds and for planning of land – about 5,000 m^3;

- gravel – for the preparation of land and grounds and for planning of land – about 8,000 m^3;
- flat construction sandwich panels – for the construction primarily of warehouse buildings – about 25,000 m^3;
- electricity – for the operation with manual power tools – about 6,000kWh;
- petroleum fuels – for the operation of construction and transport equipment – about 2,500t;
- lubricants – for the construction equipment and tools ~ 1,500l;
- varnish-paint materials for the application of protective coatings for buildings and facilities – 30t;
- welding electrodes for connection of elements during the construction of buildings and structures – about 1,500kg;
- water – for drinking, sanitary and hygiene needs and during construction – about 15,000m^3

During the **operational period** some types of materials and resources will be constantly used, and some of them – periodically, if required.

The following types and estimated quantities will be constantly used:

- electricity – for the operation with manual power tools – about 4,000kWh/a;
- petroleum fuels – for the operation of port machinery (during the operation of the port it is provided to use the following re-loading equipment – 2 mobile port cranes – about 100 tons; 2 richstackers second hand – 45 tons; 2 8-ton forklifts, 4 telehandlers of 3.5 tons; 4 forklifts of 1 and 3.5 tons and 6 port container tugs), and transport equipment – about 8,400t/a;
- lubricants – for port machinery, transport equipment and tools –about 3,500l/a;
- water – for drinking, sanitary and hygiene needs – about 20,000 m^3/a;

The following types and estimated quantities will be periodically used:

- concrete – for construction repairs – about 20,000 m^3/a;
- varnish-paint materials for the application of protective coatings for repairs of buildings and facilities – about 5t/a;
- welding electrodes for carrying out repairs of buildings and structures – about 150kg/a;

2.3. Total space requirement (including during the construction period)

The implementation of the investment initiative will take place on private land, formed from land plots with former numbers RLP I, RLP II, and RLP III, quadrant 25 of the of development plan of the town of Beloslav, with new modified structural numbers (Order 125 dated 26 February 2007 on the Mayor of Beloslav Municipality) with a total area of 211.86 decares – **Appendix 8 – *"Order 125 of 2007"***.

In the vicinity of the area in question there are urban areas, infrastructure networks, agricultural lands, national, municipal and local roads in the area of the town of Beloslav and the village of Strashimirovo.

The area is connected to the national road and rail network. It is electrified and connected to the water supply and sewerage and telecommunications networks.

The construction of structures will be carried out by local construction companies and contractors. Space of about 4,000 m^2 within the property will be required during the

construction works for temporary construction facility, including for the location of sanitary-domestic buildings necessary for the contractors.

2.4. Implementation of the investment proposal (construction period, operational period)

The implementation of the site **(construction period)** will include the performance of the following operations:

- Dredging works;
- Construction of quay wall;
- Construction works on buildings (warehouses, workshops and domestic-sanitary facilities);
- Vertical and horizontal layout;

The expected duration of the construction of the hydraulic structures of the terminal according to the expert assessments is 12-15 months. The implementation of the entire project will take about 18 months.

Dredging works – The volume of dredging works depends on the selection of the quay front configuration. The quay and the moored vessel should not interfere with the navigation through Channel 2. The more inland is the quay dug, the safer it will be for navigation.

The Preinvestment Study of Port - Logistics Center Varna considers three possible variants for the construction of the quay front. During discussions with the Contracting Authority, the further research and design on Variant – **CONSTRUCTION OF QUAY WALL WITH SHALLOW DREDGING**. The design provides for dredging up to -12 meters (the design depth of Channel 2.

The overall project includes the length of the quay wall of 460 meters or excavation and dredging of about 540,000m^3, which are divided into two parts of about 440,000m^3, which will be formed from the shore as an excavation and 100,000m^3 from the offshore. The withdrawal from the bank will be carried out after the completion of the quay wall with specialized equipment.

Dredging from the offshore is expected to be carried out with specialized dredging equipment and for this purpose three variants have been discussed – bucket dredger, suction machine or dredging with pneumatic chambers and pumps. Preliminary talks with dredging companies were carried out for this purpose. The different types of dredging have different advantages and disadvantages which will be taken into consideration when determining the contractor.

In case of need for future expansion, the quay wall may be increased to 460 meters without dismantling and reconstruction of sewage treatment and electricity facilities. The entire length of the water boundary of the site is 1,250m. By the beginning of the implementation process, the investor should have examined and clarified the possible methods and places for legally compliant disposal of residual dredging masses appropriate to their composition and quantity.

Quay wall - After the analysis made and the comparison of all known structures, the numerous consultations with specialized construction companies and port experts, the project consultants of the Contracting Authority proposes to use for the needs of Port - Logistics Center Varna a *Quay wall with steel sheet pilings with additional anchoring.*

The available land plots provided for **warehouse** areas at present are sufficient for handling of all general cargo and containers. The project provides for rehabilitation of the open storage areas for containers and the covered sheds for containerization and decontainerization. The main warehouse facility, scheduled to be built, is a universal silo for grain and other bulk cargo. The determination of the main characteristics of the individual units and equipment and their territorial situation is coordinated to:

- their compliance with the quantities, types and characteristics of handled cargo, vehicles and requirements for environmental protection, occupational safety, fire safety, etc.;
- functional bond between the individual units and sections;
- internal transport links;
- compliance with the statutory clearances of all requirements.

The technological equipment consists mainly of lifting and transport equipment with continuous operation - RBC (rubber belt conveyors).

Silo cells are low-volume, each of 2000m^3 – 14 in number with total capacity of 28,000m^3. They are located close to the quay wall. The vessel is loaded using a specialized loader with thrower for under-deck compartments and linked to the silo cells by means of covered RBC.

Completion and reconstruction of main internal road communications – The project provides for relocating the existing road connecting the covered warehouse with the main gate, connection of various platforms through internal roads, placement of pavements and vertical layout of all platforms, supply and installation of a new 90-ton weighbridge.

Equipment - Upon commissioning the port, the project provides for the purchase of re-loading equipment – 2 mobile port cranes second use, maximum 5 years old, capacity of about 100 tons; 2 richstackers second hand – 45 tons; 2 8-ton forklifts with cut hub for use in containers; 4 telehandlers of 3.5 tons; 4 forklifts of 1 and 3.5 tons and 6 port container tugs.

Transport and communication infrastructure

- **port railway network, railway approaches and connection to the national railway network** – On the territory of Port - Logistics Center Varna there is one railway line connected to the national railway network. With a view to the structure of cargo traffic and the location of the port, it is expected that the share of road transport for import-export of the expected cargo strongly dominates the share of railway transport. However, the port will have the necessary track development which meets the requirements for safe handling of various types of railway wagons. No track development is provided for on the quay front. Varna Rail Ferry Complex is located near the Near the Port - Logistics Center Varna with the option of changing the undercarriage from European to Russian standard and vice versa. The proximity of this unique complex creates logistics options for a direct connection with Ukraine (through Illichevsk railway ferry complex), Georgia (through the railway ferry complexes of Poti/Batumi) and Russia (through the ferry line Varna-Caucasus). For purposes of this investment proposal it is not necessary to build new routes of the railway and road transport network.

- **road approaches and connection to the national road network** – Port - Logistics Center Varna has an easy and convenient access to the national road network. Road E-87 through Asparuhov Bridge connects the port with Burgas, southern part of Bulgaria and the border with Turkey. The lake road can be used to quickly move various vehicles to/from Port - Logistics Center Varna from/to other important freight routes: Hemus Motorway (Varna-Sofia) and Rowad E-70 (Varna - Ruse). Port - Logistics Center Varna is conveniently located with respect to the pan-European transport corridors passing through Bulgaria, which are: IV, VII, VIII, IX, and X. The country is crossed by a network of international roads that provide important links with Western Europe, Russia, Asia Minor and the Black Sea. To the west, next to Port - Logistics Center Varna is Beloslav Ferry Complex. It is practically a "mobile bridge" that crosses Channel 2 and connects the two parts of the town of Beloslav. It is used to transport vehicles and passengers. It is served by Beloslav ferry and Bella support vessel, which are owned by Beloslav Municipality.

- **vertical layout and pavement** - In the past on the territory of Port - Logistics Center Varna was located Belopal factory and it had constructed vertical layout, the necessary pavements and internal roads for the full implementation of its operations. Vertical layout has been developed in accordance with the Terms of Reference and the functions of the port so that it can create conditions for the implementation of the new port functions. In practice, all internal roads are built. The project provides for the completion of the main road link between Gate 1 and Gate 2 which uses part of the existing road development. The new part of the road link passes along a route which connects in the most rational way the different port areas. The project also provides for internal road links between the quay front and the areas for containers, as well as containerization-decontainerization, the area where the silos are to be built and all subsites of the investment programme by years in accordance with the cargo development. It also provides for rehabilitation works associated with existing objects of the vertical layout and pavement. In practice, the entire port territory (without the covered warehouses, buildings, objects of engineering infrastructure, such as transformer stations, etc.) is a port platform where zones and road passages are defined by means of the road markings in accordance with the needs of the actual operating environment. The horizontal markings will be duplicated as in many European ports through mobile modular elements.

- **Technical infrastructure**

Power supply, lighting, electric systems and equipment - On the territory where Port - Logistics Center Varna is developing there is a completely developed power supply system. The system meets the operational suitability requirements and has two power circuits. The project provides for supplying the necessary power to all technological and domestic sites and consumers in accordance with the Master Plan. The lighting of Port - Logistics Center Varna will meet the regulatory requirements and will ensure safe and efficient operation in the nighttime, taking into account the specifics of the relevant technology areas. The port will be able to provide vessels with electricity, which is part of the offshore-port technical services. The quay will be illuminated according to all the requirements for operational suitability. The lighting will not interfere with the navigation in Channel 2 at night and should be sufficient to carry out mooring operations. The lighting of port areas is included in the investment program. Lamps complying with the required

rate of lx will be used in the construction and furnishing of the relevant sites to the areas of the silo facility, the open areas and the rehabilitation of internal roads.

Water supply and sewerage – systems and facilities - On the territory where Port - Logistics Center Varna is developing there is a completely developed water supply and sewerage system. The territory of the port has a pumping station directly connected to the treatment plant of the town of Beloslav. The project provides near the quay front the construction of a system for supplying ships with fresh water, which is part of the offshore-port technical services. In practice, Port - Logistics Center Varna will be the only Bulgarian port with complete sewerage system in accordance with the Bulgarian requirements and the requirements of the European Union. On the territory of the port there is a well developed sewerage system and network for drainage of rain water. Water supply branches are connected to all planned areas and users of drinkable water (to tap).

Appendix 9 - *Permit Documents and Diagrams of Developed Infrastructure Systems*

Heating, ventilation and air conditioning – systems and facilities - The domestic buildings and offices will be furnished with power-based air conditioning system for heating and cooling. Thus the requirements for environmental protection are met in the highest degree. No additional waste will be generated. The projects provides for the creation of optimal labour conditions in the main indoor facilities. The required resources are provided for in the investment programme on a separate line. During the rehabilitation of the premises, the heating systems will be upgraded.

In terms of the communication networks, all major mains (water supply, telecommunications, sewerage, power lines, gas supply) have already been built with connection point to the newly provided specific internal users. There are the following communication sites:

- Two completely renovated electric power lines 20kV medium power connecting the nearby substation of the National Electricity Company with its own electric distribution station.
- New underground pipe network, allowing for the passage of electric power to each facility on the design site;
- The eastern end of the site is crosses by 3 overhead power lines of 110kV each in the direction north-south;
- The water pipeline for supplying drinkable water with a flow rate of 22 l/s has been completed;
- New sewerage system has been completed, connected to the water treatment plant;
- Gas pipeline at the project border, allowing for direct connection to the supplier - monopoly BULGARGAZ AD (direct contract with BULGARGAZ AD under certain conditions, such as consumption above a defined annual volume of gas is possible to be concluded under more favourable conditions and prices);
- Near the territory of the site there is a mineral source - well, P-63-X with a water temperature of 30 °C, flow rate of 18 to 30 l/s and good drinking quality.

Information part - In accordance with the Bulgarian legislation, the port operator must meet the requirements of Ordinance 919 on statistical information. A file is created for each handled vessel that is kept under the established procedure. In accordance with

Ordinance 919, information is periodically filed with the Executive Agency "Maritime Administration" (EAMA), while working on the current edition of the program STAT 919, version 6. The plan is to build internal information systems for the overall warehouse-dispatch and accounting operations. To facilitate the operation of the agents and freight forwarders, and to attract new clients, operational information about the activities of Port - Logistics Center Varna will be posted in Internet every day. In order to track the regulated access of people and vehicles the project will use specialized information systems. A video surveillance system will be implemented in various port areas on the territory of the port. In the course of the construction of new ports in recent years, more and more attention has been paid to the development of information systems through which to achieve high operational efficiency, reliability, customer contact and control bodies, which are related to port operation. The aim of the worldwide leading ports is the creation of **Port community system**. It is recognized that in Varna port area, SE Port Infrastructure and the largest operator Port Varna EAD undertakes efforts to actively work for the connection of VTMIS with the existing port information systems in order to build **Port community system**. The process to improve the information provision to the greatest extent leads to efficiency in the transport and handling of containers.

In terms of manufacturability, the design and technological solutions considered in the development are modern, reliable, corresponding to the natural conditions and quickly achievable with the available construction equipment.

In terms of operability, the design solutions are reliable and durable, not requiring heavy maintenance. The situational solution is relatively convenient to navigational aspect.

To environmental aspect, the location of the sources of harmful emissions in the site is most consistent with the sanitary-protection zones (as long as the terrain allows), and in the sanitary-protection zone of some working areas, such as bulk cargo warehouses, no residential facilities will be designed. Thus the health of the population is not significantly endangered.

The accepted construction methods and structures do not have a serious impact on the environment. The most significant environmental impacts during the construction period will be caused by dredging works.

Description of the main characteristics of the operational process

The operational process of Port – Logistics Center Varna includes handling of containers and a wide range of general and bulk cargo with conventional and specialized technologies in a direct and indirect variant. In the future there are no plans to specialize the port for container handling (loading, unloading, containerization/decontainerization) and for grain loading. The plan is to build port facilities for handling about 1 million tons of general cargo per annum, including containers of 10-15 thousand TEU per annum and cargo in bulk. In the long run the containers will reach and surpass 100 thousand TEU.

The possible handled goods and technological options are considered in detail below.

General cargo - Classical type of technological lines will be used for general cargo handling, ensuring standards of service appropriate to the intended quantity and types of cargo. The process is characterized by the usual demand for labour force in accordance with particularly developed technology cards.

Variants of work – direct and indirect variants of freight service are possible and will be used depending on what lifting and transport equipment will be used in cargo handling and

whether the goods will be transported immediately or after a temporary stay in the warehouse.

Direct variants

- vessel - mobile crane - vehicle or vice versa;
- vessel - mobile crane - internal transport - vehicle or vice versa;

Indirect variants

- vessel - mobile crane - warehouse or vice versa;
- vessel - mobile crane - internal transport - warehouse machinery or vice versa;
- vessel - warehouse machinery - vehicle or vice versa;

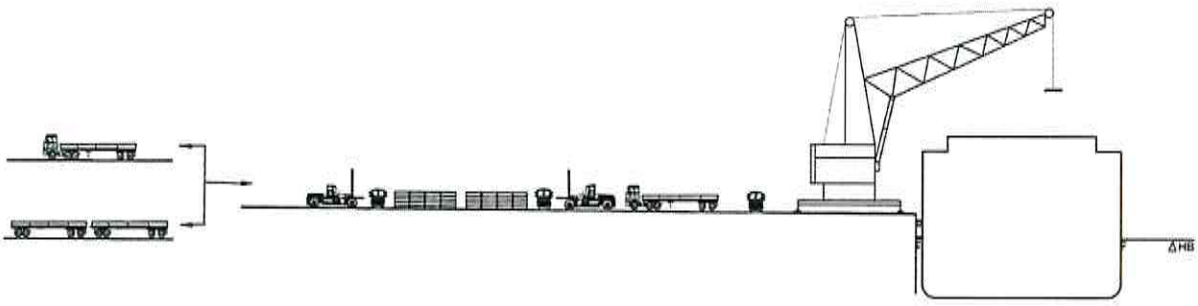


Fig. 2.2. Variant of work "vessel - mobile crane - internal transport - warehouse machinery - warehouse" and shipping

During loading-unloading operation mobile port cranes will be used completely covering the need for a safe load capacity for handling cargo volumes that are usual for the area. Front fork loaders will be used in the warehouses equipped with the widest range of replaceable load-fastening devices.

The port can handle a wide range of various general cargo for indoor and outdoor storage.

Indoor storage

- all kinds of non-ferrous metals requiring indoor storage;
- cargo in big bags, boxes, crates, etc.;
- short-term storage of fresh fruits and vegetables;
- other cargo requiring indoor storage or special arrangements.

Outdoor storage

- all types of ferrous metals;
- timber;
- cargo in crates, drums and other containers;
- other cargo that meet the requirements for loading on the quay.

Bulk cargo - it is appropriate to use specialised technology for grain storage and re-loading, which will increase the competitive level of the port services on the market, attract customers and increase the throughput performance of the port compared to the conventional technologies used for bulk cargo in Bulgaria. The supply of silo storage capacity at the beginning of the operation and the opportunity to its increase will attract customers with different share in the cargo handling by providing them storage conditions covering new standard of service. The silo facilities have incomparable competitive advantage with an option for simultaneous storage of batches provided by various owners and of various types of cargo.

Variant of work - there are several technological variants.

- Silo - rubber belt conveyor system - mobile rubber belt loader - vessel
- Vehicle - mobile rubber belt loader - vessel
- Silo - rubber belt conveyor system - tray- grab crane - vessel
- Vehicle - tray- grab crane - vessel

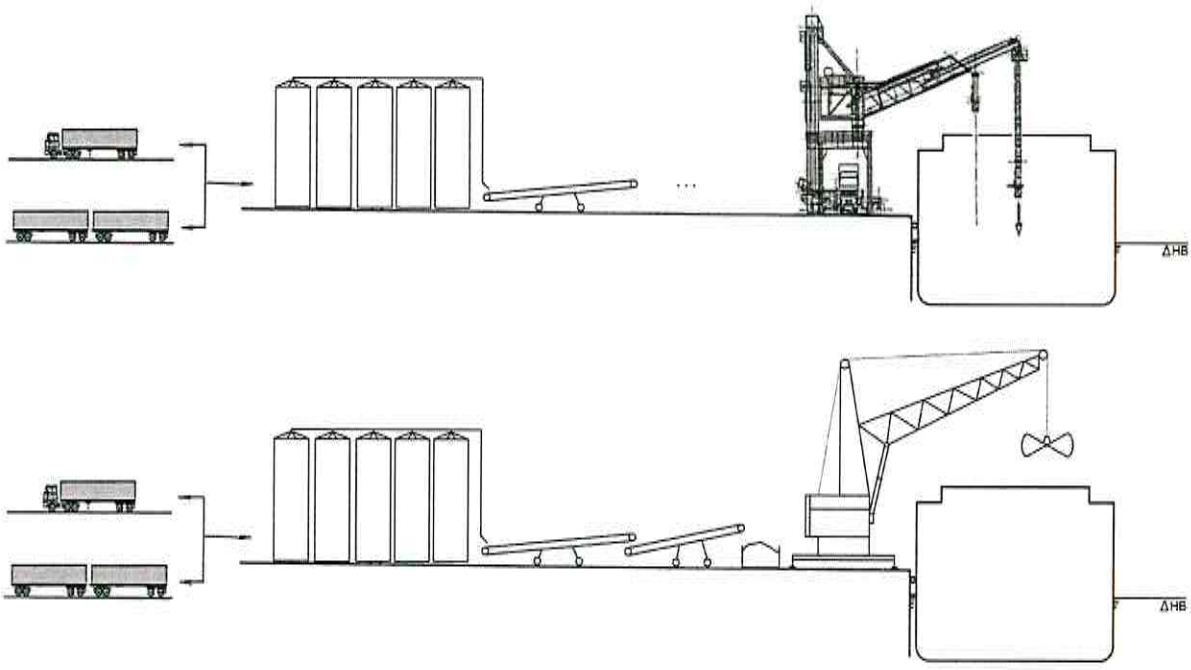


Fig. 2.3

Types of bulk cargo, which may be handled in the port:

- Indoor storage

- all types of grains and bulk products produced thereof.
- other cargo requiring indoor storage or special arrangements.

Priority will be given to the use of mobile rubber belt loader which is capable of feeding the load from rubber belt conveyor or external trucks. In case of any specifics of the handled cargo the port operator may in exceptional circumstances apply the grab technology. The cargo will be transported from the silos or indoor/outdoor warehouse to the quay operational zone through belt conveyors or dump trucks.

The main points in the grain handling will be:

1. The vehicles loaded with grain will travel on the road and will enter the port through the loading gate on the side of the village of Strashimirovo. They will drive to the highest point of the internal road near the northern fence and from there, the vehicles will reach the receiving station. The elements of the receiving station are - sampling point. The vehicles, which transport contaminated grain, will be diverted from the port and will leave

it. The vehicles, which transport uncontaminated grain, will be deviated to a drying point providing air for the tires and vehicle floor in adverse weather conditions. In dry weather the vehicles will move forward and will stand over the feed hopper. The dimensions of this facility allow unloading of the grain through rear and side dumping. Tilting device for the vehicles other than dump trucks will be constructed. Such types of devices may be found in Varna ports. These three points - the sampling point, drying point, which allows for drying of the chassis, and the dumping point, are located in the same premise, which allows the smooth acceptance of the grain in all conditions.

2. The grain is unloaded into the silos system feed hopper. The operator of the feed hoper directs the flow of grain to the respective storage silo. The grain transport system consists of rubber belt conveyor (RBC). It is a covered system, which allows work in adverse weather conditions. Dumping from several vehicles at the same time may be provided for in order to achieve maximum load of the RBC.

3. The grain may be stored in the silos for a long period of time in order to be dried or if it has to wait for a ship, proper price, decontamination, etc. The stay may also be short-term - if certain amount of the grain needs to be preconcentrated before the arrival of the ship. The system provides for direct handling as well - the grain will be transported from the feed hoper through RBC directly to the ship reloading machine. This will facilitate to a large extent the situation in front of the ship loading grain from the vehicles under the traditional use of grab shore cranes.

4. RBC to transport the grain to the operational zone of the quay. This system is equipped with feed hopper, which accepts the grain from each silo separately and directs it to the main RBC in order to be transported to the quay. In choosing the appropriate elements of this system the maximum performance should be taken into account, since this will be the main system, which will reach the allowed reloading rate per ship per night. Performance of about 400 tons per hour is satisfactory but is not sufficient to make this port a preferred one.

There are several variants for construction of technological lines in the operational zone.

The first main variant relates to the flow of grain coming from the silos. When the grain reaches the operational zone the RBC will transport it to the feed hopper of the ship reloading machine. Lots of grain reloading machines are offered on the specialised port equipment market.

The pneumatic machines will not be covered by this project due to the previous experiences in the ports and the complaints caused by them. These machines crush the grain, which inevitably causes the recipients' dissatisfaction.

The machines equipped with bucket conveyors, chain conveyors and similar devices are also unsuitable, since they are difficult to maintain and are almost unable to achieve the RBC performance.

To achieve continuity of the grain flow and to unify the system RBC should be used. It is the most appropriate solution for the grain reloading machine. The grain reloading machine will be custom made. The feed hopper will be located at the beginning of the operational zone and the other end of the operational zone will be located over the cargo hold of the ship. Structure where the part over the ship is held by shore crane may be

constructed. The use of uniform RBC system to feed the load will avoid the interruption of the reloading process, as would happen if a machine with cyclic operation, such as a shore crane, is included.

In order to increase the daily performance the conventional technology used by the Bulgarian ports may also be applied.

The vehicles unload the grain directly on the site in front of the ship or in a receiving tray with dimensions larger than the capacity of the vehicle. There is also a secondary tray where tilting device assists the trucks other than dump trucks to unload the grain. The shore crane scoops the grain by suitable grab and loads it to the ship.

If the two shore cranes provided for the quay do not have to perform other tasks and are not subject to repair, these variants allow for the erection of 3 technological lines. Then at least two bucket wheel loaders will be needed to work on the site. Their task will be to collect through their buckets the thin layers of grain on the site which can not be collected (scooped) by the grabs of the cranes. At least two trays and one tilting device for the vehicles will be needed. The port should also have covers for all trays and for part of the site (about 100 sq. m), which will be used in case of adverse whether conditions,which do not allow loading of the ship.

When loading the grain with shore cranes the vehicles will have to enter the site. This will require the second loading gate to the village of Strashimirovo to be opened. From there, the vehicles will enter the port. For this purpose, second sampling point will be placed near this gate. After taking the suitability sample needed to load the grain the vehicles will be weighted on a weighbridge, which is part of the receiving point of the silos. Portable weighbridges may also be used. They may be placed on the site of the operational zone.

The vehicles will enter this gate in order to avoid the congestion on the long-distance road. The vehicles, which have unloaded the grain, will leave the port through the same gate in order their tare to be taken. If the weighbridges are located on the site of the operational zone, then the vehicles, which have unloaded the grain, may also leave the port through the main vehicle gate to the ferry site. Definitely, the placement of the weighbridge in front of the ship immediately before unloading of the grain is preferable, although the budget will be increased by the value of another mobile weighbridge.

The free area to the east of the silo group may be used for outdoor storage of materials and spare parts for the silos or for storage of the port equipment, which is not influenced by the weather. Shelter is located under the 110 kV power transmission lines. Its construction does not comply with the provisions of Ordinance 16 on the Distances in Power Supply. The shelter may be used as a temporary structure during the construction of the silos or the other sites in the port. It would be better to dismount and relocate the shelter to another suitable location and to used it for storage purposes. Such relocation would not have exceeded 20, 000 -30,000 BGN.

Variant to handle the containers - the area identified for container handling has a total area of 59,900 m^2, of which 51,800 m^2 is a warehouse platform and 8,100 m^2covered warehouse intended for decontainerization. The design storage capacity for the full containers (import, export, refrigerated , hazardous waste, oversized and excise containers) is 2,016 TEU, of which 288 slots are intended for refrigerated containers and 525 TEU of the capacity is intended for empty containers stacked in 5 rows depending on their height.

The total storage capacity is 2,541 TEU if the full containers are stacked in 3 rows depending on their height. The full capacity is 3,213 TEU if the containers are stacked in 4 rows depending on their height. The containers are transported mainly by road vehicles and the manoeuvring complies with the estimates and is comfortable and safe.

The container-carrying vessel, which is planned to be used, is a third generation vessel with a capacity of approximately 3,000 TEU. The terminal will be equipped with modern artificial intelligence based management systems. The OCR applications will be widely used in the container handling. Thus the compensations paid to customers will be reduces to the maximum possible extent and responsibility from the port operator will be sought. The full automation of the entry and exit points will improve the accuracy and reliability of the data entered by the operators, will optimise the use of labour force, will reduce the likelihood of accidents with the staff, will reduce or completely eliminate the verbal communication, will provide an opportunity to keep a record of the container and the trucks from all sides, will allow for the immediate and accurate placement of a resolution to the customer's claim, will reduce the time for verification and entry of the data in the database system to 10 seconds, will completely eliminate the entry and exit points as a throughput performance in the terminal, will increase the throughput performance of the points and will give an opportunity for full electronic prebooking.

The technological variants for container handling are, as follows:

- Hold - gantry crane - terminal transport - reach stacker - stacker or vice versa;
- Warehouse intended for decontainerization - terminal transport - reach stacker - handling cell or vice versa;

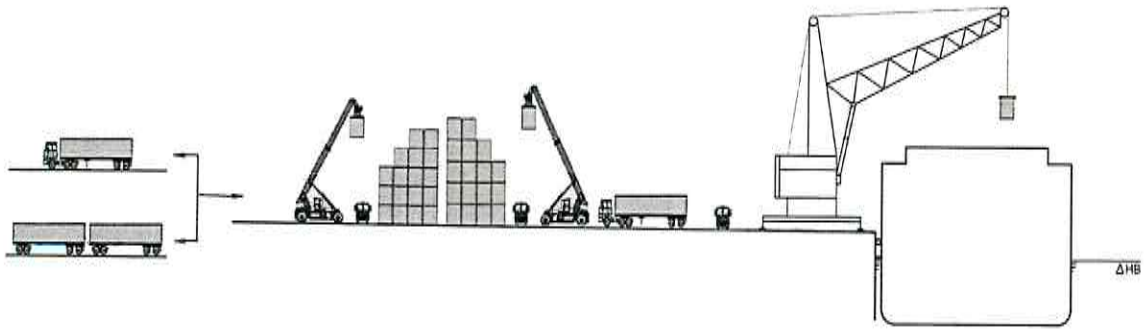


Fig. 2.4

The container-carrying vessels will be initially handled by two mobile cranes which load profile and clearance ensure the work above the geometric cross-section of the diametrical plane, in particular in its largest part. The cranes will be equipped with automatic spreaders and rotor. The rotator will increase the performance of the cranes and will improve the quality of the reloading operations. In this design stage modern reach stackers equipped with automatic spreader, which allows 8 levels of handling, will be used to store the containers. The containers will be transported between the quay front and stack by specialised container trucks. The use of this type of equipment determines the method to store containers in the storage site. Longwise the quay 7 modules intended for full containers and a block module for the empty ones are designed. The full containers will be stacked in modules of two rows in width, three rows in height and a length of 24 TEU.

Two of these storage units are intended for storage of refrigerated containers. The empty containers will be stacked in block module directed transversely along the quay located to the west of the stack provided for full containers with dimensions, as follows: length of 21 TEU, 5 rows in height and 5 rows in depth. To stack the empty containers wheel loader (empty handler) will be used. The throughput performance of the quay front will be determined based on the throughput performance of the technological line units, as each technological line will consist of quay reloading machine, terminal transport and logistics equipment. The basis to determine the throughput performance of the technological lines will be the reloading time per container (working cycle time) and hence the number of crane movements per hour. In handling the container-carrying vessel the average statistical movements of the mobile cranes per hour are15-20. Based on the above parameters in may be concluded that the throughput performance of the quay front using two mobile cranes will probably be over 40,000 movements per year or over 60 TEU. Pursuant to the terms of reference in the beginning the port should be able to handle about 10-15 thousand TEU, while as of 2020 it is expected to handle about 100 thousand TEU per year. Where necessary, if the container traffic exceeds 35,000 containers or exceeds 52,000 TEU, third quay crane may be purchased.

The containers will be handled through the following technological variants:

- Ship work

ship - crane - vehicle or vice versa;
ship - crane - vehicle - container machine - stack or vice versa;

- Stack work

- stack - container machine - truck or vice versa;

The covered warehouse intended for decontainerization will be located next to the warehouse platform and will have the following parameters: length - 90 m; width - 60 m; total area - 5,400 sq. m; capacity for simultaneous handling of containers - 12; transition area - 1,620 sq. m; useful area - 3,780 sq. m. The throughput performance will be determined based on the following parameters of the warehouse: useful area - 3,780 sq. m; average useful height of stacking - 2 m; average stay of the cargo from / for one container in the warehouse - 10 days; maximum cargo which may be simultaneously stacked in the warehouse - 2,700 tons. Hence the throughput performance of the warehouse will be 98,550 tons or 7,039 TEU per year.

Figure 2.5 shows a warehouse intended for decontainerization.

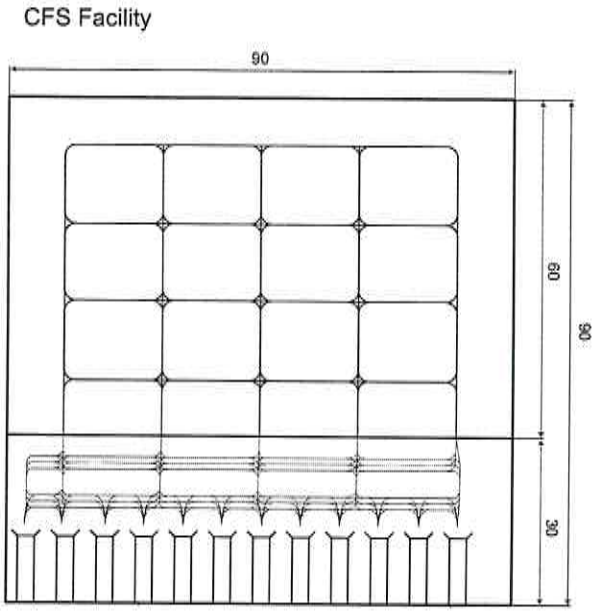


Fig. 2.5. A warehouse intended for decontainerization

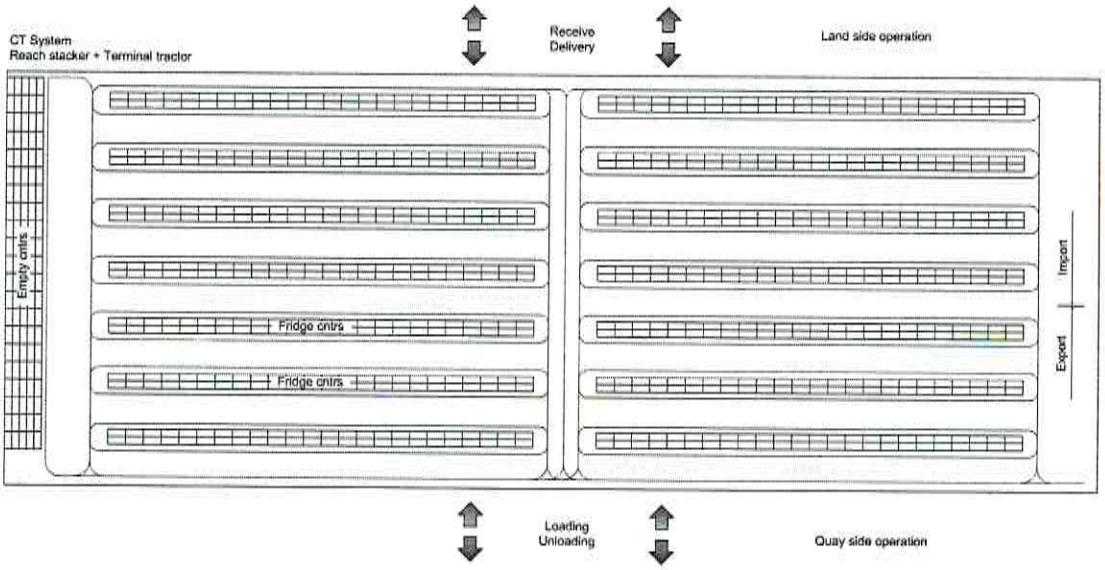


Fig. 2.6. Container stack technology plan

Thus, based on the design parameters it may be concluded that the container terminal will be able to cope with the container traffic set out in the programme thanks to the proposed handling technology and method of stacking The introduction of another type of logistics equipment and method of stacking will significantly increase the throughput performance of the storage area and the terminal as a whole.

Port – Logistics Centre Varna will be able to handle containers, bulk and general cargo by using, directly and indirectly, conventional and specialised technologies and all reloading machinery and equipment required for this purpose - ***Appendix 10 - Technological Plans and Handling Equipment for Various Types of Cargo".***

Greater throughput performance, which will enable the handling of larger cargo traffic, especially in the part of the containers, may be achieved by gradual introduction of new machinery and latest technologies.

An analysis has been made in order to identify which of the existing infrastructure elements of the site may be used in and / or adapted to the port services offered and to the activities of the new port terminal.

The main impact of the investment proposal relates to the alteration of the landscape features of the area, change of the water bodies and streams, creation of potential acoustic and visual discomfort and waste generation .

The construction and operation of the complex will have a minimum impact on the flora and fauna. Neither habitats of animal species, nor plant communities on the site will be affected.

The implementation of the investment proposal will not affect the existing cultural monuments (historical, architectural and archaeological). During the construction any the possible discovery of unknown monuments should be taken into account. In case of such discovery the requirements of the legal documents should be met.

The implementation of the investment initiative will have a positive social effect for the municipality and will create conditions for better and profitable use of the area. No adverse impact on the human health is expected.

III. ANALYSIS OF THE EXISTING SITUATION (characteristics and analysis of components existing problems), ESTIMATION AND ASSESSMENT OF THE EXPECTED IMPACT

3.1. AMBIENT AIR

Climate and weather conditions of the region (influence of the local conditions on the possibilities of further contamination or self-purification)

Beloslav falls in the European continental climatic zone, humid continental climatic sub zone, eastern climatic region of the Danubian Plain. The climate is milder due to the proximity of the town to water bodies, such as Black Sea, Varna and Beloslav lakes, and their influence. The climate nature is determined mainly by the influence of the Mediterranean and Atlantic cyclones, which moves eastward. The winter in the area concerned is relatively mild, the summer is cool and autumn is long and warm.

The area concerned is located to the north of Beloslav lake at an altitude of 15-20 m. To the west of it Devnya industrial area is located and to the east of it - the territory of Varna Municipality.

The difference in the relief, landscape and industry, as well as the difference in the location towards the measurement points compared determine the reliability of the data about the climatic and meteorological factors, which is sufficient for the purposes of this report.

Wind

One of the climatic elements with the largest impact on the distribution of pollutants emitted into the atmosphere is the wind. The concentration of pollutants from permanently operating sources is inversely proportional to the wind speed: if the wind has a constant direction the contamination is greater than in the cases where its direction is variable.

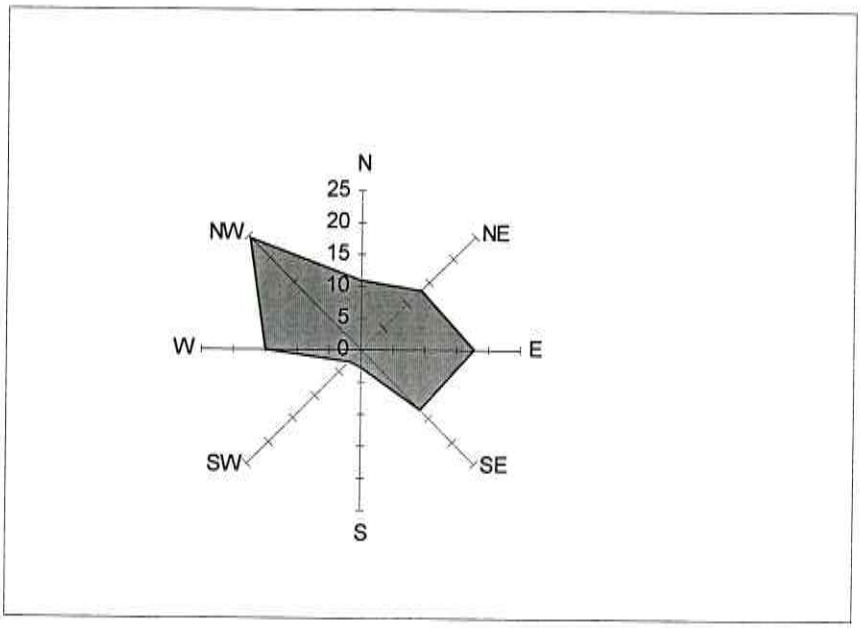
The multi-annual measurements of the wind speed and direction repeatability are typical for the area. The materials of the meteorological stations in the village of Strashimirovo and Varna airport (about 4.8 km to the northeast of the site) contain milti-annual, seasonal and current values of the parameters related to the wind processes in the area, which show that the winds the northern quarter prevail - about 50%. It is important that the wind speed should not exceed 10 m / s, which covers approximately 90% of cases. The distribution of these winds is presented in the following table:

SEASONAL WIND DISTRIBUTION AND DISTRIBUTION BY DIRECTION

Table 3.1-1

Season	Direction								Amount
	N	NE	E	SE	S	SW	W	NW	
Winter	18.19	6.33	11.74	7.66	3.11	1.98	18.41	18.08	85.51
Spring	13.99	10.43	23.88	17.32	3.04	2.37	10.97	8.72	90.72
Summer	17.88	8.69	20.51	21.10	2.19	0.93	11.96	11.51	94.77
Autumn	19.93	11.67	18.52	12.43	2.87	3.34	12.16	10.84	91.76

Average annual wind rose



The differences in topography, landscape. etc. give some variations of the climatic and meteorological factors of the concerned site compared to those of the indicated points, but we believe that the reliability is sufficient for the purposes of this assessment.

In this particular case, important are the northerly and easterly winds which could carry air pollutants over the town. As the table shows, the average easterly winds are about 19% of the days with wind, and the northerly winds are 17%. Typical for the region are the moderate and strong winds – the average annual wind speed is about 3.5 m/s.

The average frequency of days with strong winds – over 5 m/s, which causes a high level of turbulence and effectively dissipates the pollutants is 20.3% (for Varna station).

Important in terms of opportunities for retention and accumulation of pollutants in the air are the cases of calm weather. Black Sea coast is among the areas with the lowest frequency of calm weather – less than 25% of the monitored days. For the concerned area, the cases with calm weather (wind speed below 1m/s) are on average about 35%, i.e. the pollution potential is relatively high.

Phenomenon typical of the region is the presence of breeze circulations. They appear in early spring and last about 90 days per year. Their greatest manifestation is in July-August. The speeds of breeze winds vary from 3 to 5 m/s, and their direction is NW-SE. The average wind speed is 3.5m/s, and the average monthly speeds according to the following table:

AVERAGE MONTHLY WIND SPEED m/s

Table 3.1-2

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Speed [m/s]	3.8	3.8	3.9	3.3	3.1	3.1	3.1	3.1	3.5	3.7	4.0	3.6

Air temperature

The air temperature is one of two major weather elements. The average monthly and annual valuesfor a particular multi-year period are most commonly used to characterize it.

The average annual temperature (for Varna station) is 12.1°C. The following table presents data on the average monthly valuesof air temperature.

Average air temperature by month, °C

Table 3.1-3

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1.2	2.5	5.1	10.1	15.4	20.1	22.6	22.4	19.0	13.9	9.1	4.0

The table shows that the annual course of temperature has a minimum in January and a maximum – in July, which with few exceptions is typical of the whole country. The lowest is the average air temperature in January +1.2°C, and the highest one is in July +22.6°C. The positive average January temperature, on the one hand, and the relatively high average July temperature, on the other hand, are evidence of the transitional continental climate features. This is confirmed by the average annual temperature amplitude (about 21°C) which is not high.

Rainfall

The rainfall purify the atmosphere and contribute to falling and distribution of pollutants from the air into the soil and surface water. The monthly distribution of rainfall (for Varna Airport station) is presented in the following table:

AVERAGE MONTLY RATE OF RAINFALL in ImmI **Table 3.1-4**

Month	I	II	III	IV	V	VI	VII	VII I	IX	X	XI	XII
Rainfall	32	27	29	36	41	62	48	38	31	55	50	53

Two maximum and minimum rainfalls are recorded during the year. The rainfall maxima are in June and October and the rainfall minima – in February-March and September.

The ratio of the amount of rainfall during the cold half-year (November-April) to

that during the warm half-year (May-October) for the region is 0.83. According to the weather and climate observations, when this ratio is less than 1.0 it is assumed that the seasonal distribution of rainfall is not favourable for their cleansing effect – due to the greater incidence of stable stratification of the atmosphere during the cold half-year.

The rainfall contributes to falling and distribution of pollutants from the air into the soil, surface and shallow underground water. The average annual rainfall for the region of Varna is about 500-560mm.

Out for the total number of rain days – an average of 115.8 per year (for Varna station), the days with rainfall above 1 l/m^2 which "wash out" the pollutants from the ambient air are in a significant number – an average of 66.4 per year, distributed by months as follows:

Average number of days with rainfall over 1 l/m^2

Table 3.1-5

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Av. annual
6.6	6.2	5.2	6.6	5.7	6.4	4.7	3.6	3.2	4.7	6.4	7.1	66.4

Air humidity

The relatively higher air humidity in the area sue to the proximity to water bodies determines opportunities for hydration of pollutants to form new toxic compounds. The average annual relative air humidity is 77%, the maximum value – 82% is in winter and the minimum - 70% – in the summer.

Relative air humidity by month, °C

Table 3.1-6

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
82	80	78	78	78	74	70	70	73	76	80	82

Fogs

Fogs interfere with the normal human activity and favour the increase of the concentration of pollutants in the ambient air. They have a negative influence on the spread of pollutants in the air as they prevent the effective dispersion. The transformation of pollutants is similar to that of the rainfall. The presence of fogs increases the diffusion which captivates pollutants above the fog layer, which in turn increases their concentration in the fog layer. The following table presents data on the average monthly number of days with fog (for Varna station).

AVERAGE MONTHLY NUMBER OF FOGGY DAYS

Table 3.1-7

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Foggy days	3.1	4.2	4.2	4.3	3.2	1.1	0.7	1.0	1.9	2.9	3.6	4.8

The average total number of foggy days in the area is relatively high – 35.

Ground thermal inversions

Ground thermal inversions that cause retention of pollutants (aerosols and particulate matter) in the ground layer of the atmosphere and prevent dispersion are not formed in the area.

Sunshine and solar radiation

Sunshine and solar radiation are essential in supporting /raising/ or preventing /reducing/ the effect of the harmful effects of the pollutants. These factors indirectly affect the ability of air to dissipate and degrade pollutants, as well as the atmospheric stability.

Tables 3.1.1-8 and 3.1.1-9 show data on the sunshine and solar radiation in Varna. This parameter has an indirect impact on the spread of pollutants, the degradation of some of them and on the atmospheric stability.

RELATIVE DURATION OF SUNSHINE %

Table 3.1- 8

Month		II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
SUNSHINE %	29	31	32	41	48	57	68	69	48	48	31	24

AVERAGE MONTHLY SOLAR RADIATION

Table 3.1- 9

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
RADIATION [W/m^2]	48	75	108	149	183	202	205	187	152	97	53	34

The atmospheric stability is an important factor in the dispersion of pollutants. It depends on:

- mechanical turbulence – a function of wind speed and surface roughness of the substratum;
- thermal turbulence – caused by the convection of the air heated by the earth surface;
- static stability – related to the change of air temperature in height.

The indicator of the atmospheric stability is the resistance class. According to the Pascual-Gifford classification adopted in Western Europe and the U.S., the classes have the following meaning:

- Class A - strong instability;
- Class B - moderate instability;
- Class C - weak instability;
- Class D - neutral stability;

- Class E - weak stability;
- Class F - moderate stability.

During the year, the atmosphere passes through all classes of atmospheric stability depending on the wind speed, solar radiation, cloud cover and part of the day.

General assessment of the impact of climate and weather conditions:

The level of atmospheric contamination with harmful substances is determined not only by the size of their emissions in the air, their chemical composition and their properties, but also by the nature of the dispersion into the atmosphere and the conditions for self-purification.

The major weather events that create favourable conditions for accumulation of atmospheric pollutants and reduce the self-cleaning abilities of the atmosphere are:

- increased frequency of calm weather (with wind speeds from 0 to 1m/s);
- low average wind speed (in the days with wind);
- lower amount of days with rainfall over 1 l/m^2;
- significant number of days with fog;
- formation of ground and raised thermal inversions;
- adverse seasonal distribution of rainfall during the cold and warm half-year (ratio of the amount of rainfall during the cold half-year to that in the warm half-year less than 1.0 – due to the greater incidence of stable stratification of the atmosphere during the cold half-year), etc.

The following indicators are relevant for the Investment Proposal:

- average annually for 33.7% of the days, the wind speed is 1 m/s or there is no wind - *the days with moderate and strong wind speed are of two times higher frequency*
- average wind speed - 3.5 m/s - *relatively high*;
- average frequency of days with strong winds (above 5 m/s) - 20.3% *not insignificant*;
- average annually 90 days with breeze circulation (speed of 3-5 m/s) - *significant number*;
- foggy days - 35 - *significant number*;
- temperature inversions - *no data*;
- ratio of the sum of rainfall during the cold half-year to that in the warm half-year - 0.83 - *unfavourable*;
- average number of days with rainfall over 1 l/m^2 - 66.4 - *relatively high.*

From the foregoing, we can make an overall assessment that the climate and weather conditions in the area and the related dynamics of the atmosphere **are favourable** for dispersion of the atmospheric pollutants and the self-purification of the atmosphere.

Existing background contamination, potential of the environment to accommodate further impact.

Assessment of ambient air quality

The state of the ambient air in the surface layer largely depends on the impact of

the anthropogenic factors. The ambient air in the region is influenced by many pollutants - industrial enterprises, road and rail transport, household sector, etc.

The ambient air pollution in Beloslav Municipality is mainly due to the industry, the traffic flow on the road Varna-Devnya, the railway routes Sofia-Varna, the street network, household heating during the cold period, agricultural activities near the area, activities on the open areas with bulk materials (depots, quarries, landfills, construction sites, etc.). The sources of air pollution are classified according to their characteristics, having an important role for the air purity.

The main pollutants are sulphur dioxide, dust, nitrogen oxides. Abnormal valuesare reported in the indicators of dust and sulphur dioxide /the latter mainly in the winter period/.

In the area of the town there is not significant concentration of industries emitting harmful substances in the air basin. Major pollutants are located on the neighbouring territories (Devnya and Varna Municipality).

The organized sources in the municipality are mainly of manufacturing nature. Their characteristic distribution (in a typical production zone) allows to better assess their impact on ambient air pollution.

The process of inventory involves the definition of the sources of harmful emissions by their nature, influence and significance of ambient air pollution in the municipality. Furthermore, the sources are presented by the type of pollutants, and by their territorial affiliation. They are viewed as organized (when pollutants are released into the air from a designated place with known technical and technological characteristics, such as height, cross-section, temperature, volume, etc.) and unorganized (when air pollutants are released from open areas without releasing devices).

By their type the sources are classified as sources of industrial nature, heating (industrial and residential) systems and steam production, transportation sources.

With respect to influence and importance, the main sources are:

Most significant are the emitters of harmful substances in Agropolychim AD, Solvay Sodi AD, Polimeri AD, Varna-West Port EAD and Devnya TPP - from the west; Varna TPP EAD, its port ofr coal and Terem EAD - from the east;

With less influence are characterized Varna Ferry Complex, the material and technical facilities of Transstroy Varna AD, Sugar Factory - Devnya, Cement Plant - Devnya, Port Lesoport EAD, Ship Repair Facility of Dolphin-1 OOD, Waste Water Treatment Plant - Varna, ZFK Topoli;

Minimum is the impact of the factories located in the area of Varna, Varna Port Complex, Varna Incinerator.

The main impact is that of the **industrial sources and traffic flow**, whereas weaker and mainly seasonal is the influence of the plants for steam and heat production;

The impact of the organized sources far surpasses the impact of the unorganized sources in terms of quantity, diversity and extent of harmful emissions.

In terms of the nature of the polluting, the sources are the following:

Sources of sulphur oxides - Varna TPP EAD, Deven TPP, Cement Plant - Devnia, Solvay Sodi AD, Varna-West Port, Road Transport - Devnya, heating and steam production on solid or liquid fuel;

Sources of nitrogen oxides:

Road transport, domestic and industrial heating and steam production in winter, Varna TPP EAD, Deven TPP, Central Plant - Devnia, Solvay Sodi, Varna-West Port, Agropolychim AD;

Sources of carbon dioxide:

Varna TPP EAD, Deven TPP, Cement Plant - Devnia, Solvay Sodi, Varna-West Port, Agropolychim AD, heating and power production plants of the facilities, road transport, domestic heating in winter,

Sources of the chemical compounds:

Agropolychim AD - hydrogen fluoride and gaseous fluorine compounds, ammonia; Polimeri AD - chlorine, hydrogen chloride, chlorinated non-organic compounds, dichloroethane, vinyl chloride; Solvay Sodi - ammonia;

Sources of inorganic or organic, production or natural dust:

Varna TPP EAD and its port, Deven TPP, Cement Plant - Devnia, Solvay Sodi, Varna-West Port, MT Facility of Transstroy, ship repair floating dock of Dolphin 1, Padina Drilling Waste Disposal Site, Ash Pond of Varna TPP EAD, Phosphogypsum and Pyrite Cinder Depot, open quarries, landfills for municipal solid waste.

In terms of territorial belonging, the sources are:

In the area of Beloslav Municipality - Varna TPP EAD and its port for coal, MT Facility of Transstroy, Ferry Complex, ceramics factory in Razdelna, floating dock of Dolphin 1, domestic heating during the winter period;

West to the concerned area, in the area of Devnya Municipality, airborne contaminants are emitted by Deven TPP, Cement Plant - Devnya, Solvay Sodi, Varna-West Port, Agropolychim AD, Sugar Factory, Polimeri AD;

East to the concerned area in the area of Varna Municipality impact on pollution is caused by the operations of Lesport Port, Terem, Odesos Ship Repair Plant, UWWTP - Varna, Varna Port Complex, Varna Incinerator, ZFK Topoli.

The intensity of traffic on the road Varna-Devnya at peak periods varies from ~150 to 250 conventional motor units per hour. Calculations are made for the different hazards of road traffic based on the following input data: travelling of about 1 km with an average width of volume of gas dispersion to 100m on both sides of the two roadways and a height of 3.5m (vehicle exhaust gases are heavy); assumed conditional average speed on the road of 2.5 m/s; assumed distribution of equivalent motor units of 70% with petrol engines, 20% with diesel and 10% - with LPG.

According to the calculations, the pollution in area of 100 m on both sides of the road will be as follows:

Table 3.1-10

HAZARDS	CO	NOx	CH	PB
DIMENSION	mg/m^3	mg/m^3	mg/m^3	mg/m^3
Emission in peak hours – 250 conditional motor units	4.9	0.31	0.38	0.0032

In this connection, it may be assumed that the actual air pollution by gases from transport is relatively high.

In the area of Beloslav there is no systematic monitoring of the environment. The closest point to carry out monitoring, even more rarely in recent years /according to the information bulletins of the National Centre for Environment and Sustainable Development at the MEW for the recent years 1996-1999/, is the village of Strashimirovo, situated 1.5 km east of the zone. According to summarized data from the bulletins,

Strashimirovo point is among the ten points in the country with maximum daily average concentrations of air pollutants.

The available data from measurements in the area have shown that the air was contaminated mainly with dust and nitrogen oxides. The pollution was of the following order:

- for sulphur dioxide - up to 4% of TLV av.h. and up to 2% of TLV av.d.;
- for nitrogen dioxide - up to 10% of TLV av.h.;
- for fine particulate matter (FPM10) - 95-105% of TLV av.d.

The rate of air pollution at Strashimirovo point cannot be indicative for the purposes of this report due to the proximity of the points to Devnya Industrial Complex and the impacts of the operations there.

Occasional measurements of the air status near the road Varna-Devnya have been made in connection with the preparation of various EIA Reports in the area.

Results of measurements of the background level of air pollution by the specialized mobile laboratory of RIEW - Varna are summarized in Table 3.1.2-2.

Measured maximum concentrations of harmful substances, μg/Nm^3

Table 3.1-11

VALUES	HARMFUL SUBSTANCE				
	FPM	CO	O_3	SO_2	NOx
Maximum average hourly	87.1	11.6	51.5	93.1	20.6
Average daily	66.3	5.6	48.9	91.3	19.3

The existing information on the pollution of the ground air layer in the area is extremely scarce and does not justify any representative conclusions about ambient air pollution. Even conducting occasional field measurements will not be representative because of the serious dynamics of change of the atmospheric parameters and the transition of pollutants over the area.

Good air quality is one of the vital characteristics of the quality of human life and living nature. Pollutants in concentrations above the established norms pose a serious risk to human health. Negative is the impact of ambient air pollutants on flora and fauna, cultural and historical values, the ozone layer, climate, etc.

Beloslav Municipality has set the following main objectives to reduce the levels of pollutants in ambient air:

- Restoration and improvement of ambient air quality in the municipality and reaching standards levels of fine particle matters, dust and ammonia by the end of 2010;
- Protection of human health;
- Reducing the negative impact on flora and fauna, sensitive ecosystems and sites of cultural and historical heritage;
- Fulfilment of the obligations of the Republic of Bulgaria arising under international agreements and treaties;
- Implementing the principles of sustainable development.

The analysis of the reasons for exceeding the norms sets the following priority areas for the implementation of the measures and activities to improve the ambient air quality in the municipality:

- limitation of the emissions of dust, sulphur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide, etc. from production plants;
- limitation of unorganized dust emissions from transport;
- limitation of the emissions of dust, sulphur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide, etc. from domestic heating;
- limitation of unorganized dust and gas emissions from industrial depots;
- limitation of emissions of soot and noxious gases from transport.

Expected results in the implementation of the measures are:

- improving the ambient air quality in the municipality by regulating the emissions of anthropogenic origin;
- preventing and reducing the risk to human health;
- reducing the negative impact on the living nature, cultural and historical values, the ozone layer, climate, etc.;
- strengthening the control on certain indicators and norms of the ambient air quality;
- increasing the role of the municipality to limit the damage to the health of the local population in case of elevated concentrations of harmful substances in the ambient air;
- strengthening the work with the public;
- stimulating the local development;
- creating new jobs – temporary and permanent;
- supporting the process of accession of the country to the European Union.

The composition of the air in the area of Beloslav Municipality is formed under the determining influence of these anthropogenic activities:

- industrial production
- transport activities
- steam boiler plants
- domestic heating
- agricultural activities

Sources of ambient air pollution

Emissions from point sources

In the process of work, inventory was carried out of the sources of harmful emissions in the municipality, causing air pollution.

The organized major stationary sources based in the area of the municipality are the sites of Varna TPP EAD and its port, the road transport on the lake road and the domestic heating.

In some of the enterprises concerned, there are more than one sources with similar characteristics which in the course of dispersion modelling processes are merged and separated as an area source (a combination of several separate stationary sources).

In addition, due to the relatively low-rise construction, the nature of the terrain, the type of heating appliances, area sources are considered the chimneys of the residential heating of the population and the heating in the administrative buildings in the area. On the territory of the town very small part of the residents organize their heating with electricity. The main home heating is realized using solid fuel (wood and coal). Therefore, this factor has a significant impact on the ambient air quality in the municipality. The concentration of the major sources of pollution in a small area makes it possible to classify them as **area sources**. Therefore, several separate areas can be considered, where harmful substances are emitted, namely:

Area of Varna TPP EAD;
Area of MT Facility of Transstroy-Varna EAD;
Area of Devnya chemical plants;
Area of the town of Beloslav (harmful substances from domestic heating).

While working on the program to reduce the ambient air pollution of Beloslav Municipality, the team carried out modelling of the pollution from industrial heat production and heating (residential and administrative) during the cold period of the year. The emission factors have been determined for different types of fuels and the corresponding emissions from their combustion. The annual amount of emitted harmful substances are calculated according to data from previous years about the fuel used by the population and the administrative sector of Beloslav, as well as from industrial steam and heat production. The main used fuels are environmentally unfriendly (wood, coal, fuel oil and naphtha). The approximate quantities of fuels, emission factors and emitted harmful substances emitted during combustion (including from Varna TPP EAD) are shown in the following tables.

Fuels by type and quantity

Table 3.1-12

DOMESTIC AND ADMINISTRATIVE HEATING						
		TYPE OF FUEL				**TOTAL**
		WOOD	**COAL**	**NAPHTHA**	**GAS**	
		TON	**TON**	**TON**	**THOUS. M^3**	
ANNUAL CONSUMPTION		13832	5652	319.5	0.399	
EMISSION FACTOR Gram/Gigajoule	SO_2	-	1260	235	-	
	NO_x	80	50	50	50	
	CO	2000	1800	1600	1100	
	VOC	1000	400	15	10	
EMISSION (t/y)	SO_2	-	180.88	3.30	-	184.18
	NO_X	13.28	7.18	0.70	0.00066	21.16
	CO	331.96	258.40	22.49	0.015	612.86
	VOC	166.50	57.42	0.21	0.00013	224.13

INDUSTRY				
	TYPE OF FUEL			**TOTAL**
	FUEL OIL	**COAL**	**NATURAL GAS**	
	TON	**TON**	**m^3**	

ANNUAL CONSUMPTION		4863	912810	66982000	
EMISSION FACTOR Gram/Gigajoule	SO_2	1470	1260	-	
	NO_x	260	260	170	
	CO	1725	2677	1050	
	VOC	6	3	5	
EMISSION (t/y)	SO_2	87.13	13333/85	-	13420/98
	NO_x	50.32	3712.19	380.55	4143.06
	CO	33.68	2327.39	225.0	2586.07
	VOC	1.16	69.55	11	81.71

Emissions from stationary and area sources of fuel combustion in the municipality

Table 3.1-13

HARMFUL SUBSTANCE	SO_2	NO_X	CO	VOC
EMMISSION (T/Y)	13605.16	4164.22	3198.93	305.84

Line sources – the main line source for the municipal area is the road transport. The fourth-class road IV 20074 "Varna-Devnya" passes through the town on the north side of the lake, and on the south side of the lake is the road connecting the city of Varna with the town of Beloslav and the village of Razdelna. The contamination from transport is formed as the substances contained in the exhaust motor gases (nitrogen oxides, sulphur dioxide, lead aerosols, light organic compounds, etc.) and from the deposits of dust from the traffic.

Pollutant is the rail transport in the municipality. Since the traffic is mainly carried out using electric locomotives, the compositions mainly contribute to air pollution with dust entrained by the traffic.

The traffic flow of cars and trucks, buses and tractor equipment,as well as railway transport, contribute greatly to the deterioration of the ambient air quality. The harmful substances in the exhaust gases emitted by the engines (nitrogen oxides, carbon monoxide, sulphur oxides, soot and volatile organic compounds), as well as dust are the basis of the pollution of the surface air layer in the urban part of the territory. During the survey, a inventory was carried out of the vehicles passing through the town and the emitted amount of harmful substances is estimated, as well as their distribution in the air.

The vehicles passing through the two busiest intersections of the town - the north and south road junctions to the ferry – has been carried out. Furthermore, reports have been received for the vehicles registered in the municipality.

The location of the points shows the amount of vehicles by type and allows for the determination of the number of transit vehicles through the town. Reference is taken (which is largely conditional) for the quantities of fuel sold in the last year by the facilities for storage and marketing of motor fuels.

While calculating the quantities of harmful substances emitted by the vehicle traffic, the emission factors for different types and conditions and vehicles are determined, as well as the emission emitted by the traffic of vehicles in the points and total for the town, as shown in the following table.

EMISSIONS FROM ROAD TRANSPORT FOR THE CITY IN TOTAL (t/a)

Table 3.1-14

Polluter Type	From Motor Cars Divided by Type of Fuel			Total
	Petrol	Diesel	Gas	
Carbon oxide	37.92	170.8	4.06	182.78
Nitrogen oxide	4.89	1137.15	0.517	1142.53
Light organic compounds	3.79	42.78	0.404	46.97
Soot	-	4.27	-	4.27

In calculating emissions, those from the railway transport are not taken into consideration. Intensity of passing trains is relatively low, almost all of them (86 %) are electricity driven and because of that their contribution in the pollution of the air from this type of railway source is minimal. Relatively higher is the percentage of dust emitted during the passage of trains, but because of the fact that Beloslav railway station is the main station on the route of trains and they move at a low speed, so levels of emissions are not so high.

Agricultural land, landfills, quarries, open urban terrains, construction sites, sites for storage and trade with petroleum products are considered as unorganized sources. In these cases, dust is considered as the main polluter. More serious unorganized sources established in the territory are as follows:

- the cinder damp of Varna Thermal Power Plant in the locality Beglik Chair;
- landfills for phosphogypsum and pyrites cinder of Agropolyhim AD;
- landfills for dredging masses in the territory - 4b and 4c;
- Strashimirovo stone quarry;
- Byalata Voda stone quarry;
- Razdelna clay quarry;
- Belopal sand quarry;
- Flotski Arsenal KRZ quarry (Terem);
- production activities at enterprises;
- petrol stations in the territory;
- sites of enterprises.

There are a number of unorganized sources of atmospheric pollution in the territory of the municipality. These are the breathers of fuel tanks at enterprises and the sites for storage and trade with fuels, foundries, open areas for bulk materials, landfills, quarries for inert materials. Such sources are the petrol stations, landfills for SHW and construction waste, etc.

On the territory of the municipality a small number of facilities for storage and trade with liquid fuel are operating. Emissions of volatile organic compounds (VOCs) emitted by the so called big and small breathings, as well as when refueling vehicles, are extremely low.

The conclusion based on the above stated facts is that problems regarding the condition of atmospheric air for the municipality are relatively small. For the town of Beloslav the share of emissions of harmful substances is insignificant. Harmful emissions are times lower than the average for the country. Annual maps of emissions of sulphuric oxides (Environment Reference Book of the National Institute of Statistics) show that the municipality territory is in zones of emissions of SO_x - from 0 to 2.5 t/km^2, which is a proof for the cleanness of the atmospheric air.

Beloslav municipality is included in the unified system for monitoring and control of the atmospheric air. It must be noted that the points of monitoring in its territory do not operate effectively for a long time. The low potential for air pollution is of big importance for the hygienic situation in the area. This facilitates the dispersing of the deleterious substances in the atmospheric air and the reduction of concentrations in the surface air (main reasons for this are the high wind velocity and the geographic conditions). In recent years main sources of air pollution are the auto transport and the household heating installations. Industrial sources of pollution are insignificant with the exception of the transfer of pollutants from the Devnia Industrial Complex and the Varna Thermal Power Plant.

Measures to reduce the pollution of the atmosphere are planned in near future through the provision of gas services for the public buildings and the houses of the population.

Considered are also the following territorial unorganized sources: agricultural land, landfills for waste, quarries, open town terrains (streets, surfaces other than grass, construction sites and platforms and others alike). Main polluter of these is dust. In cases of SHWs landfills is also the biogas emitted in the process of non-oxygen waste decomposition. In cases of burning the field crop stubbles pollutants of the air are the exhaust gasses – product from the burning of the plant waste.

Volatile Organic Compounds from Sites for Storage and Trade with Fuels
Table 3.1-15

	FROM PETROL	FROM DIESEL	FROM GAS FUEL	TOTAL
EMISSION (t/a)	0.560	0.621	0.076	1.257

Emissions from Open Agricultural Land
Table 3.1-16

Sources	t	Total		Approximately	The Town
	h	t/a	kg/h	t/a	Kg/h
Dry Material	360	210	583	133	370
Wet Material	108	63	583	40	370

Concentration of Dust at Height of 1,5 m above Dry Land Surface
Table 3.1-17

V, m/s	0	3	8	12	16	19	Σ
C, mg/m^3	0	0,12	0,6	1,6	4,8	11,0	
T_a, days	128	168	47	15	5	2	237
T_s, days	32	41	14	2,55	0,5	-	58

Notes: t_a – number of days in the year, t_s – number of days in summer.

Emissions from Burning Agricultural Waste in the Open for Territory of Whole Municipality
Table 3.1-18

No.	Sources	OCA		CO		VOC	
		t/a	kg/h	t/a	kg/h	t/a	кg/h
1	Burning of agricultural materials	225	-	1191	-	184	-
1.1	Burning of stubbles	180	250	935	1300	144	200
1.2	Vine waste	20	28	96	133	20	28
1.3	Garden waste	17	24	90	125	10	13
1.4	Orchard waste	3	4	27	225	4	6

1.5	Waste of grass terrains	5	7	43	60	6	8

Emissions from Burning Agricultural Waste in the Open (for the Region around Beloslav Town)

Table 3.1-19

No.	Sources	OCA		CO		VOC	
		t/a	kg/h	t/a	kg/h	t/a	кg/h
1	Burning of agricultural materials	141	-	736	-	113,6	-
1.1	Burning of stubbles	114	158	593	823	91	127
1.2	Vine waste	13	18	61	84	13	18
1.3	Garden waste	11	15	57	79	6	8
1.4	Orchard waste	2	2,6	17	24	2,6	3,7
1.5	Waste from grass terrains	1	1,3	8	11	1	1,5

The tables above show that the main pollution /75-80%/ results from burning field crop stubbles.

Emissions from Open Town Terrains

Table 3.1-20

Open Terrain	Annual, t/a	Hour, kg/h
Streets	1,78	0,20
Industrial sites	0,12	0,01
Construction sites	0,45	0,05
Others	1,10	0,12

Analysis of results shows that this pollution is symbolic compared to the rest and is not representative for the objectives of this report.

Emitted Quantities of Cinder Ash Dust

Table 3.1-21

Material condition		q,kg/mh	V_c,m/s	Q,kg/d	C,mg/m^{2}d	t, days	C_c g/m^2
	1	1,70	9,7	20353	1830	4,66	8,5
	2	11,58	20,8	138945	12487	0,036	0,4

Emitted Quantities of Phosphor Gypsum Dust

Table 3.1-22

Material condition		q,kg/mh	V_c,m/s	Q,kg/d	C,mg/m^{2}day	t, days	C_c g/m^2
1	Dry	0,926	2,9	11113	998,7	32	32
	Wet	0,037		445	40		1,3
2	Dry	25,44	9,7	305298	27437	4,66	128
	Wet	1,70		20353	1830		8,5
3	Dry	92,61	20,8	1111563	99895	0,036	3,6
	Wet	11,58		138945	12487		0,4

Dust Emissions from Landfills for Dredging Masses Table 3.1-23

Period	Limits	Annual		Dry	Season
		t/a	kg/h	t/c.c.	Kg/h
Current Condition	From	112	12,8	37,4	12,8
	To	172	19,7	57,2	19,7
Future Condition	From	130	14,8	43,1	14,8
	To	199	22,7	66,1	22,7

Note: The emissions above should be considered as maximum. Moreover depending on the direction of the wind they can load with dust not only the territory of Beloslav municipality. They should be considered as maximum. Moreover, depending on the direction of the wind they can load with dust not only the territory of Beloslav municipality. The probability of realization of the higher emissions is less.

EMISSIONS OF HARMFUL SUBSTANCES EMITTED IN THE PRODUCTION PROCESSES
Table 3.1-24

Substance	Carbon Oxide	Nitrogen Oxide	Sulphur compounds	Dust	VOC	Welding aerosols	Oxides of alloyed metals
Annual Quantity (t)	503.6	87.5	40	6274200	212.8	662.5	144.5

Monitoring the air quality and its controlling is performed by the National System for Ecologic Monitoring established on the basis of the local units of the Ministry of health and the Ministry of Environment and water namely The Hygiene Epidemiological Inspection (EHI) and the Regional Inspectorate of Environment and Water (RIEW).

Control on the main indicators characteristic for the quality of the atmospheric air on the territory controlled by RIEW-Varna is performed at:

- Permanent points of the Ministry of Environment and Water for monitoring;
- Temporary points for the mobile automatic station after annual schedule approved by the MOEW;
- Points specified by RIEW - Varna in connection with submitted complaints and warnings.

Measurements are made for establishing the levels of monitored pollutants: common dust Fine Dust Particles 10, nitrogen oxide, nitrogen dioxide, carbon oxide, sulphur dioxide , ammonia, lead, ozone and meteorological parameters provided that level means specified level for concentration of a given pollutant.

The town of Beloslav and the villages Ezerovo and Strashimirovo are located between the two settlements. In the town of Beloslav control on the quality of atmospheric air is performed by the mobile automatic station equipped with analyzers of the indicators O_3, CO, SO_2, NO, NO_2, FDP-10, H_2S, NH_3 and meteoparameters. In the village of Ezerovo in 2006, Thermal Power plant in the implementation of complex permit No. 51/2005 constructed a monitoring point for the levels of sulphur dioxide, fine dust particles and nitrogen dioxide in the atmospheric air. The point is equipped with analyzers registering meteoparameters. Registered data is transmitted in real time to the regional dispatch point at RIEW- Varna and the central dispatch point at the Executive Environment Agency – Sofia.

Monitoring and evaluation of atmospheric air quality in the town of Beloslav is performed by the Ministry of Health (respectively Regional Inspectorate for Protection and Control of Public Health) at a permanent point for hand sampling collection located in the central part of the town – near the town-hall. **Beloslav Point** functioned from 1980 until 1991. After 1991 point of Regional Inspectorate for Protection and Control of Public Health for monitoring the atmospheric air in the town of Beloslav does not exist.

Quality of the atmospheric air in the town of Beloslav is monitored through the **mobile laboratory for control on the concentration of RIEW- Varna**, equipped with automatic monitors for ***carbon oxide, ozone, nitrogen oxides, sulphur dioxide and fine dust particles - FDP_{10}*** (size of particles less than 10 **μm**). Parallel monitoring of background data for the meteorological conditions of the surface layer is performed: wind velocity and direction, atmospheric pressure, air temperature, sunlight and humidity of the air. Control on the pollution of the atmospheric air through the mobile station is performed since 1996.

The town of Beloslav is located at a distance of 10 km to the East of Devnya Town – region of intensively developed chemical industry and is located on a territory that is complicated by physical – geographic characteristics of the territory. It is at the sea level and is surrounded by plateaus of 300 m height that is sufficient to keep a big part of the harmful emissions of the industrial region of Devnya in the surface air layer. On the other hand, the prevailing breeze circulation and the comparatively frequent West and North-West winds that carry the pollutants to the town, have impact on the pollution of Beloslav.

This imposes the tracking of pollution not only in the municipality of Beloslav but in the Devnya municipality that is in close proximity.

A permanent automatic point of RIEW – Varna is located in the town of Devnya – Izvorite.

Izvori Point is located in the centre of Devnya Town near to one of the big industrial pollutants - Devnya Cement. The point functions as stationary information-measuring automatic station of overnight mode of work since 1994. It controls the pollution of the atmospheric air with carbon ***oxide, ozone, sulphur dioxide, hydrogen sulphide, hydrocarbons, FDP_{10} and meteorological parameters***.

Immission Concentrations of Atmospheric Pollutants

Data from the mobile automatic station show that the average daily concentrations of sulphur dioxide were very low in 2004 - within the interval of 1.8 up to 34.7 $\mu g/m^3$ and were below the allowable norm. results are analogical in the following years: from 4.6 up to 32.6 $\mu g/m^3$ in 2005 ; from 1.0 up to 41.5 $\mu g/m^3$ in 2006; from 3.3up to 6.7 $\mu g/m^3$ in 2007 and from 0.5 up to 91.3 $\mu g/m^3$ in 2008. (ADL+AD) in the period of study varies from 125 up to 135 $\mu g/m^3$). Maximum daily levels were highest in 2008. Throughout the years no exceeding of the overnight norm is observed. Maximum hourly average levels reach up to 117.5 $\mu g/m^3$ in 2004; up to 72.7 $\mu g/m^3$ in 2005; up to 129.0 $\mu g/m^3$ in 2006; up to 7.7 $\mu g/m^3$ in 2007 and up to 93.1 $\mu g/m^3$ in 2008.

Results from the maximum one-hour concentration of SO_2 show that exceeding of the average hourly norm is not established through the years (AHL+AD=350 $\mu g/m^3$).

Average yearly concentrations of sulphur dioxide for the whole period of monitoring are below the allowable norm. This trend is in compliance with the trends of the annual emissions of one of the main pollutants of the atmospheric air. After data of Thermal Power Plant Varna EAD emissions of sulphur oxides in 2006 were 22 254 t/y, increase up to 26 975 t/y in 2007 and show a trend of increase in 2008 up to 29 657 t /y.

Average overnight concentrations of SO_2 at CENTRE Point (2004-2008)

Data from the mobile automatic measuring station show that concentrations ***of NO_2*** in the atmospheric air in the period of the study were below the allowable norm. Registered maximum average hourly concentration in 2004 reached up to 154.4 µg/m³ and in 2005 - up to 17.1 µg/m³. In 2006 average hourly concentrations were serious – up to 22.7 µg/m³. In 2007 the highest average hourly values were up to 12.6 µg/m³ and in 2008 - up to 20.6 µg/m³ not exceeding the established norm.

Maximum daily levels of NO2 in 2004 reach up to 56.1 µg/m³. Lower values are registered in the following two years. In 2005 the maximum daily levels drop down to 11.5 µg/m³. In 2006 they go to 12,9 µg/m³ and in 2007 the maximum daily levels reach up to 12.1 µg/m³ (AYN+AD=46µg/m³) and in the end of 2008 - up to 19.3µg/m³ (AYN+AD=44µg/m³).

Results for the average hourly concentrations of NO_2 in the town of Beloslav show that in the period 2004 – 2008 no levels above the standard, exceeding the average hourly norm, were established. (AHN+AD=250 µg/m³).

Yearly average concentrations of nitrogen dioxide in the atmospheric air are below the allowable norms for the period of the study. (2004-2008). Yearly average norms and the allowable deviations vary from 52 to 44 µg/m³. Data for the town of Beloslav show that the yearly average levels in 2006, 2007 and 2008 are almost the same and rather low. At the point in the town of Beloslav from the system for monitoring, the observed trend is definitely descending since 2006. This trend is in compliance with the information submitted by Thermal Power Plant – Varna EAD for reduction of the emissions of sulphur dioxide - from 18 864 t/y to 18 215 t/y.

Average overnight concentrations of NO_2 at CENTRE Point (2004-2008)

Analysis of data from the monitoring with the mobile automatic station in the last years shows significantly lower number of registered daily average concentrations of ***fine dust particles*** above the maximum allowable norms for centers of population and confirmed the traditional pollution of the surface air with dust:

Irrespective of the exceeding of the allowable norms regarding FDP_{10}. (from 1.05 to 2.04 times above the MAC) in the last three years there is a trend for reduction of the dust pollution of 50 % compared to the period around year 2000 when pollution was from 2.81 to 5.53 times above the MAC.

The high concentrations of fine dust particles measured at the points of monitoring show that FDP_{10} are a serious pollutant of the atmospheric air in the town of Beloslav.

Data from the mobile automatic station prove attest the influence of different sources on the pollution of the atmospheric air with FDP_{10}. Pollution results mostly from burning processes and industrial sources - Varna Thermal Power Plant EAD. Emissions of FDP_{10} supplement the pollution of air from industrial sources. These emissions result from the household heating in the evenings in the cold months of the year when burning coal and wood for heating. FDP_{10} emissions from automobile transport also affect the pollution of air. Emissions of dust particles are caused by the direct emissions of exhaust gasses of cars, of the tyres wear out and the repeated suspension of dust on the roads. In addition a reason for the maintenance of FDP_{10} levels over the standard is the bad condition of the road surfacing, the insufficient width of the roadway as well as the dispersing of the dust particles formed in the agricultural processing of the soil by the surface wind.

In spite of the limited number of data and the lack of data for the different seasons it can be said that the average annual concentrations of FDP_{10} at the points in the town of Beloslav are below AAN + AD and a descending trend is outlined in the pollution of the atmospheric air. This trend is not in compliance with the information submitted by Thermal Power Plant Varna EAD for increase of the emissions of FDP_{10} from the installation for production of electricity from 3 142 t/year in 2006 to 3 152 t /year in 2007 and of 34312 t/year in 2008.

Average overnight concentrations of FDP_{10} at CENTRE Point (2008)

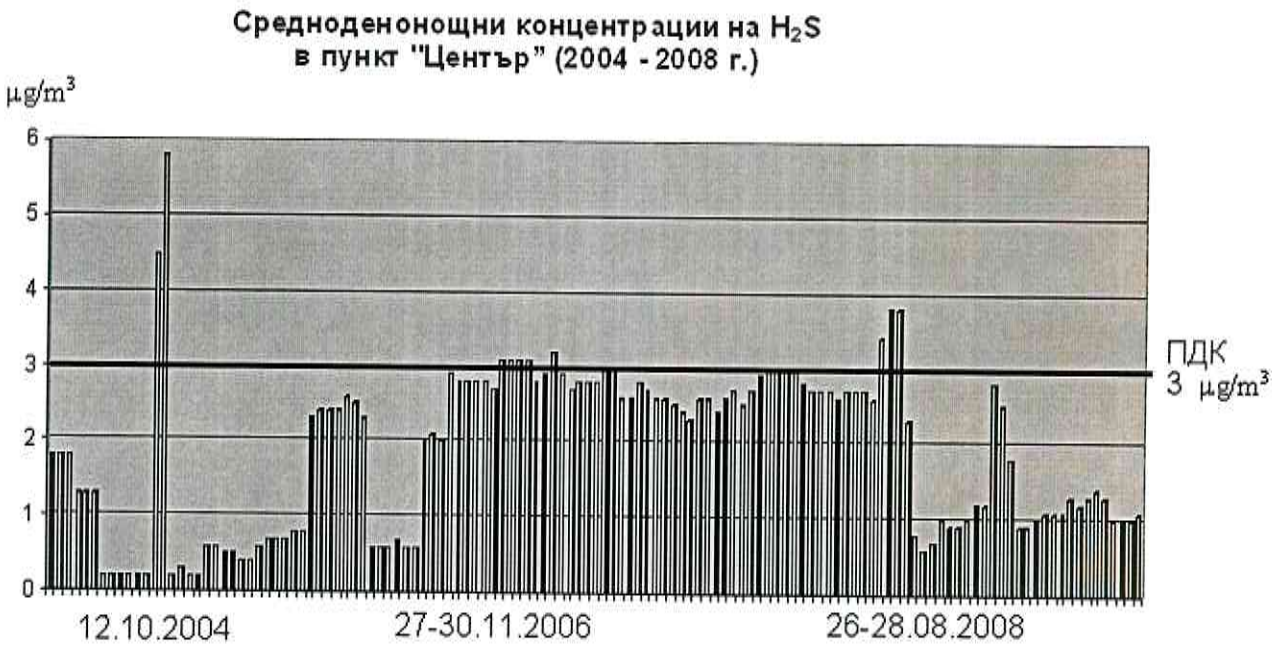
Data from the mobile automatic station the town of Beloslav show that average daily concentrations of ***hydrogen sulphide*** in the atmospheric air in 2004 vary in wide range from 0.2 µg/m^3 values up to 5.8µg/m^3 and exceed the maximum norm up to 1.9 times (AONC = 3µg/m^3). In 2005 average daily concentrations are in the interval from 0.4 up to 0.8 µg/m^3 and no exceedings of the established standard are registered. In 2006, the average daily concentrations are above the standard – up to 3.2 µg/m^3 and exceed the AND up to 1.1 times but in 2007 the reach up to 3.0 µg/m^3 and do not exceed the norm.

Data for the maximum one-hour concentrations, registered by the mobile automatic station show that in 2004 on two consecutive days in the month of October are registered 23 exceedings of the average hourly norm and get to 5,9 µg/m^3 and exceed the norm up to 1,18 times (AHN=5µg/m^3). In 2005, the maximum single concentrations were below the norm and get to 1.3 µg/m^3. In 2006 the maximum one-hour levels were a bit higher and got to 3.8µg/m^3 but were again below the allowable norm. In 2007, 100% of samples did not exceed the average hour norm and the maximum concentrations reached 3.6 µg/m^3. In 2008, maximum single concentrations were within the range of 3, - 5.1 µg/m^3 but did not exceed the average daily norm.

The season dynamics of hydrogen sulphide in the atmospheric air is tracked at both points. Data from the points show that maximum daily levels over the norm were registered in the cold months and no data is available for the warm months of the year.

Submitted data about pollution of the atmospheric air with hydrogen sulphide shows that the main pollutants are the burning processes when burning liquid and solid fuel of high sulphur content. 1 to 4% of sulphur is usually contained in coal. Ratio of quantities of non-organic and organic sulphides in coal varies from 4:1 to 1:3, but in average it is

about 2:1. Non-organic sulphur is available in the form of disulphides and sulphates. Organic sulphur is in the form of sulphides of the thiophane. In case of heating the coals evaporation of organic and not so much of the non-organic compounds occurs thus forming hydrogen sulphide (H_2S), in small quantities carbon disulphide (CS_2), carbonilsulphide (COS) and impurities from the derivatives of thiophane, thiols and organic sulphides. In oil and in the oil products sulphur is in the form of H_2S,.ith H_2S are mainly the household heating, central heating stations and local heating steam-boilers. Motor vehicles transport also contributes for the pollution.



Average overnight concentrations of H_2 S at CENTRE Point (2004-2008)

Data for **carbon oxide** - CO from the mobile automatic station positioned in the town of Beloslav show that the average daily concentrations were below the allowable daily norm in 2004, 2005 and 2008. In 2004 they were within the limits from 0,90 to 1,80 mg/m^3; in 2005 - from 0.7 to 4.10 mg/m^3; in 2008 - from 0.60 to 5.60 mg/m^3 (Until 2005 ADC = 10 mg/m^3. After 2005 the norm of CO is the maximum eight- hour average value within twenty four hour period - 10 mg/m^3).

In 2006, increase in the eight-hour norm within the twenty four hour period on 26.05.2006 was registered and the high concentration was reported with the initial measurements for the period and they sharply dropped down in the late evening hours when smooth increase started and reached up to 9.9 mg/m^3. Exceedings of the norm were registered in 20027 at both points in the month of January. At the point located in the center of the town of Beloslav on three consecutive days (12 – 14.01.2007) were registered exceedings of the norm and at the point close to the Police building exceedings were of incidental nature. The highest values of the pollutant were registered on 12.02.2007 – up to 31.4 mg/m^3.

The picture regarding maximum one-hour concentrations of CO in the atmospheric air is different. They are rather low for 2004 and within very narrow range – from 0.9 up to 2.4 mg/m^3. In 2005, maximum single concentrations were rather higher and reached up to 15,4 mg/m^3. In 2006, maximum single concentrations were also high and got

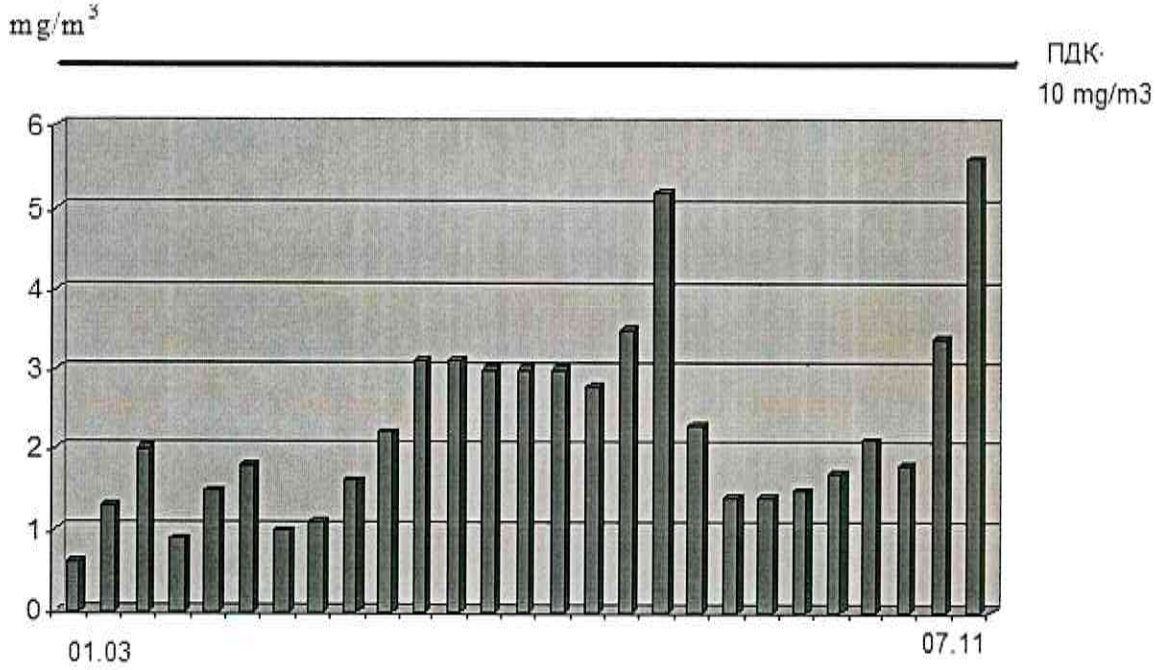
up to 6.5 mg/m^3, measured on 26.05.2006. In 2007, the biggest number (7 cases) of highest maximum single concentrations of CO were registered of 38.4 mg/m^3 on 12.02.2007. On that day, the maximum 8-hour floating value was 31,4 mg/m^3 thus exceeding the norm 3.14 times.

In 2008, low concentrations of the pollutant were established again within the limits of 0.6 mg/m^3 up to 5.6 mg/m^3 and the calculated maximum 8-hour floating values did not exceed the allowable norm. On 02.03.2008, only one individual single maximum value above the norm of 11.6 mg/m^3 was registered.

The seasonal dynamics of CO was tracked at both points. Average daily concentrations in the period of the study were a bit higher in the winter months compared to the summer months.

Submitted data do not outline the pollution of the atmospheric air with carbon oxide throughout the whole year but the sources of pollution are clear. First of all these are industrial sources and fuelling installations. Particular attention must be paid to the household heating in the cold periods of years resulting from incomplete burning of the fuel in the stoves for heating of households. Steam plants and local heating boilers in the town also contribute to the pollution. Atmospheric air pollution with CO is also caused by the motor vehicles transport.

Среднодеионощни концентрации на CO
в пункт "Център" (2008 г.)

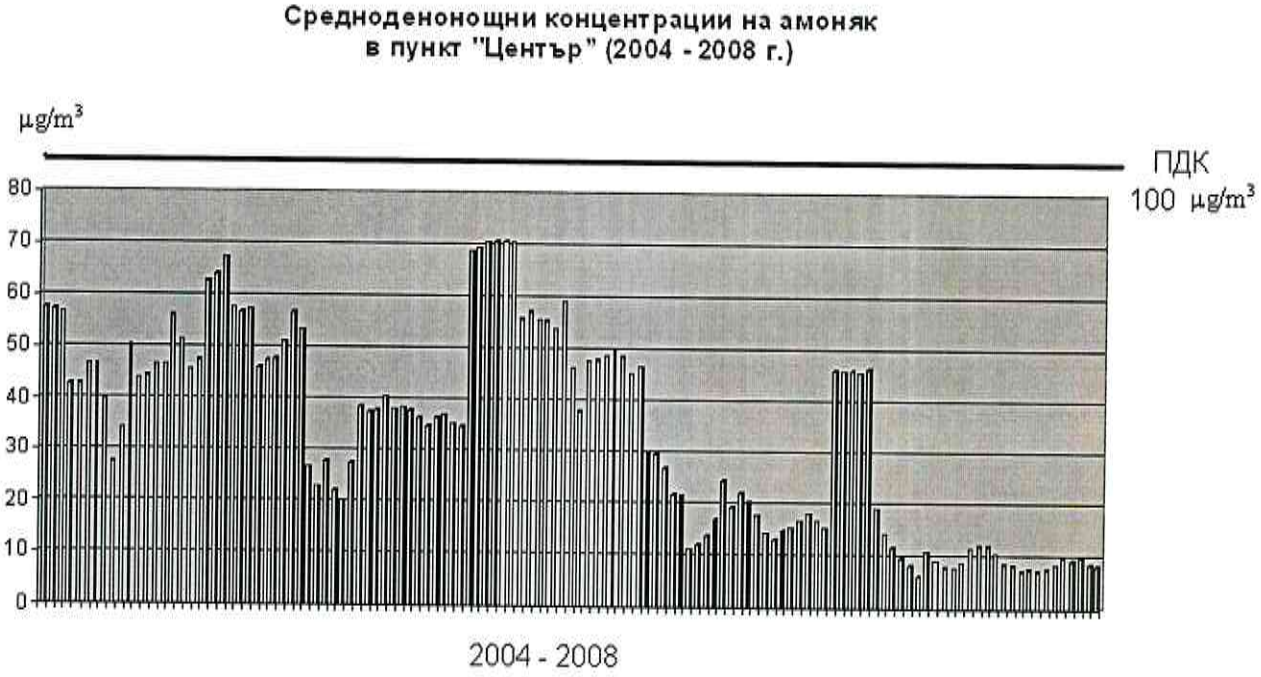


Average overnight concentrations of CO at Centre Point (2008)

Data from the mobile automatic station positioned in the town of Beloslav show that average daily concentrations of ammonia are below the allowable norm for the whole period of monitoring. In 2004, average daily levels vary from 27.8 to 57.5 μg/m^3; in 2005, from 46.0 to 67.4 μg/m^3; in 2006, from 20.0 to 70.6 μg/m^3; in 2007, from 21.1 to 55.0 μg/m^3 and in 2008, from 6.2 up to 46.6 μg/m^3 (ADN=100 μg/m^3). Registered maximum single concentrations were below the established norm. In 2004, they reached up to 78.8

μg/m^3; in 2005, up to 74.8 μg/m^3; in 2006, up to 79.0 μg/m^3; in 2007, up to 61.0 μg/m^3 and in 2008, up to 50.4 μg/m^3 (AHN=250 μg/m^3).

Average yearly tracking of ammonia concentrations shows descending trend in the atmospheric air pollution. This is very clearly seen at both points of the local monitoring system. This trend is in compliance with the submitted information from the main industrial sources of pollution of the atmospheric air with ammonia. (Agropolihim AD and SAolvei Sodi AD). After data of Solvei Sodi AD annual emissions of ammonia from 1 783 t/year in 2005 drop down to 754 t/year in 2007. After data of Agropolihim AD annual emissions of ammonia from 28.2 t/year in 2006 drop down to 25t/year in 2007) and the proved transfer of this pollutant through the years from the Devnya low-lying land in the direction of the city of Varna by the water mirror of the Varna lake.



Average overnight ammonia concentrations at Centre Point (2004-2008)

Conclusions about Atmospheric Air Quality in Municipality by Pollutants

- **Sulphur Dioxide (SO_2)**

For the period of monitoring 2004 – 2008 emissions of sulphur dioxide for the operating industrial capacities currently do not constitute a problem for the atmospheric air quality. At points where control on the atmospheric air quality was exercised no exceedings of the average hour norms and the average daily norms were registered.

Probable exceeding of the norms is possible under certain meteorological conditions in the so called "shadow" of the chimney of the Thermal Power plant Varna at the village of Ezerovo in case of full loading of the boiler units.

- **Nitrogen Dioxide (NO_2)**

Pollution with nitrogen dioxide is not a problem for the atmospheric air quality of Beloslav municipality.

There is no data for exceeding the maximum allowable concentrations of the indicator nitrogen dioxide for the period of monitoring.

- **Non-Toxic Dust and Fine Dust Particles 10**

Taking into consideration the number of exceedings for the period in review it can be said that pollution with non-toxic dust and FDP 10 is a problem regarding the air quality in the town.

Analysis of data from the performed monitoring show exceedings of MAC_{ADN}.

Seasonal dynamics of pollution of atmospheric air with FDP $_{10}$ is clearly outlined.

Emissions of dust particles are caused by the direct emissions of exhaust gasses of motor vehicles, tyres wear out and the repeated suspension of dust on roads. Except for that a reason for the maintenance of levels above the norm of FDP_{10} is the bad condition of the road surfacing, the insufficient width of the roadway as well as the dispersing of the dust particles formed in the agricultural processing of the soil by the surface wind.

Control on the quality of the atmospheric air (QAA) must be exercised for a longer period of time during the four seasons in order to define the main sources of pollution for the purpose of their localization and elimination in stages.

• Carbon Dioxide

Data from measurements in the period 2004- 2008 does not outline pollution of the air throughout the year with carbon oxide but the sources of pollution are clearly outlined. These are mostly industrial sources and fuelling installations. Special attention should be paid to household heating especially in the cold months of years resulting from incomplete burning of the fuel in the household heating stoves. Steam plants and local heating boilers in the town also contribute to the pollution. Pollution of the atmospheric air with CO is also because of the motor vehicles transport.

Estimated valuation of expected changes in the condition of the atmospheric air in the period of construction

Atmospheric air pollution in the process of the project implementation shall be mostly due to emitted in the atmosphere with the ***exhaust gasses from the construction mechanization*** pollutants - CO, NO_X, SO_2, hydrocarbons, ashes, lead aerosols, etc. Organic and non-organic dust shall be generated in the run of the earth works while performing the vertical planning and the protecting and draining channels.

At this stage of the project there is no data for the quantity of the construction machines to be in use (bulldozers, excavating machines, dump trucks, concrete-delivery trucks, trucks, etc.) so that representatively emissions of harmful substances generated by them can be forecasted. The machines to be in use mostly shall be excavating machines (up to 5 items), dump trucks (about 10 items), front loaders (2 items), concrete pumps (2 items), concrete-delivery trucks (6 items), lorries (5 items), lorry-mounted crane systems (2 items), motor hoists (3 items).

Dust during excavation and backfilling works, depending on the condition of the soil, air humidity, intensity of work, construction machinery and others in use and other factors after data in the literature may be from 0.1 to 1.2 mg/m3 - i.e. it can sometimes reach levels exceeding the MAC for centers of population.. Pollution will have a local coverage - in the construction area of the site.

In principle these emissions are limited in time and quantities, as the construction work (CMW) will be carried out only during the day and will last up to several months. Given the nature of the terrain and sample construction and installation activities as well as the typical types and quantities of emissions of automotive and construction machinery,

forecasted expected quantities of exhaust gasses will be around 11520000 m3 containing approximately 13 200 kg nitrogen oxides, 295 250 kg of carbon oxide, 437 kg ashes, 11700 kg VOC (according to the WHO methodology).

For the purpose of orientation, concentrations of harmful substances in exhausted gasses are:

CO - 27.05 g/m^3; NC – 1.01 g/m^3; NO_x – 1.14 g/m^3; ashes – 0.101 g/m^3

During construction period certain volume of welding and painting activities will be implemented or these activities will be used about 500 kg. electrodes. Individual issues in this are the following: emissions from welding activities. For the purpose of orientation about 500kg of electrodes will be used for these activities. The following are the emissions generated:

Table 3.1-25

Substance	*Welding aerosols*	*Manganese oxides*	*Silicon compounds*
Quantity (kg)	7.000	0.255	0.7

In this situation the impact on the atmospheric air during the construction and errection works may be qualified as insignificant, **transitory, restorable, of little territorial scope and without cumulative effect.**

Estimated valuation of expected changes in the condition of the atmospheric air in the period of operation

Depending on the selected in the future port activities, the atmospheric air quality may be affected by changes resulting in its deterioration. And because of that restrictive actions regarding the future investment projects are proposed as well as the implementation of measures for reducing the negative impact.

Atmospheric air in the region is of relatively not so good quality (better compared to previous periods because of reduced usage of harmful fuels by the regional industry and the slowed intensity of the activities of the production units) and in view of this it has the potential to receive the additional minimal emissions of harmful substances resulting from the planned to be implemented Investment Proposal having in mind the favorable meteorological conditions enhancing the effective dispersing.

Regarding the impact on air quality of future activities on the territory we will estimate pollution arising from the operation of the port machinery, loading and unloading activities, temporary storage of goods and transport flows of motor vehicles visiting the site.

Provisionally we assume (based on capacities of port facilities) that the site will be visited by 10-15 **lorries** per hour. Estimated quantities of automobile exhaust gases and emissions of harmful substances in them are calculated for the assumed above automobile flow and density and are shown in the following table:

Table 3.1-26

Substance	*Quantity*		*Emission in exhaust gasses*
	t/year	*kg/day*	*mg/m^3*
CO	9.22	25.78	25809
Hydrocarbons	0.359	1.02	1010
NO_x	0.41	1.16	1140
Ashes	0.036	0.102	101

On the territory of the port for servicing the port activities the **port mechanization** will operate simultaneously up to two reachstackers, two-three engine-powered trucks, autocrane. Estimated quantities of exhaust gasses from the port mechanization

(containerlifts, engine-powered trucks, etc.) and the emissions of harmful substances in them are shown in the following table:

Табл.3.1-27

Substance	*Quantity*		*Emission in exhaust gasses*
	t/year	*kg/day*	*mg/m³*
CO	4.3	11.8	25809
Hydrocarbons	0.17	0.46	1010
NO_x	0.19	0.52	1140
Ashes	0.017	0.046	101

No serious increase in the transport flow through the residential territories of the villages of Strashimirovo and the town of Beloslav is expected as a result from the implementation of the port complex. The main flow of means of transport shall be through newly constructed transport portal in the neighbourhood of the grain silos located between the village and the town of Beloslav. Expected estimated increase of transport loading will be within the range of 5-6 % of the current transport flow from the direction Devnya – Beloslav (fourth grade road IV 20074 Varna-Devnia), in a zone where no residential buildings are available. Evaluated is the impact of the newly attracted transport flows. The comparison of total annual quantities of emissions (table 3.1-14 and table 3.1-26) show that the increase of the emissions of harmful substances from the newly attracted transport flows is exceptional - pollution with CO shall increase with 5.04%, with NO_x shall increase with 0.03 % and with ashes shall increase with 0.08 %.

• flying up dust in case of loading and unloading activities,

Disposing of basic data for the machinery planned to be in use for the loading and unloading activities with bulk materials VIGAN (closed, capped belt conveyor) using the Plume methodology for calculating the dispersing of the emitted quantities of pollutants (dust) results for the immissions of dust from the activity are in practice zero – **Appendix No 23**.

- flying up dust in cases of temporary storage of bulk materials and goods

The practice is to calculate the emitted quantities of dust in cases of storage in the open of one of the most negative loads – coal. In case of storing the maximum quantity of 10 000 tons in the open on the provided site the following quantity of dust shall be emitted:

Q = 0.001xKxHxD = 0.4 (t/daily), where

K = 0.01 – emission coefficient;

H = 4 м – height of storing;

D = 10000 kg – stored quantity.

The final forecast is that the air may take this additional impact that shall be **insignificant, of small territorial scope, restorable, of minimal cumulative effect.**

Pollution in cases of emergency situations Depending on the activities emergency situations are possible related to fire, explosions, leakage resulting from natural disasters or subjective factors. In order to limit the harmful impact and to eliminate the damages resulting from the emergency situation it is necessary at stage of detailed design a specific emergency plan to be developed related to the port activities. In case of fire not only equipment but also materials and eventually loads shall burn. The air shall be polluted with products from the burning of different materials and the impact may be **significant, of limited territorial scope, for a short period of time, restorable, of potentially cumulative effect.**

In case of explosion, depending on the materials in use and the raw materials the occurrence of **serious impact of limited territorial scope, for a short period of time,**

restorable, of cumulative effect is possible.

In case of emergency leakage of hazardous materials emitting in the atmosphere harmful emissions sudden pollution is possible (in cases of big leakage of strong toxic substances) of the air of indirect impact on the other components of the environment. The impact may be **significant, of medium-size territorial coverage, for a short period of time, restorable, of cumulative effect.**

The atmospheric air in the region is of relatively good quality due to the elimination of some basic polluting activities, the reduced use of harmful fuels in the industry in the region and of the slowed down intensity of the activity and because of that currently it has the potential to receive additional emissions of harmful substances in view of the favorable meteorological conditions enhancing the effective dispersing.

3.2. Waters

3.2.1. Underground Waters

From the point of view of underground waters, the site falls into the Moesian Hydrogeological Region – Varna Artesian Basin. Typical for this region is the storey positioning of the water-bearing formations, the vertical hydrodynamic zoning of underground waters, the existence of hydraulic connection between the water-bearing horizons of the tectonic faults and fissures, although the water-bearing formations are well insulated between each other, as well as significant areal distribution of the Pre-Quaternary water-bearing horizons. The vertical zoning specifies three zones:

- upper zone of active water-exchange and with fresh non-pressure and pressure waters of the infiltration genetic cycle;
- medium zone with delayed exchange of water and increased mineralization and temperature of waters, which are pressure ones and of mixed origin – old sea and infiltration ones;
- lower zone, where waters are practically without any exchange, have high mineralization and high temperature, and their origin is of sediment genetic type.

A few water bearing horizons are shaped in the region:

- Malm-Valanginian; Eocene waters in the Quarternary (diluvial and alluvial) sediments;

The Malm-Valanginian water-bearing horizon was formed in the carbonate complex of the same name, which is distributed across North Bulgaria (the so-called Moesian Hydrogeological Region). The highest part of this complex is discovered at the surface of the region under review (the North-Bulgarian elevation). The complex is represented by limestone, dolomitized limestone and dolomite. These sediments have capacity of over 900 m and are not interrupted by the tectonic displacements, due to which they represent a unified hydraulic system. The hydrological conditions of this water-bearing horizon are determined by the cracks and karsts in the rocks, the hydraulic connection between the cavities of different nature, its hypsometric and structural and tectonic positions. The sediments of the Malm-Valangine are included between the low- or water-tight sediments of the Medium and Lower Jura below and of the Hauterivian, Upper Cretaceous and Paleogene sediments above. The carbonate complex is characterized by quite different filtration properties – 0.003 – 4.65 m/d (sometimes up to 160 m/d), which is due to the different level of karsts content – 7.8 % on the average. The conditions of occurrence together with the availability or lack of upper and lower water pressure determine the formation of pressure and non-pressure part. The latter is typical for the central part of the North-Bulgarian elevation, where the complex is discovered on the

ground surface. The supply is through infiltration of precipitation water directly in the opening up of the limestones on the surface or indirectly through the permeable loess cover (0.63 m^3/s); with water from surface flows (5.7 m^3/s); with water from upper laying water-bearing horizons. The draining is conducted through springs (the Devnya, the Zlatinski springs), artificial drillings and underwater in Black Sea. The conditions of occurrence of this water-bearing horizon are favourable for protection of water from surface pollution with the exception of the locations of immediate opening up of the water-bearing horizon at the surface, along the river valleys in particular. The depth of the piezometric level of the waters from the Malm-Valangine horizons is from 19.5 - 35 m above the terrain (self-outflow of waters) to 70 m below the terrain, depending on the hypsometric height of the latter. The elevation of the water level is from +15 to +45 m. The water conductivity is up to 3000 m^2/d, and the hydraulic gradient stands at 0.0002 – 0.008. The temperature of water is 30 - 54 ^0C. The waters are from hydro-carbonate-calcium to hydro-carbonate-magnesium, fresh, lightly mineralized, from medium hard to hard. The natural dynamic stock is not less than 6.5 m^3/s.

The Eocene water-bearing horizon is formed in Eocene sands and limestone. Its depth is changed from 450 m to 760 m and it rises quickly to the West and comes out to the surface in the region of the Pobitite Kamuni. Its supply in the region of the Pobitite Kamuni is from the precipitation waters directly (about 20 %), and to the North of this region – from Sarmat karst waters (about 80 %). The flow of waters from the Eocene horizon is up to 40 l/s, and the water pressure +1 -+2 m. In its opened part the horizon is without pressure and is drained in the kind of springs of flow of 1.2 – 3.0 l/s. The waters are alkaline, hydrocarbonate- calcium-sodium ones mainly, containing sulphuretted hydrogen, fresh, medium hard to hard. The mineralization stands at 0.46 – 0.64 g/l. The average annual module of the undergraound outflow is 0.1 – 0.5 $l/s/km^2$. The filtration ratio is 2.8-10 m/d (5,4 m/d on the average). To the South of the lake, this horizon is formed in Eocene sands and limestone, which open up on the surface. The supply in this zone is directly from the precipitation waters. Over the level of the local erosion basis, the waters are not under pressure and come out in the form of a multitude of low-flow springs along the water-bearing argillaceous-sandy beds and along proper sandstone seams. The more significant descending springs are pointed out in the table 3.2.-1:

SPRING FOUNTAINS IN THE ZONE OF THE MUNICIPALITY **Table 3.2-1**

Item No.	Name	Location	Flow, l/s
1	Manastirska Cheshma	At the foot of the Avrensko Plateau	-
2	Byalata Voda	South from the depot	3
3	Chuchurka	In the surroundings of the town	-
4	Selviyata	Ditto	-
5	Avrenska Polyana	Ditto	-
6	Doushkovite Nivi	In proximity of Razdelna village	-
7	Cheshmichkite	In the Eastern part of the town	-
8	Catchment of Beloslav	-	4

Under the level of the local erosion basis, the medium Eocene water is under pressure. The water of the water-bearing horizon under pressure opens up through drilling. It is lightly mineralized.

Both horizons are independent – a powerful series of practically water resistant Hautrieve marls.

Underground waters in Quaternary

A water –bearing horizon also exists in the diluvial sediments, which is supplied from the surface waters from the slope or from the fissure-karsts waters from the Pre-Quaternary sediments. Depending on the geological build, the depth of this horizon varies from 2 - 3 and to 10 - 15 m from the surface.

Water-bearing horizons under pressure are also formed in the alluvial sediments of the two lowest terraces. Their upper water resistance is of alluvial clays, and the lower – from Hautrieve marls. The water-bearing horizon in the buried overflowed terrace is less water-abundant. This is due to the smaller capacity of gravels. Its pressure is temporary and after a few hours, its level is stabilized at elevation +1,0 m. This horizon is contained in individual lens, not connected between them. The water-bearing horizon at the lowest non-overflowed terrace is more water abundant and is supplied by the Eocene water-bearing horizon, from the slope waters and from the Provadiyska river in the zone to the West of the Beloslav Lake. Its water quantity has been established in an experimental way and represents 3 - 61 l/s in case of reduction of the level from 6 m to 8 m. The water is not sulphate-aggressive in regards to concrete.

Drilling well P 63x is located in the neighbourhood of the territory of implementation. The drilling well is state-owned and currently no waters are used from the source, as there are no specified concessionaire, operational stocks and no permit to use the water has been issued. Analyses have been made for the waters from the source, which show increased content of iron, presuming compromising of the pipe stem and not allowing the use of water for drinking. The water source has no sanitary protecting zone and because of that the Basin Directorate for Water Management in Black Sea Region prescribes to the investor to plan during designing and construction a sanitary protecting zone belt I of 10x10 m size. The activity of the port complex will not change the quantity and quality of waters of the drilling well, as the investor has no intention to use waters from this source or to discharge Waste Waterin water facilities on the surface or in the soils and thus to pollute waters.

3.2.2. Surface Water Flows and Basins

The surface waters in the territory of Beloslav Municipality refer to the Black Sea Catchment Area, subarea with direct outflow to Black Sea. From physical and geographical point of view, the catchment basin of the rivers supplying the Varna and Beloslav Lakes redetr to the Shoumen-Provadia Region of the Ludogorsko-Dobrudja hilly plateau sub-region of the Danube Valley Region. It has a plateau refief, which is strongly to significantly divided by denudated plateaus and alluvial and proluvial accumulation plains. The altitude above sea-levels vary mainly between 250 and 400m. The area of the catchment zone of the rivers inflowing in the lakes stand at about 2600 - 2700 km^2. In regards to hydrology, the basin refers to an area of continental climatic impact over the regime of river outflow, a sub-region of preliminary rain supply, however of gradually increasing snow supply, a region of most weakly expressed continental influence over the outflow. The Northern coast of the Varna Lake and the catchment area of Devnenska River refer to a region of predominant impact of the sub-soil supply. The hydro graphic network of the region is represented by gullies, most of which have seasonal availability of water, related directly with the precipitations, whose features are described below.

The module of the annual outflow is from 0.5 to 1–2 $l/s/km^2$. The outflow regime of thee river network is characterized by summer-autumn low water and winter high water. The low water continues from July to October and is characterized by volume of the

outflow of about 5-10% of its annual volume. The module of the absolute minimum outflow stands at 0.1-1l/s/km^2 (0.1-0.3 mainly). The high water is from December to May, and its volume is 60 - 70% of the annual. The floating alluviums are 1 - 3 kg/m^3. In hydro-chemical respect, the waters of the river network refer to the province of HCO_3^- $Ca(SO_4,Mg,NO_3,Cl)$, the hydro-chemical area of $HCO_3^-Ca^{++}Mg^{++}$.

The quality and quantity of the surface water have the following factors:

- climatic (the evaporation for the region under review is 76 % on the average from the precipitations);
- geomorphologic (not big sizes of the catchment basins, due to which high maximum water quantities upon torrential rains are received);
- geological;
- plant cover (afforestation contributes to the more equal distribution of the outflow);
- anthropogenic (Waste Waterincrease the total water amount).

The surface waters in Beloslav Municipality are represented by the Beloslav and Varna Lake, Provadiyska River and the following gullies: Haramiyata, Kaplok Ivan and Ignatievsko on the northern coast, Byalata Voda and Beloslav on the southern coast. Devnenska River is outside the boundaries of the municipality, however, through Provadiyska River it flows in the Beloslav Lake and renders significant impact on it, due to which it is also reviewed in this study.

Beloslav Lake

In its origin, the Beloslav Lake represents overflowed valley. Until 1923, the lake was closed firth of completely fresh water of an area of about 11.5 km^2, connected to the Varna Lake through a shallow swampy river. In 1923, the old channel (about 3.3 km long, 3 m deep) was dug, after which the area of the lake was decreased by 2/3rds, and its level fell by ~ 2.20 m and some swampy areas were dried out (the Trustikovsko and Sindelski swamps). During the 1971 – 1976 period, the channel was deepened and expanded, and the lake turned into a navigational channel and Varna-West Port. The construction of the ferry-boat complex in 1978 is connected with significant dredging works in the lake. Its current features are: length – 3.9 km, average width 1 km, area – 3.9 km^2, volume – 9x10^6 m^3, average depth 2.3 m, mean water position +0.05 – 0.06m, annual flowing – 13-fold.

Observations of the regime of motion in the lake have not been conducted. Because of this, the motion parameters have been specified by calculation according to the wind speed, the motion duration and speed (Table 3.2-2):

MOTION FEATURES OF BELOSLAV LAKE **Table 3.1-2**

Direction	Repeatability	H, m	T,s	L,m
N	Once per year	0,18	1,4	3,00
N	Once per 20 years	0,23	1,5	3,50
N	Once per 50 years	0,28	1,7	4,50
W	Once per year	0,30	2,0	6,25
W	Once per 20 years	0,37	2,1	6,90
W	Once per 50 years	0,42	2,2	7,55

Clarification: H, T, L – average height, period and length of wind wave, respectively.

The regime changes of the water levels of the lake are determined by 927 observations carried out within a period of about 3 years (Table 3.2-3).

FLUCTUATIONS OF WATER LEVEL **Table 3.2-3**

Repeatability	1 Year	5 Years	10 Years	25 Years	50 Years
h_{max}, cm	24	27	35	41	45
h_{min}, cm	-32	-36	-45	-51	-56

Data about the streams and circulations of waters in the lake are available from two studies conducted in the 1978-1979 period by the National Institute of Meteorology and Hydrology with the Bulgarian Academy of Sciences and in the 1990-1991 period by the Institute of Oceanology of the Bulgarian Academy of Sciences. During *winter*, in case of Northwestern winds, the picture of streams is of anticyclonic swirl and practically no significant transfer of waters is conducted in Channel No. 2. The highest speeds of 0.11 m/s have been measured in the most westerly point. In the other points, the speed of the surface stream is 0.03-0.04m/s. At the benthic horizon, the speeds decrease to 0.02-0.03 m/s. The two-layer stream is typical for the motion of the water masses in channel No. 2. The surface stream is directed to east and is of speed of between 0.04 and 0.12 m/s, and the benthic one is directed to west and is of speed of between 0.08-0.12 m/s. During *spring,* easterly transfer of water masses to the region of Svinski Island with speed of up to 0.12 m/s is registered. The benthic stream is directed to the west and has a speed of 0.08-0.12 m/s, analogically to the winter period. The *summer* circulation of the waters of the lake has the characteristic features of the spring one. The anticyclonic stream causes deep westerly transfer, while the surface stream is in the reverse direction and is of low speed. Due to the insignificant stratification of water masses, the summer circulation is not stable and depends strongly on wind conditions. In case of anticyclonic type of weather, they are determined exclusively by the breeze circulation, i.e. during the day, the main transfer of waters is to the west, and during the night – to the east. The strengthened atmospheric circulation during the *autumn* creates deeply penetrating drift transfer in the direction of the wind. The streams of the Varna Lake, caused by the cyclonic vortex, are able to reach to the Beloslav Lake. Swirl is outlined in the latter, and, in the middle of Channel No. 2 easterly surface transfer of speed of 0.07 m/s and immobility of the benthic layer.

Varna Lake

By 1909, the Varna Lake was a closed firth, separated from the sea by sand bar. In 1909, the digging of the old channel connecting the lake with Black Sea was over. During 1973, Channel No. 1 was dug with design depth of 12.5m. The lake has the following characteristics: length of 13 km, average width of 1km, average area – 17.4 km^2, average depth – 9.8m, maximum depth – 19m, volume – $170x10^6m^3$, mean water position of 0.00m, annual flowing – 4-fold. Within the frames of the Beloslav Municipality, the Varna Lake is 4.5km long and has an area of about 6 km^2.

The motion regime of the lake has been specified by calculations, i.e. there are no direct nature measurements. The regime features are represented in Table 3.2-4.

MOTION FEATURES OF VARNA LAKE **Table 3.2-4**

Direction	Repeatability	H, m	T,s	L,m
N	Once per year	0,25	1,8	5,00
N	Once per 20 years	0,35	2,0	6,25
N	Once per 50 years	0,40	2,1	6,90
W	Once per year	0,48	2,6	10,55
W	Once per 20 years	0,57	2,3	12,25
W	Once per 50 years	0,72	3,0	14,00

The motion regime in the area before the port of TPP-Varna is shown in Table 3.2-5.

MOTION FEATURES BEFORE THE QUAY OF TPP VARNA **Table 3.2-5**

Repeatability	H,m	T,s	L,m
Once per year	0,33	2,2	7
Once per 10 years	0,42	2,4	9
Once per 50 years	0,46	2,5	10

The regime changes of the water levels of the lake are determined by 5629 observations, carried out in the duration of 25 years (Table 3.2-6).

FLUCTUATIONS OF WATER LEVEL **Table 3.2-6**

Repeatability	1 Year	5 Years	10 Years	25 Years	50 Years
h_{max}, cm	29	35	43	48	59
h_{min}, cm	-31	-40	-44	-48	-50

During the *winter* period, the regime of streams in the western part of the Varna Lake is specified to a great extent by the warm waters of TPP Varna, discharged in it. The stratification of waters in this zone is changing. North from the waterway, a big horizontal temperature (density, respectively) gradient is formed, which generates gradient streams of speed of up to 0.12 m/s, while in the southern area the speed of the streams is from the order of 0.05 m/s. This effect is strengthened also by the ebbs and flows of the wind, which also form gradient streams, however they are most expressed in the eastern half of the lake. The summed streams in the western part of the lake have gradient-compensation nature and determine to a significant extent the water exchange with the Beloslav Lake, as discussed above. The benthic streams are of low speed of 0.02-0.05 m/s. In general, the direction of transfer of water masses is to the east. In the eastern part of the lake, in case of easterly and northeasterly winds the transfer on the surface is generally to the north-west with a speed of up to 0.06-0.09 m/s. The benthic streams are directed to the south and reach up to 0.08-0.09 m/s. During the *spring*, the gradient zone is preserved (the speeds of streams reach 0.12 m/s, and at the benthic layer the transfer is to the west with speed of up to 0.08 - 0,09 m/s. In the eastern part of the lake, cyclonic swirl is formed on the surface and in depth, of a speed of up to 0.08 m/s. In the *summer*, waters from the bay enter through the channels into the lake, where they are attracted by the cyclonic swirl formed in the spring and existing during the summer as well. The water masses, participating in the cyclonic stream, are insignificantly stratified. The circulation scheme preserves its typical features from the spring (northern slope, directed to the west, and southern slope, directed to the east). During the *autumn,* the streams are determined mainly by the impact of the wind. The reverse nature of the latter determines the formation of the buffer zone, blocking the penetration of more salt waters from the bay into the lake. This zone is active until the end of October, after which it is destroyed, and the streams follow the direction of the wind that generates them. In the eastern part of the lake, streams penetrate, which are caused by the cyclonic swirls developed in the Varna bay in depth along Channel No. 1, and, following the waterway, they reach the Beloslav Lake. Their speed on the surface is from 0.06 to 0.15 m/s, and in the benthic horizon from 0.05 to 0.12 m/s. Through the old channel, the stream is directed to the east and transports lake waters to the Varna bay. In the eastern part of the Varna Lake, the summer cyclonic swirl is gradually destroyed. In the western part of the lake, the summer anticyclonic circulation is also destroyed and the predominant streams have gradient-compensation nature. Their direction is easterly, southeasterly, the speed at the surface is up to 0.07 m/s.

Provadiyska River

The catchment area of the river is 2132 km^2. Its length is 119 km (of them, only ~2 km). The module of the outflow is 1.09 l/s/km^2. The average outflow of the Provadiyska River before its discharge in the settling tank is 2.3 m^3/s. Its maximum outflow of provision of 1, 10 and 20% is 300, 150 and 90 m^3/s, respectively. The time of high waters is 4.5 – 5.5 months, and of low waters 3-4 months. The floating alluviums are 2.6 kg monthly.

Devnenska River

The catchment area of the river is 201 km^2. Its length is 27 km (completely outside the Municipality). The module of outflow is 3.99 l/s/km^2. The average outflow is 0,8 m^3/s (without the Devnya Springs, caught for water supply). According to studies, carried out in 1994 by the Higher Institute of Architecture and Construction, it stands at 1.3 m^3/s. Its maximum outflow with provision of 1, 10 and 20% is 100, 50 and 30 m^3/s, respectively. The main part of the outflow of the river is formed by the Devnya Springs, whose flow is 3.3-3.5 l/s, however, the predominant part of the spring water is used now for water supply. The time of high waters is 4.5-5.5 months, and of low waters 3-4 months. The floating alluviums are 1-3 kg/m^3.

Haramiysko Gully

The Haramiysko Gully has the following features: length 7 km, area of catchment zone 25.6 km^2, mean width of catchment area 2.7km, mean slope of gully 3.4%, mean incline of catchment area 5.8%, module of surface outflow 1.5 l/s/km^2, water amount 38 l/s, minimum module of outflow 0,3 l/s/km^2, minimum water quantity 8 l/s, floating alluviums 1,5 kg/m^3, hard outflow 1800 t/Y.

Kaplok Ivan Gully

The gully is of the following features: length 3.5 km, catchment area of 10.2 km^2, mean width of catchment area 1.0 km, mean incline of the gully 2.4%, mean incline of catchment area 7.3%, module of surface outflow of 1.0 l/s/km^2, water amount of 10 l/s, minimum module of outflow of 0.3 l/s/km^2, minimum water quantity of 3 l/s, floating alluviums 1,5 kg/m^3, hard outflow 500 t/Y.

Ignatievsko Gully

The gully is of the following features: length 11.0 km, catchment area of 65 km^2, mean width of catchment area 6.1 km, mean incline of the gully 3.0%, mean incline of catchment area 7.5%, module of surface outflow of 1.5 l/s/km^2, water amount of 98 l/s, minimum module of outflow of 0.5 l/s/km^2, minimum water quantity of 32 l/s, floating alluviums 1,5 kg/m^3, hard outflow 4600 t/Y.

Byalata Voda Gully

The gully is of the following features: length 4.3 km, catchment area of 10 km^2, mean width of catchment area 2.0 km, mean incline of the gully 4.0%, mean incline of catchment area 15%, module of surface outflow of 2.0 l/s/km^2, water quantity 20 l/s, minimum module of outflow 0.3 l/s/km^2, minimum water quantity of 3 l/s, hard outflow 1600 t/Y.

Beloslavsko Gully

The gully is of the following features: length 8,5 km, catchment area of 23.5 km^2, mean width of catchment area 3.7 km, mean incline of the gully 1.2%, mean incline of catchment area 11%, module of surface outflow of 2.25 l/s/km^2, water amount of 53 l/s, minimum module of outflow of 0.3 l/s/km^2, minimum water quantity of 7 l/s, floating alluviums 2.5 kg/m^3, hard outflow 3300 t/Y.

Observation Points:

The status of the surface and underground waters in the region of the municipality depends mainly on the status of the individual sectors of industry, agriculture, the level of development of the engineering infrastructure and the water treatment technologies.

The observation and control over the status of surface waters is conducted by the National System of Environmental Monitoring (NSEM), Control and Preservation of Cleanness of Waters subsystem (points of the Basin Directorate for Water Management in Black Sea Region headquartered in Varna). Within the territory of the municipality and the adjoining areas, which have impact on it, the ponts of this system are located in the Beloslav Lake - 2 pcs. /at the mouth of the Provadiyska River – point BG2PR00191 MS010, in its eastern part – point BG2PR01931 MS011, in its western part, on the Varna Lake – 5 pcs. /Varna Lake - west – point BG2PR001551 MS013, Varna Lake-northwest – point BG2PR00155 MS014, Varna Lake - centre – point BG2PR00155 MS015, Varna Lake – old channel – point BG2PR00155 MS017 and Varna Lake – new channel – point BG2PR00155 MS018 /; at Provadiyska River (after the discharging of Padina slime dump - mouth – point BG2PR00195 MS005); of Devnenska River (before its running in the Provadiyska River – point BG2PR00211 MS002).

3.2.3. Existing Background Pollution of Surface Waters and Point Sources of Pollution

Provadiyska River is polluted by many sources along its whole length: Waste Waterfrom the households of Kaspichan Town and Novi Pazar Town, industrial Waste Waterfrom Kaspichan Town and Novi Pazar Town, pollution from agriculture and centres of population from Provadia Town (Waste Waterfrom the waste water treatment plant, oil factory, Provadsol, asphalt facility, etc.), sewage from Padina slime dump (where Waste Waterfrom Agropolychim AD, Solvay Sodi AD and TPP Deven AD.

For the purpose of this study we will analyze the waters of the Provadiyska River after the Padina slime dump before their running into the Beloslav Lake. The mechanically cleaned waters coming from the Padina slime dump cause serious changes in the hydro–chemical content of the Provadiyska River. Upon mixing the strongly alkaline (pH=12.2) and hard waters (370°H) with the river ones, the carbonate balance is drawn up from bicarbonates to carbonates, which leads to increasing of the suspended substances. The insoluble carbonates are settled, and this process continues also after the running of the Devnenska River. In order to avoid the clogging of the navigation channel (Channel No. 2 – Beloslav lake), the river has been deepened and expanded before the mouth. This expanded part plays the role of settling tank, where the suspended particles are retained. The settling tank is periodically dredges and the received sediments are transferred into a depot.

Using the Bulgarian National Classification System for Quality of Water, the following status of the waters of the Provadiyska River was established during its running in the Beloslav Lake from the observation point in 2008.

Table 3.2-7

Point	BG2PR0195 MS005 Provadiyska River, Mouth								
Indicator	O_2	BNO_5	CNO	NH_4-N	NO_2-N	NO_3-N	PO_4	Sulphates	Chlorides

Status	Very good	Good	n.a.	Very bad	Bad	Bad	Bad	Very bad	Very good

The waters of the Devnenska River are of weekly alkaline reaction (pH=7.63), with phosphate and chloride content exceeding the standard, but of lower content of nitrogen contents compared to the Provadiyska River.

Table 3.2-8

Point	BG2PR00211 MS002 Devnenska River, before Running in Provadiyska River								
Indicator	O_2	BNO_5	CNO	NH_4-N	NO_2-N	NO_3-N	PO_4	Sulphates	Chlorides
Status	Very good	Good	Good	Moderate	Moderate	Very good	Bad	Very good	Bad

By significant points of pollution:

- Devnya Sugar Plant EOOD, Devnya Town – the processed Waste Water is discharged in the Odessos Channel, an affluent of Devnenska River. In 2008, excess of the admissible limits regarding the quality of the discharged waters in respect to general phosphorus indicator was established;
- Devnya Waste Water Treatment Plant – accepts the Waste Waterof Devnya Town, Souvorovo Town and the Devnya industry for treatment;
- TPP Deven AD – production of electricity and heat;
- Polimeri AD – production of chlorine and chlorine products. In 2008, excess of the admissible limits regarding the quality of the discharged waters in respect to indicators such as insoluble substances, CNO, AOX and sulphates, was established;
- Agropolychim – production of mineral fertilizers;
- Solvay Sodi AD – main production of heavy and light fused soda ash;
- Provadia Waste Water Treatment Plant – provides only mechanical treatment of waste waters. In 2008, excess of the admissible limits regarding the quality of the discharged waters in respect to indicators such as general nitrogen, general phosphorus, insoluble substances, CNO, PAH and phenols was established;
- Clunchevi Luchi Provadia EOOD – production of refined sunflower oils;
- Diffused sources of treatment of waters – pollution of small centres of population below 2000 u.p. without constructed waste water treatment plant and household waste depots.

The Beloslav Lake is one of the Black Seaside Lakes, subjected to active antropogenic impact (industrial load, water transport, dredge works, etc.). The long-term impact on the human activity specifies individual periods related to digging channels, the launch of the Devnya chemical plants, the construction of Varna-West Port. The lake is polluted mainly by the Devnya Complex and Varna-West Port through the Provadiyska River (Devnenska River, respectively), the White Channel, Haramiysko Gully and directly in case of reloading operations with bulk cargo. The pollution is mainly of biogenic elements (mineral nitrogen and phosphorus), due to which the lake is strongly euthrofied basin.

Euthorfied lake waters are a good pre-requisite for the development of the phytoplankton, for the intensive production of oxygen, respectively, determining the high level of saturation of water (> 135%). The surface oxygen content reaches 9.47 ml/l, and the maximum saturation of water with oxygen reaches 185 %. During the summer, the O2 dissolved in the benthic waters is 4 times lower compared to the surface ones. The

conditions of the oxygen deficiency during the summer season are a sequence of the vertical stratification of water masses. The lack of exchange within the benthic water leads to exhausting of O2 upon the oxidation processes, occurring at the bottom with availability of hydrogen sulphide. The hypoxia reflex extremely unfavourably to the bottom organisms and summer deaths are observed.

Using the Bulgarian National Classification System for Quality of Water, the following status of the waters of the Beloslav Lake was established in 2008.

Table 3.2-9

Point	BG2PR01931 MS 011 Beloslav Lake - West								
Indicator	O_2	BNO_5	CNO	NH_4-N	NO_2-N	NO_3-N	PO_4	Sulphates	Chlorides
Status	Very good	Moderate	n.a.	Moderate	Moderate	Good	Bad	Very good	n.a.

Table 3.2-10

point	BG2PR00191 MS 010 Beloslav Lake - East								
Indicator	O_2	BNO_5	CNO	NH_4-N	NO_2-N	NO_3-N	PO_4	Sulphates	Chlorides
Status	Very good	Moderate	n.a.	Moderate	Moderate	Good	Bad	Very good	n.a.

By significant point sources of pollution:

- Manex Sun AD – SUK, Slunchevo village. The Waste Water is discharged in the Haramiysko Gully at 6.5 km before its running in the Beloslav Lake. In 2008, excess of the admissible limits regarding the quality of the discharged waters in respect to indicators such as: insoluble substances, BNO5, CHO, general phosphorus and residual chlorine was established.
- Beloslav Waste Water Treatment Plant - the Waste Water is discharged in a lagoon in the Yatata protected locality on the southern border of channel 2, connecting the Varna and Beloslav Lake. In 2008, excess of the admissible limits regarding the quality of the discharged waters in respect to the indicator of general phosphorus was established.

Varna Lake

After digging the old channel in 1909 and of the new channel, in particular, (Channel No. 1) in 1973, the hydro chemical regime of the lake is changed significantly and is determined by its connection with the sea and with the Beloslav Lake, the waters from its own catchment area and the waste household and industrial waters, discharged in it, whose annual volume is estimated at about 60x106 m3. The Lake is water intake II category. The lake waters are polluted with metals, organic substances and oil products (from 0.28 to 0.80 Mg/l). The main polluters with organic substances are Varna Waste Water Treatment Plant and Asparuhovo Waste Water Treatment Plant. The flow of household waste waters, rich in organic substances, phosphorus and nitrogen compounds is the main reason for the high euthrofication of the Varna Lake. It is also determined by the inflow of waters from the Beloslav Lake, which are rich in mineral phosphorus and nitrogen. The thermal pollution by TPP Varna has also an impact. Compared to the Beloslav Lake, this lake is less and more unevenly polluted. A long-term tendency of binding the polluted areas to the source of pollution is observed. Under unfavourable hydro meteorological conditions however, the pollution could be distributed at significant distances from the emitter. The concentrations of most pollutants usually do not infringe the norms of water intake II category during the recent years.

Using the Bulgarian National Classification System for Quality of Water, the following status of the waters of the Varna Lake was established in 2008.

Table 3.2-11

Point	BG2PR00155 MS 013 Varna Lake – West								
Indicator	O_2	BNO_5	CNO	NH_4-N	NO_2-N	NO_3-N	PO_4	Sulphates	Chlorides
Status	Very good	Moderate	n.a.	Very good	Moderate	Много Good	Moderate	Very good	n.a.

Table 3.2-12

Point	BG2PR00155 MS014 Varna Lake– West								
Indicator	O_2	BNO_5	CNO	NH_4-N	NO_2-N	NO_3-N	PO_4	Sulphates	Chlorides
Status	Very good	Moderate	n.a.	Very good	Moderate	Good	Very good	Very good	n.a.

Table 3.2-13

Point	BG2PR00155 MS015 Varna Lake - Centre								
Indicator	O_2	BNO_5	CNO	NH_4-N	NO_2-N	NO_3-N	PO_4	Sulphates	Chlorides
Status	Very good	Good	n.a.	Very good	Moderate	Good	Bad	Moderate	n.a.

Table 3.2-14

Point	BG2PR00155 MS017 Varna Lake – Old Channel								
Indicator	O_2	BNO_5	CNO	NH_4-N	NO_2-N	NO_3-N	PO_4	Sulphates	Chlorides
Status	Very good	Good	n.a.	Good	Moderate	Good	Moderate	Good	n.a.

Table 3.2-15

Point	BG2PR00155 MS018 Varna Lake – New Channel								
Indicator	O_2	BNO_5	CNO	NH_4-N	NO_2-N	NO_3-N	PO_4	Sulphates	Chlorides
Status	Very good	Good	n.a.	Good	Moderate	Good	Moderate	Very good	n.a.

By significant point sources of pollution:

- Asparouhovo Waste Water Treatment Plant – provides only mechanical treatment of the Waste Waterof Asparouhovo quarter and Galata quarter of Varna. In 2008, excess of the admissible limits regarding the quality of the discharged waters in respect to indicators such as: general nitrogen, general phosphorus, BNO5, CNO and insoluble substances was established.

In 2010, the finalization of the construction and erection works under the Transformation of Waste Water Treatment Plant of Asparouhovo Quarter into a Pump Station with Mechanical Treatment and Transporting Pipeline along the Bottom of Varna Lake is forthcoming;

- Varna Waste Water Treatment Plant – the treated waste waters are discharged in the corrected Tel Gully at about 800 m before its intake in the Varna Lake. In 2008, excess of the admissible limits regarding the quality of the discharged waters in respect to indicators such as: general nitrogen, general phosphorus was established;

In 2009, the implementation of the Reconstruction and Upgrading of Varna Waste Water Treatment Plant has started;

- TPP Varna – Energy Efficiency;
- Terem Ship Repair Plant Flotski Arsenal – main activity, repair of ships;
- Kaolin AD – micro products plant;

- BM Port AD – Lesport port terminal. In 2008, excess of the admissible limits regarding the quality of the discharged waters in respect to indicators such as: insoluble substances and CNO was established;

- Black Sea Highways – asphalt base of Pripek village. In 2008, excess of the admissible limits regarding the quality of the discharged waters in respect to indicators such as pH was established;

- Varna Regional Pneumo-Physiatrist Diseases Out-Patient Ward with Hospital – after local treatment the waste waters are discharged into the Varna Lake. In 2008, excess of the admissible limits regarding the quality of the discharged waters in respect to indicators such as: BNO5, substances, CNO, general phosphorus, nitrogen nitrites and nitrogen ammonia.

3.2.4. Envisaged Sources of Hazardous Emissions, Kind of Harmful Substances. Significance of Impact (Range, Degree, Frequency, Continuation, Possibilities for Combined and Cumulative Impacts).

Estimate of expected changes in the status of Beloslav Lake water site during the construction Period

As a result of the natural processes and the anthropogenic interference alluviums are constantly entering the lakes and clog the navigation channels and the waterways of the ports. Three sources are specified, which form the waters of the lakes:

- natural origin of the capture basins;
- from the industrial activity along the Provadiyska River to the Razdelna Railway Station;
- from the Devnya industrial complex through Devnenska River and Padina Channel.

The seaside lake sediments (up to water depth of 5 m) are built of sands, mixed with shells, calciferous mass with carbonate nodules (lake chalk), swamp slimes and turf. Their thickness is from 1 to 8 m. With all other lake slimes, the dust fraction dominates over the others. Their specific density varies in narrow borders – 2.62÷2.68 g/cm^3. The ration of consolidation stands at between 2 and 19.10 $^{-2}$ cm^2 /min and is biggest with the sandy slimes and decreases with the dust and clay ones. In both lakes and in Channel 2 (where the Investment Proposal will be located), the *sandy slimes* are widely spread. The mean indicators about these slimes show that they contain 38 - 40 % sand, 41 -48 % dust, 14 -19 % slime.

Port – Varna Logistic Centre will be located on the north coast of navigation channel No. 2, connecting the Varna and Beloslav Lakes in close proximity to the waterway, where the weakest influence of the coast sources of pollution from the deposited slimes and sediments.

During the construction activities, more significant negative effects over water will be possible only in case of dredging for reaching the design depths before the quay wall – the dredging of the water area will be accompanied with suspension of the pollutants from the bottom sediments in the water mass, increasing of turbidity of water and deterioration of the oxygen regime in the benthic waters. From laboratory analysis made of dredged masses in the region of the Investment Proposal it was established that the average values of the polluting substances are within the limits pointed out in Tables 3.2-16 and 3.2-17.

Table3.2-16

Total Content of Heavy Metals and Arsenic (mg/kg Dry Substance)						
Lead	Cadmium	Copper	Zink	Chrome	Nickel	Arsenic
15-25	<0.25	9-14	25-28	4-7	0.5-1.5	4-5

Table 3.2-17

Ph	Sulphates mg/kg	Chlorides mg/kg	PAH mg/kg	PHB mg/kg
6-7	500-1800	8000-12000	0,1-0.5	0.1-0.3

From the data presented, a conclusion could be made that:

- The dredged masses, which are expected to be formed in regards to heavy metals, sulphates, PAH and PHB are significantly lower than the background pollution of soils in the country, and the requirements for limit values pursuant to Ordinance No. 8 (Official Gazette No. 83/2004) are fulfilled for all elements and they could be classified as inert ones. The contents of chlorides only is rather high, however this is due to the natural saltiness of the waters of the Varna-Beloslav Lake Complex.
- The suspension of the polluters from the bottom sediments would not render change of the background pollution and will have **insignificant impact, of averagely big territorial range of minimum cumulating effect.**

Upon the implementation of the Investment Proposal, as a result of carrying out dredging works, the turbidity of the water site at the point of dredging will increase significantly. The distribution of the cloud is carried out in two phases: during the first one the change of the characteristics depends on the way of overflowing, and during the second, it is determined by the hydro dynamic processes in the water area. In order to calculate the range of distribution of the cloud, necessary are parameters such as:

- Wind (direction and speed)
- Motion (height and period of wave, direction)
- Stream (speed and direction at depth of 2 m, for the whole period of observation and distribution of speed (profile) along the vertical, upon active wind-wave situation during the first 4 weeks after the inception of works).
- Source of turbidity.
- Concentration of turbidity, etc., some of which rather depend on the real conditions of the moment rather than be predicted.

The impact could be determined, from observations of similar activities, **as significant, with averagely big territorial range, for a short period of time and could be recovered.**

Due to filling the capacity of the depots for underwater storing of dredge masses, the Investment Proposal envisages the latter to be dehydrated and transferred for use.

Estimate of expected changes in the status of the Beloslav Lake water site during the period of operation

During the recent year, Beloslav Municipality implemented a number of projects related to replacement and expansion of the water supply and sewerage network, and the water supply to the centres of population is 100%, and sewerage network is 90% developed in Beloslav Town, Strashimirovo Village and Ezerovo Village. In 2007, the construction and erection works under the Expansion, Reconstruction and Modernization of Beloslav Waste Water Treatment Plant project were finalized, the commissioning of the facility is forthcoming. „Beloslav Waste Water Treatment Plant treats the waste waters of Beloslav Town and Strashimirovo village by providing mechanical, biological treatment and subsequent removal of nitrogen and phosphorus of waste water.

The water supply of the facility will be carried out by the city water supply pipeline, managed by V&K Varna OOD.

The waste waters received by the activity of the Investment Proposal through the sewerage network built at the site of the former Belopal factory will be taken for treatment by the Beloslav Waste Water Treatment Plant.

Upon the operation of the **Port – Varna Logistic Centre,** ea secondary pollution of the atmospheric waters is possible from the site of the port terminal, polluted during the loading and unloading activities.

3.3. Biodiversity

3.3.1. Characteristics of the status of the flora and fauna

Beloslavska Municipality falls in the Thracian Forestry Plant Area and in the periphery of the subarea "Varna - Burgas Black Sea Coast". This area covers the lower flat or gently undulating zone of oak forests. Overall study of the vegetation in the research area shows that there is a significant phytocenotic diversity. This wealth is in close dependence and corresponds to the mutual influence of various environmental factors. The mitigation influence of the Black Sea water basin causes the presence of more specific mesophytic plants. Some of them are more wide-spread and at certain places form characteristic phytocenoses (of the Fagaceae-beech family, a typical representative is Fagus sylvatica and Fagus orientalis). They occupy a relatively small area and in most cases also cover other deciduous species (e.g. Carpinus betulus).

Naturally distributed in that zone are the pure and mixed forests of Hungarian oak, Turkey oak, downy oak, plain and Carpinus orientalis, and elm in the lower tier manna-ash, wild briar, thorn, cornel, poultry grapes, etc. are found.

Forests are represented by natural forest ecosystems that are typical for the area of the investment proposal

Naturally distributed in that zone are the pure and mixed forests of Hungarian oak, Turkey oak, downy oak, and Carpinus orientalis. In the lower tier water hornbeam, manna-ash, wild briar, howthorn, thorny bush, cornel-three, etc. These ecosystems occupy areas of gullies on the slopes of Avrensko Plato (plateau). They are associated with wet and deep habitat with more arid water-feeding mode. Major species occurring here are different types of oak, manna-ash, Large-leaved Lime (Tilia platyphyllos), and European hornbeam. In the ecosystem periphery strongly penetrates Carpinus orientalis, which restores itself naturally and through sprouts. Dominant species are: Quercus cerris L. – Turkey oak; Q. Frainetto Ten. – Hungarian oak; Quercus pedunculiflora C. Koch; Q. pubescens Willd. - Downy oak; Carpinus betulus L. - European hornbeam; FFraxinus ornus L. - manna-ash; Ulmus minor Mill. - Field elm; Acer tataricum L. - Mekish; Carpunus orientalis Mill. - Oriental Hornbeam; Prunus mahaled L. - Wild Cherry.

Accompanying species are: Acer campestre L. - field maple; Sorbus torminalis (L.) Crantz - wild service tree; Pyrus pyraster Burgsd. - Wild Pear; Tilia tomentosa Moench. - Silver lime;T. cordata Mill. - Small-leaved Lime; Celtis australis L. - coleus; Cornus mas L. - Cornelian cherry; Ligustrum vulgare L. - wild privet; Crataegus monogyna Jacq. - Single-seeded hawthorn. The second tier is presented with varying strength, and by different species, and grasses are dominated by Melica uniflora, Buglossoides purpureo-coerulea or Festuca heterophylla.

In drier habitats on the slopes of Avrensko Plato forests with composition are found as follows: *Dominant species* - Oriental Hornbeam (Carpinus orientalis); *co-dominant* - Turkey Oak (Quercus cerris), European Hornbeam (Carpinus betulis); *shade-tolerant plants* - Fraxinus ornus L. - Manna-Ash, Tilia tomentosa Moench - Silver Lime, Tilia platyphyllos Scop. - Large-leaved Lime, Acer campestre L. - field maple, Cornus mas L. - Cornelian cherry, Crataegus monogyna Jacq. - Single-seeded Hawthorn, Colutea arborescens L. - Bladder Senna, Celtis australis L. - Coleus; *grassy tier* - Dactylis glomerata L. subsp. glomerata - Cock's-foot, Brachypodium pinnatum (L.) Beauv. Subsp. rupestre (host) Rchb. - Heath False Brome, Buglassoides purpurocoerulea (L.) Johnst. - Purple Gromwell, M. ovata Stenb et Hoppe - oval prolez, Milium effusum L. - Wood millet, Melica cilliata L. - hairy melic, Mycelis muralis (L.) Dimort. - Wall lettuce, Lamiastrum galeobdolon (L.) Ehrend. - Yellow dead nettle, Festuca heterophulla Lam. - Various-leaved Fescue, Euphorbia amygdaloides L. - Wood spurge, Festuca vaginata W. et K. ex. Willd. - Vaginal fescue, Silene Alba (Mill.) E. Krause - white campion. In the western and southern part of Beloslavska municipality Hungarian oak, Turkey Oak, and Hornbeam forests in separate sections in pure and mixed type are prevalent. The most often composition found is the following: Oriental Hornbeam ~ 40 %, Turkey Oak ~ 10 %, thorny bush ~ 40 %, other ~ 10 %. Massifs feature completeness of ~0.6 Trees are partially to fully closed in good and average condition, primarily low-stem.

Forests in the area of Ezerovo are mostly of sprouts with composition as follows: Dominant species - Turkey Oak, European ash /Fraxinus excelsior/, with shade-tolerant plants - Thorny bush and briar; accompanying species - Oriental Hornbeam, Common hawthorn /Crataegus monogina/, Wild pear, Mahaleb Cherry /Prunus mahalebb/, Ailanthus /Ailantus glandulosa/ and Manna-ash /Fraxinus ornus/. Age of the forest trees is 20 - 30 years. Trees are relatively low-growing with productivity rating of 3 - 5, in view of the poor and sandy soils and habitat. The massif features completeness of 0.5 - 0.8.

Mixed forests in steep terrains in close proximity to the area.

On the northern slopes of Avrensko Plato mixing of natural forests with imported strengthening vegetation has been carried out through species of Oriental Hornbeam, Turkey Oak and Thorny bush with extra imported - Oleaster, Small-leaved lime, Acacia, the percentage allocation of natural plantings and crops from 20% to 80% for the natural, with achieved completeness of 0.7 - 0.9.

Crops - imported strengthening vegetation.

In the area of Razdelna, in hilly terrain mixed crops are located with composition as follows: Oleaster/ Eleagnus angustyfolia/; Acacia /Rhubinia pseudoacacia/; Ailanthus /Ailantus glandulosa/ with Acacia /Rhubinia pseudoacacia/. As accompanying species in groups and small massifs - tamarix, thorny bush, hawthorn rosehip are located. The vegetation is of age ~ 4 - 8 years, non-closed, with completeness of 0.1 to 0.9. Plants are in good condition, with active vitality and growth, with normal and fruiting habit, with active self-collocation activity. In separate areas of active erosion pure crops are located of: Acacia /Rhubinia pseudoacacia/, located on steep sections, at the age of 15, in very good condition, completeness of 0.5 to 0.9 and fully closed; Black pine / Pinus nigra Ar / at the age of around 22, in good condition, with completeness of 0.8 to 0.9, and fully closed

Lakeside hygrophilous communities

The vegetation on the banks of Beloslavsko Lake and channel is represented by: White willow (*Salix alba* / - sprouty willow and seedlings / *Salix tetrandra, salix caprea*/, Amorpha /Amorpha fruticosa/, Manna-ash (Fraxinus excelsior (ornus/, meadow, marsh

and hygrophilous vegetation with - common reed */Phragmites australis/* and herbaceous species, Garden Loosestrife /Lysimachia vulgaris /, marsh woundwort /Stachys palustris /, Hairy Willow-herb /Epilobium hisulum/, larger bindweed /Calistegia sepium/, etc.

There are crops of poplar pure culture - Canadian poplar / Populus canadensis ssp. I-214 /, artificially created. Trees are at the age of ~20, in very good and good condition, with a height of 8 -14 m, and stem diameter of ~20 - 22 cm.

In the lower parts on the banks of Lakes and channels reed communities are formed with: Reed (Phragmites australis/; narrowleaf cattail (Typha angustifolia/; broadleaf cattail (Typha latifolia/; greater pond sedge /Carex riparia/; coastal reed /Schoenoplectus litoralis/ mixed with salicornia /Salicornia ssp/, and other halophyte vegetation. The reedbed features herbaceous species as follows: Garden Loosestrife /Lysimachia vulgaris/, Marsh woundwort /Stachys palustris/, Hairy Willow-herb /Epilobium hisulum/, Purple loosestrife /Lythrum salicaria/, larger bindweed /Calistegia sepium/, Bulbous bluegrass /Poa bulbosa/etc. Species are found here included in the Red Book of Bulgaria as Sea arrowgrass /Priglochin maritima/ and marsh sow-thistle /Sonchus palustris/. Underwater vegetation is represented by different species of potamogeton, ceratophyllum, myriophyllum, etc.

There are weak signs of environmental improvement of the Lake complex, following termination or reduction of the operation pace in part of the main pollutants in the area (chemical plants in Devnya, glass plant in Beloslav, etc.), however, pollutants already accumulated will have their long-term negative environmental impact as a whole. Transfer of harmful substances through groundwater into the Lake waters may result in their falling in the human organism along the food chain or by penetration through the skin when bathing in contaminated waters.

Meadows, pastures, and uncultivated land in the area around Belopal

They are occupied by grasslands with a predominantly grassy tier presented mainly of: Brome grass (Bromus sp), common knotgrass (Poligonum aviculare) (Poligonum arenastum), field bindweed (Convolvulus arense), nettle (Urtica dioica), sorrel (Rumex acetosella), Brobus tectorum L. - cheat grass, B. sterilis L. - barren brome, Lolium perenne L. - rye grass, Cynosurus cristatus L - meadow comb-grass, Cynodon dactylon (L.) Pers. – couch-grass, Carex spicata Huds. - sedge, Agrimonia eupatoria L. - common agrimony, Cichorium intybus L. - Common chicory, Erodium cicutarium (L.), Plantago lanceolata L. - ribwort plantain, P. media L. - Medium plantain, Elymus repens (L.) Gould. - Couch grass, Taraxacum sps. - Dandelions, Dactylis glomerata L. subsp. glomerata - cock's-foot, etc.

Steppe Plants

Steppe grass vegetation is located in the region of the groups Pobiti kamani, rocky walls, and sand quarries. On the shallow limestone rock there are great abundance of various grass species among which the single located - Fernleaf peony, Adonis vernalis, species such as Siberian iris, Leasing wing, Iris pumila /all of them rare for the Bulgarian flora/. A few cereal species dominate on the sand.

Green system in urban areas

For the territory of the settlements in the municipality of Beloslav no "green system" plans or similar schemes has been drawn up which form an integral part of the

existing master plans. Representative data is missing on the status of existing vegetation and the condition of the vegetation in the settlements. Walking around the settlements in the municipality of Beloslav and the studies during development of the environmental program of the municipality was reason for surveying the general status of the green system without any claims of comprehensiveness and completeness. Among the types of vegetation according to functional characteristics and use differ as follows:

- Public green areas having the following features - recreation / satisfying the needs of sports and recreation/; aesthetic and landscape aesthetic; environmental; bioclimatic - aeration, microclimatic features; meliorate - help for strengthening of steep terrains, as well as for reallocation of surface and underground flow. They cover:

Gardens of common urban importance - with mostly park landscape covering the territory of central and neighbourhood gardens - a public greenery, with purpose and functions related to leisure and usage by small groups of people. Neighbourhood gardens in Beloslav have a total area of ~ 35.6 dka. Their condition is average and good, with predominantly low-maintenance. The skeletons of lasting decorative vegetation - trees and shrubs, is entirely preserved therein. The vegetation takes average 20 - 40 % of the total territory, grouped in pure and mixed groups of trees and bushes. Main species used for landscaping are Thuja, Ailanthus, Norway maple, Sycamore, Spruce, Silver lime, Gleditsia, Coleus, Mountain ash, Graveyard Cypress, Silver fir, etc. Bushes are represented by Laurocerasus officinalis, Euonymus japonica, Juniperus, Cotoneaster dammeri, Spiraea Wanhouttei, Forsythia, Deutjia, Philadelphus, red-barked dogwood, Cydonia, Symphoricarpos, Tamarix, Lilac, and Sorbaria. Grass areas are of poor condition with small exceptions, and flowers are nearly missing.

Green areas in the Lake easement area - they are located on both banks of the channel as in the zoning of the town of Beloslav their area amounts to ~28.4 dka. Their condition is average and satisfactory, with almost no maintenance. The vegetation takes average 15 - 30% of the total territory, grouped randomly in pure and mixed groups of trees. Main species used for landscaping are: Pyramid poplar, white poplar, grey poplar, Euro-American poplar, Almond willow, Willow, Oleaster, European ash;

Street and transport landscaping - vegetation following transport flows is band located along: Varna - Sindel Railway Line, near main transport thoroughfares, as well as around approaches to the ferry. Transport landscaping comprises mainly: Eastern thuja, Pyramid poplar, Acacia, linearly arranged or grouped in massifs. The railway line route is accompanied by massive built zones - acacia massifs /Rhubinia pseudoacacia/, clean, closed, with completeness of approximately 0.9 -1 and trees at the age of ~10 years, in excellent condition. The total quantity of vegetation accompanying railway and water transport amounts to ~ 97.7 dka.

- **Serving green areas** - comprises meliorate landscaping in industrial zones. There are major zones around Belopal, Technical Schools of Glasswork, Transstroy base facility represented by massifs as follows: Acacia /Rhubinia pseudoacacia/, at the age of 15 - 20 in an average condition; European ash /Fraxinus excelsior/ - trees in average and good condition - singly located. Zones are not maintained, however, they show normal vitality. Total area of meliorate landscaping - zones around industrial sites estimates to ~ 41.6 dka.

Zoographic division of Bulgaria refers the wildlife in Beloslav region to the Black Sea region with typical zoographic elements.

<u>*Animal world in proximity to urban areas and infrastructure routes*</u> in the area of Belopal

The animal world in these areas is less presented due to the presence of heavy transport flows, populated places, and production activities.

Vertebrate fauna is represented by:

I. Class Amphibians /Amphibia/:

- Order - caudate /Caudata/ represented by salamanders /Salamandridae/: Common newt /Triturus vulgaris/; great crested newt /T. Cristatus/;

- Order - ecaudate /Ecaudata/ represented by Alytidae / Dicoglossidae/: Families - European spadefoot toads /Pelobatidae/ - common spadefoot / Pelobates fuscus/; Bufos /Bufonidae/ represented by almost all species, Bufo ssp;

II. Class Reptiles /Reptilia/:

- Order - scaly reptiles /Squamanta/: *lizards* /Suaria/- Anguidae /Ancuidae/; lizards /Lacertidae/- sand lizard (Lacerta agilis/, Balkan green lizard /L. trilineata/, green lizard /L. viridis/; Skinks /Scincidae/- represented by snakes /Untergattung Serpentes/; blacksnakes /Colubridae/ rich represented of almost all species except water snakes - Coluber ssp; vipers /Viperidae/ represented by - horned viper /Vipera ammodytes/;

III. Class Birds /Aves /;

Birds are dominated by - types of turtle-doves (Streptopelia ssp. /, blackbird, white wagtail, Pied Wheatear /Oenanthe oenanthe/, sparrows /Passer domesticus/, /Passer montanus/, crow /daw/ (Coloeus monedula), Common house martin /Delichon urbica/, Martin (Delichon urbica/, magpie /Pica pica/, gray crow (Corvus cornix/, Polish crow (Corvus flagilegus), jay (Garilus grandarius), big tit (Parus major), daw /Corvus monedula/, Eurasian Blackcap (Sylvia articapilla/, European Herring Gull /Larus argentatus/, etc.

IV. Class Mammals / Mammalia/:

Mammals are found as follows - mice /Apodemus ssp./, rats /Rattus ssp./, hedgehog /Erinaceus concolor/, mole /Talpa Europea/, squirrel /Sciurus vulgaris/, ground squirrel /Citelus citelus/, loir /Glis glis/, rabbit (Lepus europaeus/, feral dogs, etc.

Animal world in forest areas, sand quarries, and rock crowns

Animal world is significantly richer presented: In addition to the species above in the territories away from the urban activities we also meet:

I. Class Amphibians /Amphibia/;

- Order - ecaudate /Ecaudata / represented by tree frogs and their allies / Hylidae family/- European tree frog /Hyla Arborea/ and family aquatic frogs /Ranidae/ represented by long-legged wood frog and a large water frog.

II. Class Reptiles /Reptilia/;

- Order - turtles represented by: Greek Tortoise;

- Scaly reptiles /Squamanta/: lizards /Lacertidae/- Crimean lizard (Lacerta taurica /, forest lizard, steppe lizard / Podarcis muralis /; blacksnakes /Colubridae/ represented extra by water snakes - plain and gray;

III. Class Birds /Aves /;

- Order Ciconiformes represented by /Ciconia ciconia/white stork; through the territories during migration black stork also could be found;

- Order Anseriformes, presented by a large part of protected species described in the next part: Ferruginous Duck /Aytya Aythya nyroca/, Ruddy shelduck /Tadorna ferruginea/, common pochard /Aytya ferina/, White-headed Duck (Oxyura leucocephala/ ;

- Order Gruiformes represented by partridge and quail;

- Order L ariformes represented by European Herring Gull /Larus argentatus/, peewit dull, Common Tern /Sterna hirungo/;

- Order Columbiformes represented by species of doves (Streptopelia ssp./, wood-pigeon, turtledove;

- Order Piciformes represented by green, gray, medium, color and big color woodpecker;

- Order Passeriformes represented by Calandra Lark, Little Ringed Plover, blackbird, hite wagtail, Syrian colorful woodpecker /Picus Pelobates syriacus/, green woodpecker /Picus viridis/, Pied Wheatear /Oenanthe oenanthe/, Gray Wheatear , scarlet swallow /Hirundo daurica/, Great Tit /Parus major/, Long-tailed Tit /Aegithalus Longtail/, Common Nightingale /Eritacus megarhynhus/, Mavis, Eurasian Blackcap (Sylvia articapilla/, Common Blackcap, Common buzzard /Buteo buteo/, Common Cuckoo, Eastern Olivaceous Warbler, Woodlark, Ortolan Bunting, bunting, Common Starling, goldfinch,Crested , mountain and field larks, cCoastal and Barn Swallow, yellow wagtails, Polish Pipit, Red-backed Shrike, Eurasian Wren, European robin, African stonechat, Barred Warbler and Eurasian blackcap, yellow and urban headed bunting, Eurasian Siskin, finches, starlings, grosbeak, etc.;

IV. Class Mammals / Mammalia/:

Mammals are found as follows - forest dormouse, loir, fox, weasel, black polecat, and wild boar.

Aquatory Hydrobiological Characteristics

There is enough accumulated data on the aquatory part, where the investment proposal is located, for the period 1970 - 2000. For the period 1990 - 2000. The Institute of Fishing Resources performs permanent monitoring of the following parameters: microbial flora; marine phytoplankton; zooplankton; ichthyoplankton; zoobenthos; fish fauna.

Detailed features concerning hydrobiological parameters has been made in previous developments /Spatial Plan, EIA Report Port of Varna/.

Varnensko and Beloslavsko Lakes are eutrophated in the long term, which is one of the reasons for reduction of introduced species diversity and the quantitative characteristics of the flora and fauna representatives. During the period 50s - 80s species are extinct from the Lakes. Critical levels for the flora and fauna are present in 1989 - 1991 In recent years, there has been significant improvement in the environmental situation, mainly due to reduction of industrial effluent in the Lakes and reduction of pollutants. Threatened and endangered populations begin to increase slowly; density and biomass of adaptive representatives' significant increase.

Below we will give the specific characteristics of the system:

Plant communities

In the period 50 - 80 years, in Beloslavska Aquatory, due to direct contamination from industrial inflow of DPK and changes in water salinity: two types of potamogetons, Myriophyllum spicatum, etc. have disappeared; underwater Potamogeton meadows at a depth of 3 - 4 m. have disappeared; significant populations of other macrophytes as Zostera, Cystoseira, Cladophora have been destroyed, populations of the coastal cane zones /Phragmites australis/ have significantly dropped; the species composition in the presentation of phytoplankton - reduction in the number of representatives from 28 to 16 species has been reduced;

A total of 102 phytoplankton species are identified In Varna Lake, which are distributed in classes as follows: Bacillariophyceae – 34; Dinophyceae - 48;

Chrysophyceae - 7; Eoglenophyceae - 1; Chlorophyceae -4; Cyanophyceae - 4. The phytoplankton qualitative structure is dominated by diatom pyridine complex, with approximately equal representation of classes, as representatives comprises ~ 88% of the total number of species /EIA Report Varna Port/. In the last two decades qualitative structure is significantly changed /by the anthropogenic inflow/, as dinoflagellates /representatives of peregrinates/ have significantly increased. Studies carried out in the period 90 - 91 /EIA Report Varna Port/, indicates relative dominance of diatoms in competition with euglena microalgae, and thus, are indicative of the level of phytoplankton biomass. The amount of phytoplankton in Beloslav Lake is dominated by euglena microalgae in winter and summer and by diatoms in winter and autumn. Phytoplankton biomass in the Lake features high values in all seasons as a result of the high degree of various quality anthropogenic impact on the aquatory. During the period 87 - 97, new ecosystem species appear in the Lakes, which earlier have been found in minor concentrations - strong increase in blow periods of pyridinium, cryptophytes and gold phytoplanktons. Inflorescences are for most of their part monospecific or in huge concentrations are 2 - 3 species, which leads to instability in the ecosystem in the long term. Based on phytoplankton characteristics the aquatory can be classified as highly eutrophic, with seasonal impaired environmental carrying capacity.

Changes in the quantity and biomass of zooplankton communities can be used as a reliable indicator for assessment of the ecosystem ecological status in the Lakes. In the period 1987 - 97, the zooplankton in the system of Beloslav - Varna Lake shows reduced species diversity and change in the dominant currents species, particularly in the past years. The zooplankton is represented mainly by the species Copepoda and Cladocera, Rotatoria, and meroplankton. Biomass peaks have occurred during winter - spring period, which is typical for eutrophied water bodies. The highest zooplankton number and biomass is registered [EIA Report Varna Port] in the area of Varna West Port with dominance of A. clausi and the benthic larvaton. Representation of benthic organisms is essential /though with low biomass/ - C. nauplii, C. cypris, P. larvae, D. Zoea, Misidacea ssp, however given the fact that there are no live larvae in the zoobenthic samples. The zoobenthos has undergone significant changes over the past 40 years, as in the past years 9 species have been observed.

The ichthyoplankton is represented by eggs and larval forms of flounder, gobies, and anchovies in small quantities, and occasionally flathead mullets. Almost all the fish found here comes from of ponds and bay transfers. Beloslav Lake has lost its role as breeding habitat due to the high levels of contamination.

The zooplankton in Varna Lake is represented by 16 species while in the 50s over 55 species have been found. After 1990, Mnemiopsis leydii - ctenophore is found in the Lake that has destroyed part of the nutritional crab plankton.

Benthic fauna is represented by 8 species by prevalence of polychaeta eurybiontes of relatively low biomass.

35 fish species live in Varna Lake, of which 16 permanent inhabitants and 19 entrants. Here breed gobies, flounder, whiting, rainbowfishes, and some marine needles.

Rare and threatened representatives of the flora in Beloslavska municipality:
Among the microphytes found in the coastal zone the following are protected species:

Threatened:

Fool's-water-cress - Alpium nodiflorum

Oman - Inula spiraefolia

Fool's-water-cress - Apium nodiflorum
Goniolimon besseranum - Goniolimon tataricum besseranum
Rare:
Juncus anarium
Triglochin maritima
Sonchus palustris
Pastinaca umbrosa
Cystoseira barbata
Poa bulbosa L. var. bulbosa
Agropyron varnense
Artemisia pontica
Buglossoides arvensis subsp. sibthorpiana
Carduus rmcinatus Bied
Centaurea arenaria.
Cirsim alatum
Cramble tatarica
Hypecoum ponticum
Lactuca aurea
Lactuca tatarica
Serratula bulgarica
Pastinaca umbrosa

3.3.2. Presence of protected areas – characteristics, status

Protected area BG 0000191 "Varna-Beloslav Lake"

Varnensko-Beloslavsko Lake complex comprises two Lakes - Varna and Beloslav connected to artificial channel and located to the west of Varna city. Total protected area is 4,681.81 ha **located in the territory of Varna Region, Varna and Beloslav municipalities. It covers part of the town of Beloslav, Ezerovo village, Razdelna village, Strashimirovo village, Asparuhovo, Varna, and Vladislavovo. In biogeographical terms the area shall be determined as continental and black sea.**

Varnensko Lake is a coastal firth Lake at the mouth of Provadijska River of natural origin. Varna-Beloslav Lake complex is the largest and deepest along the Bulgarian Black sea coast. The surrounding of the Lake features the presence of numerous valleys, from 30 to 120 m wide, however, not saturated with major water sources. It receives its water masses mostly from Devnian springs through Beloslav Lake and some underwater springs in its western part. The largest rivers are Devnya and Provadijska, which, up to the adjustment to the Provadijska River in 1945 have flown in one place, in the western part of Beloslav Lake. In addition, Ignatievska River from Frangen Plateau, Konstantinovska River, as well as Peinerdzhikski ravine on the side of Zvezditsa flow into the Lake. Upon high water some of them carry large quantity of quartz sand, and thus beaches have formed at many places.

By the beginning of the XX century water of the Lake has flown in the sea through the abounding in water but shallow Devnya River (Varna River). After the building of Port Varna and drying up of the river, in 1906-1909, in the sandy beaches between the Lake and the sea navigation channel has been driven resulting in level drop by about 1.40 m, and sea water has entered the Lake.

Gradually swampy places on the banks of the Lake start to dry, thus, that area is available for business. Later, in 1976, when a new channel, deep 12 m, is put into operation the Lake has been dredges along the downstream. Its connection to Varna bay through two channels increases the water exchange through the generation of weak currents between both water basins.

The water level in Lake is determined mainly by the change of the sea level and partly by the flow of Provadijska and Devnya Rivers. The continuous flow of the Lake complex is about 4 times its volume per year. Temperature and salinity also are predetermined largely by the influence of the water coming from the sea. In the surface layers of the Lake the water temperature is moving in a wide range up to 25 degrees. The average annual temperature there is 14, and in the bottom layer - about 8 degrees. Varna and Beloslav Lakes do not freeze in winter, which makes them appropriate territories for wintering of different species of birds.

The Extensive connection to the Black Sea has led to an increase in the water salinity in both Lakes, thus leading to environmental characteristics close to those of the marine aquatory. The salinity mode of ground water is typically lower in the spring mainly due to the high water of Provadijska River during that season. An increase in salinity during summer-autumn months is caused by the reduced river feeder and evaporation of Lake water. Sometimes also in the summer winds feed significant quantity of sea water, but it is of less density (due to its higher temperature) and spreads out over the colder and heavy deep Lake waters. Besides in vertical cross-section salinity is different also in the different areas of the Lake complex - in the areas closer to the sea it is about 12 promiles, and in the western part of the Varna Lake - about 7 promiles, and reducing in direction Beloslav Lake.

In the northern part of Varna Lake and west part of Beloslav Lake reedbeds are situated with prevalence of common reed (Fragmates australis), lesser bulrush (tufa Angistifolia), and coastal reed (Shoenoplectus litoralis). Beds in the western part of Beloslav Lake are substantial in size and pass into wet and wetland meadows. Saltwater basin is situated to the North, which shores are overgrown with pickleweed (Salicornia sp.) and other halophyte vegetation.

The protected area has been created for the purpose of conservation and maintenance of the habitats of endangered and migratory species of birds, during nesting, migration, and wintering for achievement of their favorable conservation status according to Article 6 (1) (3) and (4) of the Biological Diversity Act. As priority shall be determined ensuring safe air corridors and places for overnight accommodation for unimpeded movement of migratory birds of prey, storks, pelicans and cranes pursuant to Article 6 (1) (3) and (4) of the Biological Diversity Act during their annual autumn and spring flights, for achieving their favourable conservation status, along with the protection and maintenance of the biological diversity in the area, as a prerequisite for the stability of ecosystems providing favourable conservation status and viability of the populations of the species- subject to conservation.

Varna - Beloslav Lake complex is an important area of international importance for wintering water birds. Here concentrate over 20,000 water birds annually - representatives of 64 species. In the territory of the complex 202 species of birds have been identified, of which 59 species listed in the Red Book of Bulgaria (1985), 91 species are of European conservation concern (SPEC). In the territory of the zone 7 species are found falling into the world endangered bird species in category SPEC1, and of the endangered species of

birds for Europe - SPEC2 here are found 21 species, and of SPEC3 - 63 species. In Beloslav Lake is found the significant in size population of the Pied Avocet (Recurvirostra Avusetta). In the same territory nests the black-winged stilt (Himantopus himantopus). For the white stork (Ciconia ciconia) the protected area Varna - Beloslav Lake is a "place with narrow front of migration". The complex represents territory of global importance for the migration of the Pygmy Cormorant (Phalacrocorax pygmeus). In that zone winter many waterfowls - ducks, diving ducks, cormorants, etc. Internationally significant clusters of common pochard (Aythya ferina) is observed. From the world endangered species, mainly during migration, Dalmatian Pelican (Pelecanus crispus) andFerruginous Duck (Aythya nyroca) are found, as well as the White-headed Duck (Oxyura leucocephala) during the winter season.

In the protected area BG 0000191 "Varna - Beloslav Lake" subject to protection are 59 species of birds, listed in Annex 2 of the Biological Diversity Act (Annex I of Directive 79/409/EEC), and 53 species of regularly occurring migratory species of birds, which are not listed in Annex 2 of the Biological Diversity Act (Annex I of Directive 79/409/EEC). From the invertebrates listed in Annex II of the Directive 92/43/EEC a local population of the Large Copper (Lycaena dispar) is developing in the territory.

3.4. Waste

Current situation

The object of the investment plan is designed to be implemented in the territory of the former industrial site - "Belopal" glassware factory. Because of the previous purpose of the site in 2008 a reconstruction of the object was made, consisting of the demolition of unneeded industrial facilities, buildings and infrastructure, as well as cleaning of waste terrains. The following objects have been removed: "Workshop 3", repair-mechanical workshop, wrapping workshop and Youth Center. The road infrastructure has been reconstructed. During that period 6752.89 tons of construction waste from the demolition were formed and submitted for disposal. Waste has been delivered under contract to two companies - "Zlaten Lav" and "Energiino obsledvane" - **Annex № 22 - *"contracts for delivery of waste".***

There is no waste pollution on the territory on which it is envisaged to implement the investment plan. The existing buildings or facilities are not subject to destruction and demolition. The considered territory is not burdened by old waste pollutions.

With regard to existing systems for waste management at municipal and regional level, directly related to the investment plan may be pointed out the municipal landfills for non-hazardous waste, city of Beloslav, and Devnia, as well as the impaired terrain in "Vrashnika" area, Devnia municipality.

It should be noted that at the present the operation of the "Municipal landfill for non-hazardous waste" city of Beloslav, is terminated by the Order № 133/16.07.2009 г. of the director of the Regional Inspection for the Protection of the Environment and Water (RIPEW) - Varna. The plans for the waste management of the municipality Beloslav related to the diversion of the waste to the "Municipal landfill for non-hazardous waste", city of Devnia, according to schedule published by the Ministry of Environment and Water (MEW).

At the regional scale is underway the implementation of integrated systems for waste management under ISPA measures: EUROPEAID/117408/D/SV/BG "Regional

Waste Management - Provadia region" and "2006 BG 16 P PA 001" for the region of Varna, in which Beloslav Municipality is included.

Given the nature of the investment intent "Port - Logistics Center" and the activities that are planned to be made, both during the construction and implementation, and in the operation of the site can be summarized that the existing systems provide the necessary opportunities to be used for the investment purposes, without being limited or substantially loaded.

Characteristics and estimated quantity of the generated waste

Port "Varna Logistics Center" will be modern port for handling of general cargo, containers and bulk cargo. In the port are not intended to be processed liquid cargo, which significantly reduces the environmental risks.

During the construction period, the main activities which will be carried out on site, including the coastal waters, are associated with dredging spoils of the sea; excavation of earth from the shore; construction of quay wall; construction / reconstruction of terrestrial facilities (warehouses, port pavements, etc.); construction of port communications. The whole project is including a quay wall with length of 460 meters or excavation and dredging mass of about 540 000 $м^3$, which are divided in two parts of around 440 000 $м^3$ of excavation mass with code 17.05.06, of which will be formed from the shore and 100 000 $м^3$ dredging mass formed in the excavation under the water.

The demolition or destruction of industrial facilities and buildings is not envisaged.

In this regard it is expected the following waste types and quantities to be formed:

- Code 17.05.06 - excavated earth mass. According to the investor in the construction of the quay wall 280 000 m^3 will be taken away from the shore as an excavation and 71,900 m^3 dredged from the aqutory. Part of the dredging spoils will then be used for backfill and horizontal layout;
- Code 17.01.07 - mixtures of concrete, bricks, tiles, porcelain and earthenware - expected amount of about 20 m^3 (will be disposed to the authorised landfill for construction waste);
- Code 17.04.05 - iron and steel (construction waste). During the construction of the object will be generated:
- Code 15.01.10* - mixed packaging containing residues of hazardous substances or contaminated by dangerous substances (packaging containing residues of paints, solvents, varnishes)are possible);
- Code 20.03.01 - mixed household waste from the construction workers on the site - about 0.6 t / month. Will be collected in a closed metal container and will be transported to a landfill designated by the municipality.

From the analysis carried out of the amounts of specific waste streams as the most significant shall be determined the excavated earth masses and the dredging sludge.

Under the existing legislation for the waste management, dredging, and in particular the dredging sediments (masses) are considered only when their treatment is carried out on the land. In this case the dredging sludge can be assigned to code 17.05.06. Otherwise (when laid to an underwater depot), when are not removed from the water object, they should not be treated as waste.

Because of its highly limited opportunities for the treatment of dredging sludge at present, such waste is a limiting factor.

In compliance with condition 7.4 of statement ref. № OVOSU – 7727/22.03.2010 of the Minister of the Environment and Waters further consultations were carried out with the Basin Directorate for Water Management (BDWM) "Black Sea Region" and was issued a statement, according to which the existing treatment options of dredging masses are:

- Disposal in the Black Sea beyond 12 nautical miles (depot coordinates 43°08,020' N, 28°12,727' E).
- On-land disposal.

Of the additional studies conducted and of the basis of the expressed by BDWM "Black Sea Region" statement the following alternatives have been considered:

Alternative 1 - Disposal in underwater depot (bay) "Nalbanka".
The alternative was rejected because of the exhausted capacity;

Alternative 2 - Disposal in deep water (12 nautical miles off the shore) - the option is supported by BDWM "Black Sea Region", but is associated with high transportation costs;

Alternative 3 - Recultivation and recovery of the bottom relief (shelf) as a result of the extraction of inert materials from the concession areas in the region of Varna Lake. The alternative is acceptable, but it is limited by the amount of the concession works subject to recultivation under the Mineral Resources Act. Moreover, for its realization the express consent of the concessionaire of the deposit is needed, which at present is not available. The alternative is evolving in time and in case of the expressed intention by the investor for its implementation further inquiries shell be carried out;

Alternative 4 - On land disposal (disposal in newly created landfills). Its implementation is related to the construction of special facilities (landfills) for dredge masses (sludges). The stringent administrative and procedural requirements applicable to that type of facilities makes them difficult for realization and practically economically unjustified for the purpose of investment, given the limited amount of dredging masses and tight deadlines for the implementation of the port complex;

Alternative 5 - On land disposal (using existing dredge deposit). The only specialized facilities in the regional plan for the disposal of dredging masses are "Depots 4b and 4c" of "Devniainvest" AD. The depots are highly specialized and are used in maintaining and ensuring conductivity of the Navigation channel 2.
Given the limited amount of expected dredge masses the alternative is acceptable in a single use of the depots. For its implementation the express consent of the operator / owner of the depots is required, which at present is not available. The

alternative is evolving in time and in case of the expressed intention by the investor for its implementation further inquiries shell be carried out;

Alternative 6 - Pre-treatment (dehydration and stabilization) of dredging masses on the territory of the investment intention. The alternative is related with ensuring the opportunities for treatment of dredging masses of landfills for inert or non-hazardous waste, as well as restoration of the landscape (recultivation of damaged terrains). The alternative is acceptable but it is associated with high investment costs.

On the basis of the carried out above systematic analysis of the possible options for managing the dredging masses as practicable measures for the specific conditions can be identified alternative № 2 and alternative № 6.

It is recommended the implementation of technological options № 2 - Disposal in deepwater outside the 12-mile zone (depot with coordinates 43°08,020' N, 28°12,727' E). Despite the high transport costs, the option is realistic and feasible in a relatively short time. It is not aggravated by additional administrative and regulatory procedures, resulting in timely implementation, without loss of time, which in most cases is a serious obstacle to the realization of the investment.

Option № 6 is offered as an alternative to the main technological option (№ 2). Its implementation is envisaged only in case of abolishment of the preferred option № 2.

It should be noted that the final decision on the selection of technological option for the management of the dredging masses will be conducted through in-depth technical and economic analysis in the next phases of the projection.

In this context and considering the stage of the investment intention will be discussed in details the two prioritized technological variants in order to provide detailed and complete information to compile an objective assessment.

Alternative № 2 - Disposal in deepwater outside the 12-mile zone (depot with coordinates 43°08,020' N, 28°12,727' E).

From the technological aspect of following alternatives are possible for the implementation of dredging:

- Dredging with self-propellant suction-compression dredger and transportation of the dredged masses by scows;
- Dredging with multi-bucket dredge and disposal of dredged masses by scows;
- Dredging with floating crane and disposal of dredged masses by scows.

Will be considered the technological scheme for dredging with self-propellant suction-compression dredger and transporting the dredging masses by scows to depot with coordinates 43°08,020' N; 28°12,727' E.

Unloading of dredging is done through the bottom valves, which helps to control the process in filling the individual sections of the underwater depot. Of significant importance for the proper conduct of the process is to maintain optimum working depth of the boat. By this way is preventing the creation of substantial turbulence and swirl, caused by the opening of the bottom valves, which minimizes the time for sedimentation of the

dredging. For the maximum limitation of the adverse effects from the discharge of the material it is envisaged the use of additional anti-silt curtain.

Alternative 6 - Pre-treatment (dehydration and stabilization) of dredging masses on the territory of the investment intention.

From the technological aspect the following variants are possible:

- installation of modular facility for deposition of artificial consolidation of dredging pulp;
- Construction of earth-fill lagoons for deposition and gravity sedimentation of dredge pulp.

Due to the limited amount of the dredging masses and field characteristics of the site will be considered the technological option to mount the modular facility for deposition by artificial consolidation of dredging pulp.

The structure is built by prefabricated concrete modules as in the base is positioned a sandy drainage and / or overloading sand cushions. In this way a controlled stabilization and dehydration of dredging pulp is done. Removed (drained) water is removed without further treatment in the water object from where the material was dredged.

Dredging masses remain in the installation until an optimal moister is reached in order to meet the criteria of on land depositing.

To identify the chemical activity and composition of the dredging masses in the region in order to evaluate the possibility of their acceptance to the landfills for non-hazardous waste or recultivation of impaired terrain a comparative analysis with limit values was done, set out in Annex № 1 of Ordinance № 8 of 24 August 2004 (SG. iss. 83/2004), concerning landfills for non-hazardous waste.

Data from already performed analyses of dredging sediments in the area of the Navigation channel 2 are used.

The clarification of this issue is crucial to the applicability of the technological option № 6.

Table 3.4-1

Total content mg/kg						
Pb	**Cd**	**Cu**	**Zn**	**Cr**	**Ni**	**As**
25	0.25	13.5	28	6.50	1.50	4.90

Table 3.4-2

mg/kg							
Indicator	**Pb**	**Cd**	**Cu**	**Zn**	**Cr**	**Ni**	**As**
L/S 2 l/kg	0.10	0.02	0.6	0.18	0.04	0.8	0.04
L/S 10 l/kg	0.20	0.02	0.20	0.40	0.20	0.20	0.20

Table 3.4-3

mg/kg							
Indicator	**Pb**	**Cd**	**Cu**	**Zn**	**Cr**	**Ni**	**As**
L/S 2 l/kg	0.10	0.02	0.6	0.18	0.04	0.8	0.04
Ordn. №8	5	0.6	25	25	4	5	0.04

Table 3.4-4

mg/kg

Indicator	Pb	Cd	Cu	Zn	Cr	Ni	As
L/S 10 l/kg	0.20	0.02	0.20	0.40	0.20	0.20	0.20
Ordn. №8	10	1	50	50	10	10	2.0

Table 3.4-5

mg/kg				
Indicators	Results		Ordnance №8	
	L/S 2 l/kg	L/S 10 l/kg	L/S 2 l/kg	L/S 10 l/kg
SO_4	-	1800	-	20000
Chlorides	-	11400	-	15000

Table 3.4-6

pH	Polycyclic aromatic hydrocarbons (mg/kg)	Polychlorinated biphenyls (mg/kg)
6.67	0.03	0.02

The results of the comparative analysis are indicative of the compliance of the dredging sludge with the requirements for their acceptance at landfills for non-hazardous waste, and the low content of heavy metals and polycyclic hydrocarbons, gives reason to believe that the sediments are fit for use for recultivation purposes.

In this context and considering the attached flow diagram (with or without treatment of the dredging sludge on land), the formed construction waste (excavated earth masses) from the realization of the object generally will be submitted for utilization before their decontamination. There is written consent of "Drum Group" OOD for the acceptance of the generated volums of earth masses on a impaired terrain in Devnia Municipality for the performance of a technical recultivation.

During the **operational period** the waste will be formed from the port itself and from the vessels. The main activity of the port covers handling of general cargo, containers, bulk and is ensured by the operation of the means of quay mechanization, logistics equipment, and all kinds of transport vehicles, warehouse department and a number of ancillary units such as FLM, routine maintenance, repair workshop and others. creating the conditions for the operation of the port. As a result of the normal operation of these units, as well as from the servicing of ships visiting the port, industrial, domestic and hazardous waste will be formed.

There are specific requirements to the ports associated with the treatment of ship waste in accordance with Ordinance № 15/2004 for handing-over and reception of waste - results from ship navigation and of ship cargo residues (SG iss.94/2004, amend. SG, iss. 28/2009).

Given the specific function and purpose of the object "Port - Logistics Center", the expected waste during the operation can generally be assigned into two groups:

- Waste generated on the territory of the object;
- Waste received from the navigation activity.

Table 3.4-7

Waste generated on the territory of "Port - Logistic center Varna"

№	Waste code	Name of the waste

1.	13 01 13*	Other hydraulic oils
2.	13 02 06*	Synthetic, motor oils, lubricants and gear oils
3.	13 05 03*	Sludges from oil sludges interceptors (collectors)
4.	15 02 03	Absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02
5.	16 01 03	Discarded tires
6.	16 01 99	Waste not mentioned elsewhere
7.	16 06 01*	Lead-acid accumulator batteries
8.	17 02 02	Glass
9.	17 04 07	Mixtures of metals
10.	17 09 04	Mixed waste from construction and demolition waste other than those mentioned in 17 09 01, 17 09 02 and 17 09 03
11.	20 01 01	Paper and cardboard
12.	20 01 21*	Fluorescent tubes and other mercury-containing waste
13.	20 01 35*	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23, containing hazardous components
14.	20 03 01	Mixed household waste

In the following tables, the waste is presented in specific groups.

Table 3.4-8

A/ Household waste

№	Name of the waste	Waste code	Projected amount
1.	Mixed household waste	20 03 01	5.0 t/y
2.	Paper and cardboard	20 01 01	0.2 t/y

Table 3.4-9

B / Construction waste

№	Name of the waste	Waste code	Projected amount
1.	Glass	17 02 02	0.1 t/y
2.	Mixed waste from construction and demolition waste other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	17 09 04	2.0 t/y
3.	Mixtures of metals	17 04 07	1.0 t/y

Table 3.4-10

C/ Production waste

№	Name of the waste	Waste code	Projected amount
1.	Absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02	15 02 03	0.1 t/y
2.	Discarded tires	16 01 03	15 t/y
3.	Waste not mentioned elsewhere	16 01 99	50 t/y

Table 3.4-11

D/ Hazardous Waste

№	Name of the waste	Waste code	Projected amount
1.	Other hydraulic oils	13 01 13*	10 t/y
2.	Synthetic, motor oils, lubricants and gear oils	13 02 06*	10 t/y
3.	Sludges from oil sludges interceptors (collectors)	13 05 03*	5.0 t/y
4.	Lead-acid accumulator batteries	16 06 01*	0.5 t/y

5.	Fluorescent tubes and other mercury-containing waste	20 01 21*	0.2 t/y
6.	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23, containing hazardous components	20 01 35*	0.2 t/y

Characteristics of waste

- Code 13 01 13* - Other hydraulic oils. Resulted by the exploitation of various hydraulic mechanisms and systems of transport and transport-lifting machines and equipment. Constitute waste hydraulic oil mixed with solid substances and water;

- Code 13 02 06* - synthetic motor oils and lubricants and gear oils. Resulted by the exploitation of different engines, mechanisms and systems during the operation of motor vehicles, transport and lifting machinery. Constitute liquid phases of waste oils mixed with metal shavings, mechanical impurities and water;
- Code 13 05 03* - Sludges from oil sludges interceptors (collectors). Formed as a result of the exploitation of local purifying installations (cleanser-degreasers) of the port. A mixture of water, oil and sludge - solid mechanical particulates;
- Code 16 01 03 - Discarded tires. Formed as a result of their depreciation in the operation of transport vehicles;
- Code 16 06 01* - Lead-acid accumulator batteries. Formed as a result of normal or accelerated aging of the batteries in the process of their operation;
- Code 17 04 07 - Mixtures of metals. Constitute unusable components, parts, structures and equipment of metal;
- Code 20 01 21* - Fluorescent tubes and other mercury-containing waste. Formed by lighting fixtures in commercial, residential, processing and storage facilities within the territory of the port;
- Code 20 01 01 - Paper and cardboard. Formed by the normal business operations;
- Code 20 01 02 - Glass. Formed by motor vehicles, port facilities, normal business operations;
- Code 20 01 36 - Discarded electrical and electronic equipment other than those mentioned in 20:01:21*, 20:01:23* and 20:01:35*. Constitute electrical and electronic equipment, instruments and systems, defective, obsolete or inefficient to use.
- Code 15 02 03 - Absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02. Constitute filter material from de-dusting systems and aspiration of the closed facilities for bulk cargo - grain silos, bunkers and other enclosed warehouses.
- Code 16 01 99 - Waste not mentioned elsewhere. These are hard and powdered waste from handling of ship cargo at the terminal facilities and warehouses.

Waste received from the navigation activity

Wastes that are envisaged to be received within the territory of "Port - Logistics Center Varna" as a result of shipping activities, are presented in the following table:

Table 3.4-12

Waste type	Designation	Waste code	Classification according to MARPOL 73/78
Solid	Biodegradable waste	20 01 08	V
	Paper and cardboard	20 01 01	V
	Plastic	20 01 39	V
	Glass	20 01 02	V
	Metals	20 01 40	V
	Waste not mentioned elsewhere	16 01 99	V
	Lead-acid accumulator batteries	16 06 01*	V
	Fluorescent tubes / lamps	20 01 21*	-
Liquid	Bilge oils from other types of navigation	13 04 03*	I
	Waste containing oils and petroleum products	16 07 08*	I
	Waste water	-	IV

Remark: **Waste water is not covered by the Law on Waste Management.**

It should be noted that "waste" - the result of shipping - are all waste, including sewage and waste, other than remnants of the ship cargo, which were generated during the operation of the ship and are falling within the scope of Annexes I, IV and V of the International Convention for the Prevention of Pollution from ships, 1973 as modified by the Protocol of 1978. (MARPOL 73/78) and by the Protocol of 1997, prepared in London on 2 November 1973 (ratified by law - SG iss. 94/2004, am. SG iss.12/2005) as well as the waste associated with the load are defined in the guidelines for the implementation of Annex V of MARPOL 73/78 - Rules to prevent pollution from ships. The waste - result of navigation activities are waste within the meaning of § 1, p. 1 of the Supplementary Provisions of the Law on Waste Management.

According to our legislation "ship cargo residues" are all remnants of any cargo on board, which remain in bilges or in cargo tanks after finishing the unloading operations and cleaning, including surpluses and spilled waste or spilled quantities during loading / unloading. The ship cargo residues are also waste within the meaning of § 1, p. 1 of the Supplementary Provisions of the Law on Waste Management.

Under the Law on Maritime Spaces, Inland Waterways and Ports of the Republic of Bulgaria (SG iss. 12/2000, am. SG, iss. 28/2009) "Port reception facilities" are all facilities, no matter if they are permanently fixed, movable or floating, which are able to receive waste - resulting from the navigation activities and residues of shipping facilities. "Adequate port reception facilities" are those port reception facilities that are tailored to the geographical location and the size of the port, the number and type of vessels that normally visit it, and the type and volume of waste from the navigation activities and the residues of shipping cargo. "Plan for the reception and processing of waste" is a document containing the description of adapted to geographical location and size of the port, the number and type of vessels that normally visit it, as well as with the type and volume of waste - the result of navigation activity and the remnants of ship cargo, procedures for receiving, collection, storage and preliminary treatment of this waste without undue delay to the ship.

By prospective assessment, the expected quantities of waste to be received for processing (collection and temporary storage) from entering the harbor vessels is presented in the following table:

Table 3.4-13

Type waste	Designation	Quantity ton/year
	Household waste	20

Solid	Lead-acid accumulator batteries	0.8
	Fluorescent tubes / lamps	0.15
	Waste not mentioned elsewhere	30
Liquid	Bilge oils from other types of navigation	210
	Waste containing oils and petroleum products	300
	Waste water	150

Waste management scheme

In the activities of port "logistics center Varna" the operator need to organize the solution of issues related to the collection and treatment of waste in accordance with the regulatory requirements. It is necessary to create a good organization and technology to perform a complex of activities for collection and transportation of the industrial, hazardous and household waste.

The industrial waste with code 16.01.99 will be collected monthly in containers in open storage and will be transported to the depot for non-hazardous waste under contracts that are signed in advance. Mixed municipal waste with a code 20.03.01 will be collected daily in metal containers and will be transported to a depot for non-hazardous waste.

The generated hazardous waste, mainly fluorescent tubes and other mercury-containing waste - code 20.01.21* and lead accumulator batteries - code 16.06.01* will be stored temporarily in special closed warehouses and will then be forwarded for final treatment by companies holding a license to operate under the Law on Waste Management. The hazardous waste with a code 13.01.13* - other hydraulic oils and 13.02.08* - other engine, lubricating and gear oils will be temporarily stored in special containers in semi-closed stores and will be submitted under a contract to licensed companies. Waste with a code 13.05.03*- sludges from oil sludges interceptors and 15:01:10* - mixed packaging containing residues of hazardous substances or contaminated with hazardous substances will also be submitted under a contract of licensed companies.

Waste with a code 16.01.03 - discarded tires will be temporarily stored on a concrete platform in a closed warehouse and will be submitted to the licensed company for further treatment. Waste with a code 17.04.07 - mixtures of metals will be stored on open platform and will be submitted periodically to the licensed company for further treatment. The waste with code 20.01.36 - discarded electrical and electronic equipment other than those mentioned in 20.01.21*, 20.01.23* and 20.01.35* will be temporarily stored in pallets in semi-closed store, and will be submitted under a contract to a licensed company.

The waste will not be processed on site before thair submission for final disposal.

Table 3.4-14

№	Name of the waste	Waste code	Activity			
			C	BpC	R	D
	Generated waste					
1.	Other hydraulic oils	13 01 13*		•	•	
2.	Synthetic, motor oils, lubricants and gear oils	13 02 06*		•	•	
3.	Sludges from oil sludges interceptors (collectors)	13 05 03*		•		•
4.	Absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02	15 02 03		•		•

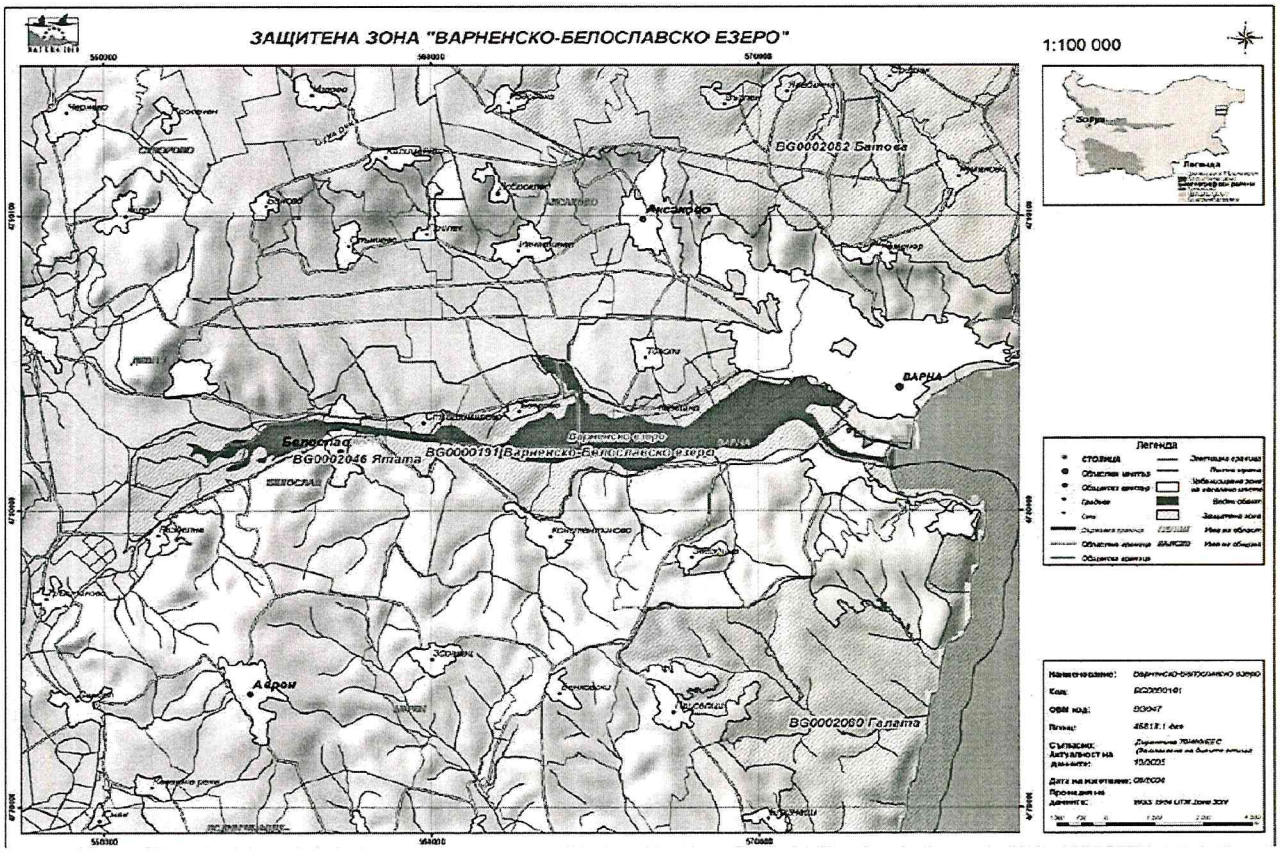
5.	Discarded tires	16 01 03		•	•	
6.	Lead-acid accumulator batteries	16 06 01*		•	•	
7.	Waste not mentioned elsewhere	16 01 99		•		•
8.	Glass	17 02 02		•	•	
9.	Mixtures of metals	17 04 07		•	•	
10.	Mixed waste from construction and demolition waste other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	17 09 04		•		•
11.	Paper and cardboard	20 01 01		•	•	
12.	Fluorescent tubes and other mercury-containing waste	20 01 21*		•		•
13.	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23, containing hazardous components	20 01 35*		•	•	
14.	Mixed household waste	20 03 01		•		•
Waste resulted from the navigation activity						
15.	Biodegradable waste	20 01 08	•	•		•
16.	Paper and cardboard	20 01 01	•	•	•	
17.	Plastic	20 01 39	•	•	•	
18.	Glass	20 01 02	•	•	•	
19.	Metals	20 01 40	•	•	•	
20.	Waste not mentioned elsewhere	16 01 99	•	•		•
21.	Lead-acid accumulator batteries	16 06 01*	•	•	•	
22.	Fluorescent tubes / lamps	20 01 21*	•	•		•
23.	Bilge oils from other types of navigation	13 04 03*	•	•		•
24.	Waste containing oils and petroleum products	16 07 08*	•	•		•

Remark: **The last two columns reflect the activities that will be carried out with the waste after its delivery for subsequent treatment.**

Assessment of the expected changes in the state of the environment in terms of waste management

From the performed analysis and the characterization of the environment under the waste factor it can be concluded that the implementation of the investment plan will not adversely affect the ecological status of the area, both during construction and during the operation period. With correctly selected from technological point of view system for the management of the specific waste streams, in particular the dredging masses, the impact will be short-term without significant changes in the characteristics of the environment. The absence of significant amounts of waste generated during the various stages of the site realization provides an opportunity for the use of the existing and planned for implementation municipal and regional systems for waste management, without being limited or substantially loaded.

The protected area "Varna - Beloslav Lake" is related to the protected area BG0002046 Yatata and area BG0002046 Galata.



Protected area BG 0002060 "Galata"

The Protected area "Galata" covers the eastern part of Momino plateau, located to the south of Varna city. The territory is locked between coastline of the Black Sea (from the southern part of Varna bay - Asparuhovo residential district, the cape of the same name, and Galata district, to the Snake Cape and Paradise camping) to the east and main road E87 Varna - Burgas. It covers part of the territories of Avren municipality and Varna municipality, and in particular the lands of Bliznatsi village, Priseltsi village, Asparuhovo village, and Varna. The total protected area is 8,136.74 ha, of which land with a territory of 6,086.85 ha**, and** 2,049.89 ha aquatory. **In biogeographical terms the area shall be determined as a black sea type**

The maximum displacement in the area is 231 m. with average altitude of 80 m. It is situated on a limestone plateau, through which deep ravines of several rivers pass. To the north the coast features steep rock and earth coasts, which are characterized by sporadic landslide activity. In the south lower part there are sand beaches and coastal forests. Basic habitat in PA Galata are the deciduous forests of Turkey Oak (Quercus cerris) and Hungarian oak (Quercus frainetto). These forests occupy almost half of the total area of the zone. The rest is occupied by coastal marine waters (25 %), arable areas and grass spaces with dominance of the meadow fescue (Festuca pratensis), Poaceae (Poa sylvicola), etc., in places with low trees and bushes. Coastal forests are suitable habitats for nesting of representative populations of the Semicollared Flycatcher (Ficedula semiturquata), Grey-headed Woodpecker (Picus Camus), Middle Spotted Woodpecker (Dendrocopos medius)

and the Woodlark (Lullula Arborea). Coastal rock and resembling steppe habitats support a representative population of the Pied Wheatear (Oenanthe pleshanka).

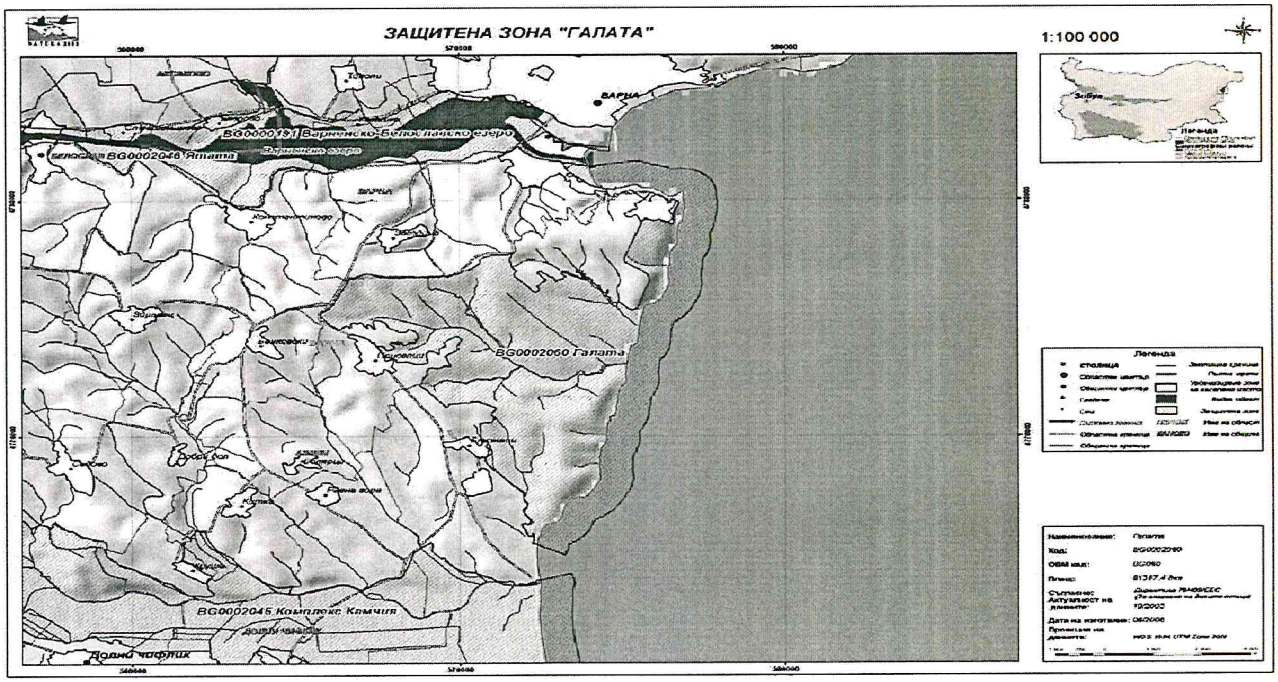
178 species of birds are laid down in the protected area Galata, of which 34 are registered in the Red Book of Bulgaria (1985). Among the species occurring 75 are of European conservation concern (SPEC) (BirdLife International, 2004). As a world endangered in category SPEC1 1 species is listed, and 50 species as endangered in Europe respectively in category SPEC2 - 22 species, in SPEC3. The area is located in the migratory flyway Via Pontica. It is a typical place, with a narrow front of migration, where migratory birds fly low over the ground. In the area during nesting and migration significant gatherings of terns and gulls settle down, including the Slender-billed Gull (Larus genei), the Sandwich Tern (Sterna sandvicensis) and the Common Tern (Sterna hirundo) due to the presence of food resources.

In the protected area BG 0002060 there are suitable habitats for 61 species listed in Annex 2 of the Biological Diversity Act, which require special protection measures. 54 of them are also listed in Annex I of Directive 79/409 of the EU. Galata covers the longest untouched coastal strip on the Bulgarian Black Sea coast, and is one of the most important places in the country for the Yelkouan Shearwater (Puffinus yelkouan), which is deemed nesting there.

Protected area BG 0002046 "Yatata"

300 m. away from Belopal is located *the protected area Yatata.* International conservation status is CORINE site, and the Bulgarian one - protected area. The area is 154 ha.

It represents artificially formed water body overgrown with hygrophilous vegetation, located on the south coast of the navigation channel connecting Varna and Beloslav Lake, right next to the town of Beloslav. The surrounding pastures, hills, and low rock crowns and small valley in the southern part relates to the plates. It covers a territory of the municipalities Varna and Beloslav by the lands of Konstantinovo and Beloslav. The total area of the zone is 144.50 ha. **In biogeographical terms the area is defined as seaside.** A peculiar humid area is formed which ~ 30% of the area and divided by embankment into two parts - south - freshwater, and northern - saltwater. In the vicinity waters of WWTP Beloslav are discharged resulting in peculiar habitats.



The coast of ancient mirror are overgrown with common reed /Phragmites australis/, and Broadleaf cattail (Typha latifolia). Around the saltwater mirror the salicornia /Salicornia ssp. / and other halophyte vegetation are found. The not so large rocks crowns and non-operated sand quarry located north-west from the site complement the diversity of habitats.

The place represents a mosaic of diverse habitats as the most characteristic are swampy territories and wetlands formed mainly as a result of continuous discharge of water from the wastewater treatment plant (WWTP) - Beloslav, located in the neighbourhood. The peculiar wetland is divided into south - freshwater, and north - saltwater part. Coast of the freshwater basin are overgrown with hygrophytes dominated by common reed (Fragmites australis) and Broadleaf cattail (tufa latifolia). Large areas around saltwater basin are covered by salicornia (Salicornia sp.) and other halophyte vegetation. To the west and north of water body extend open areas overgrown with mesoxerotherm grass vegetation. The slopes of heights to the east are covered with sprout forests of Turkey Oak (Quercus cerris), Oriental Hornbeam (Carpinos orientalis) and field elm (Ulmus minor). Diversity of habitats is supplemented by a small valley with grass and shrub vegetation, not so large rocks crowns and abandoned sand career.

Although with a small area Yatata features a rich variety of bird species in all seasons. 208 species of birds are laid down in its territory, of which 62 are registered in the Red Book of Bulgaria (1985). As a world endangered in category SPEC1 7 species is listed, and as endangered in Europe respectively in category SPEC2 - 20 species, in SPEC3 - 62 species. In Annex I of Directive 79/409/EEC 63 species of birds are listed, and the regular naturally migratory species of birds which are not listed in Annex 2 of the Biological Diversity Act (Annex I of Directive Directive (79/409) are 53 species. In the area another 24 major species of birds are laid down - subject to protection under international conventions.

Yatata is one of the most important places in the country for the conservation of the nesting black-winged stilt (Himantopus himantopus), small water bull (Ixobrychus

minutus). The place is of great importance and for the nesting of the Ruddy shelduck (Tadorna ferruginea). Pied Avocet /Recurvirostra avosetta/ also nests in Yatata although in small quantities.

The protected area is dependent on the inflow of waters from WWTP Beloslav. Whereas depreciation and obsolescence of the facilities therein, in periods of emergency for prolonged periods of time water inflow is suspended, which rises problems for the flora and fauna. The regulation for grazing of cattle in the protected area is still not controlled.

Near the area of the investment proposal a part of *Natural Spot "Pobiti kamani" is located.* Announcement of the protected area and the conservation mode of the territory is treated in the following documents:

Decree No 12304/06/26/1937 of the Ministry of Agriculture and State Property announces a central group with an area of 10.3 ha natural monument.

Decree No 22517/12/15/1938 of the Ministry of Agriculture and State Property announces natural formations of Beloslavska and Slynchevska group with areas 4.6 ha and 4.8 ha natural monument.

Regulation No 3702/12/29/72 of the Ministry of Forests and Environmental Protection announces Banovska group with an area 5.0 ha and Western group Slynchevo village with an area of 1.5 ha natural spot.

Regulation No 800/08/31/81 of the Environmental Protection Committee announces "unique rock formations in the area Kyomorluka", land of Devnya "natural spot" with an area of 60.0 ha.

Regulation No 988/09/04/93, section II (14) of "Natural Spot" of the Ministry of Environment determines NS "Pobiti kamani" a protected natural site of national importance.

Regulation No 258/08/17/95 of the Ministry of Environment, is the current regulation determining the complex NS "Pobiti kamani" with an area of 253.3 ha, a site of international importance for the conservation of unique geological formations.

The mode of protection of Regulation No. 258/08/17/95 of the Ministry of Environment comprises the following prohibitions:

Opening quarries; conduct of mining- geological and other activities which harm and destroy the rock formations or alter the natural outlook of the area;

- Any construction except as provided for in zoning plan of the area;
- Extraction of sand, rocks, and separate columns.
- Contamination through municipal and industrial waste;
- Felling of trees except of inspection and sanitary;
- Afforestation of barrens;
- Tear and destruction of grass and shrub vegetation, and collection of herbs;
- Hunting.

Other protected area is "The Small Varna Sand and Gravel Desert" of old tertiary lower Miocene age.

The desert features karst formations, most interesting of which are "Pobitite Kamani". The desert features many concretion - karst formations, chemical - karst formations of various forms - spongelike, sheep-cams, small poles, etc.

3.3.3. Description and analysis of the possibility and degree of impact of the investment proposal on the biological species and the object and purpose of the conservation of protected areas

BG0000191 "Varna- Beloslav Lake"

The elements of the investment proposal are described above, which could have an impact on the protected area. These are dredging works, construction of the quay construction, demolition, repair, reconstruction and the construction of storage facilities, completing and reconstruction of basic internal road communications, supply and equipment of the port with a crane and reloading machinery, fairway movement, loading and unloading of the ships and the associated noise loading, incl. lights in the night, as well as with the movement of people and machines in the territory of the port with a logistic center.

Location and nature of the activities during construction and operation of the port will not affect to the same extent of habitats of all species of birds, subject to conservation in the area.

"Port Logistic Center - Varna" will be built in urban territory of the former Glassware Plant Belopal OOD. Technogenic elements - buildings, quay lots, railway line, and etc. created prior declaration of the area restrict the biological diversity. Former coastal hygrophilous vegetation, bushes, willows and poplars on the coast have been removed long ago in order to build the production site to the plant. Currently at the border, with a length of 1,250 m in the urban area of the investment proposal with the water channel there is a single located and sparsely low shrub vegetation and spots of hygrophilous vegetation very small in area such as common reed and cattail in the western and eastern end of the coastal part of the ground. The plot for construction of the quay wall and front feature no vegetation, the shore is almost vertical and offers no suitable habitats for wading waterfowl.

Coastal territories will be preserved in the western and the eastern shore representing suitable trophic base or haven during migration of horned grebe *(Podiceps auritus)*, great egret *(Egretta alba alba)*, Purple heron *(Ardea purpurea)*, small white egret (*Egretta alba garzetta)*, Eurasian spoonbill *(Platalea leucorodia)*, plovers, etc.

Nesting birds subject to protection in the protected area as kingfisher *(Alcedo atthis)*, Little Crake (*Porzana Parva)*, Little Bittern *(Ixobrychus minutes),* will not be deprived of appropriate locations, including for rearing their cubs, because there is no prejudice to sheer banks, or high hygrophilous vegetation on the shore.

Besides the above types of birds in the territory of the investment proposal Red-backed Shrike *(Lanius collurio) and* Lesser Grey Shrike *(Lanius minor)* can be found. The area is possible habitat and trophic base for Woodlark *(Lullula Arborea, whether or not)* , the Syrian Woodpecker (*Dendrocopos Pelobates syriacus") and* the European Roller *(Coracias garrulous)* as their habitat will not be violated, if during construction the existing wood and shrub vegetation in Zoned Land Property is maintained to the maximum extent.

The planned dredging section (300 + 160 m) is vegetation free, which could be considered a potential habitat for birds subject to conservation in the area. In this section of the investment proposal is unlikely terrestrial habitats for birds to be damages or destructed. This also applies to the black-winged stilt *(Himantopus himantopus) and* the Pied Avocet *(Recurvirostra avosetta) for which* reedbeds in the western part of Varna - Beloslav Lake are exceptional valuable habitat as they nest in the mud coasts and eat shallow mud, where a significant percentage of the national population is supported. The habitat of the Little Crake /*Porzana Parva*/ also remains not affected the bird lives in distant reedbeds and coastal aquatic vegetation, as is highly sensitive to human presence.

Construction of the quay wall will be carried out onshore of the zone, so that it also will not cause withdrawal or damage to the nesting or trophic habitats, including habitats for hiding and resting of birds.

The implementation of the investment proposal is not related to the withdrawal of the aquatic area from the protected area, but rather to the creation of a new one in the construction of the wharf having a total length of 460 m (the previous EIA report incorrectly states a 1.13% withdrawal from the territorial sea of the area – page 36, 52 – due to lack of complete information about the investment proposal. This inaccuracy is corrected by a detailed description of the plan to build the port with a logistics centre).

There will be no direct destruction of habitats for resting and feeding of aquatic species, including migratory ones such as Aythya – common pochard *(Aythya ferina)*, tufted duck *(Aythya fuligula)*, seagulls – black-headed gull *(Larus ridibundus)*, common gull *(Larus canus)*, Caspian gull *(Larus cachinnans)*, divers, pelicans, etc., as they prefer open water areas, in particular Lakes whose area will not be reduced.

Some deterioration in the characteristics of aquatic habitats for the birds is expected in the performance of the dredging works and the construction of the quay wall due to the turbidity of the water from suspended particles and a sharp decline in dissolved oxygen due to oxidation of organic bottom sediments. This impact will be local, limited in area and of a temporary nature until the completion of the dredging and construction works since the self-cleaning capacities of the aquatic ecosystem will be temporarily hindered.

The investment proposal will also have no negative effect on the birds of prey proteced in the area, since their habitats will not be affected, for example the nesting and feeding habitat of the Western Marsh-harrier (mosaic aquatic vegetation and reedbeds) will not be reduced, nor will the hunting area of the Hen harrier. There are no tall trees in area which the Greater Spotted Eagle, for example, uses during migration and in winter. There are no nesting conditions for the Red-footed Falcon which nests on trees in forests.

Nesting substrates, food biotopes and resting areas will not suffer any negative changes, so the integrity of the habitats of the species subject of preservation in the protected area will not be impaired.

Indirect impacts on potential habitats in the west or east of the site of the investment proposal are possible because of a possible risk of fire during the operation and maintenance of the facilities on the ground of the port and the movement of large human flows, as well as the danger of accidental pollution of the sea and surrounding coastline in case of ship accidents, dumping of cargo, etc.

Indirect impact on the habitats of birds are possible due to the invasion of alien species. For this purpose, in the construction and operation of the urban area, the selection of species for planting and grassing will be very carefully approached. Introduction of alien invasive and synantropic animals and invasive weeds and ruderal plants, including through the processed cargo and vessels, may alter the species composition of the habitats and deteriorate environmental protection status. They may be enemies and competitors of plant and animal species subject to preservation in the protected areas, as well as species typical of the habitat.

Indirect impacts on habitats in the south of the site of the investment proposal are possible because of a possible risk of fire during the operation and maintenance of the facilities on the ground of the port and the movement of large human flows, as well as the danger of accidental pollution of the sea and surrounding coastline in case of ship accidents, dumping of cargo, etc.

In order to protect the aquatic environment and coastal areas from pollution due to any accidental spills of petroleum products model studies were made for the possible movement of a large oil spill. It was found that the maximum time required for the placement of oil containment booms localizing the spill is 20-40 minutes, depending on the season and winds. Model studies showed that the localized spill will cover a maximum area of 120 decares of the water area south of the port. Due to the weak waves and low-speed streams in the Lake, there is no danger that the oil spill will reach the coastal area /where birds hide or nest/ next to "Kazashko" or "Yatata" protected areas. In this case, the effect may be a short-term one – until the collection of the spilled products with skimmers. The smell of petroleum products is expected to briefly drive away birds feeding in this part of the Lake. There is no danger of clogging of petroleum products on the feathers of birds and potentially significant impacts related to their flying abilities.

Prevention of fires and fire suppression is the subject of a special technical design, being part of the project documentation, which provides for special measures to reduce the risk manifold, as well as measures to locate and extinguish fires.

BG 0002046 "Yatata"

The implementation of the investment proposal is not related to any direct or indirect destruction, damage or fragmentation of the habitats of bird species subject to protection in it. Impacts, such as disturbance, on the species are possible given the expected increase in vessel traffic in channel 2 and the associated noise and light load at night. This impact will not be of an intensity that can lead to permanent abandonment by bird species of the habitats closest to the area of the investment proposal. The shore area is covered with water vegetation dominated by Reed, Narrowleaf Cattail and Salicornia, which are suitable feeding and resting habitat for the Heron, Ibis, Eurasian Spoonbill, Swans and other bird species inhabiting the shallows near the Lake shores.

Description and analysis of the impact of the investment proposal on species subject to preservation in protected areas BG0000191 "Varna-Beloslav Lake" and BG 0002046 "Yatata".

As pointed out above, it is unlikely for the implementation of the intention to cause a significant negative impact (destruction, damage or fragmentation) on the habitats of species subject to protection in both areas. No dynamic changes in this regard can be expected in the current density, number and structure of bird populations due to lower breeding success or because of the abandonment of the traditional bird habitats as a result of the implementation and operation of the port.

Noise and light loads resulting from the construction of the port and logistics centre facilities and their operation may cause disturbance in the birds that will not be of such intensity that would lead to the abandonment of that territory and occupation of adjacent areas by the more sensitive species. This will have no permanent effect on the size and density of the populations since the adjacent areas are of the same character.

Estimates of the acoustic environment in the port area are based on statistical data. The impact of the generated noise levels in the protected areas (regulation of the settlement) will reach levels of the order of 36-54 dB. The implementation of the investment proposal will lead to a temporary increase of noise levels in the port area due to the use of construction machinery. No blasting operations, pecking works, etc. generating high levels of noise will be carried out in the work process. The impacts of noise on the

birds will be negligible, within the acceptable parameters, and the noise-generating activities will be carried out mainly in daylight hours, periodically and in short terms.

During operation the noise emission will be mostly due to the use of port machinery and increased traffic on the fairway. The reduction of noise levels will be achieved through planned construction of protected green belt of tall vegetation in the territory of the site adjacent to urban residential areas.

The impact of the facility during operation will be of continuous for the common bird species that inhabit the area, but with a low negative effect. Disturbance of migratory species will be short-term, since the time some of them spend in the area during their migration is limited (from hours to several days).

Species such as the Lesser Grey Shrike /*Lanius minor*/ and the Red-backed Shrike /*Lanius collurio*/ inhabit rare groups of trees and scrubland facies with many shrubs in open areas, which are not present on the site of the investment proposal, so their habitats are not likely to be disturbed and no changes in their numbers are expected.

Bird species such as the Little Ringed Plover /*Charadrius dubius*/, Eurasian Oystercatcher /*Haematopus ostralegus*/, Dunlin /*Calidris alpina*/, Eurasian Curlew /*Numenius arquata*/, Jack Snipe /*Lymnocryptes minimus*/, Common Snipe /*Gallinago gallinago*/, Great Snipe /*Gallinago media*/, Common Redshank /*Tringa totanus*/, Spotted Redshank /*Tringa erythropus*/, Marsh Sandpiper /*Tringa stagnatilis*/, Common Greenshank /*Tringa nebularia*/, Green Sandpiper /*Tringa ochropus*/ are found in the protected areas during migration, while in winter they inhabit mud shoals and banks in the western part of the protected area of Varna-Beloslav Lake and no direct impacts on their habitats and populations are expected.

The implementation of the investment proposal will not cause a reduction in the numbers of native, migrating or wintering bird species protected in both areas. The port facilities, including the quay wall, will be of height that would not constitute an obstacle in the everyday flight of birds between land and water, so the migration corridors will not be disturbed.

• During breeding season

There is no evidence of nesting bird species listed in Annex 1 of the Birds Directive within the area of the investment proposal, so no significant negative impact on them is expected.

• During migration

Aquatic birds passing during migration are subject to protection in the protected area of Varna-Beloslav Lake. The area of the investment proposal does not offer good sleeping, resting and feeding conditions to migratory birds. The reason for this is the infrastructure built in the coastal zone. Places preferred for concentration by the species during migration are open water areas where they find plenty of food and the necessary calm. Therefore, it can certainly be stated that the implementation of the investment proposal will have no significant negative impact on the migration of aquatic birds.

• During wintering

According to Michev & Profirov (2003), there are significant winter concentrations of aquatic birds in Varna-Beloslav Lake – on average between 16,000 and 20,000 specimens of 22 - 24 species. Birds with the highest numbers are Eurasian Coot (*Fulica atra*) having an average number of 9,900 specimens (max. 32,256 sp. in 1998), Common Pochard (*Aythya ferina*) having an average number of 2,400 specimens (max. 10,621 sp. in 1993) and Tufted Duck (*Aythya fuligula*) having an average number of 870 specimens

(max. 2,826 sp. in 1998). The majority of specimens are concentrated in PA "Kazashko", "Yatata" and the western part of the Lake complex. In addition, there is no specific data/descriptions for the observation of birds wintering in the site area in previous periods.

Nesting substrates, food biotopes and resting areas will not suffer any negative changes, so the integrity of the habitats of the species subject of preservation in both protected areas will not be impaired.

No increase in bird mortality, changes in their number and age structure, or reduction of their breeding success is expected, which is why there will be no negative changes in their favourable conservation status.

Description and analysis of the impact of the investment proposal on the integrity of the protected areas with a view to their structure, functions and conservation objectives, both during the implementation and during the operation of the investment proposal.

The location of the port with logistics centre and the use of an urban area for its building do not affect the integrity of the analysed areas. The implementation of the investment proposal "Port with Logistics Centre Varna" will not adversely affect the object and purpose of conservation, since no loss or fragmentation of habitats of ornithofauna species are expected and therefore their migration and breeding will not be suppressed.

The large amounts of nutrients in the waters of Varna-Beloslav Lake are due to the anthropogenic impacts and, in particular, the discharge of water from the treatment plants WWTP – Belevo and WWTP – Varna, the discharge of waste water from different facilities of Devnya complex bringing large amounts of nitrogen and phosphorus . Another source of nutrients in Varna-Beloslav Lake are the bottom sediments.

During the implementation of the investment proposal, in the intended shallow digging, part of the contaminants found in the sediments will pass in the water, which in the short term will degrade the oxygen regime of the water area. These Lakes are morphologically prone to eutrophication processes, the rapid development of phytoplankton and the subsequent processes of hypoxia and anoxia. At the same time, due to the intensive dredging and related water turbidity, there will be unfavourable photosynthesis conditions, which will temporarily reduce the phytoplankton biomass.

However, these conditions will rapidly improve immediately after the termination of the activities and due to the natural exchange of water caused by local water currents.

Dredging operations and possible disposal of spoil in other parts of the aquatic environment will lead to complete destruction of benthic cenoses in the affected area. As a result, the total amount of meroplankton will also be reduced. The recovery of the benthic cenoses will begin two or three years after the construction of the facilities. The lowest impact will be on zooplankton, the recovery of which will proceed expeditiously because of the relatively rapid exchange of water masses and its high reproductive rate.

Protected area "Galata" intersects with a part of the artificial channel for access of vessels to the port. The increased traffic will lead to low impact on the protected area. The section of the area in direct contact with vessels is highly anthropogenically influenced and is an important habitat for bird species and aquatic species subject to conservation in the protected area. A higher degree of impact it will occur in case of emergencies and pollution of the aquatic environment with petroleum.

Direct negative factors lowering the biological production in the affected water area will be the water turbidity resulting from suspended particles from dredging and construction operations and the sharp reduction in the oxygen content in the water as a result of oxidation of organic bottom sediments. These factors will lower for a short period of time the self-purification ability of the aquatic ecosystem and will lower its trophic potential, affecting the fish populations feeding on with meroplankton and benthos. Fish will be affected by the project implementation at the stage of eggs and larvae when they are most sensitive to pollution and reduced oxygen content. It is expected for these negative influences to have a short duration and for their potency to reach minimum levels after the construction of the facilities.

The impact rate of the investment proposal on the subject matter of the protected area is defined as low and medium. Habitat types listed in Annex I to Directive 92/43 will not be affected. The impact will be on the habitats of some bird species listed in Annex I to Directive 79/409 on the conservation of wild birds.

The impact on coastal waters subject to conservation in protected area "Galata" and the bird populations and species will be low. The impact will be on the aquatic environment, where the area affected by increased traffic area is 0.59% of the aquatic environment of the area.

Presence of reasons of overriding public interest for the implementation of the plan or reasons relating to human health, public safety or beneficial consequences on the environment.

The investment proposal implies improving the activities and functions of the port. Improving the capacity of the ports through modernization and reconstruction of the existing transport infrastructure and building a new one.

Modernization and provision of services ensuring quick and reliable servicing, increased transits through the territory of the country and increased competitiveness of the Bulgarian ports. Irrelevant to human health and public safety.

3.5. Geological setting

3.5.1. Status of the geological setting

3.5.1.1. Geological framework

Lithostratigraphic characteristics

Taking part in the geological framework are Lower and Upper Cretaceous sediments, Paleogene and Neogenic rocks and Quaternary bodies – **Appendix No. 11 – 'Geological Map'**. In addition to them, established by wells drilled in depth are even Upper Cretaceous, Upper Permian and Paleozoic lithostratigraphic units.

Cretaceous system

This system is represented by its two series – the Lower Cretaceous and the Upper Cretaceous ones.

Lower Cretaceous series

Related to it is the Gorno Oryahovo Formation – gK_1^{h-b}. It has outcropped along the southern and northern slopes of Beloslav Lake. It was also established by drilling in the bottom of that lake below the modern-time (Quaternary) bodies. It occupies quite an extensive area. The total thickness is 300-500 m. This Formation is built-up by grey-bluish marls, limey within the lower levels with rare interbeds of sandstone and siltstone. Age – Hauterivian-Barremian.

Upper Cretaceous series

The rocks of the Upper Cretaceous series are outcropped in the form of bands mainly along the slopes of the Beloslav Lake. Developed here are the following lithostratigraphic units: Mezdra Formation (mzK_2^{cp-m}) – age – Upper Campanian – Lower Maastrichtian, Shumen Formation (SK_2^{st-cp}) – it being of Lower Santonian – Lower Campanian age, the Vengan Formation (vK_2^{t-st}) – age – Upper Turonian-Lower Santonian, ... (ddK_2^{t-st}) – age – Upper Turonian-Lower Santonian, Novogenska Formation (nK_2^{cp}) – Upper Campanian, and the Mogilishte Formation (mgK_2^{t}) – Lower-Middle Turonian, The Upper Cretacesous depositions are represented by chalk-like limestones, calcareous sandstones and arenaceous sandstones, glauconitic sandstones and limestones with calcareous-cherty concretions. The total thickness exceeds 300 m.

Paleogene system

Assigned to it are the following lithostratigraphic units:

Calcareous formation – $7Pg_1^t$ – outcropped in the form of spots on the two slopes of the Beloslav Lake and the slopes of Provadiyska river and Devnenska river. It is represented by arenaceous and aleurolitic limestones. Thickness – up to 77 m. Age – Thanetian.

Beloslav Formation – bs Pg_2^1. It has outcropped mainly along the northern slopes of the Beloslav Lake. It appears in the form of spots in the southern part of the area. It is represented by argillaceous sands with thin interbeds of calcareous sandstones, sandy clays and marls. Age – Lower Eocene. Thickness 25-40 m.

Dikilitash Formation – d_1 Pg_2^1. It is builds up mainly the northern slopes of Beloslav Lake. It occupies part of the area of the southern slopes of the lake. It is represented by quartz sands and sandstone. A shelly marker bed follows there under. Age – Lower Eocene. Thickness – 40-60 m.

Aladun Formation – $alPg_2^1$ – it structures the two banks of the channel that links Varna Lake and Beloslav Lake. It is represented by numulitic limestones. The age is Lower Eocene.

Avren Formation – $avPg_2^{2-3}$ – it has outcropped on an extensive area along the two slopes of the valley in the area of Channel 2. It is represented by marls with thin interbeds of sandstones. The age is Mid-Upper Eocene.

The thickness of the Lower and Middle Eocene exceeds 100 m.

Ruslar Formation – rPg_2^3-Pg_3 – it has outcropped over a wide zone along the southern and northern shores of Varna Lake in its western-most part. It outcrops on a limited area in the southern shore of the lake near Varna Bay. The sediments of Ruslar Formation have been established by drilling wells in the entire bottom area of Varna Lake as far as the city of Varna. They are represented by clays, little sand and argillaceous sandstones, manganese ore. Age – Upper Eocene-Oligocene. Thickness – more than 100 m.

Neogenic system

The Neogene system in the area is represented by 3 lithostratigraphic units:

Galata Formation – gN_1^{t-s} – it is extensively distributed and builds-up the northern shore of Varna Lake. It is represented by sandstones, interbeds of clays, sandstones and rare conglomerates. Age – Tarkhanian-Sarmatian. Thickness: 100-260 m.

Euxinograd Formation – Vladislavovo wedge – $ev/v/N_1^s$ – it builds up the northern shore of Varna Bay. Represented by calcareous clays. Age – Upper Karaganian-Sarmatian. The thickness is 30-40 m.

Odartsy Formation – $odN1^s$ – its outcrops are in the area of Cape Galata. Represented by detritic, shelly and oolitic limestones with interbeds of clays and sands. The age is Upper Bessarabian.

The total thickness of the Neogene system does not exceed 100 m.

Quaternary system

Included in it are sediments of Pleistocene, Holocene-Pleistocene and Holocene age. The distribution and thickness of Quaternary sediments, in view of the morphological character of the area, are considerable. Particularly extensive is the thickness along the bottom of the valley – in the zone of the lakes and the bay.

Pleistocene

Eolian-alluvial-deluvial bodies – $e\text{-}a\text{-}dQ_p$

These have outcropped south of Beloslav in the form of spots. They are represented by loess-like clays, Tepian, Marnian, without structure, with thickness up to 10-15 m.

Alluvial bodies – aQp^3 – lands above flood-plain terraces I and II belong to them, which developed mainly along the valleys of the Provadiyska River and Devnenska River. The terraces are built of well-processed gravels included amongst a sandy-clayey mass with thickness of 10-15 m.

Holocene – Pleistocene – $mtQ_{p\text{-}h}$

These are marine bodies of the second marine terrace – (mtQ_p^2) represented by coarse-grained sands, slightly cemented conglomerate in the vase, and on the first marine terrace (mtQ^h) – represented by argillaceous sands and aleurolites, overlaid by turf of low-thickness. These build the eastern part of Varna Lake and its shores over their entire length.

Holocene

Referred to it are the following stratigraphic units:

Proluvial bodies – prQ^h – these are the result of the deposition activity of ravines cutting both slopes of the valley. The larger of these are: in the Haramiyata ravine at railway station Beloslav, the town of Beloslav itself, the mouth of Konstantinovska River, the mouth of Zvezdets River and around Asparoukhovo Quarter. They are represented by processed sands, gravels, boulders and clays with thickness of 10-15 m.

Alluvial bodies – aQh

These build the channels and the flood-plain terraces of Provadiyska River and Devnenska River. They are represented by sands, gravel stone and clays with thickness of 10-15 m.

Fluvial-paludal bodies – 1Qh

These are mainly developed along the coastal part of Beloslav lake. They are represented by sands, clays and turf with thicknesses of several meters.

Modern-time marine bodies – mQh

These occur in the southern and northern parts of Varna Bay. They represent beach sands.

From the viewpoint of construction and laying foundations the above sediments are classified, according to their physical-mechanical properties, in the following manner:

Rock sediments – these include the sandstones and limestones that are the ground base with highest load-bearing capacity;

Semi-rock sediments – these included the glauconite marls and the clayey-sandy siltstones, which are a strong ground base when not wetted;

Clayey sediments – these included the aleurolite clays of the Paleogene, the grey and greenish clays of Neogene and the sandy Quaternary clays (the conditional calculation loading is 0.2 – 0.25 MPa);

Sandy sediments – these include the Neogene and Quaternary sands (the conditional calculation loading exceeds 0.25 MPa);

Loose construction soils – these include the lake-side Quaternary sediments (silts, turf, mudded sands etc., which are unfit for direct foundation).

3.5.1.2. Geomorphology

The valley of the Beloslav and Varna lakes and the Varna bay represent a natural extension of the valley of Provadiyska River and Devnenska River. Its total length exceeds 25 km, while its width varies from 0.5 to 3.0 km.

South of Cape Galata in Varna Bay the sea coast is steep, even cliffy at places, with a narrow or absent beach strip. From the south the valley of the lakes is enclosed by the Mominsko table-land, its sea-level elevation being up to 180 m. Its slopes are not particularly steep and are cut by several larger ravines, such as Beloslavsko, Konstantinovsko, Szezditsko and Asparoukhovsko.

In the north the valley is enclosed by the Varna table-land, with an elevation of up to 300 m above sea-level. This plateau is characterized by gentle slopes and it is slightly less indented. The more significant wider ravines gulleys are those of Ignatievska River and the Haramiysko ravine at the town of Beloslav.

The biggest natural debts in the Varna Lake are 17-18 m, and those in the Beloslav Lake – 3-4 m.

The valley was formed to its present shape as a result of the sinking of the western Balck Sea coastal region during the Quaternary, in several phases. This is evidence by the several accumulative river terraces in the old beds of Provadiyska River and Devnenska River. The general sinking of this valley in its eastern-most part at the city of Varna is as low as 50 m, while in the western most part – at port Varna-West it is just 15-16 m. As a consequence of this plunging the valley has been transformed into a typical liman (drowned valley), its bottom being filled by loose paludal-muddy depositions of considerable thickness. The valley has been formed to its present form as a consequence of the sunken western Black Sea coastal region in several phases during the Quaternary.

3.5.1.3. Tectonics

The area under review is part of the Moesian Platform and it belongs to the Varna depression (Varna monocline). It represents a tectonic form, which took shape during the Paleogene – Neogene in the eastern wing of the Nortbulgarian arch. The dip of beds is to the east (5-10°) and it is relatively constant. In accordance with the seismic zoning of Bulgaria from 1987 the territory of Beloslav is located in a zone with VII degree of intensity after the MSK scale (seismic factor of 0.10).

Depositions that outcrop on the surface from the west to the east are gradually becoming younger and this is due to the dipping of the valley of Beloslav and Varna lakes. The area was characterized by active tectonic activity. Established are a number of disjunctive disturbances, including also faults at Beloslav and Strashimirovo, the valley having collapsed along them steplike from west to east. These faults are inactive today and they are masked by Quaternary sediments in the bottom of the valley and in the lower part of the slopes.

3.5.1.4. Physical-geological phenomena

Landslides

On a wider scale landslide processes are developing along the Black Sea coastal area north of the city of Varna. Landslides south of the city of Varna are of more limited scale.

The terrain is flat in the greater part of the area under review, built by alluvial-limnic sediments. The slopes are represented by deposits of the Cretaceous, the Paleogene and the Neogene.

Geomorphological and geological conditions here are not a precondition for the development of landslide and rock-fall processes. These may only be provoked by anthropogenic activity – execution of large excavations undercutting the slopes of the valley.

Karst

It is developed in the calcareous complexes of the Malm-Valanginian and Middle Miocene water-bearing formations.

Collapse

It is characteristic of the loess-like materials mainly distributed along the higher parts south of Asparoukhovo Quarter and Cape Galata.

Swamping

This appears to be the most significant physical-geological phenomenon and its distribution is most extensive in the coastal part of the lakes. They are developed over the entire length of the northern shore of Varna Lake, Channel 1 and Channel 2. They are most widely distributed in the area of Beloslav Lake, particularly in its western-most parts.

Abrasion and lithodynamics

The wave regime in the lakes is quite weak and of short duration in order to provoke abrasion and lithodynamic process deserving any attention. There exist no zones with unfavourable evolution of the shore line. No data is in existence about the speed of abrasion processes yet, in principle, wave abrasion is insignificant. Also negligible is the impact of waves generated by the passage of vessels and by the streams. There exist no data about constructed shore facilities with unfavourable destabilizing effect. The rate of silting-up of Channel No. 2 and of any man-made subsurface pits (of quay walls and floating docks) as per data from a comparative analysis of isobathic maps is insignificant. It was established that the subsurface batters are from 1:4 to 1:6.

Erosion

Surface erosion is observed mainly in the sand horizon. In principle there are no significant erosion activities taking place in this territory.

3.5.2. Expected impact on the geological setting

According with the investment design and the adopted variant LB for configuration of the quay face with shallow digging-in and dredging to a depth of 12 m (the design depth of Channel No. 2). The total volume of dredged mass is estimated be 351 900 cu. m.

Part of the excavated earth mass will be used thereafter for backfill and horizontal planning.

In the course of implementation of this project and operation of the facilities it is expected to have the ground base subjected to the following impacts:

- constant static load on the new facilities;
- temporary static and non-static loads from construction machines, loading-unloading activity, automobile and railway transport;

- substitution of loose soils (silts, turf, etc.) with sand cushions, backfills, etc.

As a result of these impacts a change in the lithological framework, the substance composition and the physical-mechanical properties is possible.

The geological base changed as a result of the implementation of this project may provoke additional subsidence of the facilities thus built, a change in the subsurface and above-water landscape.

In the course of development of the shore line a direct impact could be exerted by solid run-offs of erosion and abrasion origin and the executed port and shore-consolidation construction work.

The urbanization factor has a negative influence on the solid run-off and in the future it will be viewed upon as a factor of limited functions.

3.5.3. Restrictive parameters for the execution of construction works

The restrictive parameters for the performance of construction works can be defined after completion of a specific site survey and elaboration of a geotechnical report, because the engineering-geological conditions have an extremely strong influence on the selection of:

- variants for the construction and the structure of the quay face;
- load-bearing capacity of the operational zone;
- possibilities and capacity for the deposition of dredged mass.

From the ground base perspective restrictions come from the relatively shallow occurrence of the ground water, which is at the depth of 2-3 m. Foundation works then will be carried out in the conditions of water inflow.

The applicable DSP of Beloslav Municipality is based on the engineering-geological zoning of this territory. Individualized are two engineering-geological areas, 'A' and 'B'.

Engineering-geological area 'A' includes the higher parts of the terrains on both sides of Channel No. 2, these being structured by the sand-rock and clayey engineering-geological complexes. It is characteristic for these materials that they create good conditions for foundation of all types of buildings and facilities, while the level of ground water is at considerable depth. Problems here could arise in the event of gross violation of the rules for construction of buildings and equipment on sloping terrains.

Engineering-geological area 'B' comprises all low terrains adjacent to the shores of the lakes and Channel No. 2. They are built-up by looser sediments and require special surveying and foundation methods. Otherwise inadmissible subsidence is possible, as well as deformations in the buildings and facilities already erected.

3.6. Harmful physical factors

3.6.1. Ionizing radiation

Beloslav Municipality is located in the central part of Varna Region. Situated in its territory are farming, forestry and water areas. The rock base is limestone in its greater part. This predetermines the level of the natural background radiation.

The background radiation values in the town of Beloslav do not differ from the average values for the country and they vary from 100 to 130 nSv/h.

No ore or non-metallic mineral resources are produced on the territory of this municipality, which could generate a higher background gamma radiation.

Possible sources of radiation could also be raw materials produced elsewhere, yet used in an industrial enterprise in the territory. Varna TPP fires coal imported from Russia and its burning causes concentration of the natural radioactive sources. These are emitted by the TPP in two ways:

- through the stack;
- via the slag deposited in the sludge dump.

Values for natural radionuclides in the slag, U-238, Ra226, Th-232, K40 demonstrate some 4-fold higher values of their content in the soil. To the contrary - the artificial radionuclide Cs-137 is actually absent from TPP waste and its presence in the soil is a consequence of Chernobil and the nuclear tests in the atmosphere during the 60s of the 20th century.

DATA FROM A STATION FOR MONITORING ATURAL AND TECHNOGENIC RADUONUCLIDES IN UNCULTIVATED SOILS ON THE TERRITORY OF BELOSLAV MUNICIPALITY

Beloslav Station

Table 3.6 – 1

Year of measuring	Background radiation (nSv/h)	Specific activity (Bq/kg)				
		U-238	Ra-226	Th-232	K-40	Cs-137
1994	120	20	18	21	407	29
1995	120	19	17	17	379	23
1996	130	20	21	17	362	12
1998	120	18	18	12	346	15
1999	120	24	20	28	489	28
2000	110	23	23	20	372	15

DATA FOR POTENTIAL POLUTANTS OF THE ENVIRONMENT WITH RADIACTIVITY ON THE TERRITORY OF BELOSLAV MUNICIPALITY

TPP Varna site – village of Ezerovo

Table 3.6 – 2

Year of measuring	Disposed waste	Background gamma radiation (nSv/h)	Specific activity Bq/kg				
			U-238	Ra-226	Th-232	K-40	Cs-137
1994	cinder ash	160	75	97	61	632	below LDA
1995	cinder ash	150	95	100	70	727	below LDA
1996	cinder ash	140	89	95	73	723	below LDA
1997	cinder ash	160	43	95	70	785	below LDA
1998	cinder ash	150	40	90	76	768	below LDA
1999	cinder ash	160	72	69	88	742	below LDA
2000	cinder ash	170	70	71	89	796	below LDA

It is evident from the results that the values of the gamma background measured on the soils at Beloslav Station are negligibly lower that those measured on the cinder ash.

The specific activity of soils does not show any increase based on the indicators natural radionuclides and the technogenic source Cs137.

There are sites on the territory of Beloslav municipality that use ionizing radiation in their activity. These are sources for industrial and medical purposes. There are no sources in the area for scientific purposes. The sources for medical purposes are: TUR-D-700 and PC-П-8, installed in the outpatient clinic of the town of Beloslav.

The first one is an imaging apparatus for body and limbs with maximum values for the tube 100kV and 500mAs;

The second source is an imaging apparatus for dental purposes with maximum voltage at the anode 60 kV and maximum anode current of 8mA.

Both facilities are under the supervision of Varna RIPCPH, performed at least once per year. It is established from the measurements taken for penetrating roentgen radiation that outside the procedure premises the values of roentgen radiation shows background values. Besides, they pose no threat in the event of accident because their radiation is discontinued under power supply outage. No radioactive sources are used in the area for medical purposes.

Three industrial enterprises made use of radioactive sources of ionizing radiation in the past:

The **Belopal Plant** – 4 level switches with Co60, which were used for technological purposes until 1995. They were stored in a specialized lead container assembled stationary on the work place. After 1995 technological control has been performed without using radionuclides. The radioisotope source was handed over for burial in accordance with the requirements of the Committee for using nuclear energy for peaceful purposes (CUNEPP). No measurements for residual contamination have been made.

Co60 is of relatively low activity – 10 mCi, with half-life of 5.5 years and radiation energy of 1173keV and 1332keV.

Minstroy – they use a gamma flaw-detector with Ir192 for control of welded connections on the territory of the entire country. In storage mode the gamma flaw-detector has slightly increased background values within a few meters and it is kept safe in a special storage facility in accordance with the sanitary-hygiene norms in the country.

Increased radiation is monitored in operating mode and in accordance with the sanitary-hygiene requirements the area shall be fenced off and signaled. Following flawless work no residual ionizing radiation is detected on the territory of 'illumination'.

The protection of this flaw-detection device is built by depleted uranium. It is kept on record and is under the control of CUNEPP, HEI and the 'Control over hazardous means' department with the Regional Police Directorate.

Ir192 is with considerably higher activity – 60Ci, half-life of 75 days. When the activity falls below 3Ci the source is handed over for burial and the flaw-detector is charged with a new source.

Energoremont uses Gamarid25M, Rid21 and Gamarid192/120 flaw detectors with radionuclides Ir192 with maximum activity of 60Ci. They are used to detect flaws in welded connections on the territory of Varna TPP, Devnya TPP etc. There exists no contamination on the work site in normal working conditions.

At present the Belopal Plant does not exist and the sources have been decommissioned.

The following sources of ionizing radiation pass through the territory of Beloslav Municipality:

The large airplanes crossing the air space of Beloslav Municipality are equipped with sensors with Sr90 for airframe icing alarm. Increased ionizing radiation may occur only in case of accident.

Deliveries of radionuclides from and for the isotope laboratories in the city of Varna are made overland ad through the territory of Beloslav Municipality. Such transfer is realized by using specialized means of transport possessing special permits therefore. Under ordinary transportation conditions no increase in the ionizing radiation will occur. The only possibility for radiation contamination can occur in the case of a transport accident.

The sea route to Port Varna West crosses the territory of Beloslav Municipality (on water). Raw materials for the phosphates plant – apatite and phosphate rock are transported by this route. They contain radionuclides from the natural series of the uranium, actinium and thorium families with about 15 times higher specific activity compared against their natural content in soils. Under normal transport conditions no increase in the ionizing radiation is created.

The attraction of a particular number of newly accepted sea-going vessels will contribute to a minimum increase in the emissions only in the case of transportation of cargo with increased content of radionuclides. No transportation of such materials is made provision for in the investment intentions of the investor.

3.6.2. Non-ionizing radiation

All sorts of radiation creating ultra-low frequency electric electrostatic magnet fields: the radiofrequency electromagnetic waves; the ultra-high frequency electromagnetic waves /microwaves/, the constant magnetic fields, the visible light, the infrared and ultraviolet radiation; the laser light, represent the so-called *non-ionizing radiation*. As a result of the non-ionizing radiation the so-called electromagnetic fields EMF are formed.

Treated in the regulatory documentation are EMF in the frequency range from 30kHz to 30GHz. Rated and defined for fields with frequencies from 30kHz to 300MHz is the *intensity of the electrical component of the field* measured in [V/m], and for those with frequencies exceeding 300Mhz – the energy flux density, measured in [$\mu W/cm^2$].

In accordance with the definition, the most frequently encountered sources of non-ionizing radiation are the radio and television transmitters /antenna-feeder devices, retranslation towers,/, radio-relay stations /transceiver devices for radio waves translation/, all radio-electronic means used to locate, orientate and guide overland vehicles, sea-going vessels and aircraft /radiolocation radar installations and laser control devices/, high-voltage power lines /the power line installations from the national power transmission grid/, specialized medical apparatus /X-ray machines, laser devices, magnetic resonators, computer tomography hardware etc./, GSM – communications /mobile means of communication/, electronic data centers, copy centers, computerized game rooms, computer clubs, household appliances with radio and ultra-high frequency waves /radio and television receivers, microwave ovens, electronic games and computers/.

The most serious powerful sources deployed on the territory of Beloslav Municipality are as follows: Varna TPP, the power transmission network, the radio communication and locator installations of the ferryboat complex, the mobile radiolocation equipment of transport sea vessels and aircraft. The more insignificant ones are the medical

apparatuses in hospital institutions, the household electric devices working on HFC and UHFC, computers – in households and in public buildings, multiplication /copier/ equipment, mobile telephones.

In close proximity to the territory of this municipality the most powerful sources generating EMF are the radiolocation and communication installations used at Varna Airport, Port Varna – West, the high- and ultra-high frequency apparatuses in the chemical production, some military installations.

The sanitary-hygiene requirements regulate three basic hygiene zones with respect to the sojourn of persons therein – a white, grey and black zone.

When persons staying within a defined perimeter are exposed to the influence of EMF and no changes are established in the organism of an individual /sick and elderly people, pregnant women and those more sensitive to the influence of EMF/ under exposure of more than 24 hours, then such zone is defined as a 'WHITE' one. The time of stay of individuals in the white zone is not normalized or restricted.

There exists certain risk for individuals in the 'GREY' zone and for such reason personal protection means shall be used when entering the zone. A special work regime is applied /work in the zone, time for rest/ there. After they leave it all persons are subjected to preventive medical check-ups.

The 'BLACK ZONE' is the zone tightly surrounding the emitter. The presence of person there is not allowed. Exception-wise and with the use of special protection measures in cases of extreme necessity entry into the zone and minimum stay therein is admissible.

Systematic monitoring for contamination of the environment by non-ionizing radiation is not performed. There exist no constant monitoring points. The statutory documentation is obsolete, the responsibilities of individual institutions on the theme are not specified therein. Owing to such reasons no data is available for the territory under review concerning the respective contamination with and the impact of non-ionizing radiation.

In the event that the investment proposal is commissioned the level of this radiation will increase insignificantly at the expense of the radio locator equipment installed in the sea vessels calling on the port. The influence will be minimal, with no cumulative effect, repeated, periodic.

3.6.3. Thermal radiation

Thermal waves emitted by heat generating or absorbing facilities in production processes, the energy sector, transport, the household and district heating, etc. and components precipitated in the atmosphere have their impact thereon and directly or indirectly change the equilibrium in the environment. Their generation is mainly due to the use in the industry and transport of processes passing with emission of extensive quantities of heat or of cooling processes in technological equipment and liquids where no possibilities or preconditions for utilization are at hand.

Powerful sources of heat *on the territory* of this municipality are Varna TPP, the road, railway and air transport, the household and district heating installations.

Large quantities of heat are released in the lake by the cooling water of Varna TPP subsequently impairing the water resources balance. In its operation the thermal power

plant releases heat also in the atmospheric air, which results in a change in its temperature and in the possibility for effective dilution processes.

Transport releases heat with the exhaust gases from automobile and railway internal combustion engines and from jet and gas-turbine aircraft engines.

Heating installations /public and household/ release their heat not only with the heated premises, but also in the air via their stacks and through leaks and compromised sealing.

Out of this territory the main sources of heat radiation are the plants of the chemical industry in Devnya, the Devnya TPP, the Cement Plant. Used in their production processes are installations with high heat-generation capacity – cement kilns, the coolers /condensation towers/ of 'Deven', the dryers for bulk raw and prime materials of the chemical plants. Separately within the technological chain of chemical processes there exist quite a number of facilities where extensive quantities of heat are generated and released.

In reality there exists no monitoring of thermal radiation from facilities – heat emitters in the territory. One can judge indirectly about the heat released in the atmospheric air by the temperature of the flows of flue gases released from the chimneys of enterprises. The heat released by the discharged warmer water from the cooling installations of Varna TPP and Devnya TPP could be calculated empirically, yet such data will not be reliable as they will not be systemized but incidental and therefore – not accurate enough for performing a more in-depth analysis.

Unsatisfactory is the level of the statutory framework on the issue of thermal impact on the environment. Not specified are the responsible institutions, the requisite apparatuses are not provided. The control bodies lack trained experts appointed full-time, capable of performing systematic monitoring and control.

The implementation and operation of Varna Logistic Center and Port will result in an insignificant increase of thermal radiation from the operation of onboard power plants of sea vessels under processing at the port. The impact will be relatively insignificant (against the background of the existing emitters) with no cumulative effect, periodically repeated.

3.6.4. Acoustic environment

The acoustic pattern of the territory under review is shaped by noise loads differing in type and origin, which are radiated both on the territory itself and in the territories of neighbouring municipalities.

Noise represents a complex of vibrations different in frequency, strength, periodicity, etc. Noise classification is usually made based on the following parameters:

- *By their origin:*
  1. Production;
  2. Transport;
  3. Utility-household;
- *By kind of vibrations:*
  1. Continuous;
  2. Impulse;
  3. Mixed;
- *By the frequency characteristic:*
  1. Low-frequency;

2. Medium-frequency;
3. High-frequency;

According to their first classification – by origin – **industrial noise** is the one generated by production processes in plants – from production lines, individual machines and equipment, in-plant transport, etc. Usually, in most cases such noise is of continuous or mixed nature and it is emitted depending on the operational schedule of the enterprise.

Transport noise is generated on account of the type of transport vehicles transiting the territory on land and in the air. In our case transport noise is generated by automobile, air and railway transport. In contrast to industrial noise, the transport one is most often of impulse, unstable character.

Utility-household noise is emitted by various sources in relation to everyday life of residents of inhabited places. We connect such sources with the holding of sport events, entertainment places, educational institutions, provision of services in the retail network, construction sites, machines and equipment in the household sector, etc.

According to the kind of vibrations – the **continuous /constant/ noise** is unchanging or slightly changing /within the frames of 5 **dBA/** in strength, frequency, direction etc. character for a longer period of time. An example for such noise is the one emitted from the work of production lines of uninterrupted workflow;

Impulse noise, in contrast to the continuous noise, is an incidental one, of identical or varying strength, yet radiated for a short time. An example for such noise is that emitted by the traffic of railway transport, the air transport, the work process in building sites, etc.

According to the frequency characteristics – **low-frequency noise** is characterized by vibrations frpm 16 to 350 Hertz /Hz/. **Medium-frequency noise** covers vibrations with frequency from 350 to 800 Hz. **High-frequency noise** are the vibrations with frequency above 800 Hz. Human ear perceives /responds to/ noise vibrations with frequencies from 20 to 20000 Hz. Vibrations with frequencies under 20 Hz are called infrasound, and those exceeding 20000 Hz – ultrasound.

Noise is characterized as a **narrow-band** one with predominant vibrations within one particular frequency and **broad-band** noise of a broader range of vibrations different in frequency /with continuous spectrum in more than one octave/.

Noise is measured by reading its frequency and, in addition, by registering its strength in units of measurement called decibels – dB - /one tenth part of the BELL/. One Bell shows how many times the strength of sound exceed the zero level.

Noise load is dangerous for human health due to the fact that early diagnosing of diseases provoked by it is difficult. Particularly dangerous are vibrations of impulse nature, of higher frequencies and stronger.

CHARACTERISTICS OF NOSIE FROM DIFERENT SOURCES

Table 3.6 – 3

№	SOURCE	BASIC FREQUENCY CHARACTERISTIC	STRENGTH
			dBA
1	Whispered words	Medium-frequency	35
2	Shouting children	Medium-frequency	65
3	Radio music	Medium-frequency	55
4	Children playing grounds	Medium-frequency	74
5	Sports grounds	Medium-frequency	75
6	Loading-unloading railway stations, depots	Medium-frequency	95
	Mechanical engineering		
7	- Mechanical workshop	Medium-frequency	92

8	- Foundry shop	Medium-frequency	117
9	Cement industry	Medium-frequency	106
10	Reinforced-steel concrete structures	Medium-frequency	116
	Chemical industry		
11	Compressor shops	Medium- and high-frequency	129
12	Rectification towers	Medium-frequency	103
	Automobile transport		
13	Passenger cars	Medium-frequency	75
14	Cargo trucks	Medium-frequency	95
15	Railway transport	Medium-frequency	85
16	Air transport	Medium- and high-frequency	130
17	Rapid-transit urban streets	Medium-frequency	83

In order to control noise pollution and restrict its influence on human health a number of statutory documents have been adopted. At present however, they are not enough and it is necessary to update and unify the normative base on this matter. The legislator has defined noise threshold for the various territories.

There is no monitoring system built for control of the acoustic environment in the inhabited places on the territory of Beloslav Municipality. Until 1995-7 experts from Varna RIPCPH had made, not systematically, a particular number of measurements. On the occasion of opening of new projects, signals, appeals, EIA development etc. measurements have been taken by the experts of RIEW and RIPCPH at the sites of various projects.

The indicated sources of noise are differentiated by location, type, frequency, characteristics, etc.

Sources on the territory of Beloslav Municipality:

Industrial sources on this territory are mainly concentrated in the town of Beloslav and the village of Zereovo. These are: MT Base of Transstroy – Varna; Dolphin -1 floating dock; ceramic factory in the village of Razdelna. Noise generated by the activity in Varna TPP and the pottery factory is of permanent nature, of medium frequency. Noise from the MT Base of Transstroy, the floating dock and the ferryboat complex is periodic /impulse/ in nature and mainly within the medium frequencies, too.

Transport sources – the range here is an ample one. Generated are noise vibrations different both in character and by frequency and strength.

The main source with almost permanent character is the automobile noise from buses, passenger cars and cargo trucks traveling along the lake-side road. Of impulse character is the noise emitted by the railway compositions riding on the route Varna – Sofia and the aviation noise from airplanes taking off from and landing at Varna Airport.

Sources of noise within the municipality · **Table 3.6 - 4**

No	SOURCE	MAIN FREQUENCY CHARACTERISTICS	STRENGTH dBA
	TPP VARNA		
1	- Ventilators of duct No 1	Average frequency	112
2	- Ventilators of duct No 2	Average frequency	97
3	- Mill compartment	Average frequency	85
4	MT Base "TRANSSTROY"	Average frequency	65
5	Concrete plant	Average frequency	82
6	Carpentry workshop	Average frequency and high frequency	75
7	Machine shop	Average frequency	83
8	Car repair area	Average frequency	72
9	Floating dock DOLPHIN - 1		
	Air Transport		
10	Railway Transport		

11	Road Transport		

* *Part of the data in the present table are measured under specific conditions and developments, and part of them are empirical.*

There are a small number of sports facilities that emit noise exceeding the permissible limits on the territory of the municipality . The utility noise is formed of discos, restaurants and cafeterias, domestic noise (music installations, talks at louder voice, children's games, etc.). Utility and domestic noise is pulse, unstable in frequency, strength and direction having lower values, but higher repeatability and longer impact.

The most significant sources from neighboring areas affecting the urban areas in the Beloslav municipality are those located in the Devnya industrial complex - "Agropolychim", "Solvay Sodi", Port "Varna - West" TPP "Deven", and to the east "Terem - Navy arsenal," Port "Lesport", Airport "Varna".

The noise levels of the area is quite serious due to the passing planes landing and taking off at the airport "Varna". Characteristics of the aircrafts used and the number of flights per annum are shown in Table. **Table 3.6 - 5.**

LEVELS OF THE NOISE PRODUCED BY THE AIRCRAFTS MOST FREQUENTLY FLYING OVER THE AREA

Table 3.6 - 5

No	Type of plane	Effect	Level of the noise / dBA /					
			75	80	85	90	95	100
1	Boeing V727-200	Taking-off						
		Landing						
2	Tupolev Tu 134	Taking-off						
		Landing						
3	Tupolev Tu 154	Taking-off						
		Landing						
4	Mac Donnell Douglas MD - 83	Taking-off						
		Landing						
5	DS10-300	Taking-off						
		Landing						
6	Tupolev Tu 154M	Taking-off						
		Landing						
7	Boeing V737-200	Taking-off						
		Landing						
8	Airbus A300-600	Taking-off						
		Landing						
9	Boeing V737-300	Taking-off						
		Landing						
10	Boeing V737-400	Taking-off						
		Landing						
11	Boeing V767-300	Taking-off						
		Landing						
12	Boeing V757-200	Taking-off						
		Landing						
13	Airbus A310-300	Taking-off						
		Landing						
14	Airbus A320-00	Taking-off						
		Landing						
15	5Boeing V757-200	Taking-off						
		Landing						

The intensity of the Railway Transport is also essential. With its high levels of noise pollution emitted during the movement of the reailwy compositions the impact is quite significant. To and from Varna Railway Station depart / arrive more than 70 compositions during the day. This means that for every hour an average of three trains pass

through Beloslav, Ezerovo and Strashimirovo and by Razdelna and which additionally burdens the acoustic environment of the area.

Estimates of the noise level in the city of Beloslav, the settlement closest to the territory, during construction of the site, was made on the basis of the data for average sound pressure levels with filter A (dB A) of the estimated construction machinery and are shown in Table 3.6-6.

Table 3.6-6

Source of noise	Sound pressure level		
	Lower Limit	Upper Limit	Lower / Upper Limit
Bulldozer	97	105	
Excavator	80	91	
Drills	89	92	
Heavy goods vehicles	73	93	88-95
Air compressor	86	99	
Auto crane	73	93	
Pick hammer	102	116	
Vibrators	82	98	

The estimate has been made at sound pressure levels corresponding to the lower and upper limits for a given type of source. The values of the sound pressure levels in the nearest area to the residential buildings of the above mentioned places are shown in Table 3.6-7. The equivalent noise levels, defined as a sum of the noise levels measured therein and the estimates, as a result of the operation of the respective machines, are shown In the last two columns.

Table 3.6-7

Type of construction activity	Mechanisation used	Summary level of sound pressure level at the construction site, dB (A)	Sound pressure levels near the residential area, dB (A)
		In the area where the activity is performed	Beloslav
Excavating works	Bulldozer, Excavator, 2 pcs. of dumpers	98-106	43-49
Casting of concrete	Concrete mixers, Concrete pump	98-105.5	37-38.5
Demolishing activity	Compressor, Pick hammer	102-116	52-54
Assembling of trusses	2 pcs. of tower cranes	76-96	36-39

Analysis of the results from the estimates of sanitation in the residential areas regarding the noise contamination allows to make the following conclusion:

- The permissible sound pressure levels in urban areas at night (45 dBA) are higher than the maximum sound pressure levels at various construction activities except demolishing activity, i.e. the noise level in the city of Beloslav shall be determined mainly by its own background noise;

Irrespective of the estimate made it is suggested to carry out the construction works in two shifts from 6 a.m. to 22 p.m.

Estimate level of the noise in the city of Beloslav during operation of the logistics centre - an estimate of the acoustic environment in the port area has been based on the statistical data. The impact of the generated noise levels in protected areas (regulation of the residential area) shall reach levels of about 36-54 dB (A), i.e. the noise level in the city of Beloslav will be determined mainly by its own background noise;

Implementation of the investment initiative shall contribute to a temporary increase of the noise levels in areas within the port due to the use of construction machinery. In drawing up the report by an authorized laboratory background noise levels at three points on the territory have been measured - **Annex No 12 "Protocols for the background noise."** In the process of work no blasting operations, pecking works and other works generating high levels of noise shall be carried out. The influence shall be negligible, within the acceptable parameters, and shall be carried out mainly in daylight, periodically for short terms (two - three months) and for short period of time.

It is foreseen the following reloading machinery to be used in the **operation** of **the** port:

- 2 pcs. of mobile port crane;
- 2 pcs. of richstakers;
- 2 pcs. of forklifts for use in containers;
- 4 pcs. of telehandlers;
- 4 pcs. of forklifts;
- 6 pcs. of port container tugs.

Except the above machinery the intensive operation determines serious load with trucks for delivery and transport of goods. Quantities, types and characteristics of the transport vehicles and machinery have been estimated on conditions of a full load of port facilities. To cover the needs of freight throughput about 160 trucks having basic load in the daylight (on average 15 pcs. per hour) shall operate on a daily basis. The auto cranes shall work all the time. The forklifts working outdoors (4 pcs.) shall perform individually about 10 equivalent movements per hour. At the same time the reloading container equipment (2 pieces of richstakers) shall perform about 10 equivalent movements, together with the container port tugs. Under the above conditions the transport units and equipment used simultaneously, creating a high noise level, shall outnumber 29 equivalent units (conditionally aligned to the noise characteristics of the trucks) performing 97 movements (conditionally aligned to the noise characteristics of the trucks).

Calculations have been performed to determine the equivalent noise level produced at the sites being under protection according to the method of recording sound from local industrial sources ***(Ordinance No 6/2006 on the indicators of environmental noise ..... of the Ministry of Health, published in the State Gazette issue 58/2006).*** The calculations have been made for distances between the source and the site being under protection (residential areas) respectively 93, 350 and 440 meters (the distances refer to the closest residential buildings). The following formula for determining the equivalent levels has been used:

$$L_{Atera,\,T} = L_{Aekv,\,T}^{(*)} - \Delta L_{dist.} - \Delta L_{eqf.}\ dB(A)$$

Where:

$L_{Aeqv.T}^{(*)}$ - output equivalent noise level from the source (sources)

$L_{Aeqv.T}^{(*)} = 67$ **dB (A)** - *as per a nomogram to determine the level of traffic sources - fig. 1.1. of the Ordinance* for the similar nature of induced noise or

$L_{Aeqv.T}^{(*)} = 65.67$ dB **(A)** - *Calculated using the formula for determining the noise level of a parking lot:* $L_{Aeqv.T}^{(25)} = 37 + 10.lg\ (Nn.\ N) + Ln - 1.23$ **dB (A), (Nn = 3.34** - the average number of courses of used vehicles and equipment per hour; **n = 29** - number of vehicles used; **Ln = 10 dB (A)** - correction for the noise level coming from vehicles. The above formula has been used because of the nature of the activity closely resembling noise effects caused by parking.

$\Delta L_{dist.} = 54$ **dB (A)** at a distance of 93 m, **63 dB (A)** at a distance of more than 350 m and **64 dB (A)** at a distance of 440 m - correction according to the distance from the source to the site of action - defined nomogram - firg. 4.1. of the Ordinance.

$\Delta L_{eqf.} = 0$ **dB (A)** - correction depending on the availability of different screening facilities on the path of the sound spread - calculated in the absence of screening facilities.

Under these initial conditions and the equivalent level *as* determined *as per the nomogram:*

$L_{Atera,T\ (93)} = 13$ **dB (A)**

$L_{Atera,T\ (350)} = 4$ **dB (A)**

$L_{Atera,T\ (440)} = 3$ **dB (A)**

Under the same initial conditions and the equivalent level *as determined by the formula:*

$L_{Atera,T\ (93)} = 11.67$ **dB (A)**

$L_{Atera,T\ (350)} = 2.67$ **dB (A)**

$L_{Atera,T\ (440)} = 1.67$ **dB (A)**

The above calculated equivalent levels refer to a continuous full load of the port complex at day and **night** time when intense continuous activity is underway onn the territory of the port. The noise levels at night shall be lower on average by 3 decibels **(Nn = 2** - number of courses of the used vehicles per hour; **n = 20** - number of the vehicles used).

The results of the calculations show that the equivalent noise level generated by the port complex shall be minimal at the distance where the closest residential areas (the areas of impact) are located and for determination of the acoustic discomfort will be responsible mainly road transport flows on the road Varna - Devnia on the north coast of the lake and Varna - Razdelna, on the south coast of the lake, passing just a view meters from the residential buildings, as well as the movement of train compositions on the railway line Varna-Sofia, on the north coast.

The main activities during the operation is intended to be carried out at a considerable distance from the residential environment of the city of Beloslav and Strashimirovo village, thus levels in protected areas shall be reduced to a level below the permissible limits. The planned construction of protected green belt of high level greenery on the territory of the site adjacent to the residential areas shall contribute.

In the process of correcting the report on the assessment of the environmental impact measurements of the noise levels have been carried out at the points of impact. The data on the noise levels in the three most closely located zones are shown in the appendix.

We do not have representative data on the noise pressure from the port of "Gastrade" operating nearby. According to the statistical data and the expert assessment higher noise levels from the operation of the compressor units for loading and unloading ships shall be generated in the area of the present Investment proposition. Depending on the workload of that port the activities shall be carried out periodically (if a vessel is available). The noise level caused by the compressors in general have higher values. It is assumed that measures to reduce the levels of noise generated (these compressors shall be placed indoor) are foreseen, which will reduce the noise level in their work. Cumulative impacts caused by the common operation of both Investment propositions shall impact primarily the residential areas at the south from the lake, located 350 m from the zone of "Varna Port logistics centre" where the reported equivalent value of the noise caused by the site concerned is 4 dB (A). The estimated equivalent level of activities of "Gastrade" will be no higher than 10 dB (A). In this regard, the overall cumulative impact shall be in the range of 4-12 dB (A) and shall be lower than the background noise pressure caused by traffic flow and the public-utility activities. In the area of implementation there are no other significant sources of noise emissions which equivalent noise levels to form a cumulative impact. Therefore, we believe that the influence of the operation of the above Investment proposition, together with that of "Gastrade", and taking into account also the background values of the protected sites shall not load significantly the acoustic environment in the point of impact.

According to Annex No 2 to art. 5 of Ordinance No 6 the limit values of the noise at the points of impact shall be, as follows:

Limit values of the noise indicators

Limits values of the noise levels in residential and public buildings' premises

Table 1

Purpose of the premises		**Equivalent noise level, dB (A)**		
		in the day	**in the evening**	**in the night**
1		2	3	4
1.	Rooms in medical establishments and sanatoriums, operating theaters.	30	30	30
2.	Living rooms, bedrooms in childcare facilities and hostels, holiday homes, hotel rooms.	35	35	30
3.	Doctors' surgeries in medical establishments and sanatoriums, conference rooms, auditoria of theatres and cinemas.	40	40	35
4.	Classrooms and auditoria in schools, institutions for scientific research, and reading areas.	40	40	40
5.	Workplaces in office buildings.	50	50	50
6.	Cafeterias, canteens, foyers of theatres and cinemas, clubs, hairdressing and beauty parlours, and restaurants.	55	55	55

7.	Commercial facilities of shops, rooms for passengers in stations.	60	60	60
Remarks:				
1.	In exposure to tone or pulse noise the correction shall be 5 dB (A) and shall apply to the premises of item 1 to item 5 of table No 1.			
2.	Tonal noise is a noise during which the sound of a certain frequency (tone) is heard.			
3.	Pulse noise is the noise which is perceived as a single hits and is composed of one or several pulses of sound energy and the duration of each pulse is less than 1 s.			

Table 2

Areas and development zones in the urban areas and out of them		**Equivalent noise level in dB (A)**		
		in the day	in the evening	in the night
1		2	3	4
1.	Residential areas and territories	55	50	45
2.	Central parts of the city	60	55	50
3.	Territories exposed to heavy road traffic	60	55	50
4.	Territories exposed to the railroad transport and trams	65	60	55
5.	Territories exposed to noise caused by aircrafts	65	65	55
6.	Production and storage territories and areas	70	70	70
7.	Areas for public and individual recreation	45	40	35
8.	Areas of medical establishments and sanatoriums	45	35	35
9.	R & D and educational activity areas	45	40	35
10.	Quiet areas outside the conglomerates	40	35	35
Remark:	Limit value of the maximum noise level in aircraft flying over a certain territory shall be 85 dB (A).			

Even when superimposing the resulting equivalent noise levels from the common operation of the port and other adjusted industrial sources of noise the impact in protection areas would be within acceptable parameters, constant in time, with a minimum cumulative effect.

3.7. Landscape

3.7.1. Brief description of the main features of the structure and functioning of the landscapes in the area concerned

3.7.2. Assessment of possibilities for achieving the objectives, changes in the structure and the functioning of landscapes

According to the landscape zoning of Bulgaria made of M. Daneva and K. Mishev, lands of the municipality Beloslav fall into the following:

Class. "North Black Sea coast"

Subclass: "lakeside", "valley", "Hilly - valley"

Type; "Aquatic Complex," "Agricultural landscape", "Forest Landscape" "Coastal Landscape", "Anthropogenic"

Subtypes:

- according to the characteristics of the urban area - "roadside landscape", "industrial landscape", "built-up area landscape", "communication landscape", "port landscape", "landscape of the affected areas";
- According to the degree of affected state - "intact" and "affected" having aspects of "slightly affected", "medium affected", "highly affected";
- according to the characteristics of the affected environment - "anthropogenic - landfills", "anthropogenic - roadside landscape", "industrial landscape", "port landscape", "anthropogenic - landfill for industrial waste"; "landscape of highly degraded land", "landscape of the quarries and places of extraction of mineral resources","technogenic - aquatic landscape";
- according to the characteristics of the intact environment - "landscape of natural forest ecosystems"; "landscape protected areas"; "landscape of the natural coastal areas", "landscape of meadows and pastures";
- according to the characteristics of slightly affected areas - "landscape of forest plantations," "landscape of park and woodland," "landscape of low and medium eroded areas", "agricultural landscape" having the following subcharacteristics - "agricultural landscape of corn crops," "agricultural landscape of perennial crops","agricultural landscape of barren land";
- by geomorphological conditions - "terrace complex", "hilly - valley landscape", "landscapes of steep slopes", "landscape of accumulation coast";
- according to the characteristics of the forest environment - "forest landscape of monocultures", "forest landscape of mixed forest", "forest landscapes of natural ecosystems", "forest of forest pastures", "rock type landscape".

Distribution by areas of the landscapes mentioned in the above classification along with their brief description is provided within the municipality, as follows:

By the territorial scope of the types of landscapes in the region as a percentage of the total area:

- Aquatic Complex - 12.3 %;
- Agricultural landscape - 29 %;
- Forest landscape - 29 %;
- Coastal landscape -5 %;
- Anthropogenic - 13.5 %;
- Others - 11.2 %;

By the scope of subtypes according to the characteristics of the urban area as a percentage of the total area:

- Roadside landscape - 1.4 %;
- Industrial landscape - 3.7 %;
- Geographical landscape - 8 %;
- Communications landscape - 2.6 %;

- Port landscape - 0.2 %;
- Landscapes of affected areas - 2.9 %;

By the scope of subtypes according to the characteristics of affected environment as a percentage of the total area:

- Anthropogenic - landfills - 0.1 %;
- Anthropogenic - roadside landscape - 1.4 %;
- Industrial landscape - 3.7 %;
- Port landscape 0.2 %;
- Anthropogenic - landfills for industrial waste - 0.15 %;
- Landscape of eroded land - 2.2 %;
- Landscape of quarries and places of extraction of minerals - 1.4 %;
- Technogenic - Aquatic Landscape - 2.9 %;

By the scope of subtypes according to the characteristics of slightly affected and intact environment as a percentage of the total area:

- Landscape of natural forest ecosystems - 19 %;
- Landscape of protected areas - 1.9 %;
- Landscape of natural coastal areas - 4.6 %;
- Landscape of meadows and pastures - 7 %;
- Landscape of forest crops - 10 %;
- Landscape of park and woodland - 3 %;
- Landscape of low and medium eroded land - 2.2 %;
- Agricultural landscape - 29 %;

The above-mentioned types and subtypes of landscapes have the following main characteristics and local specific features:

Aquatic Complex is represented by natural water bodies - the Varna lake and the Beloslav lake, the canal between them and the natural and anthropogenic aquatic areas along the Provadiyska river.

The Beloslav lake as a habitat of aquatic organisms has undergone major changes in terms of chemistry in relation to the dredging of waterways and operation of Devnya chemical complex. The lakes of Varna and Beloslav have gone through eutrophying for a long period of time, and have modified natural characteristics of the environment. The lakes of Varna and Beloslav are areas of strong anthropogenic influence manifested primarily by industrial and domestic water inflow from operations of the Devnya industrial complex. Significant areas of conflict having the changing role of the leading anthropogenic factors (the area of TPP Varna, to the east from the lake) have emerged. Globally, three negative process are observed:

- eutrophication having a high degree in the Beloslav lake and relatively lower degree in the Varna Lake, which is one of the reasons for the reduction of species diversity and quantitative characteristics of the representatives of the lake flora and fauna. During the period of 50s - 80s significant amount of species became extinct in the lakes. Critical levels for the flora and fauna were outlined in 1989 - 1991.
- accumulation of metals in the biota (shellfish, ground fish, shrimp) posing a danger to human health;
- mode of hydrocarbon contamination of the water - the oil content in the lake bottom sediments exceeds that in the region of Varna

Given the above pointed changes in the natural characteristics of the lake ecosystems, they have significantly changed the face as a scenery and landscape category. The colour, odour, transparency, chemistry, bio-systems, the use of water from the lakes have changed. These changes are related to the catch of fish, the economic development of the coastal areas and deepening the processes of urbanization and anthropogenisation of the territory and the marine areas.

Coastal landscape

The coastal landscape is represented by: wetlands - alluvial wetlands overgrown with reeds and water-loving plants; abrasive coast; anthropogenic coast with hydraulic equipment and developed industrial and port activities; anthropogenic shore up along the channel; and cliff coast. The Hydraulic equipment is made by bulk structures, precast concrete elements and armors of large boulders. Banks of the canal are designed with rock deposits and linear coastal development and landscaping have been made at some areas. The coastal landscape merges with the industrial and port landscapes at some places. In the industrial area prevail relatively low and medium-rise industrial buildings - large dominant shells of buildings with high chimneys, underground pipelines and other linear infrastructure. The distances between the shells of buildings, the individual industrial and port facilities are relatively large, separated by wastelands and powerful insulating layers of uncompromising sustainable vegetation. Areas are poorly developed and have partially held vertical landscaping with road and railway infrastructure.

The landscape of the coasts overgrown with reed beds, having developed biotopes with many protected species of flora and fauna deserve a high rate.

Agricultural landscape

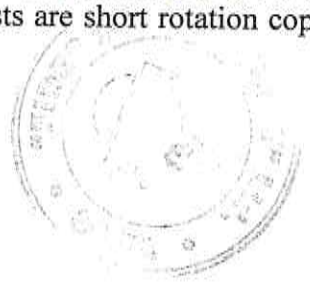
Introduced by cultivable areas of medium and small sizes, and pastures. We distinguish "agricultural landscape-fields for production of grain", located mainly in the southern part of the municipality (Avren plateau), "landscape of vineyards", presented in the area around Beloslav, "landscapes of vegetable cultivation" with small market gardens located in the lower areas around the lakes and the Provadiyska river.

Forest landscape

The forest landscape is represented by several varieties:

- *Forest covered landscape, most prominent on the slopes of the Avren plateau and the Frangen slopes. It is characterized by strongly closed vegetative volume, small open spaces. Forests of Italian oaks, Turkey oak and hornbeam prevail, in some areas pure and of mixed species. The most common composition is, as follows: hornbeam ~ 40 %, Turkey oak ~ 10 % , Garland thorn ~ 40 % other ~ 10 %. Arrays are of completeness in the range 0.6 to 1. Trees are partially to fully closed to the canopy in good and moderate status mostly short rotation coppice. The hornbeam and the Garland thorn are developed quite well.*

- *Forest partially closed landscape having partial anthropogenic interference. This is the landscape of imported monocultures reinforcing slopes, sometimes mixed with mostly natural vegetation growth. These are forests and plantations of red pine around the city of Beloslav, and also mixed forests of hornbeam and thorn with stinky willow,* Little-leaf Linden, acacia, and distribution by percentage of the natural plantations of 20 % to 80 % for natural, achieved completeness - 0.2 - 0.7. The forests are short rotation coppice in good condition having reduced growth in green mass..



Landscape assessment of these areas is appropriate to be carried out by the methodology of the University of Forestry.

According to the methodology for the territory covered by the present paper a landscape aesthetic assessment by category and area has been carried out. The results of the evaluation are, as follows:

- Very high - 30 %
- High - 29 %
- Average - 39 %
- Low - 2 %

High and very high aesthetic landscape assessment score is given to the coastal areas, the forests surrounding valleys, cultures and some of the natural forests.

Average score is given to the majority of the land occupied by low-rise and artificially planted vegetation.

Low landscape aesthetic assessment score is given to some of the areas with active erosion and imported strengthening inferior and less durable species.

Anthropogenic

Anthropogenic landscape bears all the characteristics of affected areas by the landfill of ash, municipal and industrial waste, hazardous waste, dredge deposit. Not only habitats, conditions of the environment are impaired, but natural topography and view spaces. To the anthropogenic landscape can be assumed also the areas affected by the extraction of inert materials - clay, sand, road approaches and roadside landscape disturbances.

The anthropogenic landscape is also all the areas impaired by the landfill of dredging masses and the sump of Provadiyska river anthropogenically created .

The area receives low and satisfactory assessment score in quality of landscape characteristics. The area is full of infrastructure-roads, brine and sludge pipelines, equipment related to the disposal of dredging masses, earthfill dams and artificial forms, impaired areas. Low score is given also to the land surrounding the disposed waste, and the rural micro landfills together with their contact zones contaminated by light fractions of wastes and at some places by indiscriminately dumped heaps of waste.

Industrial area and the ports are characterized by relatively rare, medium height and low-rise construction. Industrial buildings with large dominant shells of buildings, overground pipelines and other linear infrastructure are predominant. Spatial structures, the natural landscape types and subtypes in coastal areas have been modified.

The roadside landscape is presented by typical features - linear infrastructures sealed by road pavements, low or no landscaping.

Until that moment migration of contaminants from industrial and anthropogenic landscapes both within the municipality and the activities in the neighboring municipality Devnia has been observed withn the territory of Beloslav. Eutrophication in the Varna and Beloslavsko lakes and the changes in their hydrobiological characteristics are typical example of migration of pollutants from the chemical industry and the water transport. Landfills for dredge, polluted coastal areas in the estuary of the Provadiyska river are associated with long-term compromise of landscapes and local migration of contaminants. The degrees of influence on the migration of contaminants vary due to congested traffic

flows. The migration along the road Varna - Devnya is the strongest, expressed in the form of bands.

The impact of the newly foreseen construction on the features of the landscape. will be mostly positive. At present, the land foreseen for development, represents an ungainly site and the plans for development provided will ennoble this site, landscaping activities will be carried, it will be cleaned and a specific sequence of actions shall be introduced. And so far the site has the status of urbanized land and is to a certain extent anthropogenically affected.

3.8. Soil characteristics and conditions

This characteristic of soils in the region is consistent with the classification of FAO, where the genetic and geographic principle is improved and a new taxonomic system is implemented, as reflected in WRBSR (World Reference Base Soil Resources, 2002).

In the region of Beloslav, a significant variety of soil types should be noted as determined by the geological and environmental conditions. There are representatives of both zonal and azonal soils. The most common black soils (Chernozems) are the typical and the leached ones characterized by high natural fertility. In the dry valleys, in the valley of Provadiyska River and on the terraces of Beloslavsko Lake there are distributed sediments and marsh soils. Brown forest soils are widespread on the slopes of Avren Plateau.

Man with his various activities also has created anthropogenic soils represented by bulk and degraded anthrosols. A significant part of the region is subjected to active erosion, at the surface are revealed sands, sands and rocks or heavily eroded sandy soils.

From the group of *zonal soils*, representatives of several types are found: black soils (*Chernozems), PHAEOZEMS* and *LUVISOLS.*

1. The soil type Chernozems is represented by the following subtypes:

- Carbonate and typical (*Calcic Chernozems*).

Carbonate chernozems are found in the Ludogorsko-Dobrogean Province (Shumen-Varna region). They are formed on typical or loamier loess, while in the Novopazarskiya and Provadian areas on weathered marly limestone. Small patches of carbonate black soils are found outside those areas, too. In the Provadian area this subtype is present in the land of Strashimirovo, Ezerovo and partially Beloslav and they belong to the category "carbonate chernozem, of medium thickness, formed on loess-like weathered material of calcareous marls" and the variety "carbonate chernozem formed on loess-like weathered material of calcareous marls - medium sandy - clayey and light sandy-clayey". The thickness of their humus layer is 50 to 60 cm and they are formed on weathered products of Middle- and Lower-Sarmatian limestone deposits and loess-like, sandy-clayey Oligocene materials. In the western part of the land of the village of Strashimirovo they feature a humus horizon of lower thickness 40 to 50 cm, sandy and lighter in colour. Their reaction is mild alkaline and moderate alkaline from 7.3 to 8. The humus content in humus accumulation and transition horizons is in the range of 2.0% to 3.5 %. In the virgin state the carbonate chernozems feature a well-defined grain structure, with a large part of valuable agronomic aggregates - over 1 mm. In the old plowed areas the fallow-land is significantly powdered. The relative mass of the soil varies in a relatively narrow range -

from 2.68 to 2.75. In the most common medium sandy-clayey varieties, the volume weight in the dry state is about 1.5 and in the wet state - 1.2 to 1.3. The total porosity is relatively high, and much of it is internal aggregate. They are characterized by low volume density and very good porosity and water permeability. Effervescence of carbonates is medium and strong and in places is observed from the surface. The reaction is mild alkaline.

Total nitrogen content varies in a quite wide range - from 0.12 to 0.25 %. This forms the common stock of nitrogen in 1-meter layer about 1 t/dka, and in the surface layer 0 to 25 cm - about 300 to 400 kg/dka.

Total phosphorus content is relatively high and ranges from 0.210 to 0.260 g P_2O_5, which forms the stocks of 1,7 to 2 t/dka in 1-meter layer and in the surface horizon – 400 to 600 kg/dka. The main part of phosphorus is presented in the form of highly basic calcium phosphates, as the amount mobile phosphorus is relatively low. This is the main reason these soils are characterized by low natural phosphate fertility.

Carbonate chernozems are characterized by good preservation of common, mobile, water-soluble and other forms of potassium, i.e. they are assessed as soils with favourable potassium mode. This is due to the high content of primary potassium minerals (micas and feldspars), as well as the presence of clay minerals of the type of hydromicas which are rich in potassium.

Soil samples from the village of Strashimirovo land show the following characteristics:

Table 3.8-1. Agrophysical and agrochemical characteristics of *Calcic Chernozems* near the village of Strashimirovo

Samples	Mechanical composition - % clay	*pH*	*Humus %*	*Total N %*	*P_2O_5 mg/100 g*
No. 1	9.0	7.8	3.7	0.240	-
No. 2	14.2	7.3	1.95	0.126	7.8

Typical chernozems (*Calcic Chernozems*) are distributed significantly less - mainly in the Danube soil-geographic province, just south of the carbonate black earth in the form of more or less interrupted narrow strip. They are found limited in Ludogorsko-Dobrogean and Dobrogean-Black Sea province of Dobrogea. They occupy an area of about 1.8 million dka, representing about 7.82 % of the area of chernozem, or 1.62 % of the total area of the country.

Typical chernozems have a well-defined and clear-cut humus horizon (unlike the carbonate ones). For them carbonates appear from the middle and lower part of the humus horizon, most often under 40 to 50 cm. In a previous FAO classification they were defined as Vermi-calcic Chernozem - PHAEOZEM.

The conditions of soil formation are almost the same as for the carbonate black earth, which are generally more severe, but there are some differences in soil forming materials. The most widespread are the medium-thickness micellar, medium to heavy sandy-clayey varieties formed on typical and loamy loess. The thickness of the humus horizon is usually 50 to 60 cm. Here, the humus horizon is relatively sharply delimited to the transitional horizon that reaches most often 90 to 100 cm. Carbonates occur at a depth of 35 to 45 cm, and 40 to 50 cm into the carbonate appear carbonate micelles which also reach 90 to 100 cm. Carbonate concretions starts from the upper part of the transition horizon – over 60 to 70 cm deeper. In this region, they are developed with patchy carbonate chernozems in the land of Ezerovo and Strashimirovo villages. The soils have soil profiles of medium thickness, consisting of a humus accumulation horizon (30 to 60 cm) and a transitional horizon (30 to 50 cm). Horizon "C_K" is presented mainly by the soil forming rock with

weak soil formations. The soils are sandy clay and carbonates are washed over more than 40 cm. The humus horizon is dark brown, with crumb-shaped grain structure. The transitional horizon is light brown to beige, sandy-clayey with the presence of many carbonate micelles. The soils are well stocked with humus (2.5 to 3.5 %) and feature good general physical properties - good water permeability and good air mode. The reaction in the surface part of the soil is neutral and below 40 cm is mild alkaline.

- Leached or Ordinary (*Haplic Chernozems*). The most characteristic feature of leached chernozems is their better expressed washing regime and powerful profile compared to typical carbonate and humus chernozems. Under the humus horizon always follows a non-carbonate brown illuvial horizon of different thickness, depending on the degree of leaching.

The process of soil formation for them is somewhat different than that of carbonate and typical chernozems: more humid climate and mitigated continental conditions; soil forming materials are heavier, built from loess with finer particles and loess-like loam, and in some places from Pliocene and old Quaternary sandy clays. It is these more humid environmental conditions, heavier soil forming materials and the presence of forest-steppe vegetation that have left their mark in the formation of black earth and their more pronounced washing regime. Depending on the degree of leaching they are divided into low, medium and highly leached. The most widespread are those of medium thickness, low and medium humus, low and medium leached chernozems. Less common are highly leached chernozems, which are found in complex with degraded chernozems and dark grey forest soils.

Leached chernozems have a powerful dark coloured, usually brown-black to dark brown humus-accumulative horizon, which in black soils of medium thickness lies in the range from 50 to 70 cm. The lower part of this horizon gradually turns into more or less brown non-carbonate transition horizon with the lowest thickness in low-leached (20 to 30 cm), higher in average leached (30 to 60 cm) and greatest in strongly leached chernozem (60 to 80 cm). Carbonate deposits occur at different depths but always start under the transitional horizon with well-defined bright transition: in low leached chernozems below 60 to 80 cm, in average leached - under 80 to 120 cm and in highly leached - under 120 to 150 cm. Carbonate spawn is observed regularly in low leached, less frequently in medium leached and missing - in highly leached chernozems. Activities of burrowing animals and earthworms are well expressed in low leached chernozems and decrease in the direction of strengthening leaching processes.

Most of the low and medium leached chernozems, both in Middle Danube and in Ludogorsko-Dobrogea province, are heavy sandy clays. On sandy-clayey sediments and marly clays, they are usually slightly clayey. Generally, weakly leached chernozems are associated with loamy loess, medium leached - with non-carbonate and low carbonate Pliocene and old Quaternary clays.

This subtype of black earth is poorly represented in the region - in small spots on some of the high flat terrace over Beloslav and at the base of the northern and northwestern slopes of Avren Plateau, as well as in forestlands. There are also small patches in the high flat part of the land of the town Ezerovo. They are represented by two varieties: "*Medium to highly leached chernozems formed on weathered Sarmatian limestones and calcareous marl*" and "*Highly leached, at shallow depth, formed on Oligocene clays and sands*".

The first variety has a relatively strong soil profile consisting of humus-accumulative horizon (60 to 80 cm) and non-carbonate transition horizon (30 to 50) cm. The soils are heavy-sandy-loamy, moderately to strongly leached. Humus horizon is very dark brown, with crumb-shaped grain structure as carbonates are washed over 90 cm (carbonate spawn in the profile is almost absent). The transitional horizon presents a light brown, compacted, heavy-sandy-clayey and nubbly structure. Their water permeability is good and varies from 0.6 to 1.3 m/h. The soils are well stocked with humus (3 to 5 %), with good general physical properties - good water permeability and good air mode. The leached chernozems are subjected to wind erosion, and on the slopes of the dry valley also to water erosion.

The second variety is distinguished by the fact that the soils are relatively shallow, sandy-clayey, sometimes stony, compacted. They are categorized as barely leached. Humus stocks are 2 to 3 %, well stocked with nitrogen and they have good general physical properties. The reaction was mild alkaline ~ 7.3. Soil samples in forestland areas possess the following characteristics:

Table 3.8-2. Agrophysical and agrochemical characteristics of *Haplic Chernozems* in forestland areas

Samples	*Mechanical composition - % clay*	*pH*	*Humus %*	*Total N %*	*P_2O_5 mg/100 g*
No. 1	27	7.3	1.95	0.126	7.8

2. Dun (grey) forest soils defined by WRBSR as *LUVISOLS*. On the slopes of Avren Plateau in the land area of Beloslav Municipality, widespread is the subtype *Haplic Luvisols* (ordinary). Grey forest soils are widespread south of the black earth area and occupy vast areas of Ludogorie, the northwestern part of the Danubian Plain and Fore-Balkan. Their total area is about 18 million dka, representing 16.28 % of the area of the country. Nearly 67 % of them are deep, well-developed soils that are common in lowland and hilly parts of northern Bulgaria. The rest - about 6 million dka are shallow (incompletely developed) and are typical of the Fore-Balkan.

Grey forest soils in northern Bulgaria are genetically old and carry a number of relict features associated with earlier and warmer conditions as existed during the Pliocene and old Quaternary. Because of the more southern bioclimatic conditions of formation they have intense bioclimatic circulation, more pronounced processes of mineralization of organic matter, deeper leaching, and more clear texture differentiation between humus and illuvial horizons. Characteristic for them is deeper manifestation of forest soil formation process compared to eastern grey forest soils and Central European brown forest soils. Somewhat they resemble the cinnamon forest soils of southern Bulgaria.

Characteristic feature of these soils is the lack of a clearly defined under-soil horizon, as featured by Russian grey forest soils. Underlying soiling is manifested only through SiO_2 dusting in the humus area of the horizon in the form of islets. It shows that the underlying soiling process is suppressed in our conditions (due to more southern conditions).

This protects the mineral part of soil from more intensive destruction and creates conditions for mechanical movement of clay from the upper horizon, i.e. drift (pseudo-soiling process).

Another feature related to the illuvial horizon is its greater thickness and greater claying. This is due not only to the pseudo-soiling process but also to in-soil claying, which is typical for other of our soils, too. A distinctive feature of our grey forest soils is

lesser thickness of the humus horizon, which is lighter in colour and with lower humus content.

Grey forest soils are formed under the influence of the forest-steppe and forest vegetation, which leads to increased signs of forest (under-soiling) soil formation process. The extent of its morphological development is most clearly expressed in lightening of the humus horizon and corresponding increased SiO_2 dusting. In connection with these and other features the three subtypes of grey forest soils, familiar to us from the last World classification (WRBSR, 2002) do not fall into the same soil type.

Dun forest soils (luvisols) are distributed along with the previous type of soil on the slopes of Avren Plateau in the land of Beloslav Municipality. Their profile can be found as normally shaped and incomplete. Humus-eluvial horizon is shallow ~ 30 cm to low thickness - 10 to 15 cm, distinguished by the grey-brown medium sandy clay. The illuvial metamorphic horizon is 60 to 80 cm thick, of brown colour, sandy-clayey to sandy. The \soils are formed on calcareous marl on eluvia. The amount of humus in them is between 1.5 to 2.1 %, with 50 % of it concentrated in the surface 20 to 30 cm.

Throughout the southern part of Beloslav Municipality, on the steep and sloping sides of Avren Plateau developed erosion. In these areas the humus horizon is of reduced thickness and is partly exported. There are significant areas of active erosion driven by weathering processes, geological and topography conditions, while at the surface are revealed sands, sands and rocks or heavily eroded sandy soils.

3. Dark grey-brown forest soils (*Luvic Phaeozems*). In its genetic essence dark grey forest soils set the connection between the forest and chernozem soil formation process in Northern Bulgaria. They are much like degraded chernozems, but they have a much more pronounced washing regime, clear signs of forest soil formation process, well-defined textural differentiation. They still have a well-defined humus-eluvial horizon with thickness of 30 to 50 cm and gradual transition to a clayey brown or reddish-brown illuvial metamorphic horizon. With a sharp transition under 80 to 120 cm follows a horizon that is rich in carbonate. The SiO_2 dusting covers only the upper part of the humus horizon and is expressed mainly on the surface of the structural aggregates. There is less compaction and expression of the illuvial horizon.

Dark grey forest soils developed on carbonate red-brown clays, product of the weathering of limestone and other sandy-clay materials, have a light mechanical composition. Developed on loess-like deposits, they have a heavy sandy-clayey mechanical composition. Their mineralogical composition is almost similar to that of degraded chernozems – hydro-micaceous (illite) and mix-layered (illite-montmorillonite) minerals.

This soil type is also common on the slopes of Avren Plateau together with the previous one and occupies a large proportion of the soils in the region. Under the new classification it is referred to as PHAEOZEMS, also called dark chernozem-like soils. They are naturally genetically distributed on the slopes of Avren Plateau and mostly developed in the land area of Beloslav Municipality. The soil forming rock contains sandy-clayey to sandy materials on carbonate basis. Their profile is characterized by two well-formed horizons. The humus-eluvial horizon is ~ 50 cm, distinguished by dark brown colour, sandy clay with crumb-shaped structure. The illuvial metamorphic horizon has a thickness of 30 to 50 cm, dark brown colour, solid build and lumpy prismatic structure.

The amount of humus in them is less - 1.5 to 2.5 % and the total stock of nitrogen is 0.8 to 0.12 %.

Common in the region are soils, belonging to the group of azonal soils:

1. Marsh soils (*GLEYSOLS*). The soils of this type are common in the peripheral parts of the shallow marshes, field declines flooded with water and around torrential cones. Typical of these is that they are either under water, or groundwater level is high and periodically reaches the surface. Under these circumstances and in the presence of meadow-marsh vegetation, in these soils occur reduction processes and another feature - very slow decomposition of organic matter. This leads to the formation on the surface of a humus or turf horizon and below it - the formation of gley (G) horizon with clayey mechanical composition. Depending on the development of the marsh process and the nature of the organic substance, they differ several subtypes. At the lowest flood terrace of Provadiyska River as a result of natural genesis, widespread are meadow-marsh soils (Eutric Gleysols). They occupy territories on the lower plane part of the northern shores of Beloslavsko Lake. They have permanently accommodated meadow vegetation with a high level of groundwater - 0,5 to 1 m. The soils have a genetic connection with the alluvial-meadow soils. The humus horizon ranges from 20 to 60 cm, dark coloured with a loose structure and crumb-shaped grain structure and gley spots in the lower part of the horizon. By mechanical composition they are heavy-sandy clay to clay. Rich in organic matter - humus 4.5 to 6.5 % and total nitrogen 0.22 to 0.35 %. They contain a high amount of carbonates and their reaction is alkaline.

In the region there are patches of turf-swamp and turf-bog soils, united under the new classification as turf under the name *Umbric Gleysols*. The bulk of this type of soil in the country is slightly to moderately thick turf horizon, whereas the surface is more fully decomposed. The clay gley horizon is dove-grey-green coloured. Turf-bog soils are widespread in the "Flocks" ("Yatata") and in the periphery of Beloslavsko Lake, where the most part of the year they are under water. Their turf horizon refers to the ones of low thickness (50 to 100 cm).

2. Alluvial soils (*FLUVISOLS*). These are young soils formed by river sediments. Crucial for their formation is the increased groundwater level and their fouling with vegetation. Along each river, so called alluvial soils are formed. There are 6 different subtypes of alluvial soils, but their common features are always forming the floodplain and the first terrace of the rivers; they are subjected to periodic flooding and siltation of new deposits and are characterized by natural water vegetation. These are genetically young soils where the meadow soil forming process is in the initial phase. They are formed along the floodplains of the rivers on alluvial deposits in the presence of high groundwater (connected to the river's water). The structure of their profile depends on the nature of the river bow. Alluvial-meadow soils genetically are with unformed profile. They have underdeveloped humus accumulation with thickness variation ranging from 30 to 70 cm. It features a loose build and grainy crumb-shaped structure, while in farmland it is sputtered. Practically these are soils with one genetic horizon. Under the humus accumulation horizon lie layers of soil forming rock that near groundwater are gleyed (reduction of compounds with variable valence). But there is no proper gleying (endogley).

The mechanical composition of these soils is very varied - from sandy to clayey, but dominated by the lighter varieties. Usually in Northern Bulgaria they have heavier

mechanical composition. These are more coarse-particle soils and for them an essential role is played by the primary minerals - quartz, feldspars and micas. Secondary clay minerals are less well-established, whereas usually dominate hydro-micaceous clay materials. *In the small river valleys, when on the floodplain are deposited deluvial materials pulled off the shores, are formed so called deluvial soils.* They are characterized by moderate to heavy sand-clay composition with similar groundwater and gleyed at the bottom of the profile.

Alluvial-meadow soils are characterized by relatively high fertility and favourable physical-mechanical properties and water properties. They are loose and do not form a hard crust after precipitations. When ground water is not salty and is at a depth of up to 2 meters, the plants can use water by capillary action. For most of them carbonate content starts from the surface of the soil profile and they exhibit an alkaline reaction. The ones formed around non-carbonate water collection basins have slightly acidic reaction. Humus content varies within a broad range. The same applies to the contents of nitrogen, phosphorus and potassium. Care must be taken with fertilization rates, timing of introduction and so on, because due to the danger of nutrients being washed by nearby groundwater and the contamination of groundwater.

In the region of Beloslav in the floodplains of Provadiyska and Devnenska Rivers and on the lowest terrace of Beloslavsko Lake, on alluvial deposits in the lands of all settlements in the municipality are located *Mollic Fluvisols*. Alluvial soils are represented by: riverbed alluvium; central alluvial soils; near terrace alluvial soils of diverse composition. The soils possess favourable physical, physical-mechanical and water properties along with high fertility and belong to the following categories: *alluvial soils and dark alluvial soils*. Humus content is ~ 3 %. On the lowest flooded river terrace and on the northern shore of the lake prevail dark (Mollic) alluvial soils that have a dark and saturated with bases (V>50 % and pH>5.2) humus-accumulative horizon gleyed in different parts of high groundwater. They are characterized as undeveloped, formed mainly on the modern river layered sediments that continue to settle down periodically. Periodic washing, flooding and deposition of new sediments do not allow permanent accommodation of a soil formation process and fouling with vegetation. The mechanical composition is varied, both horizontally and in depth of profile. They lack formed clear genetic horizons, whereas the humus horizon is poorly defined only in the southern part of the area of planned construction. Large flat areas along Provadiyska River are occupied by typical alluvial soils with humus horizon ~ 45 cm, of loose structure, grainy crumb-shaped structure, underneath follow layers with different petrographic and mechanical composition. In these areas the soil features an ongoing process of chernozem type soil formation.

3. Deluvial (proluvial) soils (*COLLUVIOSOLS*). The soil-forming material of these soils are deposits from flooding by temporary rivers and torrents that outlet in the plains formed alluvial cones or fans of cones. They consist of lightly processed and unsorted rubble of which the fine ground is washed or deposited in peripheral parts of torrential cones. These soils are poor in nutrients, but have favourable physical and thermal properties and good drainage. These soils are also relatively young, they are found at the foot of the mountains with unstable water current, with deluvial torrential nature of the soil

forming materials in the valleys of the rivers in Northern and Southern Bulgaria. Common are both subtypes: Dystric (deluvial) and Gleyc (deluvial-meadow). They are developed in the form of bands and spots in the northern part along the valleys to the east of Beloslav near the main road and along Provadiyska River in the southern part of the municipality, whereas they are represented by several varieties. The first of them is "deluvial soils, heavy-sandy-clayey, temporary surface water logging, with groundwater level over 5 to 10 meters" (DELUVIUMSOLS, TEMPORARY SURFACE WATERLOGGING-FAO-UNESCO). The thickness of their humus layer is 60 to 100 cm, formed on Pre-Quaternary sediments, Oligocene clayey-sandy marls and/or Oligocene carbonate sediments - friable sandstone, grey-green clays and argillites. Deluvial eluvial clays are compact thin laminations, cracked, uneven sandy, grey-beige to beige. "A" - horizon has a dark grey-brown to black colour. The top layer of 20 to 30 cm is loosely structured and under fallow-land is compacted. The thickness of the plow pan is 30 to 50 cm and has a very low water permeability. Horizon "B" has a lumpy prismatic structure with a thickness of 80 to 230 cm, where in the lower portions of "B" horizon and "C" horizon are observed gley horizon patches. "C" horizon is a very heavy formation associated with the large amount of Oligocene clays determining extremely unfavourable general physical and physical-mechanical, physical-chemical and water-air properties. Carbonates are washed at great depth, the soil reaction of "A" horizon is neutral to slightly acidic, of "B" and "C" horizons is neutral. The soils are slightly to moderately stocked with organic matter. The humus content in the humus accumulation horizon is ~ 1 %. Similar is the picture concerning total nitrogen content. High levels of magnesium have been found (for motor drilling 3) in the "B" horizon due to the slow water exchange. The ratio Magnesium Mg/Ca reaches 50 to 60 %, which is very unfavourable and borders the risk status in terms of aggregation. These characteristics give us the reason to classify the local spots of this variety as "magnesium-schistose deluvial soils, with temporary surface water logging, formed on heavy-sandy-clay materials". Bulk density in PPV is very high. With the lowest bulk density is characterized fallow-land (1.18 to 1.38 kg/m^3), in horizon "B" the density reaches ~ 1.5 kg/m^3 and in the lower layers up to 1.8 to 1.95. The relative density varies in the range of 2.69 to 2.75 kg/m^3. The total porosity in PPV is good in fallow-land (5%) and is reduced with depth to less than 45 % in the lower parts of the "A" horizon and in the "C" horizon.

Another variety is "deluvial soils, heavy sandy-clayey". The thickness of their humus layer is 40 to 60 cm, they are formed on deluvial clays with a thickness of 30 to 120 cm in places with calcareous nuts and lenses of fine sand, on a base of Oligocene clayey-sandy marls and/or carbonate Oligocene sediments - friable sandstone, grey-green clays and argillites. "A" horizon is of dark grey-brown to black colour. The top layer of 20 to 30 cm is a loose structure and the under fallow-land is medium sandy-clayey. Horizon "C" is clayey to clayey-sandy loam, 30 to120 cm thick without gley spots. The "C" horizon is different, from clays with very heavy structure to sandy clays and sandy imtercalations, determining better (compared to the previous variety) general physical and physical-mechanical, physical- chemical and water-air properties. The soils are well weathered, contain a small amount of carbonates, soil reaction is neutral.

The third one is *Deluvial soils* located along the lakeside terraces. Their profile is heterogeneous by mechanical and mineralogical composition, with expressed lamination and high proportion of rock fragments (*Dystric*). In the region of the village Strashimirovo they are formed on older deluvium, well weathered and have a normally shaped profile with three horizons "A", "B", "C". The thickness of humus-accumulative and illuvial

metamorphic horizons varies greatly. The soils feature relatively good mechanical composition and properties and average productivity.

Deluvial-alluvial soils (Gleyc Colluviosoils) are developed in spots, in the southern part of the municipality at the base of the gullies. The soil-forming material is a deposit - delluvium deposited on alluvium, clayey-sandy, laminated. The soil formation process is permanently accommodated together with the fouling of grass. Humus horizon is well defined with an ongoing process of soil formation of chernozem type. The mechanical composition is varied, both horizontally and in depth of profile. The soils are predominantly sandy-clayey. The content of humus is ~ 3 %.

Deluvial-proluvial soils (DELUVIUMSOLS - PROLUVIUMSOLS - FAO - UNESCO) and *Deluvial-proluvial-alluvial soils* (DELUVIUMSOLS - PROLUVIUMSOLS - Fluvisols - FAO -UNESCO) are poorly presented, located in spots in the district of Ezerovo, discovered south-east of depot for PTBO Ezerovo. The soil forming material for the former is a deposit – deluvium deposited on proluvium, clayey-sandy. The soil forming material for the latter is a deposit – deluvium deposited on proluvium and alluvium, clayey. The humus horizon is well outlined with thickness of 50 to 80 cm, sandy-clayey to clayey, located on a proluvial layer (50 to 100 cm) of heterogeneous semi-smoothed gravel and sands, in places mixed with clay and clayey-sandy materials, followed by laminated material of sandy clays.

4. Shallow soils (*LEPTOSOLS*). The most important condition for their formation is the sustainability of maternal rock weathering in the specific features of climate and relief. These are some of the most common soils in our country, occupying compact areas in the mountains and hilly areas. They are represented by several subtypes, of which the region has rendzinas (humus-carbonate soils) that under the global soil classification bear the name *Rendzic Leptodols*. Their chemical properties are associated with weathering products of carbonate rocks such as limestones, marbles, calcareous marls. They are widespread in our country. In Northern Bulgaria they are found between *Chernozems* and *Luvisols*. They are characterized primarily by high contents of humus and carbonates. The latter must be over 40 % in the profile or the rock beneath it to be defined as such. They consist of one horizon only. The colour varies from black through reddish-brown to brown. It is clayey and is characterized by good structure. The greatest amount of physical clay in the upper part of the profile, and other characteristics of these soils is, there is no movement of clay in depth of profile. The thickness of the humus-accumulative horizon is 40 to 60 cm.

5. Sandy soils (*ARENOSOLS*). These soils have a low prevalence in Bulgaria. Their distinctive feature is the sandy composition which determines their qualities and properties. By the depth of profile (1 m) they have four key characteristics: coarse sand fraction is above 65%; they have a loose structure; they do not have shaped soil horizons and are not water logged, so they lack gleying.

6. Anthropogenic soils (*ANTHROSOLS*). These soils are formed through the crucial human impact as a result of production activity, and depending on man's attitude changes are positive or negative. Various human activities on the natural soils are united in three main directions:

- changes related to agricultural use;
- changes under the influence of industry and construction;
- changes related to the household of people

Anthropogenic factors may indirectly cause alterations without external disturbance of the soil profile (from compaction equipment, improper watering, etc.). Direct anthropogenic influence is becoming increasingly important. Depending on the nature of human activity and differences in composition, structure and properties, anthropogenic soils in our country are divided into four subtypes: agrogenic (Aric), urbanogenic (Urbic), ancient irrigated (Cumulic) and re-cultivated (man-made).

Anthropogenic soils in the region can be represented as "bulk anthrosols" and "degraded anthrosols".

Bulk antrosols (conventionally called soils) are specific non-standard material applied to the land by man. The categories found in the region of the municipality are "bulk soils from household waste" and "industrial bulk soils". Bulk soils from household waste are accumulated non-standard wet materials containing mostly household waste, which in composition and properties is superior to many mineral fertilizers. The disadvantage is slow mineralization and content of larger fractions in the accumulated waste. Bulk soils are present in the region of DPTBO Ezerovo and in areas with local landfills and micro-dumps. Their distribution by area is:
DPTBO - 28 dka; landfill Beloslav - 31.74 dka; rural landfills Konstantinovo, Razdelna, Strashimirovo - ~ 6 dka each.

Industrial bulk soils are presented in depots for dredge spoils and sludge pond (tailing pond) of TPP (thermal electric power plant) - Varna. The former represents accumulated dredge spoil. It is characterized by the absence of fertility and approximate content of: organic carbon – 2 %; phosphorus - 0.05 %; potassium - 1.7 %; iron oxides; calcium oxides; carbonates and others.

Soil samples taken from landfills are tested for heavy metals and show the following characteristics:

Table 3.8-3. Content of heavy metals in the soil from landfills (mg/kg)

Indicators	Results	
	Sample 1	Sample 2
Arsenic	0.1	0.1
Mercury	< 0.1	< 0.1
Cadmium	0.4	0.3
Lead	22	21
pH	8	8

The latter represents the accumulated cinder-ash mixture from TPP. It is characterized by the absence of fertility and approximate content [DOVOS "Ashpond of TPP Varna"] of: Ca – 1 %; Mg – 0.4 %; K – 1.7 %; P – 0.13 %; Co – 0.01 %; Mo – 0.01 %; B – 0.01 %; Mn – 0.02 %; Al – 14 %; Fe – 10 %. In the depot so far have been deposited: cinder from TPP - 879 890 t; fly ash from TPP - 7,121,387 t. The area of the depot of TPP is 1046 dka.

Degraded antrosols (conventionally called soils) represent areas with destroyed soil characteristics due to human activity. In this variety fall: lands with seized soil and subsoil layers in order to deploy industrial and communication facilities; lands with significantly changed vertical landscaping - dikes, embankments, excavations; lands with soils accumulated on artificial mounds of clay to make artificial slopes - in the areas of routes along main transport arteries - railway tracks, roads and levees limiting the sludge pond of TPP Varna and dredge deposits. Anthropogenic sediments have changed completely the

natural geological environment and soil characteristics. Soils of type "degraded antrosols" occupy ~ 52 dka.

The soils in the area of Beloslav are influenced by: transfer of pollutants into the air from activities of Devnya Industrial complex; contaminated groundwater and the waters of Devnenska and Provadiyska rivers; TPP – "Varna"; port "Varna – West".

Influence of Devnya Industrial complex: we judge its impact from the results of audit of the status of *agricultural lands* in the region of Devnya. This is done in the period 1992-1993 year by a team led by Prof. M. Penkov, they presented a report "Determining the degree of contamination of agricultural lands in Devnya Municipality and preparation of land use restrictive regime". A soil map of heavy metal pollution was composed. Studies include land from Devnya 61 479 dka, the villages Kipra 10 289 dka, Padina 17732 dka, Trastikovo14863 dka, Razdelna 2829 dka. They examined water extracts 1:5 to determine pH, conductivity - EC_5, dry residue of the extract, the major anions and cations of the extract - CO_3^{2-}, HCO_3^-, SO_4^{2-}, Cl^-, Ca^{2+}, Mg^{2+}, Na^+, K^+, contamination of soils with heavy metals - total amount of zinc, copper, cadmium, cobalt, lead, nickel and manganese. For this purpose are taken and processed over 500 samples. The results of research concerning the municipality Beloslav are:

- Soil samples - 6 from the northern exposure of Avren Plateau (Influence of DPK [tolerable limit concentration] for west and northwest winds) show: - hygroscopic moisture 2.4 to 5.2 %, humus from 2.5 to 6.7 %, pH - 7.1 to 7.4, and content of: - lead ~ 10 mg/kg soil, manganese ~ 60 mg/kg soil, zinc ~ 18 mg/kg soil and cadmium ~ 1.5 mg/kg soil. Two of the samples show contamination with honey ~ 40 mg/kg soil.

- Soil samples taken along Provadiyska River show: humus from 2.1 to 6.5 %, pH - 7.4 to 7.7, presence of heavy metals and are categorized according to the classification of the Institute "Pushkarov" as follows: slight pollution with lead in two of the samples in the area near released drainage waters, contaminated about PDK with zinc near discharged waters, contamination less and about PDK by arsenic, pollution around norms with cadmium and mercury.

Fluorine contamination was evaluated in plants and soils in Devnya Industrial complex and Razdelna.

The fluorine content in Razdelna is about 7 times the national average, or 7.2 mg/kg soil. Values above 30 mg/kg in plants are harmful to animals feeding on the production.

Contamination of soils along the bottom course of Devnenska and Provadiyska rivers due to infiltrated polluted water: Data on the status of water are as follows: pH – 7.88; Dissolved O – 8.8 mg/l; Saturation with O - 77 %; Dissolved solids - 12251 mg/l; HB - 246 mg/l; Chloride ions - 4507 mg/l; Sulphate ions - 229 mg/l; Calcium ions - 2138 mg/l; Magnesium ions - 128 mg/l; Ammonium nitrogen – 11.2 mg/l; Nitrite nitrogen – 1.46 mg/l; Nitrate nitrogen – 56.4 mg/l; Bicarbonate ions - 117 mg/l; Permanganate oxidation – 14.3 mg/l. Samples analyzed in 1998 from Provadiyska River after the channel show: - nitrite nitrogen - 9190 mg/l; silicon - 4307 mg/l; manganese – 27.5 mg/l. The soils in the valleys have not been studied in detail, so we cannot determine the area of contamination and the extent of contamination due to the influence of infiltrated polluted water.

The presence of heavy metals in the soil is not enough as a result for future forecasts and estimates. Important are the digestible quantities of heavy metals. In this case, they represent a very small part due to the fact that we have the presence of carbonates in soils and predominantly weak alkaline reaction. In these interactions and

relationships most of the heavy metals are associated almost immediately after entering the soil into compounds with non-digestible forms for plants.

Influence of TPP Varna: - Precipitation of ash thrown into the atmosphere from harmful activity of TPP may affect partially and insignificantly soils in the area. The impact can be towards a very slight change of soil reaction to alkaline given the pollutants - Klinger dust and ashes, which have basic properties. However, the soil samples taken near Ezerovo at ~ 700m from TPP Varna show data for normal soil reaction and content of heavy metals below the limits. Industrial bulk soils - dredge deposit. Conditionally given soil areas: Depot "4C" – 391.6 dka and Depot "4B" - 548.8 dka are characterized by absence of fertility and approximate content in % of: organic carbon - 2; phosphorus - 0.05; potassium - 1.7; iron oxides; calcium oxides; carbonates and others.

In the area of landfill "4 A" soil samples were taken and testing for heavy metals has shown the following characteristics:

Table 3.8 - 4

Indicators	Unit of measurement	Results	
		Sample 1	Sample 2
Arsenic	mg/kg	0.1	0.1
Mercury	mg/kg	< 0.1	< 0.1
Cadmium	mg/kg	0.4	0.3
Lead	mg/kg	22	21
pH		8	8

The data given in the table above show the presence of heavy metals in sediments deposited well below the PDK. Since in the landfill "4B" are deposited the same materials, we predict identical composition of soils.

Industrial bulk soils - sludge pond of TPP: Represent accumulated cinder-ash mixture from TPP, characterized by absence of fertility and approximate content in % of: calcium - 1; magnesium - 0.4; potassium - 1.7; phosphorus - 0.13; cobalt - 0.01; molybdenum - 0.01; boron - 0.01; manganese - 0.02; aluminium - 14; iron - 10. Terrain area of 104.6 ha may not be used for agricultural purposes.

Industrial bulk soils - landfills: Here can be attributed the anthropogenic soils as described above – bulk soils from household waste and industrial bulk soils: Depot PTBO - Ezerovo - 28 dka; landfill Beloslav ~ 2 ha; rural landfills Konstantinovo, Razdelna, Strashimirovo - by ~ 6 dka each .

Depot for oil contaminated waste "White Water" is located on Avren Plateau south of Beloslavsko Lake. It represents an abandoned old stone quarry for gravel operated to about 1982 by PIM - enterprise for aggregates. The "cup" formed during discovery is filled with liquid waste characterized as "dangerous" according to Ordinance No. 3 for the classification of waste containing petroleum products and unspecified chemicals. Besides liquid waste in adjacent areas is discarded also solid industrial waste - sea snail shells, old tyres, construction waste. The landfill was used unorganized, unregulated and uncontrolled by various organizations and individuals for almost twenty years. Disadvantageous is the circumstance that from the viewpoint of establishing a landfill, the ground within the site has a large coefficient of filtration and cannot act as a natural geological barrier .

By decision of Beloslav Municipality the use use of the landfill was discontinued.

The investment proposal does not envisage forfeiture of new land and destruction of soils. The impact on land and soil is practically zero.

3.9. Cultural heritage, archaeological, historical and architectural monuments

In the land of the Beloslav Municipality, man appeared for the first time in the Upright Stones place, marking the start of the Paleolithic culture.

Flint tools were found out, dating around 30 - 25 thousand years B.C. Separate Paleolithic finds were discovered scattered over almost the whole Upright Stones place.

In 1958, in the neighborhood of the Suludjite spring archaeological excavations were carried out which subsequently, from the finds discovered, allowed us to trace the development of the Paleolithic culture, which began from the end of the Middle Paleolithic and continued to the Neolithic. The oldest finds were discovered of the first of its kind discovered in Bulgaria Paleolithic settlement.

During the Middle Paleolithic, the transition took place from the primitive human herd to the tribal community. The origin and kinship were counted by maternity line. The woman performed a leading role in the economic life and had a high social status. That stage of the primitive-communal order was called matriarchy.

A dwelling of the primitive people was the Dark Hole cave, also called the Cave by the local residents, located about 100m to the west of the Acacia district. Today it is known by the name the Fulling-mill cave and has been declared a historical site by order №183/06.06.68. The bones found there of a wild horse, cave bear, cave hyena, as well as a flint knife speak for the primitive man's life.

The separation and formation of the Varna and Beloslav lakes was of historical significance. The period continued in the course of million years. In the past there was not unity in the names of the two lakes. In some documents the Varna lake was called Gebedjansko (the former name of the town of Beloslav was Gebedje), and in others – Varna Gebedjansko lake and even Devnensko. Documents and georgraphical information are found, in which the Beloslav Lake was indicated by the name Devnensko or Upper Devnensko Lake.

In 1936, the geographer A. Valkanov made for the first time a proposal the names of the lakes to be formed according to their geographical location. The lake lying closer to the sea and in the vicinity of Varna was called by A. Valkanov Varna, and the upper lake – Gebedjensko owing to the close proximity to Gebedje (Beloslav).

The renowned archeologists, the brothers Herman and Karel Shkorpil came to the conclusion that the age of the two lakes or the exact time of the separation of the firth from the sea as a result of the Glacial and the Post-glacial Period was about 1000 years B.C.

The Varna Bay is connected with the lakes by two canals dug in 1909 and 1976. Of economic importance is the new canal, through which ocean ships pass to the Varna-West port, located near the river of Devnya.

Another archeological and historical landmark is the *pile dwelling settlements,* situated on the territory of the municipality.

The appearance of the pile dwelling settlements is one of the peculiarities of the Eneolithic culture in Europe. They existed in the end of the Stone-copper Age and the beginning of the Bronze Age, i.e. in the second half of IIIrd millennium and in the beginning of IInd millennium B.C. The first one was discovered in 1923 beside the village of Strashimirovo during the digging out of the "old canal" and they named it Strashimirovo I. Today the places of 10 pile dwelling settlements have already been established, discovered accidentally in dredging and excavation works. These are: Strashimirovo II, Ezerovo I, Ezerovo II, Ezerovo III, Povelyanovo, Varna I and Varna II, Asparuhovo and

Baltata (it is situated between the railway lines of Povelyanovo and Razdelna). Preserved wood piles, table ceramics, hoes and hammers from deer's antlers, flint knives, bone needles and awls, millstones and spindle and loom weights, parts of floor coatings, walls and fireplaces were found in them.

Unique finds were also discovered, such as a dug-out boat, found in April 1966 in the pile dwelling settlement named Ezerovo I.

Strashimirovo II, Ezerovo I and Varna II existed only during the Bronze Age. The Eneolithe is a period of economic and cultural upsurge. In the end of the Eneolithe new population came forward, bearing a patriarchal tribal system (until then the matriarchal tribal system was practiced).

The presence of the *Thracians* on the territory of the Beloslav Municipality is proved by the found archeological materials.

Many Thracian settlements were discovered.

A large number of fragments from Thracian ceramics were found out near Beloslav, to the east of the cave. On the south bank of the Varna Lake, to the east of the Ladgata, there are two Thracian mounts. In the Upright Stones place a fragment was found of a votive tablet with a relief image of a Thracian horseman during hunting with a dog. On the tablet bottom side there is preserved inscription in the Greek language. The remains of a Thracian sanctuary were discovered on the Cross elevation.

There are also other Thracian epigraphic monuments, found out within the Beloslav Municipality, by which we understand of the existence and learn about the life of the Thracians on these lands.

Another historical landmark is the *Petrich stronghold* from the Early Byzantine era. It was set up as a part of the Early Byzantine system. With some interruption during the First Bulgarian State, the stronghold was functioning as late as to the first century of the Ottoman rule in Bulgaria. During the II-III century at that place there was an unfortified Thracian settlement. The intensive life arose here in the VIth century, when a fortifying facility was built up.

Archeological investigations prove the presence of Slavs on Beloslav lands, as well.

The first Early Bulgarian monument – *the necropolis* near the village of Razdelna was found out accidentally in 1959. The only manner of burial in that necropolis was the pagan corpse burning, typical for the Slavs upon their conversion to Christianity. The discovered ceramic vessels were 80% of Slavic type, and an insignificant part of them were of the so called "saltovski type", characteristic for the proto-Bulgarian.

A Slavic settlement was discovered in the Boaza place. Ít is situated at a distance of about 1km to the south of the Beloslav lake, 800 m south of the necropolis, on the left bank of the river, coming from the White Water place. At that place there are pieces of broken ceramics, same as those of the necropolis. Clay oven walls and burnt walls of dwellings are found out.

Within the Beloslav Municipality many archeological excavations were carried out, which showed and told us the history of the tribes that dwelled in those lands.

From the studies made we also understand of the long Ottoman influence in the region. In the found diary of second lieutenant Kuljchitskii, it is announced for the entry of the 71th Belevski regimen in Gebedje on 1 and 5 August 1878. By this historic document the exact date of the liberation of the lands in the region from the Ottoman rule.

Before their departure the Russians placed on the elevation Rocky Peak (town of Beloslav), at that time called the White hill, a large wooden cross with the height of 2,5m above the ground, painted in black oil paint. This kind of a monument was placed to serve as a remembrance for the stay of the 71th Belevski regimen in Gebedge. Since then that rocky peak is called the Cross and has become one of the symbols of today's town of Beloslav.

Adverse effects on the monuments of history, archaeology and architecture had the man unfamiliar with their value. The destructive actions on his side – treasure-hunting, environmental pollution, disposing household, construction and other wastes in the close proximity of regions defined as historical places. Influence is also exercised by the outside environment, which in the course of time changes (erodes) in part or in full the external appearance of the discovered finds and cultural monuments.

3.10. Health and hygiene aspects. Hygienic protection zone

3.10.1. Defining of the potentially affected population and territories, zones and/ or sites with specific hygiene-security statute or subject to health protection depending on the envisaged territorial scope of the impacts on the environment components

Despite of its conceptual unity, this investment proposal includes a complex of heterogeneous activities, which should be considered in several aspects from viewpoint both of the envisaged activities and technologies, and from viewpoint of *ORDINANCE № 7/1992 of the Ministry of Health on the hygiene requirements for health protection of the settlement environment.* This is necessitated by the fact that new zones are formed and separated on the existing territory according the envisaged activities:

- separation of a zone for general cargoes;
- separation of zones for containers, containerization and decontainerization;
- separation of a zone for storage of bulk cargos in the open;
- separation of a zone warehouses (silos) for grain;
- separation of a zone for auto and railway scales;
- separation of a transport zone (approaches, roads, incl. internal, etc.);
- separation of administrative and business, and public services zones.

For the envisaged activities pursuant to *Ordinance № 7/1992* of the Ministry of Health are required certain minimum hygienic protection zones (HPZ), indicated in Section. 3.10.8.

Thus, **the assessment of the investment proposal's compliance with the requirements of *ORDINANCE № 7/1992 1992 of the Ministry of Health on the hygiene requirements for health protection of the settlement environment* must give an answer to 2 basic questions:**

- are the statutorily required minimum hygienic protection zones against the separate sources of impact, as envisaged in the plan, provided in relation to the nearest sites subject to health protection;
- are the statutorily required minimum hygienic protection zones for envisaged in the plan warehouses for grain cargoes, as they are also sites subject to health protection within the meaning of the cited *ORDINANCE № 7/1992 OF THE Ministry of Health (MH).*

Another detail that needs special attention is the **assessment of the admissibility of the proposed by the plan internal zoning of the platform** of PORT – LOGISTIC CENTER VARNA as a whole, from viewpoint of *ORDINANCE № 7/1992 of the MH.* In

this connection our opinion is that regardless of the absence of specific national regulations for zoning of port platforms, the meaning of the hygienic protection zones according to *ORDINANCE № 7/1992 of the MH* concerns not only the so called „outside"sites (outside of the platform), but also to the specific **sites subject to health protection located on the territory of the platform itself** of an investment proposal (the so called „internal"sites).

In this sense, **in terms of *ORDINANCE № 7/1992 of the MH*, 3 groups of sites are separated, subject to health protection** in the region of the investment proposal:

– I group: populated places;

– II group: „external" sites subject to health protection outside of the territory of the investment proposal, which eventually could be affected by the plan realization;

– III group: „internal" sites, subject to health protection on the territory of the investment proposal, which eventually may be affected by the plan realization, as well as by other sites beyond the investment proposal's territory.

Thus, the **nearest populated places** (sites from Ist group) to the platform of the investment proposal, in terms of the planned sources of harms, are (**Appendix № 13**):

– departmental blocks of flat at 93,72 m northeast from the zone for containerization and decontainerization (between the platform and the railway line Sofia – Varna), with required minimum HPZ of 300 m;

– residential area of the town of Beloslav to the north of the canal at about 440 m northwest from the zone for containerization and decontainerization, with required minimum HPZ of 300 m; that residential zone is at a distance of about 686 m northwest from the additional quay front and at around 890 m also northwest from the zone of the open warehouse for bulk cargos, with required minimum HPZ of 1 000 m;

– residential area of the town of Beloslav south of the canal at about 482 m southwest of the zone for containerization and decontainerization, with required minimum HPZ of 300 m; that residential area is at a distance about 613 m southwest from the additional quay front and at about 912 m southwest from the zone of the open warehouse for bulk cargos, with required minimum HPZ of 1 000 m;

– residential area of the village of Strashimirovo at about 550 m northeast from the zone for containers, with required minimum HPZ of 300 m; the same residential area is at a distance of about 441,60 m northeast from the zone of the open warehouse for bulk cargos and at about 520 m northeast from the operational area of the quay front, with required minimum HPZ of 1 000 m.

The nearest „outside" site, subject of health protection (site of IInd group) is the zone for trade and storage activities of the town of Beloslav (on the other side of the canal against the platform in whose area most likely there are also food warehouses. The smallest distances are as follows:

– about 238 m between the zone for containerization and decontainerization and the zone for trade and storage activities to the south, with required minimum HPZ of 300 m;

– 351,81 m between the operational area of the additional quay front and the zone for trade and storage activities to the southwest, 426,78 m between the operational area of the main quay front and the zone for trade and storage activities to the southwest and about 531 m between the zone of the open warehouse for bulk cargos and the zone for trade and storage activities to the southwest, for all of them a minimum HPZ of 1 000 m being required.

„Internal site, subject to health protection (site from IIIrd group) is the newly envisaged silo storage for grain cargos with total capacity of 12 000 m^3, at a distance

immediately north of the zone of the open warehouse for bulk cargos, with required minimum HPZ of 1 000 m for the bulk cargos and 50 m for the silo storage for grain cargos.

Therefore, some of the formal requirements of *ORDINANCE № 7/1992 of the Ministry of Health on the hygiene requirements for health protection of the settlement environment* **were not complied with.**

The platform of the investment proposal does not fall thin Sanitary Security Zones (SSZ) of water sources and is not a protected territory within the meaning of the Protected Territories Act (PTA).

3.10.2. Identification of the o for damage of the people's health

The risk factors associated with the investment proposal realization can be defined as a standard (routine) risk in the event of normal course of the construction, repair, installation and operating activities and as risk in the event of emergency situations.

During the construction, the arising of an insignificant number of risk situations is possible related to small leaks and/ or floods of petroleum products (from the means of transport) with comparatively low relevant frequency and with insignificant relevant danger, owing to the limited nature of the impact. In the event of bigger floods, it is possible the soil and the aquatory to be adversely affected. Other risk factors during the construction are dust, noise, vibrations, welding aerosols and unfavorable microclimate (in case of work in the open), but they will relate to those working on the subsites, not the population of the nearest populated places.

In the preceding sections of this report, the results are stated of the carried out analysis, forecast and assessment of the changes in the components of atmospheric air, surface and underground waters and wastes related to the site implementation. As may be expected, including also on the basis of the hitherto existing current practice, as a whole during the project realization the impacts will be of limited nature and will concern predominantly the ground of construction of the separate subsites.

For the time being, there is no clarity whether during its realization it will be necessary to perform fault detection operations for assessment of the quality of some welding activities. If such are really carried out, there is a danger of impact by ionizing radiation, both on those working, and on the persons who happened to be accidentally there. That possibility is with rather low probability, but it necessitates strict observance of the requirements when performing such activity.

Thus, the expected risk factors for damage to the health of the potentially affected population in this stage are:

– exhaust gases from the construction and transportation mechanization;

– noise from the construction and transportation mechanization, and in the installation activities;

– dust from the excavation works;

– welding aerosols;

– volatile organic compounds (VOC) from painting.

The exhaust gases and the dust will be of key importance during this stage.

During the normal operation of the sub-sites the possible risk factors are predominantly dust (organic and inorganic), noise, emissions from the means of transportation, emissions of petroleum products, as well as the wastes from the serviced ships and the port activity itself.

The possible risk factors are different for the different subsite.

Thus, during the period of the normal operation the expected risk factors for damaging the health of the potentially affected population are:

– exhaust gases and noise from motor transport;

– noise from the performed loading and unloading activities;

– dust.

All three indicated factors – dust, noise and burnt gases (exhaust) will be of key importance in this stage.

In emergency situations (major production breakdowns, fires, natural disasters) the emission is possible of considerable quantities of toxic substances, dust, incomplete combustion products, soot, etc. Such situations are with very low relative frequency and with considerable to very high relative danger depending on a number of factors (nature and scope of the impact, actions taken, meteorological conditions, etc.). To the emergency situation should also be equalized the cases of non-operating or inefficiently operating dust capture equipments in work with and storage of bulk cargos, including grain.

3.10.3. Characteristics of the separate factors in relation to their effect on the human health and their comparison with the acting hygienic norms and requirements. Determination of the key risk factors

Here below is presented the principal impact on the human organism of the key harmful factors, without it necessarily meaning realization of the indicated harmful effects.

Noise

It will be generated mainly by the motor transport vehicles, including the construction mechanization during the period of construction. For the period of operation, besides the transport vehicles, of significance will also be the noise generated in the loading and unloading activities. It is expected the noise to be one of the key risk factors during the period of operation of the investment proposal.

The mechanical vibrations with frequency from 16 to 20 000 Hz, which spread in elastic material environment (most often air) and cause auditory perceptions is called sound. *Noise* is any unpleasant or undesired sound which disturbs the silence and the rest or is dangerous for the health, causing varied functional and structural damages, reduced working capacity, impedes the verbal communication and the perception of sound signals from the environment. From hygienic and psycho-physiological viewpoint, to the noises are also attached the tones (sounds with definite pitch), when they exert harmful effect on the human organism.

The more important physical parameters characterizing the sound vibrations are:

- Frequency – number of vibrations for 1 s, expressed in Hz;
- Sound pressure – the difference between the pressure value at any instant in the environment in which the sound waves spread, and the pressure in the same environment in the absence of sound waves;
- Sound intensity – the sound power which passes through a unit of area (1 m^2) for unit of time (1 s);
- Level of sound pressure (level of sound intensity):

  $L_p = 20 . \lg (p/p_o)$; ($L_J = 10 . \lg (J/J_o)$),

  where:

  - L_p (L_J) is the level of sound pressure (sound intensity);
  - P (J) – effective value of the sound pressure (value of the sound

intensity);
- po (J_o) – threshold value;
- $p_o = 2.10^{-5}$ Pa;
- $J_o = 10^{-12}$ W/m^2 at frequency 1000 Hz;

- Sound level by XY-sound level, defined by a noise meter with frequency adjustments x = A, B, C or D and with averaging time Y = F, S or I;
- Equivalent sound level – it is defined by using the dependence
  $L_{eq} = q/0,3 \cdot \lg (1/T) \cdot \sum 10^{(0,3.Li)/q.ti}$,
  where:
  - T – time interval for which the equivalent sound level is defined;
  - L_i – value of the sound level in interval t_i;
  - q – coefficient (usually it is accepted that q = 3 dB);
- Hearing intensity – subjective assessment of the sound intensity.

The noise is a powerful biological factor which though complex neuro-reflectory processes adversely affects almost all functions, organs and systems of the human organism. The nature and extent of the noise damages, occurring with exposed to noise impact persons, are determined by a number of factors: the noise intensity, spectrum and nature; duration of the noise impact; individual sensitivity of the person, etc. The noise effect can be unspecific (on the whole organism) and specific (on the auditory analyzer).

The unspecific impact of the noise on the organism reflects its effects of a chronic stressogenic factor, predominantly over the nervous system. The balance between the exciting and the inhibitory processes is violated. Predominant are the states of astheno neurotic syndrome or circulatory distony. The subjective complaints are unspecific: headache, depression or irritability, emotional instability, insomnia. Neurologically most often established are lowered reflexes, tremor, nystagamus, and increased time of visual-motive reaction. In case of long impact, perception is impaired, attention weakens, the mental concentration is impaired, mood instability appears, apathy or irritability, absent-mindedness and slackening the pace of work, and with chronic effect – also overfatigue with the development of neurosis of neurasthenic type. The work quality worsens, the errors in work and production rejects increase, the work capacity and labor productivity are reduced.

The vegetative nervous system is especially vulnerable to noise impact. It has been proved that the changes occur with relatively low levels of the sound (50–70 dB/A). Peripheral vascular distony, distal hypothermia and asymmetry in the skin temperature, hyperhydrosis, dermorgraphism are most commonly found. Complaints from pain in the heart area, from tachycardia and headache are common. The changes on the side of the vegetative nervous system occur most often in the first years of noise exposure and are more expressed with young workers. The changes in the cardiovascular system with noise impact are of material importance. Both hypertonic, and hypotonic reactions may occur on the side of the vascular system, for which not only the noise parameters are of significance, but also the nature of the performed work. The changes in the artery pressure are met most commonly with the impact of high-frequency noises among young workers with short length of service (2–3 years). They are more expressed with professions with heightened requirements to the performance of the production task – for instance, motor vehicle drives, etc.

The other organs and system are affected as well. Changes are also found in the motor and secretory function of the gastrointestinal tract, expressed in hypaciditet and

reduced stomach tonus. Gastrointestinal illnesses (gastritis, ulcer) are more commonly registered among those working in conditions of intensive noise. The changes in the endocrine system from noise impact have not been sufficiently clarified. The violations in the function of the thyroid gland with data for hyperthyreose. It is considered that the noise also affects the adrenals, hypophysis and the hypothalamus. The changes in the levels of adrenaline and noradrenaline are in support of the noise role as one of the major stressogene factors of the surrounding (incl. the working) environment. Changes have also been found in relation to the locomotive system – reduction of the muscular strength and endurance to 25 %, lowered locomotive reactions, prolonged latent time, especially in the case of effect of high-frequency noises. These changes are connected with violations in the dynamics of the core processes and with the inhibited state of the motor analyzer.

The effect of noise on the analyzers is of particular importance. The changes in the vestibular system are observed mainly with intensive noise impact and are characterized with dizziness, stagger, headache. The vestibular changes increase progressively with the work exposure to noise, but they are also met in young workers.

The data about changes in the vision function are contradictory, which is explained by the differences in the parameters and the exposure to the noise loading. Announcements are made of brief changes in the vision acuteness under the effect of intensive noise impact (above 100 dB), and with lower level (75 to 90 dB) – changes in the steadiness of clear vision and the critical frequency of the vibrations merging.

Extra-aural (outside of the auditory analyzer) changes, especially those concerning the nervous and cardiovascular systems, occur considerably earlier than the development of the auditory damages. There are data that with the growing of the auditory changes some stabilization is observed of the extra-aural symptomatics. Thus, in practice the unspecific changes in the organism prevail in persons with shorter length of services, while with the increasing of the work exposure the auditory damages become leading.

The noise causes three *specific forms* of damage to the auditory analyzer:

- Temporary (transient) reduction of hearing – acute fatigue of the auditory analyzer;
- Permanent damage to the hearing – professional hearing loss;
- Acute acoustic trauma.

We, however, do not think that the occurrence of some of these 3 forms of professional damage is possible with the population of the nearest residential zones.

Dust

The dust is the other major expected harmful factor having relation to the investment proposal. Dust is a unavoidable factor in the construction and installation works and in the site operation (loading and unloading activities of kaolin, coal, feldspar, rock salt, slag, sodium sulphate /in big bags/, vegetable), and also a natural environmental factor. In its basic substance composition, it is expected the dust to be both organic, and inorganic.

The hygienic and health characteristics of dust aerosol with hard phase is determined first of all by its physical and chemical properties, the more important of which are: degree of dispersion, form of the particles, consistency, electrical charge, solubility and chemical composition, content of free (or bound) crystal SiO_2. Of course, the actual concentrations of the specific dust aerosol and the duration of the impact (exposure) are of paramount importance. From the different dust components, the content of free crystal

SiO_2, which is most aggressive and with most expressed fibrogenic effect, is of greatest importance. Dust aerosol in which the concentration of the free crystal SiO2 is over 10 %, is *silicosis hazardous*.

The dust (especially of domestic and animal origin) may also have allergic nature.

One of the most important elements characterizing the dust aerosol is its dispersity, i.e. the sizes of the dust particles. The retention of the dust in the organism and in the respiratory system is determined first of all by the size of the dust particles and by the anatomo-morphological specificities of the different sections of that system. The total dust content in the respiratory system grows with the increase of the dust particles' size and at that mainly at the expense of their retention in the upper respiratory tract, which is a reliable „filter" of the organism. With the reduction of the size of the dust particles (around and below 5 μm), the total retention in the organism decreases, but the quantity of dust which is retained in the pulmonary alveoli is increased. The dust aerosols with size of the particles about 1 μm are with greatest retention in the alveoli. Below and above that boundary the quantity of the deposited dust in the deepest segments of the lungs decreases.

The human organism possesses a number of protective mechanisms against the dust. The first protective barrier is the upper respiratory tract. Thus, dust particles with size above 10 μm are retained in the nose, about 50–70 % of the inhaled dust sticking to the nose mucous membrane. Next retention of the dust occurs in the trachea and the bronchi („internal barrier"). Dust particles with size over 10 μm are in practice fully retained in them. The cleaning is made through the ciliated epithelium of the trachea and the bronchi, 10–15% of the dust aerosol being retained in them.

The smallest dust particles (below 5 μm) get into the alveoli, where they are subject to fagocitosis, after which they are thrown out with the spittle. In this way 5–10 % more of the received dust is eliminated. In case of normal functioning of the described mechanisms, more than 90 % of the dust aerosols, getting into the respiratory system, are rendered harmless and thrown out.

The inhalation of high concentrations of dust for long time impedes considerably the self-cleaning protective mechanisms of man. Upon the decompensation (exhaustion) of these protective mechanisms, the dust starts to penetrate in lymphatic way in the perialveolar, peribronchial and the perivascular tissue, thus resulting in the development of fibrose reactions in the lungs, which are in the basis of the different nosological forms of the pneumoconiosis. The dust aerosols can manifest their action along the following main lines: *toxic action*, when dust aerosols are concerned, which has specific toxicity and are soluble in water and fats (cement, etc.); *allergic action* – predominantly organic dust, but also a number of organic compounds; *specific action*, whereby the respiratory system is affected (pneumoconiosis – silicosis, etc.); *cancerogenic action,* etc.

Presently, in Bulgaria in regard to the dust in the atmospheric air (as FDP $_{(10)}$ are regulated an average twenty-four-hours norm for human health protection of 50 $\mu g/m^3$ without the admissible deviation at 31.12.2008 and average annual norm for human health protection of 40 $\mu g/m^3$ without the admissible deviation at 31.12.2008 (for Stage 1 until 31.12.2008), pursuant to *ORDINANCE № 9 the Ministry of Environment and Water (MEW) and the Ministry of Health (MH) on norms for sulphur dioxide, nitrogen dioxide, fine dust particles and lead in the atmospheric air (prom., SG, issue 46 from 1999, am., iss. 86 from 2005)*. For Stage 2 (at 01.01.2010, i.e. before the putting into operation of the investment proposal) limitation will be valid for the admissible exceeding of the average twenty-four-hours norm from 35 to 7 times within 1 calendar year, and the average annual

norm for human health protection becomes 20 μg/m^3. According to the same statutory document in regard to $FDP_{2,5}$, 24-hours action level for human health protection of 40 μg/m^3 and average annual action level for human health protection of 20 μg/m^3 are regulated, which have to be reached at 31.12.2008, i.e. before the putting into operation of the investment proposal.

Simultaneously, there also exist norms for the parallel admissible concentrations (PAC) of common dust in the atmospheric air of the populated places, according to *ORDINANCE № 14/1997of MH and MEW on norms about the maximum allowable concentrations of harmful substances in the atmospheric air of the populated places* (prom., SG, iss. 88/1997, am., iss. 46/1999, iss. 8/2002):

- average annual – 0,15 mg/m^3
- average twenty-four-hours– 0,25 mg/m^3
- maximum one-time – 0,50 mg/m^3

The defining of the dust norms in the air of the work environment is according to its origin, the content of free crystal SiO_2 and other factors, pursuant to *ORDINANCE № 13 of the Ministry of Labor and Social Policy and the Ministry of Health on the workers' protection from risks related to workplace exposure to chemical agents (prom., SG, iss. 8 from 2004.).*

The possible unfavorable effects from the envisaged dust sources in the environment during the construction of the investment proposal in observance of the measures proposed for limitation of its adverse impact, may result only in short-time worsening of the conditions for staying in the close proximity to the platform, but not for the nearest populated places.

Nitrogen oxides

They will be released with the exhaust gases of the motor transport vehicles, the railway locomotives, the construction mechanization and the dredges.

Physical and chemical properties. The nitrogen oxides are changeable gas mixture from NO, NO_2 и N_2O_3 with pale yellow to dark brown coloring and peculiar odor. The nitrogen oxide in the air turns quickly into NO_2.

Toxicokinetics. The nitrogen oxides get into the organism through the respiratory tract. With the wet mucous membrane of the respiratory tract they form nitrates, nitric and nitrous acids, which affect the alveolar tissue and lead to swelling in the lungs. Nitrates and nitrites are obtained in the blood, which cause dilation of the vessels, reducing of the artery pressure and mostly – the turning of the oxihaemoglobin into methemoglobin. The dinitrogen oxide has narcotic action.

Toxicity for man. Irritation in the throat arises at concentrations 120 mg/m^3 (recalculated as NO_2), cough – at 200 mg/m^3. In case of short-term impact, concentrations 200–300 mg/m^3 are considered dangerous and in the event of impact of many hours – 70 mg/m^3. Concentrations of the order of 3 mg/m^3 do not cause any effects.

Under *ORDINANCE № 9 of the Ministry of Environment and Water (MEW) and the Ministry of Health (MH) on norms for sulphur dioxide, fine dust particles and lead in the atmospheric air (prom., SG, issue 46 from 1999 – in effect from 1.01.2000; am. And suppl., iss. 86 from 2005 – for SO_2, NO_2 and FDP_{10} in effect from 01.01.2006)* the following norms were regulated for nitrogen dioxide and nitrogen oxides in the atmospheric air:

- Average hour norm for human health protection 200 μg/m^3 for NO_2 with

allowable deviation 50 % upon the ordinance effectuation, decreasing linearly since 1.01.2001, and in every 12 months thereafter, to reach 0 % at 1.01.2010); for 2009 – 210 $\mu g/m^3$;

- Average annual norm for human health protection 40 $\mu g/m^3$ for NO_2 (with allowable deviation 50 % upon the ordinance effectuation, decreasing linearly since 1.01.2001, and in every 12 months thereafter, to reach 0 % at 1.01.2010); for 2009 – 42 $\mu g/m^3$;

The nitrogen oxide is under № 1660 according the classification of the United Nations Organization. Revised ILDH-value according to NIOSH (USA, 3/1/95) – 100 ppm.

The nitrogen dioxide is under № 2627 according the classification of the United Nations Organization (Nitrogen dioxide liquid is under № 1067). Revised ILDH-value according to NIOSH (USA, 3/1/95) – 20 ppm.

Pathogenesis of the intoxications. The nitrogen oxides form with the wet mucous membrane of the respiratory tract nitrites, nitric and nitrous acids, which affect the alveolar tissue and lead to swelling in the lungs. Nitrates and nitrites are obtained in the blood, which cause dilation of the vessels, reducing of the artery pressure and mostly – the turning of the oxihaemoglobin into methemoglobin. The dinitrogen oxide has narcotic action.

Clinical picture of the intoxications. Acute poisoning: the period of the initial manifestation is characterized with slight, sometimes hardly perceptible irrigation of the mucus of the upper respiratory tract with slight cough, headache, faintness, which may pass away for 30 minutes to 1 hour. Upon impact of high concentrations, after a period of „alleged well-being"(most commonly without subjective complaints or with feeling for suffocation) a toxic lung swelling is developed with periods of growing and ending of that swelling. It is possible the course of the acute poisoning to be by the so called cardiovascular type: with pains in the heart area of stenocardial nature and symptoms of coronary insufficiency.

Chronic poisoning: it is characterized with polymorphic symptomatics. The damages are mainly on the part of the broncho-pulmonary system. Chronic bronchitis, bronchiolite, toxic pneumosclerosis are developed. Miocarditis, gastritis, colitis, toxic hepathitis, etc. are also possible.

We, however, do not think that the described potential impacts will be realized with the population of the nearest populated places and with the temporary staying persons on the territory of the investment proposal, due to the expected low concentration of the pollutant from the potential sources.

Sulphur dioxide

They will be released with the exhaust gases of the motor transport vehicles, the railway locomotives, construction mechanization and the dredges.

Physical and chemical properties. Colorless gas with specific irritating, pungent smell and sour taste. It is 2,3 times heavier than the air. It is well soluble in water, in methyl and ethyl alcohol. It is easily wetted and oxidized, forming sulphurous acid. The sulphur dioxide is one of the main pollutants of the atmospheric air in the populated places.

Toxicokinetics. It gets into the organism through the respiratory tract, and dissolved as sulphulous acid – also through the digestive system. With people, in case of inhalation exposure, the resorbation is very high and is in direct ratio dependence from the gas concentration in the atmosphere. The sulphur dioxide passes through the respiratory organs

in the lungs and from there in the blood. It biotransformation ends with the formation of sulphates. Part of the inhaled SO_2 is released with the exhaled air, the large part is released as metabolites (sulphates) with the urine.

Toxic doses and concentration. With concentration of SO_2 about 20–50 mg/m^3 irritation of the mucous membranes occurs. Concentrations of the order of 120–300 mg/m^3 cause heavy poisonings. The repeated impact of SO_2 in concentrations 20–70 mg/m^3 leads to chronic respiratory illnesses, disturbed function of the thyroid gland and of the metabolism.

The following norms have been regulated in regard to sulphur dioxide in the atmospheric air of the populated places pursuant to *ORDINANCE № 9 of the Ministry of Environment and Water (MEW) and the Ministry of Health (MH) on norms for sulphur dioxide, fine dust particles and lead in the atmospheric air*:

- Average hour norm for human health protection 350 μg/m^3, with allowable deviation 150 μg/m^3 (43 %) upon the ordinance effectuation, decreasing linearly since 1.01.2001, and in every 12 months thereafter, to 0 % at 1.01.2005.
- Average twenty-four-hours norms for human health protection 125 μg/m^3, with allowable deviation 25 μg/m^3 (25 %) upon the ordinance effectuation, decreasing linearly since 1.01.2001, and in every 12 months thereafter, to 0 % at 1.01.2005 г.

The sulphur dioxide is under № 1079 according the classification of the United Nations Organization.

Pathogenesis of the intoxications. The irritating action of SO_2 is explained with the formation of sulphous acid upon the contact with the wet mucous membranes. Its easy solubility helps for the penetration in the organism and the development of compensated metabolic acidosis. Its general toxic action is manifested in violations of the carbohydrate and protein metabolism, reduction of vitamin B_1 and vitamin C, suppression of the oxidizing processes. As an expression of the resorbation action of SO_2, irritation of the blood producing organs (erythrocytosis and leukocytosis) and biochemical changes in the blood.

Clinical picture of the intoxications – acute and chronic poisonings are possible.

Acute poisoning: The gravity will depend on the factual concentration of sulphur gases, the duration of the exposure, on the state of those exposed – sex, ages, health and physiological condition, specificities in meals, etc. The children, adult and ill with chronic diseases of the respiratory and cardiovascular system have higher sensitivity to the action of the sulphur oxides. In case of slight degree of poisoning, irritation occurs of the eyes (hyperemia of the sclera) and the mucous membrane of the nose, feeling of burning and pain in the throat, hyperemia of the mucous membranes of the nose and the throat, cough. In the event poisoning medium-heavy degree, these symptoms are more sharply expressed – headache, fit of dry coughing, aphonia, sometimes bleeding from the nose, aches in the stomach, nausea, vomiting, cyanosis of the lips, appearance of dry and wet wheezes in the lungs. Longer impact of concentrations over 200 mg/m^3 may lead to the development of bronchiolite, acute emphysema, toxic pneumonia, lung swelling, increasing disorders of the breathing and blood circulation, asphyxia. Dystrophic changes occur in the liver, kidneys, myocarda and the nervous tissue. The heavy poisonings are rare, as the inhalation of very high concentrations of SO_2 causes sharp irritation of the mucous membranes and reflectory spasm of the respiratory tract, which forces the affected to leave the polluted

ground.

Chronic poisoning: the clinic picture is characterized with violations on the part of the broncho-pulmonary system, cardiovascular system and the gastrointestinal tract. The varied symptomatic on the part of the upper respiratory tract and the mucous membranes is characterized with burning, dryness and pains in the nose and the throat, increased nasal secretions (sometimes bloody), dry cough, tightness and pains in the chest, suffocation, burning in the gullet and the stomach, nausea and more rarely vomiting. The headache, easy tiredness and faintness, shooting pains in the heart area are common. In the beginning there is hypertrophic, and subsequently – atrophic chronic rhino-and tonsillopharyngitis, often with asthmatic component and violated lung function. Toxic pneumosclerosis in different phase is detected by X-ray examination. Neuroses and vegetative-asthenic conditions, gastrointestinal disturbances, chronic gastritis, increased dental caries, availability of alkalii and sulphates in the saliva and the urine are found. Dermatitis and eczema, chronic conjunctivitis, menstrual disturbances, hypofunction of the thyroid gland are observed.

The initial symptoms of damages to the upper respiratory tract arise after 1–1,5 years if permanent exposure to SO_2, the expressed pathology of the cardiovascular system – sometime after that, and the damages to the digestive tract – after 5–10 years of impact. It is considered that the described effects from the long exposure arise at annual mean concentrations of the averaged 24-hours values above 0,150 mg/m^3 (150 μg/m^3).

We, however, do not consider that the described potential impacts will be realized with the population from the nearest populated places and with the persons temporary staying on the territory of the investment proposal, due to the expected low concentration of the pollutant from the potential sources.

Carbon oxide

It will be released with the exhaust gases of the motor transport vehicles, the railway locomotives, construction mechanization and the dredges.

Physical and chemical properties. Colorless gas without smell and taste. It is little soluble in water. Chemically it is quite inert. It is lighter than the air – relative density of the vapors (air = 1): 0,97. It burns with bluish flame, at which CO_2 is obtained. Mixed with the air it forms explosion hazardous mixtures – explosive limit (volumetric % in the air): 12,5–74,2. In serum of human blood the solubility ratio is 0,01709 (at 38 °C).

It is widely spread everywhere where there exist conditions for incomplete burning of matters containing carbon.

Toxicokinetics and toxicodynamics. The carbon oxide forms carboxyhemoglobin (COHb) with reduction of the oxyhemoglobin from 18 to 8 % and narrowing the difference in the oxyhemoglobin between the arterial and venous blood from 6–7 % to 2–4 %. The dissociation of COHb runs about 3600 times slower than that of the oxyhemoglobin. The lethality with comparatively low content of COHb in the blood (45–55 %) is due to the simultaneous blocking of the cytochromes, dehydrogenases and other important tissue enzime systems.

The carbon oxide effects the organism through two main mechanisms: hypoxemic and hystotoxic. The first is of leading significance in the acute poisonings, and the second – with the chronic intoxications.

Toxicity for man. The carbon oxide is a gas with high toxicity. With concentration in the air 0,5 % death occurs for 5–10 min. With 0,1 % insomnia and death for several

hours is observed. The action of CO at various concentrations is as follows: with 30–60 mg/m^3 CO the vision and hearing are disturbed; the inhaling of 110–230 mg/m^3 gives about 10 % carboxyhemoglobin (COHb), deviations in the psychological, psycho-physiological tests, headache, disturbed coordination, skin hyperthermia and fatigue. Concentrations 440–690 mg/m^3 cause unbearable headache, vertigo. nausea, vomiting, adinamia and collapse, COHb is 30–40 %. Exposition to 1260–1760 mg/m^3 leads to more frequent and perfunctory breathing, weak pulse, unconsciousness and increase of COHb to 60 %. CO in concentrations 2300–3400 mg/m^3 causes unconsciousness, weak pulse, shortness of breath and coma. Upon increasing of the concentrations over 4000 mg/m^3 and of COHb over 70 %, death occurs.

The following norm was regulated for human health protection in relation to the carbon oxide in the populated places, pursuant to *ORDINANCE № 1 of MEW and MH on norms for benzene and carbon oxide in the atmospheric air (prom., SG, iss. 14 from 2004)*:

- Maximum eight-hour average value within twenty-four-hours 10 mg/m^3, with allowable deviation 6 mg/m^3 (60 %), considered from 1.01.2002, decreasing in every 12 months thereafter by 2 mg/m^{3}each, to reach 0 % at 1.01.2005 г.

The carbon oxide is under № 1016 according the classification of the United Nations Classification. Revised ILDH-value according to NIOSH (USA, 3/1/95) – 1 200 ppm.

We, however, do not consider that the described potential impacts will be realized with the population from the nearest populated places and with the persons temporary staying on the territory of the investment proposal, due to the expected low concentration of the pollutant from the potential sources.

Welding aerosol (dust from welding)

It is formed during welding in a voltaic arc at temperature 3 500–4 000 °C. Most often it is operated in combination on an electric welding machine and a torch-lamp. The welding aerosol contains predominantly iron, but also aerosols of other metals (manganese, tungsten, etc.) and gases (ozone, nitrogen oxides, etc.). In the event of long (for years) exposure, the so called ***pneumoconiosis of welders*** may occur in the workers. This is benign pneumoconiosis as a result of the deposition of iron in the lungs, which do not have fibrozogenic action (siderosis). The affected have almost no complaints, despite of the clear X-ray find. There are no functional disturbances in the breathing, or they are scarce. Upon termination of the exposure, a reverse development of the finds is observed in the course of several years [Reference book on professional illnesses. P/r St. Ivanova and Tsv. Alexieva. C., Med. and sports. 1986].

In Bulgaria there are no regulated norms for admissible content of welding aerosol in the atmospheric air and in the air of the work environment. There are regulated maximum allowable concentrations of some of the above indicated substances, which are present in the welding aerosol.

We, however, do not consider that the described potential impacts will be realized with the population from the nearest populated places and with the persons temporary staying on the territory of the investment proposal, due to the limited time of emission (only during the construction period) and the expected local impact on the territory of the platform.

3.10.4. Assessment of Possibilities for Combined, Complex, Cumulative and Remote Effect of Established Factors.

The nature of the expected harmful factors in connection with building of the investment proposal is such that a summation effect of the flue gases and dust from the construction machines of the site and from the other transport vehicles in the region is possible (including to and from the surrounding objects). The comparatively favourable location of the site compared to the closest centres of population from the point of view of the "wind rose" presupposes a certain restriction of this probability.

The nature of the possible real and potential harmful factors is such that during the operational period even under normal technological mode of operation of the port complexes, possibilities for combined, cumulative and remote effect of some of the established factors, for example, the unavoidable, although small spills of oil products (including in the water area), the systematic pollution of the port adjoining territory with some bulk dust-forming and dust-releasing materials, dangerous cargo, etc. are available. Similar also is the issue of waste, some of which is dangerous as toxicity (e. g. burnt luminescent lamps) and as biological materials. The more probable mechanism of impact is the indirect one – through possible pollution of the water area and the sea inhabitants, used as food (however, in this case the existence of other more powerful known and unknown sources of pollution of the water area, with heavy metals mainly, should be taken into consideration.) The strict observation of the operation instructions, indeed, will restrict to minimum the admission in environment of substances of analogical effect, moreover that this is supported with suitable technological decisions for reducing or excluding such possibilities, included in the project.

Practically, the essential issue in this case is the possibility for the cumulative impact of noise over the health of both potentially affected persons of the closest residential areas and of the persons who temporary visit the territory of the investment proposal.

From the measurements of the background noise levels made at about 440 m SSI, at about 450 m Protection Zone and about 350 m to the South from the site, it could be seen that these levels do not exceed the respective standards for noise during the day, the evening and the night – Protocol/Appendix No. 12. Therefore, there are certain capacity possibilities of the residential environment from acoustic point of view, i.e. these possibilities have not been exhausted.

It could be established from the estimations made (after the nomogram and calculated – Section 3.6.4 for the expected level of the noise generated at the facility during its normal operation that the **summed equivalent levels of the existing and forecast noise** in the region will be lower than the regulated borderline value for the equivalent noise level for residential territories for the respective period – day, evening and night. This finding concerns also the point of calculation at the nearest residential buildings to about 93 m Protection Zone from the facilty. The low expected (forecast) equivalent noise levels from the operation of the facility will be masked by the background noise and will not lead to increasing the latter.

Due to lack of forecast data about the noise from the operation of the nearby port of Gastrade and because of the specific peak levels of the noise from the forecast standard port activities at the facilities of ИП, it is necessary, after the commissioning of these facilities, to carry out control measurements of the noise at the nearest facilities, subject to health protection through the different periods of the day and night. If necessary, restrictive

measures should be introduced upon the operation of both investment proposal.

Upon the implementation of the investment proposal according to the proposed technologies and for the recommendations made in this EIA Report, the possibilities for emergence of such combined, complex, remote and summation effects could be restricted to an acceptable level.

3.10.5. Chapacteristricts of Exposure

The issue of exposition to potential harmful factors is different during the implementation of the project stage by stage for the different sub-facilities and during their operation. On the one part, it concerns the population from the nearest residential areas and the facility subject to health protection, and on the other part – the employees of the facility.

During the construction

During this period, the population of the nearest centres of population, as well as the facility subject to health protection will be exposed at the factors established under Section 3.10.2. Practically, this exposition will be insignificant (and for the population regarding some factors – at zero level), due to the stage-by-stage implementation of the plan, the relatively restricted volume of construction and erection works and the fact that construction and erection works of this kind have impact mainly on the site. Only, upon the possible performance of breaking down activities at the site, the noise at the nearest residential area will be higher than the regulated borderline values of the noise level in the different territories and spatial development areas in the urbanized territories and outside them, pursuant to *ORDINANCE No. 6/2006 of the Ministry of Health and the Ministry of Environment and Water.* According to statistical data, the levels of noise pressure from the operation of an air compressor are in the range of 86 to 99 dB(A), and of a pneumatic pick - from 102 to 116 dB(A). On this basis, upon operation of an air compressor and pneumatic pick at the site, the expected level of noise pressure at the residential area immediately northwest from the site will exceed the borderline values of the of the noise levels for Residential Areas and Territories, which are 55, 50 and 45 dB(A) in the day, evening and night, respectively. This means that the possible breaking down activities should not be carried out during the night.

During normal operation

The population of the nearest centres of population could in principle be exposed to different harmful factors (mainly dust, noise, etc.) always when the respective port activities are performed. However, a low level of exposure during the normal operation at the sub-facilities in connection both with the remoteness of the nearest centres of population and because of the forecast suitable contemporary technological processes, meeting the good available techniques, which to protect the environment and the health of the potentially affected population. The capacity possibilities of the environment allow its taking over additional loads by components, this not having a significant effect in negative direction and leading to significant deterioration of the living conditions in the area of the Investment Proposal.

Considering the substantial importance and priority of the measures for environment protection and the health of the potentially affected population, the investor should undertake the following commitments in this respect:

♦ **The bulk cargo should be stored in closed premises only, rather than in the open;**

♦ **If necessary, to introduce restricting measures in respect to the noise sources during the night.**

Actually, the exposition of the potentially affected population will also depend on the meteorological conditions and other factors.

During emergency situation

In case of emergency situations related to the emission in the atmosphere of significant amounts of toxic substances (e. g. fires), a massive, however short-term exposure, and the consequences for the health of the affected will depend on the kind of the toxic substances, the duration of action, the meteorological conditions, etc.

3.10.6. Health Status of Affected Population

The topical current assessment of the health status of the potentially affected population is discredited, because:

1. After the beginning of the health reform in the country (in 2000), official complete data about the demographic and health status of the population of the Republic of Bulgaria, which hinders the comparison of the registered sick rate of the population of Beloslav Town and the region with the one of the country for the period of 2001–2007 including, as well as with preceding periods until 1999;

2. There are no precise data about the total number of population below 18 and above 18 for Beloslav Town and the region;

3. By *ORDINANCE No. 42 of the Ministry of Health,* the international statistical classification of diseases and health-related problems – the Tenth Revision were introduced in the country (promulgated in the Official Gazette, No. 111/2004, in force as of 01.01.2005), according to which the classification of disease is different and comparison with the data for the years preceding 2004 (after the International Statistical Classification of Diseases and Health-Related Problems 9) is impossible.

One of the most complete assessments of the health status of the population of the Beloslav Town is presented in the ENVIROMENT AND HEALTH Action Plan of Beloslav Municipality, Stage 1, Health Status of Population in Beloslav Town Territory for 1994-1999 Perood (Sole Proprietor INCO – Apostol Marinchev, Varna, 2002).

3.10.7. Health Risk Assessment, Measures for Health Protection and Risk Management

For the purposes of this EIA Report, an assessment of risk (direct and indirect) has been made pursuant to BS 8800:1996 for the different stages (construction and operation) depending on the established harmful factors compared to the nearest facilities subject to health protection. The methodology includes:

1. Estimate of the weight of damages; it is conducted after a 3-stage scale (small, heavy and very heavy);

2. Estimate of the probability of occurrence of harm and/or damage; it is conducted after a 3-stage scale (very small probability, probably and big probability) in two alternatives (for quickly occurring dangerous events/situations and for continuously acting hazards);

3. Evaluation of Risk.

A matrix is used where the levels of the weight of damage element are registered along the horizontal axis, and along the vertical axis – the element of probability of occurring damage. The combination of these 2 elements specifies the level of risk according to 5-level scale.

– The Ignorable Risk level does not require taking additional prevention measures;

– The Admissible Risk level corresponds to the minimum requirements and safety norms;

– The other levels (Moderate, Big and Inadmissible Risk) require undertaking of different measures for its reduction or removal, including the immediate termination of the activity in case of inadmissible risk.

According to the expert appraisal, the established forecast levels of risk, compared to the closest facilities, subject to health protection, are as follows:

1. During construction:

1.a) *For gas polluters* from transport and construction equipment: weight – small, probability – very small, evaluation of risk – ignorable risk; zone of impact – local (around the site of construction);

1.b) *For dust polluters* from digging and construction works: weight – small, probability – possible, evaluation of risk – admissible risk; zone of impact – local (around the place of occurrence, however it is possible to be outside the borders of the site);

1.c) *For the noise* from the transport and construction equipment and from the construction and erection activities themselves: weight – small, probability – possible, evaluation of risk – admissible risk; zone of impact – local (around the place of occurrence, however it is possible to be outside the borders of the site);

1.d) *For emissions* of volatile organic compounds and welding aerosols with the painting and construction and erection works: weight – small, probability – very small, evaluation of risk – ignorable risk; zone of impact – local (around the place of occurrence).

2. For the period of normal (accident-free) operation:

2.a) *For gas polluters* from transport (internal and external): weight – small, probability – very small, evaluation of risk – ignorable risk; zone of impact – local (at the territory of the site and outside it);

2.b) *For dust polluters* released during some loading and unloading works and **in case of storage of bulk cargo in the open**: weight – heavy, probability – possible, evaluation of risk – **big risk**; zone of impact – **significant** (at the territory of the site and outside it);

2.c) *For dust polluters* released during some loading and unloading works and **in case of storage of bulk cargo in warehouses**: weight – small, probability – big probability, evaluation of risk – admissible; zone of impact – local (at the territory of the site, however, in case of unfavourable MTO-conditions outside it as well);

2.d) *For the noise* from the servicing transport vehicles , technological equipment and ventilation facilities: weight – small, probability – very small, evaluation of risk – ignorable risk; zone of impact – local (at the territory of the site mainly, however it is also possible outside its boundaries);

2.e) *For waste waters*: weight – small, probability – very small, evaluation of risk – ignorable risk; zone of impact – local (at the place of treatment).

3. In case of emergency situations:

3.a) *In case of non-operating* or non-efficiently working local cleaning facilities for bulk and grain cargo: weight – heavy, probability – big, evaluation of risk – **big risk**; zone of impact – **significant** (at and outside of the territory of the site);

3.b) *In case of an incident (fire)*: weight – very heavy, probability – very small, evaluation of risk – **moderate risk**; zone of impact – local (at the territory of the site, however, most probably outside its borders as well).

An estimate is made on the basis of the above that the construction and the normal operation of the Investment Proposal upon the implementation of the measures planned in the project and in compliance with the recommendations of this EIA Report.

1) There will be no inadmissible unfavourable effect over the population of the nearest centres of population.

2) There will be no inadmissible unfavourable effect over the nearest sites subject to health protection;

3) There will be no inadmissible unfavourable effect over the temporary residing population around the site of the investment proposal.

4) There are contemporary technological and technical solutions, which allow the realization of the investment proposal in such a way that in the process of its construction and normal operation the protection of the potentially affected population to be provided as well as a site subject to health protection.

This is a ground for us to propose to the competent authority with the Ministry of Health to reduce the hygiene protection zone and to approve the site of the Investment Proposal.

Assessment of Health Risk for Personnel and Health Protection Measures

The assessment of health risk for the workers at the site is subject to another r procedure, pursuant to the Health and Safety at Work ACT (HSWA) (promulgated in the Official Gazette, No. 124 of 1997, as amended and supplemented) and ORDINANCE No. 5 of the Ministry of Labour and Social Policy and the Ministry of Health on the Procedure, Way and Regularity of Conducting Evaluation of Risk (promulgated in the Official Gazette, No. 47 of 1999). During the selection of the process equipment, it should be taken into consideration that it should also meet the requirements of ORDINANCE No. 7 of the Ministry of Labour and Social Policy and the Ministry of Health on the Minimum Requirements Regarding Health and Safety at Work and upon Using Work Equipment (promulgated in the Official Gazette, No. 88 of 1999, as amended and supplemented), as well as to the requirements of Article & and Article 9 of ORDINANCE No. 6 of the Ministry of Labour and Social Policy and the Ministry of Health on the Minimum Requirements Regarding Health and Safety at Work upon Risks, Related to Exposure to Noise (promulgated in the Official Gazette, No.70 of 2005 – in force as of 15.02.2006) for non-admission of exceeding the upper value to exposure to noise for taking action of Lex,8h = 85 dB(A), pursuant to Article 3, Paragraph 1, Item 2 of the above ORDINANCE, as well as the requirements of ORDINANCE No. 3 of the Ministry of Labour and Social Policy and the Ministry of Health on the Minimum Requirements Regarding Health and Safety at Work upon Risks, Related to Exposure to Vibrations (promulgated in the Official Gazette, No. 40 of 2005 – in force as of 06.07.2005) in respect to vibrations transferred to the whole body and the vibrations transferred to the arm-shoulder system).

The procedure for the actual evaluation of risk for the workers should be conducted

when the site is already commissioned. In order to perform the procedure, the Employer should implement the requirements of Article 25, Article 24 and Article 16 of the Health and Safety at Work Act, in connection with Article 14, Paragraphs 1 and 2 of the same act. The possible future modernizations, reconstructions, expansions, etc., and/or the introduction of new equipment, technology, etc. should be subject of subsequent updating of the already prepared initial evaluation of risk.

Established are the main risk factors in the period of construction as well as for the period of operation of the investment proposal. According the expert opinion in the period of the site construction the only possible risk is that of possible traumatic injuries provided the rules of health and safety at work (HSW) shall not be observed in the performance of the construction and errection works. The selection of qualified contractors for the construction and errection works and the mandatory instructions regarding health and safety at work is of importance for the reduction of this risk and they should be documented in the appropriate order.

Conditions of work must be in accordance with the requirements of the legislation in effect after the commissioning of the site. It is only then that a precise risk evaluation for each work place can be done.

3.10.8. Hygiene Protection Zone

For the activities provisioned in the investment proposal, pursuant to the requirements of *ORDINANCE* No. *7/1992 of the Ministry of Health about Hygienic Requirements for Health Protection of Urban Environment* the following minimal HPZ are required:

– **for ports for bulk materials and liquid fuels – 1 000 m** (Item 341); potential sources: dock front/dock fronts, open storage sites, auto and railway dumping stations for bulks including grains;

– **for ports for packed loads – 300 m** (Item 364); potential sources: port front/port fronts, zones for general loads, containers, containerization and decontainerization;

– **for warehouses for food commodities including refrigerators and silos for storage of grain – 50 m** (Item 302); potential sources: silo warehouse for grain is also a site - subject of health protection.

Moreover, in accordance with Item1 of Annex 2 of *ORDINANCE No. 7/1992 of the Ministry of Health* **HPZ for electric power lines of voltage 0 kV is 10 m from the projections of the end wires of the electric power lines** provided that „Terrains under wires on both sides shall not be build up for accommodation or the performance of activities ".

In the implementation of the suggested recommendation for storage of bulk materials in closed warehouses the following rough requirements may be applied:

– **for covered warehouses for highly toxic substances and mineral fertilizers** торове (it is expedient for these to be in existing agricultural sites) – **100 m** (Item 373) or

– **For covered base warehouses for chemical preparations for plant protection, mineral fertilizers and others – 500 m** (Item 353).

Appendix No. 13 – *Hygiene Protection Zones of Sub-sites*

IV. DESCRIPTION OF THE POSSIBLE WAYS OF ACHIEVING THE GOALS OF THE INVESTMENT PROPOSAL, ALTERNATIVE SOLUTIONS

Alternative Locations

As regards the location in the territory subject of the investment proposal, there are no alternatives, as the boundaries are limited within the owned land property, besides they are consistent with the requirement to be located at recommended distance away from human settlements. There are possibilities with regard to the location of individual sites, buildings and facilities. However, these possibilities are limited by the main characteristics of the terrain, the existence of communications networks and the location of urbanized territories and sites of the respective human settlement. In this regard, the alternatives are based on the existing conditions in the region. The recommendations concerning this project comprise:

- Maximum distance from protected locations (residential buildings water sources, etc.) of sites and facilities emitting harmful substances if located at the site – this concerns mainly the handling and storing of bulk materials. In this relation, the investor has assumed that these warehouses and activities should be located at the maximum possible distance away from the town of Beloslav and the village of Strashimirovo;
- Taking noise-generating activities way from residential areas (to the east of the entrance). The investor has opted for an alternative that takes out the noisiest activities (loading and unloading activities at the wharf and the warehouses, transportation activities using in-house transportation vehicles, receiving and dispatching shipments with road and railway transport) in a region equally remote from both settlements;
- Taking away the main transport flow from the west entrance to the area of the wharfs. The investor is preparing for implementation a transport scheme with opening of a gate to the north, located next to the bulk cargo warehouse, outside the perimeter of the settlement.

Alternative Capacities of the Project

As regards the capacity of the project (in terms of tonnage of cargoes), at this stage alternative solutions are being considered both of the type of bulk cargoes (mainly grain and ores, featuring no high quantities of emissions of dust or harmful substances), and of the number of containers handled, technological sequence of cargo handling, etc. The possible environmentally-friendly solutions in this regard are primarily related to selecting the optimal conditions of technological handling and to the volumes of cargoes allowing for minimum harmful emissions. In this relation, the investor will implement the following technological alternatives:

- handling of bulk cargo using only enclosed conveyor systems;
- handling and storing of containers at yards with sufficient loading capacity for implementing high-bay stacking of containers;
- handling and storing of basic packaged and general-purpose cargoes in roofed warehouse areas.

Alternatives as to the period construction

As regards the period of construction, the following possible alternatives are considered:

- construction not taking into consideration the period and continuing throughout the whole year;
- construction of the port, taking into consideration the requirements to not disturb the period of reproduction of biological species, not disturb the flight of migratory birds over the site, not bother the population, etc.
  In this relation, the investor was recommended, and it will take this recommendation into consideration, to perform construction works in a period when it will the least impact the population of biological species and the normal life of the inhabitants in the settlements.

Alternatives as to the activities to cope with the wastes generated in the process of implementation of the investment proposal

In the process of project implementation, mainly two types of wastes of relatively large quantities will be generated. These are large masses of excavated earth with code 17.05.06 and quantities as per design documentation of about 280,000 m^3 and dredged material of about 71,900 m^3. According to the effective waste management legislation, the dredging activities, more specifically dredge depositions (materials) are considered only in case their treatment is done on land. In such cases the dredge depositions can be included under code 17.05.06.

With regard to dumping of the masses of excavated earth, there will be no problem as an opinion was stated (letter of consent) that the excavated earth masses will be accepted and used for the technical recultivation of a disturbed terrain (a quarry) in the land belonging to the nearby Devnya municipality – **Annex No.14 - *"Letter of Consent"*.**

A major issue to be resolved by the Contracting Authority will be the task of dumping dredge material. The possible alternatives are as follows:

- dumping at an on-land dumping yard;
- dumping at a dredge material dumping yard in the proximity of the territory;
- deep see dumping in the Black Sea;
- using the dredge material (or part thereof) for terrain leveling.

The first alternative is relatively possible if qualities of the dredged material are proven that allow for such dumping (moisture content, compaction ratio, environmental safety, etc.). There are no approved terrain recultivation projects (quarries) in the territory of the Devnya municipality that can possibly accept large volumes of bulk materials. This alternative has been discussed with representatives of the Basin Directorate for Water Management in the Black Sea Region (BDWMBSR) and the Regional Inspectorate of Environment and Waters (RIEW) Varna. For the implementation of this alternative, advance preparations of the dredged material should be made in order to achieve quality fit for dry dumping. This includes dewatering in a settling pond, testing of the material to prove the required qualities, etc. According to an expert appraisal, in parallel to the processes of dredging the investor may use part of its own terrain intended for the project implementation to prepare a temporary site for treatment (settlement) of dredged material. In this relation, the investor should apply the procedure required under *Ordinance No. 7 " on the Requirements to be met by the sites for deploying of waste treatment facilities* when determining the site. For the dredged materials thus processed, which meet the requirements for use in recultivation activities, there is a letter of consent for their acceptance.

The second alternative is practically unfeasible, as the accommodation capacity of the nearby dumping yard "Nalbanka" is fully exhausted.

The third alternative is practically feasible but is extremely economically disadvantageous. Nevertheless, it is outlined as the most acceptable one.

The fourth alternative has potential but only for relatively small quantities of the dredged material – around 15-20%.

Practically the impact on the elements of the environment in the case of Alternative 1 is the most insignificant and the investor will conduct the necessary procedures for its implementation when conducting the construction works.

Alternatives as to the technological sequence of handling various cargos and the technical support of the port with the necessary equipment

It is possible to select different alternatives of port mechanization that will vary in terms of production capacity, layout and elements. Based on preliminary studies from the point of view of environmental compliance and economic efficiency, a decision was made by the Investor that technical equipment will be used for the activities that would spare to the maximum the elements of the environment (enclosed conveyor systems and roofed storage of bulk cargoes, fully concrete-covered storage yards for all handled cargoes, etc.).

Main trends in the selection of technical means and technologies

The **Port - Logistics Terminal Varna** should be equipped with port mechanization and facilities, which allow for handling of the expected prospective flows of cargos, including containers, bulk cargoes inclusive of gain and general-purpose goods.

For the selection of the necessary technical means, an analysis was made of the condition and prospects for development of world ports and of the ports in the Varna region.

In principle, the main types of **dry cargoes** can be handled using:

- the reloading equipment available on the ships;
- electrical boom harbour bridge cranes;
- container and grab bucket bridge reloaders;
- mobile cranes.

In the development of the Layout Plan of the Port – Logistics Terminal Varna the handling of a ship by the reloading equipment available on the ship is accepted as possible only in exceptional and emergency cases.

Railway Cranes with bridge structure take less space on the wharf than mobile cranes, and also interfere less with the traffic on the wharf. Trucks/railway carriages can pass under them. In addition, railway cranes can be easily moved along the length of the ship, hence they usually achieve higher speed of unloading than mobile cranes.

Container and grab bucket bridge reloaders are expensive engineering equipment with high efficiency and cost recovery if used with stable large cargo flows of over one million and more tons turnover per year and over 100,000 TEU per year.

Multipurpose mobile cranes are more and more frequently used in ports all over the world in recent years. They can operate with a hook, grub bucket, spreader and electromagnet and in practice they handle all types of dry cargoes, including containers. They are very efficient in cases of cargo flows of relatively small and unstable volumes.

For the needs of the pre-investment study, the specifics of this relatively new type of port facilities were examined.

In the 1980-ies, a new direction of harbour crane engineering developed in the modern global practice – the construction of *mobile harbour cranes*. By means of electronic control of the systems, active dampening of the fluctuations of the load, diagnosing of all systems during operation, etc. is achieved. With equal technical characteristics the weight of the boom of mobile cranes is twice lower than the one of bridge cranes with an articulated four-bar linkage boom, which on its part reduces up to 30% the total weight of the crane, the inertia loading and power consumption of the mechanisms. The foremost advantage of these cranes is their mobility – the possibility to move them within the port territory where they are needed for a job and thus increasing their efficiency.

At many new terminals, mobile harbour cranes are the prevailing wharf equipment (Humber International Terminal – United Kingdom, Ambarli, Kumport and Hereke – Turkey). At big ports with sophisticated equipment, such as Odessa, Novorossiisk, Vostochny, Vannino, Tallinn, Yuzhny, existing and obsolete bridge cranes are replaced with mobile cranes manufactured by Liebcherr - Austria, Fantuzzi– Reggiane – Italy, Demag – Germany.

Mobile cranes are also used as backside logistics equipment.

The port harbour cranes currently manufactured have a Diesel–electrical or Diesel-hydraulic drive. Their loading capacity ranges from 20 to 120 tons, maximum useful radius of the boom – from 25 to 50 metres, the speed of the equipment approximates that of the bridge cranes. Control is computerized. They can operate with a hook, grab bucket spreader and electromagnet.

With regard to the disadvantages of port harbour cranes, we should mention the greater load on the pavement and the larger space needed for transferring from one work location to another.

Presently an array of harbour cranes of various types and prices are available at the market.

In recent years, Port Varna-West purchased two nos. new 100-ton mobile cranes from Gottwald, which are used very successfully for handling of containers, heavy loads (where two cranes are operating simultaneously) and bulk cargos using grub buckets.

After the analysis made, **THE USE OF MOBILE MULTIPURPOSE CRANES** is recommended for the needs of the Port – Logistics Terminal Varna.

Using mobile multipurpose cranes allows for:

- handling all considered cargoes as well as the anticipated types of ships;
- developing various technological schemes, both at the wharf front and at the backside.

Pneumatic mobile reloading machines – These are machines with a continuous operation, which have the advantages of the mobile belt reloading machines. They are manufactured in versions with various productivity rates, and allow for implementation of various technological routes, such as in wharf and backside reloading activities, without the need of stationary transportation systems to them. They can be used for direct unloading onto trucks and railway transport means with no need of setting up costly truck and railway loading and unloading stations specialized for other technologies. In comparison to other reloading equipment they are more energy consuming per ton of handled cargo and feature higher operation costs.

A machine for pneumatic handling is shown in the appendices.

Warehousing facilities – Grain cargo, such as wheat, maize, barley, etc. can be stored in silos or in roofed horizontal warehouses.

The silos feature comparatively high investment costs but require less space. With silos it is easier to separate batches for different clients and it is relatively easy to use a mobile belt conveyor system for transportation to the mobile loading equipment.

Roofed warehouses feature lower investment costs but need more ground area. Separation of batches is more difficult and requires different sites with retaining walls. Handling of the cargo from the warehouse requires the use of mobile equipment, such as wheeled truck loaders, which leads to higher operational costs.

Containers will be handled by using mobile multipurpose cranes. The experience of the ports in Varna and Burgas in operation with containers by 100-ton mobile cranes specifically shows that such type of equipment is not less efficient, particularly in terms of productivity and capabilities than the specialized container travelling bridge cranes. Furthermore, cranes with such load capacity enable handling of heavy and over-sized cargo, thus making the port competitive to the other ports in the area.

When handling containerized flows less than 100,000 TEU per annum, usually such machines as reach stackers and straddle carriers are used. In the case of containerized flows exceeding 100,000 TEU per annum more and more frequently backside logistic machines of the type RTG (rubber-tyred gantry) are used. These rubber-tyred machines do not require crane rails, and allow for more effective use of the port storage area – these are modern and reliable machines in operation.

Containerizing/decontainerizing will be carried out by using **forklift trucks** suitable for that purpose. They will be also used in handling of ordinary general cargo (pallets, packages, big bags) with the respective grip attachments.

Terminal tractors will be used for transportation of the containers from ships to the container storage facility and back. These are widely used machines – produced by various manufacturers, including Kalmar, Volvo, which are widely used in the ports of Varna region.

Front-end bucket loaders, which are also produced by many world reputed companies, such as Volvo, Bobcat, etc., are used for operation at the backside for handling bulk cargo.

The silos system for handling of bulk grain will have a positive impact on the development of the port. Absence of import and also the usually lesser volume of grain

imports determines the system of silos and rubber conveyor belts to the ship as one-way system. It makes it cheaper in terms of investment and easier for maintenance in operation.

On the other hand, the use of mobile cranes for reloading operation at the wharf allows for use of large tonnage capacity grab cranes, which will yield high productivity and reloading rates. This effect will also be intensified by the availability of sufficiently large open-air storage facility within the range of these cranes. In practice, bulk loads will not be carried back and forth around the port storage facilities, unless special care is required. Such a condition will be appealing to the clients of the port. If shipment of cargoes is performed by rail as well, part of the bulk cargo will also require inland transport, which has been taken into consideration in the General Layout.

There is a limit of the positive or negative impact of the equipment on the port. That limit is the ratio price/volume of work /number of machines. High number of machines for a small volume of work will increase the price of services. Cheap machines, in principle, means also less reliable ones, hence frequent idle time of the reloading process and poor reputation of the port. It is considered in port practice that the availability of two identical machines will ensure a trouble free operation of one technological line, and three such machines will ensure a trouble free operation of two technological lines. The selection of the number of similar type technological machines is performed on the basis of estimated cost and experience in the port management.

On the other hand, the availability of permanent technological lines, such as the silos and the respective rubber conveyor belts makes the estimation of the cost in advance easier from point of view of the one-off investment and everyday expenses for the equipment.

The methods for identifying the number of machines of similar type may differ and they may depend:

- on the available cash for investment
- on the available new models of equipment and judgment of their capabilities in the conditions of that port,
- on the objectives set to the management,
- on the up-to-date reloading norms in the Mediterranean and Black Sea regions,
- on other limitations.

The method, which will be based on up-to-date reloading norms is the most objective and could have a positive impact on the operation of the port. Here, the principle „the others + one degree", which means by one degree higher results than the competitors can be used.

The compactness of Port Logistics Terminal – Varna enables concentration of cargoes using identical type technological lines and machines or such with negligible difference of the types. This will inevitably lead to increase of their efficient use and good performance in operation. The layout of the container terminal on the site will help for the development of all its elements. This is a good advantage in comparison to other container-handling terminals. The containerizing and decontainerizing site will be a particularly

important element of the container terminal. It will be equipped with machines, which are used in this activity in accordance to the technologies for handling of "general cargoes". In this sense, the impact of these machines in terms of characteristics and quantity will be rather significant for whole port. The machines will be of the same type as the ones used for operation in the open-air and roofed storage facilities of the port. Uniformity of the type of the machines ensures good interchangeability and their easier and cheaper maintenance. This will also make easier the development to the required level of maintenance and repair facilities and spare parts store for minor repairs.

In order to meet the environmental requirements and the operation conditions laid down in the Specification, taking into consideration the comprehensive Marketing Assessment and Technical and Technological Analysis of the ports in Varna region at the level of pre-investment study it is recommended for the needs of Port Logistics Terminal – Varna that the following basic technological equipment should be used:

- Mobile cranes 100 t – 2 Nos.
- Reach stackers – 2 Nos.
- Diesel-driven forklift truck 8 t – 2 Nos.
- Telehandler – 4 Nos.
- Diesel-driven forklifts – 4 Nos.
- Tractors with trailers – 6 Nos.

For handling of grain cargoes:

- Setting up of silos yard – silo cells with volume x 2,000 m^3 – 14 Nos. with total volume 28000 m^3
- Loading on vessels should be performed by a specialized loader fitted with grain thrower for the underdeck spaces and connected with the silo cells by enclosed rubber belt conveyor.

No hazardous and liquid cargoes are envisaged for handling, which reduces dramatically and significantly the environmental risks.

Port Logistics Terminal – Varna will be gradually specialized for container handling, thus it will have the least negative impact on the environment.

The used new port mechanization, equipment and facilities will be with envisaged high criteria for protection of the environment.

The port technologies applied for handling of ships and inland transport means, as well as the storage facilities used will be in conformity with the contemporary requirements.

When handling bulk cargoes, various technological schemes will be compared and one of the main criteria for selecting the optimal version will be the possibility for protection of the environment. As early as now it is known that the option including use of grab technologies will be the least considered choice because of the difficult dust suppression and spilling out of the bulk cargo. Priority will be given to technologies using machines with continuous operation, such as pneumatic conveyors, or screw conveyors, enclosed belt conveyors, etc.

When hydro-engineering facilities are constructed (the wharf wall), modern, environment-friendly technologies, machines and equipment will be used.

During the construction and during the operation a wide use of exclusion booms will be made, thus preventing to a maximum degree any water contamination resulting from accidental oil and oil product spillages, and from other sources, and other floating polluters from vessels.

Alternatives of the length and construction of the wharf wall and the handled vessels

The main element, which determines the parameters of all other port areas is the berth space length. It will be constructed in two phases in accordance with the volumes of the expected types of cargo turnover and the main parameters of the estimated vessels. A detailed analysis of the vessels calling at the ports (basically Port Varna East and Port Varna West) in the area was made for the period 2001 – 2008 in order to determine the operational length of the berth space.Possible changes in the ships' traffic have also been taken into consideration. Taking into account the expected cargoes and the particular features of the vessels, various combinations of simultaneously handled vessels have been considered. Thus, having considered the required distances between the vessels, the alternatives of the operational length of the berth space were estimated. On the basis of dimensions of the vessels indicated above in the report and in accordance with vessel shipments, overall lengths of the berth space have been determined for the first and second phases.

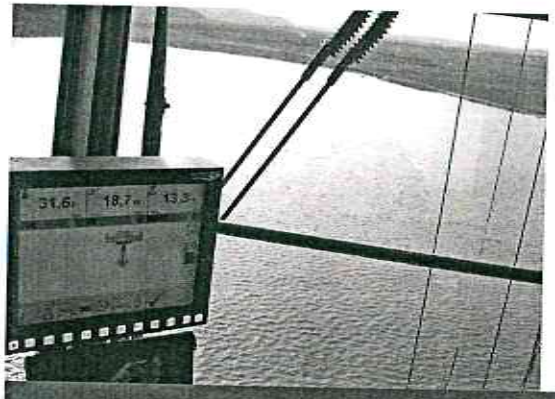
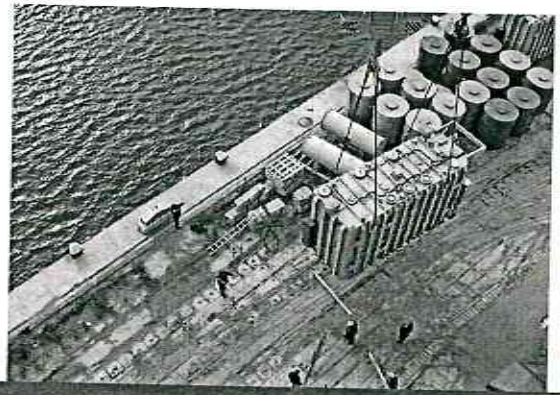
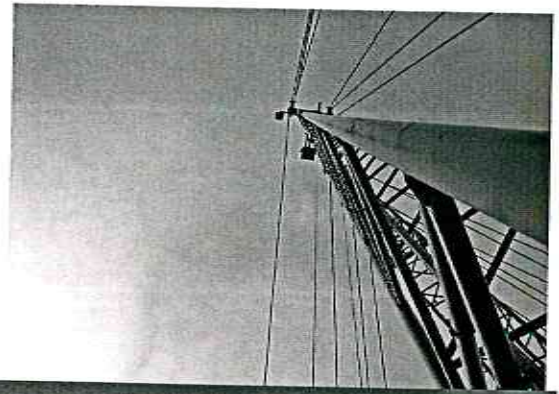
Lengths of the berth space, which will be constructed in the 1st phase were determined in accordance with the analyses – 300 linear metres and a possibility for construction of an additional berth space of 160 m in the 2nd phase, that is the port will have total 460 m berth front length.

In the pre-investment study and respectively in the Draft of the General Layout a review was made of the worldwide experience in construction of modern ports. At the same time, a very detailed analysis was made of the Bulgarian experience in construction of wharf structures, particularly in Varna region. Especially, the structure of the gravity wharf wall at Port Varna East, structure of wharf wall type Mall "A" at Port Varna East, structure of wharf wall type "prismatic cofferdam at Port Varna West, structure of gravity wharf wall at Port of Lessport, structure of gravity wharf wall at Port TETS-Ezerovo, structure of gravity wharf wall at Port Balchik were investigated.

The scope of the analysis covered the following technologies, which are most widely used in the port construction in accordance with the specific conditions and requirements:

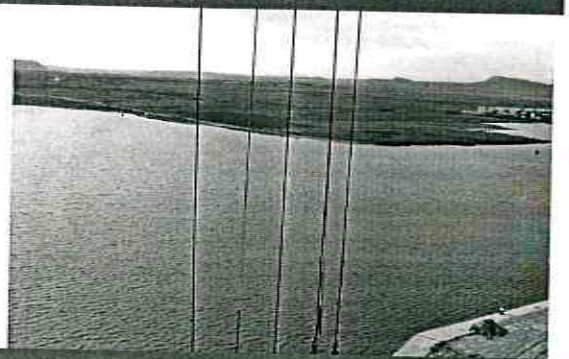
- Elevated pile foundation grille structure
- Cast-in-situ gravity wall
- Gravity wall of precast concrete blocks
- Concrete cofferdams
- Wharf of steel sheet piles
- Wharf of open cell sheet piles

The specific choice of the structure of the wharf wall is a key point in the construction and operation of the port it, and determines to a greatest degree the costs, that is the future competitiveness in performing of port services and activities.

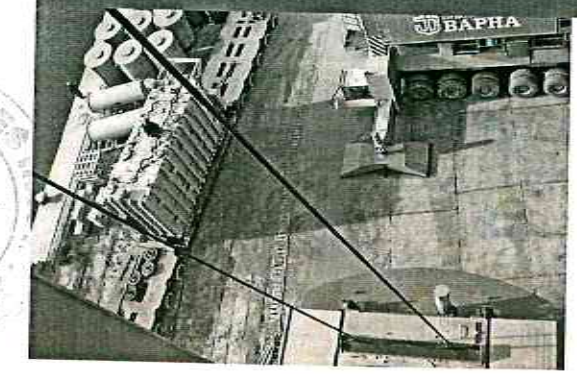




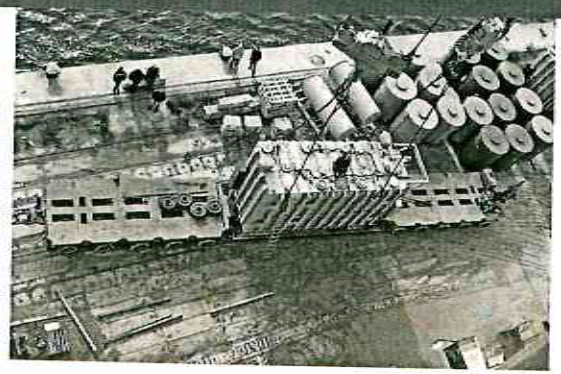
ОБРАБОТКА НА ТЕЖКИ ТОВАРИ





С ПОМОЩТА НА 2 КРАНА







ОБРАБОТКА НА ИЗВЪНГАБАРИТНИ ТОВАРИ
С ПОМОЩТА НА 2 КРАНА
ВАРНА

Handling of heavy cargoes by means of 2 cranes

Handling of oversized cargoes by means of 2 cranes

Usually in the operation of ports do not work hydro-engineers that constantly monitor the characteristics of the quay wall. Over time, these characteristics are changing though minimal, but at times their condition could become critical. Failure of a part of the quay wall takes out of operation the entire facility called port. It is therefore important to choose the type of quay wall, which will not cause problems in the coming decades.

In the draft Master Plan, in section 2.4. "HYDROTECHNICS", a) Structures, are discussed in detail and illustrated with text and graphics the versions as discussed above of the technology to build quay walls.

Below are listed the main conclusions from the comparison of advantages and disadvantages of the different technologies.

Comparison of alternatives is made based on the following factors:

- Capital costs;
- Confidence in the sustainability for continuous operation of loading;
- Requirement for economic construction;
- Ability of the structure to withstand occasional collisions without incurring damage whose repair is costly and/or disrupts port operations;
- Share of local materials and resources used in the construction;
- Ecological safety.

The advantages and disadvantages are summarized as follows:

• ***Pile structure with high grillage (Rostwerk)***

Advantages

- Low risk of fluctuations in soil layers/strength
- No differential settling of pavement

Disadvantages

- Relatively high costs
- The steel piles are subject to corrosion
- In case of concrete piles, durability may be an issue

• ***Gravity Wall - cast in place***

Advantages

- Efficient use of materials

Disadvantages

- Tough quality control of concrete, unless built on dry
- If you are building on dry, expensive and time-consuming temporary facilities are required
- Relatively high load on the ground base

• ***Gravity Wall - precast concrete blocks***

Advantages

- Better quality control is possible in the yard for pre-casting
- Concrete is effectively unreinforced; because of this, a very long project lifetime is possible

- Construction of the wall can develop in more than one position, allowing the achievement of desired program

Disadvantages

- Tough construction methods, i.e. dredging, soil improvement, foundation layer, pontoon cranes
- Difficulty in compensating for different heights of detention
- Relatively high pressures on the base (substrate), which may lead to a certain settling
- Requires tough soils at or around the foundation layer.

• ***Concrete caissons***

Advantages

- It is possible to better control the quality on the site for pre-casting
- Generally requires concrete reinforcement for load condition of flooding/ deployment. Therefore, the integrity of the structure is not so dependent on the durability of the concrete

Disadvantages

- Expensive temporary facilities are required
- Special construction techniques can discourage competitive bids from companies that have no prior experience
- Underwater work by divers for leveling of caissons is required
- Settling of caissons under dynamic loads is possible

• ***Wall of steel sheet piles***

Advantages

- Relatively low cost
- Rapid formation of the structure
- Easy to compensate for variations in soil layers/strength
- Ability to work both from the land and from the water

Disadvantages

- Requires effective corrosion protection to give a satisfactory design working life
- Requires reasonable soils, ideally granulated, all the way up. Weak soils are often scraped and replaced with sand or gravel in order to achieve this, provided that the weak soils are not too thick.

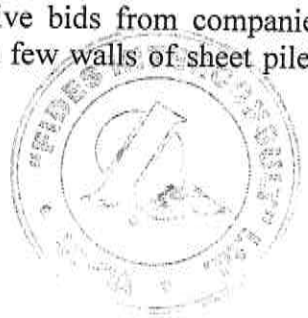
• ***Wall of sheet piles with open cells***

Advantages

- Easy to compensate for variations in soil layers

Disadvantages

- Difficult to protect against corrosion to give a satisfactory design working life
- Vulnerable to damage and difficult to repair
- Special construction techniques can discourage competitive bids from companies that have no prior experience, i.e. so far have been made only a few walls of sheet piles with open cells.



After the analysis and comparison of all known structures, numerous consultations with specialized construction companies and port specialists, the project consultants of the sponsor propose for the needs of "Port - Logistics Centre Varna" the use of *Quay wall with steel sheet piles with additional anchoring.*

Alternatives regarding the disposal of waste formed during construction – earth waste and dredging masses.

Alternative 1 - Disposal in underwater depot "Nalbanka". The alternative was rejected due to exhausted capacity;

Alternative 2 - Disposal in deepwater (12 nautical miles) - the alternative is supported by BDUV "Black Sea Region", but is associated with high transport costs;

Alternative 3 - Rehabilitation and restoration of the topography of the bottom (shelf) due to quarrying of concession areas in the region of Varna Lake. The alternative is acceptable, but it is limited by the amount of concession work-off subject to re-cultivation under the Law on Mineral Resources. Moreover, its realization requires the express consent of the concessionaire of the deposit, which at present is not available. The alternative is evolving in time and when there is an intention expressed by the investor for its implementation, further inquiries should be carried out;

Alternative 4 – Disposal on land (disposal in newly established landfills). Its implementation is related to the construction of special facilities (landfills) for dredge (sludge). Rigid administrative and procedural requirements applicable to that type of facilities makes them feasible with difficulty and practically economically unjustified for the purpose of investment, given the limited amount of dredging masses and tight deadlines for the implementation of the port complex;

Alternative 5 - Disposal on land (using existing dredge deposits). The only specialized facilities in a regional plan for the disposal of dredging masses are "Landfills 4^b and 4^c" of "Devnyainvest" JSC. Landfills are highly specialized and are used in maintaining and ensuring conduction of the Waterway (Navigation channel) 2. Given the limited amount of expected dredge, the alternative is acceptable for a single use of landfills. Its performance requires the express consent of the operator/owner of the landfills, which at present is not available. The alternative is evolving in time and when there is an intention expressed by the investor for its implementation, further inquiries should be carried out;

Alternative 6 - Pre-treatment (dehydration and stabilization) of dredging masses on the territory of the investment intentions. The alternative is related to the creation of an opportunity for treatment of dredging masses of landfills for inert or non-hazardous waste, as well as restoration of the landscape (land restoration). The alternative is acceptable but it is associated with high investment costs.

Considering the alternative solutions, practically feasible are alternatives No. 2 and No. 6, more ecologically robust alternative is the alternative of disposal in deepwater (12 nautical miles) in a depot - a circle with a diameter of 500 m and a centre with coordinates 43°08,020' N and 28° 12,727' E - alternative No. 2. Also feasible is the disposal on land given the composition and nature of dredging masses - alternative No. 6. Both alternative solutions are acceptable and agreed with the representatives of BDUV - Varna. The investor accepts the following alternatives:

- Disposal of excavated ground spoil in a depot on land on the basis of the written consent of "Drum Group" Ltd., adopting to receive the generated quantities of ground spoils on contaminated site in the locality "Vrashnika" in Devnya Municipality for technical re-cultivation;

- Disposal of dredging masses in deepwater depot - a circle with a diameter of 500 m and a centre with coordinates 43°08,020' N and 28° 12,727' E (12 nautical miles from the shore).

Zero alternative.

The zero alternative, according to an expert evaluation, is not unquestionably more ecological, considering the following:

- Existing sites are in use to date and their status is intended for industrial activity;
- At the site there is no vegetation in good condition, the latter being a serious value;
- There is a real danger parts of the territory to be used for illegal dumps;
- At present this site is a bare area and it is unacceptable not to use rationally the owned asset (location and technical capabilities, infrastructure).

Maintaining the zero alternative leads to maintaining the current, not very visually appealing pitch. According to forecast, the implementation of the investment plan is expected to improve the environment in general territorial aspect - the terrain will be cleared, landscaping activities will be implemented, organization will be created in the movement of vehicles.

The zero alternative would maintain the current status and environmental parameters.

V. MEASURES AND ACTIVITIES, ENVISAGED TO PREVENT, REDUCE OR ELIMINATE THE EXPECTED SIGNIFICANT ADVERSE EFFECTS AND PLAN FOR THEIR IMPLEMENTATION

Significance of effects (direct, indirect, secondary, cumulative, short-term, medium - and long-term, permanent and temporary, reversible, positive and negative) on the estimated components and factors

Table No.5.1

No.	*Components*	*Effects*										
		direct	indirect	secondary	cumulative	short-term	medium-term	long-term	permanent	temporary	positive	negative
1.	Aatmospheric air		◆						◆	◆		◆
2.	Surface water	◆			◆	◆				◆		◆
3.	Groundwater		◆	◆		◆						
4.	Land and soil		◆			◆				◆		
5.	Geological base and subsoil	◆						◆	◆			◆
6.	Landscape	◆							◆			
9.	Biological diversity	◆							◆			◆
10.	Cultural heritage											
11.	Waste		◆		◆	◆				◆		◆
12.	Harmful physical factors								◆			◆
13.	Public health	◆						◆				◆
14.	Occupational health	◆								◆		◆

[1] – *for realization of an open option for storage of bulk cargo*

Description of the measures envisaged to prevent, reduce and where possible cease any significant adverse environmental impacts, and plan for implementation of these measures

• Measures concerning Investment Design

1. In order to maintain the purity of the air in Project assignments on the part OV (heating and ventilation) shall be explored the possibilities of applying the following restrictive conditions: use of air-conditioning and solar energy with high efficiency, automatic shutdown of heating and air conditioning when windows are open, timers for automatic control, not using as a source of energy fuel oil and coal with sulphur content exceeding 0.2 %, not using banned by the Montreal Protocol of 1987 refrigerants for refrigeration and air conditioning systems (*PMS No. 266 dated 29.12.1995 and warrant RD 35 dated 26.04.1996 of MOS*), etc.

2. Development of the territory shall be carried out in accordance with the regulations concerning the requirements for parameters of building and landscaping.

3. Site location shall be agreed with the authorities of the Ministry of Health – RIOKOZ-Varna.

4. Development of the territory shall respect the need to develop a program to compensate for the destroyed green mass (regardless of its minor value) based on its oxygen productivity. The acceptance of the site shall provide verification of the implementation of the compensation program for the site and the preserved vegetation in place, according to the preliminary picture.

5. The draft for excavation works and vertical planning shall comply with the requirements of Ordinance No. 26, where there is a humus layer, the humus shall be collected at a temporary depot and returned for re-cultivation in the green areas of the site. The landfill may be located in the most eastern part of the site, near the service road, on land not occupied by long-term tree vegetation and foreseen as the last stage of execution. Restrictive conditions for the depot are: height of layers for disposal up to 6 m, slopes of the landfill 3:1.

6. Design solutions on the part ViK (water supply and sanitation) shall comply with the requirements of the regulations for water (Law on Water, Ordinance No. 3/2000, Ordinance No. 6/2001, Ordinance No. 8/2002 and Ordinance No. 10/2001), discussed in the report.

7. For all capital buildings and facilities located on sloping terrain (slopes) shall be conducted studies of the general and local stability in the natural state, in the construction period and during operation, based on detailed engineering-geological studies and in accordance with the requirements of the regulations. In case of insufficient stability first shall be provided and implemented appropriate anti-landslide facilities and measures (so called engineering preparation of the territory). Buildings and communications (infrastructure) shall be considered as a whole in terms of the reflection they give on the sustainability of the slope and in terms of the impact that accidents in individual facilities would have on the stability of the massif under investigation.

8. All buildings and facilities shall be designed according to the requirements of the *Standards for design of buildings and structures in seismic areas* and if necessary, by engineering judgment to specify more precisely the regulatory seismic coefficient Kc = 0.27 using geophysical surveys.

9. The sewage and water supply diversions from the network shall be designed and executed without allowing leaks.

10. A set of drainage facilities and other activities of the engineering preparation of endangered areas shall be designed and implemented in order to avoid an increase in the level of groundwater. In deep trenches and in the presence of shallow groundwater shall be compulsory to

provide solutions for the execution of excavations and possibly for strengthening the walls of the pit.

11. In case of different vertical loads and heterogeneous ground base or different depth and type of foundation, shall be foreseen deformation (expansion) joints to compensate for uneven settlement in accordance with the standards for the design of flat foundations.

12. Already at this stage the investor shall clarify the location of the landfill where are to be disposed dredging masses from digging to build the quay wall.

13. During the development of the detailed design of infrastructure shall be taken into account the boundaries of the adjacent protected areas to the sites and monuments of culture and their protection zones and measures shall be provided for conservation of local ecosystems and habitats.

14. Given the planned landscaping, selection shall be imposed of tree and shrub species, and native species shall be used in order to prevent invasion of foreign and/or non-native plant species in the region.

15. A specific engineering-geological survey shall be performed and a geotechnical report shall be prepared;

16. The borders of the IP site with the water body shall be demarcated according to the requirements and procedures of Article 155, Paragraph 1, Point 1 of the Law on Water;

17. A thorough feasibility study shall be performed for final selection of the technological system for management of dredging masses based on prioritized technological options (alternatives 2 and 6).

• Measures concerning the construction of the facility

1. In the period from March 15 to June 25 shall be limited the construction works related to the felling of trees and the reconstruction of the green system. In the breeding season and during the spring and autumn migration of birds, construction works shall be limited; operations involving heavy construction machinery shall not be carried out, as these will compromise the formation of couples, breeding, incubation of eggs and rearing.

2. If necessary at the discretion of the municipal authorities construction works shall be limited during the active season.

3. Construction shall be performed based on the developed by the contractor and approved by the competent authorities RPOIS including mandatory measures to protect the environment during the construction period (dust protection irrigation, working with regulated internal combustion engines, covered transport of dust emitting materials, filling of fuels and lubricating materials on protected sites, etc.).

4. All earthworks must be carried out in accordance with the statutory requirements to be reflected in the projects concerning the organization and execution of construction works. Particular attention shall be paid to: minimizing the volume of earthworks (shortcuts and embankments), water discharge and lowering of groundwater level (pitched security ditches, water-drainage ditches, drainage), execution of excavation works in short terms, in sections and during the dry season, turfing and grassing of permanent slopes, construction of berms and terraces with height of the slope over 6 m, placement of waterproof sidewalks around buildings, etc.;

5. Construction waste and dredging masses shall be deposited only to regulated landfills;

6. Upon discovery during construction activities of cultural and historical layers and artefacts, the activity shall be discontinued and the respective unit of the National Institute of Monuments of Culture shall be promptly notified.

7. A noise and dust protection green belt shall be designed and built in the northwest corner of the field. Green areas with horizontal and vertical landscaping shall be provided and maintained;

8. During the construction of the quay wall shall be used advanced technology, modern machinery and the aquatory of the object shall be isolated with bonds enclosures;

9. Port area, port open storage areas and roads within the port shall have a smooth pavement, allowing periodic washing and preventing the formation and emission of dust;

10. Vehicles that will be used during construction shall move at restricted speed of 30 km/h to in order *not to threaten* single specimens of representatives of the animal world.

11. Around the site for open storage of bulk goods shall be built storm sewers in order to avoid free-flowing secondary polluted water.

12. A facility for the precipitation of mineral impurities from surface waters shall be built prior to their inclusion in the water body "Beloslavsko Lake".

13. Dredging activities shall not take place during the summer season when water at the bottom has a low content of dissolved oxygen.

14. Covered warehouses shall be provided for the storage of bulk cargo.

15. At least 50 m spacing shall be provided between indoor warehouses for bulk goods and silos;

16. A system for safe storage of construction waste on the territory of site shall be organized, including the provision of containers for specific wastes;

17. Where technically feasible, generated waste shall be transferred promptly for transport or subsequent treatment;

18. During discharge/disposal of dredging masses (alternative 2) the optimum working depth of the facilities shall be observed;

19. Creation of significant turbulent vortices in the area of the bottom valves (alternative 2) shall be avoided;

20. Additional anti-sediment curtain in the area of underwater disposal shall be used to limit the adverse effects of the discharge of dredge material (alternative 2);

21. Damage to adjacent soil shall be avoided - swamping during dredging sludge dewatering (alternative 6);

22. Proper drainage and discharge of drained water shall be avoided (alternative 6);

23. Cross contamination shall be avoided, including increase in the turbidity of the water body in the area of insertion of drainage water (alternative 6).

• Measures concerning the operation of the complex

1. Waste collection in accordance with regulatory requirements shall be organized and a system for separate collection of waste shall be implemented. A plan for acceptance of waste from shipping activities shall be developed and coordinated with the relevant authorities, for the acceptance of waste from shipping activities and appropriate reception facilities shall be provided as required by the Convention "MARPOL".

2. In the establishments for public catering shall be installed grease traps and the used fat shall be collected and disposed of in an appropriate way.

3. Smoking ban shall be introduced throughout the complex with the exception of certain areas.

4. The maintenance of green areas shall be carried out without the use of pesticides or according to the principles of organic production as defined by Ordinance No. 22/2001 *on biological production of plants, plant products and foodstuffs of plant origin and its indication on them* (DV 68/2001).

5. The possibilities and modalities shall be examined to include (registrate) in the *National scheme for environmental management and audit* by creating and maintaining a *System of environmental management* in accordance with the requirements of BDS EN ISO 14001:1996 (*Ordinance on the National scheme for environmental management and audit* /DV 26/2003/) or the Scheme of the European Union for management and audit of the environment (EMAS).

6. In the establishments, which generate certain types of hazardous waste shall be provided and equipped rooms and containers for their temporary storage.

7. To reduce the use of potable water, for irrigation shall be used lake waters.

8. For the transfer of waste during construction and operation shall be concluded contracts with authorized firms for the activities (especially for hazardous waste);

9. Port equipment shall meet environmental requirements and shall make use of technology options with low dustiness and emissions;

10. The port staff shall be trained to carry out regular training exercises to prevent and/or remove the effects of pollution in port areas and used marine areas;

11. The port shall be equipped with the necessary means for prevention, control and removal of spills of dangerous substances and spillage of cargo in the used aquatory of the lake.

Plan on the implementation of the above measures, contained in Annex No. 15

VI. INFORMATION ABOUT THE APPLIED METHODS FOR PREDICTION AND ASSESSMENT OF THE ENVIRONMENTAL IMPACT

The following methods for prediction and assessment of the environmental impacts have been used in the present report:

1. Rapid Inventory Techniques in Environmental Pollution, World Health Organization, Geneva, 1993.
2. Odum, U., Ecology, M, Mir, 1985, volume 2
3. Norms for designing buildings and facilities in seismological regions, Sofia University and Bulgarian Academy of Sciences (BAS), Sofia, 1987.
4. Geological threats in Bulgaria – map in scale M 1:500 000, Geology Institute with BAS, edited by I. Brouchev, 1994.
5. Regulation No. 1 on geoprotection, SG No. 12, 1994.
6. Regulation No. 1 on design of flat foundations, Construction and Architecture Bulletin No. 10, 1996.
7. Regulations on acceptance of foundation beds and foundations, Construction and Architecture Bulletin No. 6, 1985.
8. Regulations on the acceptance of soil activities and facilities, Construction and Architecture Bulletin No. 6, 1988.
9. Baloushev, B. et al, Soil mechanics, S., 1971.
10. Handbook on water engineering, volume 1, S., 1979.
11. Prediction of ecological processes, Collection, Novosibirsk, 1986.

12. Kanev, D., Geomorphology of Bulgaria, S., 1989.
13. Theoretical foundations and experience in environmental monitoring, M., Naouka [Science], 1983.
14. Totev, Iv., Ecology and environment protection, S., 2000.
15. Assessment of the health risk, Tsonevski, D. et al, Hygiene, S., 1991.
16. Practical guide to environmental impact assessment (prof. W. McAlister, S., 2001).
17. Classifier of soils in Bulgaria.
18. Classifier of landscapes, according to the Bulgarian State Standard.
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20. Methods of the University of Forestry for aesthetic landscape assessment of territories.
21. Reference book for planning of the engineering preparation of territory development, Kiev, 1983.
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23. Bezhkov, V., 1993, Amphibian and reptilian. National strategy for biological diversity protection. Main reports, volume 2. Programme on biological diversity maintenance, S., 567-584.
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28. Michev, T., P. Yankov, 1993, Ornithofauna. National strategy for biological diversity protection. Main reports, volume 2. Programme on biological diversity protection, S., 585-614.
29. Peshev, T., 1978, Mammals, collection, Black Sea, G. Bakalov publishing house, Varna, p. 218.
30. Popov, V., K. Mishev, Geomorphology of the Bulgarian Black Sea coast and shelf, BAS, 1974.
31. Simeonov, S, 1978, Birds, collection, Black Sea, G. Bakalov publishing house, Varna, p. 218.
32. Spiridonov, Z., N. Spassov, 1993, Big mammals. National strategy for biological diversity protection. Main reports, volume 2. Programme on biological diversity protection, S., 645-663.
33. Ministry of Construction and Architecture (MCA), Ministry of Public Health (MPH), Methods for measurement and assessment of the noise in settlements, 1975.
34. Internal departmental methodology IAOSLAD No. 70 1/S, Determination of the overall sound power levels in the environment emitted by an industrial undertaking and determination of the level of noise at the site of impact, S., 2002.
35. Methods for the development of noise maps of settlements (approved by MCA and MPH in 1975).

VII. REPORT ON THE CONSULTATIONS CARRIED OUT AND THE MOTIVES FOR ACCEPTANCE OR NON-ACCEPTANCE OF REMARKS AND RECOMMENDATIONS

In the course of pre-investment studies, the Investor has defined the interested organizations and conducts consultations regarding the implementation of the investment proposal. The following parties have been informed of the Investor's intentions:

- Ministry of Environment and Water (MEW), Sofia;
- Ministry of Transport;
- Ministry of Health;
- Beloslav Municipality;

- Regional Inspectorate of Public Health Protection and Control (RIPHPC), Varna;
- E.ON Bulgaria;
- Regional Inspectorate of Environment and Water (RIEW), Varna;
- Basin Directorate for Water Management in Black Sea Region, Varna;
- Water Supply and Sewerage Company, Varna;
- History Museum;
- Bulgarian Society for Protection of Birds (BSPB);
- Maritime Administration;
- Varna Regional Directorate of the Interior;
- Bulgargaz

After the presentation of the investment proposal and consultations with the above structures, the Investor was served with coordinating documents, opinions and permits for the respective activities, related to the implementation of the proposal, **Annex No. 16, *Correspondence with institutions and organizations***.

The holding of consultations and the recording of the results thereof is carried out in accordance with the requirements of Chapter 3 of the ***Regulation on the terms and procedure for environmental impact assessment of the investment proposals for construction, activities and technologies.*** Inquiries have been drafted and sent to the respective interested parties. Visits of certain departments have been made. The results of the consultations, organized by the Investor and the experts on environmental impact assessment (EIA) have been handled and presented in the following table:

Consultations with competent authorities and interested parties

Consultations with municipal authorities, departments and organizations	Expressed opinions, recommendations and remarks	Accepted/non-accepted	Motives
MEW Sofia	1. Asked about the applicable procedure of the Environment Protection Act (EPA), MEW points out that there are two possibilities: - To consider the investment initiative as an investment proposal (falling within the scope of item 23 of Annex No. 1 to EPA) and subject to mandatory EIA. - If the investor envisages to present the initiative as a master plan, it is possible to apply the environmental assessment procedure (Article 85 (1) of EPA and Annex No. 2 to the Regulation on the performance of environmental assessment). 2. Ensuring the development of terms of reference for the scope and content of the EIA report; 3. Holding of consultations with controlling authorities, municipal bodies, etc. 4. Informing the municipality and the population about the investment proposal. 5. The EIA report should consider the investment proposal for the whole proposal; 6. An assessment of the compatibility with the object of protection of the protected areas should be made jointly with the EIA report.	The Investor has accepted all recommendations of the controlling authority by accepting the EIA procedure and fulfilling the MEW instructions.	The recommendations are in compliance with the statutory legislation.
RIEW Varna	1. Asked about consultations, recommended by MEW in connection with the drafting of the EIA report, the controlling authority has recommended the following: - To draft a detailed characteristic of the investment proposal regarding the port facilities for the handling of different cargo; - To consider in detail the impact on the ambient air with a view to the problems with its quality in the region under review; - To consider the impact on water and water facilities from the implementation of the investment proposal; - To consider alternative solutions for the activities with the waste generated during construction (dredged material) - To assess the compatibility with the object of protection of the protected areas shoould be made jointly with the EIA report;	All motives and recommendations pointed out in the RIEW Decision, outgoing ref. No. 4665/17.11.09 are recorded in the EIA report.	The recommendations are in compliance with the statutory legislation.

	- To assess the expected noise pollution from the implementation and operation of the investment proposal; - To hold consultations with the Health Ministry regarding compliance with the sanitary security zones.		
Electricity Distribution Company, Varna	An agreement has been expressed and conditions recommended for accession to the power grid. An underground pipe electricity network was built on the basis of a project; it has been accepted and authorization for its operation – granted.	The facilities is connected to the national electricity distribution network	----------
Water supply and sewerage	The water supply of the plots is based on a project and Building Permit No. 60/23.10.2007 and Use Permit No. DK-07-412/12.12.2008 have been issued for this purpose.	----------	----------
Beloslav Municipality	Issued construction decisions, coordinating documents, etc; opinions, stands or objections have not been submitted so far	All statutory requirements will be fulfilled.	----------
National Institute of Monuments of Culture with the Culture Ministry	Opinions, stands or objections on the part of the controlling authority regarding the nature of the investment intention.	Does not express an opinion.	----------
BSBP	Opinions, stands or objections on the part of the controlling authority regarding the nature of the investment intention.	Opinions, stands or objections have not been submitted so far	----------
RIPHPC	The authority will pronounce itself regarding the requirements of Regulation No. 7 on sanitary security zones upon presentation of the final development plans.	The sites will be coordinated following a decision on EIA and submission of a detailed development plan – regulation and building-development plan	----------
Basin Directorate for Water Management, Varna	After an inquiry for consultations about the drafting of the EIA report, the Directorate recommends: - The water supply of the site by the water supply and sewerage system and the drainage of the waste waters should be based on a contract; - The EIA report should cover the issue of the disposal of dredged material in the specified depots; - The borders between site of the investment proposal and the water site should be determined under item 1 of Article 155 (1) of the Waters Act	All motives and recommendations of the Directorate have been recorded in the EIA report	The recommendations are in compliance with the statutory legislation
Maritime Administration	Opinions, stands or objections of the controlling authority regarding the nature of the investment intention	Opinions, stands or objections have not been submitted so far.	----------
Regional Directorate of the Interior, Varna	The Regional Directorate of the Interior, Varna, voices an opinion regarding its powers related to the legal and procedural documents by Letter, outgoing ref. No. G-600/26.09.09. An opinion has been expressed that the authority coordinates the relevant documents in their draft version in accordance with the requirements of the Spatial Development Act. There is no established form of coordinating at the level of pre-investment studies.	At the level of working design and during the subsequent stages, the investor's actions will be coordinated with the Directorate.	----------
Transport Ministry	No opinions, stands or recommendations on the project implementation have been received so far.	-----	----------
Health Ministry	No opinions, stands or recommendations on the project implementation have been received so far.	-----	----------
Bulgargaz	No opinions, stands or recommendations on the project implementation have been received so far.	-----	----------

The local population has been informed through written announcements in the Municipality and the Mayor's Office.

The replies submitted so far do not contain negative opinions or stands regarding the implementation of the investment proposal. No negative public attitude towards the construction of the site in the given region has been established.

After the submission of the investment proposal and the consultations with the above pointed departments and organizations, the Investor has not received opinions and stands to be taken into consideration in the present terms of reference. Any negative public attitudes towards the idea of establishing of **PORT – LOGISTIC CENTRE VARNA** in the designated region have not been identified either.

So far the investor's actions have been complied with the procedures of the pre-investment studies stage. The specialized authorities and the population have not expressed

negative opinions and there are not legally motivated objections to the implementation of the investment proposal.

VIII. EXPERTS' CONCLUSION

In conclusion, taking into account the need of rational use of the territory, the specific non-production nature of the investment proposal and its overall insignificant effect on the components of the environment and the population during the construction period and at normal operation, while implementing the measures proposed under Section V, and, also, taking into account the compliance of the investment initiative with the legal requirements and the potential of the environment to bear the predicted impacts, **we propose to the RESPECTED HIGHER EXPERT ECOLOGICAL COUNCIL with MEW, Sofia, to approve the implementation of the investment proposal on the grounds of Article 99 (2) of the Environment Protection Act and Article 19 (1) of the Regulation on the terms and procedure for environmental impact assessment of the investment proposals for construction, activities and technologies under the terms, pointed out in Section 5 of the present report.**

IX. NON-TECHNICAL SUMMARY (IN ACCORDANCE WITH THE REQUIREMENTS OF THE ENVIRONMENT PROTECTION ACT, §1, ITEM 27 AND THE ORDINANCE – ARTICLE 12 (2))

The annexes contain a non-technical summary of the report on EIA of the investment proposal, **Annex No. 17.**

X. DESCRIPTION OF THE DIFFICULTIES IN COLLECTING INFORMATION FOR THE DRAFTING OF THE EIA REPORT

Certain departments neglected the letters of the Investor and the team having drafted the present report related to the collection of the information needed for EIA.

Apart from the lack of responsiveness on the part of some institutions, other difficulties regarding the collection of information were related to the fact that it was scatted in different organizations and departments, which prolonged the time needed for its collection. There is certain lack of coordination between the different departments. In most cases, the information is in a raw state, inadequate and non-representative for the purposes of the scientifically based analysis. At places, there is a lack of a general basis of representative data for most components and factors of the environment. In many cases, the information collected by the divisions of the central departments is submitted to the latter for storage without any feedback, which makes correspondence more complicated and expensive. Besides, the prevailing part of the information is not in an electronic form, which impedes its handling. It is also important to note that the term for the provision of information is prolonged by different bureaucratic procedures. This has an adverse impact on the investment process being rather dynamic and having much accelerated pace compared to the administrative procedures.

XI. LIST OF THE SOURCES OF INFORMATION USED IN THE EIA REPORT

1. Preliminary development-project design of the investment proposal;
2. Documents on ownership of the lots;
3. Opinions of competent authorities;
4. Plats of the lots;
5. Bulletins on the condition of the environment in the Republic of Bulgaria;
6. Report on the condition of the environment in the regions of Varna and Dobrich in 2001, Varna, RIEW.
7. Climatic reference book of the People's Republic of Bulgaria, volume III/1983, volume IV/1984.

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Kanev D., Geomorphology of Bulgaria, 1989.
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29. Kozhouharov, S. (edit.), 1992, Guide to higher plants in Bulgaria, S., Naouka & Izkoustvo [Science & Arts], p. 787.
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59. Regulation No. 6 of the Health Ministry and the Ministry of Environment and Water on the indicators of noise in the environment measuring the level of discomfort during different periods of the day, the limit values of the noise in the environment, the methods of assessment of the indicators of noise and the harmful effect of noise on people's health (SG No. 58/2006).

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in the water territory of Flotski Arsenal shipyard, Investor: Flotski Arsenal shipyard, 1995.

80. EIA report about a site of Belopal EAD, Investor: Belopal EAD, 1997.

81. EIA report about a project of Transstroy on the extension of the Western Wharf in the Ezerovo Village for ship construction activity, Investor: Transstroy-Delfin 1 OOD shipyard, 1996.

82. EIA report about a site, Metal Processing Workshop of Transins EOOD, Beloslav, 1996.

83. Waste management programme of the Beloslav Municipality.

84. Action plan on improvement of the quality of the ambient air in the Devnya Municipality, 2008-2013.

85. PROGRAMME on reducing the level of polluters in ambient air and reaching established norms for harmful substances in the Devnya Municipality, 2008

86. PROGRAMME on environment protection in the Beloslav Municipality

87. EIA report about a project on a fuelling station and a gas station in quarter 19, Beloslav town, Investor: Castel Oil OOD, 2000.

88. EIA report about a project on an exploration and extraction licence 91-III Galata, Investor: PETREKO SARL, 1998.

89. Annex to an EIA report on the development of the Galata deposit, new sector of the Beloslav-Provadia gas pipeline, Investor: Petreko Sarl, 2000.

90. EIA report about a site, Solvey Sodi AD, Investor: Solvey Sodi AD, 1999.

91. EIA report about a project on the extension of a phosphoplaster of Agropolichim AD, Investor: Agropolichim AD, 1999.

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105. EIA report about a project on the updating of the Master Plan of Varna Port EAD by 2020. Investor: Varna Port EAD, 1999.

106. Programme on the quality of the ambient air of the Beloslav Municipality, 2009.

XII. LIST OF THE LEGAL DOCUMENT REGARDING THE INVESTMENT PROPOSAL AND THE EIA REPORT

1. Environment Protection Act.
2. Regulation on the terms and procedure of conducting an environmental impact assessment of investment proposals of construction, activities and technologies.
3. Regulation for a National scheme for environment management and auditing
4. Biological Diversity Act
5. Act on Protection of *Air, Water and* Soil from Pollution
6. Implementing Regulations of the Act on Protection of Air, Water and Soil from Pollution
7. Spatial Development Act
8. Regulation No2/2003 on commissioning of construction works in the Republic of Bulgaria and minimum warranty terms for performed construction and installation works, facilities and construction sites
9. Regulation No7/2003 on rules and norms for development of the separate types of territories and planning zones
10. Regulation No4/2001 on the scope and content of investment projects
11. Regulation on the terms for setting and imposing of sanctions in case of damaging or polluting the environment above permissible levels
12. Energy Efficiency Act
13. Council of Ministers' Decree No. 18/ 23.01.1998 and Rules of organization and activities for prevention and liquidation of the consequences of disasters, accidents and catastrophes
14. Regulation No2, Fire safety construction and technical norms
15. Regulation No 2/ 1995 on rules and norms for territorial spatial planning of the Black Sea coast
16. Regulation No 7/1992 on the hygiene requirements for health protection of urban environment
17. Ambient Air Protection Act
18. Regulation No 7/1999 on assessment and management of the quality of the ambient air
19. Regulation No7/2003 on the norms of admissible emissions of volatile organic substances emitted in the ambient air as a result of the use of solvents in certain plants
20. Regulation No 8/1999 on the norms of ozone in the ambient air
21. Regulation No 9/1999 on the norms of sulphur dioxide, nitrogen dioxide, fine particulate matter and lead in the ambient air
22. Regulation No13/2003 on workers' protection from the risks related to chemical agents at work
23. Regulation No 14/1997 on the norms of admissible levels of harmful substances in the ambient air in settlements
24. Regulation No 16/1999 on reducing the emissions of volatile organic substances in the storage, loading or discharge and transportation of petrol
25. Regulation No 17/1999 on norms for the content of lead, sulphur and other environment pollutants in fuels
26. Council of Ministers' Decree No. 254/30.12.1999 on control and management of ozone depleting substances and Ordinance on the exercise of control and management of ozone depleting substances
27. Waters Act
28. Regulation No 3/2000 on the terms and procedure for design, approval and operation of sanitary security zones around water sources and facilities for water supply and around sources of mineral waters used for healing, prophylactic, drinking and hygiene purposes
29. Regulation No 7/1986 on indicators and norms for determining the quality of running surface waters

30. Regulation No. 11/2002 on the quality of bathing waters
31. Agricultural Land Protection Act
32. Implementing Regulations of the Agricultural Land Protection Act
33. Regulation No 3/ 1979 on the norms regarding the admissible content of harmful substances in the soil
34. Dutch Standards for soils and underground waters.
35. Regulation No 26/1996 on recultivation disrupted terrains, improvement of low-yielding lands, removal and utilization of the humus layer
36. Instruction No. 2/2000 on fighting erosion
37. Regulation on the categorization of agricultural lands in case of change of their designation
38. Regulation No1/1994 on geoprotection activity
39. Regulation No12/2001 on the design of geoprotection construction works, buildings and facilities in landslide regions
40. Regulation No1/1996 on the design of flat foundation
41. Norms for the design of pilot foundation
42. Norms on the design of buildings and facilities in seismic regions (1987, SG 6/1989).
43. Regulations on the acceptance of soil activities and facilities
44. Instructions on performance and acceptance of soil works in landslide regions
45. Waste Management Act
46. Regulation No3/2004 on the classification of waste
47. Protected Areas Act
48. Regulation No4/1980 on buffer zones around wildlife reserves
49. Plant Protection Act
50. Healing Plants Act
51. Regulation No1/1993 on the protection of green areas and ornamental plants
52. The Agreement on the Conservation of African-Eurasian Migratory Waterbirds
53. Convention on the Conservation of European Wildlife and Natural Habitats
54. Health Act
55. Regulation No 4/1999 on the protection of settlements against noise
56. Regulation No 6 of the Ministry of Labour and Social Policy and the Health Ministry on the minimum requirements for the provision of health and safety requirements regarding the exposure of workers to the risks arising from noise
57. Regulation No. 6 of the Health Ministry and the Ministry of Environment and Water on the indicators of noise in the environment measuring the level of discomfort during different periods of the day, the limit values of the noise in the environment, the methods of assessment of the indicators of noise and the harmful effect of noise on people's health
58. Norms on designing protection against noise
59. Regulation No. 9/1991 on the admissible levels of electromagnetic fields in urban territories and determining sanitary security zones around emitting sites
60. Monuments of Culture and Museums Act
61. Regulation No. 2/2004 on the minimum requirements for occupational health and safety during construction and installation works
62. Regulation No. 7/1999 on the minimum health and safety requirements at work for the workplace and for the use of work equipment
63. Occupational Health and Safety Act
64. Protection against Noise in the Environment Act
65. BDS 12.1.012-80, Occupational safety. Vibrations. General requirements for safety at work.
66. BDS ISO 1999:2004, Acoustics - Determination of occupational noise exposure and estimation of noise-induced hearing impairment.
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69. Norms on the design of hydro-technical construction. Fundamentals, Construction and Architecture Bulletin 11, 1985.

70. BDS 17.1.1.02. Environment protection. Hydrosphere. Water quality indicators. Terms and definitions.

71. BDS 17.1.3.08. Environment protection. Hydrosphere. General requirements to the protection of surface and underground waters from pollution upon transportation of oil and oil products by road.

73. BDS 17.1.3.05. Environment protection. Hydrosphere. General requirements for the protection of surface waters from pollution.

72. BDS 17.1.3.01. Environment protection. Hydrosphere. General requirements for the protection of surface and underground waters from pollution with oil and oil products.

73. BDS 17.1.3.02. Environment protection. Hydrosphere. Requirements for the protection of surface and underground waters from pollution with pesticides.

74. BDS 17.1.3.03. Environment protection. Hydrosphere. General requirements for the protection of underground waters from pollution.

75. BDS 17.1.3.03. Environment protection. Hydrosphere. Regulations for the protection of waters from pollution with oil and oil products upon their transportation via pipelines.

76. BDS 17.1.3.01. Environment protection. Hydrosphere. Requirements for the protection of underground and surface waters from pollution with fertilizers.

77. BDS 17.1.3.07. Environment protection. Hydrosphere. Regulations for selection and assessment of the qualities of water sources for central drinking water supply.

78. Maritime Territories, Inland Waterways and Ports of the Republic of Bulgaria Act (SG No. 12/2000)

79. Methods for determining the emissions in combustion processes in energy, industry and the household sector

80. Instruction on the calculation of the emission of harmful substances contained in waste gases of enterprises in the atmosphere

81. Regulation No. 2 on the sanitary security zones around water sources

82. Rapid Inventory Techniques in Environmental Pollution, World Health Organization, Geneva, 1993.

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XIII. LIST OF ANNEXES

- **Annex No. 1, Letter, outgoing ref. No. EIAY – 7727/19.11.2009 of MEW, Sofia;**
- **Annex No. 2, Documents of ownership of the Investor;**
- **Annex No. 3, List of registered experts;**
- **Annex No. 4, Written declarations under Article 11 (3) of the Regulation on the terms and procedure for environmental impact assessment of the investment proposals for construction, activities and technologies;**
- **Annex No. 5, Copies of the certificates for the registration of experts;**
- **Annex No. 6, Master plan and situational scheme;**
- **Annex No. 7, Plats;**
- **Annex No. 8, Order No. 125/2007;**
- **Annex No. 9, Authorizations and schemes of the built infrastructure networks;**

- **Annex No. 10, Technological schemes and equipment for the handling of different cargo;**
- **Annex No. 11, Geological map;**
- **Annex No. 12, Protocols of the background level of noise;**
- **Annex No. 13, Sanitary security zones of subsites;**
- **Annex No. 14, Letter of consent;**
- **Annex No. 15, Plan on the implementation of measures for the prevention and reduction of harmful impacts;**
- **Annex No. 16: Correspondence with institutions and organizations;**
- **Annex No. 17, Non-technical summary of the EIA report;**
- **Annex No. 18, Corrected terms of reference;**
- **Annex No. 19, Photos;**
- **Annex No. 20, Assessment of the compatibility with the subject protection of the protected areas;**
- **Annex No. 21, Letter, outgoing ref. No. EIAY – 7727/22.03.2010 of MEW, Sofia;**
- **Annex No. 22, Contracts on waste delivery**
- **Annex No. 23, Dispersing of dust emissions from re-loading machines and silo cells**

I, Svetlana Velikova Milenkova herein certify the authenticity of the translation by me from Bulgarian into English of the attached document from page 1 to page 38 from the original.

Translator: Svetlana Velikova Milenkova

I, Rayna Nikolaeva Ivanova herein certify the authenticity of the translation made by me from Bulgarian into English of the attached document from page 38 to page 63 and from page 134 Item 3.10.4 to page 139 from the original.

Translator: Rayna Nikolaeva Ivanova

I, Antoaneta Marinova Zhekova herein certify the authenticity of the translation made by me from Bulgarian into English of the attached document from page 63 Item 3.3 to to page 80 from the original. .

Translator: Antoaneta Marinova Zhekova

I, Ognyan Petkov Kirilov herein certify the authenticity of the translation made by me from Bulgarian into English of the attached document: extract of a report from April 2010, from page 80 Item 3.4 to page 90 Item 3.5 from the original.

Translator: Ognyan Petkov Kirilov

I, the undersigned Hristo Dimitrov Lambrinov hereby certify that this is a true and accurate translation done by me from Bulgarian into the English language of the attached document page 90 Item 3.5 to page 100 from the original.

Translator: Hristo Dimitrov Lambrinov

I, Radostina Slavcheva Dukova herein certify the authenticity of the translation made by me from Bulgarian into English of the attached document from page 101 to page 110 Item 3.8 from the original.

Translator: Radostina Slavcheva Dukova

I, Kolyu Nenov Kolev herein certify the authenticity of the translation made by me from Bulgarian into English of the attached document from page 110 to 121 and from page 149 to 156 from the original.

Translator: Kolyu Nenov Kolev

I, Svetlana Kuneva Kaneva herein certify the authenticity of the translation made by me from Bulgarian into English of the attached document: extract of a report from April 2010, from page 121 Item 3.9 to page 134 Item 3.10.4 from the original.

Translator: Svetlana Kuneva Kaneva

I, ZLATKA VASILEVA STOYANOVA, hereby certify that my translation from Bulgarian into English language of the document, to which this is attached, is fully true and correct translation of the document: Description of the possible ways of achieving the goals of the investment proposal, alternative solutions from page 139 to page 148 from the original.

Translator: Zlatka Stoyanova

I, Tanya Todorova Kirova herein certify the authenticity of the translation made by me from Bulgarian into English of the attached document from page 157 to page 169 from the original.

Translator: Tanya Todorova Kirova

The total translation consists of 183 pages.