C O M P A T I B I L I T Y

ASSESSMENT REPORT FOR

THE INVESTMENT PROPOSAL FOR

THE CONSTRUCTION OF A FACILITY FOR TREATMENT AND CONDITIONING OF RADIOACTIVE WASTE WITH HIGH VOLUME REDUCTION FACTOR AT KOZLODUY NUCLEAR POWER PLANT

WITH THE SUBJECT AND PURPOSES OF CONSERVATION OF

BG0002009 “Zlatiata“

BG0000533 “Kozloduy islands“

BG0000614 “Ogosta River“

BG0000508 “Skat River“

BG0000527 “Kozloduy “

BG00005199 “Tsiber”

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1. Summary of the investment proposal for PMF execution/installation, activities and technologies at KNPP site

The purpose of the KNPP PLC investment proposal is to build a "Facility for treatment and conditioning of radioactive waste with high volumetric reduction factor" at KNPP, using plazma technology which will help reduce the volume of low and intermediate level radioactive waste (RAW) stored at certain locations at KNPP site.
The Plasma Melting Facility (PMF) will also help ensure enough capacity of the existing RAW storage facilities at the KNPP site until the National RAW Storage Facility is built.
The selected technology for this Facility is a high energy technology able to treat a radioactive waste. In this technology a thermal plasma field is created by directing an electric current through a low pressure gas stream. The following groups of RAW will be treated and conditioned at the PMF:

- RAW generated during operation of Units 1-6 and currently stored at the KNPP site;
- Additional amounts of RAW that are expected to be generated during the stages of the SE Preparation and Operation and as result of dismantling activities during decommissioning of Units 1-4;
- Waste expected to be generated during the on-going operation of Units 5 and 6 as well as during their preparation for future decommissioning.

The Plasma Melting Facility will operate in accordance with the ALARA principles ensuring:

- Protection of the people and minimizing of the occupational dose for the operational and maintenance personnel;
- Environmental protection.

Using the best available technologies (BAT) and the existing experience in this area, the PMF will represent an expansion of the existing NPP activities for RAW treatment and conditioning.
The requirement of Technical Specification (TS) and Regulation of elaboration EIA report to use BAT is essential for minimizing the possibility of negative PMF impact on the environment and to ensure environmental protection.

1.1 General description of the PMF and installation location

1.1.1 Designated area for PMF installation within the KNPP site general plan

The investment proposal for a construction Plasma Melting Facility (PMF) will be implemented within KNPP. Fig. 1.1.1-1 shows KNPP location.

Fig. 1.1.1-1 KNPP location

Kozloduy NPP has been constructed in North-Western Bulgaria on the right bank of the Danube River near the town of Kozloduy. The site is located 120km away from the city of Sofia in a direct line, and 200km by road. The area within a 30km radius around the site includes municipalities with the following centers: Kozloduy, Valchedrum, Hayredin, Mizia (entirely) and Lom, Byala Slatina and Oryahovo (partially). The 30km area around the site also includes a sparsely populated part of the territory of Romania where a total of 23 settlements are located, of which 2 towns – Dabuleni and Bechet, and 21 villages - Nedeia, Gighera, Zaval, Ostroveni, Sarata, Calarasi, Listeava, Piscu Sadovei, Sadova, Gangiova, Macesu de Jos, Macesu de Sus, Sapata, Plosca, Bistret, Brandusa, Goicea, Barca, Horezu Poenari, Toceni, Valea Stanciului.

The closest settlements to KNPP are: Kozloduy town located 2.6 km southwest, Hurletz village located 3.5km southeast, Glozhene village 4.0km southeast, Mizia 6.0km southeast, Butan village 8.4km south and Oryahovo town located 8.4km east of the site.

KNPP site is located at the 694th km from the Danube estuary at a distance of 3.7 km from the river midstream and the state border with Romania. The NPP is located in the northern part of the first non-flooded (loess) terrace of the Danube River where Units 1-6 have been built. The site has been marked with construction coordinates A=200 to A=1200 and B=400 to B=1500. In this area the loess terrace has terrain elevations of 35.00 – 37.00m.
The total area of the site is approx. 3.2km^2 and together with the channels for circulation and technical water supply reaches 5.2 km^2.
The proposed PMF will be installed at the KNPP site and the proposed location is within Auxiliary Building 2 (AB2) (**fig. 1.1.1-2**), in Room BK301 at elevation level +6.30m and Room BK039/3 at elevation level +0.00m.

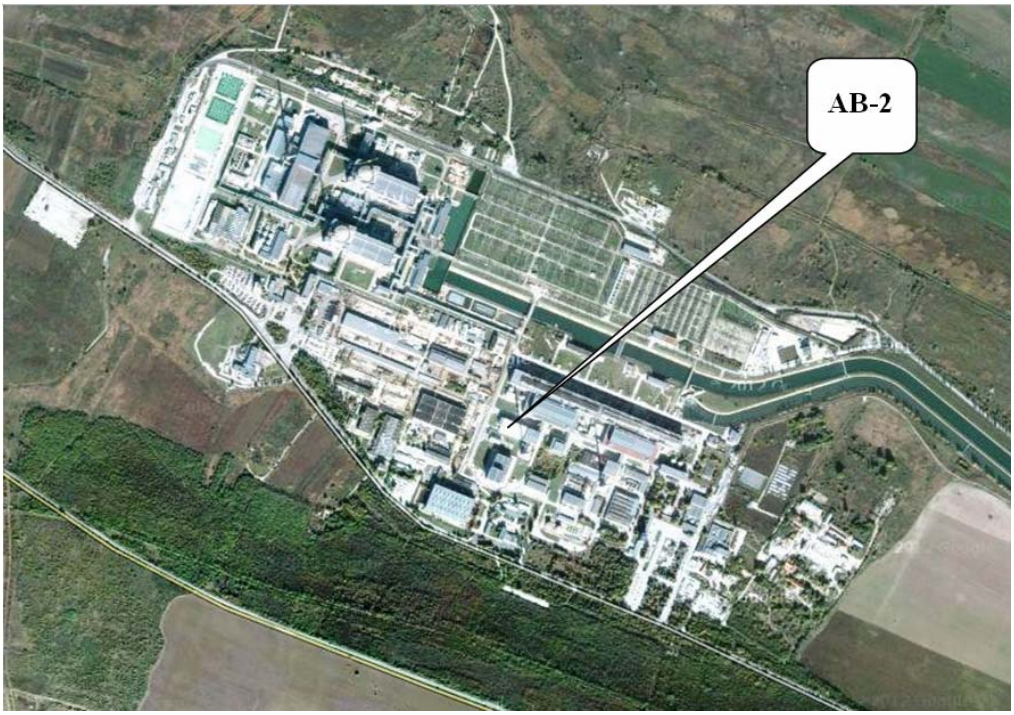


Fig. 1.1.1-2 Location of AB-2 at KNPP site

1.1.2 Relations to other existing activities approved by a territory regulation or other plan

The designated location for PMF layout is within the Auxiliary Building – 2, elevation +6.30m, Room BK301. The Room is connected to the site systems providing as follows:

- Electricity
- Steam
- Compressed air
- Demineralised water
- Cooling water
- Nitrogen
- Ventilation

PMF will have regard both to the operation of Units 5 and 6 of NPP "Kozloduy" and to the decommissioning of Units 1 to 4 of the same plant. The purpose of the facility is a significant reduction in the volumes of RAW disposal, which should lead to cost savings in the management of radioactive waste.. Construction of the facility is part of a five-year schedule of "Comprehensive Program for RAW management of NPP" Kozloduy ".

PMF as part of NPP "Kozloduy" is protected by physical protection system of NPP "Kozloduy" and therefore no provision for additional physical protection or change the existing one.

In terms of fire safety risk analysis of fire MES based on the design of PMF's instructions and the requirements contained in the procedures for protection against fire and accidents of NPP "Kozloduy".

Construction PMF will not lead to changes in the existing program for radioactive waste management in the territory of NPP "Kozloduy".

The transport of RAW to and from the PMF will be compatible with the existing transport system for the transport of processed and unprocessed RAW of NPP "Kozloduy". Transport scheme is given in section 1.2.4.2.

PMF will be built in an existing building and there will be no further need for the provision of MSW services and supporting infrastructure.

1.2 General characteristics of the PMF

1.2.1 General Plan of the PMF

AB-2 is a building designed to service KNPP Units 3 and 4 and Room BK301 is currently unused. The room is approximately 71.3m in length, 36.4m in width and approximately 8.45m in total height and the floor area is served by three cranes of lifting capacities 6.30t, 4.00t and 2.00t. (fig. 1.2.1-1).

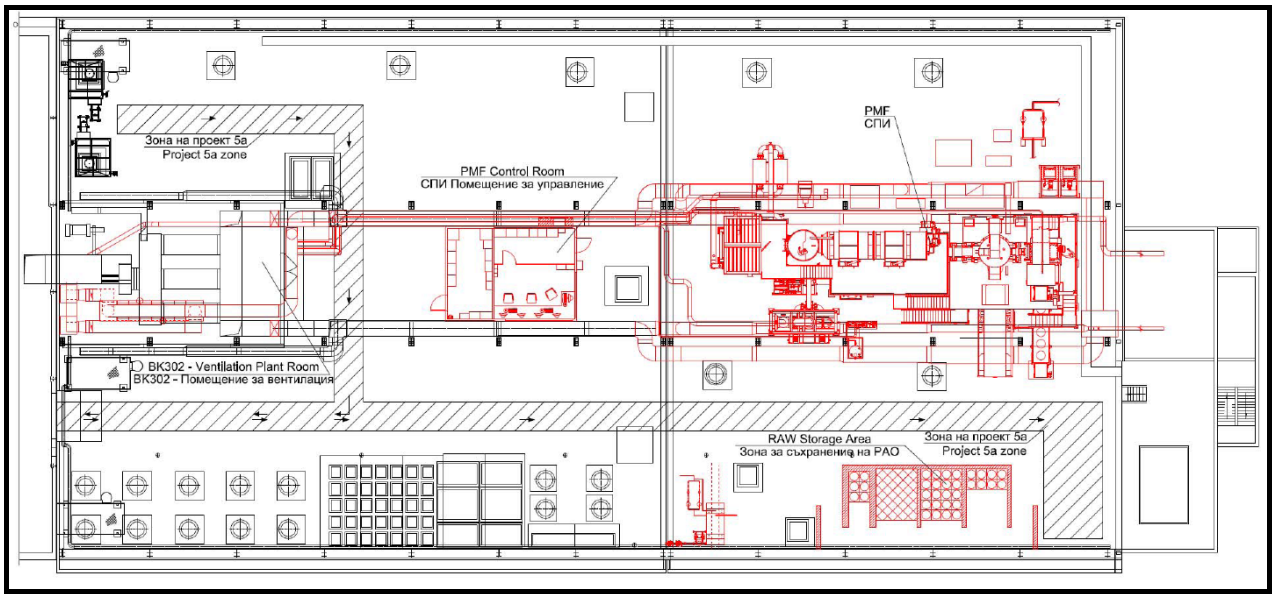


Fig. 1.2.1-1 Plan of AB-2, elevation +6.30m

The following is considered with reference to the layout of PMF and its components in this room:

- The range of the existing cranes in view of their use for the needs of the PMF design;
- The location of the protruding floor parts in Room BK301 (between axes 13 to 19);
- The roof structure support columns;
- The ventilation air ducts of the intake-extraction ventilation system of room BK301;
- The proximity of the existing transportation hatchway in the floor of room BK301, through which RAW will be loaded and unloaded.

Taking into account the existing conditions and infrastructure of the PMF, the design envisages partial reconstruction of room BK 301. Such reconstruction is required because of the overall height of some of the PMF modules and the need to provide conditions for installation, maintenance and dismantling activities.

The reconstruction height (fig. 1.2.1-3) is optimized and covers:

- Elevation of the middle part of the roof structure of room BK 301 (between rows Б and В)

in the section from axis 14 to axis 19 and limitation of the way of the existing 2,0 t crane that services this section to axis 14;

- Installation of a new suspension single-girder crane (with a lifting capacity of 5t) for PMF servicing whose way covers the area below the elevated part of the roof structure of room BK301;
- Reconstruction of the air-ducts of the existing common exchange extraction ventilation system of room BK301;
- Implementation of additional fire protection engineering and technical measures.

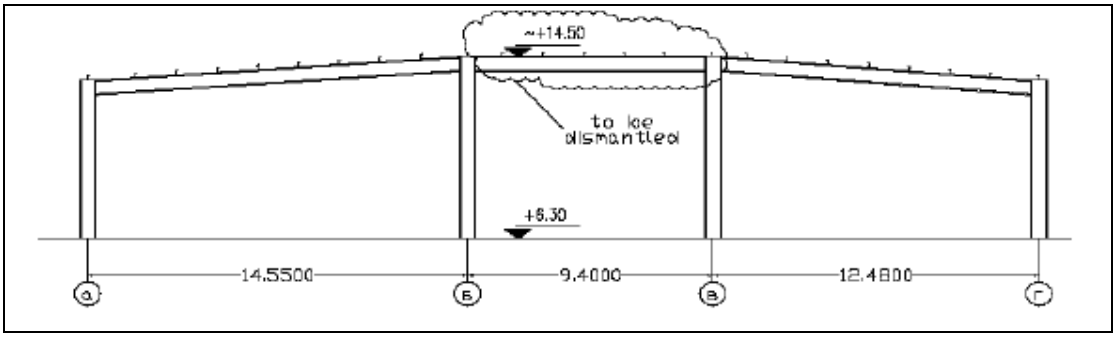


Fig. 1.2.1-3 Transection of AB-2 existing situation

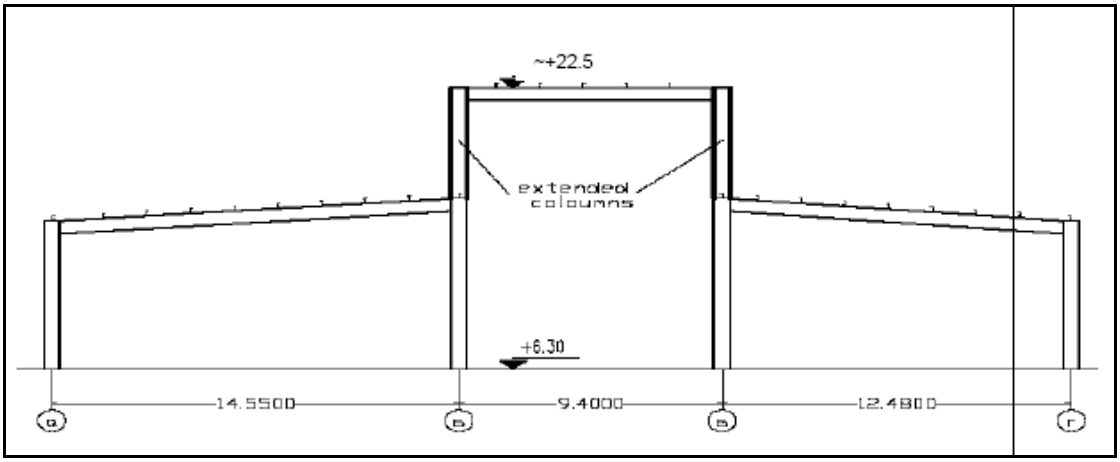


Fig. 1.2.1-4 Transection of AB-2 after reconstruction

Access to the room is either from the Radiological Control Area (RCA) to the east of the room or via a staircase on the west side. There is also a hatchway (3.00m x 5.00m) in the floor in the north east corner of the room. Beneath the hatchway, at the 0.00m level, there is a loading/unloading bay capable of accommodating vehicles carrying equipment or waste. The access to the unloading bay is via a pair of doors at either end of the bay which are 4.00m wide, 4.50m high.

In the South-East bay of room BK301 covered by the 6.3 t crane, an area for temporary storage of incoming RAW, secondary waste and final drums with vitrified waste is planned.

It is expected to delimit 3 areas designated to store 6000kg in total of incoming RAW that is almost the waste needed for one week of PMF operation and other area for 6 final drums that is the estimated production of one week of operation. Considering the maximum weight of each

waste package kind, the temporary storage can store 100 bags (20kg/bag), 20 drums (100kg/drum) or 8 pellets (250kg/pellet).
The storage is an enclosure area provided with two labyrinth entrances and therefore waste packages will be accessible by the crane and by the pallet truck. Fig. 1.2.1-5 shows the general PMF layout in the building.

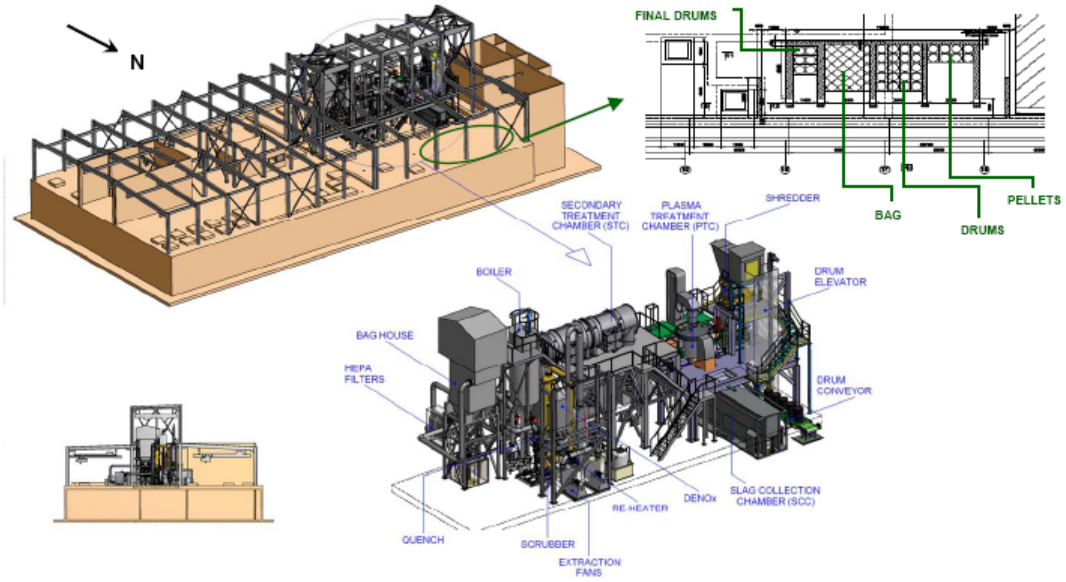


Fig. 1.2.1-5 General PMF layout

1.2.2 Stages of the investment proposal

The proposed schedule for implementation of the IP is divided in 5 stages. The design term of operation of the facility is at least forty years.
Stage 1 – 2009 – 2011 includes conceptual and technical design of PMF, including RAW manipulation, processing and conditioning equipment, and conceptual design of the auxiliary flows, the electrical power, the auxiliary equipment and the interfaces of Auxiliary Building AB-2;
Stage 2 – 2013 Production and testing;
Stage 3 – 2014 Execution of construction works;
Stage 4 – 2014 Delivery and installation: site interfaces management, leading of auxiliary flows and power supply, marking and labeling;
Stage 5 – 2014 – 2015 Commissioning: maintenance, inspection, testing, training and completion of the facility.

1.2.3 Description of the technology and the main processes related to the PMF installation and the resources used

1.2.3.1 General description of the technology for RAW treatment and conditioning

This section includes a brief technological description of PMF from RAW generation to the release of the processed outgoing gases in the atmosphere. Figure 1.2.3.1-1 includes a general technological scheme of the facility.
Untreated waste, pre-compacted waste in 200 l drums and super compacted waste (called "untreated waste" from now on) arrive at AB-2 in KNPP waste containers through the existing

lock in AB2. The waste packages are unloaded from the container using a grab device hanging on the crane hooks of the existing crane in AB-2 and are placed in temporary storage facilities.

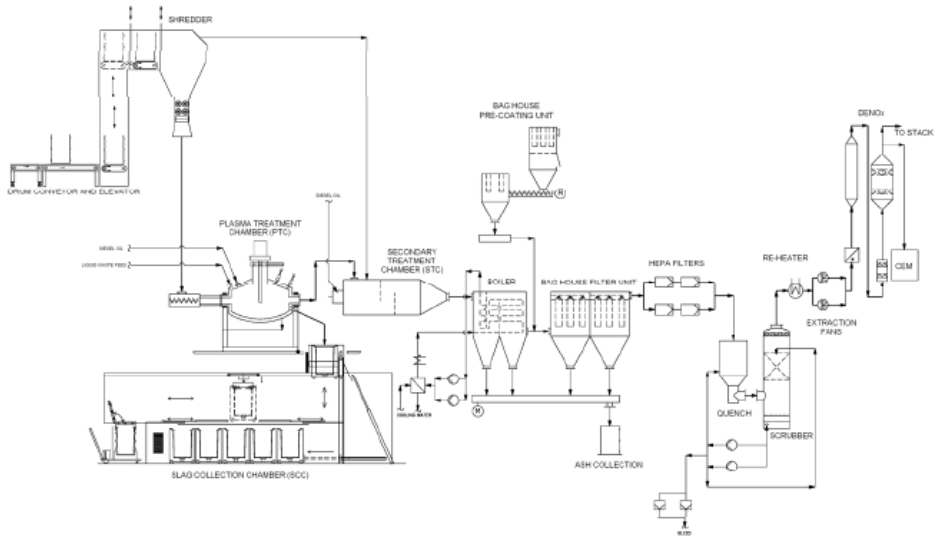


Fig. 1.2.3.1-1 General technological scheme of the facility

The untreated waste is taken by the grab devices, moved to the transport conveyor and from there by means of a lifting device the waste is automatically transferred to the shredder unit via an airlock. This system consists of semi-automatic conveyor (reception position with a built-in balance and loading bar), lifting device, airlock and a two-stage shredder with extrusion tube.
The shredder and extrusion tube process the untreated waste into small and relatively uniform material forming a continuous feed to the Plasma Treatment Chamber ((PTC, also named as Primary Treatment Chamber). The shredder unit is purged with N_2 to reduce the oxygen concentration below 4%.
The PTC is a high temperature (1100°C – 1500°C) tilting furnace. The volume of the furnace is designed to contain around 200 l of molten slag. The PTC outer diameter is approx. 2.2m and its height is approx. 2.8m. (fig. 1.2.3.1-2)
The PTC is designed to process approx. 80kg/h and nominally 65kg/h shredded organic waste during 100 hours a week, starting from Monday morning until Saturday morning inclusive. The volume of molten slag produced daily is 170 l, which is poured into 190 l forms.
Two types of burners are provided. A diesel-oil burner of 300kW is used to dry-out or to reheat a cold furnace as well as to keep the furnace warm during the weekend if desired. A Plasma Heating System (Plasma Torch) is required to achieve the high process temperatures and is mounted on top of the furnace.
Into the PTC, equipped with a plasma torch and acting as a heat source, the organic material is vaporized in volatile hydrocarbons, carbon monoxide, etc while non-combustible and other inorganic constituents are melted and transformed into glassy slag.
Plasma System is a high energy technology able to treat a large range of wastes. In plasma technology a thermal plasma field is created by directing an electric current through a low pressure gas stream (air used as plasma gas). The extremely high temperatures in the arc can be used to completely decompose all organic materials to their chemical components by injection in the plasma or using plasma arc as a heating source for burning or pyrolysis.
When there are around 200 l of slag in the PTC the pouring cycle will start for pouring the slag into moulds. The slag pouring cycle is a semi-automatic process.

When the furnace is ready for discharging, the waste feed is stopped, the tap hole opened and the furnace is tilted. The available slag is emptied into the slag mould underneath. When the mould is filled up, the furnace is tilted back. The tap hole is closed and the feed restarted.
Tilting of the furnace is carried out by means of a hydraulic cylinder and allows a good control of the pouring which can be interrupted at any time. Into the rotating axis of the furnace rotating devices are mounted for making leak tight connection with the lined duct to the STC on one hand and the extrusion tube on the other hand.
The slag is collected into the slag collection and cooling chamber which has to be seen as ventilated confinement. The Slag Collection chamber is beneath the PTC and holds the slag moulds until they are filled and conveyed to the cooling chamber.
Through an airlock, the slag moulds are transferred into the confinement, where they are put into the cooling mould by a small bridge crane. The cooling mould moves on an internal conveyor towards the position for pouring the slag. When the mould is filled up it moves further for cooling down and a new empty mould is put again into the pouring position. After cooling down, the cooling mould is moved to the emptying position where the slag mould with its content is taken by a small crane and transferred into a 200 l drum. The drum, which has practically no external contamination, is transported to a temporary storage facility waiting for the final disposal at another KNPP facility.

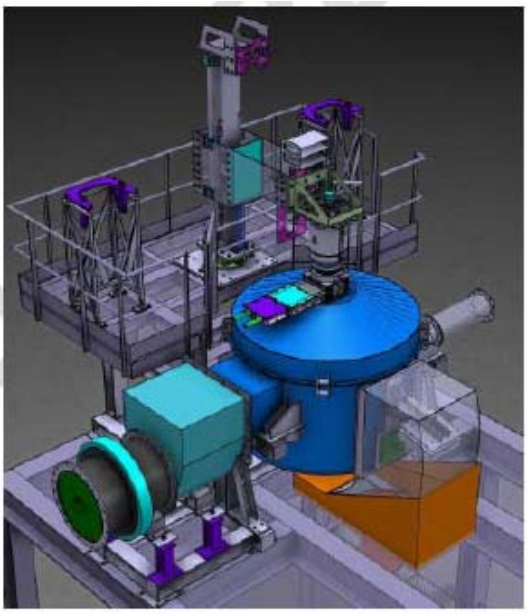


Fig. 1.2.3.1-2 Primary Treatment Chamber with a burner and console

The plasma furnace is designed with refractory concrete lining with high melting point. It will minimize refractory maintenance, and maximize the lifetime of the system. Concrete layers are selected because they can be repaired instead of replaced, thus minimizing the volume of generated waste.
The furnace has a water cooled casing in order to obtain normal surface temperatures of the primary chamber and to extend the lifetime of the refractories.
The furnace operates at negative pressure of about 250Pa and has a good air-tightness so that almost no cold air is entering into the furnace. As no additional air is added to the furnace, organic waste will not burn but rather gasify. A secondary treatment chamber (STC) will burn those gases.

The unburned gasses, hydrocarbons, soot particles, CO, hydrogen and fly ash flow from the primary treatment chamber (PTC) to the secondary treatment chamber (STC). The casing is designed to take in hot gases with a temperature of 1500°C from PTC. The gases are mixed with more air to obtain a complete combustion of primary oxidized components such as CO_2, SO_2 and H_2O. The additional amount of air is controlled by a controlling oxygen analyzer at the STC exit to maintain the minimum level of 6%.
The STC is sized to provide a minimum of two seconds residence time at the design waste feed rate and at a minimum temperature of 850°C. The normal working temperature is between 900 and 1000°C. This temperature window is a good compromise between the possibility of achieving complete combustion at a temperature considerably higher than 850°C and the power consumed for that purpose. The STC is equipped with a secondary burner. It operates with diesel oil and varies between high and low flame as a function of the STC exit temperature. The strong flame of the burner is also used to heat up the system during the preliminary heating cycle. The STC inner coating layer is designed to withstand a maximum temperature of 1650°C.
After the STC the flue gasses enter the flue gas treatment system. The flue gasses are first cooled down to about 190°C in a three pass radiant heat boiler. Further the flue gasses enter the bag house. Particulate matter is captured by surface filtration of membrane filter bags of Polytetrafluoroethylene (PTFE).The filter media is cleaned by means of pulsed jets of compressed air. The collected particles are shaken off of the surface of the bags. The hopper at the bottom of the bag house receives the released particulate matter and emptying is accomplished through a rotary discharge valve at the vibrating tube. .
After having passed the fabric filter, the gasses enter the HEPA filters, consisting of two parallel compartments. One compartment serves as standby.
Two pre-filters with 90% efficiency and two absolute filters with 99.97% efficiency for particles larger than 0.3µm are also installed. HEPA filters have an efficiency of 99.97%, and after scrubbing system can be assumed efficiency 99.99%, taking into account the degree of purification and detection of contaminants in solid waste (ash and melt) and wastewater (water scrubber).
The wet gas scrubbing assembly, installed after the HEPA filters, consists of a quencher tower for the cooling down of gasses a counter current scrubbing tower with caustic liquid for removal of HCl and SO_2, and a demister. Two extraction fans in parallel ensure the evacuation of flue gasses. One fan is stand-by. The negative pressure into the whole system is controlled by frequency controlled motors.
After heating up of the flue gasses, by recuperating heat from the boiler circuit and by an additional electrical heater, NOx concentration is reduced catalytically into the DeNOx system. Before the flue gasses are evacuated to ventilation stack 2 (VS-2) they are monitored by the continuous emission monitoring system for controlling the chemical parameters such as concentration of CO, SO_2, NOx, HCI, O_2, H_2O, NH_3 and TOC. A dust controlling device will also be installed. A sampling system for determining of the radioactive releases on 24-hour basis will also be provided. Table 1.2.3.1-1 includes the main PMF characteristics.

Table 1.2.3.1-1 Main PMF characteristics

Main PMF characteristics	
Performance	250t/year
Feeding rate (per hour)	65kg solid waste, or 55-60kg solid waste and 10-5kg liquid waste
Flow of flue gases	Nominal value: 1200-1400 Nm^3/h
Effective operation	4000 h/year

Specific radioactivity (incoming waste)	Maximum value: 5.17E+05 Bq/kg

1.2.3.2. Stages of the installation process, description of the main activities, proposed methods for PMF installation

The 5 separate stages of construction and PMF installation are shown in Section 1.2.2.

No major construction works are planned, since the facility will be installed in the existing building. The planned construction works include increasing the height in the middle of the building to provide enough space for placing all of the equipment that is part of the facility and the construction works related to the fuel supply system.

The Contractor has prepared an analysis based on the existing data for the building, taking into consideration the weight and size of the cranes [I-650-RP-0009 rev. 2 EIA input report], the new equipment to be installed and other possible loads that need to be considered due to the new use of the construction. The conclusion may indicate that only certain strengthening must be done to absorb the planned load.

In order to provide enough space for placing of the facility equipment, the Contractor proposes to remove the roof and to increase the height in the middle of the building to 12m.

Table 1.2.3.1-2 Main PMF construction activities

1	***Dismantling activities*** o The middle roof installations are removed (between rows "б" and "в"). o The roof panels are removed. o The middle roof rafters are removed. o The horizontal middle roof ties are removed (between "б"-"в" and axes 14-15 and 18-19, Figure 1.2.3.2-1). o The transverse collar beams in the middle are removed.
2	***Temporary strengthening of the steel construction*** o Installation of temporary vertical and / or horizontal connections between the columns in rows „б" and „в" (before dismantling of the collar beams)
3	***Strengthening of the existing elements and installation of new ones*** o The superstructure of the columns (the new part) is installed. o Additional (new) steel strengthening connections are installed. o Additional (new) steel horizontal strengthening connections in the middle are installed. o The roof collar beams are installed. o The roof longitudinal girders are installed. o The facades of the superstructure are installed. o The roof panels are installed. o New crane way in the middle is installed. (Figure 1.2.3.2-2)
4	***Installation of supporting steel construction and reinforced concrete foundations for the main and additional equipment*** o Supporting steel constructions for the equipment are installed. o Steel platforms and stairs are installed for maintenance purposes. o Supports for pipelines and cables.
5	***Disposal of the construction waste and building of the inner infrastructure*** o Waste disposal (according the KNPP standard procedure) o Building of special drainage channels o Steel casing of the decontamination area o Building of lead protective walls o Placing of epoxy coating on the floor

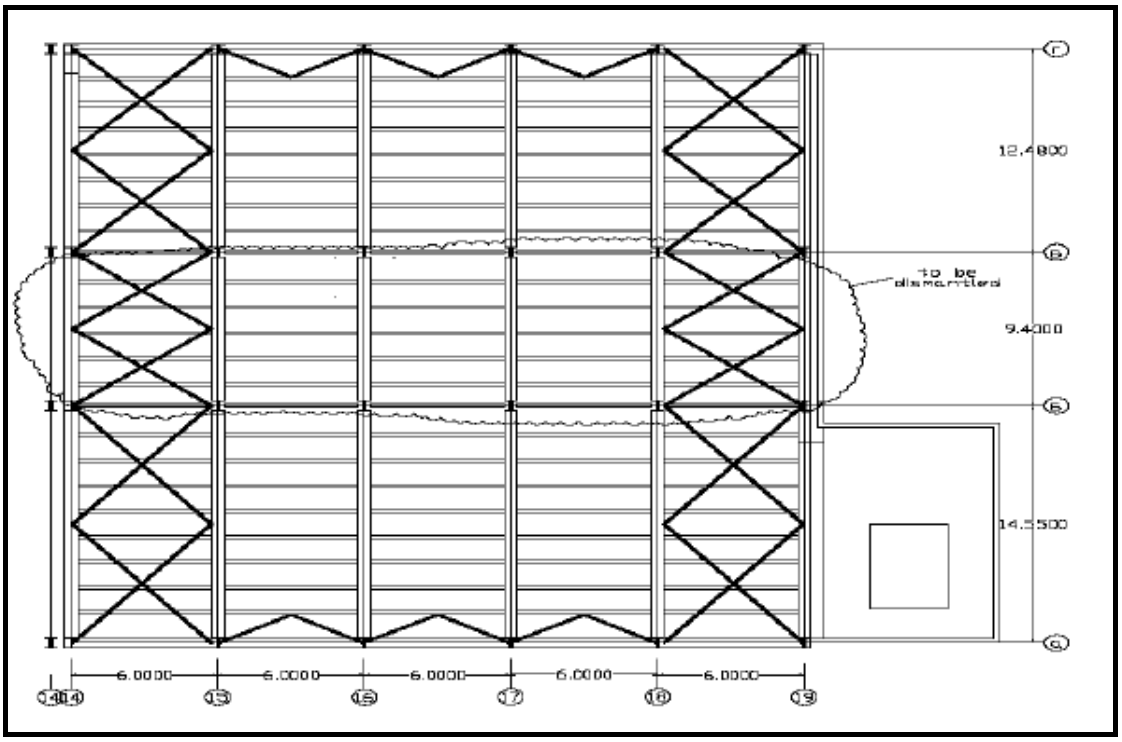


Fig. 1.2.3.2-1 Existing auxiliary building – roof plan

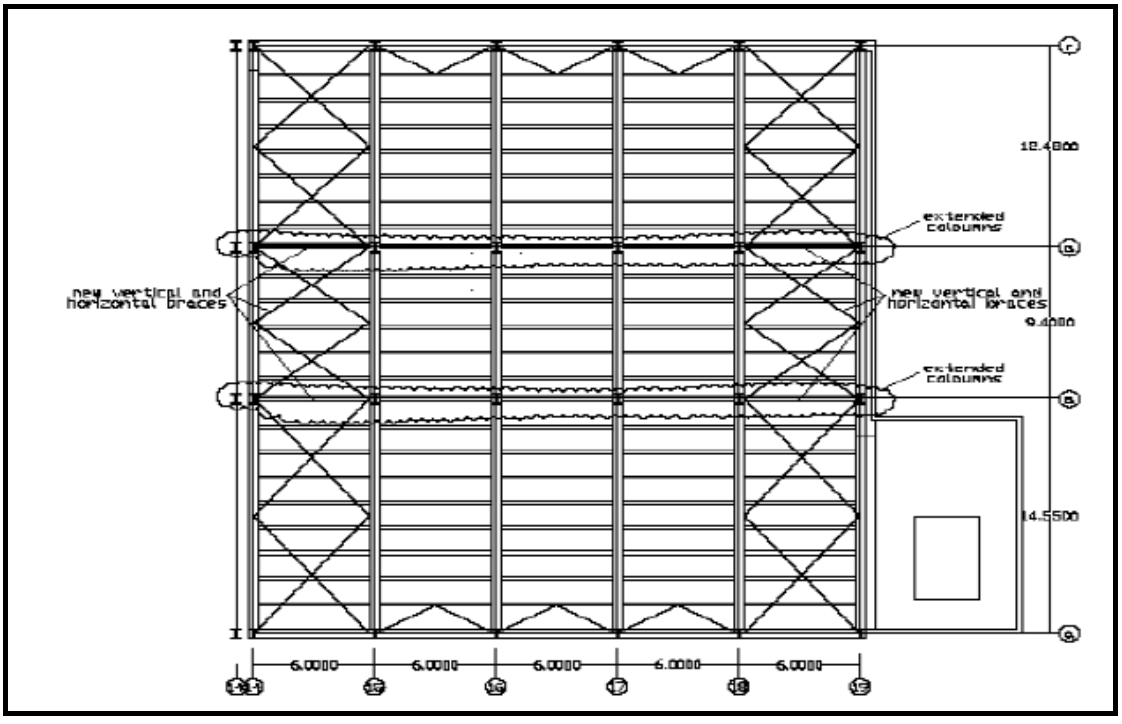


Fig. 1.2.3.2-2 Auxiliary building reconstruction– roof plan

1.2.3.3. Main resources and other materials necessary for the implementation/installation activities

According to information provided water will be the only natural resource that will be used during the project implementation .

1.2.3.4. Necessary personnel for the implementation/installation activities

The number of employed people during the project implementation is total 400 people during the all period of construction.

1.2.3.5. Information regarding the provision of offices and contractor services related to the proposal

During the construction of PMF there are available offices and contractor services related to the proposal.

1.2.4 Description of the main processes and used resources during PMF operation and decommissioning

The main processes during PMF operation and decommissioning are described in detail in the "entry" EIAR and in parts of ISAR. The criteria for acceptance of waste are taken from document.

1.2.4.1 Normal operation

For operating the PMF different normal operation process cycles are implemented with a high degree of automation. Both normal and redundant equipments need to be operable and available to operate the PMF. By selecting on the screens, operators can operate for the different blocks of the system to manual mode.

Pre heating cycle

Function of the preheating cycle is to heat up the system to operation temperatures so that proper combustion of organic waste can take place. When the STC temperature and the temperature after the bag filter house have reached respectively 850°C and 1500°C the system can process the waste.

Processing waste

When the normal conditions are reached processing of the waste can start.

Hot stand-by

This cycle is used in order to keep the temperature into the system on an elevated level. In fact the temperature is kept by functioning of the burners into the PTC and STC and adding as less as possible air into the system.

Cold stand-by

The time required to reach the cold stand-by status after activation of a SSD will be maximum four (4) days depending on the PTC temperature in the time the SSD is activated.
This cycle is activated when the PMF has to be stopped and when a low temperature of about 60°C is reached. The system will be kept in under pressure

1.2.4.2 Description of the main processes during operation

RAW reception

The incoming waste packages are transported within the standard KNPP 6m^3 waste containers that is placed in AB2 floor 0.00m. From there the container is lifted up by means of the existing 6.3 ton crane to AB2 floor 6.30m through the access hatch.

The incoming packages will be unloaded from the container to the storage by means of special grab devices hanged on the crane hooks of the existing crane

Waste packages shall be properly characterized before their arrival to AB2. KNPP shall provide information of the physical and radiological characteristics of each package to be treated in the PMF.

Administrative procedure will be established to control the waste packages from the reception in AB2 until the PMF treatment.

RAW will be temporarily stored in a reception area where a dose rate control of RAW waste packages shall be performed before PMF treatment.

Feeding the RAW

Untreated waste, pre-compacted waste in 200 l drums and super compacted waste is taken by the grab devices, moved to the transport conveyor and from there by means of a lifting device the waste is automatically transferred to the shredder unit via an airlock.

The shredders and extrusion tube process the untreated wastes in bags, pre-compacted and super-compacted 200 l drums resulting in small and relatively uniform material entering to the PTC. The shredders are equipped with a pre-programmed auto-reversing sequence which will clear most material jams. The shredders teeth reduce the waste and the drum into small pieces, which drop down into an integral extrusion tube and from there a continuous feed to the PTC.

Plasma Treatment Chamber (PTC)

The Plasma Treatment Chamber (PTC, also named as Primary Treatment Chamber) where the plasma torch is installed has been designed for treating about 80kg/h (of which 20kg for the weight of the steel drum and 60kg organic waste) shredded waste during 100 hours per week starting from Monday morning until Saturday morning.

The PTC is a high temperature (1100°C – 1500°C) tilting furnace. The volume of the furnace is designed to contain around 200 l of molten slag. Non-combustible and other inorganic constituents are melted and transformed into glassy slag.

The furnace operates at negative pressure of about 250Pa(g) and has a good air-tightness so that almost no cold air is entering into the furnace. As no additional air is added to the furnace, organic waste will not burn but rather gasify. A secondary treatment chamber (STC) will burn those gases. Therefore, the atmosphere in the furnace will be reduced preventing the metals to oxidize and result in a bigger VRF.

After pouring the slag there is still some liquid slag into the furnace. This remaining slag act as a thermal fly wheel for the thermal treatment process and protect the refractory for the next batch of waste and heat from the plasma plume. For obtaining the most optimal waste Volumetric Reduction Factor (VRF) and good slag forming the furnace should treat a mixture of organic and inorganic waste.

Secondary Treatment Chamber (STC)

The unburned gasses, hydrocarbons, soot particles, CO, hydrogen and fly ash flow from the primary treatment chamber (PTC) to the secondary treatment chamber (STC). The gases are mixed with more air to obtain a complete combustion of primary oxidized components such as

CO_2, SO_2 and H_2O. The additional amount of air is controlled by a controlling oxygen analyzer at the STC exit to maintain the minimum level of 6%.
The STC has two doors with refractory casing with dimensions 0.5m x 0.5m for performing of checks and repair.

Fuel system
Diesel fuel is provided for the primary and the secondary burner. Diesel fuel is a mixture of medium and heavy petroleum fractions, which have operating caloric value of 42.3MJ/kg and density 0.83kg/l.
The primary burner (300kW) keeps the PTC in hot stand-by. This burner is stopped during waste processing.
The secondary burner (350kW) heats up the STC and the off gas system. This burner varies between strong and weak flame during waste processing. It works with weak flame when processing typical organic waste.
The diesel fuel system includes the existing tank for diesel fuel, pumps, pipeline for fueling PTC and STC burners and for fueling the instrumentation to maintain the system operating parameters (valves, flow meters, pressure gauges, etc.)
The diesel fuel tank of the auxiliary system will be used for emergency water supply to the steam generators of units 3 and 4.

The off-gas cleaning system

The off-gas cleaning system consists of following main components:

- Hot water boiler for cooling down the flue gasses;
- Bag filters for eliminating most of the radioactivity and dust;
- Pre-coat unit to inject a pre-coating substance to the filter bags;
- Pre- and HEPA filter combination;
- Scrubber unit with pH control for the removal of gaseous contaminants such as HCl, SO_2;
- Extraction fans with frequency controlled motors for controlling the under pressure into the system;
- Electrical heater for heating up of flue gasses and DeNOx system with a catalyst for transforming nitrogen oxides to nitrogen gas;
- Continuous Emission Monitoring (CEM) and radioactivity control before the connection to the AB2 ventilation system.

After the STC the flue gasses enter the flue gas treatment system. The flue gasses are first cooled down to about 190°C in a three pass radiant heat boiler..
Further the flue gasses enter the bag house which consists of 2 compartments with 50 filter bags per compartment. Particulate matter is captured by surface filtration of membrane filter bags of Polytetrafluoroethylene (PTFE). The bags can withstand operating temperatures of 250°C.
The wet gas scrubbing assembly, installed after the HEPA filters, consists of a quencher tower for the cooling down of gasses to about 50°C, a counter current scrubbing tower with caustic liquid for removal of HCl and SO_2, and a demister. Two extraction fans in parallel ensure the evacuation of flue gasses to 150 m high ventilation stack 2 (VS-2)..
Before the flue gasses are evacuated to ventilation stack 2 (VS-2) they are monitored by the continuous emission monitoring system for controlling the chemical parameters such as concentration of CO, SO_2, NOx, HCI, O_2, H_2O, NH_3 and TOC. Results are available on real-time basis. Half hour and daily values will be presented corrected to temperature 273°K, pressure 101.3kPa, 11% oxygen and dry gas so a comparison with emission limits can be evaluated

Slag collection and cooling chamber (SCC)

When there are around 200 l of slag in the PTC the pouring cycle will start for pouring the slag into moulds.

When the furnace is ready for discharging, the waste feed is stopped, the tap hole opened and the furnace is tilted. The available slag is emptied into the slag mould underneath. When the mould is filled up, the furnace is tilted back. The tap hole is closed and the feed restarted.

Tilting of the furnace is carried out by means of a hydraulic cylinder and allows a good control of the pouring which can be interrupted at any time. Into the rotating axis of the furnace rotating devices are mounted for making leak tight connection with the lined duct to the STC on one hand and the extrusion tube on the other hand.

The slag is collected into the slag collection and cooling chamber which has to be seen as ventilated confinement. The Slag Collection chamber is beneath the PTC and holds the slag moulds until they are filled and conveyed to the cooling chamber.

The hot slag is poured into a 5mm thick steel mould, which is placed into an iron cooling mould of at least 100mm thickness in order to absorb the heat.

Through an airlock, the slag moulds are transferred into the confinement, where they are put into the cooling mould by a small bridge crane. The cooling mould moves on an internal conveyor towards the position for pouring the slag. When the mould is filled up it moves further for cooling down and a new empty mould is put again into the pouring position. After cooling down, the cooling mould is moved to the emptying position where the slag mould with its content is taken by a small crane and transferred into a 200 l drum. This drum is docked to the confinement where its cover is removed automatically and closed again when the mould is put into the 200 l drum. Then a new slag mould is put the empty cooling mould and then it is returned to the pouring position.

The Cooling System is equipped with an air circulating system to speed the cooling of the molds. Cooling down of the moulds takes about 48h, and 6 pieces of cooling moulds are sufficient to provide a continuous operation for one week.

Final drums transportation and weight measurement

After the transference of the slag mould with its content into the final 200l drum, it is transported by a pallet truck from the SCC to the temporary storage.

This pallet track lifter used to load/download the Slag Moulds (SMs) in the 200l drums has a weight device integrated in it (weight sensors technology, range 0-1000kg). This device will be used to weight the final drums and this measurement will be used during product characterization.

Characterization of final products

When the treated waste mould is already within a 200 l drum, the final drum is characterized to ensure their suitability for its storage at the PMF temporary storage area and to probe that the radioactive waste resulting from the PMF process is Category 2a, by:

- Measurement of dose rate in contact and at one meter due to gamma photons by means of a dose rate meter.
- Measurements of removable surface contamination, both alpha and beta-gamma in order to ensure that the surface of the drum is not contaminated and can be safely handled.

At the end a robust conditioned product is obtained free from liquids and organic material and free from external contamination and ready to be transferred to the standard 6 m3 container for further conditioning.

The final PMF drums transferred to KNPP comply with the following requirements that are part of the immobilized waste acceptance criteria:

- The free water content should not exceed 1% by weight.
- No explosive or pyrophoric substances, materials and ingredients should be present.
- No biological waste should be present.
- No organic solvents, oils, grease or other oil-containing materials should be present.
- The solid material shall be packed in a secured, waterproof, corrosion-resistant and mechanically rigid package.

The rest of requirements are complied after final drums conditioning which consist of embed the drums with concrete into KNPP containers.
The final drums will be transported from the outlet of the slag collection chamber to the PMF storage area by means of a pallet truck or with the special grab device designed for drums. Further on they will be loaded in the KNPP containers using the grab device designed for drums, hanged on the crane hooks in building AB-2.
The final drums will contain vitrified waste in a stable form. It is expected that these drums will be further on immobilized with cement into bigger containers in order to meet the acceptance criteria for immobilized products, determined in the Bulgarian legal documents.

Cleaning and maintaining of the facility
Periodically, the PMF shall stop for maintenance, calibration, cleaning and decontamination of components.
For purposes of ALARA criteria and personnel safety, Specific Procedures, Operating and Maintenance Manuals shall include the requirements for maintenance, calibration, cleaning and decontamination and replacement of equipments and components. Decontamination procedures and tools are based on standard current cleaning practices and not special reagents are foreseen for the PMF maintenance.
According to the design of the PMF, containment of radioactivity in the PMF is achieved by equipment boundaries and confinement's areas as well as under-pressure in the system with respect to the building. Furthermore, confinement areas where maintenance activities are carried out are periodically cleaned-up, preventing the accumulation of contamination along all the operation stage.
In addition, periodical cleaning of the necessary components inside the PMF will be carried out avoiding excessive accumulation of contamination and facilitating maintenance. Periodical cleaning will be performed in the following way:

- A special adapted vacuum cleaner is used to clean the PMF and minimize spread of contamination. It will be used to clean the refractory concrete of the PTC when repaired, the insides of the STC, the boiler, the bag house, the HEPA-filters, confinement of ash collection chamber, etc. and also the surroundings during and after repair activities;
- Before a planned shutdown of the PMF, the last waste batch fed to the system can be very low contaminated,

These activities will minimize the residual contamination in the internals of the equipment, reducing the risk of spread of contamination and the operator doses.
In any case, for manholes or covers, which have to be opened for maintenance or inspection and are considered critical in terms of potential spread of contamination, temporary confinements consisting on aluminum frames and plastic foils will be installed. (e.g. on top of PTC for refractory replacement).

Maintenance or inspection into confinements is normally executed with extra protective clothing and wearing of masks in order to protect operators or maintenance people from contamination. The suspected contaminated plastic foils from maintenance activities can be treated in the PMF.
The main equipment with residual contamination due to the processing of radioactive waste in which the operator intervention is required during maintenance periods are the following:

- PTC: For the refractory replacement the PTC lid will be removed by means of the 5t crane situated above the PMF. A frame with plastic foils will be installed above the furnace, it will be provided with an entrance trough the maintenance platform. The confinement is in under-pressure and the air flow is into the direction of the internals of the PMF by means of the extraction fan;
- Primary and secondary shredder: The main maintenance activity will be the knives replacement. The knives wearing will depend on the hardness of the material treated but it is anticipated that the replacement shall be carried out every three years The machines are designed to be serviced from the end opposite of the hydraulic motor where a temporary confinement will be installed.
- SCC: The maintenance personnel will go into the SCC though the hatch situated in the side wall next to the conveyor. The SCC works as a fix confinement during maintenance activities in order to avoid the spread of contamination. It is connected with the PMF extraction system that will be in operation during maintenance works.
- Bag house: On top of the bag house filter a fixed confinement is foreseen in order to make inspection or change the bags without spread out of contamination in the other areas of the room. This confinement is connected directly to the PMF extraction system and will be accessible from the boiler platform.
- Boiler: On top of the boiler a temporary confinement can be installed during operator intervention for maintenance and inspections. The confinement will be composed by an aluminum frame and plastic foils that will be installed around the working area. The higher under-pressure into boiler takes care for an air flow into the direction of the internals of the PMF by means of the extraction fan.

Use of energy and materials, necessary for the process

Electrical power

The annual electrical power consumption of the plasma torch is 3500MWh based on 4000 working hours per year and electricity consumption of 875kW.

Based on the total installed capacity of PMF (including the electrical system for preheating, before DeNOx system), the annual electricity consumption, excluding the plasma torch, is 2292MWh.

Diesel fuel

Diesel fuel is necessary for the maintaining of the hot standby and for the process of afterburning in the STC. The maximal annual consumption of diesel fuel is 48000 liters per year.

Filter coating material

$Ca(OH)_2$ and $NaHCO_3$ are used for better dust removal from the filters with PTFE coating. The necessary amount is between 1.2 and 14 tons per year.

Ammonia

This chemical substance is used for the DeNOx system (reducing of N-oxides). The expected nominal consumption is 28000kg (25% solution) per year.

Sodium hydroxide

This chemical substance is used to absorb SO_2, HCl, HF and other acid gases from the thermal treatment processes. The annual consumption depends on the composition of the input waste for processing (for example, sulfur content in the ion exchange resins or PVC). The NaOH consumption (30% solution) is 34kg/h. If we assume that the average annual consumption is 10% from the admissible limit, then the annual consumption is around 14 tons.

Technological water

Technological water is used for the scrubber and for the facility gas coolant. The expected nominal consumption is 2500m^3 per year.

Cooling water

Cooling water is used to cool down the equipment (for example, the plasma torch). The PMF cooling system functions in closed circuits and the heat energy is transferred by heat exchangers to the existing open-circuit cooling system of KNPP. Therefore, the water consumption is limited to the amount of the possible leaks of the closed circuits system and is expected to be 2m^3 per year.

Radiation protection

The Radiation Protection Program will be based on the assessment of operational dose rates to the personnel working at AB2 and to the public considering magnitude and location of sources of ionizing radiation in the PMF, as described in previous sections. It should cover:

- the classification of working areas and access control;
- local rules and supervision of work;
- monitoring of individuals and the workplace;
- work planning and work permits;
- protective clothing and protective equipment;
- facilities, shielding and equipment;
- health monitoring;
- application of the principle of optimization of protection;
- removal or reduction in intensity of radiation sources;
- training;
- arrangements for the response to an emergency

Classification of workplaces and marking requirements for the radiological areas in the facility, entry and exit control for personnel in radiological areas, working planning and use of radiation work permits will be accomplished according to the requirements of the Regulation on Radiation Protection and to KNPP radiation protection procedures.

Continuous radiation and air monitoring into the PMF room will be performed. PMF operators and Radiation Protection staff will conduct periodic routine radiation and contamination monitoring around the PMF equipments and in the workplaces to detect occurring contamination in an early stage. Personnel dosimetry and contamination control for workers employed in controlled area will be performed according to KNPP Radiation Protection procedures.

Office for radiation protection and other facilities (changing rooms, instrument calibration and measurement laboratories, etc.) at KNPP will be used for effective radiological control in the operation and maintenance of the PMF.

Protective clothes as gloves will be worn in controlled areas in the PMF to prevent the personnel contamination and the spread of contamination. When works have to be undertaken in areas where airborne contamination or loose surface contamination or may be produced (e.g. maintenance works in equipment confinements) respiratory protective equipment will be used. According to the radiological status of the areas in which the operators will have to work they will wear the corresponding protective clothes/equipments.

The operating organization shall make arrangements for appropriate health monitoring in accordance with the requirements of Bulgarian regulations and KNPP applicable procedures.

The application of the ALARA principle during operation and decommissioning and reduction of radiation sources in the PMF is also planned.

Control of incoming RAW for processing

According to the Technical Specification the radioactive waste intended to be treated in the PMF is classified as Category 2a.

The Regulation for Safe Management of Radioactive Waste establishes the categorization for radioactive waste generated in Bulgaria. According to this regulation, Category 2a corresponds with low and intermediate level short-lived radioactive waste (with a half-life of less than or equal to the half-life of ^{137}Cs), and long-lived alpha radionuclides with a specific activity less than or equal to 4.00E+06Bq/kg for each package, and less than or equal to 4.00E+05 Bq / kg in the total volume of RAW, according to the Regulation on waste management.

There are two types of waste to be processed in the PMF – incoming waste from KNPP and secondary waste generated from the PMF operation. Exceptions to this are refractories and water from the scrubber.

The PMF acceptance criteria are used as basis for control of incoming RAW.

Waste Package Restrictions

The waste packages accepted in the PMF are as follows:

- **Bags** containing untreated waste with a maximum capacity of 70 l, max weight of 20kg per bag and maximum density of 300kg/m^3. For volume reduction calculations an average density of 150kg/m^3 is assumed.
- **Standard metallic** 200 l drums containing:
  - Waste compressed within the drum. The weight of empty drums is approximate 20kg and the maximum total weight of the 200 l drum is limited up to 100kg. For volume reduction calculations of precompacted waste, a density of 350kg/m^3 is assumed.
  - Secondary RAW
  - Pellets resulting of the super compaction of standard metallic 200 l drums. Pellets should have a height up to 40cm and a maximum density of 2000kg/m^3

Waste Composition Restrictions

Solid radioactive waste to be treated by the facility shall be classified as low and intermediate level waste according to Category 2a definition and their radiological characteristics should correspond to the above described Category 2a.

Liquid radioactive waste accepted shall have a specific activity less than or equal to 4.00E+04Bq/kg.

PMF allows processing of contaminated soil. Asbestos-containing materials (ACM) may also be treated in PMF as ACM must be packed in accordance with the internal rules of NPP "Kozloduy" PLC – i.e. packed in plastic bags and 200 liter drums. 200 liter drums should be marked with the international label that waste containing asbestos. In PMF asbestos filters are decomposed as a result of the high temperatures and converted to an amorphous structure similar to glass. In the transformation of the crystalline structure of asbestos will not cause undesirable effects.

Waste that is accepted in the PMF can be divided in two groups, as the group has technological limitations that will be followed:

:

- Organic waste: textile, paper, wood, polyethylene polypropylene, polystyrene, different types of rubber, latex, plexy glass, liquids absorbed on cellulose, textile or other organic absorbent.
- Inorganic waste: glass bottles or window glass, galvanized and non galvanized steel, all type of granulates such as concrete, sand, soil, asphalt, bricks and asbestos materials.

PMF should not be used for the processing of the following materials:

- Sludge;
- Radioactive waste classified as highly active;
- Concrete containers containing drums and / or tablets and immobilized with cement;
- Refractory materials.

Control of the releases into the environment

Control of radiological characteristics of gaseous emissions will be done after the extraction fans of the off-gas and in the outlet pipe of the PMF extraction system. Because the radioactivity in one cubic meter flue gas is below detection limits for most detection apparatus, one needs a concentration technique in order to obtain a detectable signal. Therefore an isokinetic sample is taken and sent over a paper filter (e.g. diameter 10cm). The sample lines are heated with electrical tracing. Each 24 hours the filter is changed and put into alpha, beta counter with low background. By subtracting the activity of a basic sample filter (air contains also natural activity e.g. ^{224}Ra and daughters isotopes) the released activity can be calculated.

For obtaining a good flow pattern and representative measuring results, the radiological sampling will be placed 8 hydraulic diameters after the last obstruction (e.g. bend) and before 6 hydraulic diameters of the next obstruction.

Non-radioactive emissions will be controlled by a Continuous Emissions Monitoring (CEM) system. CEM is installed at the end of the PMF before the connection to AB-2 ventilation system.

The measured parameters are CO, SO_2, NOx, HCl, O_2, H_2O, NH_3 and TOC. By separate and conventional instruments temperature, pressure and flow are also measured.

The parameters CO, SO_2, NOx, HCl, H_2O and NH_3 are measured by a FTIR spectrometer.

O_2 is measured by a ZrO_2 oxygen sensor.

A Multi Flam-ionisation detector (FID) is installed for continuous measurement of the hydrocarbons (TOC).

The system is built in a separate cabinet and sampling lines are also planned

Necessary calibration gases and calculation software is provided. Results are the available for real-time display. Half hour and daily values will be presented corrected to temperature 273K, pressure 101.3kPa, 11% oxygen and dry gas so a comparison with emission limits can be evaluated.

Control of the liquid releases in the existing special drainage system of AB-2
The water discharge will come from three sources: boiler, torch and furnace coolants. If the water is treated with anti-corrosive products to minimize pipe corrosion, then the water change period might be longer.

The indicated water sources are closed water systems and they will not contain radiation contamination, but only slight chemical contamination. If the water is maintained properly, it could last several years.

Liquid radioactive waste is not continuously generated and their discharge shall be controlled. The liquid RAW from the scrubber are sent to a scrubber tank, which controls the flow rate within the required limit of 100 l/h. Prior to discharge, the liquid passes through a 5µm filter.

Fresh water is added from the top of the scrubber depending on the level into the scrubber tank, and a circulation pump circulates the water through the unit.

Scrubber water is collected into this scrubber tank. Other possible type of cleaning water, for example from decontaminated 200 l drums, can also be transferred to the scrubber tank some of the water evaporates into the scrubber unit and a maximum of 100 l/h is transferred to the effluent system of KNPP by means of an evacuation pump. Into the pressure line of the evacuation pump a 5µm filter unit is installed, which filters the water before it arrives at KNPP effluent system.

This filter device is a double bag filter (one in operation; one in stand-by) with disposable polypropylene filter bags of 5 µm mounted in a stainless steel housing for in line filtration. Used bags will be sent with other burnable secondary waste to the plasma furnace.

A pH-meter controls the pH to keep it higher than 8 by the addition of NaOH by means of a dose pump. Based on the presumed sulphur and PVC content into the incoming waste, the salts concentration into the evacuated liquid can be several grams per liter.

Quality control of the immobilized radioactive waste
Considering the maximum specific activity in the incoming waste, the slag partitioning (85%), the average density and volume reduction for each type of waste package, the maximum activity estimated in a 200 l drum containing 170 l of vitrified waste is 9.1E+08Bq (see table 1.2.4.2-1).

Table 1.2.4.2-1 Activity of vitrified waste in 190 l moulds

Type of waste	Average density (kg/m^3)	Specific activity (Bq/kg)	VRF	Activity/drum (Bq)
Untreated waste	150	5.17 E+05	81	9.10E+08
Pre-compacted waste	350		22	5.75E+08
Super-compacted waste	1500		2	2.24E+08

When the treated waste mould is in the 200 l drum, the finally treated drum is checked to determine whether its characteristics are stable enough to allow its storing in the PMF temporary storage area and to verify that the RAW generated from PMF is Category 2a waste, using:

- Measurement of dose rate in contact and at one meter due to gamma photons by means of a dose rate meter.
- Measurements of removable surface contamination, both alpha and beta-gamma in order to ensure that the surface of the drum is not contaminated and can be safely handled.
- Use of an average dose rate measure to estimate spectrometry for the vitrified waste, in accordance with the following process:

  Using of the Dose to Becquerel (DTB) method to determine the radiation characteristics. This means the average dose rate is taken (e.g. average of 4 measurements at 90°over the circumference of the drum) and with a certain isotope vector the Bq's of all the different isotopes into the waste can be calculated. This method gives fairly accurate results as we are dealing with typical NPP waste which contains significant gamma emitters (^{60}Co and ^{137}Cs).
- Estimations of alpha and beta emitters can be done using available KNPP representative scaling factors of the waste stream treated in the PMF.
- The relation between the activity and the dose rate depends on the density of the slag that will vary according to the composition of the incoming waste treated in the PMF. Therefore, certain values should be estimated for different slag densities.

At the end a robust conditioned product is obtained free from liquids and organic material and free from external contamination and ready to be transferred to the standard 6 m^{3}container for further conditioning.
The final PMF drums transferred to KNPP comply with the following requirements that are part of the immobilized waste acceptance criteria:

- The free water content should not exceed 1% by weight.
- No explosive or pyrophoric substances, materials and ingredients should be present.
- No biological waste should be present.
- No organic solvents, oils, grease or other oil-containing materials should be present.
- The solid material shall be packed in a secured, waterproof, corrosion-resistant and mechanically rigid package.

The rest of requirements are complied after final drums conditioning which consist of embed the drums with concrete into KNPP containers.

Personnel

Operating organization will provide appropriate organizational structure for the operation of PMF. This organizational structure will be documented with clear lines of management or communication. Will describe the functions, duties and qualifications for each position in the structure..

PMF will be commissioned, operated and maintained in accordance with written procedures. These procedures and instructions will be based on design and technical documentation (operating manual PMF) operational limits and conditions and the results of tests carried out before commissioning the installation. These procedures must include the necessary actions for the implementation of operational activities in all operational states, including deviations from normal operation.

Personnel actions in design and beyond design basis accidents will be specified in instructions drawn up on the basis of the final safety analysis, operational limits and conditions and additional analyzes of the behavior of plants under emergency conditions..

Possibility of human error will be reduced by proper training and implementation of effective procedures. The staff in the operation and repair of the PMF will seek clarification on aspects of safety in the operation of the PMF. They will be instructed on the proper operation and management of each subsystem and component of PMF, the consequences of failures or errors and corrective action in the event of a malfunction or error. They will be taught how to react appropriately in case of deviations from normal operation that may arise in the management of the systems, the emphasis is on procedures for emergency preparedness. Training will be done according to training program prepared in advance and includes theoretical and practical aspects of learning in the course of everyday work.

Furthermore shift supervisor and assistant shift manager may be required following personnel:

- During a shift (3 shifts per day): 3 for the operator to change the continuity of the process and the feed conveyor for disposal. They will be supported by the radiation protection officer part time;
- During the day: 2 additional operator for receiving and unloading of waste containers. Different packaging waste will be stored properly, expecting treatment in any of the following shift.

The staff to repair and management was established following need:

- the equivalent of a man-instrumentation and control by PLC;
- half a man-year of electrical control and half a man-year for mechanical control.

During periods of stay cleaning and maintenance work carried out by operators, they also assist maintenance personnel..

1.2.4.3 Main processes during PMF decommissioning

After final termination of the PMF operational phase, its decommissioning will be accomplished in a way that ensures radiation protection and safety of the personnel and the population as well as environmental protection.

Decommissioning operations may result in the removal of existing components or systems, decontamination of components and the cutting and handling of large pieces of equipment. Because these actions have the potential to create new hazards, the impacts on safety of these activities shall be assessed and managed so that these hazards are mitigated and are kept within acceptable limits and constraints.

International safety standards related to the design and operation of nuclear facilities (e.g. IAEA Safety Guide GS-G-1.2) indicate that an outline plan for decommissioning, covering issues such as strategies to be used, expected radiation doses and the amount of waste to be produced, should be prepared at the design stage of the facility. Such information will be relevant to optimize the design of the facility in order to reduce the amount of waste that will be produced at decommissioning stage as well as the doses of workers that could be involved in the related tasks.

In the same way, Bulgarian legislation establishes in the Regulation on safety during decommissioning of nuclear facilities that a Preliminary Concept and Plan for Decommissioning will be developed during the design phase of a nuclear facility.

This Decommissioning Concept should be submitted in support of the Design Approval application for the PMF, compliant with the requirement of Regulation on safety during decommissioning of nuclear facilities.

The primary purpose of the Decommissioning Concept is to ensure that facility designers are cognizant of decommissioning during the initial design of a facility. Thus, where design choices that would enhance decommissioning are available for types of materials and system components, and location of components, these choices should be made.

A Decommissioning Concept has been prepared for the PMF. A summary of this is included in the following sections.

Decommissioning Concept

There are three main internationally recognized strategies for decommissioning of nuclear facilities. These are 'immediate dismantling', 'deferred dismantling (safe enclosure)' and 'entombment'.

In general, entombment is not a recommended decommissioning option, and strategy selection is a choice between immediate and deferred dismantling.

There are a number of factors to be considered when deciding on the preferred decommissioning strategy, but at present, the emerging international trend is more towards immediate dismantling. According to Principle No 5 of Radioactive Waste Management, the timing of decommissioning shall be such that it does "not impose undue burdens on future generations" in terms of both additional health and safety risks and financial requirements. This favors early dismantling as preferred option for decommissioning.

Considering the expected residual activity in the PMF during decommissioning, deferral of decommissioning activities may not significant reduce the activity of the remaining nuclides or radiation exposure of workers during decommissioning activities. In line with the option for immediate dismantling of equipments outside of the safe enclosure area in the updated Decommissioning Strategy for KNPP Units 1-4, immediate dismantling is considered as the preferred option for the PMF decommissioning.

The availability of waste management infrastructure for treatment and conditioning of decommissioning waste and of the Radioactive Waste National Repository for the time of PMF

decommissioning, assumed in the updated Decommissioning Strategy for KNPP units 1-4, has been also considered when selecting PMF decommissioning strategy.
End-point of the PMF decommissioning activities is to return the area where PMF was located to as close to the pre-installation condition, while protecting human health, the environment, and to meet regulatory requirements.
The decommissioning process is divided into three phases with different duration of realisation as follows:
- Preparatory activities – 5 weeks;
- Decontamination and dismantling activities and management of wastes - 18 weeks;
- Final investigation- 2 weeks.

Facility characteristics with regard to decontamination and dismantling works
Provisions that facilitate decommissioning activities are foreseen in the PMF design.
During the design of the PMF facility, materials are chosen to facilitate decontamination and avoid spread of decontamination. Facility design takes into account enough space for access to main equipment during maintenance activities and also for equipment dismantling.
Based on the PMF characteristics, the following conclusions with regards to decontamination and dismantling works can be made:

- Activated materials will not exist due to the purpose of the PMF and the type of waste treated.
- Contamination levels during the decommissioning are commensurate to activity levels of waste category 2a and to the radionuclides existing in the RAW treated at the PMF.
- According to the design of the PMF, containment of radioactivity in the PMF is achieved by equipment boundaries and confinement areas as well as under pressure in the system with respect to the building. Furthermore, confinement areas where maintenance activities are carried out are periodically cleaned-up, preventing the accumulation of contamination along all the operation stage.
- Periodical cleaning and decontamination of the necessary components in the PMF will be carried out during the operation phase avoiding contamination accumulation and maintaining very low levels of contamination in the facility.
    - Confinement areas preclude spread out of contamination in the other areas of the room during operation and maintenance activities that would complicate or reduce effectiveness of future decommissioning activities.
    - A special adapted vacuum cleaner is used to clean the PMF, specially the off-gas system and its surroundings, before internal maintenance and so minimize spread of contamination.
- Considering that after termination of the PMF operational phase, all operational waste will be removed from the facility, only minor quantities of activity entrained in the PMF itself will be present.

Many parts of equipment in the PMF are not involved directly in the waste treatment process (electric equipment, cooling units, control devices, etc.) and they are not in contact with RAW materials and sources of ionizing radiation.
Equipment which is part of the waste treatment process (shredder, feeder, PTC, SCC, STC, off-gas equipment until HEPA filter, ash and pouring confinement) will have different residual contamination levels according to their function in the facility process and will be the subject of the decommissioning activities.

It is not expected to have contamination on the platforms and other structures such as temporary storage and AB2 structure.

- Before the shutdown on the PMF, the last waste batch fed to the system shall be non radioactive waste. By this procedure the residual radioactivity into the different components is reduced and is in fact "flushed out".
- Final cleaning and maintenance activities will be carried out after the shut-down of the facility reducing the activity levels during the decommissioning to similar levels to those in PMF maintenance activities.

Therefore, it is expected that only the internal part of the equipment are contaminated and other surfaces outside the process boundaries are potentially clean.

Estimated inventory of radioactive and other dangerous materials in the facility

All incoming radioactive waste and final waste produced in the PMF are classified as Category 2a. Therefore, contamination levels during the decommissioning are commensurate to this waste category.

The estimation is based on several assumptions regarding the following factors:

- Dust loading (g/m^3) that is the concentration of dust in air, and thus available for surface deposition.
- Deposition coefficient for aerosols and reactive gases that is the coefficient used to estimate the amount of radioactive material deposited in the system surface
- Radioactivity decay over the course of the operation time according to waste radionuclide content and their decay constants
- Cleaning factor that is the surface contamination removal fraction for cleaning

For the estimation the facility can be divided in five parts depending on the radiological characteristics of the waste housed during the PMF operation. The estimation of activity deposited in each one is as follows:

- Shredder system: 106.7 Bq/cm^2
- Refractory
  - PTC 2.55 10^9Bq
  - STC 3.62 10^8Bq
  - Elbow 2.07 10^7Bq
- Metal off-gas equipment until bag house 18.5Bq/cm^2
- Ash confinement: negligible
- Pouring confinement: negligible

Assuming an internal surface of 25m^2 in the shredder system and of 200m^2 in the metal off gas equipment, the total inventory results:

- Metal waste susceptible to be decontaminated: 64 MBq.
- Refractory: 3 GBq.

Regarding hazardous materials coming from PMF decommissioning, they are preliminary estimated as follows:

1. NH_3: 200 l
2. Oils: 1033.6 l
3. NaOH: 1000 l
4. Lead: 7000kg

RAW management during the decommissioning

Management of RAW generated during nuclear facility decommissioning shall be performed in accordance to the legislation on RAW management. In particular, the required radioactive waste acceptance criteria specified in Attachment 3 of the Technical Specification for the PMF will be considered.

RAW produced in the decommissioning activities will be classified and sorted according to their physicochemical and radiation characteristics.

Criteria for clearance, reuse-recycle and/or management as conventional waste of material coming from decommissioning will be defined according to applicable Bulgarian regulations.

The generation of radioactive waste shall be kept to the minimum practicable, in terms of both its activity and volume, by appropriate design measures and operating and decommissioning practices. This includes the selection and control of materials, the recycle and reuse of materials, and the implementation of appropriate operating procedures. Emphasis should be placed on the segregation of different types of waste and materials to reduce the volume of radioactive waste and facilitate its management.

According to their residual activity, the materials resulting from the decommissioning activities can be classified into the following groups:

a) Clean materials - Materials located outside the Radiation Controlled Area and not susceptible to be contaminated.

Clean materials not presenting any hazardous or toxic character will be managed as conventional waste and disposed of in conventional urban or industrial waste dumps

b) Waste materials able to be cleared - Materials located in the Radiation Controlled Area but with low probability of containing residual radioactivity.

Solid materials classified as "able to be cleared" initially or after a decontamination process will be transferred to the free release measurement facilities at KNPP site in order to verify the compliance with applicable clearance levels.

c) Radioactive Waste Materials- Those materials containing or externally contaminated.

- Category 1 - transitional waste that can be cleared from regulatory control after appropriate processing and/or temporary storage for a period not longer than five years whereas the waste specific activity reduces below the clearance levels; Radioactive waste classified as Category 1 will be transferred to the on-site interim storage area for this kind of waste to wait for decay to clearance levels.
- Category 2a - low and intermediate level short-lived waste containing mainly short-lived radionuclides (with a half-life shorter or equal to that of ^{137}Cs) and long-lived alpha emitting radionuclides with specific activity less than or equal to 4.10+6Bq/kg in a single waste package and less than or equal to 4.10+5Bq/kg for the whole volume of waste, according to the Regulation on waste management.

Metal material will be placed in $6m^3$ containers or 200l drums and will be transferred to the existing decontamination facilities to reduce residual contamination and reclassify the material as able to be cleared.

PTC and STC refractory removed during the decommissioning phase will be placed in 200 l drums and super-compacted, as planned for refractory removed in maintenance activities during the operation stage.

Compactable waste, such as technological waste, will be placed in 200 l drums and further pre-compacted and super-compacted in the waste processing facilities.
Dust and ashes produced in the cleaning of PMF during the decommissioning phase, especially of the off-gas system, will be collected into 200 l drums and subsequently super-compacted.
Insulation of the cables can be stripped and granulated with a cable treatment machine and placed in 200 l drums, leaving the remaining metal material clean.
Toxic or hazardous waste, although not containing radiological load, must be managed by authorized agents, and disposed of in specific sites, because of its toxic or hazardous character.
Considering the qualitative classification into the groups described above and considering different types of materials, the amount of radioactive waste and materials able to be cleared has been estimated. (table 1.2.4.3-1).

Table 1.2.4.3-1 Solid Residual material inventory (kg)

Type of material	ABLE TO BE CLEARED	RADIOACTIVE WASTE
Metal materials	171097	32115
Concrete	148100	16400
Cable	3164	330
Compactable	1992	
TOTAL	**324353**	**48845**

In addition to the direct waste produced in the PMF decommissioning, some secondary waste will be produced as a consequence of the implementation of the decommissioning activities:

- Dust and ashes from PMF cleaning
- Metal debris from cutting activities
- Technological waste such as protective clothes, polyethylene plastic (PE) foils from temporary confinements for decontamination activities, etc.

Actions, systems and equipment for facilities decontamination and dismantling
During the decommissioning stage all the equipment in the PMF will be dismantled and removed. The PMF is a modular facility, therefore it will be disassembled into its main components for further material management. Cranes and handling devices in AB-2 can be used to assisting the dismantling activities and also to transfer the disassembled components of PMF out of the building through the equipment hatch of room BK301.

A basic prerequisite in this Decommissioning Concept is that facilities for volume reduction and decontamination, for free-release measurement, for waste processing and the required temporary storage areas will be available in KNPP site during plant decommissioning activities. These facilities will allow further management of the removed material in the PMF dismantling.

The following activities are planned for the decontamination and/or dismantling of the PMF facility:

1. Preparatory works
   - Initial characterization of the equipments and components to determine their physicochemical characteristics and radiological characteristic.
   - Liquid RAW in the PMF will be transferred to the effluent system of KNPP and processed through the liquid radioactive waste system within AB-2.

     Drainage system in the AB-2 will collect potential leaks during the decommissioning activities.
   - Isolation of power equipment
   - Remaining oils in the hydraulic systems, diesel in the fuel system and other liquids in the PMF tanks will be retired.
   - Temporary confinements (frame with plastic foil) will be installed for decontamination/ disassembling activities in areas with potential airborne contamination to prevent spread out of contamination to clean areas.
   - Clean-up/ decontamination of the inner surfaces of equipments and components with residual contamination will be performed aimed at reducing contamination levels.
     - Removal of material accumulation in the shredder system
     - Removal of ashes accumulation in the off-gas system with the PMF adapted vacuum cleaner. Then, bag house filters and HEPA filters will be taken away.
     - Removal of left slag and contaminated refractory in the PTC, STC and elbow.
2. Removal of equipment

   Due to the size of some equipment, these will be cut in situ, so that all the pieces have suitable dimensions to be transported and manipulated. Waste material will be transferred to the ad-hoc waste processing facilities existing at the site for their subsequent management according mainly to type and size of material and level of contamination.

   During the dismantling of the equipments, it is important to take into account that the equipment presenting higher level of radiation shall be dismantled firstly in order to minimize the occupational dose. After that, the larger components will be dismantled to make easier the subsequent tasks inside the room.
3. Removal of auxiliary equipment and platforms

   The platforms, auxiliaries systems such as lighting, fire protection system, compressed air system, area radiation monitoring system, ventilation system and AB2 existing cranes are required to continue in operation during decommissioning tasks. Therefore, these systems should be removed at the end of the decommissioning process.
4. Final radiological survey

   Once PMF components and structures are dismantled and removed from the PMF area, remaining structures and auxiliary equipment will be included in a final radiological survey.

1.2.5 Other activities related to the investment proposal

The safety analysis performed in ISAR showed no design or beyond design basis accidents that could lead to significant contamination with radioactive material outside the site of PMF. In this connection, will be developed guidelines for management of accidents describing the actions required of personnel in case of design and beyond design basis accidents. These will be developed based on the results of the analysis of the accidents from the Final Safety Analysis Report, safety functions, operational limits and conditions and further analysis of the behavior of the system under emergency conditions.

For the purposes of occupational safety and health is developed "Plan for Safety and Health." Structure plan for health and safety in accordance with Art. 10 of the Ordinance № 2 of 22.03.2004 minimum requirements for health and safety in the course of construction works.. In the plan developing is taken into account all the measures, rules, programs and instructions for nuclear, radiation, fire, emergency and safety regulations in force in the territory of NPP "Kozloduy".

2. Description of the features of other plans and projects, existing or in process of elaboration or approval, which can exercise adverse impact on the protected areas in combination with the assessed investment proposal

The area within 30 km radius around NPP "Kozloduy" (including that on the left bank of the river) is characterized by exceptional biodiversity which in the past was many times more. This area is a complicated ecological complex, including:

- Significant area of existing and drained swamps in Bulgaria (Tsibarsko, Kozloduy and Ostrovsky), and many drained wetlands or substantially changed in Romania (Bistrets Nedeia Dabuleni etc..)
- Substantially altered vegetation along the banks of the Danube; construction of embankment.
- Corrections and dikes of river beds and estuaries of three major rivers (Ogosta, Skat and Jiu);
- 5 Bulgarian and 2 Romanian islands on which the majority was turned into poplar plantations;
- Significantly area uninhabited plateau with steppe vegetation, almost entirely transformed into fields of cereal crops.

There are few areas in Europe where they are concentrated 3 globally threatened bird species (Lesser White-fronted Goose, pelicans, sea eagle), a Ramsar site and 12 protected areas Natura 2000 network:

Directive **Member State**	**Birds Directive** (SPA)	**Habitats Directive** (SCI)	**Total**	**Ramsar Convention**
Bulgaria	BG0002007 BG0002008 BG0002009 BG0002104	BG0000199 BG0000508 BG0000527 BG0000533 BG0000614	9	Maintained reserve "Ibisha"
Romania	ROSPA0010 ROSPA0023	ROSCI0045 ROSPA0135	3	
Total	**6**	**6**	**12**	**1**

Characteristic of the described ecological complex is the presence of centuries connections and specialization of the the individual elements in it.. For example, nesting colonial fish-eating birds (pelicans, cormorants, egrets, sea eagles) eat in large areas of swamps in Romanian Bistrets Nedeia Dabuleni) and nesting difficult breakthrough Danube islands (including pelicans nest in the past Ostrovo swamp -Reiser, 1894). Wintering flocks of White-fronted geese and gray eat in large fields of Zlatiata doss in the marshes of Bistrets. Some duck species nest on the islands and eat in swamps, etc.

Historically, the major changes in these objects are made in the period after World War II. With few exceptions, there is no assessment of losses in flora and fauna and negative changes in ecosystems in the region of the Bulgarian side. No evidence of such an assessment for the Romanian part of relevant territory. Further negative impact on biodiversity in the region concerned has had the construction of NPP "Kozloduy" (1966-1974, and its extension and operation (since 1974).

Of all the changes and negative impacts the least negative impact on biodiversity has this project.

The analysis of the submitted data from RIoEW Vratza and RIoEW Montana concerning other plans and projects implemented or in process of elaboration or approval in the period 2006 – 2010, affecting Protected Areas from Natura 2000 network, gives rise to the following conclusions in reletion of cumulative effect::

According data from the investor of this IP on site of NPP "Kozloduy" has the following facilities:

- Units 1 to 4. These blocks are now shut down and there is a procedure in their dismantling;
- Units 5 and 6 of Kozloduy NPP. These blocks are now in operation. There is an intention to increase their power and the operational life.
- Dry storage facility for spent nuclear fuel (DSF).. It will be stored spent fuel assemblies in to specially designed for this purpose containers. The design life of the facility is 50 years minimum. Fuel assemblies will be sealed in special storage containers that will ensure their safety during the storage. This project has separate EIA that has a positive decision of the Ministery of Environment and Water.

Chapter 11 Appendix 10 of the EIA-R in accordance with the additional recommendations made by the the MoEW (letter - ref. № OVOS-277/13.12.2012 years - Annex 6 of the EIA) is an "Analysis of radiation exposure of the population from the observed 30 km zone of NPP "Kozloduy" of gaseous and liquid radioactive discharges into the environment from the operation of units 5 and 6 of NPP "Kozloduy", the process of decommissioning of units 1-4 and emissions from operation of the facility for plasma melting (PMF) Project 5b ". Modelling programme code, based on the EU approved methodology CREAM (Consequences of Releases to the Environment Assessment Methodology) Radiation Protection 72 –Methodology for Assessing the Radiological Consequences of Routine Releases of Radionuclides to the Environment.:

- To assess the public dose due to liquid discharges - programme code DARR-CM, as adapted to the hydrology of the KNPP area and used for conservative evaluation of the dose exposure of a critical group of the public.
- To assess the public dose within the supervised area due to gas-aerosol discharges - programme code LEDA-CM, Normal Operation Shield, as adapted to the geographical and meteorological characteristics of the KNPP area. The methodology considers both the external and the internal impact of the radioactive releases and estimates the annual individual effective dose, the annual individual dose equivalent, and the critical group dose, as well as the collective dose for the population, per age groups.

The modelling programme codes used to estimate the individual and the collective effective doses to be incurred by the population from radioactive discharges to the environment, have been verified and validated..

The dose distribution map for the population within the 40-km area and as a function of the distance to the emission source are presented on fig. 2-1 and fig. 2-2. In the selected 40 km

zone enters and observed 30 km zone, but the model is able to provide information on a wide range of 40 km..

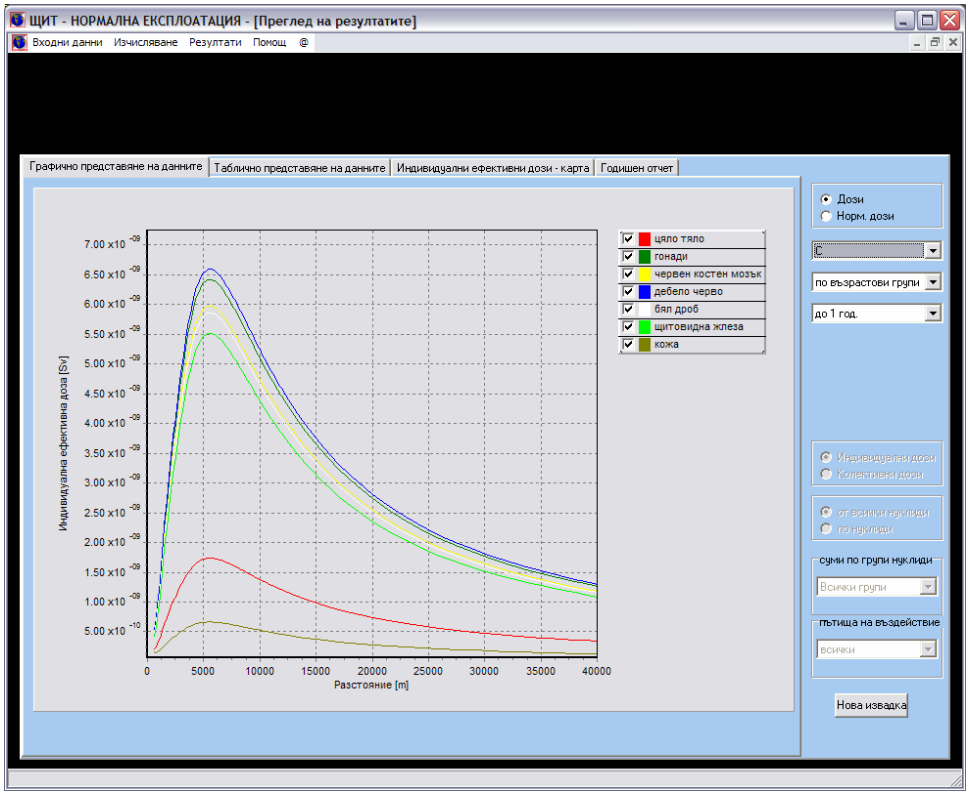
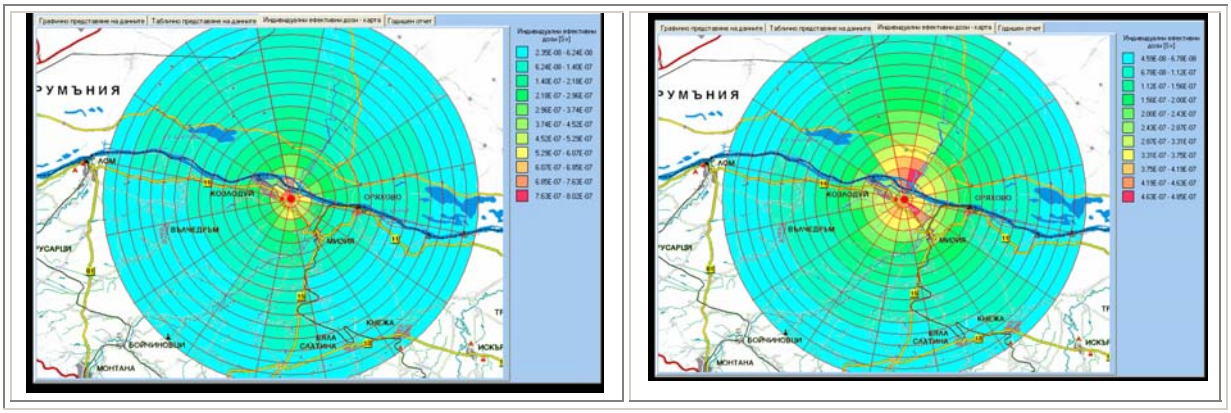


Fig. 2-1 Individual effective dose as function of the distance to the source

The maximum values of the individual effective dose were calculated within the 5-6 km Kozloduy NPP area.



a) with meteorological data for 2010 b) with micro climate data for 2001–2010.

Fig. 2-2 Distribution of the individual effective dose from external exposure to RNGs, LLAs, ^{131}I + (^{3}H, ^{14}C) within the area of Kozloduy NPP, 2010.

Based on the performed analysis for population dose during normal operation Units 5&6 Kozloduy NPP, Decommissioning Units 1-4 KNPP and normal operation of the Plasma Melting Facility (Project 5b) can made the following conclusions:

- The maximum annual effective dose per individual of the critical group of the population living within the 40-km area around KNPP, resulting from the liquid and gas-aerosol releases to the environment, was conservatively calculated at 5.05μSv/a, which is a much lower value than the quota of 250 μSv/a for exposure from radioactive emissions from NPP (Ordinance on the Assuring of Safety of NPPs) and the norms determined for the population of 1 mSv/a (ONRZ-2012, Basic Norms for Radiation Protection).
- The additional dose that might be incurred is about 500 times lower than natural radiation background (2.33 mSv).
- The calculation of the cumulative effect added to the effect of KNPP normal operation, and due to emissions from the decommissioning of KNPP units 1-4, and the normal operation of the plasma melting facility (PMF), Project 5c) results in a negligible increase of the maximum individual and collective effective doses by 0.5 to 1%.
- The maximum annual effective dose of the population within the 40-km area around KNPP, and due to aerosol emissions only, 6 MBq under normal operation of the plasma melting facility (PMF), was estimated at 5,47.10-10 Sv/a, which is barely 0.01% from the total exposure resulting from all activities on the KNPP site.
- The comparisons of the collective effective dose values for the population around KNPP with the respective data for many other nuclear power plants with PWRs (WWERs) reactor type proved comparable with the practice worldwide.

As can be seen the estimates cumulative effect of emissions on the normal operation of Units 5 and 6 of NPP "Kozloduy", due process of decommissioning of Units 1-4 of NPP "Kozloduy" and normal operation of the facility for plasma melting (PMF Project 5b), leads to a negligible increase of the maximum individual and collective effective doses of 0,5 to 1%, i.e. it is not necessary to recalculate the size of the established zones with special status of "Kozloduy".NPP.

2.1 On the territory of PA Zlatiata, code BG0002009 under the Bird directive

The following investment proposals are planned to be implemented:
Decommissioning of the existing municipal solid waste landfill of Kozloduy town;
Primary foresting of the non-arable lands on the land of Hairedin village;
Fish farming in the existing micro dam lake on the land of Butan village; overhaul of Trite bora restaurant At Haredin village;
Rubble extraction from Ogosta river bed; correction of Ogosta river bed within the land of Hairedin village;
Reconstruction and renovation of sheeps-breeding farm;
Construction of breast wall for consolidation of left river bank of Ogosta;
Construction of a micro hydropower plant Ogosta-4; Construction of a micro hydropower plant Ogosta-5;
Construction of a micro hydropower plant Elena on Ogosta river and Wind Farm Valtchedram.
The comparative analysis of the Investment Proposal for PMF construction, operation and decommissioning and of the planned projects implementation characteristics has given the opportunity to make the conclusion that in combination with the assessed IP the above IPs will not cause adverse impact on the birds in the PA Zlatiata.
Analysis of the IP Construction and operation of „National RAW repository" shown that combination with the the assessed IP (PMF) will not impacts on the birds in the PA Zlatiata.
The assessment of the possible cumulative effect on the bird species, subject to conservation in this area, is that such an effect is not expected.

2.2 On the territory of PA Kozloduy Islands, code BG0000533 under the Habitats directive

Other plans and projects are not planned to be implemented.

2.3 On the territory of PA Ogosta River, code BG0000614 under the Habitats directive

Three IPs are planned to be implemented: Construction of Wind Farm by installation of 55 WEA on the lands of Selanovtsi village and Oriahovo town, Oriahovo municipality; Construction of micro hydropower plant on Ogosta river with the output of 530kW within the land of Harlets village, Kozloduy municipality; Construction of micro hydropower plant Glozhene on Ogosta river within the land of Glozhene village, Kozloduy municipality.
The comparative analysis of the Investment Proposal for PMF construction, operation and decommissioning and of the planned projects implementation characteristics has given the opportunity to make the conclusion that in combination with the assessed IP the above IPs will not cause adverse impact on the species and habitats in the PA Ogosta River.
The assessment of the possible cumulative effect on the target fauna species, as well as on the habitats, subject to conservation in this area, is that such an effect is not expected.

2.4 On the territory of PA Skat River, code BG0000508 under the Habitats directive

Three IPs are planned to be implemented: Sturgeon fish-farming on the land of Saraevo village and Mizia town; Skat river bed correction in the region of Mizia town in the residency area; Construction of breast dams on Skat riverbanks on the land of Krushovitsa village, Mizia Municipality
The comparative analysis of the Investment Proposal for PMF construction, operation and decommissioning and of the planned projects implementation characteristics has given the opportunity to make the conclusion that in combination with the assessed IP the above IPs will not cause adverse impact on the species and habitats in the PA Skat river.

The assessment of the possible cumulative effect on the target fauna species, subject to conservation in this area, is that such an effect is not expected.

3. Description of the investment proposal elements, which separately or in combination with other plans, programs or projects/investment proposals could exercise significant impact on the protected areas and their elements

The impact of the Investment Proposal for PMF construction, operation and decommissioning (IP) on the protected areas can be combined with the Investment Proposal for Decommissioning of Units 1-4 of Kozloduy NPP and operation of Units 5 and 6 of Kozloduy NPP .
In relation with the decommissioning activities on the power units, the implementation of preparatory supporting projects during the Pre-Decommissioning Stage is planned and they can be sub-divided into: Projects for removal of the hazardous materials, Projects for processing of the accumulated operational RAW, Projects for pre-decommissioning activities and Projects for additional infrastructure construction.
The most important projects, which are presently planned to be implemented during the abovementioned stages (Pre-Decommissioning Stage, Decommissioning Stages 1 and 2), are the following:

Project: Spent Fuel Dry Storage Facility (SFDSF)
The KNPP Spent Fuel Dry Storage Facility (SFDSF) will store spent nuclear fuel assemblies in specially designed storage casks. The design life of the facility is at least 50 years. Fuel assemblies will be sealed into purpose-built storage casks which will ensure their safety during the storage period. For this project a separate EIA-R was drafted and there is a positive decision from the MOEW on it. Construction and assembly works are in the process of implementation on the site.
Project: Liquid Radioactive Waste Treatment Facility

This project should provide equipment for the treatment of low contaminated water from active laundry, hot showers and floor drains from KNPP Units 1 to 4, and the possible conditioning of the generated radioactive waste. Currently, this waste is being treated by the operating KNPP SVO-3 of Units 1 to 4, which will become non-operational upon completion of the treatment of all operational liquid RAW.
Project: Liquid RAW Decontamination and Treatment Equipment (Danube Installation)

This project should provide mobile equipment to be used for the decontamination of surfaces of the reactor pool, the spent fuel storage ponds (SFSP), the racks and other open or closed tanks, of the water therein, as well as for the conditioning of resulting radioactive waste. According to MoEW letter Ref. No. 26-00-2555 to KNPP the project does not come under the Investment Proposals specified in Appendix 1 and 2 of EPA and is not subject to a mandatory EIA.

Project: Spent Ion-Exchange Resin Retrieval and Conditioning Facility

This project should provide equipment for retrieving and conditioning of the Spent Ion-Exchange Resins from the existing storage tanks.
Project: Facility for Treatment and Conditioning of solid RAW with High Volume Reduction Factor (Plasma Melting Facility)

This project should provide a high volume reduction factor (HVRF) facility for the processing of solid low level radioactive waste currently stored in a number of locations on the KNPP site. The project envisages the drafting of a separate EIA-R.

Project: Facility for Retrieval and Processing of the Solidified Phase from Evaporator Concentrate Tanks currently stored in tanks in Auxiliary Buildings 1 and 2

This project is to provide supply and installation of a facility for Retrieval and Processing of the Solidified Phase from Evaporator Concentrate Tanks currently stored in tanks in Auxiliary Buildings 1 and 2.

Facility for Retrieval and Processing of the Solidified Phase from Evaporator Concentrate Tanks currently stored in tanks in Auxiliary Buildings 1 and 2

This project shall provide the supply and installation of a facility for Retrieval and Processing of the Solidified Phase from Evaporator Concentrate Tanks currently stored in tanks in Auxiliary Buildings 1 and 2.

Free Release Measurement Facility

This project shall ensure the supply of equipment able to measure the γ-activity for the purpose of releasing dismantled equipment and other materials from regulatory control. This project covers the provision of equipment for radiological inventory allowing the free release of the dismantled equipment and materials

Supply of equipment for Liquid and Gaseous Discharge Monitoring System

The purpose of this project is to meet the requirements of the European Commission that are listed in the European Commission Recommendation 2004/2/EURATOM and by the NRA concerning the KNPP Discharge Monitoring System. These requirements will be met by upgrading the existing monitoring system for the liquid and gaseous emissions of KNPP Units 1 to 4. The intended purpose of this system is to improve and optimize the existing system for monitoring (surveillance) of the liquid and gaseous emissions from KNPP Units 1 to 4..

Project: Size Reduction and Decontamination Active Workshop (SRDW)

This project envisages that the workshop be used for size reduction and decontamination of dismantled radioactively contaminated materials from the Turbine Hall, the Reactor Buildings and Auxiliary Buildings 1 and 2.

Project: Decay Storage Site for Transitional RAW (DSS)

This project envisages storage of transitional solid RAW of category I. The transitional RAW will temporarily be stored in containers at this site for a period not longer than 5 years of decay until the radioactivity of the contaminated elements comes down to a level suitable for free release.

Project: Construction of a Heat Generation Plant

The purpose of this project is the design, construction and commissioning of a Heat Generation Plant as a back-up source of steam and central heating water to the consumers at Kozloduy NPP in case of simultaneous outage of KNPP Units 5 and 6. According to MEW Letter Ref. No B-1214/29.07.2009 the Investment Proposal is subject to a mandatory EIA and namely this project requires the elaboration of a separate EIAR..

Project: Construction og National RAW repository

This project shall provide disposal of shortlived low and intermediate RAW generated. This project is in phase of technical design and elaboration of the safety analysis report. This project has been subject to separate EIA procedure finalized with positive statement by the competent authority – MEW.

During the PMF construction the performing of the main dismantling activities (removal of the middle roof installations (between rows "б" and "в"); removal of the middle roof rafters; removal of the horizontal middle roof ties (between "б"-"в" and axes 14-15 and 18-19); removal of the transverse collar beams in the middle); temporary strengthening of the steel construction; strengthening of the existing elements and mounting of new ones; installation of supporting steel construction and reinforced concrete foundations for the main and additional equipment; disposal of the construction waste and building of internal infrastructure, **direct impact on the flora and fauna in the protected areas is not expected**.

During PMF operation potential impact on the protected areas may be exerted by RAW transportation if there are deviations from KNPP standards in the physical and radiation characteristics of the waste containers. Therefore, it is recommended that the radiation characteristics of the waste containers are measured before their transportation to the PMF. **Negative impact on the PA is not expected** during normal functioning of the PMF in terms of processing and entering of the shredded waste into the PTC, passing of the unburned gases, through the Emissions control system, which controls chemical parameters such as CO, SO_2, NOx, HCl, NH_3, O_2, H_2O and TOC, before entering the stack. **Negative impact on the PA is not expected** during normal functioning of the cycle of pouring the slag into moulds, transportation and measurement of the finally treated drums and characterization of the final product, with a well conditioned product at the end of the process, which does not contain liquids, organic materials and radioactive contamination from external sources. The finally treated drums contain stable vitrified waste. Further on, these drums are immobilized by cement in larger drums in order to comply with the acceptance criteria defined in the Bulgarian legal documents.

The Radiation Protection Program will be based on the assessment of operational dose rates to the personnel working at AB-2 and to the public considering magnitude and location of sources of ionizing radiation in the PMF, as described in previous sections.
Special measures for prevention, mitigation and compensation of negative impacts on the PT and PA from Natura 2000 during operation, other than the best practices, are not recommended.
Potential indirect impacts on parts of the PA in some risk situations are possible during decommissioning activities related to removal of existing components or systems, decontamination of components and the cutting and handling of large pieces of equipment.
The end goal of the PMF decommissioning activities is the restoration of the area where PMF is situated to a condition as close to the original as possible, while preserving human health, the environment and keeping the regulatory requirements.
All incoming RAW and final waste generated in the PMF are determined as Category 2a. Therefore, the levels of contamination are commensurate with this category of waste.
Negative impacts on the PT in the KNPP territory are not expected during treatment of RAW generated during decommissioning of nuclear facilities in accordance with the regulations regarding RAW management.

Special measures for prevention, mitigation and compensation of negative impacts on the PT and PA during PMF decommissioning, other than the best practices are not recommended.

4. Description of the protected areas, habitats, species and the objectives of the management at the national and international level and taking them into account when preparing the investment proposal

The protected areas covered by this assessment are: one under the Birds Directive and three under the Habitats Directive.They area at distance from Kozloduy NPP site as follows:

- Protected Area "Zlatiata", code BG0002009 – 1.2 km
- Protected Area "Kozloduy Islands", code BG0000533 – 3 km
- Protected Area "Ogosta River", code BG0000614 – 6 km
- Protected Area "Skat River", code BG0000508 – 7 km
- Protected Area "Kozloduy " , code BG0000527 – 1.19 km
- Protected Area "Tsiber" , code BG00005199 – 19 km

They will be examined sequentially.

4.1 General description of Protected Area "Zlatiata", Code: BG0002009 under the Birds Directive

4.1.1 General description

Protected area "Zlatiata" is located on large part of table land "Zlatiata", in NorthWest Bulgaria, in the Danube Valley between the Danube River and the Town of Kozloduy to the North, road connecting the Town of Vulchedrum and Hayredin to the South and the riverbeds of the Rivers Tsibritsa and Ogosta to the West and East. It is located on tableland-like levelled land with open grass areas of steppe type and agricultural areas. At some places there are earth loess walls and low trees and bushes, mainly of Common Hawthorn /Crataegus monogyna/, dog rose /Rosa canina/ and etc. On the ground walls there are plenty of Begonia Altissima /Ailantis altissima/. On the territory of the Zlatiata, Shishmanov Val Dam (Asparuhov Val), the micro-dams of Bazovets and Hayredin and several smaller water basins are located (Michev&Stoyneva, 2007). Also, there are scattered pastures, fruit gardens, vineyards, field protection belts and small forests of broad-leaved trees, as well as river-side forests alongside the Ogosta River.

4.1.2 Intended purpose

According to the order of the Minister of Environment and Waters, the Protected Area "Zlatiata" is proclaimed for the purpose of:

- Protecting and maintaining the habitats of the bird species specified in Item 2 for the sake of achieving their favourable environmentally protected status;
- Restoring the habitats of the bird species under Item 2, for which improvement of their environmentally protected status is needed;

Zlatiata does not have statutory protection under the Protected Territories Act. In 1997 BirdLife International proclaimed a small part of this territory an Ornithologically Important Place. In 2005 the entire territory of Zlatiata was proclaimed an Ornithologically Important Place.

4.1.3 Protected species

According to the order of proclamation of the protected area (SG No.83/2008), there are 51 species of protected birds in this area. They are distributed as follows:

33 species under Item 2.1 of the Order of MoEW

Eurasian bittern (*Botaurus stellaris*), Little bittern (*Ixobrychus minutus*), Little egret (*Egretta garzetta*), Purple heron (*Ardea purpurea*), White stork (*Ciconia ciconia*), Honey buzzard (*Pernis apivorus*), Black kite (*Milvus migrans*), Short-toed eagle (*Circaetus gallicus*), Marsh harrier (*Circus aeruginosus*), Hen harrier (*Circus cyaneus),* Pallid harrier (*Circus macrourus),* Montagu's harrier (*Circus pygargus*), Levant sparrowhawk (*Accipiter brevipes*), Long-legged buzzard (*Buteo rufinus*), Lesser spotted eagle (*Aquila pomarina*), Red-footed falcon (*Falco vespertinus*), Peregrine falcon (*Falco peregrinus*), Merlin (*Falco columbarius),* Common crane *(Grus grus),* Great bustards (*Otis tarda*), European nightjar (*Caprimulgus europaeus*), Common kingfisher (*Alcedo atthis*), European roller (*Coracias garrulus*), Grey-headed woodpecker (*Picus canus*), Syrian woodpecker (*Dendrocopos syriacus*), Calandra lark (*Melanocorypha calandra*), Greater short-toed Lark (*Calandrella brachydactyla*), Woodlark (*Lullula arborea*), Tawny pipit (*Anthus campestris*), Barred warbler (*Sylvia nisoria*), Red-backed shrike (*Lanius collurio*), Lesser grey shrike (*Lanius minor*), Ortolan bunting (*Emberiza hortulana*).

18 species under Item 2.2 of the Order of the MoEW

Little grebe *(Tachybaptus ruficollis),* Great crested grebe *(Podiceps cristatus),* Black-necked grebe *(Podiceps nigricollis),* Great cormorant *(Phalacrocorax carbo),* Grey heron *(Ardea cinerea),* Mallard *(Anas platyrhynchos),* Garganey *(Anas querquedula),* Eurasian sparrowhawk *(Accipiter nisus),* Common buzzard *(Buteo buteo,* Common kestrel *(Falco tinnunculus),* Hobby *(Falco subbuteo),* Water rail *(Rallus aquaticus),* Common moorhen *(Gallinula chloropus),* Eurasian coot *(Fulica atra),* Little ringed plover *(Charadrius dubius),* Northern lapwing *(Vanellus vanellus),* European bee-eater *(Merops apiaster),* Sand martin *(Riparia riparia).*

4.1.4 Quality and importance

According to the Standard Form 122 bird species have been identified in Zlatiata, of which 28 species have been entered in Bulgaria's Red Book and 53 species are of European environmental importance (SPEC) (BirdLife International, 2004). 5 species are in the SPEC2 category of globally endangered species, whereas 15 species are in category SPEC2 and 36 species are in category SPEC3 of European endangered species. This place is one of the most important places of Community importance in Bulgaria for the group of species who love mainly open areas – White Stork (*Ciconia ciconia),* Marsh Harrier (*Circus aeruginosus),* Montagu's Harrier (*Circus pygargus),* Levant Sparrowhawk (*Accipiter brevipes),* Red-Footed Falcon (*Falco vespertinus),* Twany Pipit (*Anthus campestris),* Greater short-toed Lark (*Calandrella brachydactyla),* Ortolan bunting (*Emberiza hortulana)* etc. In Zlatiata there are considerable nesting populations of Bee-eater *(Merops apiaster),* Skylark /*Alauda arvensis*/ Common Quail /*Coturnix coturnix*/. This is the only place in Bulgaria where the Great Bustard /*Otis tarda*/ could be seen. During the winter in Zlatiata there is another endangered species that could be seen – Lesser white-fronted goose /*Anser erythropus*/, which uses the fields for feeding together with the flocks of the Great white-fronted goose /*Anser albifrons*/.

4.1.5 Vulnerability

Zlatiata is the biggest compact non-inhabited plain territory in Bulgaria. It is affected by human activities that have to do primarily with agriculture, forestry and infrastructure development. The intensification of agriculture, the use of pesticides and artificial fertilizers, the removal of hedges and shrubs are the activities with the most serious adverse impact on the quality of the habitats. The logging of riverside forests and the cutting of trees in the field protection belts result in a rapid and steep fall in the population of the Red-footed falcon *(Falco vespertinus)*, because of the disappearance of the nesting places. The construction of wind energy farms is a potential threat both for the habitats and for the birds in this region.

4.1.6 Description of the habitats

The following habitats are indicated in the standard form for the protected area:

Land cover classes	*% Coverage*
Water inland areas (not running and running waters)	1
Shrubby communities	0
Dry grass communities, steppe	4
Extensive grain crops (including rotation crops periodically let lie fallow)	90
Other plough land	0
Broad-leaved deciduous forests	1
Non forest regions, cultivated with wood vegetation (incl. fruit trees, vineyard, hedges)	1
Rocks within the island, taluses, sands, permanent snow and glaciers	0
Other lands (including towns, villages, roads, dumping-grounds, mines, industrial sites)	3
Total Coverage	*100*

4.2 General description of Protected Area "Kozloduy Islands", Code: BG0000533 under the Habitats Directive

General characteristics

Protected Area BG0000533 "Kozloduy Islands" is of Type "B" under Directive 92/43/EEC on Protection of the Natural Habitats and of the Wild Flora and Fauna. The total area of the Protected Area is 6,057.60 dka. It lies at an altitude of between 20 m and 34 m.

The Protected Area has no connection with other areas protected under Nature 2000.

The main objectives of the protection in the Protected Area are as follows:

- Preserving the area of the natural habitats and the species habitats and populations that are subject to protection within the boundaries of the protected area.
- Preserving the natural condition of the natural habitats and species habitats that are subject to protection within the boundaries of the protected area, including the natural species composition, typical species and environmental conditions typical for these habitats.
- Restoring, where necessary, the area and natural condition of the priority natural habitats and species habitats, as well as of the populations of species subject to protection within the boundaries of the protected area.

The area includes three larger islands. About 70% of the Kozloduy Islands are covered by forest plants. The Western part of Svrakata Island is covered with sandy deposits. The site is of medium to high conservation value. The Northern part of the Svrakata Island and the foreland of the Kozloduy Island are comparatively unaffected by human activity. The Southern part of the Svrakata Island and the tail of the Kozloduy Island are endangered by the invasion of introduced wood and shrubbery species. Natural forests of Salix alba, Ulmus minor and Populus nigra happen to lie in the protected area.

In terms of land cover classes, the territory of the protected area is sub-divided into the following groups:

Land cover class	*% Coverage*

Coastal sand dunes, sandy beaches.....9
Water inland areas (not running and running waters).....33
Swamps, marshlands, vegetation alongside the banks of water basins, bogs.....4
Shrubby communities 12
Broad-leaved deciduous forests 7
Artificial forest monoculture (e.g. plants of poplars or exotic trees).....34
Other land (including towns, villages, roads, dumping grounds, mines, industrial sites) 1
Total coverage..... 100

4.2.1 Types of vegetation and natural habitats that are subject to protection in the protected area

The following habitats and species are included in the standard form as subject to protection in the area:

TYPES OF HABITATS from Appendix I of Directive 92/43/EEC

91E0	*	Alluvial forests of Alnus glutinosa and Fraxinus excelsior (Alno-Pandion, Alnion incanae, Salicion albae)
3130		Olithotrophic to mesotrophic standing waters with vegetation of Littorelletea uniflorae and/or Isoeto-Nanojuncetea
3270		Rivers with muddy banks with Chenopodion rubri and Bidention p.p.
91F0		Riparian mixed forest of Quercus robur, Ulmus laevis and Fraxinus excelsior or Fraxinus angustifolia along the great rivers (Ulmenion minoris)

Note: The * symbol denotes a habitat type which is of priority importance as far as its protection is concerned.

Habitat 91 E0 - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Pandion, Alnion incanae, Salicion albae)* is formed on rich, alluvial soils that are periodically flooded during the seasonable increase of the level of the Danube River. In the formed riverside flooded forests, mostly the species of *Salix alba, Populus alba, Populus nigra* and *Salix fragilis* dominate. The vegetation communities belong to the cenose of *Salicion albae*. The communities include also species of *Ulmus laevis, Ulmus minor, Quercus robur, Rubus caesius, Clematis vitalba, Humulus lupulus, Vitis sylvestris, Solanum dilcamara, Euphorbia lucida, Lythrum salicaria, Phragmites australis, Typha latifolia, Leucojum astivum* etc. The representativity of the habitat is assessed as good, in terms of relative area it is class C 2% >= p >0; the equated extent is “good preservation” and the total assessment of the site is “good value”.

Habitat 3130 - Oligotrophic to mesotrophic standing waters with vegetation of *Littorelletea uniflorae* and/or *Isoeto-anojuncetea* is formed along the Danube river coastline over drying wet sediments of silt and sand, which develop pioneer communities of annual hydrophytes in late summer. The representativity of the habitat is assessed as good, in terms of relative area it is class C 2 >= p >0; the equated extent is “excellent protection” and the total assessment of the site is “excellent value”.

Habitat 3270 - Rivers with muddy banks with *Chenopodion rubri* and *Bidention p.p.* are formed along the Danube River and the larger rivers, the coasts of which develop annual nitrophilic and ruderal communities. They often form complexes with habitat 3130. The representativity of the habitat is assessed as good, in terms of relative area it is class C) 2% >= p >0; the equated extent

is "good preservation" and the total assessment of the site is "good value".

Habitat 91 F0 - Riverside mixed forests of *Quercus robur, Ulmus laevi* and *Fraxinus excelsior* or *Fraxinus angustifolia* alongside big rivers (*Ulmenion minoris*) are formed on newer periodically flooded alluvial depositions. The vegetation communities usually belong to the association *Scutellario altissimae-Quercetum roburis*. The participation of the lianas in communities is relatively small in comparion to the dense forests, whereas the grass cover is of well formed spring nature of *Scilla bifolia, Anemone ranunculoides, Ranunculuc ficaria, Polygonatum ssp*. etc. The representativity of the habitat is assessed as "negligible existence", in terms of relative area it is class C) 2 % >= p >0.

;

2 flora species, which have to do with the environmental protection and management of the site, are included in Group "Other important flora and fauna species":

Tx.group	*NAME (in Bulgarian)*	*Local population*	*Motivation*
a	*NAME (in Latin)*		
P	*Shining spurge*	R	D
	Euphorbia lucida		
P	Summer snowflak	R	D
	Leucojum aestivum		

Where:

Tx.group – taxonomic group of the respective species is marked according to the following nomenclature:
P – plants
Name – name of the species
Local population – In the cases when there is no digital data available, the size/density of the population is shown, specifying whether the species are typical (C), rare (R) or extremely rare (V). When there are no data about the population, the species is marked as existing (P).
Motivation – motivation about inclusion of each species is indicated by using the following categories: A) National Red Book; B) endemic species; C) international conventions (incl. Bern, Bonn and Convention for biodiversity); D) other reasons.

4.2.2 Animal species subject to protection

The animal species subject to protection in this area according to the standard form are as follows:

Invertebrates (Invertebrata)

Mollusca/mussels – Molusca/Bivalvia

Thick shelled river mussel – *Unio crassus*

This species lives in the downstream areas of relatively big rivers. It inhabits sections with sandy-slimy-clayey bottoms. It is much more rarely encountered in slow-flowing and stagnant water basins. The density of this species varies within a wide range from 2-3 specimens to 80-90 specimens per m^2. According to the specialists, the drop in the population of this species is a consequence of the pollution of rivers by chemical substances, the accumulation of decaying organic substances on the bottom of the water basin and appearance of plastic invasive species, competing special species.

According to the form for this area, this species is a rare one with a relatively low density, but the population is in a good environmental protection condition.

Insects/Coleoptera

Stag beetle – *Lucanus cervus*

The habitats of this species are old broad-leaved deciduous forests with rotting wood fallen on the ground. The larvae develop and undergo metamorphosis over 3-5-7 year periods feeding primarily on oak or other rotting wood. This species flies at dusk, when it can be seen in flight. The main problem facing the protection of this species is the lack of sufficient nutrients for the development of the larvae. According to the standard form, this is a rare species in this protected area. The populations are of relatively low density because of the absence of sufficient nutrients and other substances for the reproduction, nutrition and metamorphosis of the species.

Long-horn beetle – *Rosalia alpina*

An intra-zonal species is encountered in shoreline habitats and in humid and mesophilic old broad-leaved deciduous forests. The main components of its habitats are wild forests with a predominance of mesophilic tree vegetation. The larvae develop in beech-trees, elm-trees, alder-trees, maple-trees, lime-trees, willow-trees, etc. The metamorphosis lasts 3-4 years. This species is active in the daytime and flies in the period July-August. In these periods the insects can be observed on the trunks of the trees and on the foliage. In the scientific sources there is no data as to the settlement of this species in the region of the protected area. According to the author of the form, this is a rare species but is in good environmental protection condition.

Vertebrates (Vertebrata)

Jawless/ hagfishes- Agnatha/Cyclostomata

Ukrainian brook lamprey – *Eudontomyzon mariae*

This is a scientifically proven species on a one-time basis over the last 20 years for the region of the Town of Tutrakan. In the course of scientific electro-fishing in the central insland swamp, at the end of the summer of year 2006, several specimens were captured, two of which are stored for expert assessment in a scientific collection. According to word of mouth by fishermen, representatives of this species were caught on several occasions in the regions of the Town of Russe, Town of Silistra and Belene Island over the last 5 years. This species was never scientifically proven to exist in the region of the protected area. According to the author Hinkov (2005), it is stated, in the standard form for the area, that this is a very rare species, of low density but in very good environmental protection condition. The biology of the species inhabiting the Danube River has not been studied. The status and belonging to this species of the available specimens has not been determined unequivocably, doubts being raised by the considerable differences between the biology of the species and the biology of the specimens which have not been diagnosed by a specialist.

Damselfishes - Pisces/Osteichthyes

Danube streber – *Alosa immaculata*

This species is transitory and enters into its reproduction stage during the month of May, moves together in big schools in the upper water strata. In the past it was a species of economic value and was subject to massive fishing, because of which the current status of the species does not allow its use for economic purposes. The regulations for the fishing of this fish take into account

its breeding period and the quantities fished are relatively small and for satisfying household needs and in small quantities for the market in the towns on the Danube River. During the last 10 years this species demonstrates a trend towards stabilization of its stock, a conclusion drawn by us based on the relatively constant catches after the end of the fishing ban.

Cyprinidae – *Aspius aspius*

According to the author of the form, this is rare species, of low density but in good environmental protection condition. Based on our data obtained through studying the catch of fishermen, in the region of the mouth of the Tsibritsa River, we found constant catches of specimens of various ages of the Cyprinidae species, which are evidence of the relatively stable status of this species. This predator is easy to spot even by eyesight when observing the shoreline area of the river during sunset. Chasing its prey, this predator is shearing the water surface with its pectoral fin.

Whitefin gudgeon – *Gobio albipinnatus*

In the form, this species is said to be frequently encountered and in good populational and environmental protection condition.

Ziege – *Pelecus cultratus*

This is an extremely rare species for the Danube River. From its status of an economically significant species, its density has fallen to the brink of survival.

Fish linn – *Rhodeus sericeus amarus*

It is encountered on a massive scale in all the appropriate water basins. It co-habitates with the fresh water shells, where it lays its eggs.

Balkan loach – *Cobitis elongata*

According to the form, this is a very rare species but according to our information from specific studies, the density characteristics are in stable condition.

Spinned loach – *Cobitis taenia*

It is not encountered in Bulgaria, It is found in the North. In Bulgaria and along the Danube River, the species C. *elongatoides* is encountered (Bacesku & Maier, 1969). The data is from Kottelat, M. & J. Freyhof (2007)

Balon's ruffle – *Gymnocephalus baloni*

Stripped ruffle – *Gymnocephalus scraetzer*

These two species are described as frequently occurring and in stable environmental protection condition. Both are deep-water species and inhabit the bottoms covered with coarse gravel.

Zingel zingel – *Zingel zingel*

Zingel streber – *Zingel streber*

Both these species are reported in the form to be rare but in excellent environmental protection condition. These cold-loving species are active during the winter months and in early spring, when they reproduce. During the rest of the year, they hide in the deep river pools and their identification is difficult and infrequent.

Amphibia – *Amphibia*

Danube crested Newt Danube crested Newt – *Triturus dobrogicus*

Fire-bellied toad – *Bombina bombina*

The information from the form about these two species is that their density has not been determined. Both species are frequently encountered in the shoreline area of the river, where the Fire-bellied toad can be scientifically proven from a distance by its melodious sound signals. The two species are especially frequently occurring in the island's territories, where small and shallow swamps are formed and preserved over the entire year.

Reptiles – *Reptilia*

European pond turtle – *Emys orbicularis*

It is a typical species for the river and the Island territories. Isolated specimens are caught in vinters and fishing nets, where they die. Very frequently specimens of this species are killed for no obvious reason because of erroneous perceptions about the primary food of the species.

Mammals – *Mammalia*

European Otter – *Lutra lutra*

According to the Standard Form, the territory of the protected area is inhabited by 3-4 specimens. No specific methodology for identification has been described, but over such a big and trophically rich area a higher density should be expected. The data on this species is scarce and incidental for this specific region, but the studies in other regions of the country have shown an increase in the density of the species, which may also be anticipated for this region as well.

4.3 General description of Protected Area "Ogosta River", Code: BG0000614 under the Habitats Directive

Protected Area BG0000614 "Ogosta River" is of the "K" Type under Directive 92/43/EEC on the Protection of the Natural Habitats and of the Wild Flora and Fauna. The total area of the Protected Area is 12,532.40 dka. It lies at an altitude of between 19 m and 183 m. The Protected Area has connection to other protected areas under Natura 2000.

Code of the site	Name of the site	Type of the site
BG0000508	Skat River	E
BG0002009	Zlatiata	J

PA BG0000614 has also connection to one protected territory

Name	Category	T	%
Dineva Mogila (Dineva Mound)	Protected Territory*	0.02	

Name – name of the protected territory. *Category* – category of the protected territory pursuant to the Protected Territories Act. *T (type of overlap)*: = total overlap; + is contained entirely in the Natura 2000 Area; * - the two (Protected Territory and Protected Area) partially overlap; / neighbouring places; % - percentage overlap compared to the total area of the Natura 2000 Area.

The main objectives of the protection in the protected area are the following:

- Preserving the area of the natural habitats and the species habitats and populations that are subject to protection within the boundaries of the protected area.
- Preserving the natural condition of the natural habitats and species habitats that are subject to protection within the boundaries of the protected area, including the natural species composition, typical species and environmental conditions typical for these habitats.
- Restoring, where necessary, the area and natural condition of the priority natural habitats and species habitats, as well as of the populations of species subject to protection within the boundaries of the protected area.

The protected area includes the riverbed and the banks of the Ogosta River. The banks of the Ogosta River are reinforced, the bottom is covered with a lot of sediments and the water is eutrophic, which is a consequence of the impact of the dam near the Town of Montana. The accumulation of sediments and the eutrophic water are the reason for the formation of habitats 3260 and 3270, which are of Community importance. Near the Village of Kriva Bara, there are the remnants of an old riverbed which is 5 km long and which has turned into a eutrophic lake with macrophites. The Protected Territory "Daneva Mogila" established by Order 413 of 10.05.1982 is located on the right bank of the Ogosta River. This is a place of spectacular scenery and with a group of old trees of Quercus robur. The Blatoto Area [Swamp Area] (3150) is located near the mouth of the Ogosta River. The last 4-5 km of the riverbed of the river are overgrown by aquatic vegetation (3260) and are rich in fish. On the slopes of the marshland to the West of the Town of Oryahovo, there is Panonian loess steppe vegetation* (3260) with a diverse flora and fauna.

In terms of earth cover classes, the territory of the Protected Area is sub-divided into the following groups:

Land cover classes	*% Coverage*
Water inland areas (not running and running waters)	3
Swamps, marshlands, vegetation alongside the banks of water basins, bogs	7
Dry grass communities, steppe	2
Extensive grain crops (including rotation crops periodically let lie fallow)	20
Improved pastures (artificially created from grass mixtures)	56
Broad-leaved deciduous forests	2
Artificial forest monoculture (e.g. plants of poplars or exotic trees)	10
Total coverage	100

4.3.1 Types of vegetation and natural habitats subject to protection in the protected area

The following habitats and flora species have been included in the Standard Form of the area as subject to protection.

HABITAT TYPES from Appendix I of Directive 92/43/EEC

91E0 * Alluvial forests of Alnus glutinosa and Fraxinus excelsior (*Alno-Pandion, Alnion incanae, Salicion albae)*

3150 Natural eutrophic lakes with vegetation of the *Magnopotamion* or *Hydrocharition* type

3260 Lowland or mountainous rivers with vegetation of *Ranunculion fluitantis and Callitricho-Batrachion*

3270 Rivers with muddy banks with *Chenopodion rubri & Bidention p.p.*
6250 * Panonian loess steppe grass communities
91Z0 Mizian forests of silver lime

Habitat 91 E0 - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Pandion, Alnion incanae, Salicion albae) are formed on rich alluvial soil periodically flooded by the seasonal rise of the Danube. The representativity of the habitat is assessed as excellent, in terms of relative area it is class C 2 >= p >0; the equated extent is "excellent protection" and the total assessment of the site is "excellent value".
Habitat 3150 – In natural eutrophic lakes with vegetation type *Magnopotamion* or *Hydrocharition* various hydrophytic communities of floating plants and rooted to the bottom plants with floating leaves and underwater *Potamonion* macrophytes. The representativity of the habitat is assessed as excellent, in terms of relative area it is class C 2 >= p >0; the equated extent is "excellent protection" and the total assessment of the site is "excellent value".
Habitat 3260 - Lowland and mountain rivers with vegetation *Ranunculion fluitantis* and *Callitricho-Batrachion* in this area is represented by river sections downstream with attached aquatic vegetation. The bottom is silty-clay or silty-sandy. The representativity of the habitat is assessed as excellent, in terms of relative area it is class C 2 >= p >0; the equated extent is "excellent protection" and the total assessment of the site is "excellent value".
Habitat 3270 - Rivers with muddy banks with *Chenopodion rubri* and *Bidention p.p.* This habitat is formed along the Rivers Danube and Ogosta, along which annual nitrophilic and ruderal communities are developed. The representativity of the habitat is assessed as excellent, in terms of relative area it is class C 2 >= p >0; the equated extent is "excellent protection" and the total assessment of the site is "excellent value".
Habitat 6250 - Pannonian loess steppe grasslands are dominated by grasses. Depending on the capacity of the soil densely tufted steppes are formed dominated by *Chrysopogon gryllus, Dichantium ischaemum* and open communities dominated by *Stipa capilata, Agropyron cristatum, Artemisia campestris*. The representativity of the habitat is assessed as excellent, in terms of relative area it is class C 2 >= p >0; the equated extent is "excellent protection" and the total assessment of the site is "excellent value".
Habitat 91Z0 - Mizian forests of silver lime. Formed communities include *Quercetalia* and *Fagetalia* species. The representativity of the habitat is assessed as "negligible existence", in terms of relative area it is class C 2 >= p >0.
The following vegetation species, which have to do with the environmental protection and management of the site, are included in Group "Other Important Vegetation and Animal Species":

Tx.group	*NAME (in Bulgarian)*	*Local population*	*Motivation*
a	*NAME (in Latin)*		
P	*Lamb's ear*	P	A
	Stachys arenariaeformis		
P	*Rootless Walter Meal*	P	A
	Wolffia arrhiza		

4.3.2 Animal species subject to protection

Invertebrates *(Invertebrata)*

Mollusca/Mussels, Snails – Mollusca/Bivalvia, Gastropoda

Thick shelled river mussel – *Unio crassus*

According to the form, this is rare species but is in good environmental protection condition. The Ogosta River in its predominant part is severly slime-laden, which makes it an unsuitable environment for this river mussel. During our visits to the Protected Area, this species was never found. On multiple occasions scallop shells were discovered only in the area near the mouth of the river. We have found shells of swamp mussels along the bank of the Ogosta River near Hayredin, which are indicative of the conditions for life in this sector**.**

Striped Nerite – Theodoxus transversalis

This is a very rare species. It has been found only in the extreme downstream part of the Ogosta River. It prefers bottoms with large pieces of rock. Its density in the Danube River is relatively high. The drop in its density is attributed by the specialists to chemical and organic pollution. It is believed that the invasive mussel species in the Danube River are an additional competing factor affecting adversely its density.

Insects/Coleoptera

Stag beetle – *Lucanus cervus*

According to the form this is a rare species. In the course of our 1-year long studies in this area, this species was found to be frequently occurring, especially in the segments where the rotting wood vegetation was not removed.

Long-horn beetle – *Rosalia alpine*

According to the form, this is a rare species and there is no data on its present condition. In the course of our lengthy terrain studies in the region, representatives of this species were not found.

Long Horned Beetle – *Morimus funereus*

On the whole this is a rare species for the region. It has been identified as an occurring species based on several isolated specimens in the region of the Village of Sofronievo.

Bolbelasmus unicornis

This is a rare species which is difficult to identify. All the locations of occurrence of this species in the Danube Valley have been registered accidentally. This species depends for its subsistence on rotting wood substances. The larvae feed on mycelium of fungae which destroy dead and rotting tree trunks.

Vertebrates *(Vertebrata)*

Jawless/ hagfishes – Agnatha/Cyclostomata

Ukrainian brook lamprey – *Eudontomyzon mariae*

According to data from the form this is very rare species without any data on its condition..

Damselfishes – Pisces/Osteichthyes

Danube streber – *Alosa immaculata*

This species does not enter the tributaries of the river. Its reproduction happens only in the midstream of the Danube River in the deep areas.

Cyprinidae – *Aspius aspius*

This is a rare species for the Ogosta River. It is more frequently encountered in the mouth of the river and during reproductive migrations.

Mediterranean barbel – *Barbus meridionalis*

The number of representatives of this species has been drastically reduced after the construction of the Ogosta Dam. It is believed that the dam is a major barrier to the reproduction of this species, because of which it became rare downstream of the dam wall.

Whitefin gudgeon – *Gobio albipinnatus*

A rare species suspected to be subject to an adverse impact from the obstacle posed by the dam. It is more frequently encountered near the mouth of the river.

Ziege – *Pelecus cultratus*

It is encountered only near the mouth of the river.

Fish linn – *Rhodeus sericeus amarus*

The number of representatives of this species has drastically been reduced as a result of the slime deposition on the bottom of the river and the severe eutrophication.

The following three species are benthic favoring sandy bottoms. All three types are relatively common:

Balkan loach – *Cobitis elongata*

Spinned loach –*Cobitis taenia*

European weatherfish -*Misgurnus fossilis*

The four species given below are typical for the Danube River and their entry into the Ogosta River may be accidental only.

Balon's ruffle – *Gymnocephalus baloni*

Stripped ruffle – *Gymnocephalus scraetzer*

Zingel – *Zingel zingel*

Streber* or Danube streber – *Zingel streber

Amphibia – *Amphibia*

Danube crested Newt – *Triturus dobrogicus*

Southern Crested Newt – *Triturus karelinii*

These two species are competitors, because of which it is almost impossible to encounter both of them in the same habitats. The Southern Crested Newt is typical for still and slow-flowing water basins, whereas the Danube Crested Newt is adapted to running waters. The data in the form contains no clarifications.

Fire-bellied toad – *Bombina bombina*

Yellow-Bellied Toad – *Bombina variegata*

The two species are encountered in different habitats. The Fire-bellied toad is typical for the Danube Valley, whereas the Yellow-bellied toad is a species encountered primarily in mountainous and near-mountainous areas.

Reptiles – *Reptilia*

Hermann's Tortorise – *Testudo hermanni*

A rare species for the region but isolated specimens are found all the time, including newly-hatched ones.

European pond turtle – *Emys orbicularis*

This is a frequent inhabitant of the area of relatively high and constant density. The data from the form shows a stable and excellent environmental protection condition.

Four-lined snake – *Elaphe quatuorlineata*

Here we refer to the Four-lined snake. In the scientific sources there is no data on this species but, from the point of view of the requirements for this species, this region is especially suitable.

Mammals – *Mammalia*

Hamster – *Spermophilus citellus*

Romanian hamster – *Mesocricetus newtoni*

These two species inhabit similar and, on frequent occasions, the same habitats. The colonies of the Romanian hamster are sparse and difficult to identify, are situated primarily in grain fields, alfalfa fields and in the vicinity of agricultural crops which they use as food. This species is quite poorly studies on the territory of Bulgaria and all the data on its incidence and distribution are accidental or from the monitoring of birds of prey. Specimens or traces of specimens have been found near the Village of Hayredin and the Village of Mihaylovo.

European Otter – *Lutra lutra*

This is a frequently occurring species. Faeces and traces can be found almost along the entire segment of the river falling within the boundaries of the protected area. According to data from

the form, this region is inhabited by 2-3 specimens and there is no information on the counting method.

4.4 General description of Protected Area "Skat River", Code: BG0000508 under the Habitats Directive

General characteristics

Protected Area BG0000508 "Skat River" is of Type "E" under Directive 92/43/EEC on the Protection of the Natural Habitats and of the Wild Flora and Fauna. The total area of the Protected Area is 4,085.90 dka. It lies at an altitude of between 24 m and 141 m. The Protected Area has connection to only one other protected area under Natura 2000 .

Code of the site	Name of the site	Type of the site
BG0000614	Ogosta River	K

The main objectives of the protection in the Protected Area are as follows :

- Preserving the area of the natural habitats and the species habitats and their populations that are subject to protection within the boundaries of the protected area.
- Preserving the natural condition of the natural habitats and species habitats that are subject to protection within the boundaries of the protected area, including the natural species composition, typical species and environmental conditions typical for these habitats.
- Restoring, where necessary, the area and natural condition of the priority natural habitats and species habitats, as well as of the populations of species subject to protection within the boundaries of the protected area.

The Skat River is a right-hand tributary of the Ogosta River. Between the Villages of Tarnava and Altimir along the riverbed of the river, there is a relatively broad belt of *Salix alba, Populus nigra, Populus alba, Quercus robur* and *Fraxinus oxycarpa* (91E0). 2 km to the North of Altimir, there is a dense forest of *Fraxinus oxycarpa* (91F0) with a high conservation value. Part of the river in the region of Altimir is one of the few remaining habitats of *Gobio anoscopus.* This area is important for the conservation of salt medows, a small preserved flooded forest and several steppe communities of the rare, endemic species of the Star thistle *(Centaurea rumelica).*
In terms of earth cover classes, the territory of the Protected Area is sub-divided into the following groups:

Earth cover classes	***% Coverage***	
Water inland areas (non-running and running waters)	3	
Shrubby communities	3	
Dry grass communities, steppe	18	
Extensive grain crops (rotation crops periodically let lie fallow)	36	
Improved pastures (artificially created from grass mixtures)	28	
Broad-leaved deciduous forests	12	
Total coverage		100

4.4.1 Types of vegetation and natural habitats subject to protection in the Protected Area

The Standard Form of the area includes the following habitats and species as subject to protection:

HABITAT TYPES from Appendix I of Directive 92/43/EEC

91E0 * Alluvial forests of Alnus glutinosa and Fraxinus excelsior (Alno-Pandion, Alnion

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incanae, Salicion albae)
1530 * Panonian salty steppes and salty marshlands
3260 Lowland and mountainous rivers with vegetation of Ranunculion fluitantis and Callitricho-Batrachion
3270 Rivers with muddy banks with Chenopodion rubri and Bidention p.p.
6250 * Panonian loess steppe grass communities
91F0 Riverside mixed forests of *Quercus robur, Ulmus laevis* and *Fraxinus excelsior* or *Fraxinus angustifolia* alongside great rivers (Ulmenion minoris)

Habitat 91E0 - Alluvial forests of *Alnus glutinosa and Fraxinus excelsior (Alno-Pandion, Alnion incanae, Salicion albae)* are formed on rich alluvial soil periodically flooded by the seasonal rise of the Danube. The representativity of the habitat is assessed as excellent, in terms of relative area it is class C 2 >= p >0; the equated extent is "excellent protection" and the total assessment of the site is "excellent value".
Habitat 1530 - Panonian salty steppes and salty marshlands formed in areas with abundant spring spills and evaporation of soil moisture during summer due to high temperatures and drought during the summer. The representativity of the habitat is assessed as good, in terms of relative area it is class C 2 >= p >0; the equated extent is "good protection" and the total assessment of the site is "good value".
Habitat 3260 - Lowland and mountainous rivers with vegetation of *Ranunculion fluitantis and Callitricho-Batrachion* in this area is represented by river sections downstream with attached aquatic vegetation. The bottom is silty-clay or silty-sandy. The representativity of the habitat is assessed as "negligible existence", in terms of relative area it is class C 2 >= p >0.
Habitat 3270 - Rivers with muddy banks with *Chenopodion rubri and Bidention p.p.* this habitat is formed along the Danube river and the Skat river, the coasts of which develop annual nitrophilic and ruderal communities The representativity of the habitat is assessed as "negligible existence", in terms of relative area it is class C 2 >= p >0.
Habitat 6250 - Panonian loess steppe grass communities are dominated by grasses. Depending on the capacity of the soil densely tufted steppes are formed dominated by *Chrysopogon gryllus, Dichantium ischaemum* and open communities dominated by *Stipa capilata, Agropyron cristatum, Artemisia campestris.* The representativity of the habitat is assessed as excellent, in terms of relative area it is class C 2 >= p >0; the equated extent is "excellent protection" and the total assessment of the site is "excellent value".
Habitat 91 F0 - Riverside mixed forests *of Quercus robur, Ulmus laevis and Fraxinus excelsior or Fraxinus angustifolia* near big rivers (*Ulmenion minoris*) is formed on periodically flooded recent alluvial deposits. Plant communities are most often related to the association Scutellario *altissimae-Quercetum roburis*. The involvement of lianas communities is relatively small compared with wet forests, and in the grass cover there is a well-formed spring aspect of *Scilla bifolia, Anemone ranunculoides, Ranunculuc ficaria, Polygonatum ssp*. and others. The representativity of the habitat is assessed as excellent, in terms of relative area it is class C 2 >= p >0; the equated extent is "excellent protection" and the total assessment of the site is "excellent value".
The following vegetation species that have to do with the environmental protection and the management of the site are included in Group "Other Important Vegetation and Animal Species":

Tx.group	*NAME (in Bulgarian)*	*Local population*	*Motivation*
a	*NAME (in Latin)*		

P	*Star thristle* *Centaurea rumelica*	P	B
P	*Lemnaceae* *Lemna gibba*	P	A

4.4.2 Animal species subject to protection

Invertebrates (Invertebrata)

Mollusca/Mussels, Snails – Mollusca/Bivalvia, Gastropoda

Thick shelled river mussel – Unio crassus

This is a rare species because of the municipal organic pollution of the river and the processes of eutrophication. Many of the sewers in the populated settlements, through which the river passes, are mouthed directly into the river.

Insects/Coleoptera

Stag beetle – *Lucanus cervus*

Long-horn beetle – *Rosalia alpina*

Both these species are rare and not typical, because of the lack of suitable habitats in the region.

Vertebrates (Vertebrata)

Damselfishes – Pisces/Osteichthyes

Mediterranean barbel – *Barbus meridionalis*

It is encountered in a very small sector of the area. The pollution of the river is the reason for the drastic drop in the population of this species.

Danube gudgeon – *Gobio uranoscopus*

This species has been identified in a small and short sector of the river and has disappeared from the rest of the river because of changes in the environmental conditions.

Fish linn – *Rhodeus sericeus amarus*

Spinned loach – *Cobitis taenia*

Amphibia – *Amphibia*

Danube crested Newt – *Triturus dobrogicus*

Fire-bellied toad – *Bombina bombina*

Both these species are relatively rare and there is no information in the form on the status of their populations.

Reptiles – *Reptilia*

Hermann's Tortorise – *Testudo hermanni*

This is a very rare species under threat of extinction in this area. Only isolated specimens have been found. According to the form, the environmental protection condition of this species is excellent.

European pond turtle – *Emys orbicularis*

This is a species which is frequently encountered in the frequently flooded areas of the river and in some of its segments. The condition of this species is assessed as excellent.

Four-lined snake – *Elaphe quatuorlineata*

Here we refer to the Four-lined snake. It is assessed as a very rare species. The only information on this species is a single specimen found in a river pool near the Village of Lipnitsa in the summer of 2006.

Mammals – *Mammalia*

Long-Fingered Bat – *Myotis capaccinii*

There is no specific data on this species.

Romanian hamster – *Mesocricetus newtoni*

The presence of this species has not been scientifically proven in this region but is very likely, because of the proximity of habitats where it has been proven. The region may be inhabited by the European hamster (*Cricetus Cricetus*).

European Otter – *Lutra lutra*

The small flow rate of the river and its considerable pollution do not offer good living conditions, because of which the density of this species is relatively low.

4.5 Description of the Protected Area „Kozloduy" with code BG0000527 under Habitats Directive

General characteristics

The protected area „Kozloduy" is of type G under the Habitats Directive 92/43/EEC, which is contained in a protected area under the Birds Directive. The area of the protected area is 1253.80 decares and is located at an altitude between 62 and 142m. The area is steep loess wall between the town of Kozloduy and the village of Gorni Tsibar. The crest of the wall is covered by steppe vegetation featuring some endemic species. Dominant species are Stipa capillata, Artemisia campestris; endemic species are Centaurea rumelica, Stachys arenariaeformis, Chamaecytisus supinus. The ridges there are many forest plantations, mainly from acacia. The site is one of the most important in Bulgaria for habitat 6250 Pannonian loess steppe grass communities. It has a typical floristic composition and participation of many endemic and relict steppe species like Centaurea rumelica and Stachys arenariaeformis. The area is heavily affected by human activity. Steppe vegetation is preserved only in the highest parts of the loess forms. The area is surrounded by farmland.

In terms of land cover classes, the territory of the protected area is sub-divided into the following groups:

Land cover classe	*% Coverage*
Shrubby communities	8
Dry grass communities, steppe	48
Extensive grain crops (including rotation crops periodically let lie fallow)	7
Artificial forest monoculture (plantations of poplar or Exotic trees)	37
Total coverage	***100***

Protected area Kozloduy with code BG0000527 is connected with PA Zlatiata with code BG0002009 which is under Birds Directive.

4.5.1 Vegetation types and habitats under conservation in the protected area

The standard form of the area as an object of protection indicates a habitat - 6250 * Pannonian loess steppe grass communities.

TYPES OF HABITATS from Appendix I of Directive 92/43/EEC

CODE		*NAME*	*% Coverage*	*Represent.*	*Relative area*	*Equated extent*	*Total assessment*
6250	*	Pannonian loess steppe grass communities	48	B	C	C	B

The habitat is with significant representation. The relative area covered by the habitat referred to the total area of the national territory covered by this habitat is between 0 and 2%.

Of the species listed in Annex I of Council directive 79/409/EEC and Annex II of Council directive 92/43 EEC [146] plant species are not included.

To the Group "Other Important Vegetation and Animal Species" which are associated with the conservation and management of the site, the following plant species are included:

Tx.group	*NAME (in Bulgarian)*	*Local population*	*Motivation*
a	*NAME (in Latin)*		
P	*Star thristle*	P	B
	Centaurea rumelica		
P	*Lamb's ear*	P	B
	Stachys arenariaeformis		

Where:

Tx.group – taxonomic group of the respective species is marked according to the following nomenclature: P – plants

Name – name of the species.

Local population – In the cases when there is no digital data available, the size/density of the population is shown, specifying whether the species are typical (C), rare (R) or extremely rare (V). When there are no data about the population, the species is marked as existing (P).

Motivation – motivation about inclusion of each species is indicated by using the following categories: A) National Red Book; B) endemic species; C) international conventions (incl. Bern, Bonn and Convention for biodiversity); D) other reasons.

4.5.2 Animal species subject to protection

Of the species listed in Annex I of Council directive 79/409/EEC and Annex II of Council directive 92/43 EEC [146] plant species are not included. The follow animal species are listed:

Romanian hamster – Mesocricetus newtoni

This type been established there by us on our visits to the area during the summer and autumn of 2008. Besides finding that the presence of the species, we have no other information about the current status of the population in the area. The area is heavily influenced by human presence. Natural vegetation and habitats are preserved only incompetent handling steeply sloping coastal

areas which are periodically burned by local shepherds. Development of agriculturally adjacent coastal Pseudosteppe loess are likely foraging habitats of the species. According to information from the standard there is no specific data on the type, but the hypothesis of a possible presence.

Colorful Aesculapian (*Elaphe sauromates)* - Under the Law on Biodiversity - Skipjack Aesculapian / Elaphe quatuorlineata /.

Under the name of skipjack Aesculapian in the particular case aims colorful snake, which in the past was considered a subspecies of skipjack and so is stored in the area forms. Colorful Aesculapian on data from the standard form is available in that particular area, but without any further details. Scientifically proven in the vicinity of the zone is the species in two localities, one of which is for Skat River to Lipnitsa and second in the region of the river Lom close to town Lom. The presence of this species in the area of the zone is likely if two circumstances are consider. The first is the proximity of the Danube to the area, and second, the presence of preserved natural habitats, which in the recent past is inhabited. Danube and preserved coastal habitats to haunt this now rare species for Bulgaria.

To the Group "Other Important Vegetation and Animal Species" which are associated with the conservation and management of the site, the following species are included:

Tx.group	*NAME* *NAME (in Latin)*	*Local population*	*Motivation*
A	*European green toad* *Bufo viridis*	*P*	*C*
P	*Star thistle* *Centaurea rumelica*	*P*	*B*
R	*Aesculapian-archer* *Coluber caspius*	*P*	*C*
R	*Green lizard* *Lacerta viridis*	*P*	*C*
A	*Common Spadefoot* *Pelobates fuscus*	*P*	*C*
R	*Common wall lizard* *Podarcis muralis*	*P*	*C*
R	*Wall lizard* *Podarcis taurica*	*P*	*C*
P	*Lamb's ear* *Stachys arenariaeformis*	*P*	*B*
R	*Viper* *Vipera ammodytes*	*P*	*C*

Where:

Tx.group – taxonomic group of the respective species is marked according to the following nomenclature: P – plants

Name – name of the species.

Local population – In the cases when there is no digital data available, the size/density of the population is shown, specifying whether the species are typical (C), rare (R) or extremely rare (V). When there are no data about the population, the species is marked as existing (P).

Motivation – motivation about inclusion of each species is indicated by using the following categories: A) National Red Book; B) endemic species; C) international conventions (incl. Bern, Bonn and Convention for biodiversity); D) other reasons.

4.6 Description of the Protected Area Cibar with code BG0000199 under the Habitats Directive

General characteristics

The protected area „Kozloduy" is of type G under the Habitats Directive 92/43/EEC, which is contained in a protected area under the Birds Directive. The area of the protected area is 29717.30 decares and is located at an altitude between 20 and 169m. The site is one of the richest in different habitat types in Bulgarian bank of the Danube. This is the former floodplain of the Danube, one large and several small new island covered with floodplain forests. There are specific island sand dunes, salt meadows and marshes in the valley. Small loess steppes have survived highest Danube terrace near the village Zlatia. Many ducks and gulls concentrate on the sandy beaches that are formed during the summer. During the winter time at the sites Dalmatian pelicans spend the winter. On a sandy beach has and a colony of terns. The site protects rare habitat for Bulgaria like 2340, 6250, 1530. There is a large mixed colony of water birds on the island Ibisha. The protected area covers completely supportive reserve Ibisha.

In terms of land cover classes, the territory of the protected area is sub-divided into the following groups:

Land cover classe	*% Coverage*
Salt marshes, salt meadows, salt steppes	7
Inland water (standing water, running water)	25
Swamps, marshes, vegetation along the ponds, bogs	7
Shrubby communities	2
Dry grass communities, steppe	6
Extensive grain crops (including rotation crops periodically let lie fallow)	33
Broadleaf deciduous forest	5
Artificial forest monoculture (plantations of poplar or Exotic trees)	13
Non-forest areas cultivated with woody plants (including orchards, vineyards, roadside trees)	2
Total coverage	***100***

Protected area is related to the following Natura 2000 sites:

Object code	Object Name
BG0002007	island Ibisha
BG0002008	Island in Gorni Tsibar
BG0002009	Zlatiata
BG0002104	swamp Tsibar

4.6.1 Vegetation types and habitats under conservation in the protected area

The standard form of protected area includes the following habitat types, object of protection:

TYPES OF HABITATS from Appendix I of Directive 92/43/EEC

CODE		*NAME*	*% Coverage*	*Represent.*	*Relative area*	*Equated extent*	*Total assessment*
1530	*	Panonian salty steppes and salty marshlands	7	C	C	C	C
2340	*	Pannonian Inland dunes	5	C	B	C	C
3130		Olithotrophic to mesotrophic standing waters with vegetation of Littorelletea uniflorae and/or Isoeto-Nanojuncetea	1	B	C	B	B
3150		Natural eutrophic lakes with vegetation type Magnopotamion or Hydrocharition	0.2	C	C	C	C
3270		Rivers with muddy banks with Chenopodion rubri and Bidention p.p.	1	C	C	C	C
6250	*	Pannonian loess steppe grass communities	2.343	B	C	B	B
91E0	*	Alluvial forests of Alnus glutinosa and Fraxinus excelsior (Alno-Pandion, Alnion incanae, Salicion albae)	0.35	A C	B	A	

To the Group "Other Important Vegetation and Animal Species" which are associated with the conservation and management of the site, the following plant species are included

Tx.group	*NAME* *NAME (in Latin)*	*Local population*	*Motivation*
P	*Alkanet bugloss* Alkanna tinctoria	*R*	*A*
P	*Astragalus ponticus* Astragalus ponticus	*R*	*A*
P	*Centaurea arenaria* Centaurea arenaria	*R*	*A*
P	*Roumelian cornflower*	P	B
P	*Hunchbacked duckweed* Lemna gibba		A
P	*Summer Snowflake* Leucojum aestivum		A
P	*Floating watermoss* Salvinia natans	R	C
P	*Woundwort* Stachys arenariaeformis	B	

4.6.2 Animal species subject to protection

4.6.2a Regularly occurring migratory birds, which are included in Annex I of the Birds Directive

Code Name
A097 *Falco vespertinus*
A195 *Sterna albifrons*
A234 *Picus canus*
A238 *Dendrocopos medius*
A393 *Phalacrocorax pygmeus*
A439 *Hippolais olivetorum*
A177 *Larus minutus*
A193 *Sterna hirundo*
A429 *Dendrocopos syriacus*
A094 *Pandion haliaetus*

A034 *Platalea leucorodia*
A031 *Ciconia ciconia*
A020 *Pelecanus crispus*
A030 *Ciconia nigra*
A026 *Egretta garzetta*
A024 *Ardeola ralloides*
A023 *Nycticorax nycticorax*
A229 *Alcedo atthis*

A176 Larus melanocephalus

4.6.2b Regularly occurring migratory birds not listed in Annex I of the Birds Directive

Code Name
A162 *Tringa totanus*
A161 *Tringa erythropus*
A147 *Calidris ferruginea*
A145 *Calidris minuta*
A142 *Vanellus vanellus*
A136 *Charadrius dubius*
A230 *Merops apiaster*
A099 *Falco subbuteo*
A149 *Calidris alpina*
A054 *Anas acuta*
A053 *Anas platyrhynchos*
A052 *Anas crecca*
A051 *Anas strepera*
A050 *Anas penelope*
A048 *Tadorna tadorna*
A028 *Ardea cinerea*
A017 *Phalacrocorax carbo*
A130 *Haematopus ostralegus*
A359 *Fringilla coelebs*
A249 *Riparia riparia*
A146 *Calidris temminckii*
A459 *Larus cachinnans*
A363 *Carduelis chloris*
A329 *Parus caeruleus*
A311 *Sylvia atricapilla*
A304 *Sylvia cantillans*
A283 *Turdus merula*
A271 *Luscinia megarhynchos*
A269 *Erithacus rubecula*
A059 *Aythya ferina*
A198 *Chlidonias leucopterus*
A179 *Larus ridibundus*
A165 *Tringa ochropus*

MAMMALS listed on Annex II of Directive 92/43/EEC

Code	Name
1355	European Otter Lutra lutra
2609	Romanian hamster Mesocricetus newtoni
1335	Souslik Spermophilus citellus

Amphibian and reptile species listed in Annex II to Directive 92/43/EEC

Code	Name
1188	Fire-bellied toad Bombina bombina
1220	European pond turtle Emys orbicularis
1217	Hermann's Tortorise ***Eurotestudo hermanni***
1993	Danube crested Newt Triturus dobrogicus
1160	Zingel streber

Damselfishes included in Annex II of Directive 92/43/EEC

Code	Name
4125	Danube streber Alosa immaculata
1130	Cyprinidae Aspius aspius
1138	Mediterranean barbel Barbus meridionalis
2533	Balkan loach Cobitis elongata
1149	**Spinned loach** Cobitis taenia
2484	Ukrainian brook lamprey Eudontomyzon mariae
1124	Whitefin gudgeon Gobio albipinnatus
2555	Balon's ruffle Gymnocephalus baloni
1157	Stripped ruffle Gymnocephalus schraetzer
2522	Ziege Pelecus cultratus
1134	Fish linn Rhodeus sericeus amarus
1146	Balkan loach Sabanejewia aurata
1159	Zingel

Zingel zingel

Invertebrates included in Annex II of Directive 92/43/EEC

Code	Name
1032	Thick shelled river mussel Unio crassus
1083	Stag beetle Lucanus cervus
1087	Long-horn beetle Rosalia alpina

To the Group "Other Important Vegetation and Animal Species" which are associated with the conservation and management of the site, the following plant species are included

Tx.group	*NAME* *NAME (in Latin)*	*Local population*	*Motivation*
P	*Alkanet bugloss* Alkanna tinctoria	*R*	*A*
P	*Astragalus ponticus* Astragalus ponticus	*R*	*A*
P	*Centaurea arenaria* Centaurea arenaria	*R*	*A*
P	*Roumelian cornflower*	P	B
P	*Hunchbacked duckweed* Lemna gibba		A
P	*Summer Snowflake* Leucojum aestivum		A
P	*Floating watermoss* Salvinia natans	R	C
P	*Woundwort* Stachys arenariaeformis	B	

Where:

Tx.group – taxonomic group of the respective species is marked according to the following nomenclature: P – plants

Name – name of the species.

Local population – In the cases when there is no digital data available, the size/density of the population is shown, specifying whether the species are typical (C), rare (R) or extremely rare (V). When there are no data about the population, the species is marked as existing (P).

Motivation – motivation about inclusion of each species is indicated by using the following categories: A) National Red Book; B) endemic species; C) international conventions (incl. Bern, Bonn and Convention for biodiversity); D) other reasons.

5. Description and analysis of the probability and extent of the impact of the investment proposal on the subject and objectives of protection in the examined protected areas

The assessment of the probability and extent of the impact of the investment proposal on the subject and objectives in the examined protected areas is based on comparative analysis, on the forecasted changes and on the expert assessment of their impact on the existing biological diversity in certain parts of their territory.

5.1 Description and analysis of the impact of the investment proposal on Protected Area "Zlatiata", Code: BG0002009 under the Birds Directive

The description and analysis of the impact of the investment proposal on the types of natural habitats and species that are subject to protection in the two protected areas has been performed sequentially and separately for the two areas as follows:

5.1.1 On the habitats subject to protection

In the Standard Form for the protected area, there are no habitats types subject to protection in it included.

5.1.2 On the bird species subject to protection

The species of birds object to conservation in the protected zone "Zlatiata" are 51 (33 under Section 2.1 and 18 under Section 2.2 of the Order in the Official Gazette). They will be examined successively in regards to the negative impact on them:

33 species in section 2.1 of the Order of the Ministry of the protected area::

1. Eurasian bittern (Botaurus stellaris) – a permanent and transitory species from Bulgaria's Red Book. Species under the Birds Directive. There are 20-70 nesting couples in Bulgaria according to Yankov (2007). According to the standard form is represented by 2 (1-3) nesting couples in the protected area and total assessment of "B". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During milder winters and migrations, representatives of this species may hibernate along the out flowing channel and terrain of the former Kozloduy swamp, but the likelihood of a negative impact there is negligible. A negative impact on the species is not expected, due to its very low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.
2. Little Bittern (Ixobrychus minutus) - a nesting-migratory, transitory species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 1500-4500 nesting couples. Species under the Birds Directive. According to the standard form is represented by 10 (7-13) nesting couples in the protected area and total assessment of 'C'. In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During migrations, representatives of this species may hibernate on the terrain of the former Kozloduy swamp, but the likelihood of a negative impact there is negligible. A negative impact on the species is not expected, due to its low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will

not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

3. Little egret (Egretta garzetta) - a nesting-migratory, transitory and rare wintering species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 1,400 to 2,000 nesting couples. According to the standard form is represented by 13 nesting couples in the protected area and total assessment of "B". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During migrations, representatives of this species may hibernate on the terrain of the former Kozloduy swamp, but the likelihood of a negative impact there is negligible. A negative impact on the species is not expected, due to its low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

4. Purple Heron (Ardea purpurea) - a nesting-migratory, transitory species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 150-250 nesting couples. Species under the Birds Directive. According to the standard form is represented by 5 nesting couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During migrations, representatives of this species may hibernate on the terrain of the former Kozloduy swamp, but the likelihood of a negative impact there is negligible. A negative impact on the species is not expected, due to its low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

5. White Stork (Ciconia ciconia) - a nesting-migratory, transitory species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 4,956 to 5,672 nesting couples. Species under the Birds Directive. According to the standard form is represented by 6 nesting couples in the protected area and total assessment of "A". To the drainage pumping station (km 687), about 3 km east of the investment proposal, a nest on the power pole is registered. In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During spring migration in the western part of "Zlatiata" are recorded 399 passing birds, and in the autumn - 1106. A negative impact on the species is not expected, due to its low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

6. Honey Buzzard (Pernis apivorus) - a nesting-migratory, transitory species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 450-550 nesting couples. Species under the Birds Directive. According to the standard form is represented by 2 nesting couples in the protected area and total assessment of "C". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During spring migration in the western part of "Zlatiata" are recorded 2 passing birds, and in the autumn - 49. A negative impact on the species is not expected, due to its very low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2

km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

7. Black Kite (Milvus migrans) - a nesting-migratory, transitory and rare wintering species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 140-160 nesting couples. Species under the Birds Directive. According to the standard form is represented by 1 nesting couple in the protected area and total assessment of "C". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During spring migration in the western part of "Zlatiata" are recorded 3 passing birds, and in the autumn - 2. A negative impact on the species is not expected, due to its very low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

8. Short-toed eagle (Circaetus gallicus) - a nesting-migratory, transitory species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 140-160 nesting couples. Species under the Birds Directive. According to the standard form is represented by 4 nesting couples in the protected area and total assessment of "C". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During spring migration in the western part of "Zlatiata" are recorded 4 passing birds, and in the autumn - 19. A negative impact on the species is not expected, due to its very low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

9. Marsh Harrier (Circus aeruginosus) - a nesting-migratory, transitory and wintering species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 220-240 nesting couples. According to the standard form is represented by 8 nesting couples, 2 wintering birds and 10 passing birds in the protected area and total assessment of "C". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During spring migration in the western part of "Zlatiata" are recorded 227passing birds, and in the autumn - 166. A negative impact on the species is not expected, due to its comparatively low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

10. Hen Harrier (Circus cyaneus) - a transitory and wintering species from Bulgaria's Red Book. Species under the Birds Directive. According to the standard form is represented by 7 wintering birds and 15 passing birds in the protected area and total assessment of "D". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During migrations, representatives of this species may hibernate on the terrain of the former Kozloduy swamp, but the likelihood of a negative impact there is negligible. During spring migration in the western part of "Zlatiata" are recorded 77 passing birds, and in the autumn - 10. A negative impact on the species is not expected, due to its comparatively low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a

negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

11. Pallid Harrier (Circus macrourus) - a transitory and partly wintering species from Bulgaria's Red Book. Species under the Birds Directive. According to the standard form is represented by 4 passing birds in the protected area and total assessment of "D". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During migrations, representatives of this species may hibernate on the terrain of the former Kozloduy swamp, but the likelihood of a negative impact there is negligible. During spring migration in the western part of "Zlatiata" are recorded 3 passing birds, and in the autumn - 1. A negative impact on the species is not expected, due to its comparatively low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

12. Montagu's Harrier (Circus pygargus) - a nesting-migratory, transitory and wintering species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 220-270 nesting couples. Species under the Birds Directive. According to the standard form is represented by 12 nesting couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During migrations and wintering, representatives of this species may hibernate on the terrain of the former Kozloduy swamp, but the likelihood of a negative impact there is negligible. During spring migration in the western part of "Zlatiata" are recorded 127 passing birds, and in the autumn - 16. A negative impact on the species is not expected, due to the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

13. Levant sparrowhawk (Accipiter brevipes) - a nesting-migratory, transitory species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 200-340 nesting couples. Species under the Birds Directive. According to the standard form is represented by 5 nesting couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During spring migration in the western part of "Zlatiata" the passing birds are not recorded, and in the autumn - 2 birds are recorded. A negative impact on the species is not expected, due to its comparatively low nesting numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

14. Long-legged Buzzard (Buteo rufinus) – a permanent and transitory species from Bulgaria's Red Book. According to Yankov (2007) national population is 650-750 nesting couples. According to the standard form is represented by 6 nesting couples in the protected area and total assessment of "B" (according to Kostadinova and Gramatikov, 2007, there are 6 nesting couples in protected area "Zlatiata"). During our research in 2008 two occupied nests were recorded but one of them was subsequently abandoned. During spring migration in the western part of "Zlatiata" are recorded 19 passing birds, and in the autumn – 27. The species is observed only once over the site of Kozloduy NPP (29.10.2009 - adult bird in flight over the checkpoint in the eastern part of NPP area). A negative impact on the species is not expected, due to its

comparatively low nesting numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

15. Lesser spotted Eagle (Aquila pomarina) - a nesting-migratory, transitory species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 1500-2000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 3 nesting couples in the protected area and total assessment of "C". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During spring migration in the western part of "Zlatiata" are recorded 2 passing birds, and in the autumn - 18. A negative impact on the species is not expected, due to its comparatively low nesting numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

16. Red-footed Falcon (Falco vespertinus) - a nesting-migratory, transitory species from Bulgaria's Red Book, which national population, according to Yankov (2007) is 50-150 nesting couples.Globally threatened species. Species under the Birds Directive. According to the standard form is represented by 20 nesting couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. During spring migration in the western part of "Zlatiata" are recorded 21 passing birds, and in the autumn - 28. A negative impact on the species is not expected, due to its comparatively low nesting numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

17. Peregrine Falcon (Falco peregrinus) - a permanent and transitory species from Bulgaria's Red Book, which national population according to Yankov (2007) is 120-180 nesting couples. According to the standard form is represented by 1 nesting couple in the protected area and total assessment of "C". In the region of investment proposal, where nesting and foraging habitats are not suitable, is not established. In the western part of "Zlatiata" is recorded only during spring migration with 1 passing bird. A negative impact on the species is not expected, due to its very low nesting numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) of this IP and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

18. Merlin (Falco columbarius) - a transitory and wintering species. According to the standard form is represented by 4 wintering birds and 1 passing bird in the protected area and total assessment of "C". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to its very low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

19. Common Crane (Grus grus) - a transitory and partly wintering species from Bulgaria's Red Book . Species under the Birds Directive. According to the standard form is represented by 10 passing birds in the protected area and total assessment of "C". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to its very low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

20. Great Bustards (Otis tarda) - a transitory and partly wintering species from Bulgaria's Red Book. Species under the Birds Directive. According to the standard form is represented by 5 wintering birds in the protected area and total assessment of "A". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. During the year-round monitoring in the protected area is not established too (Mitchev and others., 2008). A negative impact on the species is not expected, due to its probably zero numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on feeding and wintering areas and migratory corridors of the species.

21. European Nightjar (Caprimulgus europaeus) - a nesting-migratory and transitory species under the Birds Directive, which national population according to Yankov (2007) is 7000-10000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 20 nesting couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to its very low nesting numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

22. Common Kingfisher (Alcedo atthis) – a permanent species, which national population according to Yankov (2007) is 1000-2000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 20 nesting couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. During migrations representatives of this species may hibernate on the terrain of the former Kozloduy swamp, but the likelihood of a negative impact there is negligible. A negative impact on the species is not expected, due to its very low nesting numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

23. European Roller (Coracias garrulus) - a nesting-migratory and transitory species from Bulgaria's Red Book which national population according to Yankov (2007) is 2500-5500 nesting couples. Globally threatened species. Species under the Birds Directive. According to the standard form is represented by 77 (34-130) nesting couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. During migrations representatives of this species may hibernate on the terrain of the former Kozloduy swamp, but the likelihood of a negative impact there is negligible. A negative impact on the species is not expected, due to the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise,

soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

24. Grey-headed Woodpecker (Picus canus) - - a permanent species from Bulgaria's Red Book which national population according to Yankov (2007) is 1500-2800 nesting couples. Species under the Birds Directive. According to the standard form is represented by 14 nesting couples in the protected area and total assessment of "B". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established A negative impact on the species is not expected, due to the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

25. Syrian Woodpecker (Dendrocopus syriacus) - a permanent species which national population according to Yankov (2007) is 14000-25000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 682 nesting couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. Single birds are established on the terrain of the former Kozloduy swamp, but the possibility of a negative impact there is negligible. A negative impact on the species is not expected, due to the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

26. Calandra Lark (Melanocorypha calandra) - a permanent species from Bulgaria's Red Book which national population according to Yankov (2007) is 3000-5000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 5 nesting couples in the protected area and total assessment of "C". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to its comparatively low numbers the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

27. Greater short-toed Lark (Calandrella brachydactyla) - a permanent species which national population according to Yankov (2007) is 1200-3000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 59 (11-108) nesting couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to its comparatively low numbers the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

28. Woodlark (Lullula arborea) - a permanent species which national population according to Yankov (2007) is 40000-80000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 5 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to its comparatively low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

29. Tawny Pipit (Anthus campestris) - a nesting-migratory and transitory species which national population according to Yankov (2007) is 1200-3500 nesting couples. Species under the Birds Directive. According to the standard form is represented by 84 (38-130) nesting

couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to its comparatively low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

30. Barred Warbler (Sylvia nisoria) - a nesting-migratory and transitory species which national population according to Yankov (2007) is 4000-10000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 59 (11-108) nesting couples in the protected area and total assessment of "B". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to its comparatively low numbers, the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

31. Red-backed Shrike (Lanius collurio) - a nesting-migratory and transitory species which national population according to Yankov (2007) is 300000-700000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 1600 nesting couples in the protected area and total assessment of "B". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. Single birds are established on the terrain of the former Kozloduy swamp, but the possibility of a negative impact there is negligible. A negative impact on the species is not expected, due to the absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

32. Lesser Grey Shrike (Lanius minor) - a nesting-migratory and transitory species which national population according to Yankov (2007) is 5000-15000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 100 (95-200) nesting couples in the protected area and total assessment of "A". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

33. Ortolan bunting (Emberiza hortulana) - a nesting-migratory and transitory species which national population according to Yankov (2007) is 25000-75000 nesting couples. Species under the Birds Directive. According to the standard form is represented by 950 nesting couples and 10 passing birds in the protected area and total assessment of "A". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km)..

18 species under chapter 2.2 of the Order of MEW

1. Little Grebe (Tachybaptus ruficollis) - a nesting-migratory, transitory and wintering species from Bulgaria's Red Book which national population according to Yankov (2007) is 800-1900 nesting couples. According to the standard form is represented by 27 (21-33) nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established.During migration

and winters representatives of this species may be found on the terrain of the former Kozloduy swamp. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

2. Great Crested Grebe (Podiceps cristatus) - a nesting-migratory, transitory and wintering species from Bulgaria's Red Book which national population according to Yankov (2007) is 400-600 nesting couples. According to the standard form is represented by 4 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established.During migration and winters representatives of this species may be found on the terrain of the former Kozloduy swamp. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

3. Black-necked Grebe (Podiceps nigricollis) - a nesting-migratory, transitory and wintering species from Bulgaria's Red Book which national population according to Yankov (2007) is 20-60 nesting couples. According to the standard form is represented by 6 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established.During migration and winters representatives of this species may be found on the terrain of the former Kozloduy swamp. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

4. Great Cormorant (Phalacrocorax carbo) - a nesting-migratory and wintering species from which national population according to Yankov (2007) is 2000-2800 nesting couples. According to the standard form is represented by 87 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

5. Grey heron (Ardea cinerea) - a nesting-migratory, transitory and wintering species from Bulgaria's Red Book which national population according to Yankov (2007) is 1000-1400 nesting couples. According to the standard form is represented by 27 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

6. Mallard (Anas platyrhynchos) - a nesting-migratory, transitory and wintering species which national population according to Yankov (2007) is 2500-6000 nesting couples. According to the standard form is represented by 40 nesting couples in the protected area and total assessment of "D". Hunting species. In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

7. Garganey (Anas querquedula) - a nesting-migratory and transitory species from Bulgaria's Red Book which national population according to Yankov (2007) is 150-350 nesting couples. According to the standard form is represented by 5 (1-9) nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species

8. Eurasian Sparrowhawk (Accipiter nisus) - a nesting-migratory, transitory and wintering species from Bulgaria's Red Book which national population according to Yankov (2007) is 1500-2000 nesting couples. According to the standard form is represented by 6 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. During spring migration in the western part of "Zlatiata" are recorded 46 passing birds, and in the autumn – 88. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

9. Common Buzzard (Buteo buteo) - a nesting-migratory, transitory and wintering species which national population according to Yankov (2007) is 2500-4000 nesting couples. According to the standard form is represented by 8 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. During spring migration in the western part of "Zlatiata" are recorded 82 passing birds, and in the autumn – 63. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

10. Common Kestrel (Falco tinnunculus) - a nesting-migratory, transitory and wintering species which national population according to Yankov (2007) is 4000-7500 nesting couples. According to the standard form is represented by 15 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. During spring migration in the western part of "Zlatiata" are recorded 35 passing birds, and in the autumn – 36. A negative impact on the

species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

11. Hobby (Falco subbuteo) - a nesting-migratory, transitory and wintering species from Bulgaria's Red Book which national population according to Yankov (2007) is 600-1200 nesting couples. According to the standard form is represented by 10 (6-14) nesting couples in the protected area and total assessment of "C". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. During spring migration in the western part of "Zlatiata" are recorded 8 passing birds, and in the autumn – 46. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

12. Water Rail (Rallus aquaticus) - a permanent species from Bulgaria's Red Book which national population according to Yankov (2007) is 1000-1800 nesting couples. According to the standard form is represented by 25 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

13. Common Moorhen (Gallinula chloropus) - a permanent species which national population according to Yankov (2007) is 5000-12000 nesting couples. According to the standard form is represented by 38 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

14. Eurasian Coot (Fulica atra) - a permanent species which national population according to Yankov (2007) is 1700-3000 nesting couples. According to the standard form is represented by 38 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

15. Little Ringed Plover (Charadrius dubius) - a permanent species which national population according to Yankov (2007) is 1200-1800 nesting couples. According to the standard form is represented by 5 (1-9)nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is

not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km).

16. Northern Lapwing (Vanellus vanellus) - a permanent species which national population according to Yankov (2007) is 1000-1700 nesting couples. According to the standard form is represented by 7 (6-9) nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding and wintering areas and migratory corridors of the species.

17. European Bee-eater (Merops apiaster) - a nesting-migratory and transitory species which national population according to Yankov (2007) is 25000-50000 nesting couples. According to the standard form is represented by 1300 nesting couples in the protected area and total assessment of "D". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

18. Sand Martin (Riparia riparia) - a nesting-migratory and transitory species which national population according to Yankov (2007) is 20000-50000 nesting couples. According to the standard form is represented by 470 nesting couples in the protected area and total assessment of "C". In the region of investment proposal, where nesting and feeding habitats are not suitable for it, is not established. A negative impact on the species is not expected, due to absence of additional infrastructure (including transmission lines), noxious emissions and pollution (radiation, noise, soil, air, etc.) from present investment proposal and its remoteness from the protected zone (about 1,2 km). Considering all this, the IP will not have a cumulative effect and a negative impact on nesting sites, feeding areas and migratory corridors of the species.

Based on this review the following summary can be made (Table 5.1.2-1).

Table 5.1.2-1 Summary of the number of the affected species, subject to conservation in the protected area of the various negative impacts resulting from the implementation of IP

Negative impact	Species under 2.1	Species under 2.2	Total number of species	% of the total number of types
No impact	33	18	**51**	**100**
Low impact	0	0	**0**	**0**
Average impact	0	0	**0**	**0**
High impact	0	0	**0**	**0**
Total	**33**	**18**	**51**	**100**

As can be seen from the table, no species may be negatively affected in one way or another.

Among the birds identified, there are several bird species having special status compared to the rest. These are species of worldwide importance, species that exceed the 1% Ramsar threshold, species from the Bulgarian Red Book, species of single habitats in the country, species-subject to

environmental protection in the protected area, the most numerous migrants, the so-called "sensitive species", etc. All of them will be examined sequentially:

Dalmatian Pelican *(Pelecanus crispus)* – this is a roaming and wintering species, which during its migration reaches considerable concentrations (between 150 and 252 specimens) in Protected Area "Island near Gorni Tsibur" Code: BG0002008. It hunts in the neighboring Romanian marshlands and stays for the night and rests next to the sand spits of the adjacent islands. Single birds and small flocks have been observed to make food migrations to the Dam next to the Village of Septemvriitsi. Representatives of this species may fly over the Kozloduy NPP site on infrequent basis only, because of which no adverse impact is expected.
Little white-fronted goose *(Anser erythropus)* – this is a rare wintering species in Bulgaria. There is no data available in the Bulgarian ornithological literature about this world endangered species in the examined region but in the standard forms there is data about wintering single birds. Not registered with us and during mid-census on 14 and 15 January 2013. The Kozloduy NPP site remains 3 km to the east of the spending-the-night location (the marshlands at Bistretsu in Romania and the sand spits on the islands) and the feeding locations (Zlatiata).

Migration period

Considered investment proposal falls on the border between the two migration area - Via Aristotelis and Via Balcanica, which are characterized by relatively small migration flows from soaring birds. Migration takes place mainly in the valleys of Cibrica and Ogosta Rivers.

4,382 spring migrants and 25,509 autumn migrants (Michev, etc. 2008) were spotted during the migration period in the examined region (from the observation point in the NorthWest part of Zlatiata. The most numerous migrant in the spring was the Golden plover (*Pluvialis apricaria*) and in the autumn – the Common starling (*Sturnus vulgaris*). Among the 10 most numerous spring and autumn migrants there are some species subject to protection in the protected area (white and black stork, duck-hawk and Montagu's Harrier). The main migration direction of the birds through Zlatiata is northwest - southeast (NW – SE). The Kozloduy NPP site remains 19 km to the east of the main migration route through the Zlatiata.

Based on the received results a conclusion could be drawn that there are no numerous migrants passing through the investigated region. Its territory is not crossed by major migration routes. As a whole the migration of the roaming birds is small compare to other parts of Bulgaria (Michev et al., 2012)..

In terms of ecological groups, the migrants are distributed as follows *(Table 5.1.2-2)*:

Table 5.1.2-2 Distribution of the migrants by ecological groups during the spring and autumn migration of 2008 over the National Park in Zlatiata

Season	Roaming	Sparrow-like	Water-loving	Other	Total:
Spring	1302	844	2001	235	4382
Autumn	2236	22014	523	736	25509
Total	**3538**	**22848**	**2524**	**970**	**29891**

Hibernation period

Regarding the hibernating period of the water-loving birds in the examined region, there is a considerable amount of information available. It has been collected during the yearly Mediterranean countings since 1977 (Kostadinova, Dereliev 2001; Michev & Profirov, 2003). It was found that a big part of the territory of the Zlatiata when there is no snow cover and icing of the Danube River and the Dam of Asparuhov Val can be a solid nutrition base mostly for the great white-fronted *(Anser albifrons)* and grey geese *(Anser anser)*. For the segment of the

Danube River Cibar-Somovit, including the Dam of Asparuhov Val, Michev & Profirov (2003 [92]) indicated an average number of 7,680 birds of 13 species (table 5.1.2-3).

Table 5.1.2-3 midwinter waterfowl numbers in the section Cibar-Somovit for the period 1977-1999 .

Cibar-Somovit	1977	1978	1979	1980	1981	1982	1983	1984	1997	1998	1999
Tachibaptus ruficollis	9	0	1	1	3	0	0	0	5	0	3
Podiceps cristatus	1	7	3	2	3	0	0	0	1	0	0
Phalacrocorax carbo	0	0	0	0	0	0	0	1	94	0	139
Phalacrocorax pygmeus	0	0	42	0	1	2	6	3	10	0	157
Pelecanus crispus	1	0	0	0	0	0	0	0	5	0	10
Egretta alba	0	8	0	0	0	0	0	43	6	0	1
Ardea cinerea	0	4	0	0	0	0	2	1	3	0	3
Cygnus olor	31	0	0	0	0	0	0	0	22	0	0
Anser albifrons	6703	6007	3306	85	187	0	595	14	515	0	170
Anser anser	46	433	74	0	2	4	9	0	56	0	0
Anser spp.	0	0	0	0	0	0	0	0	100	0	0
Anas penelope	0	6	0	0	0	0	13	16	13	0	0
Anas crecca	32	865	622	1	364	0	589	4450	0	0	0
Anas platyrhynchos	5832	17629	5094	162	4680	18	4575	13630	890	0	3308
Anas acuta	282	139	1	0	7	0	59	0	0	0	0
Anas clypeata	100	0	0	0	0	0	0	0	0	0	0
Aythya ferina	0	0	12	0	11	0	32	0	44	0	0
Aythya fuligula	0	0	0	0	10	0	10	4	0	0	28
Bucephala clangula	2	12	0	0	0	0	0	0	5	0	0
Mergus albellus	11	37	80	0	3	0	0	0	3	0	25
Mergus merganser	0	13	24	0	15	0	0	0	0	0	43
Gallinula chloropus	0	0	0	1	0	0	0	0	3	0	2
Fulica atra	0	0	0	0	32	0	0	0	4	0	0
Numenius arquata	0	0	5	1	0	0	15	0	0	0	0
Larus ridibundus	53	596	12	6	23	49	525	120	7	0	32
Larus canus	0	61	14	3	43	1	32	0	12	0	2
Larus cach/mich	4	0	0	0	0	0	20	1	33	0	1
Larus spp.	0	0	0	0	0	0	0	0	0	0	12
Total number of birds	**13109**	**25820**	**9291**	**267**	**5384**	**74**	**6482**	**18283**	**1833**	**0**	**3941**
Total number of species	**16**	**15**	**15**	**10**	**15**	**5**	**14**	**11**	**22**	**0**	**17**

The table shows that the largest hibernating waterfowl were mallard and Greater White-fronted Goose

In Dam Septemvriitsi Kostadinova and Dereliev (2001) found 11 hibernating waterfowl (located about 25 km SW of the protected area "Zlatiata") - five *Anser albifrons* and six *Gallinago gallinago*). There is no evidence of significant concentrations in the considered area.

Summary of the ornithological situation in the region of Protected Area "Zlatiata"

As a result of the accumulated information, the following picture presented on a satellite photo from Google Earth can be put together *(Figure 8-1)*. It shows that in the monitoring area (within a radius of 30 km around the NPP "Kozloduy") is a complex of ecological importance for biodiversity conservation. There are several natural habitats of high conservation significance - marshes, dunes, floodplain forests, sand bars, islands, estuaries, steppes, loess walls, etc.

For the preservation of this extraordinary biodiversity around Kozloduy are declared 12 protected areas and a Ramsar site (Table 5.1.2-4)

Table 5.1.2-4 Protected Areas

Directive Country	Birds Directive	Habitats Directive	Total	Ramsar Convention
Bulgaria	BGSPA0002007 BGSPA0002008 BGSPA0002009 BGSPA0002104	BGpSCI0000199 BGpSCI0000508 BGpSCI0000527 BGpSCI0000533 BGpSCI0000614	9	Maintained reserve "Ibisha"
Romania	ROSPA0010 ROSPA0023	ROpSCI0045	3	
Total	**6**	**6**	**12**	**1**

Similar ecological complexes along the Danube coast there are only Belene-Suhaia and Silistra-Calarasi.

In the vicinity of the protected area "Zlatiata" on both sides of the Danube River has several significant natural sites (swamps, islands, estuaries). Basically they are large and rich in fish ponds in the Romanian town Bistrets former Tsibarsko and former Kozloduyski marsh estuary Jiu, Tsibritsa river, river Ogosta and several major Danube Island (Tsibar, Tsibritsa, unnamed island in the village of Gorni Tsibar, Svraka Kozloduy Kopanitsa). In the past here, and all along the Danube coast, islands as more accessible to man are used by birds for nesting, and the vast and rich fishing wetlands along the left bank - for a meal. Therefore, basic food migrations of birds from breeding colonies of cormorants and herons are directed to the north of the Danube. Very few of them fly south to micro-dams located south of Zlatiata, as well as the riverbed of the Danube and the adjacent islands (Mitchev and others., 2008, unpublished data from observations of 10 and 11 July 2010 from the south bank of the marshes at Bistrets - big dune at 43 and 51 54.2 N 23 34 07.9 E). Most attractive to birds in the area under consideration are crops with crops in Zlatiata wetlands along the banks of the Danube River and the sandy-haired between islands. National Action Plan for the conservation of the Dalmatian Pelican in Bulgaria provides the sandy-haired between river kilometers 715-712, UTM Grid GM05 platform to be built simultaneously with safety equipment - chevrons and crude, intrusive - in hydraulic engineering project for deepening the bed of the Danube certain places with difficult navigation. Designed platform and will be within the protected zone "Island to Gorni Cibar" code BG0002008. At low water levels in the river of sand strips there regularly gather to rest and sleep in between 150 and 250 Dalmatian pelican, feeding in the adjacent wetlands at Bistrets village, Romania. At high water levels, however, the sandy-haired disappear and pelicans are forced to use other, less safe places to sleep and rest.

The very site of NPP "Kozloduy" (excluding conduit of NPP "Kozloduy" with his mouth in the Danube River and the terrain of the former Kozloduyski Marsh), due to lack of food resources, not essential for the birds..

Risks to this ecological complex in the implementation of this IP are discussed in detail in the EIA. Here they are given in the most general way the different components of the environment:

Atmospheric air

The negative impact from IP on the environment is not expected because is planned multilevel treatment of emissions with a combination of dry and wet methods of purificatin.

Of model assessments were made the following conclusions as to the radiation exposure of the population in the process of decommissioning of Units 1-4 of NPP "Kozloduy" normal operation of the facility for plasma burning (Project 5b) and operation of Units 5 and 6 of NPP "Kozloduy":

1. The maximum annual effective dose per individual of the critical group of the population living within the 40-km area around KNPP, resulting from the liquid and gas-aerosol releases to the environment, was conservatively calculated at 5.05μSv/a, which is a much lower value than the quota of 250 μSv/a for exposure from radioactive emissions from NPP (Ordinance on the Assuring of Safety of NPPs) and the norms determined for the population of 1 mSv/a (ONRZ-2012, Basic Norms for Radiation Protection).
2. The additional dose that might be incurred is about 500 times lower than natural radiation background (2.33 mSv).
3. The calculation of the cumulative effect added to the effect of KNPP normal operation, and due to emissions from the decommissioning of KNPP units 1-4, and the normal operation of the plasma melting facility (PMF), Project 5c) results in a negligible increase of the maximum individual and collective effective doses by 0.5 to 1%.
4. The maximum annual effective dose of the population within the 40-km area around KNPP, and due to aerosol emissions only, 6 MBq under normal operation of the plasma melting facility (PMF), was estimated at 5,47.10-10 Sv/a, which is barely 0.01% from the total exposure resulting from all activities on the KNPP site.

Analysis of the IP and the possibilities for contamination of the atmosphere in the 30-kilometer zone around the NPP "Kozloduy" indicates that no significant changes are expected on the values of meteorological elements and the atmosphere.

Waters

The provided water for household supply and for industrial purposes is within the permitted limits.

Based on technology in PMF the generated wastewater are with annual volume of about 2510 m^3, (process water from the scrubber and cooling for the facility). In these waters used for industrial purposes is expected to be slightly chemically contaminated.

In accordance with the technology, the process of separation of generated wastewater is managed to comply with the requirement that the cost of disposal does not exceed 100 l / h. The scrubbing water is collected in the scrubber tank, where will enter and scrape water from the deactivated 200 l drums, and then will be evaporated in the scrubber unit.

Considering the treatment of wastewater from the scrubber and the water from the cooling module in the system for purification of waste water of NPP "Kozloduy" may be comcluded that discharges into the Danube activity is below 400Bq/year, i.e. negligible.

The cumulative effect is insignificant in terms of quantities of wastewater. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory.

Soils and vegetation

According to the National Ecological Radioactivity Survaelence Network (NERSN) have not found elevated levels of radioactive substances in plants under the influence of NPP "Kozloduy". Not found a negative impact on the natural and derived from plants and crops within 30 km around the NPP "Kozluduy". During normal operation of PMF the negative impact on soil and vegetation of NPP "Kozluduy" site and outside is not expected.

Cumulative and transboundary effect is not expected.

Waste

In the stage of implementation of the IP are provided all safety measures ralated to activities with RAW. The aim of the proposal is related with reducing the volume of RAW for further management. In compliance with the principles of ALARA and intercompany procedures and instructions for working with RAW is not expected adverse effects of this factor on the components of the environment.
Based on all the above can certainly be argued that the implementation of the IP will not adversely affect the species, subject to conservation in the protected area "Zlatiata" code BG0002009 under the Birds Directive.

5.1.3 Fragmentation

The Kozloduy NPP site is situated approximately 1 km to the NorthEast of the protected area. Because of this, **no** fragmentation of the territory of the protected area as a result of the implementation of the Investment Proposal is expected. Here, however, it should be noted the fragmentation effect of Western and Eastern supply channel with a total length of about 10 km and units of NPP "Kozloduy" on the one hand and the Bulgarian bank of the Danube on the other.

5.1.4 Disruption of the species composition

Some studies on vegetation and wildlife of the area within 30 km radius since the Chernobyl accident have shown that populations of many species have increased. Biologist Robert Baker from the Technical University of Texas was among the first Western scientists reported the return of wildlife at Chernobyl. According to him, the accident did not significantly affect either the population or of the diversity of many animals, although genetic tests have shown the presence of mutations. Within a radius of only 10 km around the plant at Chernobyl, considered the most heavily contaminated area, were spotted foxes, wolves, otters, deer and wild boar, and many rodents. According to Robert Baker, "The consequences of the accident may even prove to be positive for wildlife because it will allow it to develop without human intervention."
Møller & Mousseau (2007), however, noted that species richness and density of nesting birds near Chernobyl decreases with increasing levels of radiation. This effect is different in species feeding on invertebrates of topsoil.
In the area of NPP "Kozloduy", probably due to the positive impact of thermal pollution at the mouth of the canal in the Danube River on zoo-and phytoplankton and zoo-phytobenthos on fish, amphibians and reptiles, there is an enrichment of the avifauna of the area with wintering waterfowl, including pelicans, Pygmy Cormorant, and SMEW and others. (Table 5.1.4-1):

Table 5.1.4-1 Mid numbers of waterfowl in wetlands of section Tsibar-Somovit (in Michev & Profirov, 2003), the green color is kind of an increase in the number and a brown - with discount

Tsibar-Somovit	1977	1978	1979	1980	1981	1982	1983	1984	1997	1998	1999	Average
Gavia arctica	0	0	0	0	0	0	0	0	0	0	1	0
Tachibaptus ruficollis	9	0	1	1	3	0	0	0	5	0	3	2
Podiceps cristatus	1	7	3	2	3	0	0	0	1	0	0	2
Podiceps grisegena	0	0	1	0	0	0	0	0	0	0	3	0
Phalacrocorax carbo	0	0	0	0	0	0	0	1	94	0	139	21
Phal. pygmeus	0	0	42	0	1	2	6	3	10	0	157	20
Pelecanus crispus	1	0	0	0	0	0	0	0	5	0	10	1
Egretta alba	0	8	0	0	0	0	0	43	6	0	1	5
Ardea cinerea	0	4	0	0	0	0	2	1	3	0	3	1
Cygnus olor	31	0	0	0	0	0	0	0	22	0	0	5
Anser albifrons	6703	6007	3306	85	187	0	595	14	515	0	170	1598
Anser anser	46	433	74	0	2	4	9	0	56	0	0	57
Anser spp.	0	0	0	0	0	0	0	0	100	0	0	9
Branta ruficollis	0	0	0	5	0	0	0	0	0	0	0	0
Tadorna tadorna	0	3	0	0	0	0	0	0	0	0	0	0
Anas penelope	0	6	0	0	0	0	13	16	13	0	0	4
Anas crecca	32	865	622	1	364	0	589	4450	0	0	0	629
Anas platyrhynchos	5832	17629	5094	162	4680	18	4575	13630	890	0	3308	5074
Anas acuta	282	139	1	0	7	0	59	0	0	0	0	44
Anas clypeata	100	0	0	0	0	0	0	0	0	0	0	9
Aythya ferina	0	0	12	0	11	0	32	0	44	0	0	9
Aythya nyroca	1	0	0	0	0	0	0	0	0	0	0	0
Aythya fuligula	0	0	0	0	10	0	10	4	0	0	28	5
Bucephala clangula	2	12	0	0	0	0	0	0	5	0	0	2
Mergus albellus	11	37	80	0	3	0	0	0	3	0	25	14
Mergus merganser	0	13	24	0	15	0	0	0	0	0	43	9
Gallinula chloropus	0	0	0	1	0	0	0	0	3	0	2	1
Fulica atra	0	0	0	0	32	0	0	0	4	0	0	3
Vanellus vanellus	0	0	0	0	0	0	0	0	2	0	0	0
Numenius arquata	0	0	5	1	0	0	15	0	0	0	0	2
Tringa ochropus	1	0	0	0	0	0	0	0	0	0	0	0
Larus ridibundus	53	596	12	6	23	49	525	120	7	0	32	129
Larus canus	0	61	14	3	43	1	32	0	12	0	2	15
Larus cach/mich	4	0	0	0	0	0	20	1	33	0	1	5
Larus spp.	0	0	0	0	0	0	0	0	0	0	12	1
Other waterfowl	0	0	0	0	0	0	0	0	0	0	1	0
Total number of birds	**13109**	**25820**	**9291**	**267**	**5384**	**74**	**6482**	**18283**	**1833**	**0**	**3941**	**7680**
Total number of species	**16**	**15**	**15**	**10**	**15**	**5**	**14**	**11**	**22**	**0**	**17**	**13**

Based on the above it can be concluded that it does not disturb the species composition of birds in the area and significant negative impacts on ornithofauna of the protected area and the area around the NPP "Kozloduy". In some species (mainly Fish-eating) observed a positive impact as a result of increased food base hydrobionts.

5.1.5 Chemical Changes

According to the EIA report the risk of chemical and radioactive pollution of the geological environment in times of accidents and incidents exist, because the risk is limited into the room where the PMF is situated. The extent of this impact is rated as low, but still should be reported

5.1.6 Hydrological changes

According to the EIA report special attention should be paid to the elimination of thermal pollution of the Danube with the cooling water during operation. Thermal discharges will be insignificant, because IP provides self-cooling of the wastewater before filing special sewage system and heat emissions into the Danube is not expected. Environmental Impact of Bulgaria is considered negligible and transboundary impact on Romanian territory is not expected.

5.1.7 Geological changes

According to the EIA-report impact on this component of the environment is not expected. IP will be implemented in the existing building and direct impact on the geological foundation is not expected.

5.1.8 Other changes

Not expected, as estimated in the EIA cumulative effect from the normal operation of Units 5 and 6 of NPP "Kozloduy" of emissions from the process of decommissioning 1-4 of NPP "Kozloduy" and normal operation of the facility for plasma melting (PMF Project 5b), leads to a negligible increase of the maximum individual and collective effective doses of 0.5 to 1%.

5.2 Description and analysis of the impact of the investment proposal on Protected Area "Kozloduy Islands", Code: BG0000553 under the Habitats Directive

The assessment of the extent of impact of the investment proposal for decommissioning of the first four units of Kozloduy NPP is based on an assessment of the impact on each of the criteria for Favourable Environmental Protection Status – population in the area, area of the habitats in the area (where there are specific habitats of smaller areas but important in significance, they are taken into account separately), quality of the habitats (structural and functional parameters), future perspectives (other important parameters). Account is taken separately of other structural and functional parameters, such as the overall functional role of the area for the connectedness of the network – bio-corridor function, geographical connectedness.
A 10-grade assessment scale is used for determining the extent of the impact and this scale makes it possible to take into account the various parameters of the significance of a given impact in respect of the standard indicators for assessment of the extent of the impact *(*table 5.2-1*)*.

Table 5.2-1 Scale for assessment in respect of the standard indicators for assessment of the extent of the impact

Assessment grade	Criteria
0	The activity has no impact
1	The activity has a very small adverse impact
2	The activity may cause temporary adverse impacts
3	The activity may cause short-term adverse impacts
4	The activity may cause secondary adverse impacts

Assessment grade	Criteria
5	The activity may cause cumulative adverse impacts
6	The activity may cause synergetic impacts
7	The activity may cause secondary, cumulative, synergetic adverse impacts. The impact can be eliminated through mitigating/compensatory measures.
8	The activity may cause significant secondary, cumulative, synergetic adverse impacts. The impact can be eliminated through mitigating/compensatory measures.
9	The activity causes significant, short-term or long-term/permanent adverse impacts. The impact can be eliminated through mitigating/compensatory measures.
10	The activity causes a significant and permanent/irreversible adverse impact. The impact cannot be eliminated through mitigating/compensatory measures.

The following four degrees of impact have been adopted depending on the assessment grades:

- 0 - there is no impact
- 1 to 3 – weak impact, which can be avoided without application of special measures other than adherence to the best practices during construction, operation and decommissioning;
- 4 to 6 – medium degree of impact, which must be taken into account in combination with other factors and for which measures for mitigation or elimination must be recommended;
- 7 to 10 – considerable impact, which must be eliminated through appropriate choice of alternatives or application of mitigating and compensatory measures.

5.2.1 Impact on the vegetation and the natural habitat types

Thus far have not been conducted specific observations on radiological status of vegetation and habitat PA "Kozloduy Islands NPP" code BG0000533, related to impact assessment of NPP "Kozloduy". The results of the monitoring to date of the soil and vegetation in an area of 30km of NPP "Kozloduy" gives reason to conclude that the influence of the plant has not changed significantly radiological status of the site BG0000533 Kozloduy Islands Protected Area "Kozloduy".
This finding is based on the results of annual vegetation studies conducted in the area of NPP "Kozloduy" and its adjoining areas.
Analysis of data from annual reports of the Radioecological Monitoring Department results from the radiological monitoring of NPP Kozloduy of studied grassland vegetation (four times a year on the stations in the town of Kozloduy, the village of Harletz and the town of Oriahovo, two times a year on the nuclear power plant site and on the stations in the town of Lom, the town of Pleven and the town of Berkovitza) during period 1993-1997, indicate that anthropogenic nuclides typical NPP (^{137}Cs, ^{60}Co and ^{54}Mn) are only registered in the territory of the plant.
The content of ^{90}Sr in vegetation in 1998 0.30-2.52Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were 4.4 ±0.3 Bq/kg a.d.w. and in 1994 0.17-1.64 Bq / kg a.d.w. The results of radiation monitoring in 1998. agricultural products from sampling in four sectors in a 3 km zone showed that most beta activity has sunflower (combs) in the sector east of NPP "Kozloduy" - 1,022 Bq / kg a.d.w and close to it - in the northern sector - 915 Bq/kg a.d.w. Much lower figures in barley (straw) - 288 Bq/kg a.d.w, maize (cobs) - 176 Bq / kg a.d.w at or about the values at different times. ^{90}Sr content is much less - Sunflower 3.36 Bq / kg a.d.w, lucerne - 1.74 Bq / kg a.d.w, wheat (straw) - 1.07 Bq/kg a.d.w; barley (straw) - 0.83 Bq/kg a.d.w.

The annual report "Results of the radiological environmental monitoring of NPP" Kozloduy "-2007" (III, 2008) presents the results for vegetation (grass) that has been examined four times a year on the stations in the town of Kozloduy, the village of Harletz and the town of Oriahovo (gamma spectrometry and Sr), two times a year on the nuclear power plant site (gamma spectrometry) and on the stations in the town of Lom, the town of Pleven and the town of Berkovitza (gamma spectrometry, ^{90}Sr once a year). The sampling is performed in close proximity to the stations, in the same places where the soil samples have been taken.
Received rezultati for the content of ^{90}Sr in grass plants are in the range 0.18-2.75 Bq/kg a.d.w, with a mean 1.43Bq/kg a.d.w. The results are comparable to the measured in previous years. Years of study (1994-2007) of ^{90}Sr in vegetations around 100km zone monitoring showed variation 0.18-4.75 Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were 4.4 ±0.3 Bq/kg a.d.w. The activity of ^{137}Cs in vegetation in 2007 was in the range 0.80-5.35 Bq / kg a.d.w.
All samples including those from industrial site showed ^{54}Mn, ^{60}Co and ^{134}Cs lower than the corresponding MDA.
The results obtained for the content of 90Sr in vegetation in 2009 were in the range of <0.32 - 5.18 Bq / kg VS, with the average of 1.31 Bq / kg a.d.w
The results are comparable to the measured in previous years. Based on the results of the monitoring of vegetation is concluded that radioactivity in the samples examined is normal for these plants. It is not known influence of KNPP on vegetation outside the site. Such findings have been made based on the results of the monitoring in 2010 and 2011.
Comprehensive analysis of the results of studies on the impact on natural vegetation and crops showed that radioactivity in the samples examined is normal for the plants tested and found free from the influence of NPP "Kozloduy" on vegetation outside the site.

In assessment of the impact on the PA is taken into account conclusions made in the EIA report "Analysis of radiation exposure of the population of 30km surveillance zone of NPP" Kozloduy "of gaseous and liquid radioactive discharges into the environment from the operation of Units 5 and 6 of the removal process decommissioning of Units 1-4 and emissions from operation of the facility for plasma melting (PMF) Project 5b. Of model assessments were made the following conclusions for the radiation exposure of the population in the process of decommissioning of Units 1-4 of NPP "Kozloduy" and normal operation of the PMF:

- The maximum annual effective dose per individual of the critical group of the population living within the 40-km area around KNPP, resulting from the liquid and gas-aerosol releases to the environment, was conservatively calculated at 5.05μSv/a, which is a much lower value than the quota of 250 μSv/a for exposure from radioactive emissions from NPP (Ordinance on the Assuring of Safety of NPPs) and the norms determined for the population of 1 mSv/a (ONRZ-2012, Basic Norms for Radiation Protection).
- The additional dose that might be incurred is about 500 times lower than natural radiation background (2.33 mSv).
- The calculation of the cumulative effect added to the effect of KNPP normal operation, and due to emissions from the decommissioning of KNPP units 1-4, and the normal operation of the plasma melting facility (PMF), Project 5c) results in a negligible increase of the maximum individual and collective effective doses by 0.5 to 1%.
- The maximum annual effective dose of the population within the 40-km area around KNPP, and due to aerosol emissions only, 6 MBq under normal operation of the

plasma melting facility (PMF), was estimated at 5,47.10-10 Sv/a, which is barely 0.01% from the total exposure resulting from all activities on the KNPP site.

Analysis of the IP and the possibilities for contamination of the atmosphere in the 30-kilometer zone around the NPP "Kozloduy" indicates that no significant changes are expected on the values of meteorological elements and the atmosphere.

Durin the operation of PMF deterioration of the waters is not expected.Based on technology in PMF the generated wastewater are with annual volume of about 2510 m^3, (process water from the scrubber and cooling for the facility). In these waters used for industrial purposes is expected to be slightly chemically contaminated.
In accordance with the technology, the process of separation of wastewater generated is managed to comply with the requirement that the cost of disposal does not exceed 100 l / h. The scrubbing water is collected in the scrubber tank, where will enter and scrape water from the deactivated 200 l drums, and then will be evaporated in the scrubber unit.
Considering the treatment of wastewater from the scrubber and the water from the cooling module in the system for purification of waste water of NPP "Kozloduy" may be comcluded that discharges into the Danube activity is below 400Bq/year, i.e. negligible.
The cumulative effect is insignificant in terms of quantities of wastewater. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory.
During normal operation of PMF is not expected negative impact to the soil and vegetation of NPP "Kozloduy" and adjacent lands.
In the stage of implementation of the IP are provided all safety measures ralated to activities with RAW. In compliance with the principles of ALARA and intercompany procedures and instructions for working with RAW is not expected negative effect of this factor on the components of the environment.
Assessment of the degree of impact of the investment proposal on the protected area is formed by the indicators: direct destruction of parts of the Habitats impact on the border areas of habitat; fragmentation (habitat fragmentation) during construction, operation and decommissioning of PMF, mixed with pollution by harmful substances in the decommissioning of units 1-4 NPP "Kozloduy" and for accidents and incidents during the implementation of the investment proposal.

In forming estimates of individual performance are taken into account made in the EIA report conclusins Estimates are consistent with the position of PA at a distance of 2km from the KNPP site.
Estimates are presented in tabular form in order to simplify, not included parameters for the BPS to be regarded as irrelevant to the expected impacts. Tabular evaluation serves to identify the extent of the impact.

Table 5.2.1-1 Impacts on habitats 91EO, 3130, 3270, 91FO

Parameters Impacts	Total area	Species composition	Invasive species
Direct destruction of the habitat	The implementation of the investment proposal is not expected to cause any direct destruction of habitats	There is no likely impact	There is no likely impact
Boundaries (ecoton) of the habitat	There is no likely impact on territories adjacent to the habitat	There is no likely impact	There is no likely impact
Fragmentation	There is no likely impact	There is no likely impact	There is no likely impact

Parameters Impacts	Total area	Species composition	Invasive species
Fire hazard	There is no likely impact from the construction and operation of the facilities. The effect is a long-term one.	There is no likely impact	There is no likely impact
Hazard of accidental pollutions from breakdowns	There is no likely impact	There is a very weak likely impact.	There is a very weak likely impact.

5.2.1.1 Loss of habitats and specimens

There is no expectation of destruction of parts of populations of the flora species *Euphorbia lucida* and *Leucojum aestivum.* There is no expectation of destruction of parts of natural habitats 91E0, 3130, 3270, 91F0, located over 2 km away from NPP Kozloduy site.

5.2.1.2 Fragmentation

Not expected fragmentation as project 5b activities will be carried out indoors at the Kozloduy site and will not directly affect the territory of PA.

5.2.1.3 Disruption of the species composition

Do not expect changes in the floristic composition as in compliance with the accepted standards of technology for PMF and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on vegetation.

5.2.1.4 Chemical changes

In compliance with the good engineering practice for PMF are not expected chemical changes within the PA.

5.2.1.5 Hydrological changes

In compliance with the good engineering practice for PMF are not expected hydrological changes within the PA. Thermal discharges will be insignificant, because IP provides self-cooling of the wastewater before filing special sewage system and heat emissions into the Danube is not expected.

5.2.1.6 Geological changes

According to the EIA-report impact on this component of the environment is not expected. IP will be implemented in the existing building and direct impact on the geological foundation is not expected.

5.2.1.7 Other changes

Not expected, as estimated in the EIA-r cumulative effect from the normal operation of Units 5 and 6 of NPP "Kozloduy", of emissions from the process of decommissioning 1-4 of NPP "Kozloduy" and normal operation of the facility for plasma melting (PMF Project 5b), leads to a negligible increase of the maximum individual and collective effective doses of 0.5 to 1%.

On the basis of the complex assessment summarized in table 5.2.1-1, the influence on PA Kozloduy Islands is defined as weak which can be avoided without application of special measures other than adherence to the best practices during construction, operation and decommissioning of the investment proposal.

The comprehensive analysis of the potential impact of the investment proposal makes it possible to draw the conclusion that the implementation of the Investment Proposal will not exert any

significant adverse impact on the vegetation and the habitats in the PA BG0000553 Kozloduy Islands.

5.2.2 On the animal species

The immediate proximity of PA Kozloduy Islands to the NPP predetermines the degree of significance of every possible impact on the target fauna. The implementation of the IP for constuction of PMF is a process which may affect the elements of protection in the area in the cases of possible accidents and in the cases of arising force majeure circumstances. In order to assess realistically the risk for the animal biota in the region of the Investment Proposal, it is necessary to implement special purpose monitoring within a radius of 30 km. In addition to the specific studies on the species composition and the quantitative parameters of the populations, it is necessary to investigate also the present day radiological and ecological status of the biota in the region. These results will be necessary as a data base in case of possible accidents or occurrence of crisis situations, as well as for taking account of the impacts of the power plant on the status of the fauna. The fauna in PA Kozloduy Island has two main components – target species inhabiting the waters of the Danube River and terrestrial fauna inhabiting the island and shoreline land territories.

5.2.2.1 Loss of habitats and specimens

Such impacts are not expected given normal progress of the implementation of the Investment Proposal. Temporary loss of habitats in the aquatic environment may occur in case of accident-related pollution or in case of force majeure circumstances. The foresight as to the possibility of such situations requires the development of specific plans for surmounting the potential problem.

5.2.2.2 Fragmentation

Not expected fragmentation as project 5b activities will be carried out indoors at the Kozloduy site and will not directly affect the territory of PA.

5.2.2.3 Disruption of the species composition

Do not expect changes in the composition of animal species as in compliance with the accepted standards of technology for PMF and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on vegetation.

5.2.2.4 Chemical changes

In compliance with the good engineering practice for PMF are not expected chemical changes within the PA.

5.2.2.5 Hydrological changes

In compliance with the good engineering practice for PMF are not expected hydrological changes within the PA. Thermal discharges will be insignificant, because IP provides self-cooling of the wastewater before filing special sewage system and heat emissions into the Danube is not expected.

5.2.2.6 Geological changes

Not expected.

5.2.2.7 Other changes

The force majeure impacts are unpredictable in view of the nature of the timing and the magnitude of action. The risk of natural disasters are analysed and assessed in number of specific plans for KNPP but these documents exclude actions in case of terroristic act as eventual force

majeure. In summary, we can draw the conclusion that the implementation of the Investment Proposal will not have any impact on the animal species subject to protection in Protected Area "Kozloduy Islands", with the exception of possible accidents in consequence of force majeure situations.

5.3 Description and analysis of the impact of the investment proposal on Protected Area "Ogosta River", Code: BG0000614 under the Habitats Directive

5.3.1 Impact on the vegetation and the natural habitat types

So far no specialized monitoring has been conducted on the radiological and ecological status of the vegetation and the habitats in PA BG 0000614 Ogosta River in connection with the assessment of the impact of Kozloduy NPP. The results from the monitoring conducted so far on the soil and vegetation components in the 30-km zone around the NPP warrant the conclusion that the impact of the nuclear power plant so far has not changed significantly the ragiological and ecological status of the territory of the PA BG0000614 Ogosta River.

This finding is based on the results of annual vegetation studies conducted in the area of NPP "Kozloduy" and its adjoining areas.
Analysis of data from annual reports of the Radioecological Monitoring Department results from the radiological monitoring of NPP Kozloduy of studied grassland vegetation (four times a year on the stations in the town of Kozloduy, the village of Harletz and the town of Oriahovo, two times a year on the nuclear power plant site and on the stations in the town of Lom, the town of Pleven and the town of Berkovitza) during period 1993-1997, indicate that anthropogenic nuclides typical NPP (^{137}Cs, ^{60}Co and ^{54}Mn) are only registered in the territory of the plant.
The content of ^{90}Sr in vegetation in 1998 0.30-2.52Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were 4.4 ±0.3 Bq/kg a.d.w. and in 1994 0.17-1.64 Bq / kg a.d.w. The results of radiation monitoring in 1998. agricultural products from sampling in four sectors in a 3 km zone showed that most beta activity has sunflower (combs) in the sector east of NPP "Kozloduy" - 1,022 Bq / kg a.d.w and close to it - in the northern sector - 915 Bq/kg a.d.w. Much lower figures in barley (straw) - 288 Bq/kg a.d.w, maize (cobs) - 176 Bq / kg a.d.w at or about the values at different times. ^{90}Sr content is much less - Sunflower 3.36 Bq / kg a.d.w, lucerne - 1.74 Bq / kg a.d.w, wheat (straw) - 1.07 Bq/kg a.d.w; barley (straw) - 0.83 Bq/kg a.d.w.
The annual report "Results of the radiological environmental monitoring of NPP" Kozloduy "-2007" (III, 2008) presents the results for vegetation (grass) that has been examined four times a year on the stations in the town of Kozloduy, the village of Harletz and the town of Oriahovo (gamma spectrometry and Sr), two times a year on the nuclear power plant site (gamma spectrometry) and on the stations in the town of Lom, the town of Pleven and the town of Berkovitza (gamma spectrometry, ^{90}Sr once a year). The sampling is performed in close proximity to the stations, in the same places where the soil samples have been taken.
Received rezultati for the content of ^{90}Sr in grass plants are in the range 0.18-2.75 Bq/kg a.d.w, with a mean 1.43Bq/kg a.d.w. The results are comparable to the measured in previous years. Years of study (1994-2007) of ^{90}Sr in vegetations around 100km zone monitoring showed variation 0.18-4.75 Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were 4.4 ±0.3 Bq/kg a.d.w. The activity of ^{137}Cs in vegetation in 2007 was in the range 0.80-5.35 Bq / kg a.d.w.
All samples including those from industrial site showed ^{54}Mn, ^{60}Co and ^{134}Cs lower than the corresponding MDA.

The results obtained for the content of 90Sr in vegetation in 2009 were in the range of <0.32 - 5.18 Bq / kg VS, with the average of 1.31 Bq / kg a.d.w
The results are comparable to the measured in previous years. Based on the results of the monitoring of vegetation is concluded that radioactivity in the samples examined is normal for these plants. It is not known influence of KNPP on vegetation outside the site. Such findings have been made based on the results of the monitoring in 2010 and 2011.
Comprehensive analysis of the results of studies on the impact on natural vegetation and crops showed that radioactivity in the samples examined is normal for the plants tested and found free from the influence of NPP "Kozloduy" on vegetation outside the site.

In assessment of the impact on the PA is taken into account conclusions made in the EIA report "Analysis of radiation exposure of the population of 30km surveillance zone of NPP" Kozloduy "of gaseous and liquid radioactive discharges into the environment from the operation of Units 5 and 6 of the removal process decommissioning of Units 1-4 and emissions from operation of the facility for plasma melting (PMF) Project 5b. Of model assessments were made the following conclusions for the radiation exposure of the population in the process of decommissioning of Units 1-4 of NPP "Kozloduy" and normal operation of the PMF:

- The maximum annual effective dose per individual of the critical group of the population living within the 40-km area around KNPP, resulting from the liquid and gas-aerosol releases to the environment, was conservatively calculated at 5.05μSv/a, which is a much lower value than the quota of 250 μSv/a for exposure from radioactive emissions from NPP (Ordinance on the Assuring of Safety of NPPs) and the norms determined for the population of 1 mSv/a (ONRZ-2012, Basic Norms for Radiation Protection).
- The additional dose that might be incurred is about 500 times lower than natural radiation background (2.33 mSv).
- The calculation of the cumulative effect added to the effect of KNPP normal operation, and due to emissions from the decommissioning of KNPP units 1-4, and the normal operation of the plasma melting facility (PMF), Project 5c) results in a negligible increase of the maximum individual and collective effective doses by 0.5 to 1%.
- The maximum annual effective dose of the population within the 40-km area around KNPP, and due to aerosol emissions only, 6 MBq under normal operation of the plasma melting facility (PMF), was estimated at 5,47.10-10 Sv/a, which is barely 0.01% from the total exposure resulting from all activities on the KNPP site.

Analysis of the IP and the possibilities for contamination of the atmosphere in the 30-kilometer zone around the NPP "Kozloduy" indicates that no significant changes are expected on the values of meteorological elements and the atmosphere.

Durin the operation of PMF deterioration of the waters is not expected.Based on technology in PMF the generated wastewater are with annual volume of about 2510 m^3, (process water from the scrubber and cooling for the facility). In these waters used for industrial purposes is expected to be slightly chemically contaminated.
In accordance with the technology, the process of separation of wastewater generated is managed to comply with the requirement that the cost of disposal does not exceed 100 l / h. The scrubbing water is collected in the scrubber tank, where will enter and scrape water from the deactivated 200 l drums, and then will be evaporated in the scrubber unit.
Considering the treatment of wastewater from the scrubber and the water from the cooling

module in the system for purification of waste water of NPP "Kozloduy" may be comcluded that discharges into the Danube activity is below 400Bq/year, i.e. negligible.
The cumulative effect is insignificant in terms of quantities of wastewater. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory.
During normal operation of PMF is not expected negative impact to the soil and vegetation of NPP "Kozloduy" and adjacent lands.
In the stage of implementation of the IP are provided all safety measures ralated to activities with RAW. In compliance with the principles of ALARA and intercompany procedures and instructions for working with RAW is not expected negative effect of this factor on the components of the environment.

The assessment of the extent of impact of the investment proposal on the protected area has been formed based on the following indicators: direct destruction of parts of the habitats; impact on the boundary areas of the habitats; fragmentation (segmentation of habitats) during construction, operation and decommissioning of PMF, mixed with pollution with harmful substances upon the decommissioning of Units 1-4 of Kozloduy NPP and in case of accidents and incidents during the implementation of the investment proposal. In forming estimates of individual performance are taken into account made in the EIA report conclusins Estimates are consistent with the position of PA at a distance of 2km from the KNPP site.
The assessments are presented in a table format, where, for the sake of simplicity, we have not included the parameters for Favourable Conservation Status (FCS) about which it is assumed that they have no bearing on the suspected impacts. The assessment from the table serves for identification of the extent of impact.

Table 5.3.1-1 Impacts on habitats 91E0, 3150, 3260, 3270, 6250, 91Z0

Parameters Impacts	**Total area**	**Species composition**	**Invasive species**
Direct destruction of the habitat	The implementation of the investment proposal is not expected to cause any direct destruction of habitats	There is no likely impact	There is no likely impact
Boundaries (ecoton) of the habitat	There is no likely impact on territories adjacent to the habitat	There is no likely impact	There is no likely impact
Fragmentation	There is no likely impact	There is no likely impact	There is no likely impact
Fire hazard	There is no likely impact from the construction and operation of the facilities. The effect is a long-term one.	There is no likely impact	There is no likely impact
Hazard of accidental pollutions from breakdowns	There is no likely impact	There is a very weak likely impact.	There is a very weak likely impact.

On the basis of the forecasted impacts on the natural habitats planned for protection in the protected area, the degree of impact of the investment proposal is assessed as weak .

The comprehensive analysis of the potential impact of the investment proposal makes it possible to draw the conclusion that the implementation of the Investment Proposal will not exert any significant adverse impact on the vegetation and the habitats in PA BG0000614 Ogosta River.

5.3.1.1 Loss of habitats and specimens

No destruction of parts of the populations of flora species *Centaurea rumelica* and *Lemna gibba* is expected. No destruction of parts of natural habitats 91E0, 3150, 3260, 3270, 6250, 91Z0 is expected, located over 3 km away from NPP Kozloduy site.

5.3.1.2 Fragmentation

Not expected fragmentation as project 5b activities will be carried out indoors at the Kozloduy site and will not directly affect the territory of PA.

5.3.1.3 Disruption of the species composition

Do not expect changes in the floristic composition as in compliance with the accepted standards of technology and decommissioning and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on vegetation.

5.3.1.4 Chemical changes

In compliance with the good engineering practice for PMF units 1-4 are not expected chemical changes within the PA.

5.3.1.5 Hydrological changes

In compliance with the good engineering practice for PMF are not expected hydrological changes within the PA. Thermal discharges will be insignificant, because IP provides self-cooling of the wastewater before filing special sewage system and heat emissions into the Danube is not expected.

5.3.1.6 Geological changes

Geological changes sre not expected as project 5b activities will be carried in existing buildinng at the Kozloduy site and will not directly affect the territory of PA.

5.3.1.7 Other changes

Not expected, as estimated in the EIA-r cumulative effect from the normal operation of Units 5 and 6 of NPP "Kozloduy", of emissions from the process of decommissioning 1-4 of NPP "Kozloduy" and normal operation of the facility for plasma melting (PMF Project 5b), leads to a negligible increase of the maximum individual and collective effective doses of 0.5 to 1%.

5.3.2 On animal species

The territory of PA BG0000614 Ogosta River is situated at a distance of several kilometers from the Investment Proposal site. In view of the fluid nature of the aquatic eco system, which is the main eco system for the protected area, the expected impacts can be mainly indirect impacts or impacts occurring in cases of emergency and force majeure situations. The target fauna of the area includes 29 species, of which 13 fish species, 4 amphibian species, 3 reptile species (1 species directly associated with the water), 3 mammal species (1 water-loving one) and 6 invertebrate species, of which 2 molluscan species – hydrobionts.

5.3.2.1 Loss of habitats and specimens

Do not expect changes in the composition of the animal species as in compliance with the accepted standards of technology for PMF and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on animals.

5.3.2.2 Fragmentation

Not expected fragmentation as project 5b activities will be carried out indoors at the Kozloduy site and will not directly affect the territory of PA.

5.3.2.3 Disruption of the species composition

Do not expect changes in the composition of the animal species as in compliance with the accepted standards of technology for PMF and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on animals. .

5.3.2.4 Chemical changes

In compliance with the good engineering practice for PMF units 1-4 are not expected chemical changes within the PA.

5.3.2.5 Hydrological changes

In compliance with the good engineering practice for PMF are not expected hydrological changes within the PA. Thermal discharges will be insignificant, because IP provides self-cooling of the wastewater before filing special sewage system and heat emissions into the Danube is not expected.

5.3.2.6 Geological changes

Geological changes sre not expected as project 5b activities will be carried in existing buildinng at the Kozloduy site and will not directly affect the territory of PA.

5.3.2.7 Other changes

Other changes can occur only in cases of force majeure circumstances, which are unpredictable at this stage of development of the Investment Proposal.

The expected specific impacts on the target fauna of PA Ogosta River, as a consequence of the future implementation of the Investment Proposal, are not worth commenting on, because of their negligibly small probability and sufficient remoteness.

5.4 Description and analysis of the impact of the investment proposal on Protected Area "Skat River", Code: BG0000508 under the Habitats Directive

5.4.1 Impact on the vegetation and the natural habitat types

So far no specialized monitoring has been performed on the radiological and ecological status of the vegetation and the habitats in PA BG 0000508 Skat River in connection with the assessment of the impact of Kozloduy NPP. The results from the monitoring conducted so far on the soil and vegetation components in the 30-km area around the NPP warrant the conclusion that the impact of the nuclear power plant has not changed significantly the environmental radiological status of the territory of PA BG0000 Skat River.

This finding is based on the results of annual vegetation studies conducted in the area of NPP "Kozloduy" and its adjoining areas.
Analysis of data from annual reports of the Radioecological Monitoring Department results from the radiological monitoring of NPP Kozloduy of studied grassland vegetation (four times a year on the stations in the town of Kozloduy, the village of Harletz and the town of Oriahovo, two times a year on the nuclear power plant site and on the stations in the town of Lom, the town of Pleven and the town of Berkovitza) during period 1993-1997, indicate that anthropogenic nuclides typical NPP (^{137}Cs, ^{60}Co and ^{54}Mn) are only registered in the territory of the plant.
The content of ^{90}Sr in vegetation in 1998 0.30-2.52Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were 4.4 ±0.3 Bq/kg a.d.w. and in 1994 0.17-1.64 Bq / kg a.d.w. The results of radiation monitoring in 1998. agricultural products from sampling in four

sectors in a 3 km zone showed that most beta activity has sunflower (combs) in the sector east of NPP "Kozloduy" - 1,022 Bq / kg a.d.w and close to it - in the northern sector - 915 Bq/kg a.d.w. Much lower figures in barley (straw) - 288 Bq/kg a.d.w, maize (cobs) - 176 Bq / kg a.d.w at or about the values at different times. ^{90}Sr content is much less - Sunflower 3.36 Bq / kg a.d.w, lucerne - 1.74 Bq / kg a.d.w, wheat (straw) - 1.07 Bq/kg a.d.w; barley (straw) - 0.83 Bq/kg a.d.w.
The annual report "Results of the radiological environmental monitoring of NPP" Kozloduy "-2007" (III, 2008) presents the results for vegetation (grass) that has been examined four times a year on the stations in the town of Kozloduy, the village of Harletz and the town of Oriahovo (gamma spectrometry and Sr), two times a year on the nuclear power plant site (gamma spectrometry) and on the stations in the town of Lom, the town of Pleven and the town of Berkovitza (gamma spectrometry, ^{90}Sr once a year). The sampling is performed in close proximity to the stations, in the same places where the soil samples have been taken.
Received rezultati for the content of ^{90}Sr in grass plants are in the range 0.18-2.75 Bq/kg a.d.w, with a mean 1.43Bq/kg a.d.w. The results are comparable to the measured in previous years. Years of study (1994-2007) of ^{90}Sr in vegetations around 100km zone monitoring showed variation 0.18-4.75 Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were 4.4 ±0.3 Bq/kg a.d.w. The activity of ^{137}Cs in vegetation in 2007 was in the range 0.80-5.35 Bq / kg a.d.w.
All samples including those from industrial site showed ^{54}Mn, ^{60}Co and ^{134}Cs lower than the corresponding MDA.
The results obtained for the content of 90Sr in vegetation in 2009 were in the range of <0.32 - 5.18 Bq / kg VS, with the average of 1.31 Bq / kg a.d.w
The results are comparable to the measured in previous years. Based on the results of the monitoring of vegetation is concluded that radioactivity in the samples examined is normal for these plants. It is not known influence of KNPP on vegetation outside the site. Such findings have been made based on the results of the monitoring in 2010 and 2011.
Comprehensive analysis of the results of studies on the impact on natural vegetation and crops showed that radioactivity in the samples examined is normal for the plants tested and found free from the influence of NPP "Kozloduy" on vegetation outside the site.

In assessment of the impact on the PA is taken into account conclusions made in the EIA report "Analysis of radiation exposure of the population of 30km surveillance zone of NPP" Kozloduy "of gaseous and liquid radioactive discharges into the environment from the operation of Units 5 and 6 of the removal process decommissioning of Units 1-4 and emissions from operation of the facility for plasma melting (PMF) Project 5b. Of model assessments were made the following conclusions for the radiation exposure of the population in the process of decommissioning of Units 1-4 of NPP "Kozloduy" and normal operation of the PMF:

- The maximum annual effective dose per individual of the critical group of the population living within the 40-km area around KNPP, resulting from the liquid and gas-aerosol releases to the environment, was conservatively calculated at 5.05μSv/a, which is a much lower value than the quota of 250 μSv/a for exposure from radioactive emissions from NPP (Ordinance on the Assuring of Safety of NPPs) and the norms determined for the population of 1 mSv/a (ONRZ-2012, Basic Norms for Radiation Protection).
- The additional dose that might be incurred is about 500 times lower than natural radiation background (2.33 mSv).
- The calculation of the cumulative effect added to the effect of KNPP normal operation, and due to emissions from the decommissioning of KNPP units 1-4,

and the normal operation of the plasma melting facility (PMF), Project 5c) results in a negligible increase of the maximum individual and collective effective doses by 0.5 to 1%.

- The maximum annual effective dose of the population within the 40-km area around KNPP, and due to aerosol emissions only, 6 MBq under normal operation of the plasma melting facility (PMF), was estimated at 5,47.10-10 Sv/a, which is barely 0.01% from the total exposure resulting from all activities on the KNPP site.

Analysis of the IP and the possibilities for contamination of the atmosphere in the 30-kilometer zone around the NPP "Kozloduy" indicates that no significant changes are expected on the values of meteorological elements and the atmosphere.

Durin the operation of PMF deterioration of the waters is not expected.Based on technology in PMF the generated wastewater are with annual volume of about 2510 m^3, (process water from the scrubber and cooling for the facility). In these waters used for industrial purposes is expected to be slightly chemically contaminated.
In accordance with the technology, the process of separation of wastewater generated is managed to comply with the requirement that the cost of disposal does not exceed 100 l / h. The scrubbing water is collected in the scrubber tank, where will enter and scrape water from the deactivated 200 l drums, and then will be evaporated in the scrubber unit.
Considering the treatment of wastewater from the scrubber and the water from the cooling module in the system for purification of waste water of NPP "Kozloduy" may be comcluded that discharges into the Danube activity is below 400Bq/year, i.e. negligible.
The cumulative effect is insignificant in terms of quantities of wastewater. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory. During normal operation of PMF is not expected negative impact to the soil and vegetation of NPP "Kozloduy" and adjacent lands.
In the stage of implementation of the IP are provided all safety measures ralated to activities with RAW. In compliance with the principles of ALARA and intercompany procedures and instructions for working with RAW is not expected negative effect of this factor on the components of the environment.

The assessment of the extent of impact of the investment proposal on the protected area has been formed based on the following indicators: direct destruction of parts of habitats; impact on the boundary zones of the habitats; fragmentation (segmentation of habitats) during construction, operation and decommissioning of PMF, mixed with pollution with harmful substances upon decommissioning of Units 1-4 of Kozloduy NPP and in the cases of accidents and incidents during the implementation of the investment proposal. In forming estimates of individual performance are taken into account made in the EIA report conclusins Estimates are consistent with the position of PA at a distance of 10km from the KNPP site.

The assessments are presented in a table format, where, for the sake of simplicity, we have not included the parameters for Favourable Conservation Status (FCS) about which it is assumed that they have no bearing on the suspected impacts. The assessment from the table serves for identification of the extent of impact.

Table 5.4.1-1 Impacts on habitats 91E0, 1530, 3260, 3270, 6250, 91F0

Parameters *Impacts*	Total area	Species composition	Invasive species
Direct destruction of the habitat	The implementation of the investment proposal is not expected to cause any direct destruction of habitats	There is no likely impact	There is no likely impact
Boundaries (ecoton) of the habitat	There is no likely impact on territories adjacent to the habitat	There is no likely impact	There is no likely impact
Fragmentation	There is no likely impact	There is no likely impact	There is no likely impact
Fire hazard	There is no likely impact from the construction and operation of the facilities. The effect is a long-term one.	There is no likely impact	There is no likely impact
Hazard of accidental pollutions from breakdowns	There is no likely impact	There is a very weak likely impact.	There is a very weak likely impact.

On the basis of the forecasted impacts on the natural habitats planned for protection in the protected area, the degree of impact of the investment proposal is assessed as weak and avoidable without application of special measures other than adherence to the best practices during construction, operation and decommissioning of the investment proposal.

The comprehensive analysis of the potential impact of the investment proposal makes it possible to draw the conclusion that the implementation of the Investment Proposal will not exert any significant adverse impact on the vegetation and the habitats in PA BG0000508 Skat River.

5.4.1.1 Loss of habitats and specimens

No destruction of parts of populations of vegetation species *Stachys arenariaeformis* and *Wolffia arrhiza* is expected. No destruction of parts of natural habitats 91E0, 1530, 3260, 3270, 6250, 91F0 is expected, locted over 10 km away from NPP Kozloduy site.

5.4.1.2 Fragmentation

Not expected fragmentation as project 5b activities will be carried out indoors at the Kozloduy site and will not directly affect the territory of PA..

5.4.1.3 Disruption of the species composition

Do not expect changes in the floristic composition as in compliance with the accepted standards of technology and decommissioning and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on vegetation.

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5.4.1.4 Chemical changes

In compliance with the good engineering practice for PMF units 1-4 are not expected chemical changes within the PA**.**

5.4.1.5 Hydrological changes

In compliance with the good engineering practice for PMF are not expected hydrological changes within the PA. Thermal discharges will be insignificant, because IP provides self-cooling of the wastewater before filing special sewage system and heat emissions into the Danube is not expected.

5.4.1.6 Geological changes

Geological changes sre not expected as the IP will be implemented in existing buildinng at the Kozloduy site and will not directly affect the territory of PA.

5.4.1.7 Other changes

Not expected, as estimated in the EIA-r cumulative effect from the normal operation of Units 5 and 6 of NPP "Kozloduy", of emissions from the process of decommissioning 1-4 of NPP "Kozloduy" and normal operation of the facility for plasma melting (PMF Project 5b), leads to a negligible increase of the maximum individual and collective effective doses of 0.5 to 1%..

5.4.2 On vegetation and animal species

This protected area is situated at the greatest distance from the Investment Proposal site and we believe that the risk of impact on the target fauna is the smallest. The target fauna includes: 4 fish species, 2 amphibian species, 3 reptile species, 3 mammal species and 3 invertebrate species. Among these species, 5 species (2 coleoptera species, 2 small mammal species and 1 snake species) have no direct association with the water. The potential adverse impacts, which may occur, are only those in cases of emergency situations involving radioactive contamination as consequence of force majeure. These impacts are of negligibly small probability and are not susceptible to correct assessment at this stage.

5.4.2.1 Loss of habitats and specimens

Loss of habitats and specimens is not expected as the IP will be implemente indoors.

5.4.2.2 Fragmentation

Not expected fragmentation as project 5b activities will be carried out indoors at the Kozloduy site and will not directly affect the territory of PA.

5.4.2.3 Disruption of the species composition

Do not expect changes in the composition of the animal species as in compliance with the accepted standards of technology for PMF and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on animals.

5.4.2.4 Chemical changes

Not expected, provided there is adherence to precautionary measures taken into account in the process of future implementation of the Investment Proposal.

5.4.2.5 Hydrological changes

In compliance with the good engineering practice for PMF are not expected hydrological changes within the PA. Thermal discharges will be insignificant, because IP provides self-cooling of the

wastewater before filing special sewage system and heat emissions into the Danube is not expected.

5.4.2.6 Geological changes

Not expected.

5.4.2.7 Other changes

Other changes are not expected, thanks to the location and remoteness of the Protected Area from the Investment Proposal site. The risk of adverse impacts on the target fauna in Protected Area "Skat River" is assessed as insignificant, thanks to the linear nature and the considerable remoteness of the Investment Proposal site.

5.5 Description and analysis of the impact of the investment proposal on Protected Area "Kozloduy", Code: BG0000527 under the Habitats Directive

5.5.1 Impact on the vegetation and the natural habitat types

So far no specialized monitoring has been performed on the radiological and ecological status of the vegetation and the habitats in PA BG 0000527 Kozloduy in connection with the assessment of the impact of Kozloduy NPP. The results from the monitoring conducted so far on the soil and vegetation components in the 30-km area around the NPP warrant the conclusion that the impact of the nuclear power plant has not changed significantly the environmental radiological status of the territory of PA BG0000527 "Kozloduy".

This finding is based on the results of annual vegetation studies conducted in the area of NPP "Kozloduy" and its adjoining areas.
Analysis of data from annual reports of the Radioecological Monitoring Department results from the radiological monitoring of NPP Kozloduy of studied grassland vegetation (four times a year on the stations in the town of Kozloduy, the village of Harletz and the town of Oriahovo, two times a year on the nuclear power plant site and on the stations in the town of Lom, the town of Pleven and the town of Berkovitza) during period 1993-1997, indicate that anthropogenic nuclides typical NPP (^{137}Cs, ^{60}Co and ^{54}Mn) are only registered in the territory of the plant.
The content of ^{90}Sr in vegetation in 1998 0.30-2.52Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were 4.4 ±0.3 Bq/kg a.d.w. and in 1994 0.17-1.64 Bq / kg a.d.w. The results of radiation monitoring in 1998. agricultural products from sampling in four sectors in a 3 km zone showed that most beta activity has sunflower (combs) in the sector east of NPP "Kozloduy" - 1,022 Bq / kg a.d.w and close to it - in the northern sector - 915 Bq/kg a.d.w. Much lower figures in barley (straw) - 288 Bq/kg a.d.w, maize (cobs) - 176 Bq / kg a.d.w at or about the values at different times. ^{90}Sr content is much less - Sunflower 3.36 Bq / kg a.d.w, lucerne - 1.74 Bq / kg a.d.w, wheat (straw) - 1.07 Bq/kg a.d.w; barley (straw) - 0.83 Bq/kg a.d.w.
The annual report "Results of the radiological environmental monitoring of NPP" Kozloduy "-2007" (III, 2008) presents the results for vegetation (grass) that has been examined four times a year on the stations in the town of Kozloduy, the village of Harletz and the town of Oriahovo (gamma spectrometry and Sr), two times a year on the nuclear power plant site (gamma spectrometry) and on the stations in the town of Lom, the town of Pleven and the town of Berkovitza (gamma spectrometry, ^{90}Sr once a year). The sampling is performed in close proximity to the stations, in the same places where the soil samples have been taken.
Received rezultati for the content of ^{90}Sr in grass plants are in the range 0.18-2.75 Bq/kg a.d.w, with a mean 1.43Bq/kg a.d.w. The results are comparable to the measured in previous years. Years of study (1994-2007) of ^{90}Sr in vegetations around 100km zone monitoring showed

variation 0.18-4.75 Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were 4.4 ±0.3 Bq/kg a.d.w. The activity of ^{137}Cs in vegetation in 2007 was in the range 0.80-5.35 Bq / kg a.d.w. All samples including those from industrial site showed ^{54}Mn, ^{60}Co and ^{134}Cs lower than the corresponding MDA. The results obtained for the content of 90Sr in vegetation in 2009 were in the range of <0.32 - 5.18 Bq / kg VS, with the average of 1.31 Bq / kg a.d.w
The results are comparable to the measured in previous years. Based on the results of the monitoring of vegetation is concluded that radioactivity in the samples examined is normal for these plants. It is not known influence of KNPP on vegetation outside the site. Such findings have been made based on the results of the monitoring in 2010 and 2011.
Comprehensive analysis of the results of studies on the impact on natural vegetation and crops showed that radioactivity in the samples examined is normal for the plants tested and found free from the influence of NPP "Kozloduy" on vegetation outside the site.

In assessment of the impact on the PA is taken into account conclusions made in the EIA report "Analysis of radiation exposure of the population of 30km surveillance zone of NPP" Kozloduy "of gaseous and liquid radioactive discharges into the environment from the operation of Units 5 and 6 of the removal process decommissioning of Units 1-4 and emissions from operation of the facility for plasma melting (PMF) Project 5b. Of model assessments were made the following conclusions for the radiation exposure of the population in the process of decommissioning of Units 1-4 of NPP "Kozloduy" and normal operation of the PMF:

- The maximum annual effective dose per individual of the critical group of the population living within the 40-km area around KNPP, resulting from the liquid and gas-aerosol releases to the environment, was conservatively calculated at 5.05μSv/a, which is a much lower value than the quota of 250 μSv/a for exposure from radioactive emissions from NPP (Ordinance on the Assuring of Safety of NPPs) and the norms determined for the population of 1 mSv/a (ONRZ-2012, Basic Norms for Radiation Protection).
- The additional dose that might be incurred is about 500 times lower than natural radiation background (2.33 mSv).
- The calculation of the cumulative effect added to the effect of KNPP normal operation, and due to emissions from the decommissioning of KNPP units 1-4, and the normal operation of the plasma melting facility (PMF), Project 5c) results in a negligible increase of the maximum individual and collective effective doses by 0.5 to 1%.
- The maximum annual effective dose of the population within the 40-km area around KNPP, and due to aerosol emissions only, 6 MBq under normal operation of the plasma melting facility (PMF), was estimated at 5,47.10-10 Sv/a, which is barely 0.01% from the total exposure resulting from all activities on the KNPP site.

Analysis of the IP and the possibilities for contamination of the atmosphere in the 30-kilometer zone around the NPP "Kozloduy" indicates that no significant changes are expected on the values of meteorological elements and the atmosphere.

Durin the operation of PMF deterioration of the waters is not expected.Based on technology in PMF the generated wastewater are with annual volume of about 2510 m^3, (process water from the scrubber and cooling for the facility). In these waters used for industrial purposes is expected to be slightly chemically contaminated.
In accordance with the technology, the process of separation of wastewater generated is managed to comply with the requirement that the cost of disposal does not exceed 100 l / h. The scrubbing

water is collected in the scrubber tank, where will enter and scrape water from the deactivated 200 l drums, and then will be evaporated in the scrubber unit.
Considering the treatment of wastewater from the scrubber and the water from the cooling module in the system for purification of waste water of NPP "Kozloduy" may be comcluded that discharges into the Danube activity is below 400Bq/year, i.e. negligible.
The cumulative effect is insignificant in terms of quantities of wastewater. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory. During normal operation of PMF is not expected negative impact to the soil and vegetation of NPP "Kozloduy" and adjacent lands.
In the stage of implementation of the IP are provided all safety measures ralated to activities with RAW. In compliance with the principles of ALARA and intercompany procedures and instructions for working with RAW is not expected negative effect of this factor on the components of the environment.

The assessment of the extent of impact of the investment proposal on the protected area has been formed based on the following indicators: direct destruction of parts of habitats; impact on the boundary zones of the habitats; fragmentation (segmentation of habitats); pollution with harmful substances in the cases of accidents and incidents during the implementation of the investment proposal. In forming estimates of individual performance are taken into account made in the EIA report conclusins Estimates are consistent with the position of PA at a distance of 1.5 km from the KNPP site.

The assessments are presented in a table format, where, for the sake of simplicity, we have not included the parameters for Favourable Conservation Status (FCS) about which it is assumed that they have no bearing on the suspected impacts. The assessment from the table serves for identification of the extent of impact.

Table 5.5.1-1 Impacts on habitats 6250 * Pannonian loess steppe grasslands

Parameters ***Impacts***	**Total area**	**Species composition**	**Invasive species**
Direct destruction of the habitat	The implementation of the investment proposal is not expected to cause any direct destruction of habitats	There is no likely impact	There is no likely impact
Boundaries (ecoton) of the habitat	There is no likely impact on territories adjacent to the habitat	There is no likely impact	There is no likely impact
Fragmentation	There is no likely impact	There is no likely impact	There is no likely impact
Fire hazard	There is no likely impact from the construction and operation of the facilities. The effect is a long-term one.	There is no likely impact	There is no likely impact
Hazard of accidental pollutions from breakdowns	There is no likely impact	There is a very weak likely impact.	There is a very weak likely impact.

On the basis of the forecasted impacts on the natural habitats planned for protection in the protected area, the degree of impact of the investment proposal is assessed as weak and avoidable without application of special measures other than adherence to the best practices during construction, operation and decommissioning of the investment proposal.
The comprehensive analysis of the potential impact of the investment proposal makes it possible to draw the conclusion that the implementation of the Investment Proposal will not exert any significant adverse impact on the vegetation and the habitats in PA "Kozloduy", code BG0000527.

5.5.1.1 Loss of habitat and specimens

Not expected destruction of parts of the populations of species *Centaurea rumelica* and *Stachys arenariaeformis*. Not expected destruction of parts of the natural 6250 which is located at a distance of over 1.5 km from the KNPP site

5.5.1.2 Fragmentation

Not expected fragmentation as project 5b activities will be carried out indoors at the Kozloduy site and will not directly affect the territory of PA.

5.5 1.3 Disruption of the species composition

Do not expect changes in the floristic composition as in compliance with the accepted standards of technology for PMF and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on vegetation.

5.5.1.4 Chemical changes

In compliance with the good engineering practice for PMF are not expected chemical changes within the PA.

5.5.1.5 Hydrological changes

In compliance with the good engineering practice for PMF are not expected hydrological changes within the PA. Thermal discharges will be insignificant, because IP provides self-cooling of the wastewater before filing special sewage system and heat emissions into the Danube is not expected.

5.5.1.6 Geological changes

Geological changes sre not expected as the IP will be implemented in existing buildinng at the Kozloduy site and will not directly affect the territory of PA.

5.5.1.7 Other changes

Not expected, as estimated in the EIA-r cumulative effect from the normal operation of Units 5 and 6 of NPP "Kozloduy", of emissions from the process of decommissioning 1-4 of NPP "Kozloduy" and normal operation of the facility for plasma melting (PMF Project 5b), leads to a negligible increase of the maximum individual and collective effective doses of 0.5 to 1%.

5.5.2 On animal species

Animal species subject and object of protection in a particular area are two types of vertebrates - Colorful Aesculapian and Romanian hamster. No change is expected in the structure of their populations..

5.5.2.1 Loss of habitats and specimens

Not expected destruction of parts of the populations of animal species as well as their habitats. The PA is located at a distance of over 1.5 km from the KNPP site***5.5.2.2 Fragmentation***

Not expected fragmentation as the activities of imlementation of IP will be carried out at the Kozloduy site and will not directly affect the territory of PA.

5.5.2.3 Disruption of the species composition

Do not expect changes in the composition of the animal species as in compliance with the accepted standards of technology for PMF and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on animals. .

5.5.2.4 Chemical changes

In compliance with the good engineering practice for PMF are not expected chemical changes within the PA.

5.5.2.5 Hydrological changes

In compliance with the good engineering practice for implementation of IP not expected hydrological changes within the PA.

5.5.2.6 Geological changes

Geological changes sre not expected as the IP will be implemented in existing buildinng at the Kozloduy site and will not directly affect the territory of PA.

5.5.2.7 Other changes

Not expected.

5.6 Description and analysis of the impact of the investment proposal on Protected Area "Cibar", Code: BG0000199 under the Habitats Directive

5.6.1 Impact on the vegetation and the natural habitat types

So far no specialized monitoring has been performed on the radiological and ecological status of the vegetation and the habitats in PA BG 0000527 Kozloduy in connection with the assessment of the impact of Kozloduy NPP. The results from the monitoring conducted so far on the soil and vegetation components in the 30-km area around the NPP warrant the conclusion that the impact of the nuclear power plant has not changed significantly the environmental radiological status of the territory of PA BG0000527 "Kozloduy".

This finding is based on the results of annual vegetation studies conducted in the area of NPP "Kozloduy" and its adjoining areas.
Analysis of data from annual reports of the Radioecological Monitoring Department results from the radiological monitoring of NPP Kozloduy of studied grassland vegetation (four times a year on the stations in the town of Kozloduy, the village of Harletz and the town of Oriahovo, two times a year on the nuclear power plant site and on the stations in the town of Lom, the town of Pleven and the town of Berkovitza) during period 1993-1997, indicate that anthropogenic nuclides typical NPP (^{137}Cs, ^{60}Co and ^{54}Mn) are only registered in the territory of the plant.
The content of ^{90}Sr in vegetation in 1998 0.30-2.52Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were 4.4 ±0.3 Bq/kg a.d.w. and in 1994 0.17-1.64 Bq / kg a.d.w. The results of radiation monitoring in 1998. agricultural products from sampling in four sectors in a 3 km zone showed that most beta activity has sunflower (combs) in the sector east of NPP "Kozloduy" - 1,022 Bq / kg a.d.w and close to it - in the northern sector - 915 Bq/kg a.d.w. Much lower figures in barley (straw) - 288 Bq/kg a.d.w, maize (cobs) - 176 Bq / kg a.d.w at or

about the values at different times. ^{90}Sr content is much less - Sunflower 3.36 Bq / kg a.d.w, lucerne - 1.74 Bq / kg a.d.w, wheat (straw) - 1.07 Bq/kg a.d.w; barley (straw) - 0.83 Bq/kg a.d.w.
The annual report "Results of the radiological environmental monitoring of NPP" Kozloduy "-2007" (III, 2008) presents the results for vegetation (grass) that has been examined four times a year on the stations in the town of Kozloduy, the village of Harletz and the town of Oriahovo (gamma spectrometry and Sr), two times a year on the nuclear power plant site (gamma spectrometry) and on the stations in the town of Lom, the town of Pleven and the town of Berkovitza (gamma spectrometry, ^{90}Sr once a year). The sampling is performed in close proximity to the stations, in the same places where the soil samples have been taken.
Received rezultati for the content of ^{90}Sr in grass plants are in the range 0.18-2.75 Bq/kg a.d.w, with a mean 1.43Bq/kg a.d.w. The results are comparable to the measured in previous years. Years of study (1994-2007) of ^{90}Sr in vegetations around 100km zone monitoring showed variation 0.18-4.75 Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were 4.4 ±0.3 Bq/kg a.d.w. The activity of ^{137}Cs in vegetation in 2007 was in the range 0.80-5.35 Bq / kg a.d.w.
All samples including those from industrial site showed ^{54}Mn, ^{60}Co and ^{134}Cs lower than the corresponding MDA.
The results obtained for the content of 90Sr in vegetation in 2009 were in the range of <0.32 - 5.18 Bq / kg VS, with the average of 1.31 Bq / kg a.d.w
The results are comparable to the measured in previous years. Based on the results of the monitoring of vegetation is concluded that radioactivity in the samples examined is normal for these plants. It is not known influence of KNPP on vegetation outside the site. Such findings have been made based on the results of the monitoring in 2010 and 2011.
Comprehensive analysis of the results of studies on the impact on natural vegetation and crops showed that radioactivity in the samples examined is normal for the plants tested and found free from the influence of NPP "Kozloduy" on vegetation outside the site.

In assessment of the impact on the PA is taken into account conclusions made in the EIA report "Analysis of radiation exposure of the population of 30km surveillance zone of NPP" Kozloduy "of gaseous and liquid radioactive discharges into the environment from the operation of Units 5 and 6 of the removal process decommissioning of Units 1-4 and emissions from operation of the facility for plasma melting (PMF) Project 5b. Of model assessments were made the following conclusions for the radiation exposure of the population in the process of decommissioning of Units 1-4 of NPP "Kozloduy" and normal operation of the PMF:

- The maximum annual effective dose per individual of the critical group of the population living within the 40-km area around KNPP, resulting from the liquid and gas-aerosol releases to the environment, was conservatively calculated at 5.05µSv/a, which is a much lower value than the quota of 250 µSv/a for exposure from radioactive emissions from NPP (Ordinance on the Assuring of Safety of NPPs) and the norms determined for the population of 1 mSv/a (ONRZ-2012, Basic Norms for Radiation Protection).
- The additional dose that might be incurred is about 500 times lower than natural radiation background (2.33 mSv).
- The calculation of the cumulative effect added to the effect of KNPP normal operation, and due to emissions from the decommissioning of KNPP units 1-4, and the normal operation of the plasma melting facility (PMF), Project 5c)

results in a negligible increase of the maximum individual and collective effective doses by 0.5 to 1%.

- The maximum annual effective dose of the population within the 40-km area around KNPP, and due to aerosol emissions only, 6 MBq under normal operation of the plasma melting facility (PMF), was estimated at 5,47.10-10 Sv/a, which is barely 0.01% from the total exposure resulting from all activities on the KNPP site.

Analysis of the IP and the possibilities for contamination of the atmosphere in the 30-kilometer zone around the NPP "Kozloduy" indicates that no significant changes are expected on the values of meteorological elements and the atmosphere.

Durin the operation of PMF deterioration of the waters is not expected.Based on technology in PMF the generated wastewater are with annual volume of about 2510 m^3, (process water from the scrubber and cooling for the facility). In these waters used for industrial purposes is expected to be slightly chemically contaminated.
In accordance with the technology, the process of separation of wastewater generated is managed to comply with the requirement that the cost of disposal does not exceed 100 l / h. The scrubbing water is collected in the scrubber tank, where will enter and scrape water from the deactivated 200 l drums, and then will be evaporated in the scrubber unit.
Considering the treatment of wastewater from the scrubber and the water from the cooling module in the system for purification of waste water of NPP "Kozloduy" may be comcluded that discharges into the Danube activity is below 400Bq/year, i.e. negligible.
The cumulative effect is insignificant in terms of quantities of wastewater. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory. During normal operation of PMF is not expected negative impact to the soil and vegetation of NPP "Kozloduy" and adjacent lands.
In the stage of implementation of the IP are provided all safety measures ralated to activities with RAW. In compliance with the principles of ALARA and intercompany procedures and instructions for working with RAW is not expected negative effect of this factor on the components of the environment.

The assessment of the extent of impact of the investment proposal on the protected area has been formed based on the following indicators: direct destruction of parts of habitats; impact on the boundary zones of the habitats; fragmentation (segmentation of habitats); pollution with harmful substances in the cases of accidents and incidents during the implementation of the investment proposal. In forming estimates of individual performance are taken into account made in the EIA report conclusins Estimates are consistent with the position of PA at a distance of 10 km from the KNPP site.

The assessments are presented in a table format, where, for the sake of simplicity, we have not included the parameters for Favourable Conservation Status (FCS) about which it is assumed that they have no bearing on the suspected impacts. The assessment from the table serves for identification of the extent of impact.

Table 5.6.1-1 Impacts on habitats 91E0, 1530, 2340, 3130, 3150, 3270, 6250

Parameters / ***Impacts***	**Total area**	**Species composition**	**Invasive species**
Direct destruction of the habitat	The implementation of the investment proposal is not expected to cause any direct destruction of habitats	There is no likely impact	There is no likely impact
Boundaries (ecoton) of the habitat	There is no likely impact on territories adjacent to the habitat	There is no likely impact	There is no likely impact
Fragmentation	There is no likely impact	There is no likely impact	There is no likely impact
Fire hazard	There is no likely impact from the construction and operation of the facilities. The effect is a long-term one.	There is no likely impact	There is no likely impact
Hazard of accidental pollutions from breakdowns	There is no likely impact	There is a very weak likely impact.	There is a very weak likely impact.

On the basis of the forecasted impacts on the natural habitats planned for protection in the protected area, the degree of impact of the investment proposal is assessed as weak and avoidable without application of special measures other than adherence to the best practices during construction, operation and decommissioning of the investment proposal.
The comprehensive analysis of the potential impact of the investment proposal makes it possible to draw the conclusion that the implementation of the Investment Proposal will not exert any significant adverse impact on the vegetation and the habitats in PA “Cibar”, code BG0000527.

5.6.1.1 Loss of habitat and specimens

Not expected destruction of parts of the populations of species *Centaurea rumelica* and *Stachys arenariaeformis*. Not expected destruction of parts of the natural 91E0, 1530, 2340, 3130, 3150, 3270, 6250, located at a distance of over 10 km from the KNPP site

5.6.1.2 Fragmentation

Not expected fragmentation as project 5b activities will be carried out indoors at the Kozloduy site and will not directly affect the territory of PA.

5.6.1.3 Disruption of the species composition

Do not expect changes in the floristic composition as in compliance with the accepted standards of technology for PMF and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on vegetation and habitats.

5.6.1.4 Chemical changes

In compliance with the good engineering practice for PMF are not expected chemical changes within the PA.

5.6.1.5 Hydrological changes

In compliance with the good engineering practice for PMF are not expected hydrological changes within the PA. Thermal discharges will be insignificant, because IP provides self-cooling of the wastewater before filing special sewage system and heat emissions into the Danube is not expected.

5.6.1.6 Geological changes

Geological changes sre not expected as the IP will be implemented in existing buildinng at the Kozloduy site and will not directly affect the territory of PA.

5.6.1.7 Other changes

Not expected, as estimated in the EIA-r cumulative effect from the normal operation of Units 5 and 6 of NPP "Kozloduy", of emissions from the process of decommissioning 1-4 of NPP "Kozloduy" and normal operation of the facility for plasma melting (PMF Project 5b), leads to a negligible increase of the maximum individual and collective effective doses of 0.5 to 1%.

5.6.2 On animal species

5.6.2.1 Loss of habitats and specimens

Not expected destruction of parts of the populations of animal species as well as their habitats. The PA is located at a distance of over 10 km from the KNPP site

5.6.2.2 Fragmentation

Not expected fragmentation as the activities of imlementation of IP will be carried out at the Kozloduy site and will not directly affect the territory of PA.

5.6.2.3 Disruption of the species composition

Do not expect changes in the composition of the animal species as in compliance with the accepted standards of technology for implementation of the investment proposal can be expected very little likely impact on animals.

5.6.2.4 Chemical changes

In compliance with the good engineering practice for implementation of the IP are not expected chemical changes within the PA.

5.6.2.5 Hydrological changes

In compliance with the good engineering practice for implementation of IP not expected hydrological changes within the PA.

5.6.2.6 Geological changes

Due to remoteness of PA from NPP Kozloduy site and in compliance with the good engineering practice for implementation of IP are not expected geological changes within the PA.

5.6.2.7 Other changes

Not expected.

6. Proposals for measures, intended for prevention, reduction and possible elimination of the adverse impacts from the implementation of the investment proposal on the protected areas and determination of the extent of impact on the subjects of conservation in the protected areas as a result of the application of the proposed measures

In the absence of a negative impact on the habitat types and species subject to conservation in protected areas are not foreseen mitigation measures beyond compliance with best practices for construction, operation and decommissioning of PMF for protected areas Zlatiata, Kozloduy Island, Ogosta River, Kozloduy, Cibar and Scat River, partly or wholly within the ten kilometer area.

For individual protected areas following measures are proposed:

6.1 Protected Area "Zlatiata", Code: BG0002009 under the Birds Directive

- Informing the people working on PMF construction, operation and decommissioning of the objectives and subject of conservation in the protected area;
- Informational signs at the boundaries of the protected area near the site of Kozloduy NPP as well as and the road Kozloduy - Lom when crossing terrain of protected area
- In case of incidents it is recommended to strictly adhere the requirements and instruction, addressed in the updated and approved revision of the Kozloduy NPP Emergency Plan, covering also the activities and possible accidents during operation of PMF.

We recommend conducting synchronous (with Romanian ornithologists) annual monitoring specific pattern of nesting wintering birds along the banks of the Danube River between Dolni Tsibar and Somovit and dam Asparouhov Val. The resulting data will be needed to track the negative trends, their analysis and mitigation, and explanatory work among the population of Bulgaria and Romania. They will be fully utilized also in future projects, extensions, alterations and other activities within the NPP "Kozloduy" site.

6.2 Protected Area "Kozloduy Islands", Code: BG0000533 under the Habitats Directivev

- Conducting annual monitoring of the fish fauna (including sturgeon species that are of paramount importance among the endangered fish fauna of the Danube and the modern radiological state in the range of PA).
- Informing the people working on PMF construction, operation and decommissioning of the objectives and subject of conservation in the protected area;
- In case of incidents it is recommended to strictly adhere the requirements and instruction, addressed in the updated and approved revision of the Kozloduy NPP Emergency Plan, covering also the activities and possible accidents during operation of PMF.

6.3 Protected Area "Ogosta River", Code: BG0000614 under the Habitats Directive

- Informing the people working on PMF construction, operation and decommissioning of the objectives and subject of conservation in the protected area;

- In case of incidents it is recommended to strictly adhere the requirements and instruction, addressed in the updated and approved revision of the Kozloduy NPP Emergency Plan, covering also the activities and possible accidents during operation of PMF.

6.4 Protected Area "Skat River", Code: BG0000508 under the Habitats Directive

- Informing the people working on PMF construction, operation and decommissioning of the objectives and subject of conservation in the protected area;
- In case of incidents it is recommended to strictly adhere the requirements and instruction, addressed in the updated and approved revision of the Kozloduy NPP Emergency Plan, covering also the activities and possible accidents during operation of PMF.

6.5 Protected Area "Kozloduy", Code: BG0000527 under the Habitats Directive

- Informing the people working on PMF construction, operation and decommissioning of the objectives and subject of conservation in the protected area;
- In case of incidents it is recommended to strictly adhere the requirements and instruction, addressed in the updated and approved revision of the Kozloduy NPP Emergency Plan, covering also the activities and possible accidents during operation of PMF.

6.6 Protected Area „Cibar" Code BG0000199 under the Habitats Directive

- Informing the people working on PMF construction, operation and decommissioning of the objectives and subject of conservation in the protected area;
- In case of incidents it is recommended to strictly adhere the requirements and instruction, addressed in the updated and approved revision of the Kozloduy NPP Emergency Plan, covering also the activities and possible accidents during operation of PMF.
- Conducting annual monitoring of the fish fauna (including sturgeon species that are of paramount importance among the endangered fish fauna of the Danube and the modern radiological state in the range of PA).

7. Consideration of the alternatives and assessment of their impact on the protected area, including the Zero Alternative

In compliance with the regulatory requirements of Art. 38, 39 and 40 of the Ordinance on the Safety of Radioactive Waste Management the site selection of radioactive waste processing and storage facilities shall be based upon evaluation of:

- Inventory, characteristics and location of the existing waste, as well as the perspective for generation of radioactive waste;
- Influence of the factors of natural and human activity origin on the safety of the facility;
- Impact of the facility upon the environment;
- Impact of the facility to the environment.
- Radiological impact of the facility on the population;
- Specific characteristics of the site, significant for migration and accumulation of radioactive substances;

- Possibilities for application of protective measures to the population in case of accident in the facility;
- Size of the special statutory areas and the emergency planning areas.

Site selection for a waste processing and storage facility shall be performed in such a way that the need in shipment of waste to be minimized.

Taking into account that the facility will be implemented on the KNPP site it will be part of the NPP territory and thus will be compliant with the requirements of the Bulgarian legislation without effect on the selection of:

- Transport access
- Areas topographic characteristics, soils characteristics, category of land use and climate acquisition
- Modification of the land use, ownership.

From several alternatives by location that meet the regulatory requirements for the deployment of PMF in the process of site selection, a convincing alternative to the preferred site for PMF within the AB-2 was chosen.

The PMF location within the existing AB-2 building is chosen based on technical and economical considerations; the safety of the personnel and the minimal impact on the environment and the population in the area has also been considered. The interconnections among all stages of RAW generation and management have also been taken into account. In other words, the optimal route has been sought for transportation of incoming RAW generated in the decommissioning process, so that the requirement under article 39 of the Regulation for safety during RAW management , according to which the choice of location for the facility site should minimize the need for RAW transportation, is fulfilled, and the requirements of article 38 of the same Regulation are also fulfilled.

This alternative is not associated with acquiring new land for the project implementation.

In terms of **transport scheme** can make the following conclusions:

- The transportation of RAW is part of the license of Kozloduy NPP, and the scheme ensures minimal impact on human and environmental components.
- The proposed two transport schemes for transporting of non-conditioned RAW to the PMF and transport of conditioned RAW to the temporary storage facilities at SE “RAW” match the current transport activities, which are well organized.
- There is no need to change the transport systems and therefore it is not required to consider alternatives for transport of non-conditioned and conditioned RAW to PMF.

In terms of **technology for treatment and conditioning** of radioactive waste with a high coefficient of volume reduction by choosing a facility for burning plasma is considered that has been chosen best modern technology. PMF alternative (**Alternative 2**) corresponds to BAT for construction of facilities for conditioning radioactive waste with high coefficient of volume reduction.

This alternative solves the problems associated with applying conventional type incinerator (**Alternative 1**), Where a significant involvement of operators, implication of a much greater risk of spreading contamination on the site, a huge waste of time in the procedure for sorting.

"**Zero**" alternative means that RAW is not treat in order to obtain a high coefficient of reduction in their volume, which can lead to lack of space for storage in an interim storage facility for conditioned radioactive waste. It is not acceptable both economically and technologically, especially from an environmental standpoint.

The proposed PMF with a large coefficient of volume reduction is in line with BAT in all aspects of waste management and limiting emissions of radionuclides and limiting emissions of conventional air pollutants.

Recommendations from the BAT for management of generation and storage of RAW are used to evaluate the safety specifications of PMF and also to assess the environmental impacts and socio-economically.
On existing operational PMF ZWILAG and CILVA can say that currently existing installations comply with the highest environmental standards and regulations to date.
Emissions from PMF at NPP "Kozloduy" meets the requirements of BREF documents in this field, Directive 2010/75/EU and Bulgarian legislation..
Selected technology meets the IAEA requirements for such facilities for conditioning of RAW with a large coefficient of volume reduction.
Disadvantages of PMF is that the costs associated with the construction and operation and rather small manufacturing experience (only ZWILAG and SILVA), as well as energy consumption is high, compared to other methods, but on the other hand the product is suitable for final disposal.
In relation to vegetation and habitats in protected territories and protected areas Kozloduy Island, Ogosta River, Kozloduy, Cibar and Scat River, as the most appropriate perceived Alternative 2, since it can be minimized negative effects on the components.
Regarding the target fauna in protected territories and protected areas Kozloduy Island, Ogosta River, Kozloduy, Cibar and Scat River, can also be recommended as the most effective and safe alternative 2..

In regard to the PMF decommissioning three main internationally recognized strategies for decommissioning of nuclear facilities have been considered. These are 'immediate dismantling', 'deferred dismantling (safe enclosure)' and 'entombment'.

In general, entombment is not a recommended decommissioning option, and strategy selection is a choice between immediate and deferred dismantling.
There are a number of factors to be considered when deciding on the preferred decommissioning strategy, but at present, the emerging international trend is more towards immediate dismantling. According to Principle No 5 of Radioactive Waste Management (Rules of insurance safety during RAW management), the timing of decommissioning shall be such that it does "not impose undue burdens on future generations" in terms of both additional health and safety risks and financial requirements. This favors early dismantling as preferred option for decommissioning.
Considering the expected residual activity in the PMF during decommissioning, deferral of decommissioning activities may not significant reduce the activity of the remaining nuciides or radiation exposure of workers during decommissioning activities.
The availability of waste management infrastructure for treatment and conditioning of decommissioning waste and of the Radioactive Waste National Repository for the time of PMF decommissioning, assumed in the updated Decommissioning Strategy for KNPP units 1-4, has been also considered when selecting PMF decommissioning strategy. End-point of the PMF decommissioning activities is to return the area where PMF was located to as close to the pre-installation condition, while protecting human health, the environment, and to meet regulatory requirements.
In line with the option for immediate dismantling of equipments outside of the safe enclosure area in the updated Decommissioning Strategy for KNPP units 1-4, immediate dismantling is considered as the preferred option for the PMF decommissioning.

8. Maps

The following maps were used for preparing the assessment:

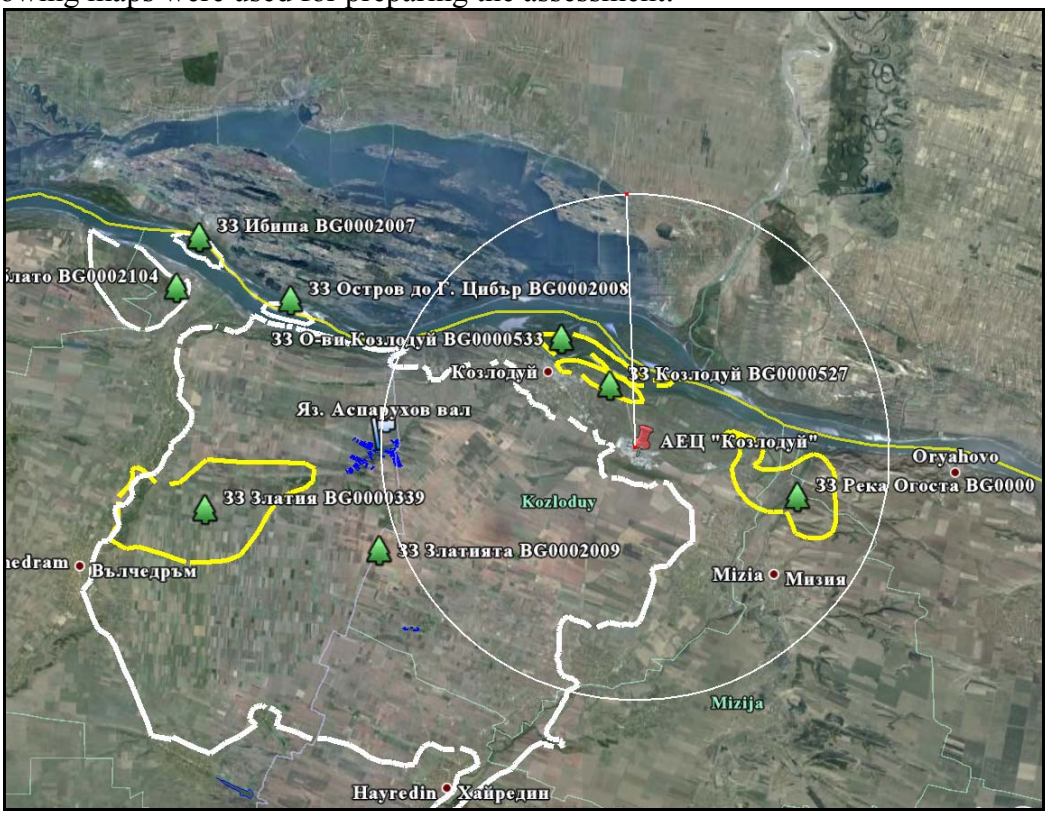

Fig. 8-1 The Kozloduy NPP region with the Natura 2000 protected areas whose boundaries are delineated in white – for the Birds Directive and in yellow – for the Habitats Directive; the 12km zone is delineated by a white circle

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E- mail: office@eninbg.com

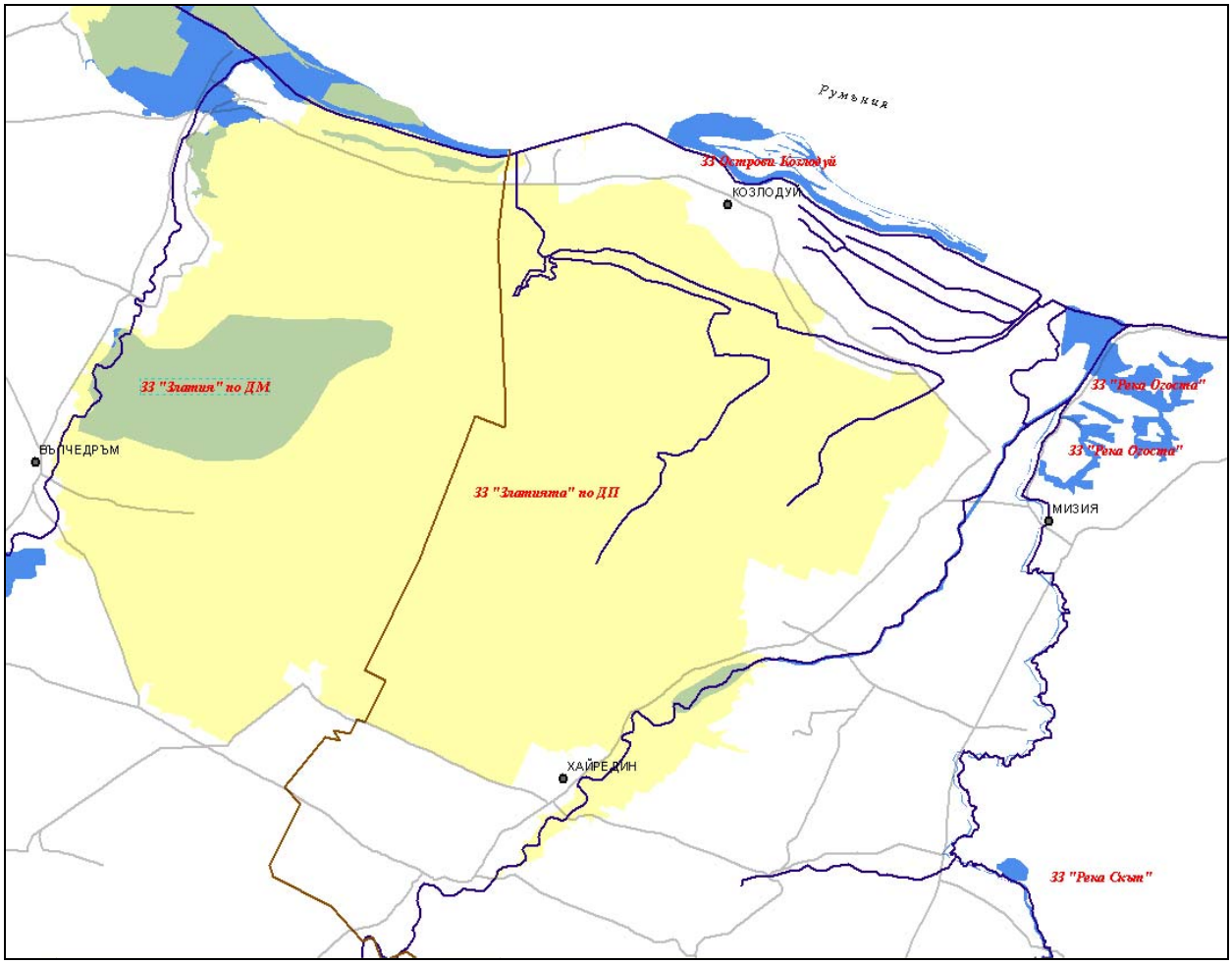

Figure 8-2 Map of Protected Area "Zlatiata" Code: BG0002009 under the Birds Directive

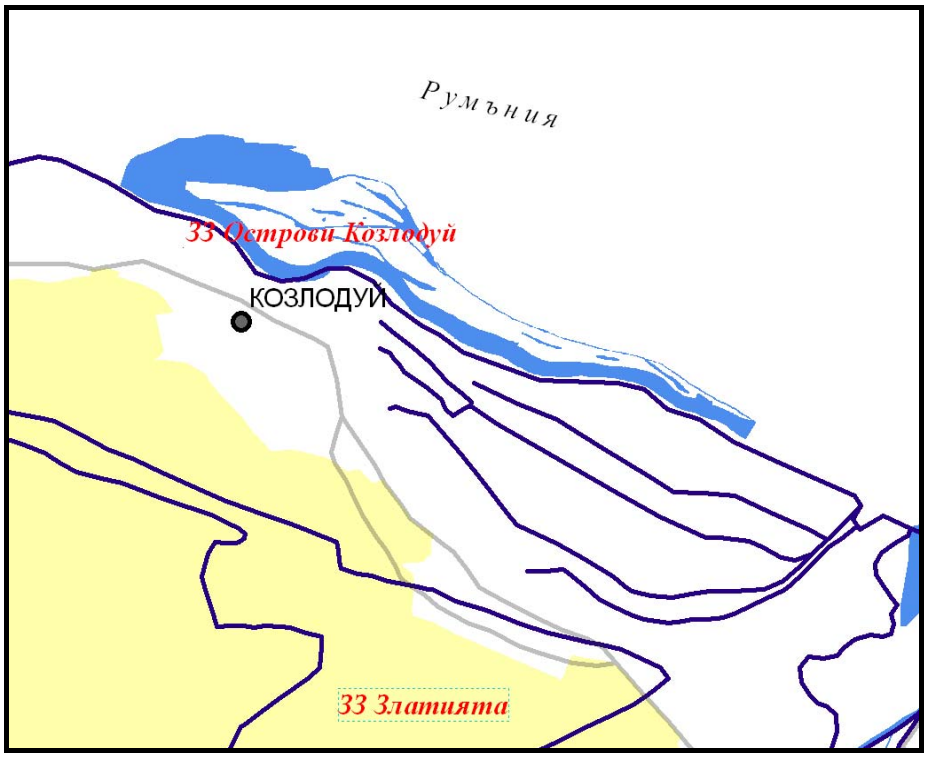

Fig. 8-3 Protected Area „Kozloduy Islands" Code: BG0000533 under the Habitats Directive

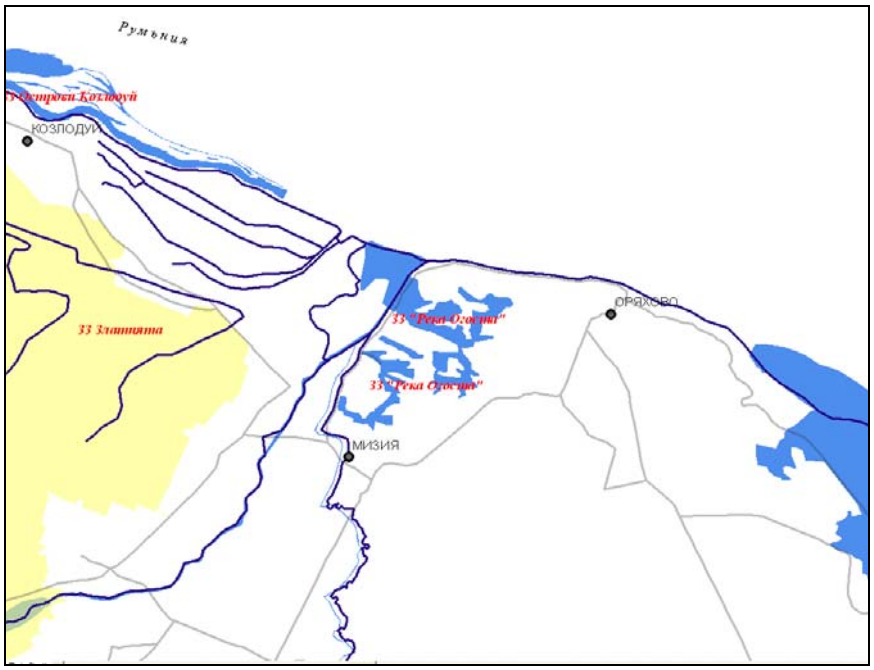

Fig. 8-4 Protected Area „Ogosta River" Code: BG0000614 under the Habitats Directive

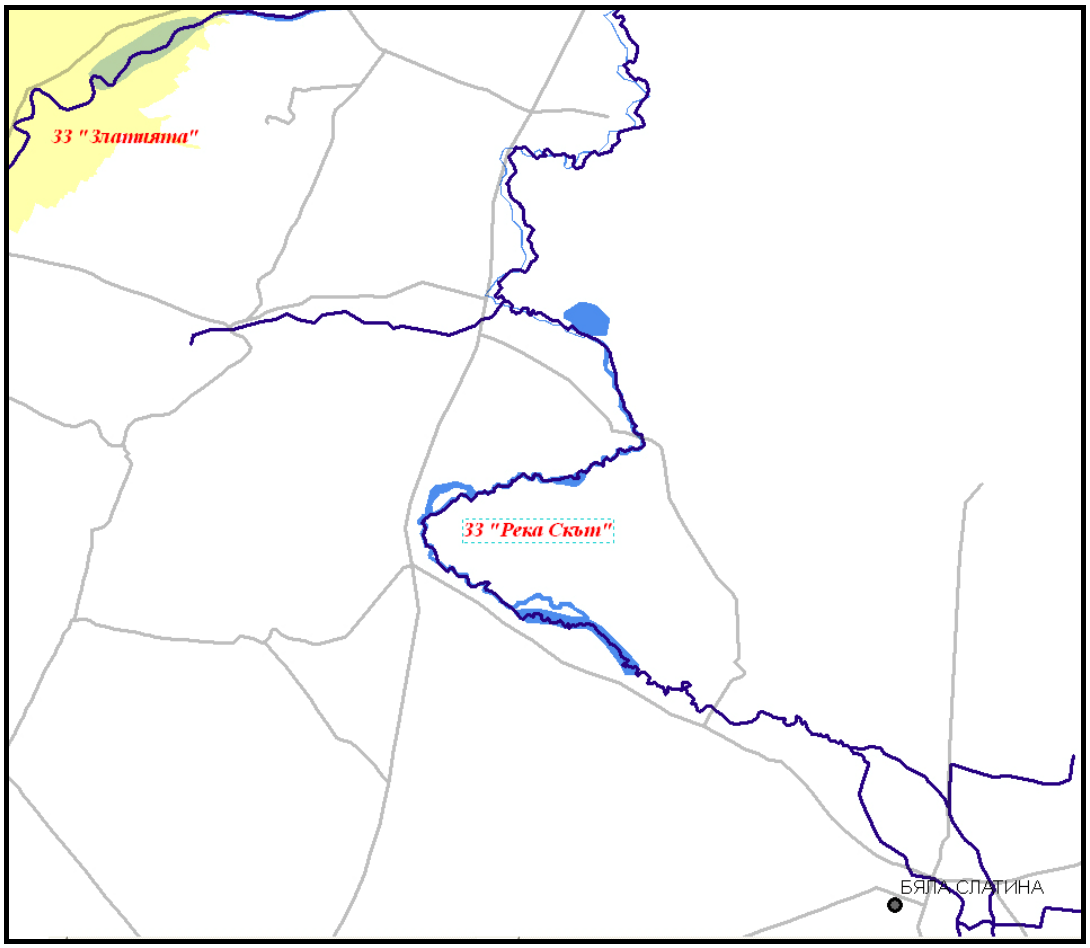

Fig. 8-5 Protected Area „Skat River" Code: BG0000508 under the Habitats Directive

Fig. 8-6 Protected Area "Kozloduy" code BG0000527 under the Habitats Directive

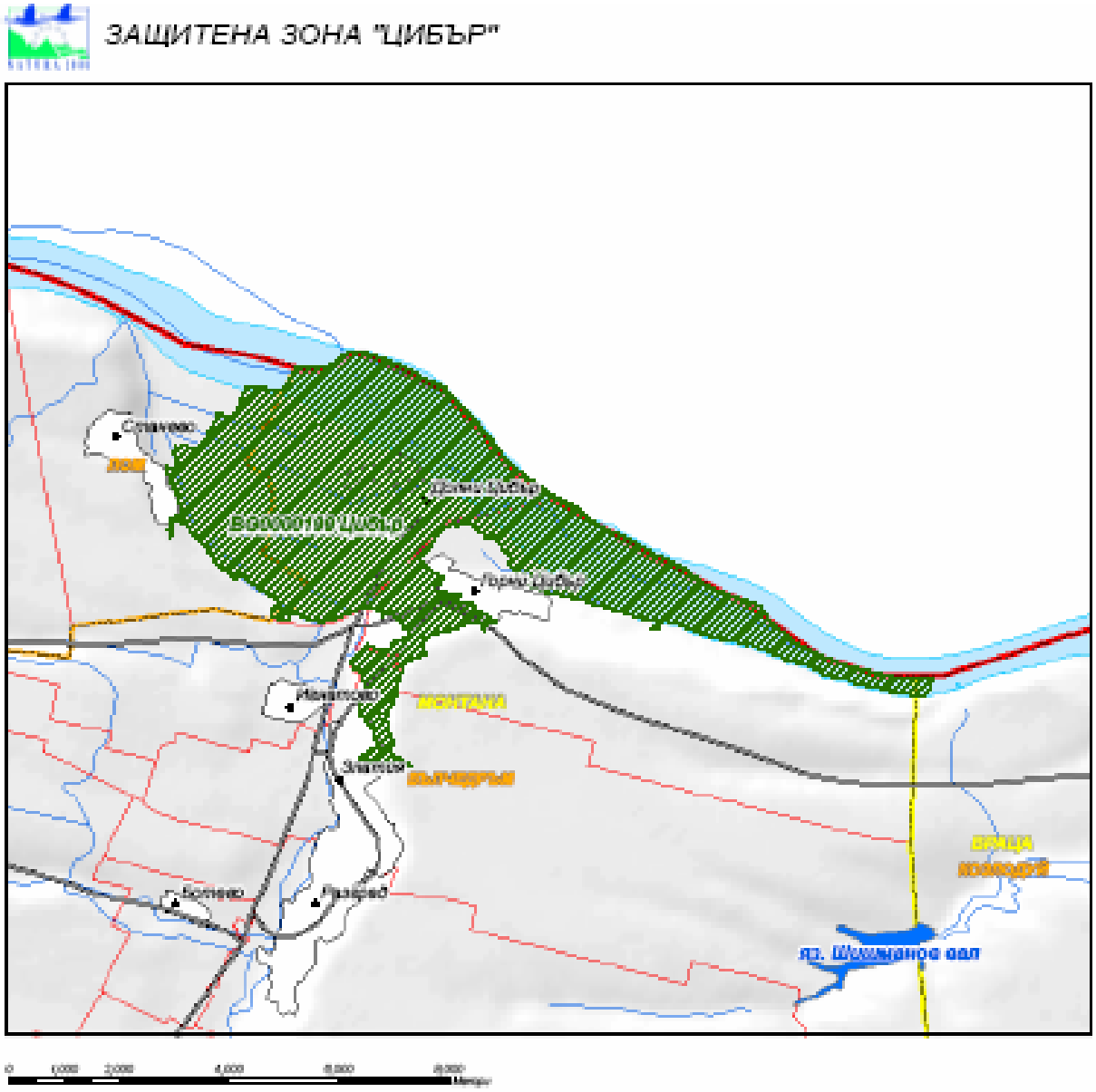

Fig. 8-7 Protected Area "Cibar" code BG0000199 under the Habitats Directive

9. Conclusion on the type and extent of the adverse impact as per the criteria of Article 22

9.1 For individual protected areas

9.1.1. Protected Area "Zlatiata", Code: BG0002009 under the Birds Directive

Because of the above, a conclusion can be drawn that subject to strict adherence to the technology described under the adopted Alternative 2 and subject to strict compliance with the already exist mitigating measures the implementation of the Investment Proposal, there will be no significant adverse impact on the bird species subject to protection in Protected Area "Zlatiata" Code: BG0002009 under the Birds Directive.

9.1.2. Protected Area "Kozloduy Island", Code: BG0000533 under the Habitats Directive

Subject to strict adherence to the adopted technology for PMF construction, operation and decommissioning and the already exist mitigating measures envisaged for prevention, reduction or termination of the harmful impact on the environment, the implementation of the investment proposal will not have significant adverse impact on Protected Area "Kozloduy Islands" Code: BG0000533 under the Habitats Directive.

9.1.3 Protected Area "Ogosta River", Code: BG0000614 under the Habitats Directive

Subject to strict adherence to the adopted technology for PMF construction, operation and decommissioning and the already exist mitigating measures envisaged for prevention, reduction or termination of the harmful impact on the environment, the implementation of the investment proposal will not have any significant adverse impact on Protected Area "Ogosta River" Code: BG0000614 under the Habitats Directive.

9.1.4 Protected Area "Skat River", Code: BG0000508 under the Habitats Directive

Subject to strict adherence to the adopted technology for PMF construction, operation and decommissioning and the already exist mitigating measures envisaged for prevention, reduction or termination of the harmful impact on the environment, the implementation of the investment proposal will not have any significant adverse impact on Protected Area "Skat River" Code: BG0000508 under the Habitats Directive.

9.1.5 Protected Area "Kozloduy", Code: BG0000527 under the Habitats Directive

Subject to strict adherence to the adopted technology for PMF construction, operation and decommissioning and the already exist mitigating measures envisaged for prevention, reduction or termination of the harmful impact on the environment, the implementation of the investment proposal will not have any significant adverse impact on Protected Area "Kozloduy" Code: BG0000527 under the Habitats Directive.

9.1.6 Protected Area "Cibar", Code: BG0000199 under the Habitats Directive

Subject to strict adherence to the adopted technology for PMF construction, operation and decommissioning and the already exist mitigating measures envisaged for prevention, reduction or termination of the harmful impact on the environment, the implementation of the investment proposal will not have any significant adverse impact on Protected Area "Cibar" Code: BG0000199 under the Habitats Directive.

9.2 General conclusion for the protected areas on the Bulgarian coast of the Danube River in the KNPP area

On the basis of all present of the above, a conclusion can be drawn that subject to strict adherence to the adopted technology for PMF construction, operation and decommissioning and subject to strict compliance with the already exist mitigating measures envisaged for prevention, reduction or termination of the harmful impact on the environment, the implementation of the Investment Proposal will not have significant adverse impact on Protected Area "Zlatiata" Code: BG0002009 under the Birds Directive, as well as on Protected Areas "Kozloduy Islands" Code:BG0000533, "Ogosta River" Code:BG0000614, "Skat River" Code: BG0000508, Kozloduy code BG0000527 and „Cibar" code BG0000199 under the Habitats Directive.

Based on the results of modeling distribution of gaseous emissions and liquid discharges into the environment presented in the report "Analysis of radiation exposure of the population of 30 km surveillance zone of gaseous and liquid radioactive discharges into the environment from the operation of Units 5 and 6 NPP "Kozloduy", the process of decommissioning of units 1-4 and emissions from the operation of the facility for plasma melting (PMF) "(Chapter 11, Appendix 10 of the EIA-R) can be concluded that will not have cumulative effect of the implementation of this IP to concerned protected areas.

10. Existence of circumstances under Article 33 of the Biodiversity Act and proposal for specific compensatory measures under Article 34 of the Biodiversity Act (when the conclusion under Item 9 is that the subject of protection in the respective protected area will sustain significant damages as a result of the implementation of the Investment Proposal and that there is no other alternative solution)

None.

11. Information on the used investigation methods, forecasting methods and impact assessment methods, bibliography, difficulties in collecting the necessary information

11.1 Used investigation methods, forecasting methods and impact assessment methods in the protected areas under the Birds Directive

Standards methods for determining the bird species composition and for assessing their number and density have been used.
The assessments were performed on the basis of the regulatory framework of the Bulgarian environmental protection legislation adapted to the European one – Environmental Protection Act, Biological Diversity Act and the Protected Territories Act and the statutory documents stemming from these acts – regulations, ordinances and tariffs for compensation for the inflicted irreparable damages. Bulgaria's Red Book, "Ornithologically Important Places in Bulgaria and Natura 2000", "Atlas of the Nesting Birds in Bulgaria" and other books were used.

Within a radius of 30km from the NPP "Kozloduy" we have held these monitoring studies and essays on ornithology:

1. Monitoring survey of avian fauna in the protected area, "Zlatia, which includ:

- Spring migration between 1 March and 30 April 2008
- Autumn migration between 10 August and 31 October 2008;
- Nesting season - May and June 2008 in five days;
- Winter period - 2 days from mid-January 2008

The results of this monitoring are included in a separate report (Mitchev and others., 2009)

2. Field study of wetlands along the left bank of the Danube between 8 and 11 July 2010, part of which included all wetlands in Bistrets (traveled route is marked by GPS with white squares and lines fig.11.1-1).

Fig. 11.1-1 Field study of wetlands along the left bank of the Danube between 8 and 11 July 2010

3.Inspection of NPP "Kozloduy" October 29, 2009

4. Inspection of NPP "Kozloduy" protected area "Islands Kozloduy" protected zone Zlatia protected areas at the mouth of the river Tsibritsa. - 13-15 January 2013

Standards methods for determining the bird species composition and for assessing their number and density have been used. Prepared is our original methodology to quantify the degree of negative impact on the species, subject to conservation in protected areas Natura 2000 network. Unique methodology was made on the basis of the many years of practical experience accumulated during the investigation and monitoring of wetlands, protected territories, rare, endangered and protected bird species in Bulgaria. The following original table (11.1-1) prepared by us was used for assessing the extent of the adverse impact on specific bird species subject to protection in the specific protected area:

Table 11.1-1Tamplate for assessing the adverse impact on a specific species subject to protection in a specific protected area:

Protected Area "Zlatiata" White stork *Ciconia ciconia* (for explanations of the table, refer to Item 11)	DEGREE OF MPACTS							
	Reproduction			Migration		Hibernation		**Total assessment**
	Birds Nests Eggs	Places for		Places for		Places for		
		Nesting	Feeding	Feeding Flying on air currents	Spending the night	Feeding	Spending the night	
Destruction (0.8 p)*		0,8				0,8		**1,6**
Impairment (0.5 p)**								
Deterioration (0.3 p)**				0,3				**0,3**
Disturbance (0.1 p)**								
Fragmentation (0.1 p)								**0,1**
Pollution (0.2 p)								
Bio-corridors (0.8 p)								**0,8**
Geographical connectedness (0.8 p)								**0,8**
Total assessment of the adverse impact on the species								**3,6**

Notes:

* When the species concerned is from the Red Book, the points are multiplied by 2 (two); when the species concerned is of worldwide importance, the points are multiplied by 3 (three).

** When in cases of impairment, deterioration and disturbance between 10% and 70% of the population of a specific species in the respective protected area are affected, the points are multiplied by 2 (two), whereas when more than 70% are affected – the points are multiplied by 3 (three).

In the leftmost column of the table, the categories (types) of adverse impacts on the specific species are arranged. The peculiarities of each one of these categories are examined sequentially:

Destruction – an adverse impact which causes zero nesting success; it causes complete destruction for various reasons of nests, eggs, places for nesting, migration and hibernation; it has a 38% weight from the overall impact.

Impairment – an adverse impact which causes significant (more than 50%) reduction of the nesting success, chasing away of the predominant portion of the couples which have occupied the nesting territory or have made nest, of the small offsprings before flight, etc.; significant reduction of the possibilities for nesting, feeding and spending the night; it has a 23% weight from the overall impact.

Deterioration – an adverse impact which causes reduction (by less than 50%) of the nesting success; chasing away of a small portion of the couples which have occupied the nesting territory or have made nests, of small offspring before flight, etc.; insignificant reduction of the possibilities for nesting, feeding and spending the night; significant disruption of the normal 24-hour activity of the birds; it has a 14% weight from the overall impact.

Disturbance – an adverse impact which does not affect significantly the nesting success but disrupts the normal 24-hour activity of the birds; it has a 5% weight from the overall impact.

Fragmentation – an adverse impact which causes segmentation, shredding, fragmenting of the places for nesting, migration and hibernation; it has a 5% weight from the overall impact.

Pollution – an adverse impact via several routes:

Pollution by solid household waste;

Pollution by industrial waste;

Pollution by crude oil products;

Pollution by chemical products for fertilization, pest control and others of this kind;

Noise pollution;

Light pollution.

Only the extent is filled in the table, whereas the nature of the pollution is specified in the text referring to the specific species; it has a 9% weight from the overall impact. The soiling and greasing by heavy fuel oil of specific bird specimens is included here.

The "Bio-corridors" and "Geographical connectedness" impact categories are included in the table only as a total assessment.

The next column includes the three phases from the year-long cycle of the birds:

Reproduction – it is sub-divided into:

Birds, nests and eggs – this refers both to fully-grown birds in their reproduction phase, newly-built nests and to birds with eggs in different development stages; small offspring (pullus) at different development stages;

Places for nesting – the natural pieces of the environment on which the nests are situated – trees, shrubs, holes in the grounds and land, loess shearing slopes, rocks and rock formations, reed (rush) clusters, pastures, medows, sand spits (electric posts, chimneys, stacks, roofs, church domes, monuments, etc. are not included here).

Places for feeding – any nutrient biotopes of natural origin.

Migration – it is sub-divided into:

Places for flying on air currents – terrains over which upward air currents are formed and used by the roaming birds in order to gain altitude during their migration. Without the help of these places and currents, this group of migrants cannot reach the places for spending the winter in Africa.

Places for spending the night – most of the water-loving birds use, for spending the night, natural and artificial water basins with a big water surface, where they feel safe. The migrating flocks of storks and cranes (*Crus*) use open spaces that are remote from roads and populated settlements – stubble-fields, fallow-fields, medows and pastures. The migrating birds of prey spend the night in vast forests. The terrains used by ducks and geese as refuge during their idling (languishing) period (the change of their plumes when they lose the ability to fly and become vulnerable) should also be included in the category of "Places for spending the night". The migrating songbirds use for spending the night forests, reed (rush) clusters and shrubby areas.

Hibernation – sub-divided into:

Places for feeding – agricultural fields of winter grain crops, alfalfa, lakes and marshlands, fisheries and fishery farms, dams and micro-dams, the Black Sea Coast.

Places for spending the night – non-frozen lakes and swamps, dams and micro-dams, fisheries and fishery farms, the Black Sea Coast; flooded forests along the Danube, Tundja, Maritza Rivers and dense forests along the Black Sea Coast, sand spits along the Danube and Maritza Rivers, etc.

In the rightmost column a summarized grade of the impact from the respective category is indicated as a sum of the separate specific grades.

In the bottom cell of this column, a summarized grade of the impact of all the categories is given. This is the ultimate grade of the extent of the impact on the specific species.

- **0 to 1** – no impact
- **1 to 5** – small extent of impact which can be avoided without application of special measures other than adherence to the best practices during construction and operation;
- **5 to 10** – medium extent of impact which must be mitigated or eliminated through application of mitigating measures;
- **10 to 15** – great extent of impact which must be mitigated or eliminated through the choice of alternatives or application of compensatory measures.

11.2 Used investigation methods, forecasting methods and impact assessment methods for the impacts on the habitats types in the protected areas under the Habitats Directive

11.2.1 The used investigation methods, forecasting methods and impact assessment methods for the impacts on the habitats types in the protected areas under the Habitats Directive

Floristic, geo-botanical and eco-systemic methods for assessment of the current state and a forecast of the changes in the vegetation and in the habitat types have been used. The assessment of the extent of impact and the forecast of the future changes was made on the basis of the results from the field investigations, on the basis of the existing scientific information and on the basis of the major statutory documents related to the environmental protection legislation.
In the process of developing the Compatibility Assessment Report in respect of the flora and the vegetation, a review of the existing source of information on the flora and the vegetation has been made (scientific publications, expert assessments made, photographs, maps, national and international statutory documents and other information sources pertaining to the rational use and protection of the flora resources and the biological diversity). The published materials on the condition of the flora and the vegetation in the territory which is subject to the impact of the investment proposal are analyzed and field investigations for assessment of the situation in critical segments are conducted. The taxonomic classification and the geographical distribution of the vegetation species are determined based on the following sources: The Flora of Bulgaria (Vol. I-X, 1962-1994), Classification of the Superior Flora of Bulgaria (Asyov etc., 2002) The syntaxonomic classification of the flora communities is determined based on the Synopsis of the Flora Communities in Bulgaria (Apostolova I., Slavova, 1997) and publications about syntaxons in different regions of the country after 1995.
In the process of the field investigations of the vegetation, the ecological phyto-cenosis investigation method is applied in key (typical) segments, where, depending on the objectives pursued, the floristic composition of the vegetation communities is described, a qualitative assessment of the phyto-cenosis structure is given and a quantitative estimate of the structure and the quantitative ratio of the species is made. In the process of assessment of the eco-systems, the Biological Diversity Act (2002), the National Biological Diversity Protection Plan (2000), the Manual on Natura 2000 in Bulgaria (2002), Directive 92/43 of the Council of EEC of 21.05.1992 on Preservation of the Natural Habitats and of the Wild Flora and Fauna and other international and national documents are used.

11.2.2 Used investigation methods, forecasting methods and impact assessment methods for the target animal species in the protected areas under the Habitats Directive

The studies are performed on the basis of the regulatory framework of the Bulgarian environmental legislation adapted to the European one – Envionmental Protection Act, Biological Diversity Act, Protected Territories Act and the statutory documents stemming from the above acts – regulations, ordinances and tariffs for compensations for inflicted irreparable damages.
Methods used for forecasting and assessing the impact
The primary methods for forecasting are the comparatively analytical ones. The meaning is an analysis, based on methods subject of comparison in the assessment of the current status and damages wich would arise in case of IP implementation. The assessment of the likely damages is analytical by use of commonly adopted axioms in the evaluation of the rising impact in function of specific circumstances. The meaning of comparative practical methods is similar situations requiring analogical analysis and respectively assessments, wich are not compulsory related to the specific IP. For assessing the impact, the experience of the author and the comparative models from the scientific practice are used. For lack of specific quantitative data on some species, the system for assessment of the conservational and environmentally protectional importance of the species is used. The CAR gives priority to the conservational importance of the species, which is protective not only of the species of high environmetal protection status, but also of the species which are important for our fauna and for the region specifically but which don't have the necessary environmental protection status.
The forecasts and the assessments of the impact were made on the basis of the many years of practical experience accumulated in the process of investigation of the natural habitats, the monitoring of wetlands, protected territories, rare, endangered and protected animal species throughout the country. The forecast assessment is a matter of judgement and based on the information on the extent of the effect (in percentage terms) on the respective habitats in the investigated region.

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