

# **COMPATIBILITY ASSESSMENT REPORT OF THE INVESTMENT PROPOSAL FOR DECOMMISSIONING OF UNITS 1-4 AT KOZLODUY NPP WITH THE CONSERVATION SUBJECT AND PURPOSES OF THE PROTECTED AREAS:**

**Protected area Zlatiata with code BG0002009**  
**Protected area Kozloduy Islands with code BG0000533**  
**Protected area Ogosta River with code BG0000614**  
**Protected area Skat River with code BG0000508**  
**Protected area “Kozloduy“ with code BG0000527**  
**Protected area “Cibar” with code BG0000199**

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## CONTENTS

1. Investment Proposal Abstract .....	1
1.1 Location of the implementation of the proposed activities .....	2
1.2 Existing and future land users .....	6
1.3 Description of Kozloduy NPP Units 1 to 4 .....	6
1.4 Decommissioning Strategy .....	7
1.5 Description of Kozloduy NPP decommissioning activities .....	8
1.5.1 Decommissioning stages .....	8
1.5.2 Generation of RAW and conventional waste, effluents and harmful physical factors by the decommissioning .....	9
1.5.3 Decommissioning activities plan .....	12
2. Description of the features of other plans and projects, existings or in process of elaboration or approval, which can exert adverse impact on the protected areas in combination with the assessed investment proposal.....	13
3. Description of the investment proposal elements, which separately or in combination with other plans, programs or projects/investment proposals could exert significant impact on the protected areas and their elements .....	19
3.1 Vegetation and natural habitat types .....	20
3.2 Fauna .....	22
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 .....	23
4.1 General description of Protected Area “Zlatitsa”, Code: BG0002009 under the Birds Directive .....	23
4.1.1 General description .....	23
4.1.2 Intended purpose .....	23
4.1.3 Protected species .....	24
4.1.4 Quality and importance .....	24
4.1.5 Vulnerability .....	25
4.1.6 Description of the habitats .....	25
4.2 General description of Protected Area “Kozloduy Islands”, Code: BG0000533 under the Habitats Directive.....	26
4.2.1 Types of vegetation and natural habitats that are subject to protection in the protected area .....	26
4.2.2 Animal species subject to protection .....	28
4.3 General description of Protected Area “Ogosta River”, Code: BG 0000614 under the Habitats Directive.....	32
4.3.1 Types of vegetation and natural habitats subject to protection in the protected area .....	33
4.3.2 Animal species subject to protection .....	33
4.4 General description of Protected Area “Skat River”, Code: BG 0000508 under the Habitats Directive.....	37

4.4.1 Types of vegetation and natural habitats subject to protection in the Protected Area	37
4.4.2 Animal species subject to protection	38
4.5 Description of the Protected Area „Kozloduy” with code BG0000527 under Habitats Directive	40
4.5.1 Vegetation types and habitats under conservation in the protected area	40
4.5.2 Animal species subject to protection	41
4.6 Description of the Protected Area Cibar with code BG0000199 under the Habitats Directive	43
4.6.1 Vegetation types and habitats under conservation in the protected area	43
4.6.2 Animal species subject to protection	44
4.6.2a. Regularly occurring migratory birds, which are included in Annex I of the Birds Directive	47
4.6.2b. Regularly occurring migratory birds not listed in Annex I of the Birds Directive	48
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	49
5.1 Description and analysis of the impact of the investment proposal on Protected Area “Zlatiata”, Code: BG 0002009 under the Birds Directive	49
5.1.1 On the habitats subject to protection	49
5.1.2 On the bird species subject to protection	49
5.1.3 Fragmentation	67
5.1.4 Disruption of the species composition	68
5.1.5 Chemical Changes	69
5.1.6 Hydrological changes	69
5.1.7 Other changes	69
5.2 Description and analysis of the impact of the investment proposal on Protected Area “Kozloduy Islands”, Code: BG 0000553 under the Habitats Directive	69
5.2.1 Impact on the vegetation and the natural habitat types	71
5.2.1.1 Loss of habitat and specimens	73
5.2.1.2 Fragmentation	73
5.2.1.3 Disruption of the species composition	73
5.2.1.4 Chemical changes	73
5.2.1.5 Hydrological changes	73
5.2.1.6 Geological changes	74
5.2.1.7 Other changes	74
5.2.2 On the animal species	74
5.2.2.1 Loss of habitats and specimens	74
5.2.2.2 Fragmentation	75
5.2.2.3 Disruption of the species composition	75
5.2.2.4 Chemical changes	75
5.2.2.5 Hydrological changes	75
5.2.2.6 Geological changes	75
5.2.2.7 Other changes	75
5.3 Description and analysis of the impact of the investment proposal on Protected Area “Ogosta River”, Code: BG0000614 under the Habitats Directive	76
5.3.1. Impact on the vegetation and the natural habitat types	76
5.3.1.1 Loss of habitat and specimens	78
5.3.1.2 Fragmentation	78
5.3.1.3 Disruption of the species composition	79

5.3.1.4 Chemical changes.....	79
5.3.1.5 Hydrological changes.....	79
5.3.1.6 Geological changes.....	79
5.3.1.7 Other changes.....	79
5.3.2 On animal species.....	79
5.3.2.1 Loss of habitats and specimens.....	79
5.3.2.2 Fragmentation.....	79
5.3.2.3 Disruption of the species composition.....	79
5.3.2.4 Chemical changes.....	80
5.3.2.5 Hydrological changes.....	80
5.3.2.6 Geological changes.....	80
5.3.2.7 Other changes.....	80
5.4 Description and analysis of the impact of the investment proposal on Protected Area “Skat River”, Code: BG0000508 under the Habitats Directive.....	81
5.4.1 Impact on the vegetation and the natural habitat types.....	81
5.4.1.1 Loss of habitat and specimens.....	83
5.4.1.2 Fragmentation.....	84
5.4.1.3 Disruption of the species composition.....	84
5.4.1.4 Chemical changes.....	84
5.4.1.5 Hydrological changes.....	84
5.4.1.6 Geological changes.....	84
5.4.1.7 Other changes.....	84
5.4.2 On animal species.....	84
5.4.2.1 Loss of habitats and specimens.....	84
5.4.2.2 Fragmentation.....	84
5.4.2.3 Disruption of the species composition.....	85
5.4.2.4 Chemical changes.....	85
5.4.2.5 Hydrological changes.....	85
5.4.2.6 Geological changes.....	85
5.4.2.7 Other changes.....	85
5.5 Description and analysis of the impact of the investment proposal on Protected Area “Kozloduy”, Code: BG0000527 under the Habitats Directive.....	86
5.5.1 Impact on the vegetation and the natural habitat types.....	86
5.5.1.1 Loss of habitat and specimens.....	88
5.5.1.2 Fragmentation.....	89
5.5.1.3 Disruption of the species composition.....	89
5.5.1.4 Chemical changes.....	89
5.5.1.5 Hydrological changes.....	89
5.5.1.6 Geological changes.....	89
5.5.1.7 Other changes.....	89
5.5.2 On animal species.....	89
5.5.2.1 Loss of habitats and specimens.....	89
<b>5.5.2.2 Fragmentation.....</b>	<b>89</b>
<b>5.5.2.3 Disruption of the species composition.....</b>	<b>90</b>
<b>5.5.2.4 Chemical changes.....</b>	<b>90</b>
<b>5.5.2.5 Hydrological changes.....</b>	<b>90</b>
<b>5.5.2.6 Geological changes.....</b>	<b>90</b>
<b>5.5.2.7 Other changes.....</b>	<b>90</b>
5.6 Description and analysis of the impact of the investment proposal on Protected Area “Cibar”, Code: BG0000199 under the Habitats Directive.....	91
5.6.1 Impact on the vegetation and the natural habitat types.....	91
5.6.1.1 Loss of habitat and specimens.....	93
5.6.1.2 Fragmentation.....	94
5.6.1.3 Disruption of the species composition.....	94

5.6.1.4 Chemical changes.....	94
5.6.1.5 Hydrological changes.....	94
5.6.1.6 Geological changes.....	94
5.6.1.7 Other changes.....	94
5.6.2 On animal species.....	94
<b>5.6.2.1 Loss of habitats and specimens</b> .....	94
<b>5.6.2.2 Fragmentation</b> .....	94
<b>5.6.2.3 Disruption of the species composition</b> .....	94
5.6.2.4 Chemical changes.....	95
5.6.2.5 Hydrological changes.....	95
5.6.2.6 Geological changes.....	95
5.6.2.7 Other changes.....	95
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.....	96
6.1 1 Protected Area “Zlatiata”, Code: BG0002009 under the Birds Directive.....	96
6.2 Protected Area “Kozloduy Islands”, Code: BG0000533 under the Habitats Directive.....	96
6.3 Protected Area “Ogosta River”, Code: BG0000614 under the Habitats Directive.....	97
6.4 Protected Area “Skat River”, Code: BG0000508 under the Habitats Directive.....	97
6.5 Protected Area “Kozloduy”, Code: BG0000527 under the Habitats Directive.....	97
6.6 Protected Area „Cibar” Code BG0000199 under the Habitats Directive.....	97
7. Consideration of the alternatives and assessment of their impact on the protected area, including the zero Alternative.....	99
8. Maps.....	103
9. Conclusion on the type and extent of the adverse impact as per the criteria of Article 22.....	112
9.1 Individually for protected areas.....	112
9.1.1 Protected Area “Zlatiata”, Code: BG0002009 under the Birds Directive.....	112
9.1.2 Protected Area “Kozloduy Island”, Code: BG0000533 under the Habitats Directive.....	112
9.1.3 Protected Area “Ogosta River”, Code: BG0000614 under the Habitats Directive.....	112
9.1.4 Protected Area “Skat River”, Code: BG0000508 under the Habitats Directive.....	112
9.1.5 Protected Area “Kozloduy”, Code: BG0000527 under the Habitats Directive.....	112
9.1.6 Protected Area “Cibar”, Code: BG0000199 under the Habitats Directive.....	112
9.2 General conclusion.....	112
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) .....	114
11. Information on the used investigation methods, forecasting methods and impact assessment methods, bibliography, difficulties in collecting the necessary information.....	115
11.1 Used investigation methods, forecasting methods and impact assessment methods in the protected areas under the Birds Directive.....	115
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.....	117
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 .....	117
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 .....	117
11.3 Bibliography .....	119
11.3.1 Under the Birds Directive .....	119
11.3.2 Under the Habitats Directive .....	121
11.3.2.1 Vegetation and natural habitat types .....	121
11.3.2.2 Fauna .....	122
12. Documents as per art. 9 (2), (3) .....	124
12.1 Documents of Senior Researcher Tanyu Michev .....	124
12.2 Documents of Prof. Dimitar Pavlov, Ph.D. in Biology .....	127
12.3 Documents of Prof. Ekaterina Pavlova, Ph.D. in Biology .....	130
12.4. Documents of Senior Assistant Prof. Nikolai Kodzhabashev .....	134

## 1. Investment Proposal Abstract

In November 1999, the Bulgarian Government and the European Commission signed a Memorandum of Understanding in which the Bulgarian Government made a commitment to shut down and decommission Units 1 to 4 of Kozloduy Nuclear Power Plant (KNPP) at the earliest possible date, beginning with the closure of Units 1 and 2 at the end of 2002. A commitment for closure of Units 3 and 4 at the end of 2006 was signed later on. In consequence all four Units were shut down at the agreed time.

In connection with this obligation, in June 2005, an Updated Strategy for Decommissioning of KNPP Units 1 to 4 was prepared, taking into account all related technical, economic and social aspects.

The Strategy for Decommissioning of KNPP Units 1 to 4 was elaborated based on the existing technical documentation on the decommissioning of units 1 and 2, in reference of the modern international trends in the decommissioning matter as well as in reference of the large experience from similar projects performed in the United Kingdom, France, Germany and other countries.

Currently Units 1 and 2 have a license issued by the Bulgarian Nuclear Regulatory Agency (BNRA) as RAW Management Facilities subject to decommissioning. Units 3 and 4 have licenses issued by the BNRA as RAW Management Facilities subject to decommissioning.

Currently the SNF from Units 1-4 has been removed from the Units and is placed at the SNF Storage Facility (SNFSF).

Units 3 and 4 of Kozloduy Nuclear Power Plant EAD were declared as RAW Management Facility subject to decommissioning and their property is entrusted for management to SE"RAW" by Decision of the Council of Ministers (DCM) of Republic of Bulgaria (DCM 1038/19.12.2012).

Investment proposal envisages the decommissioning of Units 1-4 of NPP "Kozloduy". At these investment proposal the State Enterprise "Radioactive Waste" (SE RAW) is an investor of the investment plan.

The purpose of the proposed activity "Decommissioning of Units 1 to 4 at Kozloduy NPP" is to achieve the status, corresponding to the criteria (in accordance with the national regulations) for site release from regulatory control for unrestricted use for industrial purposes.

The subject of this Compatibility Assessment is to analyse, assess and compare the adverse impacts from the proposed decommissioning of KNPP Units 1 to 4 on the objectives and tasks of the considered Protected Areas (PA) as well as on the different types of habitats, vegetation and animal species, subject of conservation in these PA.

Decommissioning of nuclear power plants is included in Annex I of the Espoo Convention. In this respect is launched EIA in a Transboundary Context and the IP is notified to the Republic of Romania, as an interested party to the Convention on Environmental Impact Assessment in a Transboundary Context. Romanian Government decided after receipt of such notification to participate in the EIA procedure. Specific requirements of the Romanian side are covered in the transboundary aspects of IP.



### ***1.1 Location of the implementation of the proposed activities***

The activities for decommissioning of Units 1 to 4 are planned to cover the territory of the said units and transport to other places. The area covered by KNPP site is about 2 km<sup>2</sup> and together with the network of the circulation and service water supply it reaches 4 km<sup>2</sup>.

The Kozloduy Nuclear Power Plant was erected in North-Western Bulgaria on the right bank of the Danube River, 5 km to the south-east of the town of Kozloduy. The site is situated at the 694th km of the Danube River and at a distance of 3.7 km to the south of the fairway of the river and from Bulgaria's border with Romania. The site region is located in the northern part of the first non-submergible terrace of the Danube River at elevation +35.00 m. The site covers a flat country with an altitude varying from +28.00 m to +36.00 m according to the Baltic Sea leveling system. The lowland and the site are protected from the Danube River by an embankment reaching absolute elevation of +30.40 m. To the north it borders on the Danube Lowland.

To the south of the site the slope of the watershed plateau is relatively high (100-110 m), to the west it is about 90 m, while to the east it is relatively less high and goes down to 30 m altitude above the sea level.

The Kozloduy Nuclear Power Plant is located at a distance of 120 km (as the crow flies) and at a distance of 200 km (via motorway) from the City of Sofia (fig.4). The following municipalities are included in the 30-km zone around the site: Kozloduy, Valchedrum, Hairedin, Mizia (entirely) and Lom, Byala Slatina, Oryahovo (partially). A sparsely-populated part of the territory of Romania – namely 12 villages – is also included in the 30-km zone around the site. The nearest populated settlements are as follows: Town of Kozloduy – at 2.6 km to the south-west; Village of Harletz – at 3.5 km to the south-east; Village of Glojene – at 4.0 km to the south-east; Town of Mizia – at 6.0 km to the south-east; Village of Butan – at 8.4 km to the south; Town of Oryahovo – at 8.4 km to the east of the site.

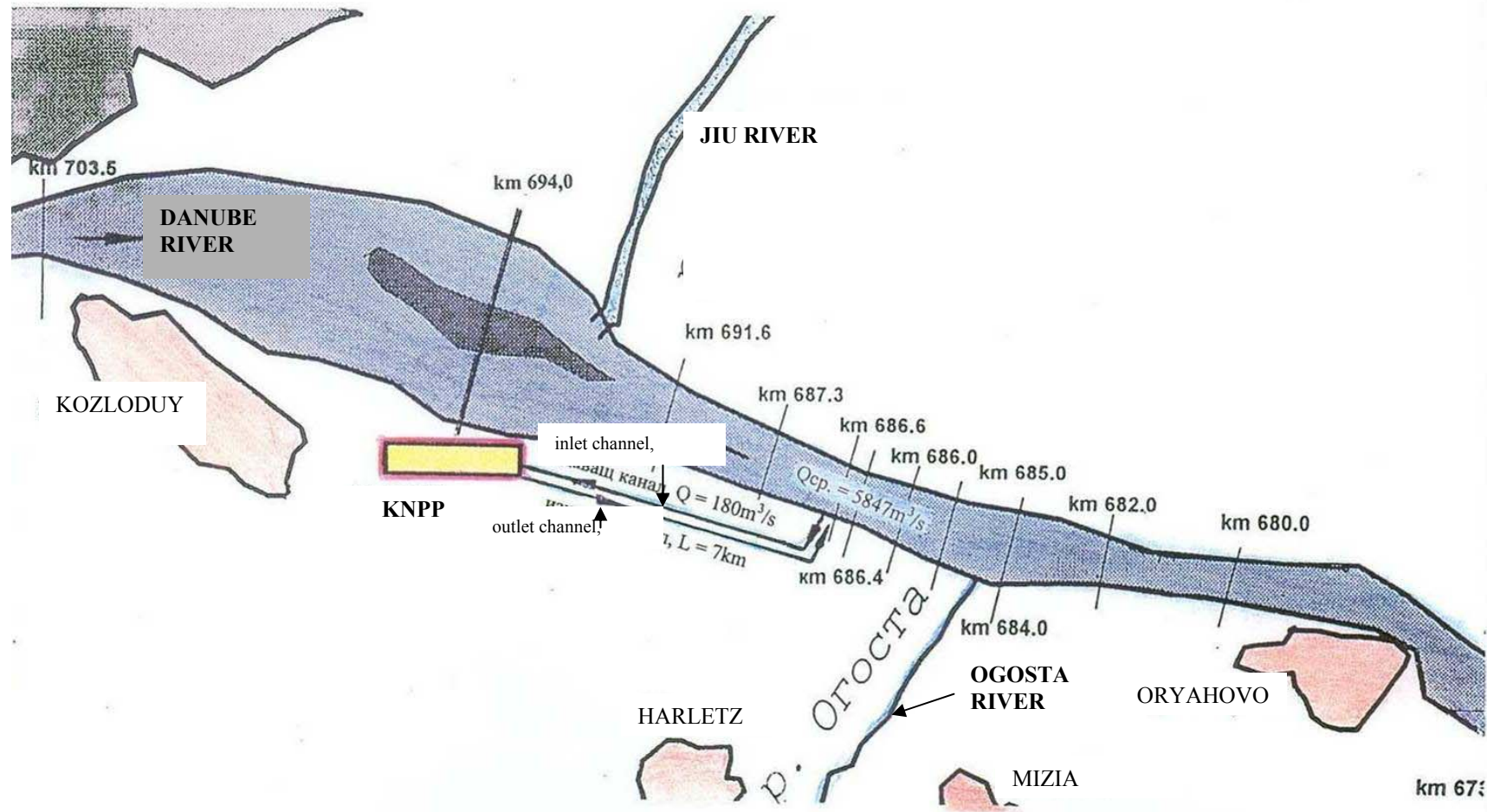
The Kozloduy NPP site regional location as shown on fig.1.1-1 and fig.1.1-2 gives the situational layout of Kozloduy NPP relative to the Danube River.

The potential impacts of the proposed activities on the natural and anthropogenic components of the environment and on the population were evaluated in the affected area around Kozloduy NPP, namely within 2 and 30 km radius circles, shown on fig.1.1-3.





Fig. 1.1-1 Kozloduy NPP site regional location



**Fig. 1.1-2 KNPP site layout relative to the Danube River**



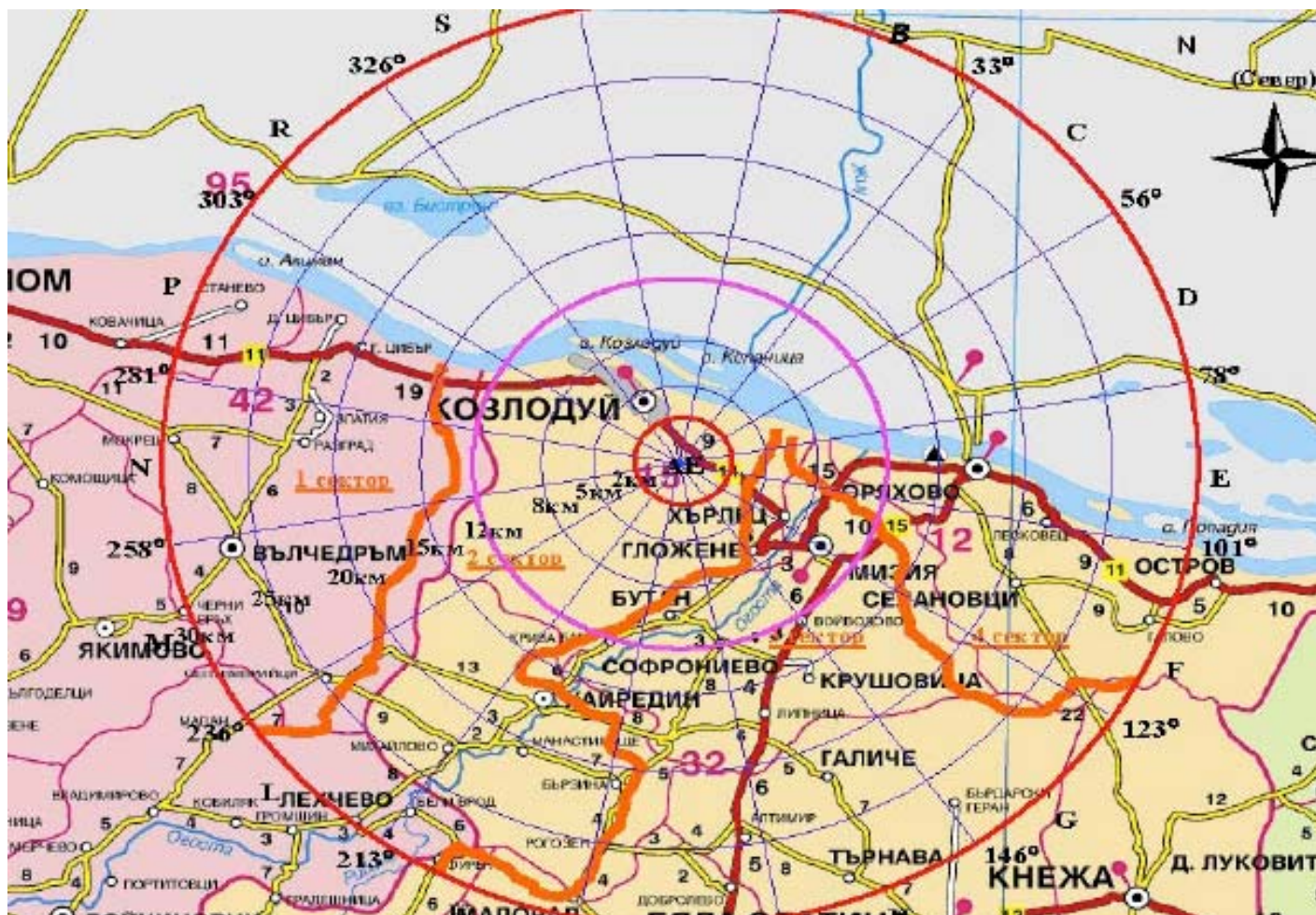


Fig. 1.1-3 Analysed affected areas around the decommissioning site of Kozloduy NPP Units 1 to 4 (Layout Plan)

## ***1.2 Existing and future land users***

The territory envisaged for the needs of the decommissioning of Kozloduy NPP Units 1 to 4 encompasses only the existing site of the said units, in other words the area needed for the purposes of the decommissioning is already used for the purposes of Kozloduy NPP as it is.

The planned activities which will be implemented during the Decommissioning are not expected to differ considerably from the activities implemented on the site of KNPP Units 1 to 4 at present.

After the completion of all measures and activities associated with the decommissioning, the buildings planned to be released from special monitoring mode shall be used for industrial purposes. No release of territories for agricultural and forestry purposes is expected.

## ***1.3 Description of Kozloduy NPP Units 1 to 4***

The Reactor Buildings and the Auxiliary Buildings of Kozloduy NPP Units 1 to 4 are situated on an area of 1.4 km<sup>2</sup>. The erection of KNPP Units 1 to 4 was completed in two stages – as follows:

- First stage — construction of Units 1 and 2 under the project name “Kozloduy –I”;
- Second stage — construction of Units 3 and 4 under the project name “Kozloduy –II”.

Units 1 to 4 are equipped with WWER-440/230 type reactors and were put into operation in the period from 1974 (Unit 1) to 1982 (Unit 4).

The general characteristics of the nuclear power units are as follows:

- The sources of the heat energy at Units 1 to 4 of the NPP are the WWER-440 type reactors. Slightly enriched uranium with Uranium-235 (<sup>235</sup>U) content of up to 3.6% is used as fuel for the reactor.
- The primary circuit is radioactive and includes 1 (one) power reactor and 6 (six) circulation loops. Each loop consists of: Main Circulation Pump (MCP), Steam Generator (SG), two Main Isolation Valves (MIV) with motor actuators and Circulation Pipelines. The steam generators generate saturated steam at a pressure of 4.7 MPa.
- Each of the WWER-440 reactors and the primary circuit lies in a concrete structure composed of hermetic confinement.
- The secondary circuit is non radioactive and consists of the following: steam supply part of the steam generator, a turbine and auxiliary equipment of the Turbine Hall.
- Each power unit is equipped with two Turbine Generators (TG) of K-220-44 type, each of them of 220 MW output. They operate with steam under a pressure of 4.4 MPa.
- The voltage of the TBB-220-2 type generators is 15.75 kV, the power factor is 0.85; with water cooling of the stator and hydrogen cooling of the rotor.
- The service water supply is provided by direct flow with water taken from the Danube River.

Units 1 and 2 and Units 3 and 4 respectively were built as twin-units. Some of the installed systems are shared by two different units, whereas other installed systems are shared by all WWER-440 units.

Basic specifics of this type of construction are the design layout of two reactors in a common building with a shared Central Hall. There is a single Turbine Hall (TH) for the 4 (four) WWER-440 units. There is no significant difference between the premises and the layout of the equipment in the premises. The number of premises is consistent with the primary and auxiliary equipment that has to fit into them.

The Reactor Building (RB) structures from elevation -3.35 m to elevation +10.50 m, which serve for biological protection, are mainly of cast-iron reinforced concrete. The foundations of the turbine generators in the TH are also of cast-iron reinforced concrete. The covers of the roof and between the floors of the Main Building are large reinforced concrete slabs.

The civil structures of the hermetic rooms of the RB are calculated to withstand an overpressure in the hermetic rooms equal to 0.1 MPa. The Auxiliary Building (AB) is designed for decay storage of liquid and solid radioactive waste and contains facilities for processing of liquid and gaseous radioactive waste, gas purging systems, ventilation systems of the AB and equipment for preparation of boron solutions. Auxiliary Building-1 (AB-1), Auxiliary Building-2 (AB-2) respectively, is connected via a gallery to the Reactor Building. The general ventilation extraction duct from the Reactor Building to the stack is at elevation +10.50 m and passes through the upper half of the cross-section of the gallery.

A common Ventilation Stack (VS) is built for each pair of units and has a height of 150 m.

### ***1.4 Decommissioning Strategy***

The Strategy for decommissioning of Units 1 to 4 at Kozloduy NPP can be summarized as follows:

#### **Pre-decommissioning stage**

Pre-decommissioning stage is the current stage and it is covered by the post-operational license which is not part of the decommissioning permit.

#### **Decommissioning stage**

This stage include the follow sub-stages:

##### **Stage 1**

Preparation of the Safe Enclosure (SE).

Operation of the Safe Enclosure (SE) for 5 years.

Dismantling of the equipment inside Turbine Hall.

##### **Stage 2**

Deferred dismantling of the equipment within Safe Enclosure.

#### **Closure and land restoration stage**

The long-term state of the industrial site where KNPP Units 1-4 are being decommissioned is defined as “brown lawn”.

## ***1.5 Description of Kozloduy NPP decommissioning activities***

### **1.5.1 Decommissioning stages**

The entire preparation and decommissioning process according to the adopted Continuous Dismantling Alternative can be sub-divided into the following main stages encompassing the respective activities:

#### PRE-DECOMMISSIONING STAGE:

Preparation of the documentation for issuance of a decommissioning permit (Decommissioning Plan, EIA Report, updated: Safety Analysis Report, Technological Specification and Operating Instructions) and

This phase includes the implementation of projects in preparation for decommissioning as: Size reduction and decontamination workshop, Facility for Treatment and Conditioning of Solid Radioactive Wastes with High Volume Reduction Factor, Sites for temporary storage of radioactive materials from the activities of the decommissioning of units and non-radioactive waste from decommissioning. These preparatory projects are comparable to the projects of NPP "Greifswald" the process of decommissioning. This stage also includes the removal of flammable and hazardous materials and thermal insulation removal and conditioning of spent ion exchange resins, insulation and draining.

#### STAGE OF DECOMMISSIONING

This stage includes the follow sub-stages:

- STAGE 1:

Preparation of Safe Enclosure

Safe Enclosure of the Reactor Buildings (the RB of Units 1 and 2 and the RB of Units 3 and 4 and the interconnecting passageways are included in this area) and Dismantling of the equipment outside the Safe Enclosure Area.

- STAGE 2

Deferred dismantling of the equipment within Safe Enclosure.

Release from regulatory control of the site and the buildings for use for other industrial purposes.

During the implementation of the abovementioned stages: transitional (pre-decommissioning) stage, Stage 1 and Stage 2 of the decommissioning, different types waste management activities will be carried out. After sorting of the dismantled materials, depending on their contamination rate the wastes can be:

- Free released and transported outside the KNPP site without or after decontamination;
- Stored temporarily for natural decay;
- Handed over as a RAW for further treatment and conditioning.

#### CLOSURE AND LAND RESTORATION STAGE

The long-term state of the industrial site where KNPP Units 1-4 are being decommissioned is defined as "brown lawn".



### **1.5.2 Generation of RAW and conventional waste, effluents and harmful physical factors by the decommissioning**

In the EIAR there is a summary of the expected types of waste, effluents and harmful physical factors, to be generated during the Transitional stage (Pre-decommissioning stage), during Stage 1 and Stage 2 of the Decommissioning, and closure and land restoration stage based to the information available up to now.

#### **A. Waste effluents and harmful physical factors generated during the Transitional stage (Pre-decommissioning stage)**

##### **Conventional waste, effluents and harmful physical factors**

##### **Generated solid waste**

The implementation of the activities during the transitional stage is expected to generate conventional waste: municipal, construction, industrial waste, hazardous waste from insulation containing asbestos, combustible and flammable waste etc.

##### **Generated liquid effluents**

The implementation of the activities during the transitional stage is expected to generate non-radioactive liquid effluents, as the spent industrial water (purified waste water, conditionally clean waters from the spent cooling water flow), the sewage domestic water, and the rainfall water flows.

##### **Waste gases**

The implementation of the activities during the transitional stage is expected to generate non-radioactive fugitive and point source emissions from processing, transport, construction equipment, dust (particulate matter – PM) from material and equipment processing, odors etc.

##### **Harmful physical factors**

The implementation of the activities during the transitional stage is expected to generate noise and vibrations mainly in result of new buildings construction preparation or reconstruction of existing buildings or solid waste treatment.

##### **Radioactive waste, effluents and harmful physical factors,**

##### **Generated solid RAW**

Such waste will be generated from the processing of solid and liquid waste, as well as the dismantling of the contaminated equipment and contaminated construction materials. The RAW will be appropriately conditioned in the relevant facilities and handed over for further storage (disposal).

##### **Generated liquid RAW**

The operational liquid RAW are stored in the AB storage areas of Units 1 to 4: in the Low Activities Sorbents Tanks (LAST), in the High Activities Sorbents Tanks (HAST) and the Evaporator Concentrate (Bottoms) Tanks (ECT). It is expected that during the pre-decommissioning period RAW will be generated mainly from the equipment decontamination process and ion-exchange resins and bottom treatment etc. These liquid RAW will be collected and processed.



## **Waste gases**

The expected generation of waste gases will be mainly the result of the treatment of the operational RAW, the equipment etc and these emissions will be captured and treated by the relevant ventilation systems of Units 1 to 4 and will be released under surveillance in the environment in strict compliance with the established regulatory limits.

## **Harmful physical factors**

Sources of ionizing radiation.

### **B. Waste effluents and harmful physical factors generated during Stage 1 and Stage 2**

These wastes will be generated as a result of the implementation of different decommissioning activities. Mainly they are expected to be generated during the dismantling and decontamination processes.

#### **Conventional waste, effluents and harmful physical factors**

##### **Generated solid waste**

Upon the free release and decontamination it is expected there to be generation of significant amount of solid conventional waste from the dismantling of the process equipment and the demolition of the auxiliary concrete civil structures.

##### **Generated liquid effluents**

During the decommissioning activities it is expected the generation of non-radioactive liquid effluents, as the spent industrial water (purified waste water, conditionally clean waters from the spent cooling water flow), the sewage domestic water, and the rainfall water flows.

## **Waste gases**

During the implementation of the decommissioning activities it is expected the generation of non-radioactive fugitive and point source emissions from processing, transport, dust (particulate matter – PM) from material and equipment processing, odors etc, which will be released into the atmosphere after filtration. Other waste gases will be generated by the transportation vehicles.

## **Harmful physical factors**

During the decommissioning activities noise and vibrations will be generated from the processing of solid waste. Generation of non-ionizing radiation is not expected during the decommissioning.

#### **Radioactive waste, effluents and harmful physical factors,**

##### **Generated solid RAW**

It is expected there to be generation of solid RAW from SE preparation and operation activities, from the dismantling of the process equipment and the demolition of the auxiliary concrete civil structures. These wastes will be treated by the existing facilities for processing and storage owned by State Enterprise “Radioactive Waste” (SE “RAW”).

### **Generated liquid RAW**

It is expected that liquid RAW (spent water, oils) will be generated by the SE preparation and operation, as well by the decontamination of the dismantled contaminated equipment.

### **Waste gases**

During Stage 1 and Stage 2 of the decommissioning some amount of gaseous waste emission will be generated, which will be captured and purified by the ventilation systems of Units 1 to 4 and then released under monitoring into the environment in strict compliance with the established regulatory limits.

### **Harmful physical factors**

Sources of ionizing radiation.

### **C. Waste effluents and harmful physical factors generated during the closure and land restoration stage**

These wastes will be generated as a result of the closure and land restoration activities.

#### **Conventional waste, effluents and harmful physical factors**

##### **Generated solid waste**

During this stage of activities it is expected to be generation of solid conventional waste.

##### **Generated liquid effluents**

During this stage of activities it is expected the generation of non-radioactive liquid effluents, as the sewage domestic water and the rainfall water flows.

##### **Waste gases**

During the implementation of the decommissioning activities it is expected generation of non-radioactive fugitive and point source emissions from processing, transport, dust (particulate matter – PM) from material and equipment processing, odors etc, which will be released into the atmosphere after filtration. Other waste gases will be generated by the transportation vehicles.

##### **Harmful physical factors**

During the decommissioning activities noise and vibrations will be generated from the processing of solid waste and during reconstruction of existing building.

#### **Radioactive waste, effluents and harmful physical factors.**

##### **Generated solid RAW**

It is expected to be generation of solid RAW from release of contaminated equipment from the sites. These wastes will be treated by the existing facilities for processing and storage owned by State Enterprise “Radioactive Waste” (SE “RAW”).

## **Generated liquid RAW**

It is expected that liquid RAW will be generated by the SE preparation and operation, as well by the decontamination of the dismantled contaminated equipment. This liquid waste will be collected and conditioned.

## **Waste gases**

During this stage of the decommissioning some amount of gaseous waste emission will be generated, which will be captured and purified by the ventilation systems of Units 1 to 4 and then released under monitoring into the environment in strict compliance with the established regulatory limits.

## **Harmful physical factors**

Sources of ionizing radiation during the site release from contaminated equipment.

### **1.5.3 Decommissioning activities plan**

The activities during the operational shutdown and the decommissioning preparation include:

- Pre-decommissioning activities – including radiological backlog in order to enable removal of hazardous and other wastes generated by the units operation;
- Activities on collection, sorting, treatment and transportation of decontamination waste;
- RAW management activities;
- Decontamination.

Activities within the stages of decommissioning

Activities during Stage 1

- Activities on units' RB Safe Enclosure (SE) preparation;
- Activities on SE Operation;
- Activities outside the SE, dismantling of Turbine Hall (TH);
- Activities on SE waste transportation and processing.

Activities during Stage 2

- Dismantling of the equipment within the SE;
- Release from regulatory control of the site and the buildings for use for industrial purposes.

Closure and land restoration stage activities

The final phase of closure land restoration, provides the long-term end state of the industrial site, on which were decommissioned the Units 1 to 4 of NPP "Kozloduy" to determine the status of "brown field". This will be achieved by implementing the following activities: dismantling of the equipment not intended for further use; free release of the buildings and facilities remaining in operation; processing and taking out of all RAW from the site and bringing it to a condition suitable for nuclear purposes or other economic activities. Some building and underground communication will be stay for serving Units 5 & 6 KNPP.

## **2. Description of the features of other plans and projects, existings or in process of elaboration or approval, which can exerce 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.

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 (actually zero) on biodiversity have this project and 5b project for construction of a facility for treatment and conditioning of radioactive waste with high coefficient of volume reduction in NPP "Kozloduy".

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 relation 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 Ministry of Environment and Water.

In accordance with further recommendations made by the MoEW (letter - ref. № OVOS-289/09.01.2013g.- Chapter 11 Appendix 7 of EIA-R) in [223] is given “Analysis on the dose originating from gas aerosol and liquid releases to the environment from the Units 1-4 decommissioning process and the emissions from the plasma melting facility (PMF) operation, incurred by the public within the 30-km supervised area surrounding Kozloduy NPP.”[223]. For calculation of cumulative effect are used the following computer codes and models:

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.

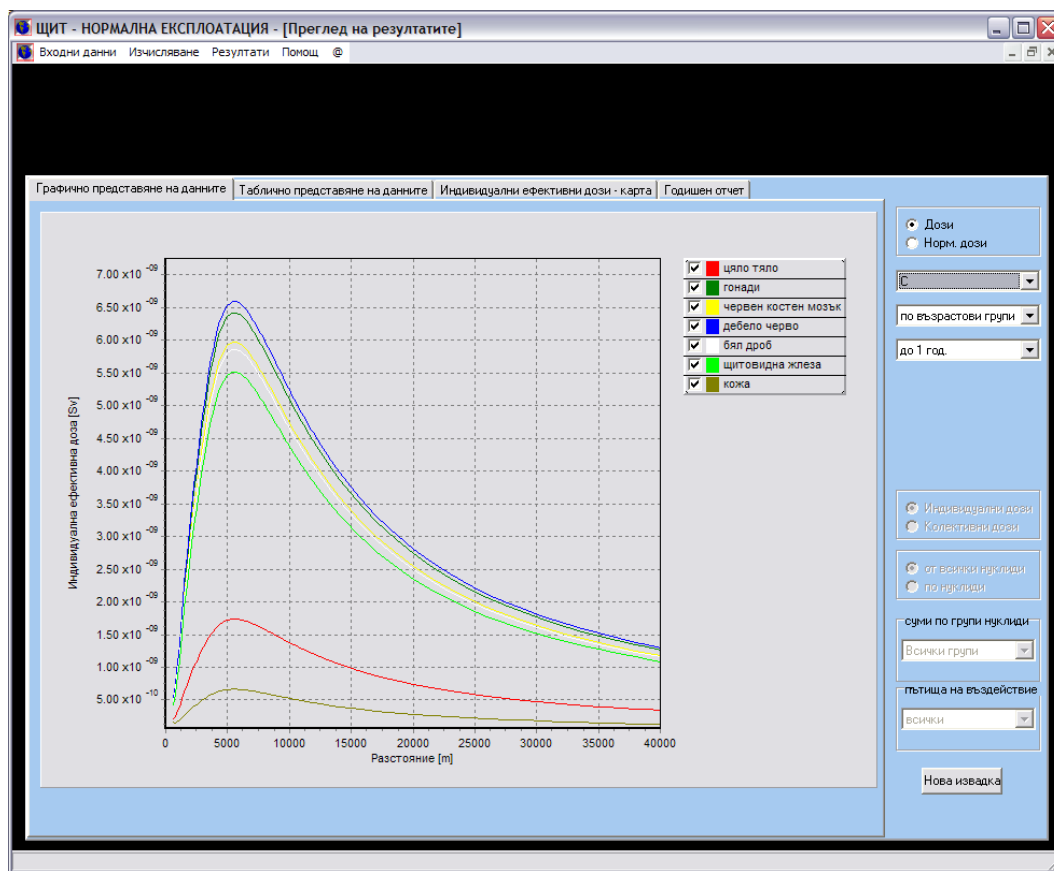
- To assess the public dose due to liquid discharges - programme code DARR-CM, as adapted to the hydrology of the KNPP area and used for conservative evaluation of the dose exposure of a critical group of the public.
- To assess the public dose within the supervised area due to gas-aerosol discharges - 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 estimates obtained refer to the population of the Bulgarian side (72416 people, year 2007). Taking into account the population in the respective part of Romania – another 75 150 people, the collective effective dose for the entire area can be approximately doubled. These are data fully comparable with the practice adopted for RWRs worldwide.

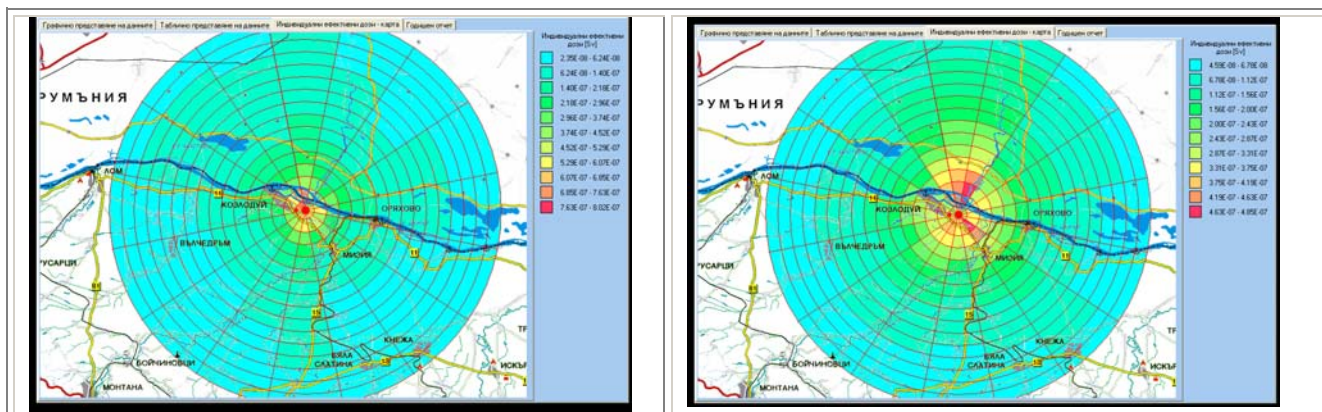


The dose distribution map for the population within the 40-km area and as a function of the distance to the emission source are presented on fig. 2-1 and fig. 2-2.



**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.



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

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

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 5c) 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  $5.05\mu\text{Sv/a}$ , which is a much lower value than the quota of  $250\mu\text{Sv/a}$  for exposure from radioactive emissions from NPP (Ordinance on the Assuring of Safety of NPPs) and the norms determined for the population of  $1\text{ mSv/a}$  (ONRZ-2012, Basic Norms for Radiation Protection).
- The additional dose that might be incurred is about 500 times lower than natural radiation background ( $2.33\text{ mSv}$ ).
- 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,  $6\text{ MBq}$  under normal operation of the plasma melting facility (PMF), was estimated at  $5,47.10\text{-}10\text{ Sv/a}$ , 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.

Plans, programs and investment projects related to the cumulative effect of a negative impact on individual protected areas are considered in turn.

**A. PA Zlatiata, code BG0002009**

On the territory of PA Zlatiata, code BG0002009, it is foreseen to implement the following investment proposals (Data are based on reports submitted by the Regional Inspectorate of Vratsa and Montana Regional Inspectorate for other plans and projects, existing or under development or approved for the period from 2006 to 2010, concerning Protected Areas (PA) of the Natura 2000):

- Decommissioning of the existing municipal solide waste landfill of



- Kozloduy town;
- Primary foresting of the unnarrable 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 Decommissioning of Units 1-4 of Kozloduy NPP and of the foreseen 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.

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

**B. . On the territory of PA Kozloduy Islands, code BG0000533 other plans and projects are not foreseen to be implemented.**

It is not envisaged the implementation of other plans and projects.

**C. On the territory of PA Ogosta River, code BG0000614 is foreseen the implementation of three IPs::**

- Construction of Wind Farm by installation of 55 WEA on the land of Selanovtsi village, Oriahovo municipality;
- Construction of micro hydropower plant on Ogosta river with the output of 530 kW 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 Decommissioning of Units 1-4 of Kozloduy NPP and of the foreseen 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 eventual 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.

**D. On the territory of PA Skat River, code BG0000508 is foreseen the implementation of three IPs:**

- Sturgeon fish-farming on the land of Saraevo village an 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 Decommissioning of Units 1-4 of Kozloduy NPP and of the foreseen 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 eventual cumulative effect on the target fauna species, subject to conservation in this area, is that such an effect is not expected

After analyzing the nature and essence of the above projects and investment proposals can be concluded that in combination with the IP in question, they will not have a significant negative impact on the habitat types and species, subject to protection in question 6 protected areas.

### **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**

In relation to the implementation of the decommissioning of the units provides the performance of a group of projects in the stage of preparation for decommissioning which basically can be divided into: Projects for removal of hazardous materials; Projects for processing of accumulated operation RAW; Projects activities before dismantling and Projects for the construction of additional infrastructure

The most important projects, which are presently planned to be implemented during the abovementioned stages (Pre-Decommissioning Stage, Decommissioning Stages 1 and 2 and Closure and land restoration stage) and for some of which the EIAR will provide an assessment concerning the probability to have or not to have impacts on human beings and on the environment are described below.

#### **Size Reduction and Decontamination Workshop (SRDW)**

The project ensures the construction of a Size Reduction and Decontamination Workshop (SRDW) for contaminated materials from Turbine Hall, AB-1 and AB-2 and the RBs.

#### **Facility for Treatment and Conditioning of RAW with High Volume Reduction Factor at Kozloduy NPP**

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

#### **Design and Construction of Sites for Management of Materials generated by the decommissioning activities of Units 1-4 at Kozloduy Nuclear Power Plant**

By this project is provided a safe temporary storage of solid radioactive materials (RAM) subject to clearance procedure, generated by the decommissioning activities of Units 1-4 on two dedicated sites. The RAM (transitional RAW) will be temporary stored in containers on these sites over a period not longer than 5 years, where their specific activity will decrease below the free release levels. Sites for temporary storage of RAW from the decommissioning activities of units 1-4 will be designed and operated in a manner ensuring minimum risk to personnel, population and environment in accordance with the ALARA. In the frame of this project is foreseen the selection of a Site for conventional waste from decommissioning of the units.

#### **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.

### **National Disposal Facility for shortlived low and intermediate RAW**

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.

### **Liquid Radioactive Waste Treatment Facility**

This project shall 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 SWT-3 of Units 1 to 4 which will become non-operational upon completion of the treatment of all operational liquid RAW.

### **Supply of Mobile Equipment for Water Decontamination and Treatment Equipment**

The project shall provide the supply of mobile equipment for surface decontamination of the Reactor Refueling Pool (RRC), Spent Fuel Storage Pond (SFSP), SFSP racks and other similar open or closed storage vessels, for tanks' water treatment and for secondary RAW conditioning. According letter Ref.No26-00-2555 of MEW the project can not be associated to the IP listed in Annexes 1 and 2 to the EPA and subsequently is not subject to mandatory EIA.

### **Ion exchange Resins Retrieval and Conditioning Facility**

The Project shall ensure the supply of equipment for the retrieval and treatment of spent ion-exchange resins from the existing storage facilities.

### **Free Release Measurement Facility**

This project shall ensure the supply of equipment able to measure the  $\gamma$ -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.

### **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.

### **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.

The envisaged projects and activities for implementation of the Investment Proposal are considered to adverse effects on the habitat types and species under protection in the examined protected areas.

## ***3.1 Vegetation and natural habitat types***

The decommissioning process is associated with a number of activities aimed at bringing the nuclear equipment into a state of long-term Safe Enclosure (SE). The

main activities are described in detail in Chapter 1 of the EIA Report. The analysis of these activities shows that potential impact on some parts of the protected areas is to be expected. Because of this, before the very beginning of the Safe Enclosure period it is planned to implement a number of activities aimed at reducing the potential risks. The potential adverse impacts involve flammable and hazardous materials and radioactive waste. Therefore and for the purpose of precluding the adverse impacts, it is necessary to ensure their timely removal and safe enclosure. For the sake of attaining the objective of the project, namely “maintaining the levels of all releases in conformity with the levels permitted in the licence”, specific technical solutions have to be developed, which must guarantee the safety of the environment, including the safety of the vegetation and habitats situated within the scope of impact in the protected area.

It is planned to use various decontamination methods specified in the Units Decommissioning Plan [36].

In the process of implementation of these activities, no direct impact on the vegetation and habitats in the areas adjacent to Kozloduy NPP.

With the efficient implementation of the envisaged equipment decontamination activities, which is planned to take place in closed premises in the Size Reduction and Decontamination Workshop and given the strict process and radiation monitoring during size reduction and decontamination of the equipment, materials etc, no impact on the vegetation and habitats in the protected areas in the adjacent territories is expected.

The analysis of IP and opportunities for air pollution in the 30-kilometer zone around the NPP "Kozloduy" show that no negative impacts are expected from this investment proposal, as provided for purifying emissions and organized or are not expected to impact the PA.

During the period of decommissioning of Units 1-4 of Kozloduy NPP, liquid and solid radioactive waste is expected to be generated, where the limits for the releases of liquid waste are assumed to be considerably lower than the limits during normal operation of Units 1-4 of Kozloduy NPP. This implies that no change in the protected areas radiological status is expected during the period of decommissioning as far as the RAW temporary storage site is efficiently maintained and operated. As far as the liquid radioactive waste is concerned, the “project” envisages processing down to a type of waste called “evaporator concentrate” (bottoms). In this manner, minimization of the waste and long-term and safe insulation from the environment shall be achieved.

Provided there is a well-organized waste collection and transportation system, no impact on the protected areas is predicted. As far as the household waste is concerned, collection in especially and appropriately placed vessels and containers is envisaged. These vessels and containers shall be transported and emptied on the dedicated regulatory sites.

In connection with the developed “Kozloduy NPP Conventional Waste Management Program”, it is envisaged to undertake measures for identification of all types of hazardous waste and for determining the amounts. In the process of implementation of the program for management of all the various types of waste, that will be

generated during the decommissioning of the NPP, no impact of the conventional waste on the protected areas is expected.

### **3.2 Fauna**

The different components covered by the Investment Proposal for decommissioning of Units 1 to 4, are diverse in nature, mechanism and time duration. On the basis of the forecasted impacts on the fauna as a result of the implementation of the investment proposal, they are assessed as minor, primarily indirect impacts or impacts arising in the case of emergency accident caused by force majeure situations, which can be avoided without application of any special measures other than adhering to the best practices for decommissioning of Units 1-4 of Kozloduy NPP.

The other impacts, which may occur during the implementation of the Investment Proposal, are associated with environmental pollution with various biologically hazardous substances. The soluble chemical substances are especially hazardous, if they come in contact with the aquatic environment. In such cases, impacts at great distances along the waterbeds of the rivers are possible, as well as entry of these substances into enclosed or slow-flowing water basins.

The indirect impacts during the eventual implementation of the Investment Proposal will be of secondary importance and in some cases can be ignored due to their insignificance.

The impacts as a result of the increased motorway traffic can also be assessed as inevitable but negligibly small (insignificant) for the target species. These impacts have essentially local character and are concentrated in the IP region which is extremely synantropogenic.

In summary, a conclusion can be drawn that the eventual implementation of this specific Investment Proposal must be monitored very carefully for chemical and effluents pollutions in the region as well as for inadvertent spillage (leakage) of fuels and other biota-hazardous substances in order to ensure the fauna and habitats conservation. The soluble chemical substances and the different decontamination effluents are especially hazardous, if they come in contact with the aquatic environment since they can impact many animal groups and their habitats.

In terms of Protected Territories and Protected Areas during the decommissioning of units 1-4 are not recommended special measures to prevent, reduce, mitigate or compensate for significant adverse effects on them, but compliance with the best practices for the implementation of technological processes.



## **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: in Bulgaria one under the Birds Directive and five under the Habitats Directive. The distance of these PA from KNPP site is follows;

- Protected area “Zlatiyata” with code BG0002009 – 1.2 km
- Protected area “Kozloduy lands” with code BG0000533 – 3 km
- Protected area “Ogosta River” with code BG0000614 – 6 km
- Protected area “Skat River” with code BG0000508 – 7 km
- Protected area “Kozloduy” with code BG0000527 – 11.9 km
- Protected area “Cibar” with code BG00005199 – 19 km

These PA are described sequentially.

### ***4.1 General description of Protected Area “Zlatiyata”, Code: BG0002009 under the Birds Directive***

This protected area was proclaimed by Order ПД-548 of 5 September 2008 of the Ministry of Environment and Waters, which was promulgated in SG No.83/2008.

#### **4.1.1 General description**

According to Ignatov etc. (manuscript) Zlatiyata is located 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 Kozloduy to the West and East. It is located on tableland-like leveled 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 Zlatiyata, 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 “Zlatiyata” 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 favorable 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.

#### **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 MEW**

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 (*Circus 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 MEW**

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 Ignatov etc. (manuscript) 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 SPEC1 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:

<i>Land cover classes</i>	<i>% Coverage</i>
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
<i>Total Coverage</i> .....	<i>100</i>

The terrain of the Investment Proposal is occupied entirely by agricultural land.

## 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 6057.60 dka. It lies at an altitude of between 20 m and 34 m.

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

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 shrubby 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:

<i>Land cover classe</i>	<i>% Coverage</i>
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
<b>Total coverage .....</b>	<b>100</b>

### 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

CODE	NAME	% Coverage	Represent.	Relative area	Equated extent	Total assessment
91E0	* Alluvial forests of <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Pandion, Alnion incanae, Salicion albae)	21.305	B	C	B	B
3130	Oligotrophic to mesotrophic standing waters with vegetation of <i>Littorelletea uniflorae</i> and/or <i>Isoetes-Nanojuncetea</i>	6	B	C	A	A

3270	Rivers with muddy banks with <i>Chenopodium rubri</i> and <i>Bidenton p.p.</i>	3	B	C	B	B
91F0	Riparian mixed forest of <i>Quercus robur</i> , <i>Ulmus laevis</i> and <i>Fraxinus excelsior</i> or <i>Fraxinus angustifolia</i> along the great rivers ( <i>Ulmenion minoris</i> )	0.0933	D	C		

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

In the table of separate habitats an assessment of the following indicators is shown:  
*Representativity* provides an indication as to what extent a certain habitat is "typical". The following classification system is used: A-excellent representativity; B-good representativity; C- considerable representativity; D- negligible existence;  
*Relative area* /area of the site covered by a certain habitat compared with the total area of the national territory covered by this habitat/. The intervals used by classes are as follows: A)  $100 \geq p > 15\%$ ; B)  $15 \geq p > 2\%$ ; C)  $2 \geq p > 0\%$ ;  
*Equated extent*/the extent of protection of the structure and function of a certain habitat and the possibility for its restoration is assessed/. The following classification system is used: A-excellent protection; B-good protection; C-average or weak protection.

*Total assessment* of the site value for protection of a certain type of natural habitat/integrated assessment of the previous criteria considering their different weight for the examined habitat. The following classification system is used: A-excellent value; B-good value; C- important value.

**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.

**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 roboris*. 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

Two 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) NAME (in Latin)	Local population	Motivation
P	Shining spurge <i>Euphorbia lucida</i>	R	D
P	Summer snowflak <i>Leucojum aestivum</i>	R	D

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<sup>2</sup>. According to the specialists, the drop in the population of this species is a consequence of the pollution of rivers by chemical substances and the accumulation of decaying organic substances on the bottom of the water basin.

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, which 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 inland 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 unequivocally, 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.

According to the form, this species is frequently encountered but the source of the information is unclear.

**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, in which 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 schraetzer***

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***

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.

#### **4.3 General description of Protected Area “Ogosta River”, Code: BG 0000614 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	%
Daneva Mogila (Daneva 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; / neighboring 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 macrophytes. 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:

<i>Land cover classes</i>	<i>% Coverage</i>
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
<b>Total coverage</b>	<b>100</b>

#### 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**

CODE	NAME	% Coverage	Represent.	Relative area	Equated extent	Total assessment
91E0	* Alluvial forests of <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Pandion, Alnion incanae, Salicion albae)	0.232	A	C	A	A
3150	Natural eutrophic lakes with vegetation of the Magnopotamion or Hydrocharition type	7.4	A	C	A	A
3260	Lowland or mountainous rivers with vegetation of <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i>	0.2	A	C	A	A
3270	Rivers with muddy banks with <i>Chenopodion rubri</i> & <i>Bidention p.p.</i>	0.2	A	C	A	A
6250	* Panonian loess steppe grass communities	9.553	A	C	A	A
91Z0	Mizian forests of silver lime	0.537	D	C		

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	Local population	Motivation
a	NAME (in Latin)		
P	<i>Lamb's ear</i>	P	A
	<i>Stachys arenariaeformis</i>		
P	<i>Rootless Walter Meal</i>	P	A
	<i>Wolffia arrhiza</i>		

#### 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 severely 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 alpina***

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 fungus 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 fish favoring sandy bottoms. All three are relatively common

### **Balkan loach – *Cobitis elongata***

### **Spinned loach – *Cobitis taenia***

### ***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 schraetzer***

### **Zingel zingel – *Zingel zingel***

### **Zingel 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 Tortoise – *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**

### **Souslik – *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 studied 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: BG 0000508 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 meadows, 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:

<b>Earth cover classes</b>	<b>% Coverage</b>
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
<b>Total coverage</b>	<b>100</b>

##### **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**

CODE	NAME	% Coverage	Represent.	Relative area	Equated extent	Total assessment
91E0	* Alluvial forests of <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Pandion, Alnion incanae, Salicion albae)	2.205	A	C	A	A
1530	* Panonian salty steppes and salty marshlands	0.03	B	C	B	B
3260	Lowland and mountainous rivers with vegetation of <i>Ranunculus fluitans</i> and <i>Callitriche-Batrachion</i>	0.06	D	C		
3270	Rivers with muddy banks with <i>Chenopodium rubri</i> and <i>Bidens p.p.</i>	0.03	D	C		
6250	* Panonian loess steppe grass communities	0.397	A	C	A	A
91F0	Riverside mixed forests of <i>Quercus robur</i> , <i>Ulmus laevis</i> and <i>Fraxinus excelsior</i> or <i>Fraxinus angustifolia</i> alongside great rivers (Ulmion minoris)	9	A	C	A	A

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	Local population	Motivation
a	NAME (in Latin)		
P	Star thistle <i>Centaurea rumelica</i>	P	B
P	Lemnaceae <i>Lemna gibba</i>	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 Tortoise – *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 Souslik (*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:

<i>Land cover classe</i>	<i>% Coverage</i>
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
<b>Total coverage .....</b>	<b>100</b>

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***

<i>CODE</i>	<i>NAME</i>	<i>% Coverage</i>	<i>Represent.</i>	<i>Relative area</i>	<i>Equated extent</i>	<i>Total assessment</i>
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:

<i>Tx.group</i>	<i>NAME (in Bulgarian)</i>	<i>Local population</i>	<i>Motivation</i>
<i>a</i>	<i>NAME (in Latin)</i>		
P	Star thistle <i>Centaurea rumelica</i>	P	B
P	Lamb's ear <i>Stachys arenariaeformis</i>	P	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.

#### 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:

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

<i>Land cover classe</i>	<i>% Coverage</i>
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
<b>Total coverage .....</b>	<b>100</b>

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 Bidenton 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

##### 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 and an overall evaluation state of population A. River Tsibritsa is in large part strong silt which is unsuitable environment for habitation of this river oyster. In estuary part, where the river is included in the protected area, it was converted into an artificial basin bounded by loose earth embankments. The area covers part of the water area of the Danube, around the mouth of Tsibritsa the nearby surroundings of the town of Kozloduy. During our visits to PA type has not been identified along the river Tsibritsa and relatively very rare in the coastal part of the area around the Danube. Along the Danube town of Kozloduy around we found shells mainly marsh clams, which are indicative of the living conditions in this sector. Open shells of river mussels are single and those of oval river mussel (pearl oyster, according to BA) extremely rare artifacts. This species is in critical condition all along the Danube and its tributaries for the following main reasons:

- Global pollution of the river and its tributaries with faecal and other organic household waste anthropogenic cause fouling on the bottom. The species inhabits sections of the river with sandy-clay bottom, unaffected by anthropogenic organic layering.
- Industrial and household chemical contamination.
- thermal pollution
- Invasive competition from both mainstream of the river system type Chinese pond mussel and Chinese korbikula
- Direct physical destruction in dredging the riverbed to sand mining.

### **Insects/Coleoptera**

#### **Stag beetle – *Lucanus cervus***

According to the form this is a rare species. In the course of our studies in this area, the type was identified as common, especially in areas close to the Danube, where probably the type metamorphism in riparian woody vegetation.

#### **Alpine longhorn – *Rosalia alpia***

According to the form type is rare, with no evidence of current status. In our long-term field research in the area the species has not was observed.

For both is essential to have a substrate for the propagation and growth, such as a dry rotten wood local broadleaf species.

### **Vertebrates (Vertebra**

#### **Jawless/hagfishes – *Agnatha/Cyclostomata***

#### **Ukrainian lamprey - *Eudontomyzon mariae***

According to data from a very rare form, with an isolated population, but with excellent overall assessment of the state of the population. In the literature there are no data to establish the species in this section of the Danube. Given the current state of the rivers in this part of the Danube catchment is highly unlikely type to be identified.

### **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. Breeding migrations of the species have the first two annual peaks from mid April to late May, the second in late June to mid-July, sometimes until mid-August. Over the past 50 years the species is highly decreased due uncontrolled catching him in the Black Sea and the rivers are entering breeding. No Specific information for the species in this region of PA.

#### **Cyprinidae – *Aspius aspius***

The species is trivial for Danube ichthyofauna. Except in river species are found in the mouths of the inflowing rivers. In Bulgarian literature data on the state of the population in the Danube River and rivers of the watershed.

#### **Mediterranean barbel – *Barbus meridionalis Barbus petenyi* (syn.*B.meridionalis petenyi*)**



The species is strongly reduced due to pollution Tsibritsa River and the construction of artificial protective embankments next to the river shores. It is considered that organic domestic pollution is a serious barrier to the propagation of the species, therefore, has become rare in the whole plain sector of the River Tsibritsa.

**Whitefin gudgeon – *Gobio albipinnatus***

Common in the Danube River and many rare species of river Tsibritsa. More often found near the outflow of the river.

**Ziege – *Pelecus cultratus***

The species has become very rare in the Danube during the last 30-35 years. In Tsibritsa River may enter only at the outflow of the river.

**Fish linn – *Rhodeus sericeus amarus***

Strongly decreased due to fouling of the bottom of the river and Tsibritsa strong eutrophication.

The following three species are benthic favoring muddy-sandy bottoms. All three are relatively common in the Danube River and a relatively rare for Tsibritsa River outside estuary zone.

**Balkan loach – *Cobitis elongata***

**Spinned loach – *Cobitis taenia*** (This species is not found in Bulgaria and probably implies type *C. elongatoides*, that is morphologically similar to the previous type.)

**Balkan loach - *Sabanejewia balcanica*** (sin. *S. aurata balcanica*)

The following four types are typical of the Danube, where the bottom is a large gravel and water column has a height of over 5 meters. Of the four types are relatively rare the Zingel that in some sections of the river almost completely absent

**Balon's ruffle – *Gymnocephalus baloni***

**Stripped ruffle – *Gymnocephalus schraetzer***

**Zingel – *Zingel zingel***

**Danube streber – *Zingel streber***

***Amphibia – Amphibia***

**Danube crested Newt – *Triturus dobrogicus***

It is found along the banks of the Danube and estuary areas of the rivers of the watershed. Animal spends most of its active period in the basin and its hibernation occurs on land in coastal forest habitats. The species is not listed in locations far from Danube River and lower courses of the rivers of the watershed.

**Fire-bellied toad – *Bombina bombina***

The species is distributed throughout the Danubian plain in keeping with near ponds in which he lives. It occurs mainly in coastal waters with overgrown areas. Studies on the population parameters of the species in Bulgaria were not made.

***Reptiles – Reptilia***

**Hermann's Tortoise - *Testudo hermanni***

Extremely rare for the area, without establishing securely over the last 20-25 years in the area of the zone. Deforestation and forest habitat in the area are probably the main reason for the disastrous state of the species in the region. Another serious problem in

the area of the zone is poorly educated and impoverished Roma population that has no means of livelihood and earn their living mainly offered natural resources of the region

**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. Our observations are also the same when we visited that particular area.

**Mammals – Mammalia**

**Souslik – *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 studied on the territory of Bulgaria and all the data on its incidence and distribution are accidental or from the monitoring of birds of prey. Individuals or trace species have been scientifically established along the entire coastal strip between Gorni Tsibar village and town of Kozloduy, and in uncultivated areas located near the river Tsibritsa in the area between the village Zlatia and the road above the village of Gorni Tsibar.. Souslik kind directly related to grassland and arable land in the immediate vicinity. The area of PA has traditionally been used as pasture because of its close location to the settlements with limited pastoralism.

**European Otter – *Lutra lutra***

The species is frequent along the Danube and missing in the sector of the area, located along the river Tsibritsa without estuary part. Stools and traces can be found almost all along the section of the Danube, falling under in PA. According to the form the region is inhabited by 5-6 individuals. There is no information on the method of recording and counting.

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

Code	Name
A097	<i>Falco vespertinus</i>
A195	<i>Sterna albifrons</i>
A234	<i>Picus canus</i>
A238	<i>Dendrocopos medius</i>
A393	<i>Phalacrocorax pygmeus</i>
A439	<i>Hippolais olivetorum</i>
A177	<i>Larus minutus</i>
A193	<i>Sterna hirundo</i>
A429	<i>Dendrocopos syriacus</i>
A094	<i>Pandion haliaetus</i>
A034	<i>Platalea leucorodia</i>

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

## **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: BG 0002009 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 (*Circus 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 227 passing 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
<b>Total</b>	<b>33</b>	<b>18</b>	<b>51</b>	<b>100</b>

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 Septemvritsi. 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
<b>Total</b>	<b>3538</b>	<b>22848</b>	<b>2524</b>	<b>970</b>	<b>29891</b>

#### **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	Средно
<i>Tachibaptus ruficollis</i>	9	0	1	1	3	0	0	0	5	0	3	2
<i>Podiceps cristatus</i>	1	7	3	2	3	0	0	0	1	0	0	2
<i>Phalacrocorax carbo</i>	0	0	0	0	0	0	0	1	94	0	139	21
<i>Phalacrocorax pygmeus</i>	0	0	42	0	1	2	6	3	10	0	157	20
<i>Pelecanus crispus</i>	1	0	0	0	0	0	0	0	5	0	10	1
<i>Egretta alba</i>	0	8	0	0	0	0	0	43	6	0	1	5
<i>Ardea cinerea</i>	0	4	0	0	0	0	2	1	3	0	3	1
<i>Cygnus olor</i>	31	0	0	0	0	0	0	0	22	0	0	5
<i>Anser albifrons</i>	6703	6007	3306	85	187	0	595	14	515	0	170	1598
<i>Anser anser</i>	46	433	74	0	2	4	9	0	56	0	0	57
<i>Anser spp.</i>	0	0	0	0	0	0	0	0	100	0	0	9
<i>Anas penelope</i>	0	6	0	0	0	0	13	16	13	0	0	4
<i>Anas crecca</i>	32	865	622	1	364	0	589	4450	0	0	0	629
<i>Anas platyrhynchos</i>	5832	17629	5094	162	4680	18	4575	13630	890	0	3308	5074
<i>Anas acuta</i>	282	139	1	0	7	0	59	0	0	0	0	44
<i>Anas clypeata</i>	100	0	0	0	0	0	0	0	0	0	0	9
<i>Aythya ferina</i>	0	0	12	0	11	0	32	0	44	0	0	9
<i>Aythya fuligula</i>	0	0	0	0	10	0	10	4	0	0	28	5
<i>Bucephala clangula</i>	2	12	0	0	0	0	0	0	5	0	0	2
<i>Mergus albellus</i>	11	37	80	0	3	0	0	0	3	0	25	14
<i>Mergus merganser</i>	0	13	24	0	15	0	0	0	0	0	43	9
<i>Gallinula chloropus</i>	0	0	0	1	0	0	0	0	3	0	2	1
<i>Fulica atra</i>	0	0	0	0	32	0	0	0	4	0	0	3
<i>Numenius arquata</i>	0	0	5	1	0	0	15	0	0	0	0	2
<i>Larus ridibundus</i>	53	596	12	6	23	49	525	120	7	0	32	129
<i>Larus canus</i>	0	61	14	3	43	1	32	0	12	0	2	15
<i>Larus cach/mich</i>	4	0	0	0	0	0	20	1	33	0	1	5
<i>Larus spp.</i>	0	0	0	0	0	0	0	0	0	0	12	1
<b>Total number of birds</b>	<b>13109</b>	<b>25820</b>	<b>9291</b>	<b>267</b>	<b>5384</b>	<b>74</b>	<b>6482</b>	<b>18283</b>	<b>1833</b>	<b>0</b>	<b>3941</b>	<b>7680</b>
<b>Total number of species</b>	<b>16</b>	<b>15</b>	<b>15</b>	<b>10</b>	<b>15</b>	<b>5</b>	<b>14</b>	<b>11</b>	<b>22</b>	<b>0</b>	<b>17</b>	<b>13</b>

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	
<b>Total</b>	<b>6</b>	<b>6</b>	<b>12</b>	<b>1</b>

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 Kozloduyki 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**

IP will not adversely impacting the environment because it provides cleaning organized emissions..

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  $5.05\mu\text{Sv/a}$ , which is a much lower value than the quota of  $250\mu\text{Sv/a}$  for exposure from radioactive emissions from NPP (Ordinance on the Assuring of Safety of NPPs) and the norms determined for the population of  $1\text{ mSv/a}$  (ONRZ-2012, Basic Norms for Radiation Protection).
2. The additional dose that might be incurred is about 500 times lower than natural radiation background ( $2.33\text{ mSv}$ ).
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  $5,47.10^{-10}\text{ Sv/a}$ , which is barely 0.01% from the total exposure resulting from all activities on the KNPP site.

In compliance with the technology and control the processes of decontamination and dismantling, decommissioning can be made safe for the environment and the population is expected radioactive gas aerosol emissions are within the permissible air pollution in the vicinity of nuclear power to be less than that during the normal operation. Emissions of non radioactive substances in the air during the process of decommissioning of Units 1 to 4 of NPP "Kozloduy" will be below the legally allowed levels. 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**

Among the positive impacts associated with decommissioning, special attention should be paid to the elimination of thermal pollution of the Danube due to the cooling water during operation. Thermal discharges will be insignificant, since after the reactor will have thermal emissions from these units in the Danube. Upon completion of decommissioning there will be improve of the purity of surface and groundwater in the affected area.

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 Surveillance 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 "Kozloduy". The efficient implementation of the planned activities in decontamination is not expected to impact the soil of NPP "Kozloduy" and adjacent lands. After conducting decontamination potential sources of soil contamination are different waste sludge and water that are used for technology needs.

The analysis of the expected sources of impacts on soils associated with the decommissioning of units 1-4 and the period after the completion of decommissioning shows that planned activities are not a source of soil contamination. Upon completion of decommissioning is expected to reduce radiological and non-radiological emissions into the environment (air and water).

### **Waste**

During the decommissioning of NPP "Kozloduy" of operation is expected to generate liquid and solid radioactive waste, limits for discharges of liquid waste is accepted much lower than the limits during normal operation of Units 1 to 4 of the Kozloduy "NPP".

In the stage of implementation of the project are provided all safety measures related to activities with RAW. 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 1,2 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
<i>Gavia arctica</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Tachibaptus ruficollis</i>	9	0	1	1	3	0	0	0	5	0	3	2
<i>Podiceps cristatus</i>	1	7	3	2	3	0	0	0	1	0	0	2
<i>Podiceps grisegena</i>	0	0	1	0	0	0	0	0	0	0	3	0
<i>Phalacrocorax carbo</i>	0	0	0	0	0	0	0	1	94	0	139	21
<i>Phal. pygmeus</i>	0	0	42	0	1	2	6	3	10	0	157	20
<i>Pelecanus crispus</i>	1	0	0	0	0	0	0	0	5	0	10	1
<i>Egretta alba</i>	0	8	0	0	0	0	0	43	6	0	1	5
<i>Ardea cinerea</i>	0	4	0	0	0	0	2	1	3	0	3	1
<i>Cygnus olor</i>	31	0	0	0	0	0	0	0	22	0	0	5
<i>Anser albifrons</i>	6703	6007	3306	85	187	0	595	14	515	0	170	1598
<i>Anser anser</i>	46	433	74	0	2	4	9	0	56	0	0	57
<i>Anser spp.</i>	0	0	0	0	0	0	0	0	100	0	0	9
<i>Branta ruficollis</i>	0	0	0	5	0	0	0	0	0	0	0	0
<i>Tadorna tadorna</i>	0	3	0	0	0	0	0	0	0	0	0	0
<i>Anas penelope</i>	0	6	0	0	0	0	13	16	13	0	0	4
<i>Anas crecca</i>	32	865	622	1	364	0	589	4450	0	0	0	629
<i>Anas platyrhynchos</i>	5832	17629	5094	162	4680	18	4575	13630	890	0	3308	5074
<i>Anas acuta</i>	282	139	1	0	7	0	59	0	0	0	0	44
<i>Anas clypeata</i>	100	0	0	0	0	0	0	0	0	0	0	9



Tsibar-Somovit	1977	1978	1979	1980	1981	1982	1983	1984	1997	1998	1999	Average
<i>Aythya ferina</i>	0	0	12	0	11	0	32	0	44	0	0	9
<i>Aythya nyroca</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>Aythya fuligula</i>	0	0	0	0	10	0	10	4	0	0	28	5
<i>Bucephala clangula</i>	2	12	0	0	0	0	0	0	5	0	0	2
<i>Mergus albellus</i>	11	37	80	0	3	0	0	0	3	0	25	14
<i>Mergus merganser</i>	0	13	24	0	15	0	0	0	0	0	43	9
<i>Gallinula chloropus</i>	0	0	0	1	0	0	0	0	3	0	2	1
<i>Fulica atra</i>	0	0	0	0	32	0	0	0	4	0	0	3
<i>Vanellus vanellus</i>	0	0	0	0	0	0	0	0	2	0	0	0
<i>Numenius arquata</i>	0	0	5	1	0	0	15	0	0	0	0	2
<i>Tringa ochropus</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>Larus ridibundus</i>	53	596	12	6	23	49	525	120	7	0	32	129
<i>Larus canus</i>	0	61	14	3	43	1	32	0	12	0	2	15
<i>Larus cach/mich</i>	4	0	0	0	0	0	20	1	33	0	1	5
<i>Larus spp.</i>	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
<b>Total number of birds</b>	<b>13109</b>	<b>25820</b>	<b>9291</b>	<b>267</b>	<b>5384</b>	<b>74</b>	<b>6482</b>	<b>18283</b>	<b>1833</b>	<b>0</b>	<b>3941</b>	<b>7680</b>
<b>Total number of species</b>	<b>16</b>	<b>15</b>	<b>15</b>	<b>10</b>	<b>15</b>	<b>5</b>	<b>14</b>	<b>11</b>	<b>22</b>	<b>0</b>	<b>17</b>	<b>13</b>

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. The extent of this impact is rated as low, but still should be reported

### 5.1.6 Hydrological changes

According to the EIA report the overall impact on the geological environment is seen as negative, direct, short-term during the dismantling work.

### 5.1.7 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: BG 0000553 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 Favorable 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
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 ( $^{137}\text{Cs}$ ,  $^{60}\text{Co}$  and  $^{54}\text{Mn}$ ) are only registered in the territory of the plant.

The content of  $^{90}\text{Sr}$  in vegetation in 1998 0.30-2.52 Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were  $4.4 \pm 0.3$  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.  $^{90}\text{Sr}$  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,  $^{90}\text{Sr}$  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  $^{90}\text{Sr}$  in grass plants are in the range 0.18-2.75 Bq/kg a.d.w, with a mean 1.43 Bq/kg a.d.w. The results are comparable to the measured in previous years. Years of study (1994-2007) of  $^{90}\text{Sr}$  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  $4.4 \pm 0.3$  Bq/kg a.d.w. The activity of  $^{137}\text{Cs}$  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  $^{54}\text{Mn}$ ,  $^{60}\text{Co}$  and  $^{134}\text{Cs}$  lower than the corresponding MDA.

The results obtained for the content of  $^{90}\text{Sr}$  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 assessing the degree of impact on the PA are taking into account the findings of EIA report, that in compliance with of technology and control the processes of decontamination and dismantling, decommissioning can be made safe for the environment and the population is expected radioactive aerosol gas emissions are within the permissible air pollution in the vicinity of NPP "Kozloduy" to be lower than that during normal operation.

Emissions of radioactive substances in the air during the process of decommissioning of Units 1 to 4 of NPP "Kozloduy" will be below the legally allowed levels.

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.

In terms of water expected and positive impacts associated with decommissioning associated with the elimination of thermal pollution of the Danube due to cooling water during operation. Thermal discharges will be insignificant, since after the reactor will have thermal emissions from these units in the Danube. Upon completion of decommissioning will be monitored to improve the purity of surface and groundwater in the affected area. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory.

The efficient implementation of the planned activities in decontamination is not expected to impact the soil of NPP "Kozloduy" and adjacent lands. After conducting decontamination potential sources of soil contamination are different waste sludge and water, which are used for processing.

The analysis of the expected sources of impacts on soils associated with the decommissioning of units 1-4 and the period after the completion of decommissioning shows that the planned activities do not constitute a source of contamination of soil off-site. Upon completion of decommissioning is expected to reduce radiological and neradiologichni emissions into the environment (air and water).

During the decommissioning of NPP "Kozloduy" is expected to generate liquid and solid radioactive waste, limits for discharges of liquid waste is accepted much lower than the limits during normal operation of Units 1 to 4 of the Kozloduy "NPP".

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) 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 is taken into account 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 [223]. 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
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 habitat and specimens**

Not expected destruction of parts of the populations of species *Euphorbia lucida* and *Leucojum aestivum*. Not expected destruction of parts of the natural habitats 91EO, 3130, 3270, 91FO, which are located at a distance of over 2 km from the KNPP site.

#### **5.2.1.2 Fragmentation**

Not expected fragmentation as decommissioning 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 and decommissioning 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 in decommissioning activities units 1-4 are not expected chemical changes within the PA.

#### **5.2.1.5 Hydrological changes**

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected hydrological changes within the PA..

#### **5.2.1.6 Geological changes**

According to the EIA report the overall impact on the geological environment of the site is estimated to be negative, direct, short-term during the dismantling work. But due to the remoteness of the PA of the Kozloduy NPP site and subject to good engineering practice in decommissioning activities units 1-4 are not expected negative geological changes within PA.

#### **5.2.1.7 Other changes**

Not expected, as estimated in the EIA cumulative effect (presented in Chapter 2 of this document) [223] 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 decommissioning of the reactors 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**

It is not expected. The specificity of decommissioning does not imply fragmentation, given today's positioning of buildings and lack of intent related to changes in the current situation. There is no direct or indirect connection between the site of decommissioning and those of PA.

#### **5.2.2.3 Disruption of the species composition**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not disturb the wildlife species composition in the territory of PA.

#### **5.2.2.4 Chemical changes**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not expect chemical changes in the territory of PA.

#### **5.2.2.5 Hydrological changes**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not expect hydrological changes in the territory of PA.

#### **5.2.2.6 Geological changes**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not expect geological changes in the territory of PA..

#### **5.2.2.7 Other changes**

In case of emergency situations, potential local contamination may occur, which cannot be assessed and predicted at this stage of development of the Investment Proposal. 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 terrorstic 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**

Thus far have not been conducted specific observations on radiological status of vegetation and habitat PA "Ogosta River" code BG0000614, 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 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 ( $^{137}\text{Cs}$ ,  $^{60}\text{Co}$  and  $^{54}\text{Mn}$ ) are only registered in the territory of the plant.

The content of  $^{90}\text{Sr}$  in vegetation in 1998 0.30-2.52Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were  $4.4 \pm 0.3$  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.  $^{90}\text{Sr}$  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,  $^{90}\text{Sr}$  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  $^{90}\text{Sr}$  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  $^{90}\text{Sr}$  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  $4.4 \pm 0.3$  Bq/kg a.d.w. The activity of  $^{137}\text{Cs}$  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  $^{54}\text{Mn}$ ,  $^{60}\text{Co}$  and  $^{134}\text{Cs}$  lower than the corresponding MDA.

The results obtained for the content of  $^{90}\text{Sr}$  in vegetation in 2009 were in the range of  $<0.32 - 5.18 \text{ Bq / kg VS}$ , with the average of  $1.31 \text{ Bq / kg a.d.w}$

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 assessing the degree of impact on the PA are taking into account the findings of EIA report, that in compliance with of technology and control the processes of decontamination and dismantling, decommissioning can be made safe for the environment and the population is expected radioactive aerosol gas emissions are within the permissible air pollution in the vicinity of NPP "Kozloduy" to be lower than that during normal operation.

Emissions of radioactive substances in the air during the process of decommissioning of Units 1 to 4 of NPP "Kozloduy" will be below the legally allowed levels.

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.

In terms of water expected and positive impacts associated with decommissioning associated with the elimination of thermal pollution of the Danube due to cooling water during operation. Thermal discharges will be insignificant, since after the reactor will have thermal emissions from these units in the Danube. Upon completion of decommissioning will be monitored to improve the purity of surface and groundwater in the affected area. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory.

The efficient implementation of the planned activities in decontamination is not expected to impact the soil of NPP "Kozloduy" and adjacent lands. After conducting decontamination potential sources of soil contamination are different waste sludge and water, which are used for processing.

The analysis of the expected sources of impacts on soils associated with the decommissioning of units 1-4 and the period after the completion of decommissioning shows that the planned activities do not constitute a source of contamination of soil off-site. Upon completion of decommissioning is expected to reduce radiological and neradiologichni emissions into the environment (air and water).

During the decommissioning of NPP "Kozloduy" is expected to generate liquid and solid radioactive waste, limits for discharges of liquid waste is accepted much lower than the limits during normal operation of Units 1 to 4 of the Kozloduy "NPP".

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) 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 is taken into account 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 [223]. 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 5.3.1-1 Impacts on habitats 91E0, 3150, 3260, 3270, 6250, 91Z0**

<i>Parameters Impacts</i>	<b>Total area</b>	<b>Species composition</b>	<b>Invasive species</b>
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.

Based on the estimated impacts planned for conservation in the protected area of natural habitats, the impact of the investment proposal is estimated to be slightly over. The impacts can be avoided without the use of special measures beyond compliance with the best practices in the construction, operation and decommissioning decommissioning of Units 1-4 of NPP "Kozloduy".

The comprehensive analysis of the potential impact of the investment proposal makes it possible to conclude that the implementation of decommissioning will not adversely impact on the vegetation and habitats of PZ " Ogosta River" code BG0000614.

#### **5.3.1.1 Loss of habitat and specimens**

Not expected destruction of parts of the populations of species *Centaurea rumelica* and *Lemna gibba*. Not expected destruction of parts of the natural habitats 91E0, 3150, 3260, 3270, 6250, 91Z0, which are located at a distance of over 2 km from the KNPP site.

#### **5.3.1.2 Fragmentation**

Not expected fragmentation as decommissioning 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 in decommissioning activities units 1-4 are not expected chemical changes within the PA.

#### **5.3.1.5 Hydrological changes**

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected hydrological changes within the PA..

#### **5.3.1.6 Geological changes**

According to the EIA report the overall impact on the geological environment of the site is estimated to be negative, direct, short-term during the dismantling work. But due to the remoteness of the PA of the Kozloduy NPP site and subject to good engineering practice in decommissioning activities units 1-4 are not expected negative geological changes within PA

#### **5.3.1.7 Other changes**

Not expected, as estimated in the EIA cumulative effect (presented in Chapter 2 of this document) [223] 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**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not expect loss of habitats in the territory of PA.

#### **5.3.2.2 Fragmentation**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not expect fragmentation in the territory of PA.

..

#### **5.3.2.3 Disruption of the species composition**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not disturb the wildlife species composition in the territory of PA.



#### **5.3.2.4 Chemical changes**

Chemical changes are possible only in cases of emergency situations but their impact will be local. These impacts can be predicted and a preemptive action plan for emergency situations can be developed.

#### **5.3.2.5 Hydrological changes**

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected hydrological changes within the PA. Thermal discharges into the Danube will be insignificant and declining compared to the period of operation of the units.

#### **5.3.2.6 Geological changes**

According to the EIA report the overall impact on the geological environment of the site is estimated to be negative, direct, short-term during the dismantling work. But due to the remoteness of the PA of the Kozloduy NPP site and subject to good engineering practice in decommissioning activities units 1-4 are not expected negative geological changes within 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 BG0000508 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 ( $^{137}\text{Cs}$ ,  $^{60}\text{Co}$  and  $^{54}\text{Mn}$ ) are only registered in the territory of the plant.

The content of  $^{90}\text{Sr}$  in vegetation in 1998 0.30-2.52Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were  $4.4 \pm 0.3$  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.  $^{90}\text{Sr}$  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,  $^{90}\text{Sr}$  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  $^{90}\text{Sr}$  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  $^{90}\text{Sr}$  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  $4.4 \pm 0.3$  Bq/kg a.d.w. The activity of  $^{137}\text{Cs}$  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  $^{54}\text{Mn}$ ,  $^{60}\text{Co}$  and  $^{134}\text{Cs}$  lower than the corresponding MDA.

The results obtained for the content of  $^{90}\text{Sr}$  in vegetation in 2009 were in the range of  $<0.32 - 5.18 \text{ Bq / kg VS}$ , with the average of  $1.31 \text{ Bq / kg a.d.w}$

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 assessing the degree of impact on the PA are taking into account the findings of EIA report, that in compliance with of technology and control the processes of decontamination and dismantling, decommissioning can be made safe for the environment and the population is expected radioactive aerosol gas emissions are within the permissible air pollution in the vicinity of NPP "Kozloduy" to be lower than that during normal operation.

Emissions of radioactive substances in the air during the process of decommissioning of Units 1 to 4 of NPP "Kozloduy" will be below the legally allowed levels.

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.

In terms of water expected and positive impacts associated with decommissioning associated with the elimination of thermal pollution of the Danube due to cooling water during operation. Thermal discharges will be insignificant, since after the reactor will have thermal emissions from these units in the Danube. Upon completion of decommissioning will be monitored to improve the purity of surface and groundwater in the affected area. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory.

The efficient implementation of the planned activities in decontamination is not expected to impact the soil of NPP "Kozloduy" and adjacent lands. After conducting decontamination potential sources of soil contamination are different waste sludge and water, which are used for processing.

The analysis of the expected sources of impacts on soils associated with the decommissioning of units 1-4 and the period after the completion of decommissioning shows that the planned activities do not constitute a source of contamination of soil off-site. Upon completion of decommissioning is expected to reduce radiological and neradiologichni emissions into the environment (air and water).

During the decommissioning of NPP "Kozloduy" is expected to generate liquid and solid radioactive waste, limits for discharges of liquid waste is accepted much lower than the limits during normal operation of Units 1 to 4 of the Kozloduy "NPP".

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) 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 is taken into account 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 [223]. 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 5.4.1-1 Impacts on habitats 91E0, 1530, 3260, 3270, 6250, 91F0**

<i>Parameters Impacts</i>	<b>Total area</b>	<b>Species composition</b>	<b>Invasive species</b>
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 habitat and specimens**

Not expected destruction of parts of the populations of species *Stachys arenariaeformis* and *Wolffia arrhiza*. Not expected destruction of parts of the natural habitats 91E0, 1530, 3260, 3270, 6250, 91F0, which are located at a distance of over 10 km from the KNPP site.

#### **5.4.1.2 Fragmentation**

Not expected fragmentation as decommissioning 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.

#### **5.4.1.4 Chemical changes**

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected chemical changes within the PA.

#### **5.4.1.5 Hydrological changes**

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected hydrological changes within the PA.

#### **5.4.1.6 Geological changes**

According to the EIA report the overall impact on the geological environment of the site is estimated to be negative, direct, short-term during the dismantling work. But due to the remoteness of the PA of the Kozloduy NPP site and subject to good engineering practice in decommissioning activities units 1-4 are not expected negative geological changes within PA.

#### **5.4.1.7 Other changes**

Not expected, as estimated in the EIA cumulative effect (presented in Chapter 2 of this document) [223] 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 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**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not expect loss of habitats in the territory of PA.

#### **5.4.2.2 Fragmentation**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not expect fragmentation in the territory of PA.



#### **5.4.2.3 Disruption of the species composition**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not disturb the wildlife species composition in the territory of PA.

#### **5.4.2.4 Chemical changes**

Not expected to meet the precautionary measures taken into account possible follow implementation of IP

#### **5.4.2.5 Hydrological changes**

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected hydrological changes within the PA.

#### **5.4.2.6 Geological changes**

According to the EIA report the overall impact on the geological environment of the site is estimated to be negative, direct, short-term during the dismantling work. But due to the remoteness of the PA of the Kozloduy NPP site and subject to good engineering practice in decommissioning activities units 1-4 are not expected negative geological changes within PA

#### **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 ( $^{137}\text{Cs}$ ,  $^{60}\text{Co}$  and  $^{54}\text{Mn}$ ) are only registered in the territory of the plant.

The content of  $^{90}\text{Sr}$  in vegetation in 1998 0.30-2.52Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were  $4.4 \pm 0.3$  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.  $^{90}\text{Sr}$  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,  $^{90}\text{Sr}$  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  $^{90}\text{Sr}$  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  $^{90}\text{Sr}$  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  $4.4 \pm 0.3$  Bq/kg a.d.w. The activity of  $^{137}\text{Cs}$  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  $^{54}\text{Mn}$ ,  $^{60}\text{Co}$  and  $^{134}\text{Cs}$  lower than the corresponding MDA.

The results obtained for the content of  $^{90}\text{Sr}$  in vegetation in 2009 were in the range of  $<0.32 - 5.18 \text{ Bq / kg VS}$ , with the average of  $1.31 \text{ Bq / kg a.d.w}$

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 assessing the degree of impact on the PA are taking into account the findings of EIA report, that in compliance with of technology and control the processes of decontamination and dismantling, decommissioning can be made safe for the environment and the population is expected radioactive aerosol gas emissions are within the permissible air pollution in the vicinity of NPP "Kozloduy" to be lower than that during normal operation.

Emissions of radioactive substances in the air during the process of decommissioning of Units 1 to 4 of NPP "Kozloduy" will be below the legally allowed levels.

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.

In terms of water expected and positive impacts associated with decommissioning associated with the elimination of thermal pollution of the Danube due to cooling water during operation. Thermal discharges will be insignificant, since after the reactor will have thermal emissions from these units in the Danube. Upon completion of decommissioning will be monitored to improve the purity of surface and groundwater in the affected area. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory.

The efficient implementation of the planned activities in decontamination is not expected to impact the soil of NPP "Kozloduy" and adjacent lands. After conducting decontamination potential sources of soil contamination are different waste sludge and water, which are used for processing.

The analysis of the expected sources of impacts on soils associated with the decommissioning of units 1-4 and the period after the completion of decommissioning shows that the planned activities do not constitute a source of contamination of soil off-site. Upon completion of decommissioning is expected to reduce radiological and neradiologichni emissions into the environment (air and water).

During the decommissioning of NPP "Kozloduy" is expected to generate liquid and solid radioactive waste, limits for discharges of liquid waste is accepted much lower than the limits during normal operation of Units 1 to 4 of the Kozloduy "NPP".

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) 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 is taken into account 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 [223]. 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 5.5.1-1 Impacts on habitats 6250 \* Pannonian loess steppe grasslands**

<i>Parameters Impacts</i>	<b>Total area</b>	<b>Species composition</b>	<b>Invasive species</b>
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 11.9km from the KNPP site

#### **5.5.1.2 Fragmentation**

Not expected fragmentation as decommissioning 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 and decommissioning 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 in decommissioning activities units 1-4 are not expected chemical changes within the PA.

#### **5.5.1.5 Hydrological changes**

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected hydrological changes within the PA.

#### **5.5.1.6 Geological changes**

According to the EIA report the overall impact on the geological environment of the site is estimated to be negative, direct, short-term during the dismantling work. But due to the remoteness of the PA of the Kozloduy NPP site and subject to good engineering practice in decommissioning activities units 1-4 are not expected negative geological changes within PA

#### **5.5.1.7 Other changes**

Not expected, as estimated in the EIA cumulative effect (presented in Chapter 2 of this document) [223] 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 11.9km from the KNPP site

#### **5.5.2.2 Fragmentation**

In compliance with the good engineering practice in decommissioning activities units 1-4, do not expect fragmentation in the territory of PA..



#### **5.5.2.3 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..

#### **5.5.2.4 Chemical changes**

Not expected to meet the precautionary measures taken into account possible follow implementation of IP.

#### **5.5.2.5 Hydrological changes**

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected hydrological changes within the PA.

#### **5.5.2.6 Geological changes**

According to the EIA report the overall impact on the geological environment of the site is estimated to be negative, direct, short-term during the dismantling work. But due to the remoteness of the PA of the Kozloduy NPP site and subject to good engineering practice in decommissioning activities units 1-4 are not expected negative geological changes within PA

#### **5.5.2.7 Other changes**

Not expected, as estimated in the EIA cumulative effect (presented in Chapter 2 of this document) [223] 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 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 "Cibar" BG0000119 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 "Cibar" BG0000119.

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 ( $^{137}\text{Cs}$ ,  $^{60}\text{Co}$  and  $^{54}\text{Mn}$ ) are only registered in the territory of the plant.

The content of  $^{90}\text{Sr}$  in vegetation in 1998 0.30-2.52 Bq/kg a.d.w. Prior to commissioning of Kozloduy NPP measured average were  $4.4 \pm 0.3$  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.  $^{90}\text{Sr}$  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,  $^{90}\text{Sr}$  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  $^{90}\text{Sr}$  in grass plants are in the range 0.18-2.75 Bq/kg a.d.w, with a mean 1.43 Bq/kg a.d.w. The results are comparable to the measured in previous years. Years of study (1994-2007) of  $^{90}\text{Sr}$  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  $4.4 \pm 0.3$  Bq/kg a.d.w. The activity of  $^{137}\text{Cs}$  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  $^{54}\text{Mn}$ ,  $^{60}\text{Co}$  and  $^{134}\text{Cs}$  lower than the corresponding MDA.

The results obtained for the content of  $^{90}\text{Sr}$  in vegetation in 2009 were in the range of  $<0.32 - 5.18 \text{ Bq / kg VS}$ , with the average of  $1.31 \text{ Bq / kg a.d.w}$

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 assessing the degree of impact on the PA are taking into account the findings of EIA report, that in compliance with of technology and control the processes of decontamination and dismantling, decommissioning can be made safe for the environment and the population is expected radioactive aerosol gas emissions are within the permissible air pollution in the vicinity of NPP "Kozloduy" to be lower than that during normal operation.

Emissions of radioactive substances in the air during the process of decommissioning of Units 1 to 4 of NPP "Kozloduy" will be below the legally allowed levels.

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.

In terms of water expected and positive impacts associated with decommissioning associated with the elimination of thermal pollution of the Danube due to cooling water during operation. Thermal discharges will be insignificant, since after the reactor will have thermal emissions from these units in the Danube. Upon completion of decommissioning will be monitored to improve the purity of surface and groundwater in the affected area. Environmental Impact of Bulgaria is considered negligible and is not expected to impact cross Romanian territory.

The efficient implementation of the planned activities in decontamination is not expected to impact the soil of NPP "Kozloduy" and adjacent lands. After conducting decontamination potential sources of soil contamination are different waste sludge and water, which are used for processing.

The analysis of the expected sources of impacts on soils associated with the decommissioning of units 1-4 and the period after the completion of decommissioning shows that the planned activities do not constitute a source of contamination of soil off-site. Upon completion of decommissioning is expected to reduce radiological and neradiologichni emissions into the environment (air and water).

During the decommissioning of NPP "Kozloduy" is expected to generate liquid and solid radioactive waste, limits for discharges of liquid waste is accepted much lower than the limits during normal operation of Units 1 to 4 of the Kozloduy "NPP".

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) 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 is taken into account 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 [223]. 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 5.6.1-1 Impacts on habitats 91E0, 1530, 2340, 3130, 3150, 3270, 6250**

<i>Parameters Impacts</i>	<b>Total area</b>	<b>Species composition</b>	<b>Invasive species</b>
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 BG0000199

#### **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 habitats 1530, 2340, 3130, 3150, 3270, 6250 and 91EO which are located at a distance of over 1.9km from the KNPP site

#### ***5.6.1.2 Fragmentation***

Not expected fragmentation as decommissioning 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 and decommissioning and accidents and incidents during the implementation of the investment proposal can be expected very little likely impact on vegetation.

#### ***5.6.1.4 Chemical changes***

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected chemical changes within the PA.

#### ***5.6.1.5 Hydrological changes***

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected hydrological changes within the PA.

#### ***5.6.1.6 Geological changes***

According to the EIA report the overall impact on the geological environment of the site is estimated to be negative, direct, short-term during the dismantling work. But due to the remoteness of the PA of the Kozloduy NPP site and subject to good engineering practice in decommissioning activities units 1-4 are not expected negative geological changes within PA

#### ***5.6.1.7 Other changes***

Not expected, as estimated in the EIA cumulative effect (presented in Chapter 2 of this document) [223] 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***

Not expected destruction of parts of the populations of the species subject to protection in the area and their habitats which are located at a distance of over 19 km from the KNPP site.

#### ***5.6.2.1 Loss of habitats and specimens***

Not expected destruction of parts of the populations of the species subject to protection in the area and their habitats which are located at a distance of over 19 km from the KNPP site.

#### ***5.6.2.2 Fragmentation***

Not expected fragmentation as decommissioning activities will be carried out indoors 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 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 and animal species.



#### ***5.6.2.4 Chemical changes***

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected chemical changes within the PA.

#### ***5.6.2.5 Hydrological changes***

In compliance with the good engineering practice in decommissioning activities units 1-4 are not expected hydrological changes within the PA.

#### ***5.6.2.6 Geological changes***

According to the EIA report the overall impact on the geological environment of the site is estimated to be negative, direct, short-term during the dismantling work. But due to the remoteness of the PA of the Kozloduy NPP site and subject to good engineering practice in decommissioning activities units 1-4 are not expected negative geological changes within PA

#### ***5.6.2.7 Other changes***

Not expected, as estimated in the EIA cumulative effect (presented in Chapter 2 of this document) [223] 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%.

## **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**

With the anticipated negligible impact on the extent of protected areas, it can be avoided without the use of special measures beyond compliance with best practices for construction, operation and decommissioning of nuclear facilities. This applies to protected areas Zlatiata, Kozloduy Island, Ogosta River and Skat River, partly or wholly within the ten kilometer area.

Nevertheless, 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 decommissioning activities of units 1 to 4. For individual protected areas following measures are proposed

### ***6.1 1 Protected Area “Zlatiata”, Code: BG0002009 under the Birds Directive***

- Informing the people working on decommissioning of units 1 to 4 for 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 units 1 to 4 decommissioning,
- 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

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 Directive***

- Informing the people working on decommissioning of units 1 to 4 for 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 units 1 to 4 decommissioning,

- 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).

### ***6.3 Protected Area “Ogosta River”, Code: BG0000614 under the Habitats Directive***

- Informing the people working on decommissioning of units 1 to 4 for 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 units 1 to 4 decommissioning,.

### ***6.4 Protected Area “Skat River”, Code: BG0000508 under the Habitats Directive***

- Informing the people working on decommissioning of units 1 to 4 for 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 units 1 to 4 decommissioning,.

### ***6.5 Protected Area “Kozloduy”, Code: BG0000527 under the Habitats Directive***

- Informing the people working on decommissioning of units 1 to 4 for 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 units 1 to 4 decommissioning
- Conducting annual monitoring of both target vertebrate species, and their habitats.

### ***6.6 Protected Area „Cibar” Code BG0000199 under the Habitats Directive***

- Informing the people working on decommissioning of units 1 to 4 for 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 units 1 to 4 decommissioning,
- Conduct 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 status within the PA) and other species under protection in the zone.



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

Considered alternatives for the decommissioning of Units 1-4 of NPP "Kozloduy" are as follows:

- Alternative 0 (No Dismantling, Without decommissioning);
- Alternative 1 (Deferred Dismantling);
- Alternative 2 (Continuous Dismantling).

Brief description and comparison of the above alternatives is given below and the main advantages and disadvantages of each alternative are outlined. Described below, alternatives are compared with a so-called "zero" alternative. This alternative presents the situation that would arise if the decommissioning of Units 1 to 4 are postponed indefinitely.

### **Alternative 0: No Dismantling – without decommissioning**

The zero Alternative is the status that would arise after KNPP Units 1 to 4 final shutdown and the subsequent consequences if the proposed decommissioning activity does not take place.

The alternatives described below are compared with the so called "Zero" alternative, which considers the possibility and the consequences of no decommissioning of Units 1 to 4, respectively no units dismantling. Therefore this alternative represents the situation arising if Units 1 to 4 decommissioning is postponed indefinitely.

The Alternative 0 does not require availability of decommissioning financing but financing of the maintenance of the units will nevertheless be required. Site release for further use would be postponed for the indefinite future. In addition, the risk of possible leakage of radioactive substances into the environment will be increased (the tanks where the RAW are presently stored are not designed for long-term storage). This is not an advantageous alternative with regard to the costs for maintenance, reconstruction of buildings and equipment and institutional control needed for an indefinite period of time.

In accordance with the national legislation and regulatory requirements, the nuclear power units must be operated in a manner that ensures that their radiation safety will be guaranteed and continuously monitored after the reactor final shutdown. Thus, under Alternative 0 some systems will have to be permanently operated.

All these concerns (increased radiological risks and related costs) compromise the Alternative 0 concept for decommissioning of the nuclear facilities.

### **Alternative 1: Deferred Dismantling**

A basic feature of this Deferred Dismantling Alternative is the Safe Enclosure (SE) of the equipment of the primary circuit for a predetermined time period (35 years) and after that the dismantling works shall start up.

The spent fuel shall be removed from each unit in the frame of the valid operational license.

This alternative is investigated in the last revision of the Decommissioning Design from year 2005 [3] and consists of the following 3 Stages:

Stage 1: 5-year transition period including:

- Post operation;
- Preparation of Safe Enclosure.

Stage 2: Safe Enclosure under surveillance and monitored for 35 years

Stage 3: Deferred dismantling.

These three stages are consecutive, i.e. are performed sequentially. The first two phases of Stage 1 of the post-operational period and the Safe Enclosure Preparation are partly overlapping.

The Safe Enclosure Area according to Alternative 1 - Deferred Dismantling includes the two Reactor Buildings (RB-1 and RB-2), the two auxiliary buildings (AB-1 and AB-2), the two ventilation stacks (VS) and the interconnecting passageways, as shown on fig. 6 (only for Units 1 and 2).

The deferred dismantling shall begin after the long lasting (35 years) Safe Enclosure. When the 35 years period of SE under surveillance expires the facilities shall be dismantled thanks to the decreased radiation because of the isotopes spontaneous decay. Therefore this alternative can be characterized as a decommissioning process with a time lag during which the radioactive equipment shall be under SE mode and shall be monitored for a specific time period and after the expiration of which dismantling shall be performed in order to release the site from regulatory control for unrestricted use.

The key features of this alternative are:

- Decrease of dose levels;
- Development of new techniques for dismantling;
- Accumulation of financial resources;

### **Alternative 2: Continuous Dismantling**

The main feature of this alternative is continuous dismantling of equipment and facilities and uninterrupted waste management as well as Operation of the Safe Enclosure that meets all the requirements of environmental and radiation protection. During SE stage dismantling works of the equipment shall be performed outside the SE Area. The subsequent stage shall cover deferred dismantling inside the Safe Enclosure and the release of the site and the buildings for use for other industrial purposes.

The Continuous Dismantling is a selective combination of two possible options:

- Immediate dismantling for some facilities or equipment;
- Deferred dismantling for other facilities or equipment.

The stages of Safe Enclosure Preparation and Safe Enclosure Operation from the Original Decommissioning Strategy are combined together into the single Stage 1.

Under this alternative the preparatory works shall start earlier and shall be followed by the continuous dismantling. The work load of the equipment involved in the waste treatment shall be more uniform.

Shortening by 2 years the preparatory activities such as removal of combustible and flammable materials, removal of asbestos and other hazardous materials is possible (and can be completed by the end of 2011). Potentially, these activities can be extended by other pre-decommissioning activities.

It is planned that the decommissioning license for Units 1 and 2 should enter into force on 1 January 2012 and the one for Units 3 and 4 - two years later.

In this case the dismantling activities could then commence in 2012 which is four decades earlier than planned according to Alternative 1.

The Continuous Dismantling Alternative shall progress in two stages:



Stage 1: Safe Enclosure of Reactor Buildings and dismantling of equipment outside of the Safe Enclosure Area;

Stage 2: Deferred Dismantling of the equipment within the Safe Enclosure and release of the site and buildings from regulatory control for reuse for other purposes.

The scope of the SE shall be limited to the units' RB, part of the Sanitary Buildings (SB) and the connecting passageways. The Auxiliary Buildings shall remain special statutory facilities for use during the different phases of the decommissioning activities. The scope of the SE for Units 1 to 4 corresponding to this alternative is shown on Figure 7. The end of Stage 1 shall be marked by the completion of the dismantling outside of the Safe Enclosure Area.

The dismantling of the equipment from the Auxiliary Buildings must be implemented at the end of Stage 2 according to the Continuous Dismantling Alternative. The end of the Stage 2 shall be marked by the completion of the dismantling within the Safe Enclosure Area.

An important goal of the dismantling process is to achieve maximum reuse and recycling of the dismantled materials, especially metals. This requires a procurement and installation of appropriate infrastructure for dismantling, fragmentation, sorting, volume reduction, decontamination, and free-release measurements before the beginning of the decommissioning activities.

For the implementation of these stages, the necessary projects are planned. The most important are:

- Size Reduction and Decontamination Workshop;
- Decay Storage Sites for Transitional RAW and Site for Conventional Waste from Decommissioning;
- Facility for Treatment and Conditioning of RAW with High Volume Reduction Factor at KNPP.

During the continuous dismantling, reclaiming of any contaminated soils may be carried out.

Upon commissioning of the National Repository for Disposal of Low and Intermediate Level RAW (NDF), the stream of conditioned radioactive waste will be directed to the National Repository enabling removal of the RAW from the site.

During Stage 2, dismantling of the equipment in the SE Area, i.e. of the primary circuit contaminated equipment shall start. It shall be followed by the dismantling of the reactors and surrounding activated components. At the end of this stage the site and buildings shall be released from regulatory control for further industrial use.

***Most appropriate Alternative in reference of the level of the adverse impact exercised on the considered protected areas***

The Zero Alternative is non applicable for decommissioning of nuclear facilities in view of the high radiological risks and the respective costs.

On the basis of the complex analysis of the proposed project alternatives for decommissioning (Alternative 0 (No Dismantling, without decommissioning); Alternative 1 (Deferred Dismantling) and Alternative 2 (Continuous Dismantling), the following recommendations are made:

In consideration of PA Zlatiata the Alternative 2 is recommended.

In connection with the vegetation and the habitats in the PT and PA Kozloduy Islands, Ogosta River Skat River, Kozloduy and Cibar Alternative 2 is considered as the most

suitable because it allows the minimization of the adverse impacts on these components. In the case of Alternative 0 and the 35 years transitional period of Alternative 1 the risk of possible leaks of radioactive materials, accidents and other sources of adverse impact on the PA vegetation and habitats is increased.

In consideration of the target fauna in the PT and PA Kozloduy Islands, Ogosta River and Skat Rive also Alternative 2 can be recommended as the most efficient and riskless.

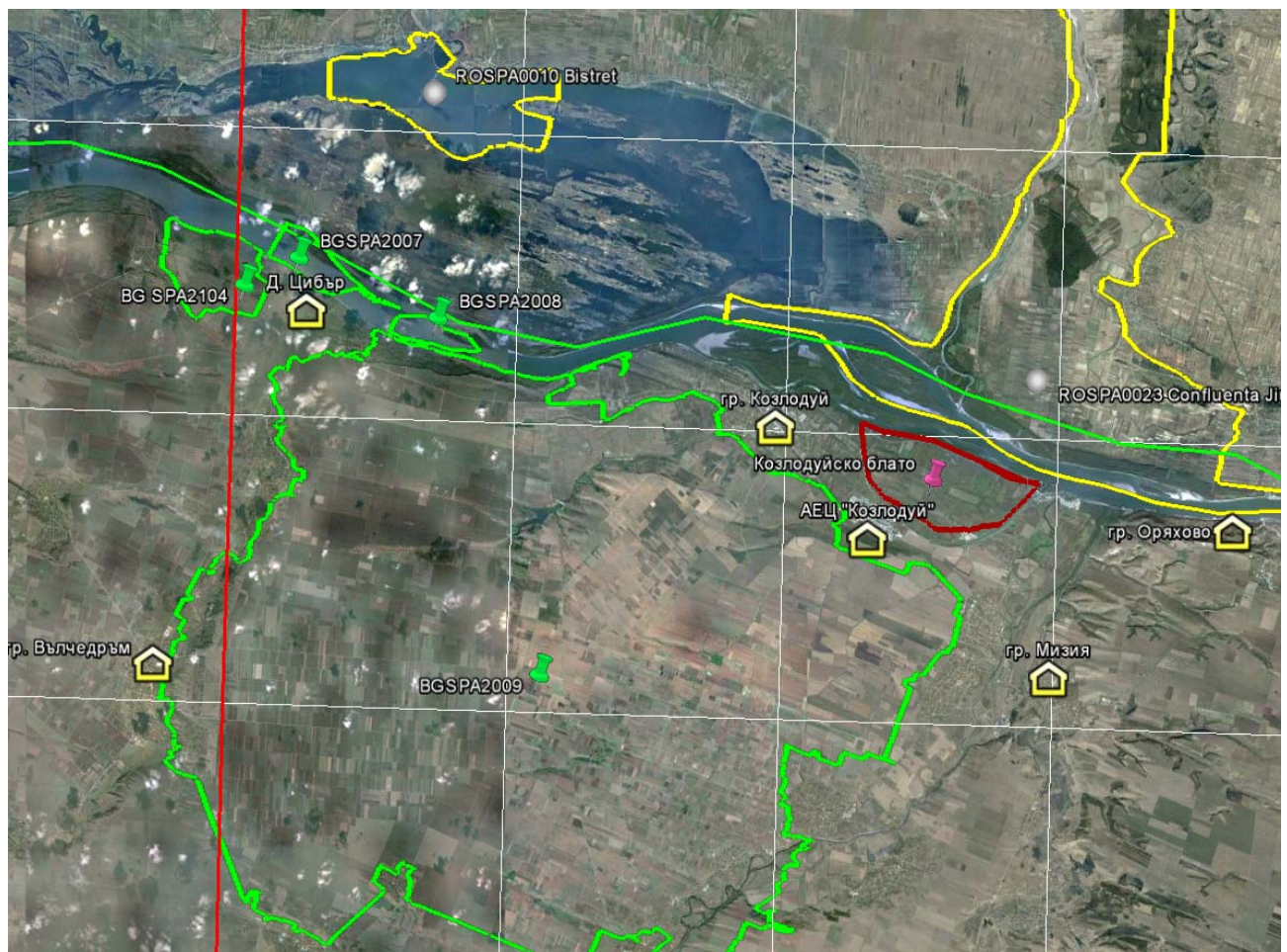
## 8. Maps

The following maps were used for preparing the assessment:

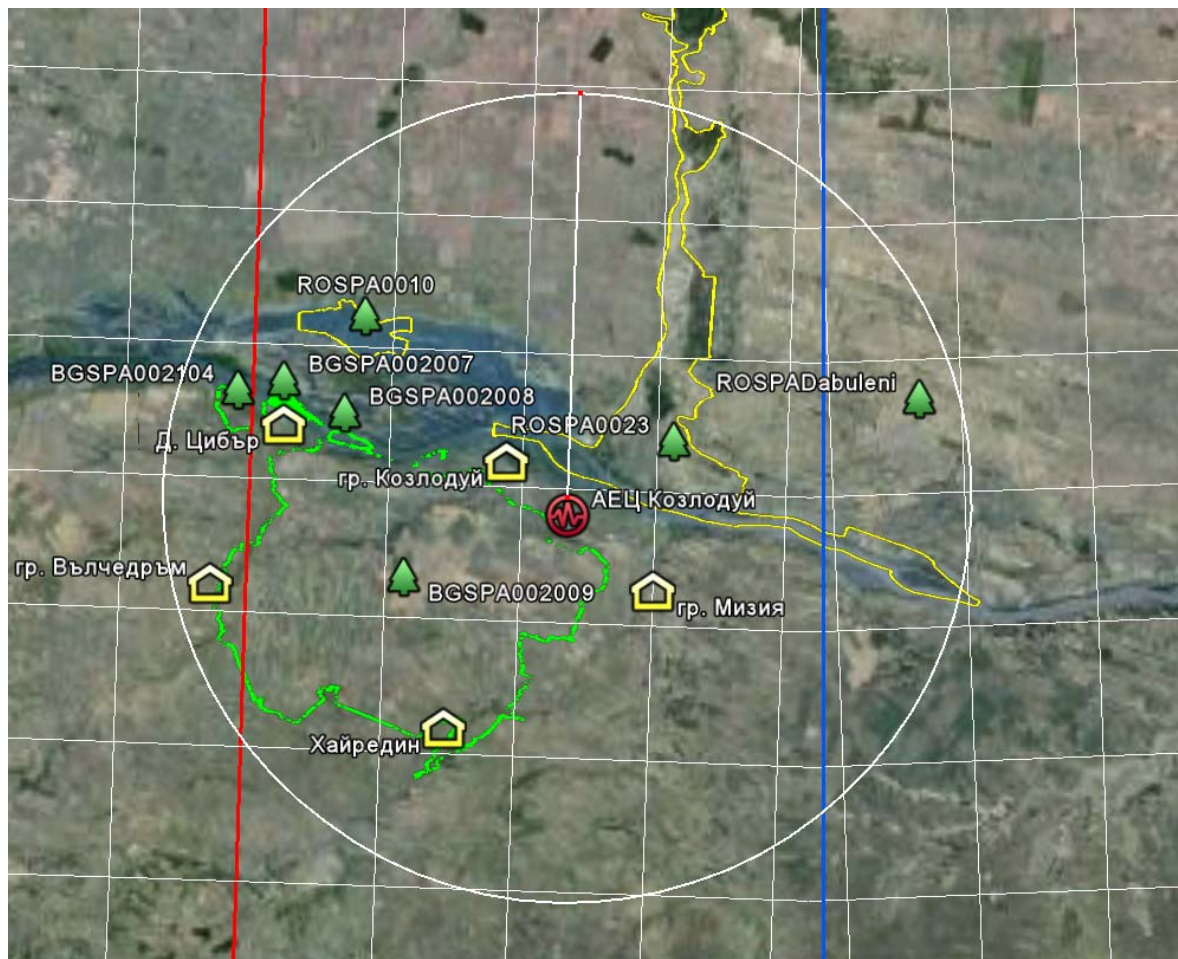


**Figure 8-1 The Kozloduy NPP region with the Natura 2000 protected areas whose boundaries are delineated in white – for the Birds Directive and in yellow – for the Habitats Directive; the 12-km zone is delineated by a white circle**

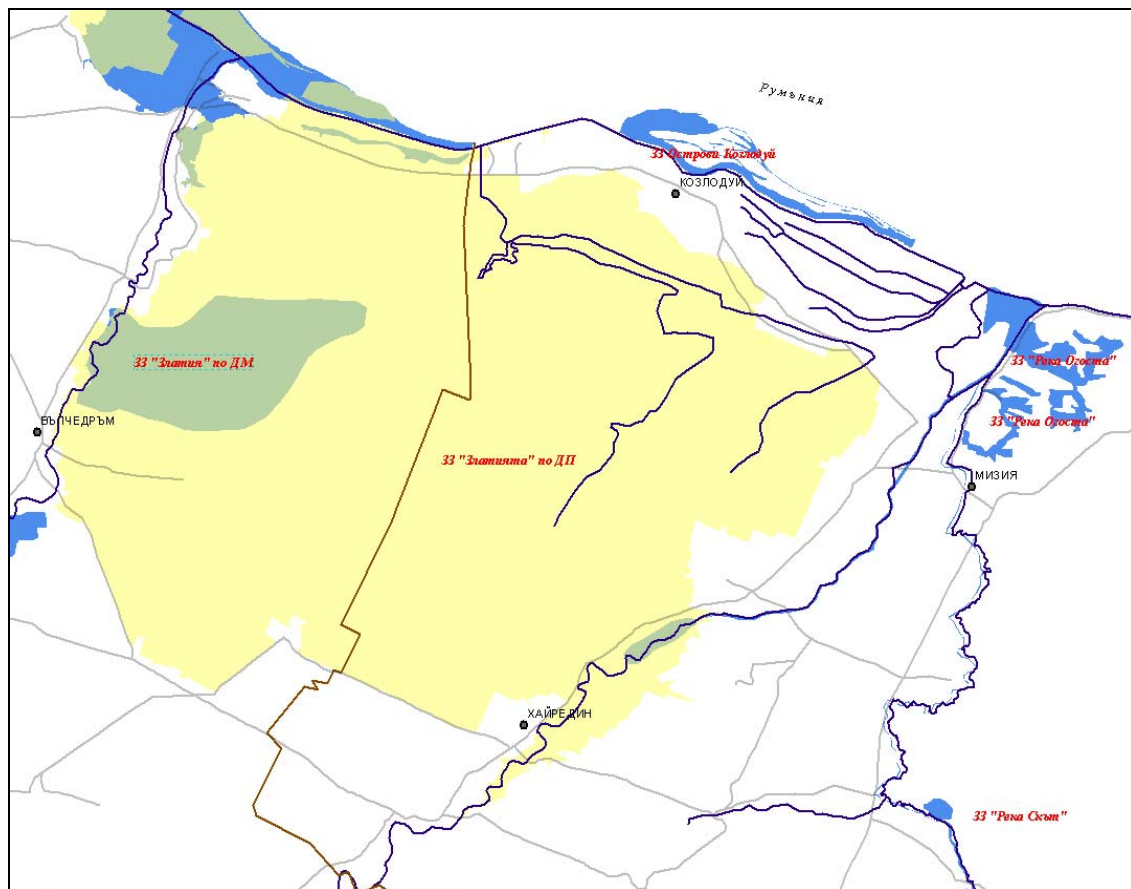




**Fig. 8-2a Location Kozloviyski former marsh (red outline)**

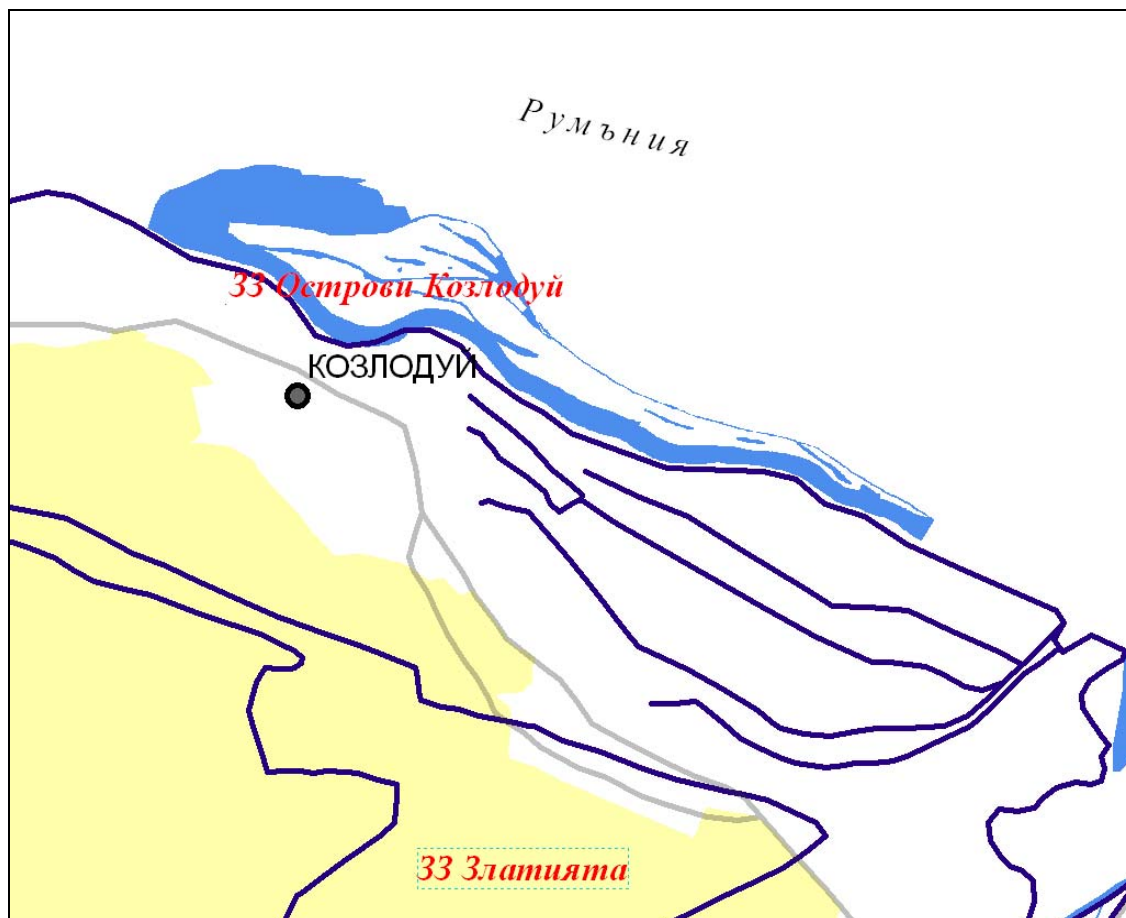


**Fig. 8-2b Ornithological environment around NPP "Kozloduy"**

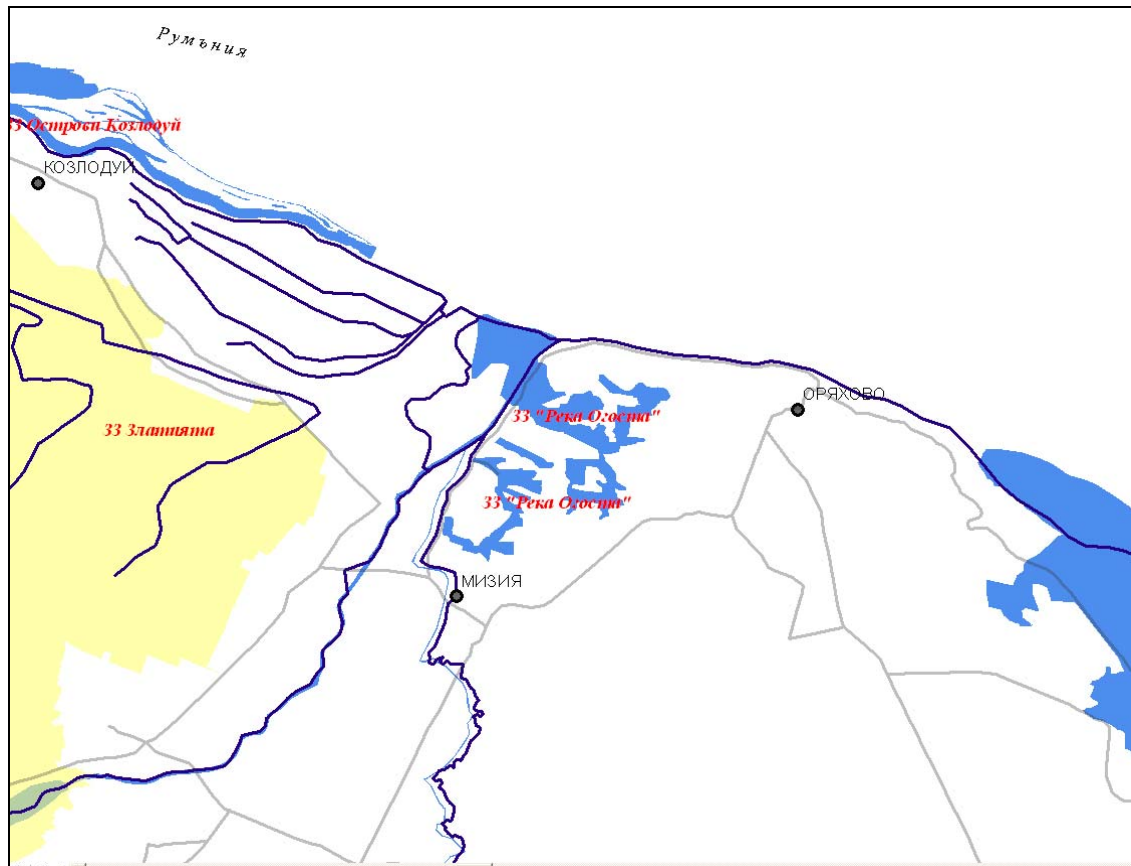


**Figure 8-3 Map of Protected Area “Zlatiata” Code: BG0002009 under the Birds Directive**

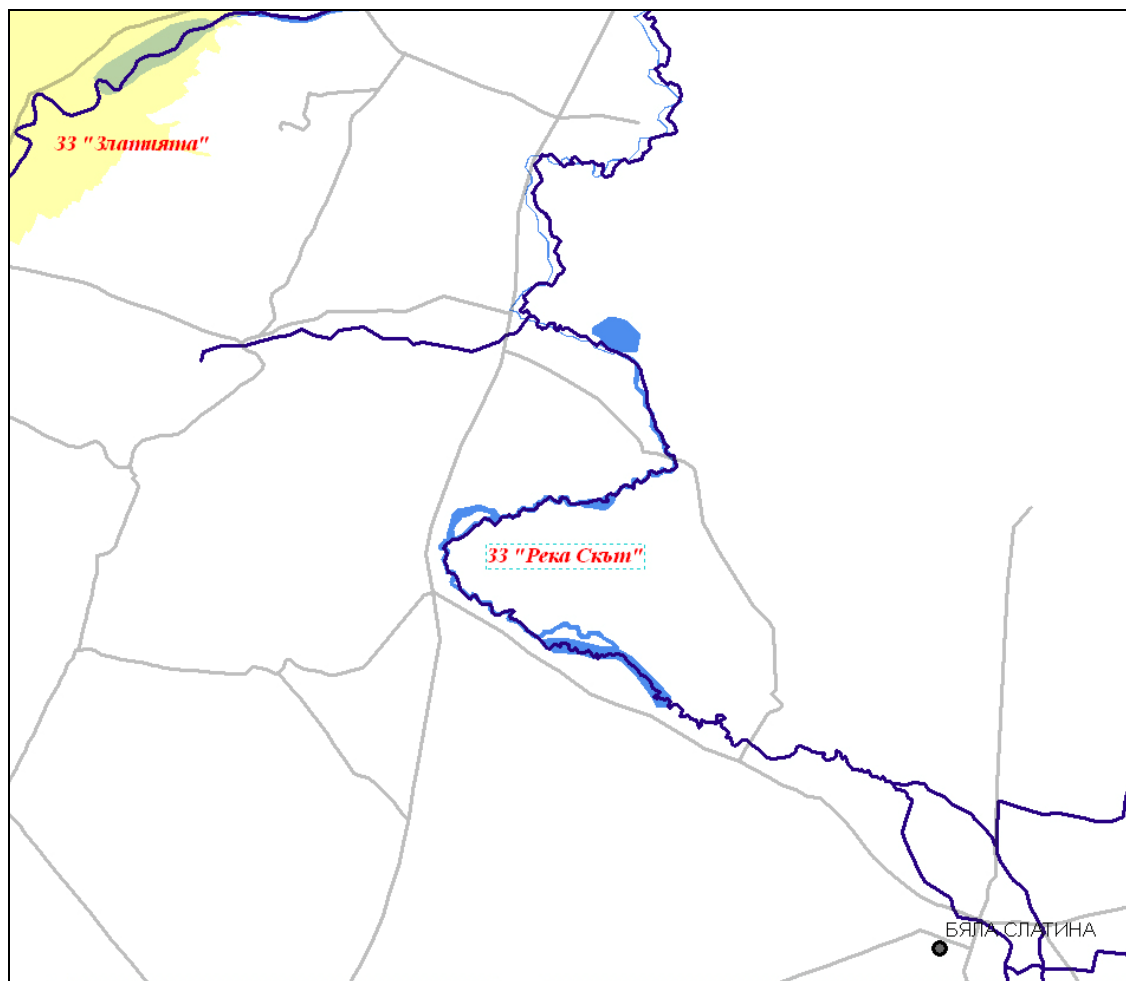




**Figure 8-4 Protected Area „Kozloduy Islands” Code: BG0000533 under the Habitats Directive**



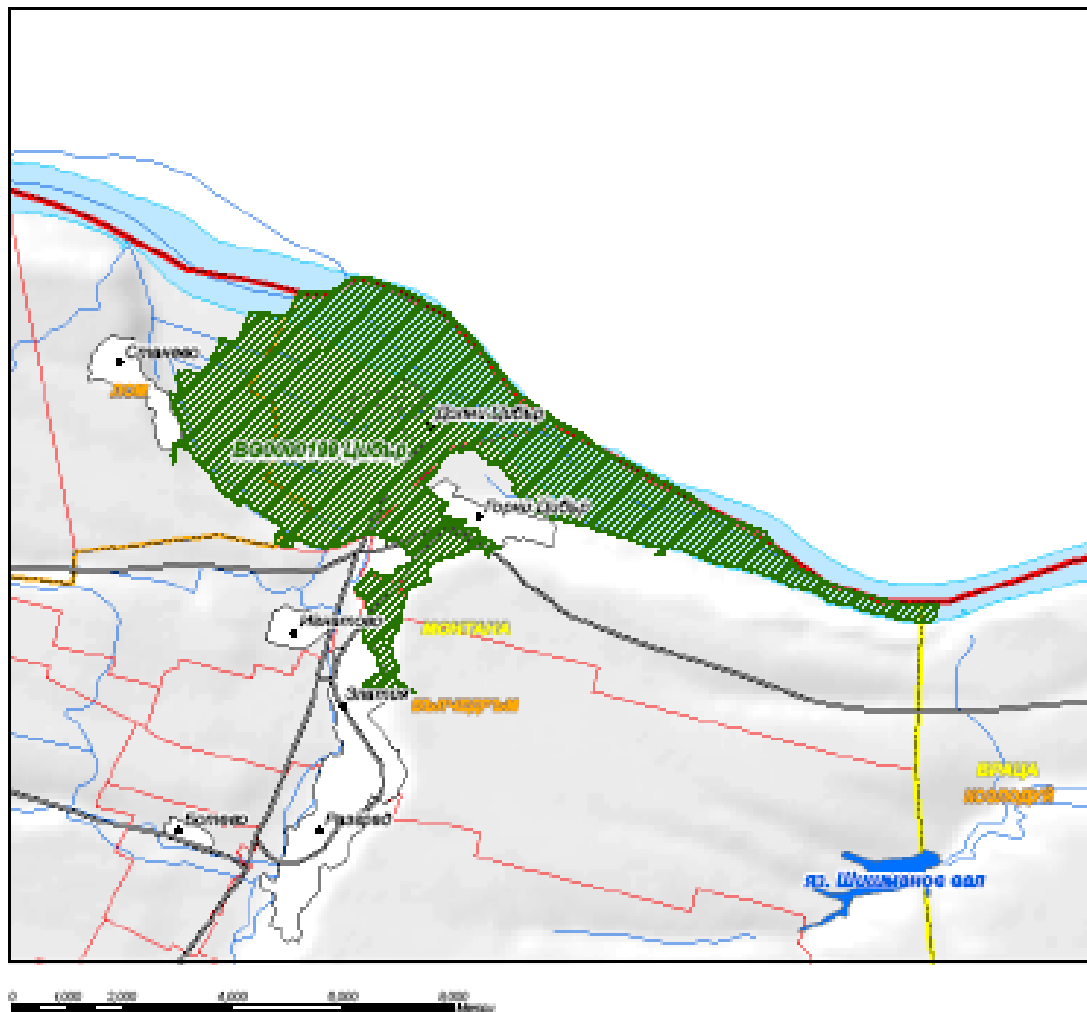
**Figure 8-5 Protected Area „Ogosta River” Code: BG 0000614 under the Habitats Directive**



**Figure 8-6 Protected Area „Skat River” Code: BG0000508 under the Habitats Directive**



## Directive



**Fig. 8-8 Protected Area "Cibar" code BG0000199 under the Habitats**  
**ive**



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

### ***9.1 Individually for protected areas***

#### **9.1.1 Protected Area “Zlatiata”, Code: BG0002009 under the Birds Directive**

Because of the above, a conclusion can be drawn that the described technology recommended measures, the implementation of IP will not have a significant negative impact on the species subject to conservation in the protected zone "Zlatiata" code BG0002009 by Directive birds

#### **9.1.2 Protected Area “Kozloduy Island”, Code: BG0000533 under the Habitats Directive**

In compliance with the good engineering decommissioning of Units 1-4 of NPP "Kozloduy" recommended measures realization of the project will have no significant negative impact on the PA “Kozloduy Island” BG0000533 under the Habitats Directive.

#### **9.1.3 Protected Area “Ogosta River”, Code: BG0000614 under the Habitats Directive**

In compliance with the good engineering decommissioning of Units 1-4 of NPP "Kozloduy" recommended measures realization of the project will have no significant negative impact on the PA “Ogosta River” BG0000614 under the Habitats Directive.

#### **9.1.4 Protected Area “Skat River”, Code: BG0000508 under the Habitats Directive**

In compliance with the good engineering decommissioning of Units 1-4 of NPP "Kozloduy" recommended measures realization of the project will have no significant negative impact on the PA “Skat River” BG0000508 under the Habitats Directive

#### **9.1.5 Protected Area “Kozloduy”, Code: BG0000527 under the Habitats Directive**

In compliance with the good engineering decommissioning of Units 1-4 of NPP "Kozloduy" recommended measures realization of the project will have no significant negative impact on the PA “Kozloduy” BG0000527 under the Habitats Directive

#### **9.1.6 Protected Area “Cibar”, Code: BG0000199 under the Habitats Directive**

In compliance with the good engineering decommissioning of Units 1-4 of NPP "Kozloduy" recommended measures realization of the project will have no significant negative impact on the PA “Cibar” BG0000199 under the Habitats Directive

### ***9.2 General conclusion***

On the basis of all present of the above, a conclusion can be drawn that subject to strict adherence to the adopted technology in the process of implementation

Investment Proposal will not have significant adverse impact on flollow objects from network Natura2000: “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 under the Habitats Directive, Protected Areas “Kozloduy” Code:BG0000527 and Protected Areas “Cibar” Code:BG0000508.

Based on the results of modeling distribution of gaseous emissions liquid discharges into the environment presented in the report "Analysis of radiation exposure to the population of 30km surveillance zone of NPP" Kozloduy "of gaseous liquid radioactive discharges into the environment from the normal operation 5 and 6 units of NPP "Kozloduy", the process of decommissioning 1-4 energoblokove emissions from operation of the facility for plasma melting (PMF) [223] it can be concluded that the cumulative effect of the IP **on issue areas will be.**

**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***

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 include:

- 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. In the absence of a negative impact from the investment proposal, the methodology is not given here.



## ***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 field studies were conducted in the period June-August 2008 and September 2011. 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 (2013), the National Biological Diversity Protection Plan (2000), the Manual on Natura 2000 in Bulgaria (2010), Handbook for 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 – Environmental 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 which 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, which 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 environmental protection status, but also of the species which are important for our fauna and for the region specifically but which do not have the necessary environmental protection status.

Forecasts and impact assessments, including cumulative, are made on the basis of the results of modeling distribution of gaseous emissions liquid discharges into the environment presented in the report "Analysis of radiation exposure to the population of 30km surveillance zone of NPP" Kozloduy "of gaseous liquid radioactive discharges into the environment from the normal operation 5 and 6 units of NPP "Kozloduy", the process of decommissioning 1-4 energoblokove emissions from operation of the facility for plasma melting (PMF) [223] as well as based on many years of practical experience gained in the study of natural habitats, monitoring of wetlands, protected areas of rare, threatened and endangered species in the country. Predicted evaluation is subjective based on the information for the degree of interference in percentages for the respective habitat area of the survey.

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