

**Environmental Impact Assessment Report**  
**for the Decommissioning of Units 1 to 4**  
**at Kozloduy Nuclear Power Plant**

**CHAPTER 6**

**DESCRIPTION OF THE MEASURES  
ENVISAGED TO AVOID, REDUCE OR  
WHERE POSSIBLE, CANCEL THE  
SIGNIFICANT ADVERSE EFFECTS ON  
ENVIRONMENT AND PLANS FOR THE  
IMPLEMENTATION OF THESE MEASURES**

## CONTENTS

6. Description of the measures envisaged to avoid, reduce or where possible, cancel the significant adverse impacts on environment and plans for the implementation of these measures .....	1
6.1 Measures for reductions mitigation or termination of the harmful environmental impacts.....	3
6.1.1 Measures for minimization and mitigation of harmful impacts by radiation exposure of the personnel (ALARA principle).....	3
6.1.2 Measures for minimization and mitigation of the harmful impact by radioactive releases to the atmosphere .....	4
6.1.3 Measures for minimization and mitigation of soils radioactive contamination.....	5
6.1.4 Measures for minimization and mitigation of the harmful impact by radioactive releases into surface and groundwater.....	6
6.1.5 Measures for minimization and mitigation of the harmful physical factors impact.....	7
6.1.6 Measures for minimization and mitigation of the harmful impact related to RAW management .....	7
6.1.7 Measures for minimization and mitigation of the harmful impact by non radioactive emissions to the atmosphere .....	10
6.1.8 Measures for minimization and mitigation of the harmful impact by soil pollution.....	11
6.1.9 Measures for minimization and mitigation of the harmful impact by non radioactive effluents into surface and ground water.....	11
6.1.10 Measures for minimization and mitigation of the harmful impact by conventional waste management.....	12
6.1.11 Measures for minimization and mitigation of the harmful impact to earth interior.....	13
6.1.12 Measures for minimization and mitigation of the harmful impact on the landscape.....	14
6.1.13 Measures for minimization and mitigation of the harmful impact on the natural landmarks .....	14
6.1.14 Measures for minimization and mitigation of the harmful impact on the biodiversity - flora, fauna, protected territories and Protected Areas (Natura 2000).....	15
6.1.15 Measures for minimization and mitigation of the harmful impact on the biodiversity - fauna.....	15
6.1.16 Measures for minimization and mitigation of the harmful impact on the human health .....	15
6.1.17 Measures for minimization and mitigation of the harmful impact on the cultural and historical heritage .....	16
6.1.18 Measures for minimization and mitigation of the negative socio-economic effects.....	16
6.1.19 Measures for minimization of fire risks and fire consequences.....	17

6.1.20 Emergency planning with regard to the modifications related to risk of accidents in decommissioning conditions.....	18
6.2 Recommendations to the Environmental Management.....	19
6.3 Recommendation to the Site Monitoring Plan.....	20
6.4 Recommendation to the Emergency Plan.....	20

## **6. Description of the measures envisaged to avoid, reduce or where possible, cancel the significant adverse impacts on environment and plans for the implementation of these measures**

This chapter presents the proposed basic measures for minimization and mitigation measures of the harmful environmental impacts on the environment and human health as a result of the implementation of the Investment Proposal for Decommissioning of Units 1 to 4 of Kozloduy NPP. They are established to meet the requirements of the Bulgarian and EC regulatory requirements as well as the requirements lying down in the documents of the European Bank for Reconstruction and Development (EBRD).

These measures could be preventing measures when they aim to avoid or introduce modifications in the activities related to the specific project. On this basis mitigation and prevention measures were identified for incorporation in the project aiming to avoid, mitigate or compensate the adverse impact on the environment.

The principle for radiation protection optimization, widely known as ALARA principle (As Low As Reasonably Achievable) is lying down at the basis of the measures for minimization and mitigation of the expected significant harmful impacts on the human health and the environment as a result of the Investment Proposal (IP) implementation.

The ALARA requires that each one who uses nuclear energy, performs activities that cause radiation exposure and/or performs activities for restriction of the natural exposure or of an exposure caused by a radiation emergency, is obliged to comply with such a level of nuclear safety, radiation protection, physical security and emergency preparedness, which is reasonably achievable under balancing of the economical and social perspectives, considering the economical and social aspects.

An essential part of ALARA application is the optimization of the processes causing exposures in a way to achieve a balance between the benefit of the performed working operations, the dose intake and the economical expenses.

The main step of ALARA implementation is the establishment of a suitable administrative structure, able to manage, coordinate and distribute the radiation protection responsibilities.

The procedure of process optimization may include a combination of the following activities:

- Evaluation of the dose intake aiming to define the need of optimization;
- Definition of factors that would reduce the dose intake;
- Qualitative and quantitative analyses of the implementation of the various activities, related to the dose burden reduction factors;
- Definition of the optimal number of options for protection;
- Final definition of radiation protection procedures, techniques and measures.

The ALARA principle is applied under a special program during the decommissioning process. The ALARA Program has got the application of specific measures and guidelines, which upgrade the routine radiation protection instruction. The main issues concerning the implementation of ALARA principle are based on the existing mechanisms at EP-1. The direct control over the implementation of the ALARA principle is done by the ALARA Council. The ALARA Council evaluates and approves the proposed estimated dose budget.

In order to limit the impact on the personnel and the population due to the completion of units decommissioning activities a relevant Concept for radiation protection applicable for the decommissioning is developed. The individual dose control is organized as per [17]. The control is required in order to limit the dose burden within the target objectives. These objectives contribute to the minimization of the stochastic biological effects and to the elimination of the deterministic biological effects. In compliance with the ALARA principle there shall be accepted lower annual administrated limits of the individual effective dose for the decommissioning activities at the units. A significant point is that this control shall consider the whole history of the occupational radiation exposure. At Kozloduy NPP this activity has been regulated through an Individual Dosimetric Control Centre (IDCC) with the relevant resources available to meet the requirements of [17].

The precondition to the successful fulfillment of the decommissioning is the implementation of the planned supporting projects before to start of the decommissioning activities. The assessment of the environmental impacts and the impact on people is made with the presumption of realization of all planned projects. Based on the assessment made in Chapter 4 of this report are proposed additional measures, given in tables below. For this reason in tables are presented planned and proposed measures.

The specific measures for the minimization and mitigation of the considerable harmful impact on the human health and the environment resulting of the implementation of the Investment Proposal (IP) for Decommissioning of Units 1 to 4 of Kozloduy NPP are listed below. At first place are presented the measures related to the radiological impact of the environment and the public health and at second place – those, related to the conventional impact on the environment and the public health.

In **Chapter 11** of the EIA-Report the framework drafts of an Environmental and Social Action Plan (ESAP) (**Attachment 11.6.2**), an Environmental Management Plan (EMP) – A. Mitigation Plan and– B. Monitoring Plan (**Attachment 11.6.1**) are included. The EMP – B. Monitoring Plan is also indicated in section 6.3.

These plans summarize the mitigation activities and actions as required by the EBRD. The “draft plans” are developed as framework plans (skeleton) which have to be completed (implementation of all actual necessary measures) by the investor (KNPP) under the responsibility of the Environmental Manager.

In the sections 6.2 to 6.4 recommendations are given for the implementation of the Environmental Management, an Emergency Plan and a Site Monitoring Plan.

## ***6.1 Measures for reductions mitigation or termination of the harmful environmental impacts***

In this section are presented planned and proposed measures for minimization, and mitigation of the harmful environment impacts.

### **6.1.1 Measures for minimization and mitigation of harmful impacts by radiation exposure of the personnel (ALARA principle)**

No	Description of the measure	Period/Phase	Result
<b>Planned measures</b>			
1.	Elaboration of detailed instructions for each dismantling activity.	Decommissioning preparation	Personnel health protection and health and safety labor conditions
2.	Removal of all components/equipment of Category 3 as large as possible and later treatment after decay storage (KNPP Units 1 to 4 Updated Decommissioning Strategy)	During Decommissioning	Personnel health protection and health and safety labor conditions
3.	Pre-dismantling decontamination of systems and equipment (e.g. Projects 4A and 4B)	Decommissioning preparation	Personnel and population health protection and health and safety labor conditions
<b>Proposed measures</b>			
1.	Implementation of Units dismantling program and establishment of a data base for traceability of each component of the Decommissioning activities	During Decommissioning	Personnel health protection and health and safety labor conditions
2.	Introduction of additional measures for radiation protection optimization during decommissioning (data base on occupational dose related to activities)	During Decommissioning	Personnel health protection and health and safety labor conditions
3.	Implementation of the results from the Quantitative assessment of the materials and the radiological inventory of Units 1-4 KNPP ( <sup>1</sup> Project 11C).	Decommissioning preparation	Personnel health protection and health and safety labor conditions
4.	Respect of the statutory limits and the adopted administrative limits for the occupational and public dose	Decommissioning preparation and during	Personnel health protection and health and safety

<sup>1</sup> Supporting projects of the Decommissioning of Units 1-4 of Kozloduy NPP, financed by KIDSF

No	Description of the measure	Period/Phase	Result
	rate by conducting continuous radiation monitoring. Optimization of the control thresholds for $\gamma$ -radiation equivalent dose rate corresponding to the respective zones at KNPP site and within the restricted (controlled) zone of the Units	Decommissioning	labor conditions

### 6.1.2 Measures for minimization and mitigation of the harmful impact by radioactive releases to the atmosphere

No	Description of the measure	Period/Phase	Result
<b>Planned measures</b>			
1.	Provide the gaseous releases control into environment from SRDW activities, by application of the approved methodologies in the NPP Radiation monitoring program.	Decommissioning preparation and during Decommissioning	Protection of the atmosphere against radiological impact
2.	The activities related to the preliminary waste conditioning by application of modern technological solutions of decontamination and size reduction in closed cabins with separate filtering systems when applicable (planned for the SRDW project).	Decommissioning preparation	Protection of the atmosphere against radiological impact
3.	SRDW to ensure an effective protection against release of radioactive substances into the environment, including emission of radioactive aerosols into the atmosphere, installed upstream the ventilation stack output.	Decommissioning preparation	Air pollution prevention
4.	The SRDW design to be referenced to the following additional radiation limits: <ul style="list-style-type: none"> <li>• Equivalent dose rate at a distance of 1.0m to the external wall of the SRDW up to 1<math>\mu</math>Sv/h;</li> <li>• Equivalent dose rate for the population up to 0.025<math>\mu</math>Sv/h over the natural radiation background.</li> </ul>	Decommissioning preparation and during Decommissioning	Environmental and public health protection

No	Description of the measure	Period/Phase	Result
5.	Design and implementation of a radiation monitoring system based on the type, quantity and level of contamination of the incoming materials in SRDW.	Decommissioning preparation and during Decommissioning	Environmental and public health protection
<b>Proposed measures</b>			
1.	Use of mobile systems for capturing and filtering for all activities related to decommissioning, with potential of aerosols formation.	During Decommissioning	Protection of the atmosphere against radiological impact
2.	Installation of a plant-wide ventilation system for the SRDW (supply and extract) with HEPA filtration having at least 99,97% efficiency for the gas discharges purification from aerosols	During Decommissioning	Protection of the atmosphere against radiological impact
3.	Provide qualitative and quantitative assessment program for the quantification of the respective emitted radioactive substances on the basis of the type, quantity and level of contamination of the materials to be handled in the SRDW (depending also of the fragmentation level, fragmentation and decontamination methods etc)	Decommissioning preparation and during Decommissioning	Protection of the atmosphere against radiological impact
4.	Elaboration of the Site Monitoring Program, derived on the basis of the principle of conservatism during sampling of aerosols with periodic update of the sampling points and, if necessary, inclusion of new ones, consistent with the location of the decommissioning activities like the SRDW.	Decommissioning preparation and during Decommissioning	Protection of the atmosphere against radiological impact

### 6.1.3 Measures for minimization and mitigation of soils radioactive contamination

No	Description of the measure	Period/Phase	Result
<b>Planned measures</b>			
1.	Pre-operational radiation monitoring of soil	Decommissioning preparation	Prevention of soil contamination and environmental protection

No	Description of the measure	Period/Phase	Result
<b>Proposed measures</b>			
1.	Up-date of the sampling points locations for the purposes of soils radiation monitoring, in consideration of the decommissioning activities	Decommissioning preparation	Prevention of soil contamination and environmental protection
2.	To provide the necessary measures for continuous monitoring control and environmental protection within the design of the Project for Organization of Sites for Management of Materials generated by the decommissioning (Decay Storage Sites for Transitional RAW (DSS) and Site for Conventional Site (SCD)	Decommissioning preparation and during Decommissioning	Prevention of soil contamination and environmental protection
3.	Update of the scope of the radiation monitoring of the sludge from drain channels dredging in consideration of the decommissioning activities	Decommissioning preparation	Prevention of soil contamination and environmental protection

#### 6.1.4 Measures for minimization and mitigation of the harmful impact by radioactive releases into surface and groundwater

No	Description of the measure	Period/Phase	Result
<b>Planned measures</b>			
1.	Effective management of the liquid RAW management	Decommissioning preparation and during Decommissioning	Prevention of radiological contamination of surface and underground water
<b>Proposed measures</b>			
1.	Implementation of a continuous monitoring program including regular control measures and appropriate maintenance procedures of the Active Drainage Pipework in order to avoid and prevent potential leakages and radioactive contamination	During Decommissioning	Protection of the surface and groundwater against radiological impact
2.	Elaboration of operational instructions for implementation of process radiation control of the main sources of liquid radioactive discharge related to the dismantling and decontamination of the equipment	Decommissioning preparation and during Decommissioning	Prevention of radiological impact on surface and groundwater

No	Description of the measure	Period/Phase	Result
3.	Elaboration of radiation monitoring program based on the conservative principle of the sampling points selection for the liquid releases with periodic up-date of the sampling points and when applicable incorporation of new ones in reference of the decommissioning activities	Decommissioning preparation and during Decommissioning	Prevention of radiological impact on surface and groundwater

### 6.1.5 Measures for minimization and mitigation of the harmful physical factors impact

The program for safety assessment during the period of decommissioning is necessary for assessment and management in order to reduce the risk of impact and ionizing radiation for the personnel of the plant, the population and the environment from the planned activities. It is prepared in accordance with the Updated strategy for decommissioning of KNPP Units 1-4 [7] and is in accordance with the contemporary standards, criteria and the international experience of decommissioning of nuclear facilities, in reference of some specific characteristics. The Concept for radiation protection, presented in the Decommissioning plan [36], provides opportunity to meet the requirements and rules for radiation protection during execution of all planned activities. Also, monitoring programs, instructions, rules, etc. have been developed in accordance with this concept aimed at reducing the radiation impact, including ionizing impact on the environment.

Provided that the measures in the program for radiation protection are implemented, protection measures during execution of the decommissioning activities are not planned.

Provided that the planned decommissioning activities and technologies are performed and the specified machines, equipment and units are used, which according to the documents are not significant sources of migrating EMF, additional impacts on the environment are not expected. This is also confirmed by the EWN experience [50], and no additional measures are proposed.

Additional measures to mitigate the impacts from noise and vibrations during the implementation of the IP are not planned, provided that the planned measures in the projects are applied.

### 6.1.6 Measures for minimization and mitigation of the harmful impact related to RAW management

A Complex Program for RAW Management at Kozloduy NPP, ID No:DOD.ED.PM.387/03 [162] was established in order to guarantee safe RAW management. The program covers all the activities, related to the removal of the RAW back-log from Units 1- 4, AB-1 and AB-2, including their retrieval from the specialized temporary RAW storage facilities as well as the activities for management of RAW generated by decommissioning.

In order to mitigate the adverse impact for the environment and human health due to RAW generation during the decommissioning of the units, the basic requirements and

main provisions of the developed Complex Program for RAW Management at Kozloduy NPP No:DOD.ED.PM.387/03 [162] shall be observed. Ongoing review of internationally used RAW management techniques and methods is going on and the result and the result shall be applied for the specific case.

No	Description of the measure	Period/Phase	Result
<b>Planned measures</b>			
1.	Construction of Size Reduction and Decontamination Workshop (SRDW) (Project 12) in application of the relevant safety and environmental protection measures	Decommissioning preparation	Environmentally friendly and safe RAW management; human health protection
2.	Design and Implementation of Sites for Management of Materials generated by the Decommissioning (Decay Storage Sites for Transitional RAW (DSS) and Site for Conventional Site (SCD), (Project 19) in application of the relevant safety and environmental protection measures	Decommissioning preparation	Environmentally friendly and safe RAW management; human health protection
3.	Construction of Facility for Treatment and Conditioning of Solid RAW with High Volume Reduction Factor (RWT) (Project 5b) in application of the relevant safety and environmental protection measures	Decommissioning preparation	Environmentally friendly and safe RAW management; human health protection
4.	Supply of Facility for Treatment of Low Level Liquid RAW (Danube system) in application of the relevant safety and environmental protection measures	Decommissioning preparation	Environmentally friendly and safe RAW management; human health protection
5.	Facility for Retrieval and Stabilization of Spent Ion Exchange Resins (RES) (Project 5a) in application of the relevant safety and environmental protection measures	Decommissioning preparation	Environmentally friendly and safe RAW management; human health protection
6.	Facility for Free Release Measurement (FRM) (Project 6a) in application of the relevant safety and environmental protection measures	Decommissioning preparation	Environmentally friendly and safe RAW management; human health protection

No	Description of the measure	Period/Phase	Result
7.	Supply of Equipment for Retrieval and Processing of the Liquid Phase from Evaporator Concentrate Tanks (LPR) in AB-1 (Project 9a) in application of the relevant safety and environmental protection measures	Decommissioning preparation	Environmentally friendly and safe RAW management; human health protection
8.	Supply of Equipment for Retrieval and Processing of the Solidified Phase from Evaporator Concentrate Tanks (SPR) (Project 9b) in application of the relevant safety and environmental protection measures	Decommissioning preparation	Environmentally friendly and safe RAW management; human health protection
9.	Supply of different type of containers for transport and storage of materials resulting from dismantling works (WCP) (Project 11b) in application of the relevant safety and environmental protection measures	Decommissioning preparation	Environmentally friendly and safe RAW management; human health protection
10.	Supply of mobile decontamination and treatment equipment (DTE) (Project 4a) in application of the appropriate safety and environmental protection measures.	Decommissioning preparation	Environmentally friendly and safe RAW management; human health protection
<b>Proposed measures</b>			
1.	Inventory of the quantities and the processes of treatment of the liquid and solid radioactive waste resulting from the dismantling activities as well as monitoring of the sites for temporary storage of the containers with waste and tracking of all these data by using of adapted database system for Complete Waste Tracking similar to this used by the EWN decommissioning project	Decommissioning preparation and during Decommissioning	Environmentally friendly and safe RAW management; Human health protection

### 6.1.7 Measures for minimization and mitigation of the harmful impact by non radioactive emissions to the atmosphere

No	Description of the measure	Period/Phase	Result
<b>Planned measures</b>			
1.	With regard to the intensive traffic on the site territory during the decommissioning to provide control for transport vehicle in good shape.	Decommissioning preparation and during Decommissioning	Air quality protection
<b>Proposed measures</b>			
1.	Use of mobile systems for capturing and filtering for all activities with potential of aerosols formation.	During Decommissioning	Air quality protection against conventional pollution
2.	<p>During transportation and storage of bulk material the following measures have to be applied:</p> <ol style="list-style-type: none"> <li>1. The sand shall be storied by using windproof enclosures or tips; protection covers of the surface; reduction of the bulk tips height; avoiding of these activities at high wind speed</li> <li>2. Construction of closed type storage sites for zoolite.</li> <li>3. Optimization of the handling activities by reduction of the uploading height, etc; automatic modification of the uploading height in reference of the tips height modification;</li> <li>4. The transportation of these materials shall meet the following requirements: use of closed or covered transport vehicles including the internal site transport ; the transport routes to be regularly cleaned up and covered with asphalt layer in reference of the level of pollution</li> </ol>	During Decommissioning	Air quality protection Prevention of fugitive dust emissions dispersion

### 6.1.8 Measures for minimization and mitigation of the harmful impact by soil pollution

No	Description of the measure	Period/Phase	Result
<b>Proposed measures</b>			
1.	Update and realization of the second stage of the Repository for conventional waste	Decommissioning preparation	Soil and environment protection
2.	The existing radiation monitoring network to be used for determination of non radiation characteristics of soils as soils acidity, general heavy metal content during sampling analyses etc.	Decommissioning preparation	Soil and environment protection
3.	Remove from the lands, where new constructions are planned the fertile humus layer and store it separately for conservation according the provisions of Regulation N 26 of 2 October 1996.	Decommissioning preparation	Soil and environment protection
4.	Provide non radiation monitoring of the drain channels sludge dredging.	Decommissioning preparation and during decommissioning	Soil and environment protection

### 6.1.9 Measures for minimization and mitigation of the harmful impact by non radioactive effluents into surface and ground water

No	Description of the measure	Period/Phase	Result
<b>Proposed measures</b>			
1.	With regard to the intensive traffic on the site territory during the decommissioning to provide control for the use of transport vehicle in good shape.	Decommissioning preparation and during Decommissioning	Protection of surface and groundwater quality
2.	Water supply pipelines and sewerage fittings shall be maintained in good operating condition in order to prevent leakages and losses.	During Decommissioning	Water resources management
3.	With regard to the sensitivity of this region to pollution by nutrients continuous control of EP-1 sewage waters shall be followed for nutrient pollution. In case of systematic pollution a module for sewage water biological treatment incorporating denitrification stage shall be implemented.	During Decommissioning	Protection of surface and groundwater quality
4.	Continuous control aiming organized and permits compliant waste water discharge in the existing and newly built (e.g. Size reduction and decontamination workshop) KNPP sewage system.	During preparation for Decommissioning and during the Decommissioning	Protection of surface and groundwater from contamination

No	Description of the measure	Period/Phase	Result
		process	
5.	Measures to prevent (isolate) potential interaction of the sewage system with the ground water.	During preparation for Decommissioning	Protection of surface and groundwater from contamination

#### 6.1.10 Measures for minimization and mitigation of the harmful impact by conventional waste management

The best way according to EWN experience is the elaboration of a manual for conventional waste management (see [50]) with detailed instructions for all waste management activities. This instruction must be elaborated under consideration of the relevant requirements of the BREF. Another important stipulation in the manual for conventional waste management must be the control/auditing of waste treatment facilities which receive waste from KNPP before contract signature.

No	Description of the measure	Period/Phase	Result
<b>Planned measures</b>			
1.	Supply of complex weight platform for transport vehicle station (Project 6e)	During Decommissioning	Environmental protection
<b>Proposed measures</b>			
1.	The management of the construction waste generated by the decommissioning of units 1 to 4 shall be in compliance with the requirements of the Regulation on construction waste management and use of recycled construction waste (promulgated SG89/13.11.2012)	Decommissioning preparation and during Stages 1 and 2 of the Decommissioning	Environmentally friendly waste management
2.	Organize segregate collection and transportation of the demolition wastes and avoid their mixture by establishing Operating and Execution Procedures	Decommissioning preparation and during Stages 1 and 2 of the Decommissioning	Environmentally friendly waste management
3.	The Problem with the discarded chemicals should be solved stage by stage	Decommissioning preparation and during Stages 1 and 2 of the Decommissioning	Environmentally friendly waste management

No	Description of the measure	Period/Phase	Result
4.	The waste generated by the site activities to be handed over based on written contracts to operators holders of the respective authorization under art.35 of the Waste Management Act (WMA)	Decommissioning preparation and during Stages 1 and 2 of the Decommissioning Post-decommissioning stage (closure and land reclamation)	Environmentally friendly waste management
5.	Establish and maintain a data base on waste generation sources, quantities, pathway and the companies, to which it was handed over for further treatment, facilitating the waste inventory management in compliance with the WMA provisions.	Decommissioning preparation and during Stages 1 and 2 of the Decommissioning	Environmentally friendly waste management
6.	The handing over and reception of the operational, construction and harmful waste to be performed on the base of written contract with operators holding a permit or registration document under art.35 for the respective activity with the respective code of the waste storage site, according the regulation under art 3 of waste classification and in compliance with art.8 of the WMA.	Decommissioning preparation and during Stages 1 and 2 of the Decommissioning	Environmentally friendly waste management
7.	It is recommended to be required the Supplier to submit safety data sheets in compliance with the Act on the Protection from the Negative Effect of the Chemical Substances and Mixtures (or the European Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation)	Decommissioning preparation and during Stages 1 and 2 of the Decommissioning	Environmentally friendly waste management

#### 6.1.11 Measures for minimization and mitigation of the harmful impact to earth interior

No	Description of the measure	Period/phase	Result
<b>Planned measures</b>			
1.	Observation of the established instructions, procedures, methods and programs for the implementation of technological	Decommissioning preparation	Protection of the geological environment and the associated

No	Description of the measure	Period/phase	Result
	radiation control of the main sources of liquid releases and radioactive contamination, related to the dismantling and decontamination of the facilities.		groundwater bodies from radiological impacts.
2.	When construction works are performed, the sites should be approved by a geological engineer	During Decommissioning	Prevention of the occurrence of local technogenic engineering geological processes
3.	Monitoring of the geological environment in terms of its stability should be performed.	During Decommissioning	Prevention of technogenic engineering geological processes and phenomena
4.	Control of the protection of the surface and ground waters from chemical pollution as a preventive measure for preservation of the geological environment.	Permanently	Protection of the geological environment

#### **6.1.12 Measures for minimization and mitigation of the harmful impact on the landscape**

Harmful effects on the landscape are not expected due to the fact that the decommissioning activities in all stages and the implementation of the supporting projects (such as: Size Reduction and Decontamination Workshop, Decay Storage Site for Transitional RAW and Site for Conventional Waste from Decommissioning) will take place within Kozloduy NPP site.

#### **6.1.13 Measures for minimization and mitigation of the harmful impact on the natural landmarks**

Due to the expected weak impact on the natural landmarks located outside the KNPP site, special measures for mitigating the harmful impacts on them are not planned, except for compliance with the best practices during Decommissioning preparation, Decommissioning process and during closure and land reclamation of KNPP Units 1-4. In order to avoid a cumulative effect from the decommissioning activities for KNPP Units 1-4, the operation of KNPP Units 5-6 and the National RAW Disposal Facility (NDF), the main objective during operation of all specified objects is keeping the levels of all releases in compliance with the permitted ones in the license and application of specific technical solutions ensuring the safety of the environment.

#### 6.1.14 Measures for minimization and mitigation of the harmful impact on the biodiversity - flora, fauna, protected territories and Protected Areas (Natura 2000)

No	Description of the measure	Period/Phase	Result
<b>Proposed measures</b>			
1.	During the construction activities on building, equipment and commissioning of the Sites for management of the material from decommissioning of units 1-4, the associated transport to avoid additional impact on the flora in the adjacent territories.	Decommissioning preparation	Biodiversity protection
2.	It is recommended to use plant samples for the current radiation monitoring for determination of some conventional parameters such as heavy metals content in plants in the 3-km area.	During Decommissioning	Biodiversity protection

#### 6.1.15 Measures for minimization and mitigation of the harmful impact on the biodiversity - fauna

No	Description of the measure	Period/Phase	Result
<b>Proposed measures</b>			
1.	Monitoring of fauna species present onsite including the ex-marsh land of Kozloduy, whose habitats would be potentially disturbed (or destroyed) by construction works is recommended. A plan must be developed to relocate habitats elsewhere	During Decommissioning	Biodiversity protection
2.	It is recommendable to investigate if there is impact on the physiological, behaviour and reproduction status of the animal species, subject of conservation in the protected areas Zlatiata SPA and Kozloduy Islands SAC (SCI) as well as the risks of likely impact related to their proximity to the KNPP sites .	During Decommissioning and in Post decommissioning phase	Biodiversity protection

#### 6.1.16 Measures for minimization and mitigation of the harmful impact on the human health

The impact on the occupational health from the processes and activities of KNPP Units 1-4 decommissioning will consist in exposure to general dust and noise for the construction workers. During the installation and assembly works some working groups will be exposed to general and local vibrations, metal aerosols, infrared and ultraviolet radiation (welding). There are effective devices for collective and personal

protection against the exposure of these conventional factors and their use will minimize the unfavorable health effect, which will be local and short term impact.

Concerning the impact on the occupational health due to ionizing radiation, all activities planned to be implemented will be conformed to the health and safety protection of the working staff and the population. The decommissioning activities shall be preliminarily planned and this shall includes elaboration of dismantling activities time-schedule, taking into account that for each decommissioning activity or group of activities in reference of its complexity a separate working package/procedure, containing detailed activity description is provided. It is opportune to mention also the high level of safety culture in Kozloduy NPP and systematic application of the ALARA principle, minimizing the specific risk of occupational radiation exposure.

Concerning the health risk for the population in consequence of the KNPP Units 1 to 4 decommissioning it should be stated that the public health impact is almost zero, taking into account that the hazardous/radioactive materials, as well as the construction works, source of adverse impact, will not cross the fence of the NPP site, thus in this case no measures for mitigation of the impact on the public health in relation with the project implementation are needed.

#### **6.1.17 Measures for minimization and mitigation of the harmful impact on the cultural and historical heritage**

Harmful effects on the sites of cultural and historical heritage are not expected due to the fact that the decommissioning activities in all stages and the implementation of the supporting projects (such as: Size Reduction and Decontamination Workshop, Sites for management of the material from decommissioning of Units 1-4, e.g. Decay Storage Site for Transitional RAW and Site for Conventional Waste from Decommissioning) will take place within Kozloduy NPP site, where no cultural relics or archaeological findings were identified.

#### **6.1.18 Measures for minimization and mitigation of the negative socio-economic effects**

No	Description of the measure	Period/Phase	Result
<b>Planned measures</b>			
1.	Periodical update of the Program for the management of the social consequences from decommissioning of Units 1-4 of Kozloduy NPP, approved in 2006 by the KNPP [157]	Decommissioning preparation and during Decommissioning	Reduction of the negative socio-economical impact
2.	Based on the Agreement between KNPP and State Enterprises RAW (SE RAW) a part of EP-1 personnel to be relocated (reemployed) by State Enterprises RAW	Decommissioning preparation and during Decommissioning	Reduction of the negative socio-economical impact

No	Description of the measure	Period/Phase	Result
<b>Proposed measures</b>			
1.	SE RAW Management to provide funding for application of measures aiming to preserve the highly qualified personnel, employed so far in the operation of the four shutdown Units	Decommissioning preparation and during Decommissioning	Reduction of the negative socio-economical impact
2.	To provide conditions and mechanisms for vocational retraining of former operational personnel of the shutdown Units aiming their integration in the decommissioning process	Decommissioning preparation and during Decommissioning	Reduction of the negative socio-economical impact
3.	Suggestion to organize meetings-interviews with each one of the staff of the shutdown Units in order to clarify the options, preferences and opportunities for redirection, vocational retraining, additional training to acquire new knowledge and skills or preferences for early retirement	Decommissioning preparation and during Decommissioning	Reduction of the negative socio-economical impact
4.	The Management of SE RAW in cooperation with the Administration of the affected municipalities should seek opportunities to develop joint projects for development of production and serving the SERAW activities through which to provide employment and income to part of the population of the region and to consider the opportune policy to offer job with priority to people from the affected municipalities.	Decommissioning preparation	Reduction of the negative socio-economical impact

#### 6.1.19 Measures for minimization of fire risks and fire consequences

No	Description of the measure	Period/Phase	Result
<b>Planned measures</b>			
1.	In order to mitigate the adverse impact and risk of fire for the environment and the population during the decommissioning of the Units, the requirements of the respective decommissioning procedures shall be observed, aiming to avoid occurrence of fire and to	Decommissioning preparation and during Decommissioning	Human health protection and environmental protection

No	Description of the measure	Period/Phase	Result
	observe the fire protection rules.		
<b>Proposed measures</b>			
1.	In the framework of the elaboration of Decommissioning Safety Analysis Report to assess the fire risk and to propose appropriate measures for fire occurrence prevention and limitation of fire consequences	Decommissioning preparation and during Decommissioning	Human health protection and environmental protection

#### 6.1.20 Emergency planning with regard to the modifications related to risk of accidents in decommissioning conditions

No	Description of the measure	Period/Phase	Result
<b>Planned measures</b>			
1.	Strictly observe the requirements and instructions stated in the approved Updated Emergency Plan of KNPP [132], including activities during decommissioning of Units 1-4	Decommissioning preparation (design of the planned facilities) and during Decommissioning	Human health protection and environmental protection
2.	The internal emergency plans of the Units to be maintained in full compliance with the up-dated Emergency Plan of KNPP and to be strictly applied for all accident scenarios including the limiting events regarding the occupational, public and environmental risks	During Decommissioning	Human health protection and environmental protection

## ***6.2 Recommendations to the Environmental Management***

To guarantee the application of a systematic approach to managing the environmental and social issues and impacts associated with the Proponent's activity, different plans and programs are established including an **Environmental Management Plan (EMP)**.

Effective management systems, appropriate to the size and nature of the business activity of KNPP and SERAW, allow companies to better manage risks, take advantage of opportunities, enhance their social and environmental performance and reputation and goodwill and often lead to improved financial performance. A successful and efficient environmentally and socially responsible management system is a dynamic, continuous process, initiated and supported by management, and involves meaningful communication between SERAW and KNPP, its workers, and the local communities affected by the project.

This implies the application of a systematic approach, integrated planning, implementation, review and response to the specific results on structural basis in order to achieve continuous improvement of the project implementation.

This plan shall outline the responsibilities of KNPP and SERAW within the process of appraisal activities such as risk assessment, auditing, or management of the environmental and social problems arising from project implementation.

The project stakeholder's engagement shall be a separate part of this process.

The plan shall include at minimum the following goals:

- To identify and assess environmental and social impacts and issues, both adverse and beneficial, associated with the project.
- To adopt measures to avoid, or where avoidance is not possible, minimize, mitigate, or offset/compensate the adverse impacts on workers, affected communities, and the environment.
- To identify and, where feasible, adopt opportunities to improve environmental and social performance.
- To promote improved environmental and social performance through a dynamic process of performance monitoring and evaluation.
- To identify people or communities that are or could be affected by the project, as well as other interested parties.
- To ensure that such stakeholders are appropriately engaged on environmental and social issues that could potentially affect them through a process of information disclosure and meaningful consultation.
- To maintain a constructive relationship with stakeholders on an ongoing basis through meaningful engagement during project implementation.

Environmental and social issues and impacts will also be analyzed for the relevant stages of the project cycle. The appraisal will also consider potential transboundary and global issues, such as impacts from effluents and emissions, increased use or contamination of international waterways – Danube river, greenhouse gas emissions, and impacts on endangered species and habitats.

Proposal of framework of Environmental and Social Action Plan (ESAP) was elaborated and include as attachment 11.6.2.

### ***6.3 Recommendation to the Site Monitoring Plan***

To be able to check that the residual impacts identified are the only ones the already available KNPP and SERAW Monitoring Plan should be used. This would ensure that no unexpected impacts arise and that the proposed mitigation measures are working adequately. If unexpected impacts do arise, this would give an opportunity to take remedial action.

In order to control the effectiveness of mitigation measures in avoiding or reducing impacts, it will be necessary to define the measuring points and the frequency and methodology used for such measurements; and also the values that are to be expected, in order to be able to detect differences between the actual situation and that predicted.

It is recommended that the establishment of a Radiation Monitoring Plan shall be based on the conservative principle in the sampling approach for aerosols or effluents emission with opportunity to periodic up-date of the sampling points location and when applicable the inclusion of new ones in reference of the decommissioning activities location.

A framework monitoring plan (Environmental Management Plan (EMP) Part B Monitoring Plan, includes some advises how and what has to be implemented to supervise all proposed mitigation measures, as can be seen in ***Attachment 11.6.1-B***.

### ***6.4 Recommendation to the Emergency Plan***

KNPP Plc has its own Emergency Plan. In connection with the implementation of this IP the Plan shall be updated integrating also the new decommissioning activities and processes because their performance in case of accidents could require commensurable emergency action during the decommissioning phase of the Units 1 to 4.

The Emergency Plan provides information on emergency preparedness, demonstrating in a reasonable manner that, in the event of an accident, all actions necessary for the protection of the public, workers and the environment will be taken.

Emergency planning arrangements – procedures and instructions, commensurate with the hazards, shall be established and maintained in case of accidents during decommissioning. Safety important incidents shall be timely reported.