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**Joint Assistance to Support Projects in
European Regions**

Sectoral EIA Guidelines

**Flood Prevention &
Protection Works**

ROMANIA





Name of Guideline:

Sectoral EIA Guidelines for Flood Prevention & Protection Works



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Preface

This Guidance document is primarily aimed at the EIA practitioners in the Romanian environmental authorities and at consultants. It is also envisaged to be of interest for the other authorities that must be consulted with in accordance with legal provisions, for Non-Governmental Organizations as well as the public and should facilitate their enhanced participation in the EIA process. The contained recommendations will be of practical benefit to those involved in the EIA process for flood protection and prevention projects.

Note: This Guidance document does not attempt to reproduce the work of the statutory EIA Guidance documents that already exist in Romania and so should be read in conjunction with them.



1 BACKGROUND

1.1 INTRODUCTION

The overall objective of this Guidance document is to improve the content of the environmental reports carried out for projects in the water sector (especially flood prevention and/or protection projects and associated dams & reservoirs) prepared for EU funding and in this respect to ensure that those responsible for carrying out the assessment and preparing the EIA Report are fully aware of the key issues for the sector and address these issues adequately

The Guidance document has been prepared by sharing the experience of the specialists in floods control sector, environmental authorities and consultants.

1.2 LEGISLATIVE CONTEXT

This Guidance document is prepared for the following type of projects as comprised in Annex I and Annex II of the EIA Directive:

- *Dams and other installations designed for the holding back or permanent storage of water, where a new or additional amount of water held back or stored exceeds 10 million cubic meters: Annex I 15*
- *Dams and other installations designed to hold water or to store it on a long-term basis (projects not included in Annex I (projects not included in Annex I): Annex II 10 (g)*
- *Flood-relief works – as suggested in the document “Interpretation of definitions of certain project categories of annex I and II of the EIA Directive”, prepared by the Environment Directorate-General of the European Commission, projects which may be included in Annex II 10(f)*

This Guidance document is applicable also for rehabilitation or extension of the above mentioned projects which may be included in Annex II, 13 of EIA Directive.

1.3 MAIN PRINCIPLES

The governing principles in preparation of this Guidance document can be found in its specific purposes:

- to support the relevant environmental authorities when preparing the guideline regarding the information to be included in the report, so-called scoping report (in Romanian so-called “indrumar”);
- to support the final beneficiaries/project developers to draft the terms of reference for the external support (EIA Consultants in Romanian so-called “evaluatori de mediu”).

This guidance document comprises concise but tailored standardized recommendations regarding the content of the environment reports and should be read in conjunction with National Romanian Guidelines and methodology for EIA.

The overall purpose of this guideline document is to ensure that those responsible for actually carrying out the assessment and preparing the Report are fully aware of key issues for flood protection & prevention sector as well as water storage & retention and that all specific issues are addressed adequately. Furthermore, after compilation and the formal submission of the report, the guidance document should also be used by the relevant environmental authorities to review the quality of the information, in particular to ensure that none of the key issues have been overlooked.



The structure of the Guidance document follows, to a large extent, the requirements provided in Annex IV of the EIA Directive with respect to the information referred to in article 5 (1), i.e. the information which the developer has to supply to the competent authority or authorities for projects subjected to an environmental impact assessment.

This guideline is not exhaustive. Thus, some issues common to all type of projects may not be mentioned or addressed.

The guidelines addresses all type of projects mentioned in section 1.2 in a unique document commenting on those issues which are specific to one or another type.



2 DESCRIPTION OF PROJECT

The purpose of this section is to highlight the main issues to be addressed for each of the sub-sections below when describing a project prepared for a flood protection and/or prevention projects and for the modernization and/or extension of these type of projects.

- **Sub-Section 2.1:** a description of the physical characteristics of the whole project and the land-use requirements during the construction and operational phases,
- **Sub-Section 2.2:** a description of the main characteristics of the production processes (flood prevention and flood protection works as works for river bank consolidation, embankments against flood, dams, polders etc.), for example, nature and quantity of the materials used, and an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the proposed project.
- **Sub-Section 2.3:** an outline of the main alternatives studied by the developer and an indication of the main reasons for this choice, taking into account the environmental effects.

Note: *The first two sub-sections will cover only the selected alternative.*

2.1 PHYSICAL CHARACTERISTICS OF THE PROJECT & LAND USE REQUIREMENTS

The main project characteristics result from the flood risk assessment made for river catchments basin:

- Identification of the significant flood causes
- The frequency and extend of flood events
- Actual and potential adverse consequences for human health, the environment, cultural heritage and economic activity associated with a flood event
- Analysis of efficiency of existing flood defense structures
- Structural and non structural measures for flood protection
- Prioritization of the measures

Reference must be made to the Plans, Programmes or Strategic Environmental Assessment (SEA) especially to the Flood Risk Management Strategy and River Basin Management Plan, that preceded the project and any scoping or pre-application consultations which have been taken place, the bodies consulted and the principal concerns arising, the consultation with the relevant authorities and/or affected public.

Also, will be provided information related to stakeholders and documents concerning consultation process (any received comments or concerns within the overall mitigation plan).

2.1.1 Description of Site Layout

- A general description of project location: local and regional context
- Description of river catchments basin
- Flood risk map for project area and river catchments basin (flood plain, flood zone etc.)
- Land use in project location
- Description of localities; administrative borders of localities



- Locations of the works envisaged by the project; the distance to other significant features on and offsite: human settlements, roads, historical and cultural objectives, protected areas etc. A map at an appropriate scale should be used;
- Locations of the work sites related with the works envisaged by the project; if the locations have not been established yet, the EIA Report will contain proposals for the work sites. The proposals will be done considering the size and the type of works envisaged by the project
- Land use in proposed area of the works envisaged by the project; size of works area required for the main components of the project
- Land use in proposed area of the work sites; the extend of work sites
- Vicinities of the works and work sites locations: land use (agricultural, residential, commercial, recreation, industrial areas, tourist areas, institutions; distances of project location(s) to these areas
- Design limitations imposed by site characteristics (including adjacent land use)

Detailed map containing the above mentioned aspects must be provided.

A set of engineering maps should be provided to illustrate scheme layout with the overall land take clearly shown. It is suggested that these maps should be at a scale of 1:5000. Each Flood Protection Scheme should have a corresponding Engineering map in the EIA.

The location map will contain, in addition of the works proposed by the project, the existing hydrotechnical works in the area, main localities, roads, railways, water courses, landfills, water and wastewater facilities etc.; the recommended scales are between 1:10.000 and 1:2.000

2.1.2 Description of Design including Size or Scale

For each project component (dam, polder, dyke etc.) the following information will be provided in the EIA Report:

- The layout of the development on the site
- Surface water body on which the work is associated
- Localities, agricultural land or other land use that will be protected by the works proposed
- Land and constructed environment protected by the works
- The principal activities proposed: describe how the project components will act to prevent flooding;
- The principal processes proposed; description of how the project components will act for flood prevention and/or flood protection
- Associated or secondary developments: access roads, new land use, forestation, fisheries etc.
- Technical characteristics of each facility/ object/ works; for example:
 - Dams, polders: materials used for construction, height above foundation; crest length; thickness at crest; thickness at base; crest elevation; total storage capacity; full supply level; canals/overflow for water discharge to reservoir/polder active storage; reservoir area at full supply level; extreme water level; minimum supply level; probable maximum flood and return period; outlet/overflow; elevation of outlet/overflow; diameter of outlets; maximum discharge; annual run-off at the dam; longitudinal profile and cross sections, etc.
 - Dykes: protected river; materials used for construction; length and mentions related the sector of the surface water body where it is designed; distance to river bank; dike slope; crest; berm slope; maximum water level; longitudinal profile and cross sections
 - River bank protection works: length and mentions related the sector of the surface water body (where it is designed; type of work (e.g. gabions, riprap, masonry); longitudinal profile and cross sections; levels and flows on river sections: works location (river sector), sections upstream and downstream the works
- For each type of activity and works proposed the following aspects will be presented:



- Construction techniques/ method(s), as adopted, including the nature of construction works (excavation, backfilling) and scale of machinery to be used;
- Land surface occupied permanently and temporarily on land use categories (forest, agricultural, industrial, commercial, residential, recreational, protected areas).
- Method of disposal of excess material; quantities of materials to be moved from the site
- Decommissioning and demolition works (e.g. existing flood protection damaged works): overview of structures and facilities to be decommissioned/demolished
- Land area covered by each of the permanent project components and land area temporarily required for construction
- Land use overview before and after project implementation

Drawings, plans containing project design features must be provided.

2.1.3 Description of Existing Development

- Existing flood prevention and flood protection structures in project area
- Main deficiencies identified on site inspection as the result of the latest flooding events or ageing; evaluation of the status flood prevention and flood protection structures in project area and emergency cases identified
- Urban areas and villages and major infrastructures exposed to flood risk

A map containing the above mentioned main characteristic features of existing urban and rural areas, infrastructure utilities and existing flood prevention and flood protection structures must be provided.

For works as dams, dykes drawings the recommended scales are between 1: 10.000 and 1:2.000 while the drawings for cross and longitudinal sections, the recommended scales are between 1:500 and 1:100

- Ongoing projects (e.g. urban development, water supply, wastewater collection system, road construction, gas works, etc)
 - Brief project/s description
 - Commissioning date of ongoing project/s

2.2 THE EXISTENCE OF THE PROJECT – MAIN PROCESSES

2.2.1 Description of Construction

- Investigations preliminary to the construction phase (e.g. soil tests, geotechnical tests, drillings)
- Works involved by site preparation will refer to any of the following, as applicable:
 - Clearing the existent land of vegetation; in the case, there are vegetation areas included in any designated or proposed Natura 2000 sites, this will be mentioned separately; loss of certain native species or genetic diversity, if any, should also be mentioned
 - Topsoil removal, excavation works, transport and disposal of surplus excavated material;
 - If any decommissioning or demolition activities are needed for project implementation: decommissioning/demolition methods, main equipment, installations, civil structures, works/civil structures proposed for decommissioning/demolition
 - Closing or deviation of existing transport routes or infrastructure; if temporary, the involved period of time should be mentioned
 - Infrastructure diversions (temporary and permanent)
 - Drawing of or water transfer from groundwater or surface waters
 - Temporary water course deviation
 - Land improvement works
 - Access roads



- The anticipatable characteristics of the works in terms of workforce and work sites for all project components
- Accommodation facilities for the work sites: water supply (domestic and technological if any) , discharge of wastewater and installations for treatment and/ or removal of liquid effluents, where appropriate, electric supply)
- Parking, equipment maintenance and storage facilities for building materials
- Sequence of activities, taking into account the type of works in project area and different type of construction activities
- The approximate duration of the construction period; if staged, the order of each stage and its approximate duration
- Equipment, and construction procedures to be used for construction the main works proposed by the project
- Materials used on construction stage of the project (including those that may be hazardous for the health of the population or the environment): type, quantity, storage and handling locations and conditions
- For excavations/ backfilling works: estimated volume will be indicated
- Mineral natural resources used for construction: sand, clay, gravel, riprap, water etc. – quantities, source of supply, number of transports, handling methods
- Quantities of excavated, dredging materials, temporary storage, further use.

2.2.2 Description of main Residues and Emissions from Construction

Actual residues and emissions (including their estimated volumes/quantities) expected to be generated due to the development of the project with respect to: works, actions, equipment, materials, climatic/seasonal meteorological conditions, construction methods and mitigation measures envisaged to be taken or applied. The residues and emissions will be identified and quantified so that the EIA Report will not contain only mentions of the residues and emissions in general terms.

- Wastes - The following types of waste can be generated during construction: material resulted from excavation/ dredging not being used for backfilling, humus layer, contaminated soils or other materials, domestic waste, hazardous waste, waste resulted from construction or demolition, equipment resulting from dismantling/decommissioning, etc. For all the types of wastes resulted on this stage detailed information should be provided.
 - An inventory of the types and quantities of waste to be produced
 - An assessment of any opportunities for reducing solid waste generation, in particular of hazardous and toxic (persistent and non-reusable) types of wastes;
 - For each type of waste, the most appropriate waste management approach will be identified. This would generally include details on (temporary) storage, transport and final destination of the waste. With regards to the latter, the most appropriate way would be reuse, followed by recycling/recovery and finally disposal and/or incineration
- Noise and vibration
- Wastewater resulted from technological water use (e.g. concrete production)
- Air pollutants and dust

2.2.3 Description of Commissioning

In providing a description of the commissioning of a project (where relevant), aspects as phasing, testing and commissioning and establishment of mitigation measures will be presented.



2.2.4 Description of Operation of the Project

With regards lifetime of the works for flood protection and prevention, it is very important to ensure their integrity so as to proper operating during flooding events. In this case, the current operating activities involve maintenance and inspection and monitoring activities.

- Operational range of water levels and associate controls
- The description of the operation will be detailed for each type of works envisaged by the project, considering the specific activities related to:
 - On site inspection and control activities
 - Maintenance & management: clearing of vegetation, reparations of the works (or part of them) in the case of damage etc.
- Materials used (including those that may be risky or toxic for the health of the population or the environment): type, quantity, storage and handling locations and conditions (e.g. fuel for equipment and vehicles, construction materials, herbicides)
- Brief description of the main activities envisaged for the period after a flood event:
 - on site inspections and control
 - reparations if any damages are identified
 - clearance of the sites (wastes and materials transported on flood event)

2.2.5 Description of main Residues and Emissions from Operations

Generally the residues and emissions from operation are similar with those resulted in the construction stage. Additional type of wastes that can occur on this stage will be identified (e.g. wastes with vegetal components, wastes collected from surface water body) and recommendations for the most appropriate waste management will be done (see previous section Description of main Residues and Emissions from Construction)

2.2.6 Description of Changes to the Project

Additional works & future extensions (especially downstream)

2.2.7 Description of offsite developments

Provision of infrastructure and services for major developments can often require development of a scale (and impact) commensurate with the main development. Examples include the following:

- Intensification of, or new, land uses in flood protected areas
- Intensification of agriculture activities through irrigation
- Riverside amenity and leisure activities
- Bridges, footbridges
- Riverside access
- Rehousing of displaced residences
- Infrastructure extension (e.g. roads, electric supply)

2.3 MAIN ALTERNATIVES STUDIED

The presentation and consideration of the various alternatives investigated by the applicant is an important requirement of the EIA process.

Annex IV paragraph (2) of the EIA Directive specifically asks that the information supplied by the developer according to the Article 5(1) of that Directive (i.e. the EIA Report) should comprise “an outline



of the main alternatives studied by the developer and an indication of the main reasons for this choice, taking into account the environmental effects.”

Thus, an outline of the main alternatives examined throughout the design and consultation process needs to be described. This serves to indicate the main reasons for choosing, for example, a particular polder location, taking into consideration the environmental effects. For the purposes of these guidelines therefore, alternatives may be described at three levels:

- Alternative location, routing of piping etc
- Alternative designs
- Alternative processes

However, as part of the EIA process, it is recommended that an assessment, as required under Article 6 of the Habitats Directive 92/43/EEC, is carried out when analyzing main alternatives as required by the EIA Directive.

2.3.1 Description of alternative locations (including summary of assessment as required by Article 6 of the Habitats Directive – 92/43/EEC)

Flood protection projects are generally located along the river's course, in certain clearly defined points. The locations of the works proposed by the Project are the results of the conclusions of the detailed studies carried out for the river catchments basin:

- hydrological modelling
- flood history, hydrological and geographical conditions
- layout of urban and build-up area, material asset, exposed to flooding
- existing flood protection structures

These studies are carried out at the strategic level (flood protection strategies), local planning (flood control plan), river catchments basin planning.

Screening of the main conclusions of the above mentioned studies left very few alternatives for the project components locations.

A map containing the alternative locations must be provided.

Projects which these guidelines address projects impact upon protected areas as outlined in Articles 3 and 4 of the Habitats Directive – Natura 2000 sites. For this reason it is recommended that when describing alternative locations in the EIA report that such alternatives include all findings and recommendations provided under the assessment required by Article 6 of the Habitats Directive.

In choosing the final location, a range of criteria may impact upon the final decision including physical constraints as well as engineering and economic criteria. Each must be clearly highlighted.

However, it is also clear from the above that any assessment carried out as a requirement under Article 6 of the Habitats Directive may also provide a number of constraints when determining the most suitable location, criteria that may not necessarily arise as part of an assessment of potential physical, engineering and economic constraints.

Thus, when presenting the findings of the alternative location assessment, it is recommended that the results of the assessment as required under Article 5 (1) of the EIA Directive i.e. *an outline of the main alternatives studied by the developer and an indication of the main reasons for this choice* (including physical, environmental, and financial constraints) are presented in conjunction with the conclusions of the assessment that is required under article 6 of the Habitats Directive, the details of this assessment which is outlined in Box 1 below. The reasoning and rationale of the conclusions both from the analysis



under Article 5 (1) of the EIA Directive and those conclusions as a result of the assessment as required under Article 6 of the Habitats Directive should be presented in a clear concise and above all, an integrated fashion.

Box 1 Addressing the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC

In order to assist Member States in interpreting the requirements of Article 6 of the Habitats Directive and to provide guidance in carrying out the assessment required by Article 6 of the Habitats Directive, the document entitled **“Assessment of plans and projects significantly affecting Natura 2000 Sites – Methodological guidance on the provisions of Article 6 (3) and (4) of the Habitats Directive 92/43/EEC”** has been published by the European Commission (DG Environment). The document proposes the assessment as a four stage process:

1. **Stage One: Screening** — the process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;
2. **Stage Two: Appropriate assessment** — the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site’s structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;
3. **Stage Three: Assessment of alternative solutions** — the process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site;
4. **Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain** — an assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed (it is important to note that this guidance does not deal with the assessment of imperative reasons of overriding public interest).

Each stage determines whether a further stage in the process is required. If, for example, the conclusions of stage 1 are that there will be no significant impacts on Natura sites, there is no requirement to proceed further.

However, if, based on the screening decision, appropriate assessment is required (stage 2), the results of the appropriate assessment results may illustrate the necessity to carry out the Assessment of alternative solutions (stage three). In this stage, the alternative solutions are tested against their implication for the Natura 2000 site and, as stated in the Methodological guidance, “the conservation objectives and status of the Natura 2000 site will outweigh any consideration of costs, delays or other aspects of an alternative solution” i.e. “other assessment criteria, such as economic criteria, cannot be seen as overruling ecological criteria”.

2.3.2 Description of Alternative Design and Alternative Processes

Design alternatives for flood protection works should take into account the following aspects:

- Vulnerability to floods of urban areas, agriculture, utility infrastructure (roads, railways, water supply etc)
- Hydrological and hydraulic data : water flows and water levels on predicted flood events
- Geotechnical characteristics of the soil in works locations
- Type of works for preventing flooding effects
- Availability of needed materials for construction (e.g. natural resources as clayey soils, gravel etc.)
- Availability of land on works locations

It is important to note that at early design stage the environmental aspects should be considered. Depending on baseline conditions, for the specific locations, the design solutions should consider the integration of the flood protection and prevention works into the natural and constructed environment, minimizing the adverse impacts, for example:



- a dyke and the use of natural floodplain versus construction of a dam
- a polder for temporary water retention areas in the floodplain versus construction of a dike
- non structural solutions for erosion limitation/mitigation: revegetating cleared areas, contouring and terracing, tree planting (shrubs, trees) along watercourses, river levees
- forested land adjacent to streams, rivers, wetlands
- gabions and mattresses for watercourse and river banks regulation and restoration activities
- reduction of impermeable areas (e.g. urban area) by using of natural and permeable materials or artificial porous materials

2.3.3 Alternative selection

A summary of the analysis used to compare the different options/ alternatives technically identified in order to select the best one should be presented in a dedicated sub-section. It should provide the reviewers with the main elements necessary to follow the selection process. Reference should be made to the detailed analysis (performed within the process of carrying out the Feasibility study) as comprised in a separate document (attached to the EIA Report or otherwise made available to any interested party).

Generally, several technical options – considering the locations and design - are compared taking into account the achievement of flood limitation targets, social, financial and economic assessments (both, for the investments and for the operation costs). In presenting the information, a matrix may be used to demonstrate how each alternative performed against each selection criteria. While this may be a simplification of the selection process, it provides a useful aid to the reader of the EIA in understanding how the chosen location & design was arrived at and the range of environmental factors considered.

The study of alternatives must include also “*Do nothing*” option considering the project area further vulnerable on flooding and the loss compensations needed after any flood event.



3 DESCRIPTION OF EXISTING ENVIRONMENT

This section should highlight key issues as regards carrying out baseline assessment (description of the aspects of the environment likely to be significantly affected by the proposed project, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.)

3.1 CONTEXT

- The baseline conditions will be presented considering the integration and possible interactions of the works proposed by the project in defined and structured environment.
- Both the natural and the constructed & inhabited receiving environment should be addressed.

3.2 CHARACTER

When describing the physical environmental components: of great importance is selection and presentation of data relevant for each project component, not only those general for the project area.

An adequate evaluation and prediction of potential environmental effects of the proposed development presume the detailed consideration of the baseline conditions. The data considered should provide a sound basis for assessment, and in a further stage, for monitoring.

The focus should be on the analysis of significance and sensitivity of the site in relation with the impact assessment not on the pure description. Some recommendations in this respect are given below:

Water & Groundwater

- Quantitative description of historic hydrological problems in project area, including flooding, flash floods, and inadequate drainage; location of these phenomena occurrence on the project area and on river catchments basin and indication of their seasonally and their causes, both natural and atrophic
- Maximum flows recorded at the stations on the river basin catchment during the event; the major recent one, that affected the whole river basin
- Surface water (rivers, streams, dry washes that may became regular creeks during the rainy and snow melting seasons, lakes, canals) in project area and neighborhoods: distances to project location/s
- Tributaries and confluences of the water body with other surface water bodies
- Simultaneity of floods on the various tributaries of the river hydrographic basin
- Predictions of overflow events (frequency and volume) current overflow events (frequency and volume)
- River's basin morphology; river's basin catchments map
- Geomorphology of concerned rivers
- Identification of the pipes (existing or proposed within the project) crossing the works location
- Data on water quality of surface water body: physical and chemical parameters, nutrients, pH etc.
- Data on surface water bodies related to flows (minimum, average, maximum)
- Levels on surface water bodies: the extent and maximum levels of any recorded flooding
- Provisions of River Basin Management Plans correlated with the provisions of River Basin Flood Strategy



- The map for river catchments basin will contain the marking of flood protection works and the protected areas, as well as the flooding limits for the considered assurance (scale 1:10.000, 1:5.000 and 1: 2.000)
- River banks stability in project area and downstream
- Water use of the surface water body in project area and downstream :source of drinking water, as source of industrial water supply, irrigation, fishing, recreation
- Discharge points of water polluters or potential polluters: industrial, non-treated water, farming etc
- Dilution capacity of receiving water body
- Drainage in project area; includes the location and capacity, canals, drains and rivers; identification of areas prone to flash foods
- The nature and location of the aquifers in the project area; water movement direction on groundwater
- Data on groundwater quality; aquifer vulnerability
- Seasonal changes in water table levels
- The main sources leading to the apparition of some critical areas in the aspect of polluting groundwaters

Soils and geology

- Topography, geomorphology
- Pedological features of project area: texture (topsoil and subsoil), chemical composition (fertility, reaction (pH), etc.), salinity – natural and as a result of irrigation on other land use, permeability
- Geotechnical features of project area;
- Soil contamination in project area; previous or recent investigations, comparison with land use requirements.
- Types of soil degradation in project area: surface erosion, depth erosion, landslides, soil settlement – compacting
- Mineral resources in project area; the value of still unexploited mineral resources

Air quality

- Sensitive locations to air quality in project area and neighbourhoods
- Relevant climate and atmospheric conditions: precipitation, evaporation, wind directions and frequency of occurrence, temperature, seasonal variability
- Data on existing air quality in project area

Human beings

- Administrative locations and general features of project location
- Quantification of the total population in project area and percentage of population that can be affected by flooding events
- Geographical location
- Current and future settlement areas (as stated in Urban Development Plan)
- Distances from main proposed works to residential, commercial, recreational areas, institutions and other sensitive receptors
- Occupation, activities related to the inhabitants in project area; where relevant, indicate the time, duration or seasonality of any of those activities.
- Transportation routes, e.g. rivers, roads, railways
- Disease rate related to water use in project area, risks on human health
- Sensitive locations to noise in project area and main works vicinity

Noise and vibration

- Sensitive locations to noise and vibration in project area and neighbourhoods



- Data on existing noise level in works locations

Flora and Fauna

- Flora description in project area and neighbourhoods: existing habitats or plant communities, locations of sensitive or rare species, protected sites
- Fauna description in project area and neighbourhoods: principal habitats, species, significant locations for breeding, sites for survey/trapping,
- Special requirements of fauna species in project area and neighbourhoods: territory size, habitat quality, current management, lack of disturbance
- Flora in project area and neighbourhoods: dominant species, species diversity, dependence on particular environmental factors, existing management
- Diversity, population size or density of fauna
- The importance of water as a habitat in the area
- The presence of any habitat, flora or fauna species that is internationally, nationally, regionally or locally rare, especially species that are protected
- Wetlands in the area; groundwater gradients, storage volumes and quality parameters required to sustain groundwater reserves for baseflow to wetlands
- Aquatic biota in features dependent on groundwater baseflow, such as rivers, wetlands, and caves, or biota living in the aquifer itself
- Clearly identify the natural protected areas other than Natura 2000 sites and, separately, the already designated or proposed Natura 2000 sites

Landscape

- Geomorphology of the relief in works locations
- The landscape on project locations and in the surrounding area;
- Views of the sites from adjacent properties and public areas particularly where these are sensitive, e.g. residential, recreational or tourist areas

Material assets

- Cities, towns, villages and settlements
- Utilities in project area (water supplies, power systems, canals, gas etc).
- Industry, commercial, agriculture, rearing farms, fisheries in project area and downstream
- Transport infrastructure, including navigation if applicable
- Residential, tourism and recreational areas
- Isolated public & private objectives for residential, commercial, industrial, recreational or social purposes (individual properties for housing, schools, camping and other recreational plots including hospitals, zoo parks, facilities for old age people)
- Buildings, bridges and other civil structures located on floodplain
- Urban Planning provisions and regulations for project area

Cultural Heritage (archaeological and architectural heritage)

- Architectural, archaeological heritage in project area; precise location and distances to the works proposed.
- If important architectural or archaeological objectives are located the vicinity of works proposed by project distances to these objectives will be specified.



3.3 SIGNIFICANCE

The significance of the environmental components potentially affected by the project may be the same. However, if some environmental components or issues are perceived as being extremely important, these may be described separately in more detail, for example, landscape very important for the local or regional economy, historical importance of the flood catchment area etc.

3.4 SENSITIVITY

What changes could significantly alter the character of this aspect of the environment, e.g.:

- Water table levels variation accentuating soil degradation
- Groundwater aquifer alteration in terms of quality and quantity
- Natural habitat change due landuse change

3.5 SUFFICIENCY OF DATA

How can a competent authority or developer be assured that the EIA contains sufficient data? The following criteria can provide useful guidance on this matter:

- Is the information necessary for identification of the main effects available?
- Is the information focused on effects which are *likely* and *significant*?

The certainty or confidence which the information provides is a good basis for evaluating the quality of data. In practice, unsatisfactory information is more likely to result from omissions than from inaccuracy. All information is ultimately used to make decisions about whether to grant or withhold consent to develop. "Sufficiency" may therefore be regarded as enough information upon which to base a decision.

Where it is the case that incomplete information is provided in the Report, it must be made clear that this information has not been withheld intentionally and that all parties are aware of the incompleteness of the information. The resulting decision will usually be qualified or conditional on the information being provided at a later stage.

Box 2 Example of a report on Flora and Fauna which is qualified due to necessity of being carried out at an unsuitable time of year

The site was examined and was deemed to be grassland of a type which is very common throughout the region. It should be noted that the examination was carried out in December when the full range of potential flora and fauna was not evident. A further study will be made, of the damp areas in particular, to determine whether any significant species are present during May – July. The detailed design may need to be altered/adjusted if anything of significance is encountered.

3.6 REGULATORY FRAMEWORK

The purpose of this section is to give an overview of the national and EU legislation that has been taken into consideration in carrying out the environmental impact assessment. The EU Directives and the international agreements and protocols should be quoted together with the national legislative acts ensuring their transposition and implementation. Simply listing relevant legislation and regulatory acts does not suffice.

A brief description of the content should be given to provide the context as well as the reporters notes or comments on how the requirements of the relevant legislation will be addressed. Furthermore, it is imperative that all relevant national, regional and local/municipal plans and strategies are clearly highlighted and their relevance and association to the proposed development described. As well as providing the national and regional strategic and planning context of the proposed project, it will also illustrate to the reviewer of the report, the development history of the proposed project.



4 SIGNIFICANT ENVIRONMENTAL EFFECTS; MITIGATION MEASURES

The purpose of this section is to provide recommendations for addressing in the EIA Report the aspects related to :

- the description of the likely significant effects of the proposed project on the environment resulting from:
 - the existence of the project,
 - the use of natural resources,
 - the emission of pollutants, the creation of nuisances and the elimination of waste,
- the description of the forecasting methods used to assess the effects on the environment.
- the generic mitigation measures that should be considered i.e. measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.

It is important to note that the potential effects and mitigation measures are sector specific. The amount of detail that will be provided in the EIA report will be determined by the circumstances of each individual project

Description of likely significant impacts

In general, the effects and their sources/ causes (works, actions, materials etc.) as well as the associated impacts are well known. Each sub-section below covers an environmental factor on which a flood protection project is likely to have significant effects and presents briefly, which these might be.

It is recommended that the EIA Report to not contain the general potential impacts but rather to present those effects which have been identified and assessed for the proposed project. The causes for impacts occurrence due to any specific conditions of the site, activity schedule, and supply with construction materials and so on as well as due to the characteristics of the receptors previously identified must be described. If any significant effects have been identified in relation with a certain environmental factor, it is strongly recommended to be presented the similar specific conditions and the mitigation measures taken from the start, which make unlikely the appearance of any effects.

The requisite criteria for the presentation of the potential characteristics of potential impacts sets out potential significant effects of the proposed development will be described concerning the following aspects:

- the extent of the impact (geographical area and size of the affected population)
- the magnitude and complexity of the impact
- the probability of the impact
- the duration, frequency and reversibility of the impact
- the transfrontier nature of the impact (if applicable)

The description of impacts is usually subjected to closer scrutiny than any other part of the EIA report. Clarity of method, language and meaning are vital to accurately explain the full range of impacts. The description should clearly and consistently identify four key aspects of any impact, namely its character, magnitude, duration and consequence (refer to box 3 for further details).

**Box 3 Impacts: key aspects*****Character and Duration of Impacts***

- Identify the aspect of the environment affected; Identify the receptors which will be affected, indicating their sensitivity and significance;
- Describe whether the impact is positive, neutral or negative; Highlight significant impacts (positive and negative).
- State whether the impact will be continuous, intermittent or occasional;
- Indicate whether the impact will be temporary, short, medium or long-term; Highlight permanent impacts.
- Indicate if the impact is reversible or irreversible

Extension, Magnitude and Complexity

- Quantify the amount or intensity by which the character/quality of any aspect of the environment will change (i.e. how much pollution);
- Indicate the spatial extent of the impact (will some, much or all of the areas be affected);
- Describe the degree of change; (i.e. imperceptible, slight, noticeable or significant);
- Highlight profound (i.e. complete) changes of character.

Consequences

- Indicate whether the impact can be avoided mitigated or remedied; Highlight irreversible impacts
- State whether compensation is available, possible or acceptable;
- Highlight when the consequence cannot be determined

The description of the forecasting methods used to assess the effects on the environment.

For each environmental factor in the case of which does not exist a quality standard against which the impact to be assessed, it is recommended to mention any eventual criteria used to evaluate the impacts that may occur as a result of the proposed project – criteria for the impact significance and nature as well as criteria with respect to the confidence limits to impact predictions. For convenience reasons, these may be presented in tabular format.

Description of Mitigation measures

The central purpose of Environmental Impact Assessment is to identify potentially significant adverse impacts, as outlined above, and to propose measures to mitigate such impacts. There are three established strategies for impact mitigation – avoidance, reduction remedy. For example, change the works` location to avoid utility infrastructure disturbance, increased planting of trees/shrubs to offset unavoidable loss of vegetation.



4.1 WATER AND GROUNDWATER

4.1.1 Possible Effects and Impacts

Construction

- Temporary changes on hydraulic characteristic of the surface water body: levels, velocities, flows due to construction works on river bed or river banks (e.g. bridge, correction meanders of the river course)
- Change at local level of the hydrodynamic drainage due to underground civil structures or river bank protection works construction operations
- Surface water body pollution due to run-off, causing increased turbidity; in the case of weathering of newly exposed soils, causing leaching and oxidation, thereby releasing chemicals into the water
- Degradation of river banks stability due placement or operation of construction equipment in the vicinity river banks.
- River contamination by uncontrolled surface run-off from working sites (e.g. accidental spills of wastewater, fuel and lubricants etc)
- Groundwater contamination due to soil infiltration of accidental spills of wastewater, fuel and lubricants etc., improper disposal of wastes resulted from construction activities

Operation

- General effects:
 - Permanent changes on hydraulic characteristic of the water body (surface and groundwater): levels, velocities, flows; these aspects should be approached also for the case of flood events
 - Changes of surface water bodies morphology, for example in the case of water course rectification/redirection
 - Changes to the chemical and biotic characteristics of water bodies
 - Alterations to beneficial uses associated with the physical, chemical and biotic characteristics of water (e.g. water catchments for drinking water production, fisheries, irrigation etc);
 - Induced effects on adjoining wetland water level (for example, in cases of dams and embankments, decrease of water table level)
 - Extended duration of water stagnation in floodplain due to dam release; estimation of the duration corresponding with seasonal climate conditions should be done
 - Changes of water resources management (on project area and on river basin): current conditions and during and after flood events
- River bank protection, river course rectification
 - Reduction of groundwater recharge
 - Artificial water levels
 - Increased water velocity
 - Downstream sedimentation
- Dams & reservoirs
 - Variation of water table levels in the areas located in the vicinity
 - Decrease of river flow downstream dams can lead to decrease of water table level and drying of land areas located in the vicinity
 - Materials sedimentation in the dam's reservoir and consequences as alteration of water quality and decrease of reservoir storage capacity
 - Alteration of surface water body quality downstream, due to water discharged from the reservoir
 - Scouring of river bed below the dam



- Salinisation of floodplain lands

4.1.2 Potential Mitigation Measures

Construction

- Excavation works will not be executed under aggressive weather conditions (rains, strong winds).
- Use of low quality water for sprinkling for dust prevention on working sites
- Locate access roads to minimize stream crossings and to minimize impacts where crossings cannot be avoided.
- Use special construction techniques in areas of steep slopes, exposed to erosion phenomena, and stream crossings.
- Avoidance of significant modifications on the natural surface water body morphology
- Construct drainage ditches only where necessary. Use appropriate structures at culvert outlets to prevent erosion.
- When possible, excavation works will be executed only on one side of the river bank
- Avoid creating excessive slopes during excavation and blasting operations in the vicinity of rivers banks
- Measures to avoid soil infiltration of accidental spills of fuel, lubricants, chemicals due to working sites run-off , as presented in section Soil & Geology

Operation

- Regular inspection of works (dams, culverts, river bank protection, dykes) and afferent surface water courses in order to observation and correction of deficiencies,
- Implementation of a monitoring programme for groundwater (water table levels)
- In the instance where a dam or reservoir is required:
 - The effects of the increase of water table level in the area located in the vicinity of reservoir can be mitigating by execution of drainage works.
 - Limitation of the retention time of water in the reservoir and periodically hydraulic removal of the sediments
 - Control of water discharges into reservoir as well as the areas with potential pollution sources due to drainage
- Control of land use in watershed, for example avoid conversion of forest to agriculture thus limiting stormwater runoff
- Hydraulic removal of sediments from the reservoir for marinating its storage capacity

4.2 SOILS & GEOLOGY

4.2.1 Possible Effects and Impacts

Construction

- Soil degradation due to stripping and removal of humus layer
- Temporary land use change
- Temporary increase in soil erosion, on the locations of excavation leading to soil instability and landslides
- Erosion due to removal of vegetation, earth works and the use of heavy machinery during construction activities in or close to the river bed
- Soil pollution by accidental spillage of fuels, lubricants and chemicals by spreading of cement milk and suspensions from the platforms of concrete preparation or from the locations where concrete is used



- Soil contamination by infiltration of leachate from uncontrolled deposits of wastes and construction materials

Operation

- Permanent change of land use - agricultural, forest, wetlands, into surface water body (reservoir)
- Erosion and deposition – especially downstream of the project area
- Changes on the agricultural lands located in the proximity of dam, reservoir

4.2.2 Potential Mitigation Measures

Construction

- Topsoil removal and storage in separate piles and reinstallation after refilling of trenches, to enable natural revegetation;
- Tanks for fuel storages leak-proofed and installed on impermeable surface; in case of incidental spills collecting recipients, absorbent material and fire fighting equipment shall be provided
- Procedures for storage and handling of waste, hazardous wastes and raw material (e.g. batteries, chemicals, fuel)
- Parking area arrangements for equipment and vehicles involved in construction activities (e.g. impermeable surface)
- Application of appropriate erosion-protection measures such as silt screens, in particular where it concerns works on slopes and in stream beddings.
- Excavation works will not be executed under aggressive weather conditions (rains, strong winds).
- Temporary storage of stripped humus layer only in the special designed areas and in proper conditions, and reinstallation after refilling of trenches, to enable natural revegetation.
- Adequate filling of borrow areas
- Control of land clearing
- Maintenance, fuelling and cleaning of vehicles and equipment done at workshops/sites with adequate leakage prevention of pollution materials or, for accidental leakage, measures for limiting the infiltration into the soil

Operation

- Appropriate design of the dam's and reservoirs size or location; intensified protection measures for equivalent land area with the same use in the region
- Limiting the access of vehicles on river banks or on dykes
- Implementation of inspection and control programme for the works with the aim of rapid and efficient remediation interventions (as presented on Water & Groundwater Section)
- Implementation of active revegetation programme on works sites, including in particular erosion-prone areas (e.g. hill sides and river banks)

4.3 AIR QUALITY

4.3.1 Possible Effects and Impacts

- On construction stage : atmospheric pollution due to:
 - Dust possibly contaminated with other air pollutants resulting from earthworks, load and unload of raw materials, etc.
 - Emissions of air pollutants from transport and construction motor equipment; include particulate emissions from diesel engines, NO_x, volatile organic compounds, Carbon monoxide and various other hazardous air pollutants including benzene.



- During operation stage, the effects will be similar as those on construction stage, but in a lesser degree.

4.3.2 Potential Mitigation Measures

- Reduction of overall harmful gaseous emissions and dust, by:
 - Prevention of dust through sprinkling during periods of dry weather
 - Limitation of work sites and duration of works
 - Daily cleaning of access ways in the neighbourhood of work sites (removal of earth and sand) to prevent dust
 - Control and clearing of loose materials in vehicles and sites for storage of excavated material

4.4 NOISE AND VIBRATION

4.4.1 Possible Effects and Impacts

- Construction equipment and activity will generate noise which can affect workers, population and animals living or moving in the vicinity of working points
- Vibration generated during construction from activities can:
 - Cause varying degrees of cosmetic and/ or structural damages in civil structures
 - Affect vibration-sensitive machinery or equipment
 - Cause disturbance or annoyance on people or, at higher levels, affect a person's ability to work
 - Cause damages on civil works placed in immediate proximity of works

4.4.2 Potential Mitigation Measures

Construction

- Interdiction of construction activities at night
- Identification of vulnerable civil works placed in immediate proximity of construction sites and use of safety methods and equipment; if case, elimination the use of equipment that may generate dangerous vibrations

Operation

- Use of low noise and vibration installations and equipment

4.5 CLIMATE

4.5.1 Possible Effects and Impacts

- Green house gas contribution both from construction and operation
- Drainage of wetlands may reduce occurrence of mist and fog due to drainage of wetlands;
- Local climatic effects, particularly regarding temperature and evaporation, due to creation of a reservoir or loss of the floodplains.
- Increased water loss through transpiration because of proliferation of aquatic vegetation (e.g. in the case of a reservoir)

4.5.2 Potential Mitigation Measures

- High standard of construction management
- Clearance or periodically harvest of aquatic vegetation (especially weeds)



4.6 FLORA AND FAUNA

4.6.1 Possible Effects and Impacts

Construction

- Affecting the fauna species that has a seasonally variable vulnerability due, for example, to breeding, critical feeding times or migratory passage
- Destruction of flora during construction
- Fauna affected due to disturbance and depletion of river and bank side flora (food and shelter)
- Water pollution and groundwater contamination altering the water's physical, chemical and biological qualities,
- Changes of aquatic and/ or terrestrial habitats due to pollution or morphological effects

Operation

- Modification or destruction of migration routes for terrestrial and aquatic fauna
- Destruction or alteration of the habitats or the plant species (e.g. increased water temperature due to removal of vegetation)
- Degradation of the flora caused by physical factors: modification of the hydrological conditions; (e.g. in the case of the water course rectifications can occur changes on water level, water velocity etc.)
- In the cases of deviation canals, risk of local migration of unwanted species that can affect existing species or aquatic vegetation
- Surface water level variation resulting in negative impact upon spawning and reproduction
- Loss of habitat for certain fauna species (e.g. otters - concrete river banks)
- Indirect impacts due to induced changes in adjacent landuse patterns

4.6.2 Potential Mitigation Measures

Construction

- Manual execution of works through elimination of using any equipment and vehicles in protected sites or sensitive area especially when the works must be done during reproduction periods
- Removal and replanting of trees and arbutuses as more as possible instead of cutting. Clearing and cutting of trees shall only occur with the appropriate authority's consent. An inventory of trees to be cut shall be made and a plan for replanting will be developed and implemented
- After any intervention that may disturb natural sites: ecological restoration through environmental engineering (restorations, rehabilitation) shall be undertaken, including restoration of top soils and (re-) introduction of genetic species to re-establish the natural local ecology
- Monitoring the affected protected area for a certain period (2-3 years), recommended at the beginning and at the end of vegetation period; if any restoration of flora elements failed corrections and additional planting plan should be started

Operation

- Compensatory planting or restocking of indigenous species
- Creating opportunities for terrestrial fauna migration (e.g. installation of passageways for aquatic fauna)
- Protection of reproductive sites for aquatic fauna (especially for fish)
- Regular surface water monitoring (e.g. water quality, flow)
- Plantation of vegetation on river banks
- Compensatory afforestation in the area if construction works necessitate clearing of vegetation and trees (species selected for planting should be indigenous)



- Use of planted berms instead of concrete
- Selective, instead of uniform, removal of natural river bank features

4.7 PROTECTED AREAS, NATURA 2000 SITES

- When natural protected areas do exist in the project “zone of influence” the effects on habitats and on protected species of flora and fauna will be presented.
- Based on the assessment required under Article 6 of the Habitats Directive (refer to Section 2.3.1), resulting from stage 1 (screening process) - if the project is deemed to have potential impacts on Natura 2000 sites , recommendations of stage 2 – *appropriate assessment* – and stages 3 & 4 (*assessment of alternative solutions* and *Assessment where no alternative solutions exist and where adverse impacts remain*) will be clearly presented as to how such recommendations are being integrated into mitigation measures outlined throughout the EIA report (in particular under section 4.6 Flora and Fauna, outlined above).

This is in conjunction with Article 9(1) of the MO 135/76/84/1284 from 2010, if the project was initially evaluated as falling under the scope of Article 28 of Emergency Ordinance of the Government no. 57/2007 regarding natural protected areas, conservation of natural habitats and of wild flora and fauna

4.8 HUMAN BEINGS

4.8.1 Possible Effects and Impacts

Construction

- Safety problems that may be caused to the general public by excavations, as well as transportation, movement of heavy equipment and obstructions of roads
- Disturbances and nuisances to the population, because of the dust produced on work sites, as well as resulted from the transport of raw and waste materials, but also odour from waste stored on site works.
- Discomfort for the inhabitants due to noise generated by construction activities
- Damage to other infrastructure (roads, water supply pipelines, drains, buildings, utility lines, etc.), and therewith lead to a (temporary) disruption of certain public services
- As for some works a significant quantity of excavated material will be needed to be transported from or to the work sites, the traffic of the vehicles associated with this activities can lead to traffic disruptions and traffic crowding, resulting in nuisance and interruption of commercial and social activities in the crossed localities

Operation

- Displacement of properties and rights to access or use. For example wetland restoration, creation of new water bodies, canals, polders will occupy the land and current land use and associated activities will be changed;
- Changes in settlement patterns
- Restriction of landuse in works locations
- Relocation of the people living in certain works locations (dike, dam, reservoir)
- Creation/loss of amenities
- Landuse intensification in flood protected areas



4.8.2 Potential Mitigation Measures

Construction

- Preparation of a traffic management plan for limiting disturbance to localities crossed by vehicles involved into construction activities
- Daily cleaning of access ways in the neighbourhood of work sites (removed of earth and sand), and maintenance of such roads.
- Construction activities shall not be allowed at night and will be restricted on limits on rest hours in sensitive neighbourhoods (e.g. hospitals)
- Protection (fencing) and signalling of work sites (especially excavation works), in particular during the night, with clear marking of the safety border on the works perimeter (specify main locations)

Operation

- Implementation of non-structural measures to prevent increased flood risk
- Implementation of flood warning system
- Coordinate flood strategy measures with urban planning – new housing locations, roads etc.
- Methods to prevent and control biting insect populations
- Operation of dam in order to decrease habitat for water related disease vector
- Integration of leisure, amenity features into engineering solution

4.9 LANDSCAPE

4.9.1 Possible Effects and Impacts

- Alterations to the natural appearance and character of the river due to loss of vegetation and the introduction of regular geometric landforms
- Alterations to the appearance and character of floodplains flowing flood protection
- Impacts on area in particular visibility from viewpoint at recreation area, tourist area, residential area etc.

4.9.2 Potential Mitigation Measures

- Restriction of the size of construction sites
- Conservation of vegetation around construction sites (if present) as much as possible in order to serve as visual shields.
- Adequate organization and maintenance of construction sites through good housekeeping.
- Restoration of construction sites directly upon completion of works (deadline is recommended to be provided)
- Development of green belts around works sites
- Planting of different vegetation types in the project area in relation to depth and predicted duration of flood

4.10 CULTURAL HERITAGE (ARCHAEOLOGY & ARCHITECTURE)

4.10.1 Possible Effects and Impacts

- Loss/disturbance of monuments, artifacts and cultural landscape due to excavation or disturbance
- Alteration to long established landuse patterns
- Loss of architectural and archaeological monuments by inundation to form the reservoir in the cases of dams and polders.



For the purposes of the Convention for the Protection of the Architectural Heritage of Europe, Granada, 1985 (ratified by Romania by the Law 157/1997) the expression “architectural heritage” is considered to comprise the following permanent properties:

- **monuments:** all buildings and structures of conspicuous historical, archaeological, artistic, scientific, social or technical interest, including their fixtures and fittings;
- **groups of buildings:** homogeneous groups of urban or rural buildings conspicuous for their historical, archaeological, artistic, scientific, social or technical interest which are sufficiently coherent to form topographically definable units;
- **sites:** the combined works of man and nature, being areas which are partially built upon and sufficiently distinctive and homogeneous to be topographically definable and are of conspicuous historical, archaeological, artistic, scientific, social or technical interest.

4.10.2 Potential Mitigation Measures

- Include any necessary measure to ensure the protection of such objectives under the legal provisions.
- If any alternatives for reducing the size or change of location are unavoidable, the recovering of the monuments (e.g. if possible, moving to another location)

Box 4 Examples of Architectural Heritage

Architectural Type	Examples – illustrative purposes only
Vernacular Rural and Urban	Farm buildings, cottages, houses
Industrial	Mills, breweries, distilleries
Transport	Road bridges, railway bridges, canals, canal locks
Ecclesiastical	Churches, chapels, graveyards
Country estate	Country houses, entrance gates, lodges
Maritime	Harbours, quay walls
Monuments	Roadside memorials, plaques, statues, historic monuments

4.11 MATERIAL ASSETS (OTHERS THAN ARCHITECTURAL HERITAGE)

4.11.1 Possible Effects and Impacts

- Damage to other infrastructure (roads, water supply and wastewater pipelines, drains, buildings, electricity, gas, etc.), and therewith lead to a (temporary) disruption of certain public services.
- Temporary interference with private property (e.g. pipeline crossings over private lands).
- Temporary disturbance on residential and other sensitive receptors (hospitals, schools etc)
- Interruption of commercial and social activities located in works area
- Traffic disruption during construction
- Potential amenity use of reservoirs
- Potential amenity use of canals
- Dams:
 - Proliferation of aquatic vegetation in reservoir and disturbance of the downstream water users due to alternation of water quality and decrease of the flows discharged (irrigation systems, fisheries, water intake)



- Significant water table levels changes
- In the case of increasing water table level:
 - reducing of land bearing capacity and the subsidence of buildings foundation
 - flooding of underground structures for utility networks: water supply, sewerage, electricity, telecommunications etc.
- In the case of decreasing water table level: drying of land areas located in the vicinity

4.11.2 Potential Mitigation Measures

- Avoidance interference with other infrastructure
 - Coordination of work at crossing points with other utility network owners (water, telecom and electricity networks)
 - In case of any damage, repair works will be executed as soon as possible (time limits referred to Emergency plan for accidental pollution events, damages for elaborated by Contactor for construction stage)
 - If any restriction or limitations are required by other utility network owners, these should be precise scheduled
- Integration of leisure, amenity features into engineering solution
- Maintenance of minimum flow for fishing
- Traffic management planning. Disturbance to residential areas, local businesses, commuters etc can be significant with regards construction of the works, especially when traffic crossing localities can not be avoided . It is recommended that a detailed traffic management plan be prepared to mitigate against both disturbance and inconvenience.
- The effects of the increase of water table level in the area located in the vicinity of the reservoir can be mitigating by execution of drainage works.
- Dams:
 - clearance of vegetation from the location corresponding to reservoir area before inundation to form reservoir
 - control measures for aquatic vegetation and if necessary, harvest of excess vegetation
 - discharge of minimum flow for downstream water users (e.g. fisheries)
- River banks protection works, dikes
 - regular maintenance of the works
 - implementing a planting and maintenance program for vegetation on river banks and dykes

4.12 CUMULATIVE ENVIRONMENTAL EFFECTS AND INTERACTION OF THE FOREGOING

4.12.1 Cumulative Effects Assessment

The concept of cumulative effects is related to the previous issue of coordination between schemes. It is argued that environmental assessment of an entire programme, or an entire route corridor, is required in order to fully identify and assess impacts. In particular, this broader level of assessment is required to fully understand impacts that arise through the combination or cumulation of developments.

The most effective way for cumulative impacts to be dealt with in the context of a flood prevention & protection scheme EIA is to coordinate the assessment process with adjacent schemes where this is relevant (e.g. River Basin Management Plan, Flood Risk Management Strategy, Urban Planning). This approach should be clearly identified in the EIA Report. It is important for the EIA Team to be conscious of the potential for cumulative impacts and also to have an awareness of 'other approved developments' in the area.



For example, flood phenomena must consider the impact upstream and downstream the project area and locations vulnerability (almost because of anthropic interventions).

4.12.2 Interaction of the foregoing

Interactions relate to the reactions between impacts within a project and the inter-relationship between impacts identified under one topic with impacts identified under another topic.

The consideration of impact inter-relationships and interactions provides an opportunity to consider the overall impacts of a scheme which might not be immediately apparent particularly when the EIA Report is structured around individual topics. These impacts can be addressed in the EIA Report by including a section at the end of each topic chapter dealing with impact inter-relationships and interactions or by including a separate chapter, normally towards the end of the EIA Report, dealing with the issue.

Examples of impact inter-relationships:

- Flood protection can induce significant and widespread changes to landuse and settlement patterns in hitherto unusable areas.
- Intensification of landuses particularly for leisure and amenity – can follow major capital works projects or rivers.
- Induced erosion and deposition patterns can interact with landuses, beneficial uses of the coastal zone, habitats and the landscape.

Figure 1 illustrates how impact interactions can be highlighted in an EIA Report through the use of a matrix.

Figure 1 Sample Impact Inter-relationship Matrix

Inter Relationship Matrix	Soils & geology	Water & Groundwater	Air Quality	Noise & Vibration	Climate	Fauna	Flora	Landscape	Human Beings	Arch Heritage	Material assets
Soils & geology	■	■				■	■		■		■
Water & Groundwater	■	■			■	■	■	■	■		■
Air Quality	■		■		■	■	■		■		■
Noise & Vibration	■			■		■			■		■
Climate			■		■	■	■		■		■
Fauna						■	■				■
Flora						■	■	■			■
Landscape						■		■	■		■
Human Beings									■		■
Arch Heritage								■		■	■
Material assets									■		■



An example of how interactions and inter-relationships may be presented is outlined in Box 5 below. Air and noise have been selected as an example to illustrate how interactions and relationships could be summarized in the report.

Box 5 Example of a Summary of Potential interactions & inter-relationships - Air

Subject	Interaction with	Interactions/relationships
Air	Human beings	Air quality is a major concern both at the local community level and on a broader national/global scale. In terms of the proposed development, dust (both during the construction and operational phases) and emissions and its impact on the communities and residents adjacent to the proposed development will be the main issues.
	Flora and Fauna	Vegetation can act as a purifier for air in absorbing CO ₂ and giving out oxygen. Dust from the proposed development could affect fauna and flora.
	Water	Dust from the proposed development could affect surrounding watercourses
	Geology/Hydrogeology/ Soils	Dust from exposed soils during construction could cause deterioration of air quality in the immediate vicinity of the development.
	Climate	Emissions to the air will potentially effect/impact on air quality. Reduction in air quality caused by dust could impact on agricultural enterprises in the vicinity of the development particularly during construction.
Noise	Human Beings	Sensitive receptors located close to the proposed development may experience some increase in noise particularly during the construction stage of the proposed development.
	Landscape	The construction of landscaping berms and planting will mitigate the effect/impact of noise.
	Flora and Fauna	Construction and operation proposals could result in significant noise disturbance, which may impact on the fauna currently using the area.
	Material Assets	Dairy cattle and other sensitive animals are reputed to be sensitive to sudden noise events that may occur as part of the construction. Any sensitive agricultural enterprise will be facilitated through consultation with landowners.

4.12.3 Summary of Impacts, Mitigation, Residual Impacts

Such a summary is usually presented in tabular format which allows an overview of the impacts on each environmental factor corresponding to each stage of project realization.

The format might be rather simple or more complicated to address also the impact characteristics: magnitude and significance, duration (permanent/ temporary), extent (coverage and receptors), nature (direct/ indirect, adverse /beneficial), reversibility (reversible/ irreversible), sensitivity of receptors, probability of occurrence, confidence limits to prediction, mitigation and monitoring measures, scope of mitigation/ monitoring, residual impact.



5 NON TECHNICAL SUMMARY

5.1 PRINCIPLE

Annex IV of the EIA Directive setting requirements for the information to be supplied to the competent authority by the project developer, mentions in its point 6 “A non-technical summary of the information provided under the above headings.” i.e. of the information contained in the EIA Report.

A NTS is required because one of the fundamental objectives of the EIA process is to ensure that the public are made aware of the environmental implications of any decisions about whether to allow new developments to take place.

It is often useful to prepare a NTS as a separate and self contained document, which can be widely distributed to the public who are likely to be affected by the proposed development.

5.2 STRUCTURE AND CONTENT

The NTS is laid out in a similar, but condensed, format to the main EIA Report. i.e. describing the project, existing environment, impacts (including both negative and positive) and mitigation measures. It should include a site location and site layout plan (showing context) together with easily interpreted graphical representation of the proposed development, such as a perspective drawing.

Also it may contain an overview of the approach to the assessment and some brief explanations related to the development consent process for the project and the role of EIA in this process; It is recommended to include in the NTS data about stage's sequence of EIA procedure for the project component accomplished so far and foreseen (Screening and Scoping Decisions of EPA, previous public consultation).

5.3 PURPOSE AND LANGUAGE

As stated above, the main purpose of the NTS is to communicate to the public the EIA Report findings.

To achieve this goal, it should use a language easy understandable, without a scientific and technical jargon. In this respect, the copy and paste exercise by which some entire paragraphs are transferred from the EIA Report itself into NTS, is contra-productive and should be avoided. Instead, the text needs to be rephrased.

The NTS length should not be a matter of concern. Examples are available of short but intelligent prepared NTS (23 pages including 6 with photos and diagrams for a 280 pages coordinated EIA Report), in comparison with a long but fluffy NTS (about 100 pages for a 300 pages coordinated EIA Report).

Recommendation is to attach the tables with Summary of Impacts, Mitigation, Residual Impacts to the NTS when made available to the public.



ANNEX 1 – Relevant legislation for the present guidance document

European legislation

- Directive 2007/60/EC on the assessment and management of flood risks
- Water Framework Directive (Directive 2000/60/EC)

National EIA legislation

- Government Decision 445/2009 on the assessment of certain public and private projects on the environment;
- Order 135/2010 of the Minister of Environment and Forests to approve the application methodology of environmental impact assessment for public and private projects;
- Order 863/2002 of the Minister of Water and Environment Protection to approve the methodological guidelines that apply to different steps of the environmental assessment framework procedures.

National legislation on Nature Protection

- Emergency Government Ordinance 57/2007 on the regime of protected areas, conservation of natural habitats, wild flora and fauna.
- Ministerial Order 19/2010 for approval the methodological guidance regarding the assessment on the effects of the plans/projects on Natura 2000 sites

National legislation for management of flood risk

- Water Law 107/1996, modified and completed by Law 310/2004, Law 112/2006 and Emergency Government Ordinance no. 3/2010



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