



Jaspers Joint Assistance to Support Projects in European Regions • Jaspers Joint Assistance to Support Projects in European Regions

JASPERS

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

Sectoral EIA Guidelines

**Groundwater Abstraction
and Water Supply Systems**

ROMANIA





Name of Guideline:

**Sectoral EIA Guidelines for Groundwater Abstraction and
Water Supply Systems**



Table of Contents

1	BACKGROUND	5
1.1	INTRODUCTION	5
1.2	LEGISLATIVE CONTEXT	5
1.3	MAIN PRINCIPLES	5
2	DESCRIPTION OF PROJECT	7
2.1	PHYSICAL CHARACTERISTICS OF THE PROJECT & LAND USE REQUIREMENTS	7
2.2	THE EXISTENCE OF THE PROJECT – MAIN PROCESSES	10
2.3	MAIN ALTERNATIVES STUDIED	12
3	DESCRIPTION OF EXISTING ENVIRONMENT	16
3.1	CONTEXT	16
3.2	CHARACTER	16
3.3	SIGNIFICANCE	18
3.4	SENSITIVITY	19
3.5	SUFFICIENCY OF DATA	19
3.6	REGULATORY FRAMEWORK	19
4	SIGNIFICANT ENVIRONMENTAL EFFECTS; MITIGATION MEASURES	20
4.1	WATER AND GROUNDWATER	22
4.2	SOILS & GEOLOGY	23
4.3	AIR QUALITY	25
4.4	NOISE AND VIBRATION	25
4.5	CLIMATE	26
4.6	FLORA AND FAUNA	26
4.7	PROTECTED AREAS, NATURA 2000 SITES	27
4.8	HUMAN BEINGS	28
4.9	LANDSCAPE	29
4.10	CULTURAL HERITAGE (ARCHAEOLOGY & ARCHITECTURE)	29
4.11	MATERIAL ASSETS (OTHERS THAN ARCHITECTURAL HERITAGE)	30
4.12	MONITORING	31
4.13	CUMULATIVE ENVIRONMENTAL EFFECTS AND INTERACTION OF THE FOREGOING	33
5	ENVIRONMENTAL MANAGEMENT PLAN	36
5.1	PURPOSE AND SCOPE OF EM PLANS (EMP)	36
5.2	CONTENT AND FORMAT OF EM PLANS	36
6	NON TECHNICAL SUMMARY	42
6.1	PRINCIPLE	42
6.2	STRUCTURE AND CONTENT	42
6.3	PURPOSE AND LANGUAGE	42



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 groundwater abstraction and water supply systems 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 (in particular groundwater abstraction and drinking water supply networks) 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.

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 (transposed into Romanian legislation by GD 445/2009):

- Groundwater abstraction or artificial groundwater recharge schemes where the annual volume of water abstracted or recharged is equivalent to or exceeds 10 million cubic meters: Annex I 13
- Groundwater abstraction and artificial groundwater recharge schemes not included in Annex I: Annex II 10 (I)
- Water supply networks – 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(b) Urban development projects

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.

Although the EIA Directive annexes do not comprise projects as “Surface water abstraction” and “Water treatment plants for drinking water production”, this guidance document includes also some specific aspects of these types of projects.

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 water sector 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 guidance document is not exhaustive. Thus, some issues common to all type of projects may not be mentioned or addressed.

The guideline 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 groundwater abstraction and water supply 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 (e.g. groundwater abstraction, water treatment, water distribution network), 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, waste, 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

2.1.1 Description of Site Layout

- A general description of project location with reference to the maps on which the area of study should be clearly identified
- Description of Water Supply Zone (WSZ)-defined as stated in Law 458/2002 on the quality of drinking water, amended by Law 311/2004 ; localities within WSZ; administrative area covered; WSZ borders
- Locations of the works envisaged by the project : wells, main water transmission, drinking water treatment plant (DWTP), reservoirs, water pumping station (WPS), networks etc.; Land use in proposed area of works
- Land area for proposed works; size of works area required for the main components of the project
- 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 work sites; the extend of work sites
- Vicinities of the works and work sites locations 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)
- Well's location will be chosen by taking into account the local conditions and hydrogeological studies carried out. When presenting the location in the report, the following should be addressed:
 - land morphology
 - topography
 - accesses (roads, properties)
 - underground pipes existence/cables (e.g. water, sewerage, natural gas) and electric cables



- proximity to sensitive surface or ground water bodies

Detailed map containing administrative borders of localities, WSZ borders, and main project works locations must be provided.

2.1.2 Description of Design including Size or Scale

The basic data for the drinking water treatment design must be the requirements of Directive 98/83/EC transposed into Romanian legislation by Law of drinking water 458/2002, modified by Law 311/2004, and Government Decision 974/2004, and compliance with Accession Treaty deadlines/transition periods (related to quality parameters of water intended for human consumption).

For each project component (new wells and/or DWTP and water supply system, extension/rehabilitation of these types of works) the following information will be provided in the EIA Report:

- *Water Supply System (WSS) design, WSZs within WSS*
- *Defining of WSZ design :*
 - Settlement areas covered by WSZ and afferent inhabitants
 - Specific water consumption: domestic water demand (house connection, yard connection, public tap supplies) and non-domestic water demand: specific flow – according to the specific type of industry
 - Percent of population connected to WSS and WSZ
- *Water supply source:*
 - surface water:
 - surface water body as raw water source (e.g. river, lake)
 - intake location, distances to drinking water treatment plant (DWTP)
 - intake type (e.g. structural characteristics; equipment)
 - flows/volumes abstracted
 - main quality parameters of raw water: physical and chemical parameters, microbiological parameters
 - groundwater:
 - intake type (e.g. single or multiple wells)
 - location, distances to DWTP
 - aquifer abstracted
 - well's depth
 - drilling method
 - data regarding well's house
 - equipment (pump, water meter etc)
 - proposed restricted area in well's location
 - flow capacity of the well/wells field;
 - main quality parameters of groundwater: physical and chemical parameters, microbiological parameters
 - raw water use: drinking water production, fire fighting, industry etc.
 - reasons for choosing the surface water body or/and groundwater as water source
 - water demand for project development (average daily flow; maximum daily flow; maximum daily flow; average annual flow); in the case of using both surface water and groundwater sources for water supply, for each of them the designed water demand must be provided
- *Main water transmission:* route, pipeline material, length, diameters, flows, pressure
- *Water treatment for drinking water production (according raw water quality):*
 - DWTP : design capacity
 - Main quality parameters of raw water
 - Water treatment process (depending on the raw water parameters)



- Pre-treatment (e.g. screening, pH adjustment)
 - Aeration
 - Flocculation
 - Sedimentation
 - Removal of ions and other dissolved substances
 - Filtration (e.g. rapid sand filters, activated *CARBON FILTER*)
 - Disinfection (e.g. UV, ozone, chlorine)
- Technology for DWTP – installations, equipment and its main characteristics: no. of units, capacity per unit, total capacity
- Water treatment performance, including treatment performance, treated water parameters
- If the case, sludge treatment
- Water balance for DWTP (for each treatment stage)
- Flow diagram for water treatment process and if the case, sludge treatment
- *Reservoirs* : size, storage capacity, location
- *WPSs*: location, technical characteristics
- *Main water distribution, water network: pipeline material, length, diameters, flows, pressure*
- *Road construction and outdoor installations*

Water supply system diagram, drawings, plans containing project design features must be provided. For water treatment facilities and drinking water treatment plant recommended scales for maps and drawings are between 1: 10.000 and 1:2.000 while the drawings for cross and longitudinal sections, for the main works, the recommended scales are between 1:500 and 1:100.

Additional, for wells the following maps and drawings must be provided: geological map (recommended scale 1:50.000 or 1:200.000), geologic sections for existing wells in the area map (recommended scale between 1:5.000 and 1:25.000), geologic field mapping plots geologic units and structures, core drilling containing bedrock data from the subsurface.

2.1.3 Description of Existing Development

- Brief description of existing water supply infrastructure in project area:
 - raw water sources (surface water/groundwater sources and intake type)
 - transmission main
 - DWTP or other drinking water treatment facilities (e.g. chlorination station)
 - water pumping stations
 - reservoirs
 - drinking water network
 - localities served by existing WSS, specific water consumption, connection rate
- Main deficiencies identified in existing water supply system
 - Limited supply area – percent of covered population
 - Non compliant with water and health regulations on drinking water quality
 - Water loss: water supply and drinking water distribution network, water main transmission
 - Reduced efficiency of DWTP
 - Frequent interruptions on drinking water supply
 - Low coverage of drinking water demand
 - High energy consumption
 - No management or inadequate management of sludge resulted from DWTP operation
 - Accidents risk due chlorine equipment (e.g. obsolete dosing devices)
 - Ongoing projects (e.g. drinking water network rehabilitation and/or extension, road construction, gas works etc.)
 - Brief project/projects description



- Commissioning date of ongoing project/projects

A map containing the above mentioned main characteristics of existing water supply infrastructure should be provided.

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, drillings)
- Works involved by site preparation will refer to any of the following, as applicable:
 - Clearing the existent land of vegetation; in the case that 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
 - For excavations/ backfilling works: estimated volume will be indicated
 - Topsoil removal and storage, excavation works, transport and disposal of surplus excavated material;
 - 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
 - Flatten out the location of drilling and where applicable, soil compaction
 - For wells: foundation, arrangement of preparation drilling fluids, construction or installation of other facilities: basin for leakages from drilling installation, technological water reservoir, tanks for drill cuttings, transport and installation of drilling equipment
- If decommissioning or demolition activities are needed for project implementation: decommissioning/ demolition methods, main equipment, installations, civil structures, pipes (concrete, asbestos etc.) proposed for decommissioning/demolition
- The anticipated characteristics of the works in terms of workforce and work sites
- Parking facilities and storage facilities for building materials, fencing work sites
- Sequence of activities, taking into account the 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 to construct the major features of 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 locations, storage and handling locations and conditions

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. Reporter should avoid mentioning the residues and emissions in general terms, i.e. those potential to be generated during works construction.

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, drilling cuttings (in the case of well's drilling), domestic waste, hazardous waste, waste resulted from construction or demolition, equipment resulting from dismantling/decommissioning.

Where on the proposed work's location, especially on those where decommissioning activities are envisaged, the types and quantities of existing wastes will be also estimated.



For all types of wastes resulted on this stage detailed information will be provided:

- An inventory of the types and quantities of waste to be produced, including their hazard class;
- An assessment of any opportunities for reducing solid waste generation, in particular of hazardous and undesirable (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

2.2.3 Description of Operation of the Project

As commissioning stage will be preceded by technological tests (e.g. pressure tests on drinking water network pipelines or the main water transmission) and washing and disinfection operations; a brief description of these operations will be provided.

The description of the operation will be done for each water supply system's components covered by the project.

- **Water supply source**
 - *Groundwater*
 - On site inspection activities: integrity of groundwater boreholes and protection of wells from surface contamination
 - Periodic maintenance visits: well chamber, pumps, water meter etc.
 - Operational monitoring: records of groundwater quantities abstracted, variations of hydrodynamic and hydrostatic levels
 - Groundwater quality monitoring
 - De-sanding operations, if any
 - *Surface water*
 - On site inspection activities (e.g. structures, equipment, intake pipe)
 - Maintenance activities (e.g. equipment)
 - Removing floating material, debris etc. from the screens, weir etc. to prevent intake blockage
 - Monitoring: water level in intake location, water volumes abstracted
- **DWTP**
 - On site inspection activities : equipment, civil structures, pipes
 - Maintenance of the DWTP equipment
 - Water treatment process control (e.g. dosing substances for different stages of water treatment), control of the flows on DWTP (raw water, treated water),control of the efficiency of water treatment process
 - Operational monitoring: records of raw water/treated water volumes, sampling and records of various analyses related to quality parameters of drinking water
 - Materials used: type and quantity of materials, storage facilities, storage and handling locations and conditions (including hazardous substances)
- **Main transmission, network distribution, storage facilities**
 - On site inspection activities: pipes integrity, civil structures
 - Maintenance of the equipment from main transmission and networks distribution (including DWPSs, reservoirs)

Drawings and flow diagrams of the DWTP and sludge treatment installations must be provided.



2.2.4 Description of main Residues and Emissions from Operations

- Wastewater resulted from technological operations of water treatment: flows, (annual) volumes, pollutants` concentrations, pollutants` loads
- Chlorine emissions (incidental, in the case of installation damage)
- Type and quantities of wastes that may occur on DWTP and water network operation: grit, sludge resulted water treatment, packaging wastes (including those of hazardous materials and substances)
- Final destination of sludge and other wastes resulted from DWTP operation: land spreading agriculture/forestry reuse, composting, landfilling, incineration
- Noise and vibration

2.2.5 Decommissioning

Decommissioning activities related wells used for groundwater abstraction:

- The abandonment of the well is needed in the case of its irreversible damage (e.g. the sealing damage), significant degradation of groundwater quality or in the case of option for other raw water sources etc.
- The description of the operations required for well's abandonment will contain a brief description of the sequences of operations that will be done and afferent records according water regulations.

2.2.6 Description of Changes to the Project

- Potential urban development projects (e.g. tourist zones, extension of certain residential zones because of development of a road or other utility facilities) may suppose increased water demand in the project area
- Ageing of structural components causing deterioration and weathering of physical fabric, with anticipated time horizon depending on the maintenance system

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 a particular well's location, piping network etc., taking into consideration the environmental effects.

For the purposes of these guidelines therefore, alternatives may be described at three levels:

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

However, as part of the EIA process with regards groundwater abstraction and water supply systems, it is recommended that an assessment, as required under Article 6 of the Habitats Directive 92/437EEC, 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)

It is recommended that alternative locations are examined in early stages of planning, recognizing that the avoidance of impacts through the early consideration of alternatives may be the most important and effective mitigation strategy.

This should include a description of the main alternatives considered, the criteria used for comparing and choosing between alternatives and the main reason for the choice of the preferred location.

Usually the alternative locations for some works (e.g. DWTP) and the routes for water main transmissions are analyzed on Strategic Environmental Assessment carried out for Urban Planning (Zonal Urban Planning, Locality/Municipality General Urban Planning) - reference to this aspect should be made.

The area for potential well's locations will be selected based on the results of the hydrogeological and geological studies carried out in a preliminary stage of design. The following aspects are investigated:

- depth to bedrock,
- rock types, deposits and alteration,
- conclusions of the geophysical investigations
- aquifer geometry (extent, thickness, slope, etc.).
- annual recharge, and infiltration conditions in soil and subsoil
- water table level, and type (perched, confined, unconfined)
- water table fluctuations (seasonal, extremes)
- groundwater flow direction and gradient
- aquifer properties (permeability, transmissivity, storage) and classification (regionally important, locally important, etc.).
- records for existing groundwater wells in the area: groundwater quality and wells yield
- surface water bodies: flows directions, distances to investigated area, seasonal flows variations and extreme flow variations (flood or drought), quality parameters

The EIA Report will describe the alternative locations for all main components of the project and will refer to:

- Pipeline routes
- DWTP location
- Wells location/s, surface water intake
- Locations for WPS, reservoirs (considering the land use on site and on the proximity, elevation etc)

A map containing the alternative locations for project components must be provided.

Projects which these guidelines address may 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 - aquifer properties, proximity to rivers, proximity to towns, site topography etc Furthermore, engineering and economic criteria may also influence the decision, both of which 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

Alternatives will take into account the environmental aspects (minimisation of environmental impacts due to emissions, noise, odour and wastes), existing water infrastructure (DWTP, WTP, reservoirs, drinking water distribution network) design flexibility for future extension, investment and operation costs.



The following provides relevant examples of alternative design and processes:

- Water Supply System (WSS) design: centralized (one WSS for WSZs) versus decentralized system (each WSZ with its own WWS Alternative designs water abstraction: single well versus multiple wells; construction of new wells/wells versus rehabilitation of the existing wells- for groundwater abstraction , and for surface water abstraction ,rehabilitation of existing intake structures or new intake structures construction, e.g. shore intake, pier intakes.
- New DWTP versus abandon the existing one or rehabilitation of the existing one
- Water treatment processes alternatives which can differ according to raw water quality parameters and treatment processes required:
 - pH adjustment by using lime, soda ash, or sodium hydroxide
 - Flocculation: by using various of flocculating agents e.g. aluminum hydroxide, polymers ,iron hydroxide etc.
 - Filtration: rapid sand filter, membrane filters
 - Disinfection: chlorine, ozone, ultraviolet
- Water distribution: Keeping the existing system configuration versus reconnecting the water distribution system supplied from high level reservoirs and adding extra storage capacity
- Reservoirs location with a potential for gravity flow into supply versus location that require pumping
- Sludge treatment: settlement tanks and lagoons versus settlement tanks and mechanical thickening and dewatering facilities.
- Construction alternatives, e.g. classical technology – open trenches versus controlled horizontal drilling for pipe laying

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).

For example, in selecting a well's location, after previously confirmed by preliminary studies the areas where an aquifer meet the requirements of the project (e.g. yield, quality parameters) the following aspects are considerate and analysed:

- available land (or landowner) and landuse
- distances to other existing or designed water infrastructure works locations (DWTP, reservoirs) with which must be in connection
- elevation of proposed location and elevation of other existing or designed water infrastructure works locations (DWTP, reservoirs) with which must be in connection

The study of alternatives must include also *“Do nothing” option*.

Generally, several technical options – considering different locations, processes and /or design - are compared taking into account 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.



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 the location of 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

- Surface water (rivers, streams, dry washes that may become regular creeks during the rainy and snow melting seasons, lakes, canals) in project area and neighborhoods: distances to project location/s;
- In the case of surface water bodies used as sources for water supply: tributaries and confluences with other surface water bodies
- River's basin catchments map
- Identification of the rivers, streams etc. crossed by water supply pipelines - main water transmission, distribution networks (existing or proposed within the project); location description of the crossings
- Water use of the water bodies in project area and downstream : source of drinking water, source of industrial water supply, irrigation, fishing, recreation
- Data on water quality of surface water bodies used or proposed to be used as source for water supply: physical and chemical parameters, pH, hardness, bacteriological and microbiological parameters, priority substances etc.
- Surface water bodies used as sources for water supply: water flows/volume and levels (minimum, average, maximum); the extent and maximum levels of any recorded flooding
- Discharge points of water polluters or potential polluters in the water bodies located upstream or in the project area : industrial, non-treated water, farming etc
- The nature and location of the aquifers in the project area; water movement direction on groundwater
- Depth to water table, mainly in proposed works locations and on pipelines routes
- Data on groundwater quality; aquifer vulnerability. For groundwater abstraction works detailed data will be presented, including water quality analysis, including as a minimum general chemistry, trace metals and bacteria. Depending upon the local conditions (e.g. pesticide application in vicinity, past industrial use of land,



etc.) and the end use of the water supply (e.g. drinking water supply, industrial supply etc.) additional parameters testing must be done.

- Quality targets for groundwater and surface water bodies, set by River Basin Management Plans, for project area
- Existing groundwater abstraction points in the area : location, distances to proposed well's location; nearest groundwater abstraction points; aquifer abstracted; total abstraction rate; well's yield
- Summary of the hydrogeological study carried out for the project (groundwater abstraction) and, if any, the results of the test drillings
- Identification of any groundwater existing pollution or contamination hazards
- Historical quality or quantitative fluctuations on groundwater/surface water proposed as water source
- Drainage in project area; includes the location and capacity, canals, drains and rivers; identification of areas prone to flash foods
- Sanitary restricted area in the vicinity or on proposed routes/locations of water main transmission, drinking water network, D WTP, WPSs, reservoirs
- Predictions of overflow events (frequency and volume) current overflow events (frequency and volume)
- Water bodies catchments area map;
- Actual water consumption (l/day/cap) in project area
- Relevant information from strategies/plans on national or regional level (River Basin Flood Strategy, River Basin Development Plan, River Basin Management Plan)

Soils and geology

- Topography, geomorphology
- Geological and hydrogeological features of project area and detailed data related to envisaged location of the well/s: regional and local geological setting, relevant data resulted from on site investigation (e.g. trial pits, groundwater tests) (corresponding map must be provide). Related to wells: standard geological cross-sections should be included. Whenever possible, the soils or geological information generated by the investigation should be described graphically
- Pedological features of project area
- Geotechnical features of project area
- Any exploration for natural resources in the area (minerals, oil, water supply etc)
- Types of soil degradation in project area: surface erosion, depth erosion, landslides, soil settlement – compacting
- Historical land use with contamination suspicion (e.g. tannery, industrial, disposal, etc.)
- Contaminated land sites in the proximity of project location;
- Identification of landfills or waste facilities in the area; distances to them, location, type, status (active/inactive)
- Soil contamination in project area; any previous or recent investigations, comparison with land use requirements

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
- Geographical location
- Current and future settlement areas (as stated in Urban Development Plan)



- Distances from main proposed works to residential, commercial recreational, area institutions and other sensitive receptors
- 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 neighborhoods
- Data on existing noise level in works locations

Flora and Fauna

- Flora description in project area and neighborhoods: existing habitats or plant communities, locations of sensitive or rare species, protected sites
- Fauna description in project area and neighborhoods: principal habitats, species, significant locations for breeding, sites for survey/trapping
- Special requirements of fauna species in project area and neighborhoods: territory size, habitat quality, current management, lack of disturbance
- Flora in project area and neighborhoods: dominant species, species diversity, dependence on particular environmental factors, existing management
- Diversity, population size or density of fauna
- 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

- Characteristics and 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 (wastewater collecting system, power systems, canals etc).
- Industry, economic objectives; there will be specified those which have wells for groundwater abstraction (independent water source from locality's WSS)
- Touristic areas

Cultural Heritage - (archaeological and architectural heritage)

- Architectural, archaeological heritage in project area or in the vicinity. 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: groundwater abstraction in the project area can limit the use of the same aquifer for other existing users (industries, commercial).

3.4 SENSITIVITY

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

- Works done during construction period could accentuate soil degradation
- Improper sealing of borehole of wells could lead to aquifer pollution

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, material etc) as well as the associated impacts are well known. Each sub-section below covers an environmental factor on which a water supply or groundwater abstraction project is likely to have significant effects and presents briefly, which these might be.

In the spirit of the entire document, the Reporter is recommended to not describe the general potential impacts but rather to present in the EIA Report those effects which have been identified and assessed for the proposed project and the causes for their appearance due to any specific conditions of the site, activity schedule, supply with construction materials and so on as well as due to the characteristics of the receptors previously identified. If any significant effects have been identified in relation with a certain environmental factor, it is strongly recommended to present 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 with regards to:

- 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: realignment of the pipeline route to avoid sensitive areas, residential property, implementing the restricted areas in the proximity of wells, consolidation works to avoid landslides.

The general mitigation measures appropriate for each effect/impact are described in each subsection below. The EIA Report should present those actually envisaged for the proposed project, as concisely and accurately as possible.



4.1 WATER AND GROUNDWATER

4.1.1 Possible Effects and Impacts

Construction

- Change at local level the hydrodynamic drainage due to underground civil structures or pipes construction operations
- In the case of imperfect sealing of contaminated upper layers during wells drilling there is the risk of deep groundwater aquifers contamination leading to degradation of water quality extracted and also to major impact on water supplies for other water users located in the downstream direction of groundwater flow.
- River bed blockage or reduction of flow sections the runoff of sediment as an indirect effect of increased soil erosion a due to removal of vegetation, earth works and the use of heavy equipment.
- Clearance of sites from vegetation, as well as the execution of excavation works using heavy equipment or inappropriate construction practices and soil protection measures, may accelerate erosion, leading to soil instability and landslides in sloped areas, resulting in possible water pollution due to run-off to surface waters (causing increased turbidity)
- Degradation of river banks stability due to placement or operation of construction equipment in the banks vicinity.
- Surface water body contamination by uncontrolled surface run-off (accidental spills of fuel, lubricants, etc.)
- Groundwater contamination due to infiltration of accidental spills of fuel and lubricants due to improper disposal of storage facilities or improper handling and refuelling operations
- Potential contamination of surface and groundwater with hazardous substances due drainage water from work sites
- During wells drilling a significant amount of water will need to be displaced from the site; if the location has not connection to sewage network, the discharge can affect the area, especially if the pH value is low, because of using of some chemicals used in the case of drilling hole blockage (e.g. sodium-hexametaphosphate)

Operation

- Water losses (main transmission, network) conduct to overuse of water resources used as raw water source
- Variations of groundwater levels and flows (depending on abstraction rate, location and site-specific hydrogeology) due to abstraction may draw poor quality groundwater into the aquifer, from another aquifer
- Over exploitation of the resource due to higher volumes than initially designed of groundwater abstraction with effects on:
 - yields of the operated well and/or nearby wells
 - flows in nearby springs or streams
- The effects can have significant impacts in the case of shallow groundwater abstraction and if over exploitation of the groundwater resources is done on drought periods.
- Changes in groundwater flow and changes of other well's yield, which abstract the same aquifer
- Reduction of groundwater recharge by creation of large build-up or paved areas, irrigation
- Decrease of base flow of surface water body due to increased abstraction rate cumulated with drought conditions, especially in the case of shallow groundwater abstractions.
- In the case of wells located in coastal zones, due to overexploitation of the aquifer, the alteration of groundwater qualitative parameters due to saltwater intrusion



- Contamination of groundwater due to soil contamination and infiltration (local and accidental soil contamination or due to extensive use of fertiliser in agriculture, inappropriate design or operation of landfill, oil reservoir parks, etc)
- Contamination of groundwater due to accidental damage of wells sealing during operation and mixture with the contaminated upper layers
- Reduction of wells yield because of discontinuous exploitation or over exploitation and boreholes sanding.

4.1.2 Potential Mitigation Measures

Construction

- Excavation works will not be executed under aggressive weather conditions (rains, strong winds).
- Special attention should be given to concluding the drilling phase of wells by sealing, insulation and cement the un upper aquifers to prevent contamination of water abstracted
- Correct lay out of drinking water pipelines in order to avoid infiltration from accidental damage on sewage
- Use of low quality water for sprinkling for dust prevention on working sites

Operation

- Delimitation of the restriction areas in the proximity of wells, WPS, reservoirs and DWTP locations and along main water transmission and periodically inspections for checking the compliance with water management regulations related the prevention of water resources pollution (as stated by GD 930/2005)
- Any intervention (construction, consolidation etc) in the vicinity of wells, reservoirs, WPSs and DWTP, surface water intake, must be executed according to water management legislation, related to sanitary and hydrogeological restricted areas
- Adequate protection of wells
- Periodically testing of water source (surface and groundwater) quality by specific analyses
- In the case of wells: measurements and records of hydrodynamic and hydrostatic levels of groundwater to detect any changes on yields and quality parameters; in the case of significant modifications, additional investigations should be done for identifying the causes and taking appropriate measures (e.g. de-sanding operations)
- Restrictions of groundwater quantities abstracted in the case of significant modifications of aquifer parameters and if possible, the use of surface water source (especially on drought periods)
- Survey of groundwater pollution sources identified in the wells locations or in their vicinity
- Regular inspections of the drinking water network in order to timely detect any failures, and take appropriate remedial action to avoid water losses and water contamination
- For mitigate water losses, implementation of inspection and control programme for water network with the aim of rapid and efficient remediation interventions
- Emergency plan for accidental pollution events and damages on water supply system, including the DWTP

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 pipelines routes or on the locations of excavation works, wells, DWTP, WPS, reservoirs, leading to soil instability and landslides in sloppy areas
- Erosion due to removal of vegetation, earth works and the use of heavy machinery during construction activities in or close to the river bed (e.g. water main transmission crossing a river or brook)
- Soil pollution by accidental spillage of fuels, lubricants and chemicals (e.g. detergents and paints), 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 (work sites)

Operation

- Permanent change of land use (e.g. DWTP or reservoir location)
- Erosion phenomena, soil instability and landslides in hilly areas, due to run-off to surface waters; the effects may be accentuate on period until revegetation has occurred
- On the DWTP location, in the case of inappropriate storage facilities of hazardous substances, through accumulation of rain and snow, the hazardous substances may be dissolved and due the runoff and infiltration can conduct to significant soil and groundwater pollution
- Depth wells reconditioning/rehabilitation through de-sanding operations can generate the same effects and impacts as in the construction stage even if the operation duration is limited.

4.2.2 Potential Mitigation Measures

Construction

- Topsoil removal and storage in separate piles and reinstallation after refilling of trenches, to enable natural revegetation;
- Proper maintenance of transport and construction equipment
- 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.
- In the cases of pipes crossing rivers, creeks: implementation of active revegetation programme on works sites, including in particular erosion-prone areas (e.g. hill sides and river banks)
- In the cases of wells drilling: recipients for drilling fluid collection and de-sanding facilities for groundwater abstracted

Operation

- Storage of hazardous substances in appropriate storage facilities (restricted access, sealed packages)
- Implementing of procedures for storage and handling hazardous substances, including procedures for limitation of contamination of soil



4.3 AIR QUALITY

4.3.1 Possible Effects and Impacts

Construction

- 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.

Operation

- Chlorine emissions due to improper storage recipients handling or damage of equipment

4.3.2 Potential Mitigation Measures

Construction

- 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

Operation

- Procedures for safe handling of chlorine recipients
- Procedures for safe operation of chlorine equipment

4.4 NOISE AND VIBRATION

4.4.1 Possible Effects and Impacts

Construction

- 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 buildings
 - 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

Operation

- Disturbance to neighborhoods (residential, schools, hospitals, recreational area etc)
- Damages (because of vibration) on civil works.



4.4.2 Potential Mitigation Measures

Construction

- Interdiction of construction activities at night and restrictions on limits on hours of rest in sensitive neighbourhoods (e.g. hospitals)
- Identification of vulnerable civil works placed in immediate proximity of construction sites and use of safety methods and equipment; if the case, elimination the use of equipment that may generate dangerous vibrations

Operation

- Insulating the pump houses
- 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

4.5.2 Potential Mitigation Measures

- High standard of construction management

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
- Low ability to recover of fauna species (either naturally or with assistance) from disturbance of the habitat
- Disturbance whether at the local level the habitat is an ecological corridor between other isolated habitats of ecological importance
- Water pollution and groundwater contamination altering the water's physical, chemical and biological qualities, due to the same causes described above for soils and to similar ones which affect directly the water; this further affect the aquatic environment
- Changes of aquatic and/ or terrestrial habitats due to pollution or morphological effects

Operation

- Alteration of the habitats or the plant species, modification or destruction of migration routes for terrestrial and aquatic fauna due to landuse change
- Degradation of the flora caused by physical factors (soil treading, modification of the hydrological conditions)
- In the case of shallow groundwater abstraction, especially related to wells located in the vicinity of wetlands:
 - Decrease of water table due to high abstraction rate,
 - Disturbance to aquatic habitat and consequently of aquatic fauna due to reduction in streamflows



- Degradation of terrestrial vegetation and consequently disturbance and reduced rate of natural restoration
- These effects are accentuated on drought periods.

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
- Removal of trees and replanting as apart from cutting them down. 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 (e.g. 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
- Limiting animals access to the locations that might consist a risk
- Provision of new appropriate habitat
- Creating opportunities for fauna migration
- Related to shallow groundwater aquifer: restriction of groundwater quantities abstracted, especially in the drought periods. In the mean time water table variations must be monitored and in extremely case, temporary interruption of abstraction

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

- Traffic disruptions, resulting in nuisance and interruption of commercial and social activities (especially during pipelines construction or rehabilitation).
- 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
- Temporary interruption of water supply (population, industries, commercial etc.)

Operation

- Maintenance activities on the water supply system: will have similar potential impacts on human settlement and objects of interest, albeit generally at a much smaller scale. For such activities, the same mitigation strategies therefore apply as during construction.
- Operational noise
- Proper services and water supply infrastructure, with benefits to living and working in project area or neighbourhoods
- In the cases of significant raw water contamination and its improper treatment due to DWTP technology limitation, negative effects on water consumers health

4.8.2 Potential Mitigation Measures

Construction

- Preparation of a traffic management plan (of particular relevance to construction of water network)
- 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)
- Avoidance/limitation of disruption and nuisance
 - Limitation of any temporary interference with private property (e.g. pipeline crossings over private lands) – alternatives studied
 - The length of trenches at one time will be limited as much as possible - period estimation will be done
 - (Timely) informing the local communities of the construction programme through for example local news papers.
- 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

- Regular inspections of the water supply system in order to timely detect any failures of the system, and take appropriate remedial action – Environmental Management Plan
- Monitoring the operation of the DWTP in order to optimize the treatment process



- Monitoring the water quality in different points on water distribution network (as presented in Section 4.1.2. Monitoring).
- Procedures for immediate corrective action required to re-establish process control following failure to meet value limits. The procedures should include instructions on required adjustments, process control changes and additional monitoring. For this propose, possible corrective actions in the cases of improper water treatment are:
 - use of an alternative raw water source (if available)
 - change the doses of chemicals used for treatment
 - using auxiliary chemicals such as coagulant, flocculants
 - increasing disinfectant dose
 - secondary or booster disinfection, and localised disinfection
- Public notification of population if the water quality is affected and improper for consumption

4.9 LANDSCAPE

4.9.1 Possible Effects and Impacts

- Impacts on the physical structure and aesthetics of landscape depends on the changes in scale and dimensions, introduced by project structures in comparison with the existing landscape characteristics (height, plan dimensions)
- Impacts on area in particular visibility from viewpoint at recreation area, tourist area, residential area etc.
- Indirect visual impacts due to changes in water regimes

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)
- Adequate screening and design of treatment plant to ensure that it blends into the surrounding environment

4.10 CULTURAL HERITAGE (ARCHAEOLOGY & ARCHITECTURE)

4.10.1 Possible Effects and Impacts

- Like in case of other large projects involving earthworks, there is the risk to uncover objects of cultural and archaeological significance not known before
- Vibrations can influence the constructed environment including architectural and archaeological monuments
- Physical damage of historically or archeologically objectives because of water table fluctuation



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

- Carry out detailed archaeological survey of site as well as comprehensive desk study to determine level or potential level of cultural or architectural significance of the area
- Include any necessary measure to ensure the protection of such objectives under the legal provisions.

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

Construction

- Damage to other infrastructure (roads, water supply pipelines, drains, buildings, utility lines, 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)
- Temporary interruption of industrial, commercial and social activities due to limitation of drinking water supply during construction activities
- Traffic disruption during construction due to construction/rehabilitation of works, mainly of water distribution network.



Operation

- Insufficient water quantities for water supply (people, industry, other consumers), due to the decrease of well's yield in the case of interference with other wells which use the same aquifer for groundwater abstraction
- In the case of aquifer contamination, disruption of industrial activities (e.g. food industry) due to supplying water into distribution network which does not meet quality parameters.

4.11.2 Potential Mitigation Measures

Construction

- Avoid interference with other infrastructure
 - Coordination of work at crossing points with other utility network owners (wastewater, 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 on drinking water distribution network)
 - If any restriction or limitations are required by other utility network owners, these should be precise scheduled
- Traffic management planning. This is of particular relevance to the construction/extension/rehabilitation of water network. Disturbance to local businesses, commuters etc can be significant with regards construction of an extensive water supply system. It is recommended that a detailed traffic management plan be prepared to mitigate against both disturbance and inconvenience.

Operation

- Qualitative and quantitative monitoring of groundwater abstracted
- Alternative water source in case of groundwater contamination or, if possible, additional treatment
- Promotion of reduction of water use and wastage
- Mitigation measures for preventing groundwater source contamination and overuse as presented in Water & Groundwater Section

4.12 MONITORING

The EIA Report will contain a monitoring programme, both for construction and operation phase, which will cover the following aspects:

- On site inspections in order to detect any malfunctions or damages on water supply system
- Pollution emissions (parameters, sampling points, sampling frequency)
- Wastes (types, quantities)
- Institutional capacity to implement the monitoring programme
- Format and frequency of reporting

Construction

A schedule of implementing the measures for reducing or mitigation the environmental effects will be provided.

The proposed monitoring programme for the construction phase is generally limited to water and groundwater quality, air quality and noise level in the working sites, monitoring of the wastes quantities.



Operation

Monitoring activities must be defined for the raw water sources quality and quantity, water treatment process efficiency, drinking water quality on distribution network, sludge resulted from water treatment and also from wastewater treatment, air quality and noise etc.

Water

- *Raw water sources*
 - Groundwater:
 - Qualitative parameters (physical and chemical parameters, microbiological parameters)
 - Groundwater quantities abstracted
 - Variations of hydrodynamic and hydrostatic levels
 - Surface water body:
 - Qualitative parameters (physical and chemical parameters, microbiological parameters)
 - Quantities of water abstracted
 - Fluctuations of surface water body levels in the raw water catchments area
 - The sampling points (upstream and downstream towards intake) and also the frequency of samplings will be specified.
- *DWTP*
 - Water flows (raw water, treated water)
 - Water qualitative parameters – raw water and water in different stages of treatment process, for example: pH, turbidity, Total Organic Carbon (TOC), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), ammonia, hardness, chloride, microbiological parameters and depending on local conditions and the water treatment process: aluminium, iron, lead, cadmium, pesticides etc.
- *Water distribution network*
 - It is recommended that the sampling of water samples from drinking water supply network (including reservoirs and pumping stations) to be done in representative points, selected under the following criteria:
 - network wearing out, considering the areas with frequently malfunctions and water losses (it will be included the areas where interruptions on drinking water supply are recorded)
 - the areas with the most high pollution potential as intersections with other pipes (e.g. sewage pipes),
 - the areas where the previous analyses recorded deficiencies on supplied drinking water quality
 - the areas where it had been done recently reparations or pipes replacements
 - The number and the frequency of samplings will be set depending on the supplied population in the WSS.
- *Wastewater resulted from drinking water treatment process*
 - Qualitative and quantitative monitoring for the technological wastewater must be done
 - The qualitative parameters will be set depending on the water treatment process and the receiver of the wastewater - surface water body or sewage (for example: BOD, COD, SS, pH)

Wastes

- Sludge resulted from water treatment quantitative and qualitative monitoring must be done. Parameters monitored include the mineralization rate, sludge age, organic substances content, dry substance content (%), and pH. In addition, before sludge is transport to the final destination,



analyses must be envisaged to be undertaken in order to determine pH, pollutants content, coliforms etc.

Materials and chemical substances used in water treatment process

- The type and quantities of materials and chemical substances used in the water treatment process will be recorded, e.g. coagulants, sodium hydroxide, chlorine.

Air quality

- Monitoring of air emissions should be done on DWTP location, especially as it concerns chlorine (when such substance is used for water treatment).

Noise

- In the cases of DWTP and WPSs located in residential area or in the vicinity of other sensitive locations noise levels should be periodically measured.

4.13 CUMULATIVE ENVIRONMENTAL EFFECTS AND INTERACTION OF THE FOREGOING

4.13.1 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 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 water scheme is to coordinate the assessment process with adjacent schemes, where this is relevant (e.g. River Basin Management Plan, Urban Plan) For example, in the case of other existing or planned groundwater abstractions, it can be identified cumulative impacts due the decrease of the abstracted aquifer resources.

4.13.2 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 in a water supply scheme context include inter-relationships between soil and geology and water and groundwater impact; and community impacts:

- extensive groundwater abstraction leads to decreased trend of the aquifer resource (in well's abstraction point or others existing in the area) with negative effects on water supply in terms of quantitative aspects; also, this can lead to variations on water table levels affecting biodiversity in the area where these changes occur



- water supply system disturbance by reasons as above mentioned with consequences as reduced well's yield or proper treatment failure due to changes of raw groundwater quality parameters; the negative effects can have impacts on water consumers (inhabitants, industries etc.)

Figure 1 shows an example of 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.

4.13.3 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 ENVIRONMENTAL MANAGEMENT PLAN

5.1 PURPOSE AND SCOPE OF EM PLANS (EMP)

5.1.1 When an EMP is required?

The EIA Directive does not explicitly require the preparation of an EMP. Nevertheless, its preparation and inclusion is recognized as international best practice. EMP may not occur for small-scale projects; projects in non-sensitive environments; projects where the negative impacts have already been assessed in analogous EIAs and found to be minimal; and/or projects fully aligned with the land use zoning.

5.1.2 Over-arching Objectives of an EMP

The objectives of an EMP should include:

- Ensuring compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international;
- Ensuring that there is sufficient allocation of resources on the project budget so that the scale of EMP-related activities is consistent with the significance of project impacts;
- Verifying environmental performance through information on impacts as they occur;
- Responding to changes in project implementation not considered in the EIA;
- Responding to unforeseen events; and
- Providing feedback for continual improvement in environmental performance.

5.1.3 Generic Scope of an EMP

In order to achieve the above objectives, the generic scope of an EMP should include the following:

- Definition of the environmental management objectives to be realized during the life of a project (i.e. pre-construction, construction, operation and/or decommissioning phases) in order to enhance benefits and minimise adverse environmental impacts.
- Description of the detailed actions needed to achieve these objectives, including how they will be achieved, by whom, by when, with what resources, with what monitoring/verification, and to what target or performance level. Mechanisms must also be provided to address changes in the project implementation, emergencies or unexpected events, and the associated approval processes.
- Clarification of institutional structures, roles, communication and reporting processes required as part of the implementation of the EMP.
- Description of the link between the EMP and associated legislated requirements.
- Description of requirements for record keeping, reporting, review, auditing and updating of the EMP.

5.2 CONTENT AND FORMAT OF EM PLANS

It is widely recognized that there is no standard format for EMPs. The format needs to fit the circumstances in which the EMP is being developed and the requirements that it is designed to meet. The level of detail in the EMP may vary from a few pages for a project with low project-related environmental risks; to a substantial document for a large-scale complex project with potentially high environmental risks.

The following sections provide an overview of information that should be included in an EMP



1. Overview of the proposed activity and the local context

Provide a brief summary of the:

- proposed project and associated construction or operational activities;
- affected biophysical, economic and social environment;
- local environmental management, legal and planning context relevant to the EMP.

2. Summary of impacts associated with the proposed activity

Summarise the predicted negative and positive impacts associated with the proposed project, particularly those presenting impacts of medium to high significance.

3. Project Proponent's environmental management policies and commitments

Summarise the Project Proponent's existing policies, guidelines and commitments relating to health, safety and environment.

4. Institutional arrangements: roles and responsibilities

Clearly define the responsibilities for management actions contained in the EMP and clarify arrangements for coordination among the role players involved in implementation.

5. Legal requirements

Identify the legislation, standards, guidelines and associated permits or licences that apply to the project and are related to management activities specified in the EMP.

6. Implementation programme

Presents the objectives to be achieved through the EMP and the management actions that need to be implemented in order to mitigate the negative impacts and enhance the benefits of the project. Associated responsibilities, monitoring, criteria/targets and timeframes are clearly specified.

The implementation programme provides the core of the EMP and should include a description of the following:

- Objectives
- Management actions
- Responsibilities for the identified actions
- Monitoring
- Performance specifications (i.e. criteria and targets)
- Implementation schedule.

The EMP should provide over-arching objectives to be achieved through the management of project activities and risk sources. These objectives are based on managing the environmental impacts identified *inter alia* through an EIA process; and specify the desired outcomes from effectively minimizing the negative impacts and enhancing the positive impacts.

Management actions are actions that are feasible, practical and cost-effective, and need to be implemented in order to achieve the objectives described above. These actions are based on the mitigation and enhancement actions identified in the EIA, together with additional information that may become available subsequent to completing the EIA. The EMP must specify a programme for implementing the management actions, including: who, when and how; as well as what resources should



be allocated. Enhancing the positive impacts of a project is often overlooked, and it is important that the EMP contains clear actions in this regard, based, for example, on the EIA recommendations.

As part of implementing the management actions, Method Statements should be prepared by the Contractor and/or Sub-contractor. These Method Statements should specify how they will manage potential environmental impacts in line with the requirements of the EMP, and, where relevant, environmental best practice; and how they will practically ensure that the objectives of the EMP are achieved.

Box 6 Requirements for determining whether management actions are clearly defined

To determine whether the management actions are adequately defined they need to satisfy the following key requirements:

- **Written:** Management actions should be stipulated in writing, this forces the formulators to think through each action carefully.
- **Dated:** A management action must indicate a specific time by when the action should be implemented.
- **Risk- or impact-specific:** Each management action must link to a specific impact (either positive or negative) or environmental risk, and should be worded in specific terms rather than in general terms.
- **Time and space specific:** An indication must be given as to the conditions under which the management action applies (continuously or only in the event of contingencies). The time (such as the season or time of day) and location of the application of the management action.
- **Measurable:** Management actions must, where possible, be quantitatively defined. A standard with which performance can be compared, must thus be set. Objectives and targets of the management action must be clearly stated.
- **Achievable:** The management action must be realistic, feasible and hence achievable;
- **Reasonable:** The management action must be readily implementable within the time and budget constraints of a project.
- **Timely:** Measures must be put in place to coincide with specific project activities.
- **Understandable:** Management actions must be described simply, using clear, non-technical language where possible.

Responsibilities must be clearly identified for the different parties involved in implementing the management actions and monitoring.

Monitoring programmes should be prepared to determine the effectiveness of the management actions and to understand the actual residual impact of the construction and/or operations on the environment. These monitoring programmes (e.g. soil or groundwater monitoring) may be designed by specialists in consultation with the Project Proponent and relevant stakeholders, depending on the complexity of the monitoring required. Where monitoring programmes are required, these should be designed to be pragmatic and implementable. As far as possible, measurement parameters should be selected which provide immediate results in order for appropriate management actions to be taken as soon as possible, in the event of an exceedance of guideline values or accepted performance levels.

The monitoring programme could comprise three main aspects:

- **Baseline measuring:** This should occur prior to the start of the project or activity in order to determine the level and status of the environmental parameters prior to any impacts associated with the project or activity.
- **Impact (or performance) monitoring:** This monitoring should be ongoing throughout the project life-cycle and must be implemented to ensure that environmental impacts are within the predicted levels and that specified performance targets are being achieved.



- **Compliance monitoring:** This monitoring should be implemented to ensure that the prescribed mitigation measures are having the predicted and desired effect. This monitoring would be conducted periodically, the timing of which will vary from project to project. It must be used to check that the levels of specific environmental parameters are compliant with laws, regulations, standards or guidelines, as applicable. The programme must make provision for remedial measures to be effectively implemented in the event of non-compliance - i.e. when mitigation measures are inadequate or when impacts have been underestimated in the EIA.

The management actions and monitoring need to take into account the following three scenarios:

- Normal operations
- Abnormal situations (e.g. planned shutdown to service equipment)
- Emergency situations (e.g. unexpected oil spill).

Performance specifications (e.g. criteria or targets) must be provided for each management action or monitoring activity, in order to assess whether the actions have been effective. Performance specifications could be based on the level at which an environmental condition must remain (eg. habitat in a part of the site that must not be disturbed), or the level to which the environmental condition must be restored (eg. habitat rehabilitation), or legislated or agreed limits (e.g. air quality standards), or the level of socio-economic benefits to be realized through the project (e.g. use of local labour and enterprises). Where possible, these performance specifications should be quantitative. These specifications might be revised during the implementation of the EMP, in the spirit of promoting continuous improvement.

An **implementation schedule** must be prepared showing the sequence and timing (including frequency and duration) of the management actions and monitoring activities of the EMP. Where monitoring reports are produced, the timing of such reports should be indicated. The schedule must be drawn up with the Project Proponent, to ensure necessary links are made between the implementation schedule for the EMP and the overall project schedule.

7. Cost estimates and financial resources

Provide cost estimates for initial and recurring expenses for implementation of the EMP, including provision for: mitigation and enhancement actions; training and environmental awareness requirements; monitoring; auditing; and corrective actions.



Box 7 Environmental Management Plan – Water Supply System

Main contents of an Environmental Management Plan for a WSS should include but not be limited to:

- **Company (operator) description and site location**
 - Name and Address of the company
 - Company operations
 - Staff numbers
 - Company structure (operational chart is recommended)
 - Site address (details will be provided for all areas where the company is operating)
- **Site Description**
 - Site layout
 - Buildings and civil structures
 - Equipment and installations
- **Regulatory documents – legal agreements, consents and permits**
 - Type of documents already granted or has to apply for (environmental agreement/permit, water agreement/permit, development consent etc.)
 - Specifications related to the provisions of the regulatory documents: - : location, land area covered, raw water source, quantities for water abstracted; key conditions: performance specifications (e.g. efficiency of water and sludge treatment processes, parametric values of treated water parameters, sludge humidity); mitigation measures
 - Required monitoring: environmental factors, sampling points, parameters, frequency, responsibilities
- **Potential impacts of the project and recommended mitigation measures**
 - A brief description of potential impacts of the project and recommended mitigation measures will be presented in a tabular form, containing the following:
 - Project stage: pre-construction, construction and operating phase
 - Activity/operation: working sites preparation, excavation works, water abstraction, water treatment, sludge treatment etc.
 - Potential environmental impacts associated to the activity/each type of operation
 - Brief description of the mitigation measures recommended/envisaged; implementing schedule and reporting
 - Institutional responsibilities (Contractor, Operator, others)
- **Operational matters**
 - Procedures for records of wells operation: daily and total abstracted groundwater, measurements of hydrostatic and hydrodynamic groundwater levels, interruption of groundwater abstraction, any interventions on borehole
 - Inspection procedures for prevention the water resources pollution - the restricted areas in the proximity of wells, WPSs, water main transmission and DWTP
 - Drinking water treatment process description (including sludge treatment); water treatment process diagram and water and wastewater treatment flow diagrams will be attached
 - Operational procedures: work instructions for maintenance & operation of the DWTP, reservoirs, WPSs
 - Inspection procedures to determine the current conditions and the necessary maintenance operations (DWTP, reservoirs, WPSs area, structures, equipment and installations etc., inspections frequency, responsibilities)
 - Procedures for regular inspections on drinking water network
 - Procedures for storage and handling materials and chemicals on site, for DWTP operation; records of type and quantities of materials and chemicals used
 - Procedures for records of wastes, especially sludge resulted from treatment process (qualitative and quantitative)
 - Procedures for records of specific analyses on drinking water supplied (DWTP, reservoirs, distribution network)
 - Environmental monitoring (parameters, sampling points and concentrations): air emissions, raw water, treated water, receiving river/sewerage, waste water resulted from water treatment, soil, treated sludge, noise levels, type, quantities and final destination of wastes and sludge resulted from water treatment etc. (see Section 4.12. Monitoring)



Box 7

- Operational monitoring:
 - Key operating parameters, e.g. physical and chemical parameters of water in different stages of treatment process, flows of treated water and wastewater and sludge resulted from water treatment, liquid levels in the basins from DWTP etc.
 - Materials and chemicals used on water treatment process
 - Wastewater treated volumes/flows
 - Energy consumption
 - Quantities of chemical substances used for water treatment (e.g. coagulants, polyelectrolyte, disinfectants etc)

Records of data related to monitoring will be kept on DWTP site and periodically reporting to the environmental, water management and health authorities will be done, as stated on regulatory documents.

- Identification of risk cases related to the site or the activity (natural disasters as seismic activity, flooding, landslides; fire, explosion; breakdown or failure of processes or facilities; incidents related to hazardous chemicals; occupational health and safety incidents) and procedures for accidents and abnormal events (contingency plans, emergency plans)



6 NON TECHNICAL SUMMARY

6.1 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.

6.2 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).

6.3 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

- Water Framework Directive (Directive 2000/60/EC)
- Drinking Water Directive (Directive 98/83/EC)
- Drinking Water Abstraction Directive (Directive 75/440/EEC)
- Groundwater Directive (Directive 2006/118/CE)

National EIA legislation

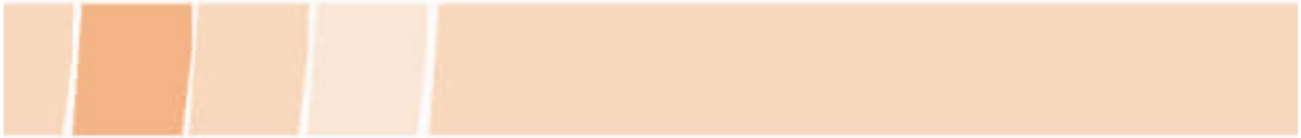
- Government Decision 445/2009 on the assessment of certain public and private projects on the environment;
- Order 135/2010 of the Minister of Environment and Forests to approve the application methodology of environmental impact assessment for public and private projects;
- Order 863/2002 of the Minister 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 for nature protected area, conservation of natural habitats, fauna and flora wild species
- Order 19/2010 of the Minister of Environment and Forests for approval the methodological guidance regarding the assessment on the effects of the plans/projects on Natura 2000 sites

National legislation related to water and groundwater

- Water Law 107/1996, modified and completed by Law 310/2004, Law 112/2006 and Emergency Government Ordinance no. 3/2010
- Law 458/2002 on the quality of drinking water, amended by Law 311/2004
- Government Decision 930/2005 for approval the Special Norms referring to the character and size of sanitary and hydro-geologically protection zones
- Government Decision 567/2006 regarding quality standards that must be fulfilled by the surface water used for purification (NTPA 013 and NTPA 014)
- Government Decision 974/2004, to approve the supervision norms, health inspection and quality monitoring of drinking water
- Government Decision 53/2009 for the approval of National Plan for the protection of groundwater against pollution and deterioration



Contacts:

JASPERS Regional Offices

JASPERS Office for Bulgaria and Romania:

Head of Office
Ms Maria-Teresa Calvete
Vasile Lascar Street, 3
RO-020492 Bucharest
Tel.: (+ 40-21) 208 64 01
Fax.: (+ 40-21) 316 90 60

JASPERS Office for Poland and the Baltic States:

Head of Office
Mr Michael Majewski
Plac Pitsudskiego 1
PL-00-078 Warszawa
Poland
Tel.: (+48 22) 310 05 1 0
F a x . : (+48 22) 310 05 01

JASPERS Office for the Czech Republic, Hungary, Slovakia and Slovenia:

Head of Office
Mr Axel Horhager
Head of JASPERS
Mattiellistrasse 2-4
A-1040 Wien
Austria
Tel. : (+43-1) 505 36 76
Fax. : (+43-1) 505 36 82

JASPERS Headquarters

JASPERS Team in Luxembourg

Mr Agustin Auria Head of JASPERS
European Investment Bank
98-100, boulevard Konrad Adenauer
L-2950 Luxembourg
Tel.: (+352) 43 79-1
E-mail: jaspers@eib.org

JASPERS Headquarters in Luxembourg acts as
JASPERS regional office for Cyprus and Malta

JASPERS website : www.jaspers-europa-info.org



Jaspers Joint Assistance to Support Projects in European Regions • Jaspers Joint Assistance to Support Projects in European Regions



Cover photo: Lithuania: EBS Klaipėda-Jakai Junction

