

**TACIS**  
**Prut River Water Management Project**  
**ICWS, The Netherlands**

**Guidelines**  
**for**  
**Environmental Impact Assessment**  
**of**  
**Waste Water Treatment plants**

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## **1. INTRODUCTION**

### **1.1 Aim and status of these Guidelines**

#### **Context**

These guidelines form part of the Prut River Water Management Project. This project was performed by an international consortium led by ICWS Consultants, for the TACIS programme of the European Commission. The guidelines have been prepared by DHV Consultants of The Netherlands.

#### **Aim**

These Guidelines have the aim to improve the planning process of Waste Water Treatment Plants (WWTPs). By applying EIA to the choice made about site selection, design, construction, operation and abandonment of WWTPs, information about the impacts on the environment and the human population can be considered when decisions are made.

#### **Status**

These Guidelines can be used when Moldovan legal procedures on EIA are applied. However, they are entirely voluntary. It is up to the different actors in the EIA process, initiators, authorities and Non-Governmental Organisations (NGOs) alike, to make use of the recommendations made.

These Guidelines have been developed in an assignment for the Ministry of Environment and Territorial Planning. They take account of Moldovan legislation, and international practice, in particular the legislation in the European Union. They make use of the extended experiences in many countries of the world, as lessons from practice have been represented in documents and recommendations by organisations like the World Bank.

Good quality of these Guidelines and their applicability in the Moldovan situation have been ensured by closely involving Moldovan government officials, Moldovan experts and international experts in its development.

#### **EIA and Sanitation in Moldova**

EIA can be applied to the development of new WWTPs or the upgrading of WWTPs. At present, about 70% of the Moldovan population is connected to a WWTP, but many of these are not performing according to standards. At present, studies are performed to identify priorities for upgrading old WWTPs or establishing new ones. These Guidelines can be applied as soon as principle decisions have been made, and funds for investment are identified.

#### **EIA for other industrial activities**

The general EIA process is the same for all types of industrial installations. What differs, is the technological aspect: impact prediction methods, abatement methods, alternative process technology. Only these are related to different types installations, like food processing industries. These Guidelines therefore may also be useful for other installations and projects than WWTPs.

### **1.2 What is Environmental Impact Assessment?**

#### **Definition and aims**

Environmental Impact Assessment (EIA) is internationally defined as a process to assess the environmental impacts of proposed projects, before permission is granted for their construction. Its aim is to take the environment into consideration when decisions are made, and to increase public support

for the decision by involving the public in the process. EIA legislation and guidelines by the European Union and World Bank are based on this definition.

The term "**environment**" has many different interpretations. In relation to EIA it is often interpreted by international organisations like the World Bank, as anything which is not the direct interest of the project proponent (or initiator). If these interests are affected, this means there is an impact on pollution (environmental quality), public health, social structures or incomes, and ecosystems (the latter are **ecological effects** which may affect biodiversity). An EIA is required to enable decision-makers not only to account for the proponent's interests and objectives, but also the interests of others.

One could argue that WWTPs are designed to improve the environment rather than deteriorate it, and therefore EIA would be less useful. However, WWTPs can also be a threat to the environment in the case of improper design and management, in particular if they are located in sensitive areas (densely populated areas, areas with valuable other land uses, or discharging effluent into ecologically sensitive water). Therefore, large WWTPs, and WWTPs in sensitive areas, require an EIA in many countries, including the member states of the European Union.

### **EIA and SEA**

EIA processes are always linked to a formal government decision. If this decision is a construction permit, it is called a "project EIA", or simply "EIA". If the decision is relevant for a project, but follow-up decisions are still needed before construction works are allowed to start, it is called a "strategic EIA", or Strategic Environmental Assessment (**SEA**).

SEAs are not linked to project decisions, but to policies, plans or programmes. One such programme is the countrywide Masterplan on Waste Water Treatment, which is at present under preparation. The general SEA process is similar to the general EIA process, but assessment methods (methods for impact prediction) are different. Such methods at strategic level are not considered in these Guidelines. It should be remembered, however, that to gain the best environmental benefits from investments made in WWTPs, priorities should be set among different investment options in the country. These priorities should take account of factors like size of the connected population, benefits for public health and ecosystems. Such priorities are set within the framework of an SEA rather than an EIA. EIA only enters the stage as soon as the need for a WWTP, serving a certain population, has been established in an earlier plan.

Guidance on SEAs can be found, for example in the Water Resources Management and Sanitation sections of the website of the World Bank, and in the updates of the Environmental Assessment Sourcebook of the World Bank (see the World Bank website, where it can be downloaded).

### **Steps in the EIA process**

In the EIA process, the following chronological steps are usually necessary:

- **screening**, to determine whether a proposed project might have significant environmental impacts, in which case an EIA is required
- **scoping**, to decide the contents of the EIA; for example; what are the environmentally relevant parts of the project which should be described in detail before impacts can be assessed? which potentially environmentally sound alternatives to the projects should be assessed?
- **assessment**, the preparation of a report that describes the project, its alternatives and predicts impacts
- **review**, in order to decide whether the EIA report (also called Environmental Statement (ES)) is scientifically correct and gives answers to questions posed in the scoping phase
- **decision-making**, to decide whether the project should proceed and under which conditions, indicating how the findings in the ES were taken into account, and weighed against other impacts (e.g. costs, social impacts); if a project is admitted, it is said to be given **consent**; usually this is

done by means of a written **permit** which includes detailed conditions with respect to location, design, and future management of the project

- **monitoring**, to assess whether the project is actually implemented under the conditions posed by the decision-maker, and the actual size of the impacts. Monitoring data should be evaluated and provided to the decision-maker, who can adjust his decision if required.

In many of the stages in the EIA process, the affected public and agencies may be consulted about their views. In most EIA systems, this is formally required in the review phase, often also in the scoping phase. In practice, **public consultation and participation** also may -informally- occur during the preparation of the EIA report.

### Actors in the EIA process

The following actors are involved in EIA processes:

- the **initiator** (or proponent) is the actor who proposes to construct a project; he is also responsible for preparation of the EIA report, and plays a role in scoping and monitoring
- the **competent authority** is the decision-maker who decides about the permit, and may revise the permit when monitoring data show that permit conditions are too lax
- **independent experts** are often involved in the scoping and review process; in some countries EIA reports can only be prepared by **licensed EIA experts**
- **affected agencies (formal consultees)** are government bodies who should express their views about the project and the impacts it may have. These views are advisory. The decision-maker has to take them into consideration.

In practical situations, the EIA process may be linked to different permission procedures at the same time (e.g. environmental permit, discharge permit, building permit, spatial planning decisions). Here, different competent authorities are involved.

EIA processes provide information, which decision-makers should take into account; the EIA process or the EIA report in itself are not decisions. In cases with "multiple decision-makers", EIA processes may become complicated: who has to do what in which stage? What should be done first, and what should be done later? It will then be extremely useful to make clear when the EIA process starts, which decisions are required to consider the information in the EIA report. This will make it much easier to decide which type of information is relevant to be provided by the EIA.

## 1.3 European Union legislation and International Treaties

These Guidelines refer where appropriate, to the European Union legislation relevant to EIA of WWTPs, and to international treaties. These can be split into two types of legislation: first about the EIA process, and second about technical criteria that should be met by WWTPs.

### International legislation relevant for EIA as a process

- European Union Directive on Environmental Assessment of Projects (1985, amended 1997): this Directive requires that certain projects (including large WWTPs) are submitted to an EIA process.
- Espoo Convention on Environmental Impact Assessment in a Transboundary Context, 1992 (so-called Espoo Convention) (signed by Moldova); this Convention requires a country involve neighbour in the EIA process if projects may have transboundary impacts
- The Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, 1998 (so-called Aarhus Convention)

The legal elements of this legislation are in a general way accounted for in these guidelines. More detailed information about them can be found at websites indicated in chapter 6. A new European Union Directive on Environmental Assessment of Plans and Programmes has been accepted in 1999 and will be implemented in the coming years.

### **Environmental design criteria for WWTPs**

Environmental design criteria are technical standards and rules that have to be met by WWTPs, like emission levels, environmental protection systems, etc. (This is not the same as the *process of decision making*). Every country has its own environmental design criteria. At the international level, the most relevant sources for such criteria are the World Health Organisation (recommendations for exposure of humans to pollution), the World Bank, (recommending standards for effluent quality, etc.). The European Union has some legislation as well.

The most important legal standards that WWTPs should meet according to EU legislation, are:

- Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment. This obliges Member States (among others) to provide urban waste water collecting systems (sewerage) and treatment plants for all agglomerations above 2.000 population equivalents, the level of treatment must depend on the sensitivity of the receiving water body, the sensitive water bodies should be designated for the whole country.
- A number of legislation concerning the required quality of surface water and ground water which is to be used for certain purposes (bathing water, drinking water, shellfish waters).
- EU legislation on the maximum allowed noise emission levels of construction plant and equipment, like lawnmowers, motor vehicles, compressors, concrete-breakers, tower cranes
- Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture

Apart from legal standards, there are "best practices" with respect to the mitigation of impacts:

- the design of WWTPs, concerning technical measures to prevent of leakage to the soil and groundwater, emissions to the air, worker safety, noise, odour, etc.
- sludge disposal methods

### **1.3 Link with other environmental policy instruments**

EIA (and SEA) are defined as *processes*. By following a good process, it is assumed that an environmentally sound decision about the proposed project is made. During the EIA process, there are many links with other policy instruments:

#### **Environmental standards**

These are other laws and regulations, specifying the general requirements for WWTPs and other installations, like minimum distances, effluent quality, etc. Whereas environmental standards should be verified during the EIA process, this is not its first objective. The first objective of EIA is to take account of the unique circumstances and impacts of an individual project, rather than generic standards which apply to any WWTP.

#### **Environmental monitoring, inspection and enforcement**

When a WWTP gets its final permit for construction, it includes environmental conditions. Conditions may concern the construction, operation and abandonment phase. These conditions may be the same as for all other WWTPs in Moldova, but they may also be specific for only this WWTP. The competent authorities should verify whether these conditions are maintained, and should enforce them if necessary. The initiator should prepare a monitoring plan as part of the EIA. This monitoring plan can generate data that the authorities can verify (site inspections, samples and listening to complaints of the local population).

#### **Strategic planning**

The link with strategic planning of national sanitation policy has already been indicated above. There can also be links with strategic spatial planning and environmental planning (e.g. establishment of

classes of sensitive ecosystems). These strategic plans will provide criteria, which can be used when EIAs are prepared.

### **Charging systems for industries discharging on sewer systems**

When industries discharge effluent on the sewer system, this pollution is treated in a WWTP. Obviously, these industries need their own environmental permit, and if they are big they also need an EIA. These permits should include conditions about pollution loads in the effluent. It is also possible to require these industries to pay charges according to the discharged pollution load. This requires a sound monitoring system for pollution loads. The charge can be a strong incentive for cleaning-up their own effluent before discharge. (Charging systems can also be applied for industries discharging directly in the environment.)

### **Environmental management and auditing**

According to international standards, owners of industrial installations may ask for certification against an official standard of environmental management. The most well-known standard is the ISO14000 series, which complies with the European Union Directive on Environmental Monitoring and Auditing Systems (EMAS). These standards are only related to the establishment of an Environmental Management Plan for the operational phase of an installation, and not to its more general environmental impacts. In an EIA, however, the initiator could express his intention to implement an environmental management system according to ISO 14000 within a certain time period. This could then be made a permit condition. According to ISO 14000, plant operators should systematically approve the environmental performance, and display openness toward the public. However, it gives no technical guidelines for design or impact mitigation. Under ISO 14000, a certified institute should verify whether the plant manager operates according his own environmental management plan.

## Overview

The following table shows the links between items mentioned in the text above.

Strategic Level, Time	Alternatives	Government Decisions	Decision Information Tool	Environmental Criteria
More strategic, earlier ♦	how important is sanitation (willingness-to-pay)?	Policies, Plans, Programmes	Strategic Environmental Assessment (SEA)	Targets in strategic plans
	which pollution sources should be cleaned-up with priority?			Legal standards
	which type of technology is appropriate under the different circumstances?			Suggestions during consultations
	where to (roughly) locate treatment plants?			(all may apply at every stage)
♦ Less strategic, later	global design	Project Consent / Permit	Environmental Impact Assessment (EIA)	
	where to locate treatment plants exactly?			
	detailed design	Follow-up	Environmental management Systems Environmental Auditing Monitoring and enforcement	
	construction			
	operation			

### EIA versus design criteria

EIA is concerned with the process of decision-making at project level, involving the right groups and providing the right information. EIA is mainly intended to make it easier for decision-makers to trade-off different costs and benefits (which cannot easily be measured in terms of money) against each other. EIA is mainly intended to take account of impacts which are not legally forbidden by general rules.

The design criteria for WWTPs are then of three types:

- Of course, general technical rules (**technical standards**) about WWTPs and their impacts should be obeyed, whether an EIA is undertaken or not (e.g. noise emission standards, compensation of land take, etc.). This should be verified before a permit is issued (in Moldova, this is the Ecological Expertise). The EU standards are described hereafter.
- Next to legal standards, there could be strategic plans for the management of waste water in Moldova; such a plan could include **policy targets** for the quality of effluent. These targets then may serve as criteria for global design at project level, but the decision-maker could decide not to choose a design that realises these targets.
- All general criteria which are mentioned in EIA legislation, and anything that is brought up during the EIA process, by agencies, the public and NGOs (**suggestions during the process**). Also here, the decision-maker ultimately decides about the weight that should be given to these criteria in the design process.

## 1.5 Who are the potential users of these Guidelines?

These Guidelines are intended to be used by all professional actors in the EIA process for WWTP's: proponents, the different governmental bodies involved and the public and non-governmental organisations. The main users are therefore:

- **authorities and enterprises** who initiate the development or upgrading of a WWTP
- the **certified institutes** that are responsible for the design of WWTPs and for the preparation of EIA reports
- the **Ministerial bodies** that are responsible for the **review** of the EIA report (Ministry of Environment and Territorial Development: Department of Ecological Expertise, State Environmental Inspectorate)
- the **Ministerial bodies** or their local representatives who are involved in giving **permission** (decision-makers) of the WWTP (Ministry of Environment and Territorial Development (Resources Use and Licensing Department and the Land Use Planning Department), Ministry of Health, Ministry of Energy.
- the potentially **affected groups**: residents of the affected area, Non-Governmental Organizations.

The Guidelines should be understandable for those who have no technical knowledge of water treatment, or of impact prediction methods. However, they do refer to other sources where more technical background information can be found. Details are also included in appendices.

## 1.6 How to read these Guidelines?

Those who are interested in the legal procedures in Moldova concerning the development of waste water treatment plants, are invited to read **chapter 2**. It was prepared in early 2000, after which date it quickly may become outdated.

**Chapter 3** is interesting for those who need guidance on the steps to take in an EIA process. It applies international principles to the Moldovan situation (early 2000). It is concerned with the steps actors should take, less than technical aspects of impacts assessment.

For those who are looking for guidance on how to predict impacts at each stage of project development (site selection, global design, construction, operation, abandonment), approaches are suggested in **chapter 4**.

**Chapter 5** contains useful websites, references to literature, and explanations of terms and abbreviations.

Readers who are interested in particular **types of environmental impact**, are advised to refer to the scoping and assessment sections of chapter 3, and to chapter 4.

## 2. EIA FOR WASTE WATER TREATMENT PLANTS (WWTP'S) IN MOLDOVA

### 2.1 Introduction

The Terms of Reference specify that these Guidelines should give specific guidance for the environmental assessment in the different states of WWTPs: design, land-use planning and evaluation of alternatives; of operational status and routine assessment (monitoring); of construction and renovation. It is therefore assumed that the decisions on which the EIA process is supposed to have an influence, are about:

- design,
- site selection,
- the provisions made with respect to future management of construction, operation, monitoring, and renovation activities.

In this chapter, the relevant decision-making procedures with respect to these WWTPs are summarised (section 2.2). Then, it is indicated how EIA provisions are linked to decision-making (section 2.3).

### 2.2 The general planning process for WWTPs

The planning and design of Waste Water Treatment Plants (WWTP) and channeling networks is carried out according to national procedures (which are mainly the same as for other types of industrial facilities). The present chapter is discussing the planning and design stage; construction monitoring and operation are discussed only so far as they are related to the planning and design phase.

Major formal documents are indicated in **bold**, major binding formal decisions by the government are indicated in ***bold italics***. References are number and listed at the end of the section.

#### STRATEGIC OR PRE-FEASIBILITY STAGE

##### **Initiation and coordination with the general plan of territory development**

The party (person or legal entity), interested in developing sewage systems and WWTPs is to address the local public administration with a **permit application** seeking permit to design and build such objects. Earlier most of such parties were various national ministries. Presently all municipal infrastructure is subject to be transferred into the ownership (management) of the local administration (1). It is expected that in the future, the main developers of WWTPs will be agencies of local administration and industry.

Every town or village has a ***General Development Plan***, coordinated with the Ministry of Ecology and Territorial Development. This plan accounts for the development needs of the respective community, including the need of having a WWTP (2). After receiving from the local townhall the Situational Plan, which indicates where WWTP could be planned, the interested party is to address a licensed designer. If the General Development Plan does not provide for the proposed project, it will be amended after the project has been approved.

## FEASIBILITY OR GLOBAL DESIGN PHASE

### **Preliminary options regarding the location and treatment technology (Technical and Economic Foundation and Calculations - TEFC)**

The designer is to develop the **preliminary project documentation**, including the documentation needed for the receipt of the town-planning certificate (3). The designer, together with the developer, make a preliminary calculation of the required capacity of the WWTP, using model WWTP designs, and peak norms of water consumption and water treatment. The designer also draws a preliminary sketch of the technological circuit and set-up of main and auxiliary structures and networks, based on the required conditions of treatment and dumping of treated waters (4, 5).

Two to three WWTP alternative set-up options are reviewed at this stage. The description of each of these options includes:

- (1) area of the object (including possible extension),
- (2) preliminary estimate of investment requirements (including prevention of air and deep and shallow groundwater pollution and special conditions, such as seismic activity, high groundwater level, propensity to landslides, etc.), and
- (3) operation of the WWTP. Additional options may be offered by alternative treatment technologies. The planned area of the WWTP is determined after the largest of all options.

The developer together with the designer, receives from the potential customers the so-called "preliminary conditions" describing the connection of the WWTP to the prospective sources of waste water, networks, and communication for each customer. All these statements are to be received in written form and serve as basis for the preliminary area planning (6).

At this stage, WWTP with a capacity of over 10,000 m<sup>3</sup> per day, require the implementation of an **EIA Report** as part of the overall packet of documents (7). WWTP with a smaller capacity only need an «environmental chapter» to be written at a later stage of the project.

The optimal choice of the object set-up is determined on the basis of the technical and economic comparison of the different options. The decision is made by designers together with the developer on the basis of calculations and other materials. The preliminary project documentation resulting from the TEFC stage is to be co-ordinated with all interested parties and **approved** by the relevant state control agencies, which should also participate at the selection for the site of the future WWTP (the commission mentioned hereafter).

### **Selection of the construction site**

The developer is responsible for the selection of the construction site, obtaining all the co-ordination and conclusion documents. At the request of the developer, the local administration appoints a commission for the selection of the construction area for the option approved as part of the TEFC.

On a pre-scheduled day all members of the commission visit the site, and, after that, on the basis of their visual assessment and available documentation, prepare the written co-ordination and conclusion documents. Their agreement with the developer's choice of site is confirmed by signatures on the **Act of Site Selection**, to which they attach all the conclusions, remarks, or adjustment requirements (which should be taken into account and implemented in the process of further project design). For example, if the proposed site coincides with an archaeological site, then the developer may turn it down or agree to financially support the archaeological works.

Should the commission members disagree on the choice of site, the Act of Site Selection will contain a record on the disagreement, and the dispute will be settled in civil or economic court (8). In this case the developer may also turn down the site.

**Preliminary land allotment**

The preliminary is subject to detailed review, following the comments and technical conditions. The general plan of the site displays the networks and buildings with a clear marking of their boundaries. (9, 10, and others). The preliminary land allotment materials (Act of Site Selection, and Land Cadaster Plan), are subject to revision and approval of the owners of the land. The owners are to provide a signed approval for the allotment of the land. After that the materials are to be reviewed by the local administration (within 10 days) and the Ministry of Agriculture (within 10 days). The approved materials are then to be transferred to the Government for the issuance of the permit for the preliminary allotment of land and project development. On the basis of this approval the developer receives the *town-planning certificate*, allowing further development of the project.

**Amendment of the general municipal development plan**

In case if the general plan does not provide for a WWTP or the site allotted for the WWTP is not large enough, then the town-planning Department should propose to the developer a new site, which typically requires amendments (adjustments) in the general municipal development plan. In such cases, the choice of site should take into account a set of requirements (which typically have already been taken into account in the general plan), specifically: WWTP should be located on non-agricultural land, or, in the absence of such areas, on agricultural land of lesser quality. Basically, the further actions are similar to items 2-4, and differ from them only in the sense that the interested agencies (Ministry of Ecology and Territorial Development, Ministry of Health, Ministry of Culture) may require some more detailed research data.

**Working (detailed) projects**

After receiving the town-planning certificate and the preliminary land allotment, the developer subcontracts the project design organisation and prepares the project task (11). Further on the development of the project documentation is carried out on the basis of the preliminary project documentation, town-planning certificate, project task, and research data. All major decisions made during the preliminary project stage (TEFC) are maintained (technological scheme, main types of structures and equipment). Decisions which consist of a set of options are made for small sites and mainly during the set-up of the equipment.

The composition of the project documentation should comply with the existing requirements (11, 12, 13, 14). The main condition applying to WWTP projects is that the project design of WWTP should be developed at the same time as the project design of water supply systems, and should necessarily take into account the balance of water consumption and waste water treatment, the needs of existing water consumers and their growth potential, the options of using treated waste water waters, and rainfall data.

The process of designing WWTPs is regulated by existing norms, reference materials and manuals (9, 15, 16, 17, others). The project design of WWTP should take into account the active environmental legislation and provide for a set of measures excluding (diminishing) direct and indirect impact upon the environment, ecosystems, public health (4, 5, 7, 18-22, others) at all stages of project implementation (building, operation, liquidation).

The project documentation of all types of WWTP (regardless of their capacity) should include an «Environmental Protection» chapter containing well-supported and rational options for the protection of waters, air, soils (13). The Environmental Protection chapter in the project documentation of large WWTP may be based on the Environmental Protection recommendations developed during the preliminary stage.

The project documentation should include budgets for construction works, equipment set-up, and measures of environmental protection. The project documentation should also include a chapter on «Emergencies Prevention». This chapter should take into account all technical standards concerning emergency situations (seismic activity, landslides, carst, groundwater flooding, surface flooding, etc.)

and different types of emergencies. Besides, it should include recommendations on compliance with technical regulations (on the basis of facility operation instructions), environmental and technological monitoring.

### **Approval of the detailed project documentation**

The project documentation is reviewed by the Norms and Control Department of the project design organization, and, if major divergencies between the project documentation and the initial technical conditions and conclusions (recommendations) were allowed, it is also co-ordinated with other interested organizations. If the interested organizations do not approve the project, they should provide their comments and the project may be amended and sent back for their approval. Also, at this stage a determination is to be made concerning the amount of work on the removal and storage of the fertile soil layers. After that the project documentation is sent for the technical and **ecological expertise** (review) by the Ministry of Environment and Territorial Development and is defended by the project design organization.

If the expertise returns a positive answer, the project documentation is sent for the *approval (of detailed design)* by the local public administration (if the project is financed by the state) or by the developer (if it is financed from other sources). Specific requirements towards the project approval documentation are contained in (7). There also need to be held consultations with the local communities (23).

If the expertise returns a negative answer, the project documentation is to be amended correspondingly.

### **Final land allotment**

An evaluation commission calculates the losses of agricultural and forestry output, and the concerned owners receive compensations for these losses. After that the [1] local public administration or the government [2] make a decision on the final allotment of land (6).

In the first case, the local public administration passes a decision on land allotment, based on the approved project documentation and the developer's application, within 15 days after the receipt of the application.

If the land allotment is handled by the Government, the materials are co-ordinated with all the interested agencies, then sent to the Ministry of Agriculture and Food Industry (MAFI). Within 15 days, the materials and conclusion of the MAFI are returned to the Government, which passes a decision on the final land allotment.

On the basis of the approved documents (see above), town-planning certificate, decision of the Government or local public administration, and application of the developer, within 30 days the developer receives the *permit for the building* of the project valid for a period of up to 12 months.

## **FOLLOW-UP PHASES: DETAILED DESIGN, CONSTRUCTION, OPERATION**

### **Construction monitoring**

The construction organization is subject to implement the construction works in compliance with the project documentation (Chapter «Construction Works»). The project design organization monitoring the construction process on the basis of the contract between the developer and the project design organization. The construction is also monitored by a special commission. In the process of construction the developer is required to ensure the implementation of the requirements for the of soils, water and air protection from pollution and other hazardous impacts, as provided by the «Environmental Protection» chapter. All fertile soil layer rehabilitation activities are confirmed by a special Act, signed by a special commission, and are controlled by the ecological inspection (24).

The quality of construction projects is verified by the developer with the assistance of certified technical monitoring experts, and the construction organization (25, 26).

### **Operation monitoring**

The developer through its operation service is responsible for the working condition of the WWTP in the process of operation. The WWTP monitors the quality of waste water: before treatment, at each state of the treatment process, and after treatment. The WWTP (or subcontracted) laboratory carries out the tests and registers the results. After chlorination, the treated waste water should be checked for the levels of chlorine. The composition of water in the reception pool (at the two inlets) is also subject to monitoring. The procedures of sample collection, choice of collection points, monitoring parameters is to be co-ordinated with the sanitary and environmental services. These services conduct periodic control tests.

A central dispatching unit is used to ensure centralised control and technological monitoring of the operation of the WWTP. This unit collects information on the debit of raw and treated waste water, pH, dissolved oxygen, temperature, active sludge, and wet sediment. Alarm systems should be provided in cases of emergency equipment disconnections, disruption of the technological cycle, excessive increase of the level of water or sediment in reservoirs and channels, excessive concentration of explosive gas in working areas.

### **Materials used in WWTP project development**

- 1.Law on local administration no.186-XIV, 06/11/98;
- 2.Law on the foundations of town-planning and territorial development, no. 835-XIII, 17/05/96;
- 3.Regulation on the town-planning certificate and building or demolition permit, Decision of the Government no. 360, 18/04/97;
- 4.Rules of protection of surface waters from pollution with waste water waters. Model regulations, State Committee for Ecology of the USSR, Moscow 1991;
- 5.Regulation on the protection from the pollution of lakes and ponds, Ministry of Health, Chisinau 1997;
- 6.Regulation on the land allotment procedure, Decision of the Government no. 246, 03/05/96;
- 7.Law on the ecological expertise and environmental impact assessment, no. 851, 29/05/96;
- 8.Land Code, no. 828-XII, 25/12/91 and Land Code, no. 369-XII, 10/11/95;
- 9.Building Norms and Rules II.04.03-85. Waste water. External networks and buildings;
- 10.Building Norms and Rules II-89-80. General plan of industrial enterprises;
- 11.Building Norms and Rules 07.02-99. Instructions regarding the procedure for the development, coordination, approval, and composition of construction project documentation;
- 12.Building Norms and Rules I.02.01-85. Instructions regarding the procedure for the development, coordination, approval, and composition of construction project documentation; Design of buildings and other facilities;
- 13.Instruction on the procedure for the organization and implementation of ecological expertise, Ministry of Environment and Territorial Development, no. 33, 24/02/95;
- 14.Building Norms and Rules I.02.01.85 (manual);
- 15.Building Norms and Rules II.04.03.85. (manual);
- 16.Building Norms 245-71;
- 17.Building Norms 475-85;
- 18.Law on environmental protection, no. 1515, 16/06/93;
- 19.Code of Waters, no. 1532, 22.06.93;
- 20.Law on protected water zones and basins of rivers and lakes, no. 440-XIII, 27/04/95;
- 21.State Standard 17.1.3.06-82 (Council of Mutual Economic Assistance 3079-81) Environmental protection. Hydrosphere. General requirements towards the protection of surface waters from pollution;
- 22.Regulation on the protection of groundwater, Ministry of Geology of the USSR, Moscow, 1984;

- 23.Regulation on consultations with local communities in the process of development and approval of territorial development and town planning documentation, Decision of the Government no. 951, 14/10/97;
- 24.Regulation on the rehabilitation of land, Decision of the Government, no. 404, 09/06/94;
- 25.Regulation on the monitoring of projects and construction works, and technical expertise of projects and construction works, Decision of the Government, no. 361, 25/06/96;
- 26.Law on quality of construction projects, no. 721-XIII, 02/02/96.

### **2.3 Moldovan procedures on EIA**

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### 3. STEPS OF THE EIA PROCESS

#### 3.1 The main steps

This chapter provides information related to different stages of Environmental Impact Assessment (EIA). It gives guidance on how to implement EIA in compliance with international principles, as well as in the framework of Moldovan procedures.

The following table shows the recommended steps to take in a Moldovan EIA process. The left column lists the generic stages in the EIA, as described in the introductory part, the right one lists the stages, which can be separated by analyzing the Moldovan legislation:

Step of the EIA process	Moldovan legal provisions
Screening	The existing list of types of activities for which EIA is compulsory
Scoping	Formal stage is missing
Assessment	Evaluation (Environmental Impact Application)
Review	Review of the EIA Report by ministries, agencies, and local communities
Decision-making	(not part of EIA law but of planning law)
Monitoring	Ecological expertise

#### 3.2 Screening

##### International

Under the commonly accepted definition, the stage "screening" of a prospective or planned activity is to decide whether EIA is or is not needed (if no legal requirements exist in this respect). Internationally, types of project which require an EIA are either identified in enumerative lists, or they are subject to case-by-case screening. In the second case, the competent decision-maker has to decide whether he requires an EIA to be undertaken; the law then stipulates the criteria which he has to use. European Union legislation includes two lists: the projects which always require an EIA, and the projects which must be screened on a case-by-case basis.

##### Moldova

The Moldovan legislation determines the range of objects or activities for which EIA is required. The Law on Ecological Expertise and EIA contains a list of 32 such objects and activities, as well as requirements towards EIA if their throughput is greater than 10 000 cub. m per day. Besides, EIA is required for any construction projects located on rivers and water protection zones of rivers and lakes, and also apply to WWTP with design capacities of less than 10 000 cub. m per day if they are located in such areas. The legislation also provides that, if necessary, and at the decision of the national environmental authority, the EIA procedure may also apply to other objects and activities, including WWTP with design capacities of less than 10,000 m<sup>3</sup> per day.

Thus, even if the planned WWTP has a capacity of less than 10,000 m<sup>3</sup> per day, it may still be required to pass the EIA. All EIA procedures, methodologies and reporting requirements applied to such WWTPs are identical to those applied to larger WWTPs. The decision on whether or not the EIA procedure is applied to a WWTP with the capacity of less than 10,000 m<sup>3</sup> per day can be made only by the Ministry of Ecology and Territorial Development (METP). The national legislation does not provide any formal criteria on which such decisions are based, and does not specify at which stage of the development of a new project such a decision may be taken, but states that such a decision may be

taken depending on the expected level of the environmental impact (although the magnitude of the level is not specified as well).

We may assume that in such cases the decision on the EIA may be taken at different stages, for example at the stage of general planning, land allotment, and even detailed project development. This may happen when either the developer or the project design organization start a dialog with the representatives of METP and some of the aspects of the project's environmental impact become evident. It is most likely that this happens at the stage of preliminary land allotment. The decision of the METP is to be justified and supported with strong arguments. Such arguments could be the possibility of a significant negative environmental impact, poor quality of the waters into which it is planned to discharge the treated waste waters, use of new and unusual technologies, elevated risk of emergencies, high level of ground waters, crowded set-up of the WWTP (lack of enough space to accommodate all structures, impossibility to maintain normative spaces and sanitary zones between structures, seismic activity in the area, landslides, etc.), etc. Local communities may prompt the METP to require EIA.

The lack of clearly defined procedures to serve as basis for EIA decision-making may lead to conflict situations between the METP and the developer. If the METP and the developer disagree on this matter, it can be also settled in court.

The most disagreeable situation arises when the need to conduct an EIA is determined at the stage of the ecological expertise (review) of the detailed project documentation (this is a compulsory procedure used to determine if the project documentation complies with the national legislation and norms; it takes place before the decision on the beginning of the construction is taken). At this stage the developer has already invested time and money into the development of the detailed project documentation and obtaining of all relevant approvals. Also, in this case the role of the EIA as an instrument for the making of a "correct and justified" decision on the location of the WWTP, selection of an effective environmental-friendly technology, etc. is nullified. At this stage it is difficult to examine any new options, and the developers of the EIA are forced to review only the main option and the refusal to pursue the project.

According to national procedures, after the EIA is completed, the METP is to review the EIA before the approval to start designing the detailed project is granted. In a sense, the approval of the EIA by the Ecological Expertise serves as an approval to start designing the detailed project. In this case the role of the Ecological Expertise is to make sure that project documentation is not approved without the EIA.

### **Possible improvements**

In the future, the Moldovan legislation may be added specific requirements that would serve as basis for screening decisions:

- a formal and irreversible screening decision at the start of the feasibility phase, by the competent authority. If the project is not listed as a compulsory category, the competent authority should ask the advice of the environmental authorities. The screening decision should be based on an application by the developer which gives sufficient information about the proposed project. It could be considered to prepare a list of project types which require such a case-by-case screening procedure. The EU Directive on EIA has such a list which could be used for inspiration.
- If the screening remains at the discretion of the environment authorities, it is proposed to develop more detailed legal criteria for screening - possibly as an intermediary approach. These would include: the environment authorities have to be informed before the feasibility study, and should decide within (e.g.) 1 month if an EIA is required.

### 3.3 Scoping

#### International

According to international principles, before the EIA is started, the main directions of the EIA are to be determined. Such a determination is preferably to be made by all concerned parties (for example the developer, developers of the EIA, ecological authority). The objective is to ensure that the EIA report will contain all information relevant for decision-making, but nothing more. Relevant issues are in the first place to be identified by the affected groups (stakeholders). The proposed project should therefore be discussed with stakeholder groups and the public.

At this stage the main steps, activities, and directions of the EIA report are determined, and the options, subject to be reviewed by the EIA development group, are defined. The types of impacts, which should be given priority, are also determined at this stage. For example, if the greatest impact is expected to come from the ground waters and relief configuration, these impacts should have priority over other others (such as biodiversity), which may be examined in less detail or not examined at all.

International guidance about scoping in general (for any kind of installation or project) can be found in the EU Scoping Guidelines (EC-DGXI, 1996). For WWTPs specifically, the following impact types (based on Karr, 1998) are distinguished. The table below describes the most common types of impacts and references to sources containing methodological guidelines for predicting these impacts, and criteria for their significance. In each specific case the list may be revised: Safety measures, Noise, Quality of air Aerosols, Combustion exhausts, Odor, Minimum distances, Landscape, Compensation for land allotment, Dealing with soil displacement, Effluent quality, Compensation for crop losses, Energy use, Sludge Quantity and Quality, Disposal method, Biodiversity, Habitat destruction, Habitat disturbance (incl. effects of effluent discharge), Health, Socio-economic impacts, Nuisance, Recreation, Local economy, Soil contamination, Soil erosion, Wastes, Quality, Quantity, Disposal routes, Traffic, Biogas production, Impacts on cultural heritage.

The scoping procedure is made part of the EIA process so that the developers of the EIA report may set up a work plan and hire the best specialists, with the appropriate qualifications and experience at the earliest stage of the EIA. This is also important for the EIA as it allows saving time and money by narrowing down the list of impacts to those that have the greatest significance. Less important impacts may be examined and predicted with less detail. However, it is necessary to make sure that the truly important impacts receive an exhaustive treatment. The key issue here is to take into account the opinions of the main interested parties, such as the ecological authority, local community and public administration. It is useful to identify the degree of their interest at the earliest stage of the EIA, as it may prevent disagreements appearing at later stages.

#### Moldova

Although the Moldovan legislation does not contain any formal requirements for the scoping process, it inevitably takes place informally. The developer and the EIA development group are to agree on the options to be reviewed, budget, timeframes, specific experts to be involved, specific issues to be researched, amount and type of primary information to be offered by the developer and to be acquired separately, etc. The priorities are commonly established by the EIA development group as part of the Terms of Reference and are co-ordinated with the developer.

There is no guarantee that the various ministries, local communities, and – at the final stage – the Ecological Expertise reviewing the EIA will not raise questions concerning the impacts examined and degree of detail of the EIA.

#### Possible improvements

- Because it is in the best interest of both the developer and the EIA development group to prevent any potential disagreements at later stages, it is recommended that preliminary consultations be held

with all interested parties at the earliest stage. It is also advisable to introduce formal requirements towards the scoping process and the co-ordination procedures outlined above in the Moldovan legislation.

- It might be considered to use the scoping phase for determining the agencies responsible for review of the EIA report, later in the process.

### 3.4 Assessment

#### International

During the assessment phase, the developer (or the certified design institute in his place) develops the global design of the project, and at the same time the impacts are assessed of all design options which are taken into consideration. The assessment phase ideally takes the form of a permanent dialogue between the design team and assessment team. The assessment process leads to an EIA Report, describing which alternatives have been assessed, and grounds for choosing the selected global design and location.

An EIA report should be easy to understand for non-technical people, as they will have to read the report and express their opinions. It should have the following contents (based on the World Bank Environmental Assessment Sourcebook):

Chapter	Content
Main report	
Executive summary	Non-technical summary of up to 10 pages, describing the outcomes of the EIA as relevant to decision-makers and managers.
Baseline description	Description of the area where the project is located, to the extent relevant for the possible impacts. Geography, (geo)hydrology, ecosystems, population, socio-economic characteristics, etc.
Project description	Description of the selected global design, the needs for the project, its location, selected technology, etc. Including maps and process diagrams.
Environmental impacts	Description of the predicted impacts, and applied methods.
Analysis of alternatives	Description of the alternative site, technological options, which have been taken into consideration, and why they were not selected.
Mitigation plan	Description of the technical measures and management systems selected to mitigate environmental impacts and ensure safe operation. Including compensation of losses to the local population.
Monitoring plan	Description of impacts that the initiator (or the operator of the plant in his service) intends to monitor. Format of yearly monitoring reports, which will be submitted to the competent authorities for review. Including effluent quality, sampling methods, performance for safety measures, complaints from the population, impacts in the environmental and counter measures taken, as relevant.
Appendix	
Technical details	Details of technical installations, prediction methods, etc.
Report of public consultation and participation	Example of invitations in newspapers, other materials used to inform people. Minutes of meetings with the public and Non-Governmental Organisations (NGOs).

#### Moldova

According to the national legislation, EIA is to be developed in compliance with the methodology developed by the National Institute of Ecology, the research arm of the national environmental authority. Unfortunately, during the past 5 years following the adoption of the Law on EIA, the

Institute has not developed any such methodologies or guidelines.

However, the national procedures require that the EIA developers prepare two sets of documents – the "EIA Documentation" (EIAD) and the "Application for Environmental Impact" (AEI). The following table illustrates some of the requirements applied towards these sets of documents. There is no major difference between them. AEI contains the same materials, calculations, and analysis present in the EIAD only in a more systematized format. The other differentiation is that AEI is sent for examination to ministries/departments and EIAD and the amended AEI (taking into account the objections of local administration, ministries and departments, results of public hearings) are sent to the Ecological Expertise.

<b>EIAD</b>	
Materials describing and evaluating expected direct and indirect impacts	Climatic conditions, air, surface, shallow and deep ground waters, soils, subsoils, landscapes, protected areas, plants and wildlife, functionality and stability of ecosystems, population, natural resources, cultural and historical monuments, quality of the environment in populated areas, overall social and economic situation.
Comparison of proposed options, and justification of the selection option	
Proposed actions and conditions for the minimization of negative impacts and maximization of positive impacts	
Analysis of consequences if the proposed project is not implemented	
<b>AEI</b>	
General data	Type of activity, set-up of the object and justification of the set-up, developer, project designers, consumers, timeframe of functioning, technical and technological characteristics, level of technical decisions, budget, list of surrounding towns and villages, whose environment will be affected by the project.
Introductory characteristics	Land, water, sources of raw materials and energy, transportation and infrastructure, atmospheric air.
Expected changes in the environment	Discharges into the atmosphere, waste, noise, vibration, radioactive and electromagnetic radiation.
Description of options and their comparison	Geographic and technological option, marginal benefit.
Characteristic of the components of the environment	Main components (climate, air, water, soils, geological factors, plants and wildlife, stability of ecosystem and landscape), other components (transformed landscapes, populated areas, population, protected areas, historical and cultural monuments).
Expected impacts	Direct, indirect, secondary, short- and long-term impacts, level of impact upon the population, ecosystems, climate, hydrosphere, soils and geology, plants, and wildlife, antropogenic systems, structure, and functional use of territories, large-scale transformation of landscapes.
Proposed actions for the prevention, elimination, minimization, and compensation of the negative environmental impacts	Territorial environmental protection plans, technical measures, compensations, etc.
Short-term measures for the minimization of emergency risks	
Environment quality management and monitoring schemes	
Use of forecasting methods and principles of impact assessment	
Conclusions uncertainty level assessment	
Attachments	Maps, schemes, diagrams
Conclusions	

### **Possible improvements**

- Introduce a legal linkage between the EIA report and the documentation for the go/no go decision about a project.
- Try to simplify the documentation required to be prepared in the assessment phase.

## **3.5 Review**

### **International**

When the EIA is finished, it should be submitted for review by experts who are not dependent on the developer. They review the quality of the information provided by the EIA report. These experts are not decision-makers: they only express their view about the quality of the report (correctness and completeness).

At the same time, the public itself should be invited to review the EIA report and give its comments and suggestions.

The reviews are public, and it is up to the competent authorities to accept the EIA report (given the review), or decide that a supplement or revision is necessary.

The European Commission has developed general guidelines for the determination of the criteria, which should be used in the review process.

### **Moldova**

Moldovan EIA procedures provides that the AEI should be submitted to the appropriate ministries and agencies. The law does not establish any principles according to which the selection of these agencies is made. Apparently, the developer is making his selection after consulting with the national ecological authority. The ministries and agencies concerned send their comments on the AIE back to the developer cc to the national ecological authority within 50 after receipt of the AIE documents.

At the same time the AIE documentation is sent to the local government, which should, within 5 days after their receipt, announce, by means of local media, the time and place where the community may make itself acquainted with the AIE, receive a copy of it, organize an ecological expertise and public hearings of the AIE. The AIE should be available for 30 days. During the last 14 days the local administration is to collect all the comments and concerns expressed during the public hearings, submit them to the developer with a copy to the national ecological authority.

In this way, the Moldovan legislation provides that the public has the first opportunity to become acquainted with the planned activity at the stage when the EIA is accomplished and AIE is drafted. The public is also able to provide feedback. However, it is desirable that the developer and EIA developers make this information as early as possible, for example in the beginning of the EIA activities. This would allow them to receive the feedback from the population at a much earlier stage, when its range of interests can be defined more effectively. There exist many ways to attract the community interest, for example round tables, meetings with NGOs, publishing of short summaries of the planned activity in newspapers, public meetings, working with community leaders, etc.

However, the existing legislation does not make it clear who should be responsible for organizing and finance the participation of communities in the review of the AEI. It should be either the developer or the local administration. Besides, the legislation does not provide guidance on the terms of the involvement of state agencies in the review process, for example who should pay for their review and which criteria they should use in the review process. The lack of such criteria may lead to conflict situations.

**Possible improvements**

- Limit the role of the environmental authorities to giving recommendations about the acceptance of the report on the criteria correctness and completeness, and let the decision-maker decide if it has enough information
- Further suggestions for public involvement scoping are included at the scoping step and the public consultation step

**3.6 Decision-making****International**

When the comments are received from the reviewers and the population, the decision-making authority can decide about the project. It should make its decision public, giving the grounds for the decision and indicating how the environmental impacts were taken into consideration. The decision should also indicate any conditions for development of the project, like environmental conditions additional to the normal environmental legislation (this decision can be called a "construction permit"). After this, the developer or the public have some time for appeal to a court if they believe that the decision has not been made in a proper way (i.e. the legal procedures have not been followed). Then, the decision is final, and gives the developer the irrevocable right to develop his project. All later decisions are considered to be "follow-up": they approve or reject detailed design, monitoring plans, method of operation, always using the conditions of the main project decision as criteria. As long as these criteria are met, the developer is allowed to construct and operate his project. The only authority who has a right to withdraw the construction permit is the same decision-making body, but then he likely will have to pay financial compensation to the developer.

**Moldova**

According to Moldovan procedures, the amended AEI and EIAD are submitted to Ministry of Environment (the "state Ecological Expertise" department). Only the positive conclusion of the Ecological Expertise serve as legal basis for the approval of the EIA by the developer and beginning of the development of the project planning and design documentation. The national environmental authority makes a public announcement about the results of the Ecological Expertise and archives the EIA file.

After the detailed project documentation is completed and approved by all relevant authorities (see chapter 3.2.) the project documentation is submitted back to the Ecological Expertise. The approval of the project documentation by the Ecological Expertise serve as grounds for the issuance of the building permit.

**Possible improvements**

- The competent authorities for project decision-making should be obliged to give their grounds in their decision, explicitly referring to the findings in the EIA report. The decision should be public.
- Improve the linkage with project decision-making, but first improve the decision-making system itself
- Give training to the competent authorities on how to deal with EIA

**3.7 Public consultation and participation****International**

Internationally, it is considered essential that the public is involved in the making of government decisions that may strongly affect them. This has two reasons:

- the public can help to identify impacts which otherwise may be overlooked, or it may indicate the significance these impacts has in its view

- it can raise awareness of the public, in terms of the need for the project (why is it necessary?) and the problems it solves; giving the public an opportunity to speak up often enhances its acceptance of the project. In democratic societies, this is necessary, otherwise it becomes difficult for politicians to make project decisions which initially meet strong opposition.

### **Moldova**

In Moldova there is a “Law on the Principles of Town–Planning and Territory Arrangement” (Monitorul oficial al RM, 02.01. 1997, N1–2). Most relevant provisions are:

- In the article N27, it is said: “Consultation with the population is realized before the approval of all plans of town planning and territory arrangement, except plans of arrangement of the territory of the country and detailed town plans not effecting the territory in general use.
- Article 28. – It is obligatory to post out an advertisement in the premise of the organ of local public government and to submit the project documentation for general acquaintance and discussion.
- Article 29. – (1) Consultation with the population is realized differently in dependence of the volume and importance of the documentation and in accordance with the statute elaborated by the organ of central public administration of town–planning and territory arrangement and approved by the Government. (2) Responsibility on the realization of the consultation with the population is in charge of the corresponding organs of local public government. (3) The expenditures caused by the procedure of consultation are defrayed from the funds for financing and elaboration of the corresponding documentation.“

According to the National Legislation on the Evaluation of Impact on the Environment the Local Public Authorities after having got the Application on the Evaluation of Impact on the Environment should promulgate it in the Mass Media. They have to organize a public ecological expertise and a public discussion (the people should have the access to the documents during 30 days). After the term for public discussion has expired in 14 days the Local Public authorities are obliged to submit their remarks to the customer and to the central environment department.

Public participation is voluntary and in cases of elaboration of Environmental Impact Assessment is obligatory. Though the corresponding legislation exists, in practice the consultation with population usually is not realized. In order to more efficiently deliver improved project sustainability it is necessary to implement a good practice in the planning, implementation and monitoring of public consultation in the EA process.

### **Possible improvements**

- Recommendations are presented at the scoping step
- Public and stakeholder involvement should preferably be started as early in the process as possible
- It is suggested that some state agency assumes the task of better community involvement in general in making development decisions. This agency could assist in designing the public involvement in EIA processes.

## **3.8 Monitoring and enforcement**

### **International**

The monitoring plan, which forms part of the EIA should become part of the construction permit. In other words, the operator of the WWTP must carry out the monitoring in accordance with the monitoring plan, established during the EIA process. The competent authorities should check whether this is done in a proper way. This may include:

- During the detailed design stage – is the project developed according to the recommendation made during the EIA process?
- During the building stage – does the developer comply with the ecological and quality requirements?

- During the operation stage – here a link with the national environmental management and auditing systems could be made;
- During the liquidation stage – here too a link with the national environmental management and auditing systems could be made.

If the developer or operator does not comply with the permit conditions or general standards, enforcement actions are necessary.

### Moldova

The Moldovan law has implemented this under the title "Ecological Expertise".

### Possible improvements

The Moldovan monitoring legislation and practice was not reviewed in detail. A good chapter on monitoring can be found in the EIA Handbook by Petts (1999). Also the UN-ECE website has guidance on monitoring, as well as the WB Pollution Prevention and Abatement Handbook

## 3.9 A word about time and money

When an initiator envisages a project, he usually likes to spend as less time and money on the preparatory stages as possible. However, government regulations can require him to spend more time on the preparation process.

If an EIA process is undertaken, the planning and decision-making process should not take-up significantly more time than without such an EIA process. International practice has shown that this is possible after, in a country, some experience has been gained. Also, the costs for the EIA should not be too high. It is accepted that an EIA process should normally not cost more than 1 - 2% of the investment cost of the project.

However, in order to stay within these limits, a number of conditions need to be met:

- starting the EIA process as early as possible, long before the global design stage
- a good planning of the process as a whole, to be made at the start of the process (at the screening stage, when it is decided that an EIE is required): how much running time and resources from the initiator will every stage require?
- during the process, several government actions are required (as opposed to the initiator's actions): screening decision, review, decision-making. The legislation should make clear how much time these governmental bodies are allowed to use to make their decision. A normal time is one to several months, depending on the importance of the decision.

This leads to a typical running time for an EIA process of about a year between initiation of the process and final permission for construction. However, in Moldova it may be longer, given the complicated requirements for the decision-making stage (EEE).

Step in the EIA process	Running time Months
(initiator submits request for screening)	(start)
making a decision about required EIE and EEE	1
scoping, including public consultation	3
assessment and global design	6
review	1
decision-making	1
<b>OVERALL RUNNING TIME</b>	<b>12</b>

## 4. THE DEVELOPMENT PROCESS OF WWTPs

### 4.1 Introduction

When WWTPs are developed, a number of choices have to be made, like determining how much money could be spent on sanitation, priorities for investments, site selection, global design, construction, operation. This chapter describes the criteria that may be considered, when such choices are made, and the "best practice" solutions in Western Europe.

Relevant guidance material can be found at the websites of the World Bank, UNEP, UNDP and the US EPA. Some general sources from the literature relevant for this section are:

1. Correia, F.N. (Ed.), 1998, *Selected Issues in Water Resources. Management in Europe*. A detailed scientific research report with water basin management, wastewater treatment, and water quality management in Europe as main components.
2. European Commission, DGVIII, 1998, *Towards Sustainable Water Resources Management - A Strategic Approach, Guidelines for Water Resources Development Cooperation*. Official handbook of the EU for integrated water resources management and river basin management.
3. Hofwegen, P.J.M. and Jaspers, F.G.W., 1999, *Analytical Framework for Integrated Water Resources Management - Guidelines for Assessment of Institutional Frameworks*, A handbook for evaluating legal and institutional frameworks which are based on river basin management, conceptual and innovative.
4. Metcalf and Eddy, 1991. *Wastewater engineering. Treatment, disposal, and reuse*. Detailed manual for the waste water treatment engineering industry. Includes emission reduction, health, safety issues.
5. Mostert, E., 1998. *River Basin Management in the European Union - How it is done and how it should be done* A non-specialist introduction to the principles of river basin management.
6. WEF/ASCE, 1992. *Design of Municipal Wastewater Treatment Plants*. Detailed manual for the waste water treatment industry in the United States, financed by US-EPA. Includes emission reduction, health, safety issues.

### 4.2 Location of the discharge outlet

#### Possible locations

The possible locations of the discharge outlet depend on the possible sites of the WWTP itself, and the different places that can be reached from there, at a reasonable cost. Effluent can, in theory, be discharged in surface water bodies, on the soil (especially in arid areas), or it may under certain conditions be used for irrigation purposes.

Whatever an outlet's location, the effluent must be of a quality that causes no harm to the function of the receiving environment (e.g. no crops are contaminated, no harm to swimming water, fishery or ecosystems, etc.). Ideally, the function of the environment is defined by an earlier strategic plan (like a national water resources management plan). Alternatively, the function can be described in the EIA by assessing the functions that the receiving water body has at the moment, or could have in the future. The required quality of the effluent depends on the required function of the receiving water body, and therefore on the sensitivity of the receiving environment.

#### Minimum effluent standards

Whatever the sensitivity of the receiving water body, in all cases a minimum level of treatment is

required. The World Bank, which frequently loans money for the construction of WWTPs, states the following in its Pollution Prevention and Abatement Handbook (WB, 1998):

Process wastewater, domestic sewage, and contaminated stormwater and runoff must meet the maximum limits shown in the table hereafter, before being discharged to surface waters. Levels of pesticides, dioxins, furans, and other toxics, such as polynuclear aromatic hydrocarbons (PAHs), in effluent discharges should not exceed either 100 times the WHO guidelines for drinking water or 0.05 mg/l.

**Limits for Process Wastewater, Domestic Sewage, and Contaminated Stormwater Discharged to Surface Waters, for General Application (From WB Pollution Prevention and Abatement Handbook, 1998)**

(milligrams per liter, except for pH, bacteria, and temperature)

Pollutant or parameter	Limit
pH	6–9
BOD	50
COD	250
Oil and grease	10
TSS	50
Metals	
Heavy metals	total 10
Arsenic	0.1
Cadmium	0.1
Chromium	
Hexavalent	0.1
Total	0.5
Copper	0.5
Iron	3.5
Lead	0.1
Mercury	0.01
Nickel	0.5
Selenium	0.1
Silver	0.5
Zinc	2.0
Cyanide	
Free	0.1
Total	1.0
Ammonia	10
Fluoride	20
Chlorine, total residual	0.2
Phenols	0.5
Phosphorus	2.0
Sulfide	1.0
Coliform bacteria	< 400 MPN/100 ml
Temperature increase	< 3°C <sup>a</sup>

Note: MPN, most probable number.

a. The effluent should result in a temperature increase of no more than 3° C at the edge of the zone where initial mixing and dilution take place. Where the zone is not defined, use 100 meters from the point of discharge.

**What if the receiving environment is too sensitive for receiving effluent treated at a minimum level?**

If the receiving environment has a sensitive function, more strict effluent standards are necessary. It is difficult to give general norms for certain functions, since dilution also plays a role, and the effluent

may accumulate with other pollution sources. Therefore, dispersal and dilution should be modeled, and the effects of certain effluent quality standards on ambient quality standards should be predicted. Water quality models often can be quite simple, but need hydrological and geohydrological data. Assessments should take account of foreseeable developments in the water basin.

### 4.3. Sewerage systems and drainage runoff

The design of a WWTP depends on the quantity and quality of the influent it receives from the sewer system. The influent characteristics depend especially on the presence of runoff water, caused by precipitation. Whether runoff should be treated at a WWTP depends on a number of factors.

In cities and on roads, runoff has to be collected in a drainage system (pipes). This could be the sewer system which is also used for domestic waste water (**combined sewer system**). This requires that sufficient dimensions for the pipes are necessary, in order to cope with periods of heavy rain. In such periods, part of the collected water has to be discharged at emergency outlets, in order not to exceed the hydraulic capacity of the WWTP. Since part of the discharged water originates as waste water, special (mechanical) provisions may be needed to reduce the discharged pollution load, and the receiving environment should not be sensitive. Even so, in periods of rain the WWTP will receive some stormwater, which requires larger dimensions, larger energy use, larger land take, etc.

To prevent polluted discharges from emergency outlets, and unnecessary large dimensions of the WWTP, a **separate water collection system** for runoff could be applied. Runoff itself can also contain significant amounts of suspended solids and BOD (especially if roads are not clean), but most of this can be removed by a simple mechanical treatment at the outlet.

A third system is the **improved combined system**. It involves two sewer systems which are connected by means of small pipes at regular distances. The runoff drainage system is positioned higher than the waste water collection system. As soon as a thunderstorm breaks out, the first flush of water (which contains most pollution), is then through these connections transferred to the waste water system. When water amounts increase, most runoff water will stay in the upper pipes, and does not reach the WWTP. This system is relatively expensive, however, and only used when the environment receiving the runoff water is sensitive.

The system which is most appropriate depends on a number of factors, like:

- climate (frequency and size of rainstorms)
- surface area which needs to be drained, compared with the population size connected to the waste water collection system
- cost of double piping systems versus larger dimensions and more resources use of WWTPs
- the sensitivity of potential places for the discharge of runoff water
- whether the streets are envisaged to be cleaned-up or hard surfaced

### 4.4 Main treatment process technology

The main criterion for choosing a treatment process is the required quality of the effluent. All processes can generally be divided into three types:

- mechanical treatment to remove coarse material, sand, fat, suspended solids (which become sewage sludge), taking with it a significant amount of pollutants like BOD and metals (**primary treatment**)
- biological treatment, here bacteria break down the organic material (BOD) into mineral compounds like phosphate and nitrate—(**secondary treatment**), main forms are lagooning, activated sludge treatment and the oxydation ditch method (the latter two require mechanical aeration to feed the bacteria with oxygen); there are also anaerobic processes available;

- removal of the nitrate and phosphate (**tertiary treatment**)
- **disinfection** to remove pathogenic microbes

The treatment methods usually required for different uses of the surface water are indicated in the following table.

use	"required treatment"
drinking water	Pri., Sec., Tert., Disinf.
industrial process water	Pri., Sec., Tert., Disinf.
industrial cooling water	Pri., Sec., Tert.
recreation	Pri., Sec., Tert., Disinf.
irrigation	Pri., Sec., Disinf.

Pri. = primary treatment  
 Sec. = secondary treatment  
 Tert. = tertiary treatment  
 Disinf. = disinfection

The level of treatment also has to take account of the sensitivity of the receiving water body, but also of the available budgets. It is better to have basic treatment which is affordable, than no treatment at all. Also it may be more efficient to develop a large number of cheap treatment plants with basic treatment, rather than one expensive plant which meets ideal standards. However, these types of questions should preferably not be addressed at the level of global design (when EIA is applied), but much earlier, at the strategic stage.

Choice of main treatment process technology also depends on other factors, like:

- quantity and quality of influent
- required robustness (esp. electrical components like aerators can be sensitive and expensive)
- price and reliability of required resources, like energy
- the surface area which is available on the selected site

#### 4.5 Sludge treatment and disposal

Sludges are a by-product of WWTPs. The treatment and disposal of sewage sludge is an expensive and environmentally sensitive problem for a community. Sewage sludge contains large quantities of water, pathogens, BOD and chemical pollutants like heavy metals. The first important step in sludge handling is to reduce the sludge volume. This process is generally known as thickening. Thickening of dilute sludge can achieve significant reductions in volume. Further sludge treatment is necessary to reduce the final volume to be disposed of, to make it less offensive and/or to reduce its public health risks. The final disposal of the sludge depends on the local circumstances. If sludge is not contaminated (e.g. by heavy metals) it can be used as a fertilizer or soil conditioner in the agriculture. Residual sludge or ashes can be disposed of on land combined with domestic garbage disposal.

European Union limit values in sludge reused in the agriculture are shown in the following table. In the USA a different approach has been adopted by the Environmental Protection Agency (EPA). Sludge loading rates to be applied are usually to be limited by the levels of heavy metal contamination. In general, these limits are to be based on the cation exchange capacity (CEC) of the soil as an indicator of the relationship between total metal addition and the soil's ability to control metal uptake in plants.

EU Limit values in sludge reused in the agriculture	Limit value in mg/kg dry solids
Zinc (Zn)	2500 to 4000
Copper (Cu)	1000 to 1700
Lead (Pb)	750 to 1200
Chromium (Cr)	-
Nickel (Ni)	300 to 400
Cadmium (Cd)	20 to 40
Mercury (Hg)	16 to 25
Arsenic (As)	-

#### 4.6 Smaller WWTPs which require no EIA

Smaller WWTPs generally require no EIA, since the impacts of decisions made at project level (global design and site selection) are relatively insignificant. However, smaller WWTPs need to respond to exactly the same environmental criteria as large WWTPs (e.g. effluent quality, sludge disposal, ..). Whereas no EIA report needs to be prepared, an Ecological Expertise is still necessary. At the stage of Ecological Expertise, the authority should still check whether such conditions are met, and whether the WWTP meets the criteria which may have been set in strategic plans. The most relevant plans may be waste water management plans, water resources management plans, and spatial plans.

Especially for the situations where EIA at project level is not required, it becomes more important that strategic plans are developed which form the framework of project development. In the European union in the near future, such strategic plans will most probably require to be submitted to a Strategic Environmental Assessment.

#### 4.7 Site selection

Usually several options for locating a WWTP are available, although some may be more expensive than others. Site selection should be based on an identification of possible sites, and making a choice based on sound criteria. The baseline situation of each possible location should be described, and the impacts of a possible WWTP should be assessed (as far as they discriminate between sites).

Site selection for WWTPs has to take account of the following criteria:

- Cost. This is mainly determined by factors like:
  - the availability of an existing WWTP which can be upgraded or replaced,
  - the length and elevation of required water transport,
  - local soil conditions and geomorphology,
  - sensitivity of the environment receiving the effluent (discharging in a sensitive ecosystem requires higher treatment levels and more operational reliability than discharging into a less sensitive ecosystem)
- Economic benefit. Examples are:
  - the option to use the effluent for irrigation purposes (vineyards, orchards) in dryer parts of the country
- Environmental effects.
  - the quantity of waste water which can be connected,
  - adverse side effects as presented in the section on scoping.

Some of the same criteria also need to be used when this project is programmed, for example as part of a national priority programme for sanitation. However, when the decision is made that an area should be served by a WWTP (or that an existing WWTP should be upgraded), site selection can still

influence such criteria. On the other hand, a number of adverse impacts can be ruled out: they are not relevant since they can be sufficiently mitigated at reasonable cost, whatever the site which is chosen. For example, if all sites are located near the same water body where effluent will be discharged, the sensitivity of the receiving water body is the same for all, thereby it is not a discriminating criterion in site selection.

On the other hand, the process technology may be linked with site selection, for example if the available surface area on one site is limited, a treatment process may have to be selected which is relatively less space demanding.

## 4.8 Mitigation of local environmental impacts

### 4.8.1 Noise

WWTPs may cause significant environmental noise, especially the aerators of biological treatment. This may be a nuisance for workers and for residents in the close vicinity.

The WB recommends the following standards for ambient noise quality (Pollution Prevention and Abatement Handbook):

Noise abatement measures should achieve either the levels given below or a maximum increase in background levels of 3 decibels (measured on the A scale) [dB(A)]. Measurements are to be taken at noise receptors located outside the project property boundary.

<i>Receptor</i>	<i>Maximum allowable log equivalent (hourly measurements), in dB(A)</i>	
	<i>Day</i>	<i>Night</i>
	<i>(07:00–22:00)</i>	<i>(22:00–07:00)</i>
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Ambient noise can be reduced by housing the aerator engines and covering up of aerators.

## 4.9 Air and odour

There are no international standards on the desired air quality around WWTPs. However, the utmost should be done to prevent contamination via aerosols (little drops of waste water suspended in the air), and odour nuisance.

The presence of odours is one of the most offensive conditions to people living near or working in the waste water treatment plant. Odours in the wet stream usually are associated with characteristics of the waste water received at the plant or the existence of an improper environment in biological treatment plants. Aeration, chemical dosing and oxidation or pH adjustment is used to reduce odours in plant influent. Covering tanks or installation of exhaust hoods and foul air treatment may be necessary.

Treatment step	Air and odour problems
Primary treatment	Screenings, grit chambers and primary sedimentation tanks are often responsible for odours. Depending on the anaerobic circumstances also and emission of H <sub>2</sub> S may occur.
Secondary treatment	The odour can be characterized as the odour from "fresh soil or compost". The anaerobic process (UASB) is a closed system without emission of odour. The biological process produces methane gas, which is incinerated or burned or used for energy production. The emission of untreated methane gas can cause odour nuisance.
Tertiary treatment and disinfection	These cause no odour nuisance.

When normal odour control measures are applied, the following minimum distances usually keep nuisance for residents at an acceptable minimum:

- 250 m for plants with a capacity until 20,000 person equivalent
- 250 to 500 m for plants with a capacity from 20,000 person equivalent to 100,000 person equivalent
- 500 m for plants with a capacity of more than 100,000 person equivalent

In locations where the public exposure is great, additional odour containment and treatment may be the only option.

#### 4.10 Environmental management and monitoring during operation

##### Monitoring

The WB Pollution Prevention and Abatement Handbook states:

Liquid effluents should be sampled and measured weekly, or as agreed between the borrower and the World Bank Group, for common parameters such as BOD, suspended solids, pH, oils and grease, and flow. The World Bank Group will specify sampling frequencies for project-specific pollutants that are present in the effluent.

However, more specific monitoring requirements may be necessary if there are specific risks involved, depending on the use of the surface water.

##### Record keeping and Reporting

The operator should maintain records of air emissions, effluents, and hazardous wastes sent off site, as well as significant environmental events such as spills, fires, and other emergencies that may have an impact on the environment. The information should be reviewed and evaluated to improve the effectiveness of the environmental protection plan.

#### 4.11 Upstream reduction of waste load

Quantitative and qualitative waste and waste water reduction can be obtained by several measures at the source, in the collection system and discharge procedure. These measures should generally be considered in a WWTP design and EIA process.

##### In-plant measures in industries discharging into the sewer system

In plant measures can reduce the waste water flow and pollution load e.g. recycling cooling water, reuse cooling water for process water, water saving and product saving measures, recovery of waste products (heavy metals). These measures save product, water and thus costs.

### Pre-treatment of industrial waste water

For specific industries a pre-treatment is necessary in order to protect the sewer system and the biological part of the treatment plant. This pre-treatment results in less pollution discharge into the public treatment plant. In general, treatment at the source (the industrial production process) is less costly than a combined treatment in the public waste water treatment plant. At the source, dilution can be prevented and a more appropriate treatment system can be operated.

### Measures at-the-source

The use of phosphate free detergent for laundry will reduce the discharge of phosphate. The elimination of the use of garbage grinders in the kitchens will result in a lower suspended solids discharge to the sewer system.

## 4.12 Health and safety

### Health

Operators exposed to microorganisms in waste water and sludge may incur risks of infection and disease. The following table gives selected biological health risks of occupational exposure to waste water and sludge. Of course, a necessary defense against viral and bacterial infections is good personal hygiene.

Illness	Risk
Hepatitis A infection	Some evidence of increases risk associated with working with raw waste water and primary sludge
Other viral infections	Some indication of infection in most highly exposed workers
Leptospirosis	Risk now seems minimal, but formerly considered to be a major problem among sewer workers
Parasite infestation	Sewer workers incur some increased risk
Gastrointestinal illness	Increased illness rates, especially among workers in first years of employment
Compost-related factor(s) <sup>a</sup>	Excess of nasal, ear, and skin abnormalities in compost-exposed workers determined by physical examination. Increased symptoms of burning eyes and skin diseases reported by compost-exposed workers.

a) Although no specific factors have been associated with these findings, biological exposures are expected to be involved.

### Safety

Many safety hazards exist throughout a treatment plant and protective measures should be taken:

Component	Safety measures
Plant site	As a general practice, fences enclose the plant site or, at least, the treatment process areas to guard against vandalism and to protect the public.
Storage facilities	Many of the materials and chemicals used in the waste water treatment are corrosive, poisonous, explosive, or flammable. Handling of these materials requires proper precautions.
Illumination	Adequate illumination of wastewater plants is essential
Ventilation	Wastewater treatment plants require careful analysis of and provision for ventilation needs, because plant ventilation supports life, prevents explosive gas mixtures, and helps to maintain safe working conditions.
Fire protection	All equipment, buildings and fire alarm systems should comply with local, state, and national fire codes and standards

Water supply	The potable water supply should meet needs for laboratory and general clean up uses around the plant, as well as for drinking water and personal hygiene.
Electrical equipment	Most of the equipment in a waste water plant uses electricity as the primary power source. Maintenance of the equipment requires exposure to electrical hazards that may result in shock or death unless safe practices are strictly followed.

### Training

Supervisors must first have the proper attitude and interest in safety and health, and then gain a full working knowledge and understanding of the many ways in which they can prevent accidents and occupational illness.

### 4.13 Irrigation

Land application of municipal waste water is a well established practice in many arid and semi-arid regions of the world. In some regions 70 to 85% of such water is used for agricultural and landscape irrigation. Although irrigation with municipal waste water is, in itself, an effective form of waste water treatment, often additional treatment may be required before this water can be used for agriculture or landscape irrigation. Pre-application treatment is necessary to protect public health, to prevent nuisance conditions during application and storage, and to prevent damage to crops, soils, and groundwater.

Agricultural reuse applications have been developed for municipal waste water and a variety of industrial waste waters. The benefits of agricultural reuse is, among others, the fertilizer values of waste water. The nutrients in waste water contribute significantly to the macro-nutrient (N, P, K) and micro-nutrient (B, Cu, Fe, Mo, Zn) requirements of irrigated crop. Besides, water reuse is inherently a water conservation measure.

The required level of (pre)-treatment depends on the requirements of the crop to be irrigated and the method of application. The following table contains an example of health and treatment regulations excerpted from the California Wastewater Reclamation Criteria.

Irrigated crop	Application method	California Wastewater Reclamation Criteria
food crop	spray	disinfected, oxidized, coagu-lated, clarified, filtered, coliform $\leq$ 2.2/100 ml
food crop except orchards and vineyards	surface	disinfected, oxidized, coliform $\leq$ 2.2/100 ml
orchards and vineyards	surface	primary effluent (assuming no contact with fruit)
fodder, fiber, seed	surface or spray	primary effluent
pasture for milking animals	surface or spray	disinfected, oxidized, coliform $\leq$ 23/100 ml
landscape irrigation	surface or spray	disinfected, oxidized, coliform $\leq$ 23/100 ml

Wastewater contains impurities that are generally much higher than natural waters. Therefore careful consideration must be given to water quality in order to evaluate the possible long-term effects on soil and plants of salts, nutrients, and trace elements that occur naturally or added during use or treatment. The primary factor in evaluating water quality for irrigation is the quantity and kind of salt present in the water. As salinity increases in the irrigation water, the probability of agronomic problems for certain soils, water and crops increases. These problems are related to the total salt content, to one or more types of salt or to excessive concentrations of one or more trace elements. The sodium adsorption ratio (SAR) is a calculated value and an indicator of the probable influence the sodium ion has on soil properties. If the SAR nears 10, it signals danger. Also an effluent that has an excessive salinity level

(> 2 g/l) causes trouble.

## 5. APPENDIX

### 5.1 Websites

The following websites give information relevant to EIA of WWTPs.

EU Environment Website	legal texts and studies about EIA and SEA in the EU, and specific guidance on EIA	//europa.eu.int/comm/dgl1/index_en.htm
World Bank	information about Water Resources Management, Environmental Assessment, Pollution Control	//www.worldbank.org/
World Bank Pollution Prevention and Abatement Handbook	overview of pollution control management requirements of the World Bank	//wbln0018.worldbank.org/essd/essd.nsf/Docs/TOC
UN-Economic Commission for Europe	the ESPOO Convention on transboundary EIA; database (with Russian version) containing Guidelines and example EIAs from the past (EnImpAs)	//www.unece.org/env/
International Association for Impact Assessment	references to EIA Training packages, and to the largest international EIA professional network	//iaia.ext.nodak.edu/IAIA/
European Environment Agency	information about the state of the environment in Europe	//www.eea.eu.int/

### 5.2 Literature

Caponera, D.A., 1992. *Principles of Water Law and Administration - National and International*, Balkema, Rotterdam, The Netherlands.

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Karr, Katharina, 1997, *Environmental Impact Assessment in the United Kingdom and Germany. A comparison of EIA Practice for Waste-water Treatment Plants*, Aldershot, England: Ashgate

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Metcalf and Eddy, 1991. *Wastewater engineering. Treatment, disposal, and reuse*. 3rd edition. McGraw-Hill series on water resources and environmental engineering. ISBN 0-07-100824-1

Mostert, E., 1998. *River Basin Management in the European Union - How it is done and how it should be done*, in: *European Water Management*, Volume 1, Number 3, pp. 26-35

WEF/ASCE, 1992. *Design of Municipal Wastewater Treatment Plants*. Vol I and Vol II. WEF Manual No. 8 (Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994, US) / American Society of Civil Engineers (345 East 47th street, New York 10017-2398, US). Financed by US-EPA.

World Bank, *Environmental Assessment Sourcebook*

### 5.3 Some relevant EU legislation

The Environment website of the European Commission contains a list of all environmental legislation in the EU. It is impossible to list everything related to WWTPs and water pollution. The following are most directly relevant as criteria for the development of WWTPs at the global design stage.

#### EU Legislation with respect to water protection and management

- A number of legislation concerning the required quality of surface water and ground water which is to be used for certain purposes (bathing water, drinking water, shellfish waters).
- Council Resolution of 7 February 1983 concerning the combating of water pollution. *OJ C 046 17.02.83 p.17*
- Council Directive 86/280/EEC of 12 June 1986 on limit values and quality objectives for discharges of certain dangerous substances included in List I of the Annex to Directive 76/464/EEC. *OJ L 181 04.07.86 p.16, Amended (OJ L 158 25.06.88 p.35) , (OJ L 219 14.08.90 p.49) ,(OJ L 377 31.12.91 p.48) , Incorporated by (OJ L 001 03.01.94 p.494)*
- Council Directive 88/347/EEC of 16 June 1988 amending Annex II to Directive 86/280/EEC on limit values and quality objectives for discharges of certain dangerous substances included in List I of the Annex to Directive 76/464/EEC. *OJ L 158 25.06.88 p.35 , Incorporated (OJ L 001 03.01.94 p.494)*
- Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment. *OJ L 135 30.05.91 p.40, (OJ L 226 07.09.93 p.23)*
- Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources. *OJ L 375 31.12.91 p.1*
- Council Resolution of 20 February 1995 on groundwater protection. *OJ C 049 28.02.95 p.1*
- Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption.

### 5.4 The EU Urban Waste Water Treatment Directive

The following can be downloaded from ECs Environment website.

The objective of the Directive is to protect the environment from the adverse effects of discharges of urban wastewater and of waste water from industrial sectors of agro-food industry. The Directive obliges Member States to:

- provide prior regulation or specific authorization for all discharges of urban waste water and industrial waste water from the particular sectors mentioned in the Directive, as well as for all discharges of industrial waste water into urban waste water systems;
- provide urban waste water collecting systems (sewerage) and treatment plants for all agglomerations above 2.000 population equivalents ( widely used measurement unit for the organic

pollution of waste water equaling to the average pollution load of one person per day).

The general rule for the level of treatment is secondary treatment, i.e. biological treatment. However, the treatment must be more stringent (tertiary treatment) for discharges to the relevant catchment areas of sensitive areas as identified by Member States and may be less stringent (primary treatment), under certain conditions of agreement, for certain discharges to coastal waters and estuaries identified as less sensitive areas. The deadline for this application is 31/12/1998, 31/12/2000 or 31/12/2005 depending of the size of the agglomeration and the sensitivity of the receiving waters;

- ensure that by 31/12/2000 the industrial waste water from the mentioned sectors shall before discharge respect the established conditions for all discharges from plants representing 4.000 population equivalent or more;
- provide before 31/12/1998 general rules or registration or authorization for the sustainable disposal of sludge arising from waste water treatment and, by the same date, to phase out any dumping or discharge of sewage sludge into surface waters;
- ensure that the urban waste water discharges and their effects are monitored;
- publish situation reports every two years and establish implementation programmes.

The sensitive areas must be designated according to one or more of the following criteria:

- water bodies which are found to be eutrophic (eutrophication is an enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life) or which in the near future may become eutrophic if protecting action is not taken;
- surface freshwaters intended for the abstraction of drinking waters and which could contain more than 50 mg/l of nitrates if action is not taken;
- areas where further treatment is necessary to fulfill other Council Directives.

The list of sensitive and less sensitive areas must be reviewed every four years.