



Discharge of untreated wastewater into Nahr es Salib

Hydrogeology

The intensive karstification of the limestones in the Mount Lebanon mountain range has created water pathways which allow a rapid transfer of pollution. Flow velocities can reach up to 2000 m/h, leaving not enough time for attenuation of pollution.

Topography

The selection of the appropriate location for treatment and effluent discharge is crucial. Locations for discharge of treated effluent should be selected so that no impact on surface or groundwater used for drinking or irrigation purposes could occur, even if untreated wastewater has to be bypassed. Pumping of untreated wastewater to higher locations requires energy, which is not available at all times in Lebanon. Conveyance of untreated wastewater will have to be operated by the municipalities,

which will not be able or willing to cover the costs for pumping. These facts could significantly affect water resources located downstream. Treatment plants may be affected by flooding.

Management and reuse of treated wastewater and sludge

Sludge from wastewater treatment plants cannot be allowed to be applied in any area for agricultural purposes. If used on karstic areas, contaminants from the sludge may be transferred to the groundwater. The same applies for treated wastewater. From the perspective of groundwater protection, reuse could only be allowed where the risk of potential infiltration into groundwater is minimal. It is suggested to use groundwater vulnerability maps for the selection of suitable reuse areas.

Reuse depends on the acceptance and willingness of the local population and farmers. Often treated wastewater will have to be pumped up several hundred meters to designated reuse areas. Farmers must be willing to pay for that.

The treatment process would have to be adopted to reuse when needed for irrigation.

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EIA Guideline for Wastewater Facilities

Protection of Jeita Spring

What is an Environmental Impact Assessment ?

An EIA provides the basis for decision makers to decide whether a project should be implemented as proposed. The EIA covers:

- a description of the project
- a description of the environmental situation in the project area
- an identification and analysis of the potential impacts
- Proposed mitigating measures for those impacts
- a proposed environmental management plan during implementation
- a proposal for public involvement and participation

Why do we need an EIA Guideline for proposed wastewater facilities ?

EIAs are done in order to protect the ground and surface water resources from pollution.

Therefore planning in the wastewater sector in Lebanon needs to take into account the specific conditions which may affect the water resources, especially

- the geology and tectonics, i.e. the risks of earthquakes, landslides, rock falls, tectonic movements and soil stability
- the hydrogeology, i.e. the groundwater pathways and flow velocities, influenced especially by the intensive karstification
- the topography and hydrology, i.e. the risk of not collecting all wastewater (because of pumping) and the risk of flooding
- the effects on water resources by discharge of treated effluent into the environment must be integrated into the EIA
- the management of sludge from the wastewater treatment process must also be considered in the EIA
- intended reuse of treated wastewater and sludge must consider that reuse should not have a negative impact on water resources.

What are the potential risks and impacts on water resources ?

Geology and Tectonics

If a proposed collector line or wastewater treatment plant (WWTP) are located on a fault or fracture zone, their structural integrity might be damaged by tectonic movements, e.g. through earthquakes. Earthquakes are observed frequently in this region as it constitutes a tectonically highly instable zone. There are numerous faults, some of them with vertical tectonic displacements of several hundreds of meters. Physical damage to the wastewater facilities would lead to uncontrolled infiltration of untreated wastewater and thus contamination of the water resources.

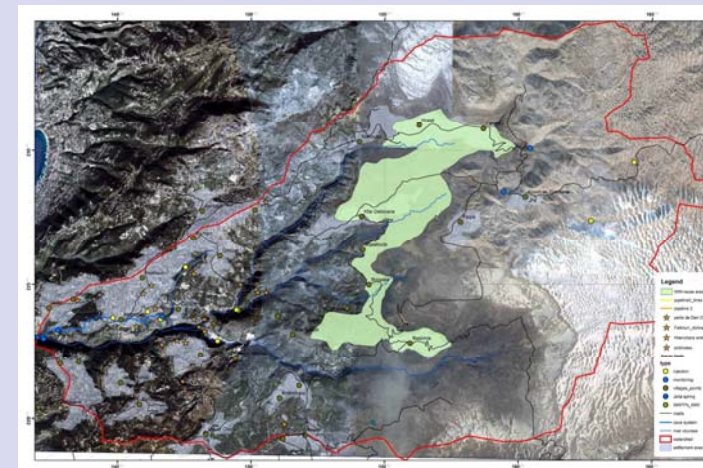
ANNEX 1: Criteria for Site Selection and Design of Wastewater Facilities in Lebanon

Criteria	Collector Lines	WWTP Location	WWTP Design	discharge Location	Remarks	Tasks / source
General Criteria						
number of inhabitants to be serviced						
Geological and Hydrogeological Criteria						
geology (rock type, underground as a barrier, dip direction/angle)	xx	xx			if natural geological barrier is existing, it should be used	geological mapping
Cost related Criteria						
method of treatment (primary / secondary / tertiary)			xxx	xxx	can existing regulations / guidelines for effluent (reuse) quality be maintained at all times?	
reliability of treatment			xxx	xxx		
storage capacity (bypass in case of overload?)	xx	xx	xx	xx	must be large enough to guarantee that bypassing untreated WW will not be necessary	
discharge location must be high enough to use as little energy as possible for reuse	xx	xxx	xxx	xxx		
analysis of sludge content; determine sites for sludge application; determine treatment of sludge and related feasibility					can existing regulations / guidelines for quality of (organic) fertilizer be maintained at all times?	
overall costs for construction (available funds)					including equipment, laboratory and staff for continuous monitoring of treated WW quality	
annual costs for maintenance and operation (available budget)					including continuous monitoring of treated WW quality and sludge mgmt.	

xxxx - killing arguments, xxx - very important arguments, xx - important arguments, x - less important arguments

Criteria Catalogue for Site Selection of Wastewater Facilities

Many EIAs conducted until now in the field of wastewater do not follow a standard outline and often do not cover all important aspects in the interest of reaching an optimal solution for the protection of the water resources. Criteria catalogues are missing for the site selection process. The project has therefore proposed both, a **Standard Outline for EIAs in the Wastewater Sector** and a **Criteria Catalogue for the Site Selection of Wastewater Facilities**.



Potential Areas for Treated Wastewater Reuse