

Operative framework for environmental effects assessment in Egypt Pilot Activity

General aspects

The pilot project in Egypt aims at implementing a decentralized wastewater treatment plant serving Al Gezayra village (about 1000 inhabitants) in the Ismailia Governorate. The general purpose of the project is to demonstrate an adapted and effective approach to provide sustainable sanitation systems in rural areas and a safe wastewater reuse for agricultural practices.

Wastewater treatment scheme to be implemented still not defined, decision on the treatment technologies and scheme is expected to be carried out after the finalization of the tender of construction in late summer 2014. . Treated wastewater will be reused for non-freshly eaten crops.

To date, the project implementation has included the following steps:

- confirmation of pilot activity scheme;
- confirmation, after a local survey, of pilot activity location at Al Gezayra (village with 1000 inhabitants in the Ismailia Governorate);
- identification of the need to implement a new sewage network because of the actual presence of a faulty drainage system;
- preparation of tender documents for the construction of a decentralized WWTP and the implementation of the EIA related to such settlement.

The definition level of the project is still preliminary so that it could be possible to insert some further considerations in the definition of the environmental effects assessment monitoring program. In fact, there are several aspects connected to the pilot activity to be still cleared out, such as:

- Type of treatment technology after the end of the tender of construction
- Extent of the irrigated area with treated WW and type of irrigation;
- Overall management of the system.

In the reference area, water from Nile is distributed by canals and used for both irrigation and drinking water production (through dedicated water treatment plant); other drain canals are characterised by high salinity and microbial contamination and are used for irrigation during drought periods. At the present, groundwater (which lies at shallow depths) is not used for agricultural purposes, while in the past it represented the solely drinking water source. Groundwater is subject to leaks from existing sewage disposal system that is mainly based on cesspits.

The BA conducted shows that agriculture represents the main activity in Al Gezayra village, since no industries are settled in the area. Moreover, a dedicated drainage network collecting only domestic wastewater to the pilot treatment plant will be realised; consequently, no heavy metals or other particular pollutants are expected in wastewater and no monitoring of these elements will be carried out as shown in the following table. THM will be monitored as possible disinfection (if expected) by-products, while surfactants are typically linked to domestic activities.

Compartment: Water

Water compartment include:

- Wastewater to be treated
- Treated wastewater to be used for irrigation purposes or discharged in drain canals
- Agricultural drains
- Groundwater

Assessed effects	Selected indicators	Sampling Point	Time/frequency	Scope
Nutrients and organic content	<ul style="list-style-type: none"> ○ TSS [mg/L] ○ VSS [mg/L] ○ BOD₅ [mg/L] ○ COD [mg/L] ○ Total N [mg/L], Ammonia [mg/L] ○ Total P [mg/L] ○ K [mg/L] ○ Ca [mg/L] ○ Mg [mg/L] ○ Oil and Fats [mg/L] 	WWTP influent and effluent (before land application)	Influent: twice a week with 24 hours sample every two months Effluent: twice a week on one hour sample every two months	Mass balance and WWTP efficiency assessment
		Groundwater and drains	Before starting treated WW land application and every three months	Mass balance in soil and nutrient groundwater contamination assessment
Others	<ul style="list-style-type: none"> ○ Total THM, Surfactants (total) 	WWTP influent and effluent (before land application)	Influent: twice a month every three months Effluent: twice a month every three months	Removal efficiency/formation of pollutants during the whole process. Soil and groundwater contamination assessment
		Groundwater and drains	Once before starting treated WW land application and every three months	

Salinity	<ul style="list-style-type: none"> ○ ECw [dS/m] ○ SAR (Sodium Adsorption Ratio) ○ TDS (Total Dissolved Solids) [mg/L] ○ Na, Cl, B [mg/L] 	WWTP effluent (before land application)	Effluent: twice a week on one hour sample every month	Mass balance, assessment of soil and groundwater salinization
		Groundwater (except SAR) drains	every month	
Pathogens	<ul style="list-style-type: none"> ○ E.coli [# /100 mL] ○ Helminths eggs [#eggs/L] 	WWTP influent and effluent (before land application)	Influent: twice a week with 24 hours sample every month Effluent: twice a week on one hour sample every month	Removal efficiency of the whole process, impact of WW reuse on soil and groundwater
		Groundwater and drains	Once a week every month	

Compartment: Soil

The soil compartment refers to the layer(s) interested by treated wastewater irrigation. In this case the sampling point is to be defined depending on the morphology of the aquifer and the type of irrigation system adopted.

Assessed effects	Selected indicators	Sampling Point	Time/frequency	Scope
Soil characteristics	<ul style="list-style-type: none"> ○ Texture ○ Organic matter [mg/L] ○ Total carbon [mg/L] ○ Total nitrogen [mg/L] ○ Soil permeability 	To be defined according to the aquifer and the type of irrigation system	Once before starting treated WW land application Once at the end of the project	Effects evaluation on soil characteristics
Salinity	<ul style="list-style-type: none"> ○ pH, ○ electrical conductivity (ECe), ○ extractable cations (B, Ca, Mg, Na, and K) ○ extractable anions (Cl, NO₃, and SO₄). 	To be defined according to the aquifer and the type of irrigation system	Once before starting treated WW land application Every 3 months	Effects on salinity
Others	<ul style="list-style-type: none"> ○ Total THM, Surfactants (total) 	To be defined according to the aquifer and the type of irrigation system	Once before starting treated WW land application Every 3 months	Presence and accumulation

Compartment: Air

Assessed effects	Selected indicators	Sampling Point	Time/frequency	Scope
Odour	<ul style="list-style-type: none">○ Odours (qualitative)	Inner WWTP, 50 meters out of WWTP Irrigated area, 50 meters out of irrigated area	Once a week	Impact of odour, plant and irrigation management evaluation

Note: One field trip is expected when full operation of the system will be reached.