**TOR OF GEOTECHNICAL CAMPAIGN FOR WWTP GARDABANI**

It is necessary to carry out a complete geotechnical report at the place where the Gardabani Wastewater Treatment Plant will be located. The aim is to define the characteristics of the soil, to study foundation solutions, to study the execution options for the WWTP works, and to analyze the aggressiveness of soil and groundwater to concrete.

Nowadays, we have some geotechnical data from the primary treatment area from the Geotechnical Study made in 2017 by Strabag, which will only serve us as a previous orientation.

The geotechnical study will be formed by:

# FIELD TESTS

**-** 5 boreholes of 20 meters depth plus 4 other boreholes of 30 meters depth. In each of them, the following will be carried out:

o Standard penetration test (SPT) every 2 meters.

o Permeability test (Lefranc) at 5 meters deep, in case of finding groundwater level.

- It would NOT be necessary to perform penetrometers (CPTU)

Topographic elevation will be determined at every inspection point in relation to the UTM Coordinates.

Please, find attached a layout of the plant with the approximate location of the inspection points.

# LABORATORY TESTS

o Particle size analysis by sieve method.

o Attemberg limits.

o Density

o Compression test

o Swelling test (in the case of clays)

o Modified Proctor compaction test

o Chemical analysis of soil and groundwater

# GROUND INVESTIGATION REPORT

o Characterization of the different detected geotechnical levels

o Geotechnical parameters for the design of retaining walls

o Groundwater level detected

o Seismic classification of the place

o Liquefaction potential (in the case of non-cohesive soils)

o Ballast module (K30)

o Settlements and permissible bearing capacity

o Aggressiveness of soil and groundwater to concrete

o Recommended excavation slopes at each geotechnical level

o Ground characterization for general filling and backfilling

o Foundation recommendation for buildings and for tanks.

# TOPOGRAPHIC SURVEY

Due to the continuous modifications that the plant has undergone over time, it is necessary to have a fully topographic survey of the entire plot.

In addition, due to the demolition and expansion works to be carried out, it is necessary to have the location and geometry of the existing constructions as well as the buried pipelines.

The topographic survey will contain all necessary points to define the geometry of the marked area in particular: inlet pipes/inlet shafts, the piles of the electric lines, etc.

The existing constructions will be indicated with x/y/z coordinates from top level of slab for each object and at the level of the ground will be taken the corners of each object/construction and all the necessary coordinates to fully characterize the construction.

If possible, should be taken points of the levels of the bottom slab of the biological reactor and of the existing secondary settling basin. A particular importance will be given to the level of the discharge channel to the river.

The Site Investigations company will perform the necessary topographic elevations, as required by the Georgian norms. The topographic elevations will be made in the UTM System.

The Designer will prepare the topographical drawings in such a way as to enable ground verification, identification of all utilities, road crossings or existing public access routes along the tracks or site locations.

The topographic mapping will include also the followings:

* Biological reactor: top level of walls and depth of each line
* Secondary settling tanks: top level of walls and depth of each settling tank.
* Elevation of inlet and outlet pipes at each shaft
* Distribution chambers: channel width and depth (dimensions of penstocks) of each chamber (primary and secondary clarifiers)
* Sludge basins: diameter and depth of outlet structure and top level of walls
* Buildings: external dimensions of building and high.
* Identification of the underground utilities (pipes, cables, etc)
* Identification of the potable water pipe

The result of the topographic survey will be as follows:

* Technical memo: used method, bases used, coordinate system……
* Full list of points (Excel) with their identification;
* Topographic drawing in AutoCad format;
* Topographic drawing at scale 1:500 and 1:1000;
* Level curves (every 25 cm), boundaries of existing basins, electrical lines, networks…
* Roads (if applicable);

# DRAWINGS

The location of the boreholes and the boundary of the affected area in both the current and reformed state are attached below.



