terrasol

setec

Transport and infrastructure
Hydraulic structures

Water treatment plant in Zahle

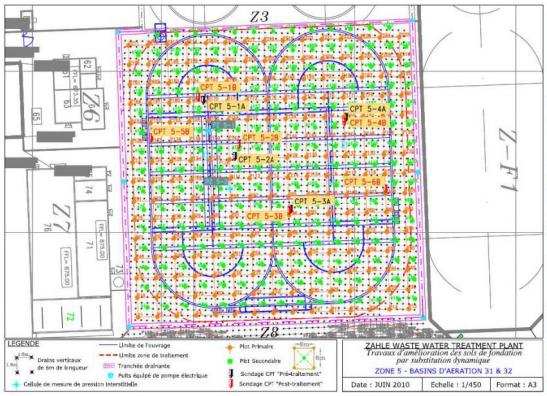
Design of a soil treatment solution and follow-up of works

2008 - 2014

LEBANON

Client

BUTEC HEADQUARTER



The Project

This Wastewater Treatment Plant (WWTP) is located in the city of Zahle, in Lebanon. It is situated on a 17.5 acres site and serves a population of more than 200,000 in the Beka valley.

This project is located on a triangular zone right-angle shape, with the hypotenuse being the river Litani. The dimensions of the triangular site are:

- longer side of about 435 m;
- shorter side of approximately 325 m.

The natural ground at plant location is considered to be 874.2 m.

TERRASOL's mission on the Zahle wastewater treatment plant located in the Beqaa valley of Lebanon was initiated in 2006 by a request from DEGRÉMONT SUEZ to perform a review of soil conditions. The geotechnical analysis of the initial ground investigations indicated the presence of a soft clay layer within the lacustrine sediments leading to large consolidation settlements under the facilities reaching 30 cm. In a second phase, complementary pressuremeter testing was analyzed and used to calculate total and differential settlements under clarifiers which confirmed the first findings.

Key features

- Geotechnical analysis of the ground investigations
- Study a soil treatment program based on dynamic replacement associated to wick drains
- Follow-up of works
- Raft design

Our Services

TERRASOL was then entrusted by the general contractor BUTEC to study a soil treatment program based on dynamic replacement associated to wick drains. The spacing, diameter and depth of the gravel inclusions were defined to obtain an equivalent soil modulus for the reinforced clay leading to acceptable settlement values. A methodology was specified with definition of treatment targets. To validate the design, two trial zones were executed and followed closely by TERRASOL. The improvement was verified by pre- and post-testing using pressuremeter and CPT.

The main zones were then treated and a careful final survey of dynamic compaction was performed. CPT profiles showed that the soil improvement increased the overall modulus to target value and all the zones reached the set criteria. Soil improvement works were covered by a compacted base course and subgrade layer before raft execution. TERRASOL assisted BUTEC during the execution period from 2008 to 2010.

Later in January 2013, TERRASOL performed a site visit at the request of BUTEC in order to validate the design of soil improvement works under the aeration tank based on the results of post-treatment CPTs. TERRASOL also reviewed plate load test procedures and results to validate the base coarse layers and redefine target specifications.

Finally, in 2014, TERRASOL performed the raft design under the recirculation sludge pumping station and filters and assessed expected settlements for these particular structures located below water table and below improved layers.

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