

Executive Summary

Damietta Port Authority in Egypt is planning to establish a new containers terminal as an extension to Damietta Port. Wataniya Environmental Services Co. (WES) has been invited by KGL Ports International (KGLPI) to undertake Baseline Environmental Study (EBS) and Environmental Impact Assessment (EIA) Study for the purpose of Damietta Port Project. The main target of the study is to identify current environmental conditions at the proposed site and the nearby affected areas

Damietta Harbor is considered as semi closed water body affected mainly from loading/unloading operations, municipal and agricultural wastes resulting from Damietta Governorate. The Harbor is connected with Damietta branch of the River Nile through a connecting navigational channel of 4.5 Km long, 90 m wide and with an average 5 m deep. Untreated domestic wastewater with agricultural and industrial wastes still released through a number of drainages and outfalls along the coastal area of study.

The Environmental Baseline Study (EBS) for the new extension of Damietta Port was based and focused on active main tasks. These main tasks were:

- 1- Land Use
- 2- Demography and Socioeconomics
- 3- Geology and seismic risk assessment
- 4- Groundwater and Soil Characterization
- 5- Coastal Marine Environment
- 6- Coastal Dynamics
- 7- Terrestrial Ecology
- 8- Ambient Air Pollution and Noise

Land- and water- uses in the proposed area as well as in the nearby affected areas, was investigated by using recent high resolution images from QuickBird (0.6 to 2.4 m resolution), in addition to ground survey. Image interpretation and application of remote sensing mapping methods determined that the landscape of the New Damietta port area is dominated by man-made cover types and infrastructures, rather than natural land covers.

Prominent surface features of the study area include: port area, bare land, water bodies, road and rail network, built-up area, and sand dunes. The area includes also various types of land use e.g., commercial and industrial, agriculture and mixed crops (corn, rice, green leafy, bananas, etc.), residential fabrics and dumping sites. All of these classes have been described and their area estimated. A final land-cover/land-use map have been produced. The site of the proposed new extension has been also described and mapped in detail.

In order to get the most real figures on the social and demographic analysis regarding the area surrounding the Damietta port, the Socioanthropological method was used. This method follows both the quantitative and qualitative techniques, in order to collect the most completed field data and information for the analysis of the situation.

The quantitative analysis was done using a pre-design questionnaire applied to samples from the residents of the surveyed surrounding areas. This questionnaire includes some technical questions and some other general questions. The diversities in the style of questions allow the residential people to indicate their beliefs and views regarding the different local problems. The sampling methodology followed the principle of snowball sampling technique.

The main points that were undertaken during the Social and demographical task are: Demographic Characteristics, Social Characteristics, and Economic activities of the local residential people. The factors that had been studied in this task are:

- Statistical analysis for the different population based on the range of age.
- Trends towards urbanization developments
- Analysis and data on the labor and workers.
- Analysis of the levels of livings and incomes, and
- Analysis of the educational levels.

Four (4) local communities can be identified:

- Bedouin (non-resident)
- Sale-people for seasonal agricultural products
- Khamsa Village (Eizbet Khamsa)
- Nasr Village (Eizbet Nasr)

Based on the field observations and the texture constitutes, the study area surface geology can be divided into: River sand, coastal sand, accretion ridge sand, beach dune and nearshore sand.

The area of study is just on the border of two seismic source zones, These sources are: Al-Fayoum Northeastern Egypt sources zone and southeastern Mediterranean source zone.

The estimated Peak Ground Acceleration (PGA) in milligals due to earthquake loads, estimated at the bedrock, during the next 50 year is about 105 milligals, while the estimated PGA during the next 100 years is about 132 milligals. These ground motion levels are calculated at 2 HZ frequency (predicted predominant frequency at the site) and are subject modification by the soils.

Groundwater samples were collected from two drilled boreholes around the investigated area. Eight (8) subsurface soil samples, about 0.5m from the ground surface were also collected covering the total area of study during 25th of July 2006.

The results of the physical and chemical analysis of groundwater and soil samples showed the following points:-

- 1- The physical analysis revealed low Oxygen concentration less than 4 mg/l in borehole No. II.
- 2- High concentration in ammonia 0.24 mg/l in borehole No. II, increased two folds than those recorded in borehole No. I.
- 3- Very high concentration of Nitrate (NO₃-n) in borehole No. I, reach to 20 times compared with the results taken from borehole No. II
- 4- High concentration of phosphate reached two folds in borehole No. II than it found in borehole No. I.
- 5- Water salinity of borehole No. I reached four times than those recorded in borehole No. II.
- 6- The feeding of borehole No. I, may be related to the water percolation from the Mediterranean Sea. This could be confirmed as a result from the high content of Ca and Mg

Persistent organic pollutants (POPs) which include chlorinated pesticides and petroleum hydrocarbons were determined in groundwater and soil samples collected from Damietta Harbor during August, 2006. Concentration of total pesticides ranged from 20 to 22 ng/L. The increasing order of total pesticides was: THCHs < TC < total DDTs with concentrations ranged from 4.2-4.9 ng/L, 5.8-6.3 ng/L and 10.4-11.3 ng/L, respectively in the area of study.

The average concentrations of total petroleum hydrocarbons recorded in soil samples were *above the admissible environmental levels*. They ranged from 0.56-6.67 µg/g during August, 2006. land based activities mainly agricultural and municipal wastes in addition to loading/unloading operations are the major source of pollution occurred markedly in area.

The soil sample can be classifies as sand, ranging from very fine to medium sand, most of samples are well to moderately sorted, which indicates that oil sediments are composed from one or two size classes and sources.

The marine hydrographical parameters that measured in this study indicated healthy conditions except for a suspected eutrophication problem at the southern part of the Port, which can be determined only by long term study (daily, monthly and/or seasonally) including real time continuous measurement of the eutrophication parameters. Depleted bio-available nutrients (nitrite, nitrate and dissolved inorganic phosphate) were recognized during discussion of the obtained results. Total nitrogen and phosphorous was abundant during the sampling time.

Water contamination with metals indicated low concentration of iron and manganese, suggesting their incorporation in the rapid growth of phytoplankton. DH can be considered contaminated by both copper and cadmium, while very high concentrations were detected for zinc and lead reaching risky conditions.

On the other hand, high oil pollution in DH was noticed compared to marine environment; however, the determined values are usually present in the Port and the Mediterranean coastal waters.

The bed sediments indicated an elevated load of organic matter, trace metals and oil pollution. The grain size results showed fine sediments inside the Port with poor sorting and negative skewness.

The coastal marine environment is rich in its biodiversity. Phytoplankton, zooplankton and marine benthic animals have been identified. The phytoplankton communities were much higher than the zooplankton indicating a high primary productivity inside the Port. Species of coastal shore area have been identified and the main fish community in the vicinity of Damietta area was identified.

Detailed information about the quality of other components of the eco-system (sediments, phytoplankton and fish) is reported in the present study.

The coastal dynamic Studies include; shoreline stability, dominated hydrodynamic forces and coastal issues. Damietta Harbor is located on the northeastern coast of the Nile delta, Egypt. Adjacent geomorphologic areas include, Damietta promontory, beach, backshore sand-flat, backshore depression, distributary channel, cultivated and arable land. Medium and fine sand occur in the beach area ($Mz = 0.14$ to 0.58 mm) whereas very fine sand and coarse silt cover the nearshore zone including the vicinity of the navigation channel ($Mz = 0.08$ - 0.2 mm). The spatial distribution of mean grain size shows a general seaward decrease as well as in the longshore direction toward the vicinity of the harbor. The waterfront of the Harbor is sandy, gently curved with a general NNE-SSW orientation. This shoreline orientation provides effective oblique wave exposures. Waves approach the coast from the northwest quadrant, commonly dominated from north-northwest direction (maximum 87%) induced longshore sediment transport to the east, whereas, waves from the north-northeast sector (5 to 25%) generates a reverse longshore current towards the west. The net sediment transport is to the east. The coastline is typical of microtidal semi-diurnal nature with a tidal range of 75 cm.

Based on analyses of beach profiles and satellite images acquired between 1984 and 2000 maximum accretion (14.7 m/yr) occurred along the western coast due to the construction of the western breakwater, whereas, greatest erosion (-14.5 m/yr) dominated along the down-drift beach of the eastern breakwater. The erosion/accretion pattern is resulted from the NW wave-induced longshore current to the east. Beaches on both sides of the harbor are relatively still unused except the two recreation beaches at the New Damietta City about 6.7 km west of the harbor and the artificially-protected resort at Ras El Bar, 6.0 km east.

The wildlife study included terrestrial fauna and flora. The investigation indicated that the new proposed port area is considered moderate or less important areas as it contains few fauna and flora that are found elsewhere in Egypt and are affected with the landscape due to rapid urbanization.

An ecological survey based on the available data, site reconnaissance and field trips along the study area is carried out to distinguish habitats, existing flora and status of vegetation cover and the probable impact of the new land use system on native flora. Eight sampling sites were selected to represent the prevailing physiographic and physiognomic variations in the study area. The main habitats recognized in the study sites are salt marshes and sand formation habitats. List of plant species is recorded, their occurrences, and species richness are calculated and noteworthy species in the study area are distinguished. The highest value of species richness of species occurred in site 1, while the lowest value in site 2. The low species diversity of the vegetation types of the salt marsh and sand deposit sites is probably related to the high salinity of their soils. The area was previously planted with thousands of date palms but most of these trees have been removed to build new establishments of the port. Also the natural vegetation has been removed and, accordingly, the recognized zones are restricted to salt-affected lands dominated by salt tolerant plants. Analysis of data demonstrated higher occurrence of life forms resistant to water stress: Therophytes and geophytes in the studied sites. This life form has its own unique adaptation to Mediterranean climate. The condition of the study area has deteriorated alarmingly in recent years. The area is affected by several factors such as continuous degradation and deposition, the accumulation of remains of vegetation, the blowing of sand and man made desiccation e.g. closing of some irrigation canals and construction of levees. This had a severe effect on natural plant communities and habitats.

The air quality mobile laboratory was used for field measurements in the vicinity of the proposed study site. Measured data were analysis to obtain a baseline concentration level for major pollutants in the area.

The measured values for both SO₂ and NO₂ were well below the standard values provided by EEAA-Egypt at both sites.

Damietta City is located 8.5 km south-east of the existing Damietta Port. The prevailing wind is from the northwest which might provides moderate concentrations of both NO₂ and SO₂ in this locality that blow most of the emitting pollutes toward the land downwind.

Ras El Bar on the contrary, to the east of the existing Port area and is most likely to be affected by the emissions during constructions. This coastal resort would experience high hourly and daily SO₂ ground level concentrations while NO₂ concentrations fell below the EEAA standards.

The levels of both total suspended particulate (TSP) and particulate matter less than 10 micron (PM₁₀) were higher than air quality limits (AQL) as recommended by Egyptian Environmental law 4/94 in some sites which exposed to air pollution sources.

The major inorganic gases SO₂, NO_x, CO and others measured gases had average levels below AQL, and it seems that all levels in at most cases are near the background levels.

Noise levels exceeded the permissible levels in several sites of those selected to be measured. It can be inferred that the highest noise level was located in Station 3, 4, 5 and 6. These stations are mainly affected with traffic noise and Diesel noise of the Gantry cranes. Noise levels in the areas surrounding the Port showed acceptable levels. In general, the ambient noise background in Port area should be around 50 dB. One kilometer away from the Port, the noise contribution was around 50 dB; and at two-kilometer distances, the contribution was about 42 dB. Therefore, it is reasonable to believe that after the completion of the new Damietta extension, the noise level will be at most about 80 dB at a one-kilometer distance; and at a two-kilometer distance about 60 dB.