

#### 5.4.4. Air Quality and Noise

In the vicinity of the study area, many sources of air pollution and odour emissions exist. This is due to the operation of the tanning industries, food industries, open air cement batching factory, the movement of the vehicles transporting fuel, the solid waste sorting facilities, the various commercial activities and traffic. The consultant will review previous studies on the study area and inquire from the municipalities about industries operating in their jurisdiction to identify potential hotspots. The consultant contacted the MOE for the air quality data available from the UNDP project “Environmental Resources Monitoring in Lebanon Project”. This data is only available for 2010-2012. In order to verify and update this information, the Consultant will undertake air quality testing for the PMs, NO<sub>x</sub>, SO<sub>x</sub>, H<sub>2</sub>S and CO at the proposed project site, in addition to at one location near residential areas. The method used for each parameter is as follow:

- Carbon Monoxide – CO: CO analysis using the permanent gas  $\mu$ GC/TCD technique after sampling in Tedlar bags (5 L). LQ CO = 20 ppm.
- Nitrogen Oxides – NO<sub>x</sub>: NO<sub>x</sub> analysis (NO & NO<sub>2</sub>) using the ionic chromatography technique after sampling on OGAWA passive supports (PS-124 and PS-100) in accordance with laboratory’s internal method MO.LAB.843. LQ NO<sub>2</sub> & NO = 0.3  $\mu$ g / support.
- Hydrogen Sulfide – H<sub>2</sub>S: H<sub>2</sub>S analysis using spectroUV-visible technique after sampling on Radiello passive support (code 170) in accordance with laboratory’s internal method MO.LAB.705. LQ = 20  $\mu$ g / m<sup>3</sup> for 8 hours screening.
- Sulfur Dioxide – SO<sub>2</sub>: SO<sub>2</sub> analysis using the ionic chromatography technique after sampling on Radiello passive supports (code 166) in accordance with laboratory’s internal method MO.LAB.842. LQ SO<sub>2</sub> = 12  $\mu$ g / support for 8 hours screening.
- Particulate Matter – PM: A PM counter (AEROCET 831) for quantifying the total dust of 10 microns maximum (PM<sub>1</sub>, 2.5, 4, 10 & TSP) will be used for a maximum of 30 minutes at each testing point.

In addition, noise data taken for the ESIA of Phase 1 were obtained and presented in the table below (Table 5-7). The noise measurements were recorded using the noise meter Cirrus CR: 800C. L<sub>90</sub> and L<sub>10</sub> were reported as these are considered to be more representative of existing conditions than the equivalent sound level or Leq. Three locations were selected for noise measurements:

- at the project site
- Near the fishermen’s port
- In the industrial area to the south

Noise levels at the three locations N1, N2, and N3 did not exceed national standards (MOE Decision 52/1 for 1996 for industrial areas). L<sub>MAX</sub> results were above standard at all locations due to passage of vehicles along the adjacent road.

**Table 5-8: Summary of Measured Sound Levels**

Point	Time/Period	Limit for Ambient Noise Levels dB(A) in Selected Regions (Decision 52/1)	Sound Level Values in dB(A)			
			LEQ	LMAX	L10	L90
N1	Day Time (07:00-18:00)	Industrial Area (60-70)	69.3	90.6	69.1	59.5
N2			62.6	79.6	65.4	52.8
N3			55.7	78.7	56.1	49.9

**5.4.5. Traffic**

The study area is located tangent to the seaside road that connects the North to the South and the capital Beirut. Traffic on that road is at its peak in the afternoon rush hour. An additional traffic peak is in the morning rush hour. The road leading to the project site is that of the dumpsite. In addition, it is a tertiary road that only concerned staff and trucks pass through. No traffic was observed on this road during the site visits. In fact, upon entry to the site from the tertiary road, there is ample space for potential construction vehicles to park without leading to any road congestion. Figure 5-25 shows the sea side road, the Dora main highway and the tertiary road leading to the proposed WWTP.



**Figure 5-25: The Road Network near Project Site**

**5.4.6. Biodiversity**

**5.4.6.1. Terrestrial**

The proposed location of the project site is land reclaimed from the sea surrounded by highly urbanized land. The terrestrial biodiversity is therefore expected to be very low with no plant or animal species

of any conservation value in the nearby vicinity. The Consultant will visit the site to verify this conclusion.

#### 5.4.6.2. Aquatic

The marine biodiversity is rich along the coastal area of Lebanon and originates mostly from the Red Sea and the Indio-Pacific Ocean. The coast is considered the most vulnerable zone of the country and is threatened by urbanization, coastal developments, over-fishing, water pollution and coastal erosion<sup>12</sup>.

The seabed of five areas lying off the Lebanese coast was visually explored by Oceana through a research cruise carried out in coordination with MOE along the Lebanese waters. Samples were collected from the soft-bottom areas and specimens were retained in mesh for identification<sup>13</sup>. The coastal area of the Bourj Hammoud WWTP project is part of the St. George Canyon where the conducted marine surveys had covered both the shallow and the deepest waters. Figure 5-26 shows the five areas of the study including the St. George Canyon in reference to the project location. Various types of habitats along with their associated marine species were observed at the St. George Canyon.

The Consultant will therefore use the information obtained from this study to describe the marine biodiversity near the study area.

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<sup>12</sup> Abi Saab, M. (2012). Marine Biodiversity in Coastal Waters. National Council for Scientific Research, Lebanon CNRS

<sup>13</sup> Aguilar, R., Garcia, S., Perry, A.L., Alvarez, H., Blanco, J., Bitar, G. 2018. 2016 Deep-sea Lebanon Expedition: Exploring Submarine Canyons. Oceana, Madrid. 94 p. DOI: 10.31230/osf.io/34cb9



Figure 5-26: Surveyed Areas Including St. George Canyon Location in Reference to the project location

#### 5.4.6.3. Protected Areas

The study area is located around 1.4 km away from the Beirut Port Outer Platform and 35 km away from Medfoun Rocky Area. Both are proposed Marine Protected Areas according to the Lebanon Marine Protected Area Strategy of 2012. Moreover, the Project site is located around 5.5 km away from the Beirut River Valley International Bird Area (IBA). The Consultant will undertake additional research on these protected areas and contact MOE and the Municipality of Bourj Hammoud in order to identify any additional proposed sites nearby.

#### 5.4.7. Available Infrastructure

The sewage network in Beirut serves around 96% of the resident population. In contrast, only 40% of populations of Baabda and Aley, which are part of the catchment area, are connected to a sewage network. The sewage and storm water networks in the project area have been rehabilitated and expanded progressively to be connected to the existing network that discharges directly into the sea. Moreover, a pumping station for sewage has been implemented towards Beirut River mouth. However, the sewage and storm water networks overlap at different locations leading to an overflow on roads, which is of special concern to the residents because it contains industrial wastewater. The

Municipality of Bourj Hammoud regularly cleans these networks mainly next to the pumping station. The total length of the existing networks as is around 510 km. Within the study area, there are four point-sources discharging municipal and industrial wastewater along the coastal part near the study area<sup>14</sup>.

According to the meetings that were possible to undertake with the concerned municipalities of the catchment area given the current restrictions, questions asked by the consultant included those related to the general status of the wastewater networks in each village. Some municipalities confirmed that their wastewater networks are in good condition, while others have a lack in wastewater network coverage (only 50% or 80% of the village covered). In some villages, the networks were very old or in bad condition. Several municipalities do not have wastewater networks and are still using septic tanks.

As for solid waste, the study area includes the coral composting facility, which was upgraded in 2017, and the Bourj Hammoud dumpsite that was rehabilitated into a landfill. Solid waste was also observed dumped along the Beirut River bed.

During the ESIA, information on wastewater management were collected mainly through meetings with the municipality of Bourj Hammoud and all the concerned municipalities benefitting from the WWTP in the Metn District, Baabda and Beirut. In these meetings, the Consultant has obtain additional information on the size of the wastewater network, number of households connected to the network, how the wastewater is managed for households that are not connected, and where the wastewater is disposed.

#### **5.4.8. Socioeconomic Conditions**

Due to the lack of census data, population estimates in Lebanon vary according to source. For this study, the Consultant relied on population data used in preparing the National Water Strategy Update of 2020. According to this data, the total population in Bourj Hammoud, which constitutes the residential area in the General Area of Influence of the project, is 140,711 (2020 projection). Bourj Hammoud is a densely populated area and it is known for its high population of Armenian residents. Armenians have fled to Lebanon seeking refuge from the Great Crime and genocides practiced in Armenia by the Ottoman Empire. However, the municipality hosts notable other Lebanese Shi'a Muslims, and Christians, as well as Palestinians<sup>15</sup>. Furthermore, according to the UNHCR's statistics, the municipality of Bourj Hammoud hosts 10,068 registered Syrian refugees<sup>16</sup>. However, there are no informal tented settlements or camps in this area.

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<sup>14</sup> APEC (2010). Bourj Hammoud Municipality. Organization Study of Bourj Hammoud Industrial Zone. Architecture Planning and Engineering Consultants.

<sup>15</sup> Civil Society Center. (2015). Burj Hammoud Locality Profile. Available at: <https://civilsociety-centre.org/sites/default/files/vpr/burjhammoudlocalityprofile-ls-cskc.pdf>

<sup>16</sup> UNHCR. (2019). Lebanon Beirut and Mount Lebanon Governorates. Distribution of the registered Syrian refugees at the Cadastral Level", April 30th, 2019, available at: <https://reliefweb.int/sites/reliefweb.int/files/resources/69592.pdf>