5.4.10. Archaeology and Cultural Heritage

Armenian culture and heritage have been kept alive through several religious centres, institutions and cultural associations, many of which are located in Bourj Hammoud. Bourj Hammoud lack public spaces and parks. However, it has two theatres, a music conservatory known as the "Levon Shant Cultural Center" that is part of a cultural centre run by Hamazkayin Armenian Educational and Cultural Association, a bookstore and publishing house where the daily Armenian newspaper "Aztag" is printed[36].

It does not appear that there are any historical sites within or near the proposed WWTP site, as this is reclaimed land from the sea. However, in order to verify this, the Consultant will request additional information from the Municipality of Bourj Hammoud, as well as during interviews with the local population. In case an archaeological finding is identified, procedures will be developed and included in the ESIA.

5.5. Potential Environmental and Social Impacts

During this stage the potential environmental and social impacts will be identified and assessed. Impacts will be considered during both the construction and operation phases of the project, as well as cumulative impacts resulting from the wastewater sector in Lebanon in general. The evaluation of potential environmental and social impacts will be based on scientific evidence, literature review and professional judgment. In addition, quantitative assessment such the sea wastewater outfall dispersion modelling undertaken as part of this FS and odour dispersion modelling undertaken as part of the EIA done in 2019 will also be assessed to evaluate potential impacts.

The CORMIX GTD11.0 software was used to simulate the development of the plume resulting from the continuous discharge of wastewater effluent from the planned WWTP and to demonstrate its expected contribution to the coastal water body. Four scenarios were examined under this modelling taking into account a fixed outfall flow rate (5.99m^3/s) along with a high and low wind and the sea current speeds. As for odour emissions, the Gaussian air dispersion model was adopted to assess odor generation form the pre-treatment headworks, which is the most significant source of odours. The model calculates the concentration of an odorous compound at any distance from the emission source given the emission rate at the source. The model was designed for the modelling of H_2S emissions from the outlet stack of the odour control unit for three scenarios with different working conditions, H_2S emitted concentrations and wind speeds.

The impact classification and ranking approach that will be applied is as follows:

- Identification of project-related activities (during both construction and operation phases) and environmental risks;

[36] Nathalie Rosa Bucher. (ND). Bourj Hammoud: Beirut's Armenian Soul. Available at https://www.hotelibanais.com/travel/bourj-hammoud-beirut/

- Determination of potential impacts on the physical, natural and socioeconomic environment that may arise from these activities;
- Assessment and evaluation of potential impacts based on the criteria set out in table 3

5.5.1. Impact Magnitude

Potential impacts of the project will be categorized as major, moderate, minor or negligible based on consideration of parameters such as: i) duration of the impact; ii) spatial extent of the impact; iii) reversibility; iv) likelihood; and v) legal standards and established professional criteria. The criteria for assessing the magnitude of impacts are given in Table 5-9.

Table 5-9: Parameters for Determining Magnitude

Parameter	Major	Moderate	Minor	Negligible
Duration of impact	Long term (more than construction period)	Medium Term Lifespan of the project (during construction period)	Less than project lifespan	Temporary with no detectable impact
Spatial extent of the impact	Widespread far beyond project component site boundaries	Beyond immediate project components, site boundaries or local area	Within project components and site boundary	Specific location within project component or site boundaries with no detectable impact
Reversibility of impacts	Impact is effectively permanent, requiring considerable intervention to return to baseline	Baseline requires a year or so with some interventions to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant
Legal standards and established professional criteria	Breaches national limits and or international guidelines	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of impacts occurring	Occurs under typical operating or construction conditions	Occurs under worst case (negative impact) or best case (positive impact) operation conditions	Occurs under abnormal, exceptional or emergency conditions	Unlikely to occur

Source: Handbook of Environmental Impact Assessment, Volume II, Judith Petts, 1999. Blackwell Science Ltd.

5.5.2. Sensitivity of Receptor

The sensitivity of a receptor (physical, ecological and social receptors) will be determined based on review of the vulnerability of the receptor present in the study area and their capacity to absorb proposed changes. Each detailed assessment will have a defined sensitivity in relation to the topic. The criteria for determining sensitivity of receptors are outlined in Table 5-10.

After evaluating the potential impacts, their significance will be assessed based on the previous criteria. The different criteria in relation to the significance of the studied impacts are shown table 4.

Table 5-10: Criteria for Determining Sensitivity

Sensitivity Determination	Definition
Very High	Vulnerable receptor with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
High	Vulnerable receptor with little or no capacity to absorb proposed changes or limited opportunities for mitigation.
Medium	Vulnerable receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation
Low/Negligible	Vulnerable receptor with good capacity to absorb proposed changes or/and good opportunities for mitigation

Source: Handbook of Environmental Impact Assessment, Volume II, Judith Petts, 1999. Blackwell Science Ltd.

5.5.3. Assigning Significance

Following the assessment of magnitude, the quality and sensitivity of the receiving environment or potential receptor will be determined and the significance of each potential impact established using the impact significance matrix shown in Table 5-11.

Table 5-11: Significance of Impact Criteria

Magnitude of Impact	Sensitivity of Receptors			
	Very High	High	Medium	Low / Negligible
Major	Critical	High	Moderate	Negligible
Moderate	High	High	Moderate	Negligible
Minor	Moderate	Moderate	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

The Project's potential impacts and their significance will be assessed following the above described semi-quantitative methodology. The different criteria in relation to the significance of the impacts that will be studied are shown in Table 5-12.

Table 5-12: Description of Impact Significance Results

Significance	N	**Negligible:** • No measurable impact. Issues identified as negligible can be scoped out.
	L	**Low:** • No considerable adverse alteration of the existing environment • Low priority mitigation
	M	**Moderate:** • Results in considerable adverse alteration of the existing environment • Impact is a priority for mitigation to minimize or prevent the significance of the impact

	H	**High:** • Results in considerable adverse alteration of the existing environment • Project cannot be safely implemented without mitigation measures; compensation or offsetting may be necessary
	C	**Critical:** • Results in critically adverse alteration of the existing environment • Project cannot be safely implemented. Alternatives including the no project alternative need to be investigated in depth for reducing the level of impact significance

As part of the ESIA process, mitigation measures are proposed when negative impacts are identified (which cannot be managed through design controls). In order to properly propose mitigation measures and identifying design controls, the sequence of the mitigation hierarchy must be followed (Figure 5-29). As shown in the figure, the efforts must be initially made to avoid or prevent negative impacts. Minimize or reduction of adverse impacts will be then followed. Mitigation measures must be applied through an effective management plan for the project related activities during construction and operation. Remaining significant residual impacts are then addressed through considering mitigation measures such as offsetting and compensation.

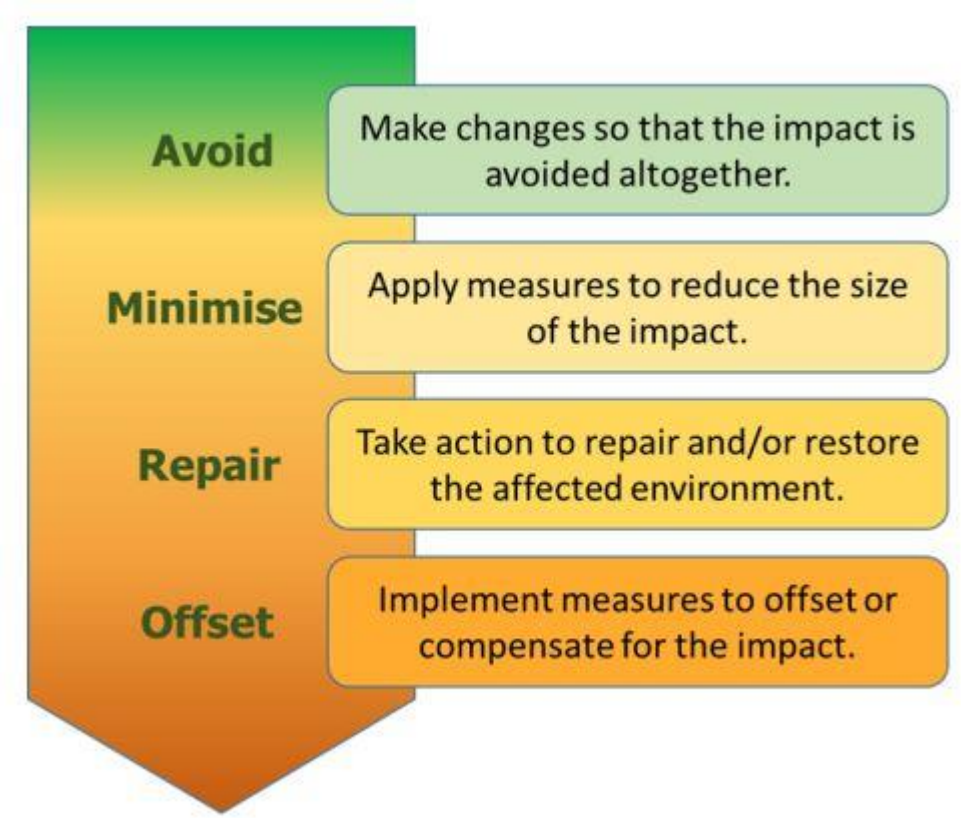

Figure 5-29: Mitigation Hierarchy[37]

Table 5-13 and Table 5-14 present a list of potential environmental and social impacts that have been identified for the construction and operation phases, their receptor and whether they have been scoped in or out for further investigation in the ESIA study.

[37] EBRD. (2010). Main Road Reconstruction Project, Rehabilitation and Upgrade of the Danilovgrad-Podgorica Road Section: Framework Biodiversity Action Plan