سلطة المياه الفلسطينية
PALESTINIAN WATER AUTHORITY

# Palestinian Water Authority (PWA)

# Environmental and Social Management Plan (ESMP)

## For

## Gaza Wastewater Management Sustainability Project (WMS)

**(P172578)**

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## Abbreviations and Acronyms

| Abbreviations | Name |
|---|---|
| AFD | Agence Francaise de Developpement |
| BLWWTP | Beit Lahia Wastewater Treatment Plant |
| BOQ | Bill of Quantities |
| BP | Bank Procedure |
| CBOs | Community Based Organizations |
| CEO | Consultant Engineering Office |
| CFR | Code of Federal Regulations |
| CMWU | Costal Municipality Water Utility |
| CO2 | Carbon dioxide |
| dB | Decibels |
| EA | Environmental Assessment |
| EHSGs | Environmental Health and Safety Guidelines |
| EPRI | Environmental Protection And Research Institute |
| EQA | Environment Quality Authority |
| ERP | Emergency Response Plan |
| ESCP | Environmental and Social Commitment Plan |
| ESF | Environmental and Social Framework |
| ESMP | Environmental and Social Management Plan |
| ESO | Environmental and Social Officer |
| ESS | Environmental and Social Standard |
| FIs | Financial Intermediaries |
| GEDCo | Gaza Electricity Distribution Company |
| GIIP | Good International Industry Practice |
| GRM | Grievance Redress Mechanisms |
| HSE | Health, Safety and Environment |
| IEE | Initial Environmental Evaluation |
| ILO | Intentional Labor Organization |
| ISO | International Organization For Standardization |
| IUCN | International Union for the Conservation of Nature |
| LC | Least Concern |
| LTI | Lost Time Injury |
| m3/day | Cubic meter per day |
| MoA | Ministry of Agricultural |
| MoFP | Ministry of Finance and Planning |
| MoH | Ministry of Health |
| MoTA | Ministry of Tribal Affairs |
| NG WWTP | North Gaza Wastewater Treatment Plant |
| NGEST | Northern Gaza Emergency Sewage Treatment |
| NIS | New Israeli shekel |
| NO | Nitrogen Oxide |
| NSR | Noise Sensitive Receptor |
| O&M | Operation and maintenance |
| OIPs | Other interested parties |
| OP | Operational Policy |

| | |
|---|---|
| OSHA | Occupational Safety and Health Administration |
| PA | Palestinian Authority |
| PAD | Project Appraisal Document |
| PAPs | Project-affected parties |
| PCBS | Palestinian Central Bureau Of Statistics |
| PDO | Development Objective |
| PEAP | Palestinian Environmental Assessment Policy |
| PEL | Palestinian Environmental Law |
| PENRA | Palestinian Energy and Natural Resources Authority |
| PLC | Palestinian Legislative Council |
| PM&E | Participatory Monitoring and Evaluation |
| PM10 | Particulate Matter up to 10 micrometers |
| PMU | Project Management Unit |
| PPE | Personal Protective Equipment |
| PPHL | Palestinian Public Health Law |
| PS | Palestinian Standards |
| PSI | Palestinian Standards Institution |
| PV | Photovoltaic |
| PWA | Palestinian water authority |
| RSMP | Road Safety Management Plan |
| SAT | Soil Aquifer Treatment |
| SCADA | supervisory control and data acquisition |
| SEP | Stakeholder Engagement Plan |
| SO2 | sulfur dioxide |
| TOR | Terms Of Reference |
| TPS | Terminal Pumping Station |
| UNRWA | United Nations Relief and Works Agency |
| WASH | water, sanitation and hygiene |
| WB | World Bank |
| WBG | World Bank Group |
| WHO | World Health Organization |
| WMSP | Gaza Wastewater Management Sustainability Project |

# Executive Summary

## ESMP Scope and Objectives

North Gaza wastewater is collected and treated by the Northern Gaza Emergency Sewage Treatment (NGEST) project comprised of North Gaza Wastewater Treatment Plant (NG WWTP) with a capacity of 35,600 $m^3$/day will be increased up to 69,000 $m^3$/day in the future and Terminal Pumping Station (TPS). The project also involves the aquifer recharge with the treated wastewater from the NG WWTP through nine infiltration basins of an area of 8 ha; as well as the recovery of the recharged aquifer through 28 recovery wells to be used in irrigation of around 1,500 ha of agricultural lands. Prior to the implementation of the NGEST project, the wastewater in the Northern Governorate was collected in Beit Lahia Wastewater Treatment Plant (BLWWTP) and the random lake that has been formed next to the BLWWTP over year to receive the growing amounts of wastewater. BLWWTP comprises seven ponds (2 anaerobic, 2 aeration, 2 facultative and one polishing pond (Pond #7)).

The NGEST project has successfully contributed to improving environmental health conditions in targeted communities, as the effluent lake at Beit Lahia posed acute health and safety threats to the nearby communities before it was drained. The Project also brought an effective solution to treat wastewater effluents and prevent the degradation of the aquifer while providing improved sanitation services to the targeted beneficiaries (368,978 people).

However, the financial collapse of the Palestinian economy in 2018 compromised the already weak capacity of the PWA to continue funding the operating expenditures of the NG WWTP. The Palestinian economy has been on a declining growth trajectory and experienced almost zero growth in 2017. This situation limited the ability of the MoFP to process on time the payments due to the contractor in charge of the operation of the NG WWTP, which consequently decided to terminate the contract in July 2019. Since then, the PWA has been operating the NG WWTP at a precarious level with its own staff. PWA has received an emergency grant from AFD to procure essential chemical products and consumables to run the plant until the end of February 2020. If no support is provided after March 2020, wastewater effluents will start filling the Beit Lahia lake and infiltrating the aquifer with untreated wastewater, posing a serious humanitarian and environmental crisis in Gaza, with spill-over consequences to Israel. This indicates the urgent need for the project. To ensure continues operation of the plant the project includes retroactive financing and meanwhile PWA is operating the treatment plant with its limited available financial resources.

The proposed Gaza Wastewater Management Sustainability Project (WMSP) aims to: (i) Prevent the collapse of the Northern Gaza Wastewater Treatment System to mitigate adverse environmental impacts on surrounding communities; and (ii) improve managerial capacity and financial resilience of wastewater treatment services in the Gaza strip. The proposed WMSP would provide financial and technical support to PWA to: (i) operate the NG WWTP under strict parameters of efficiency and reliability; (ii) rehabilitate and operate its associated facilities; and, (iii) design and put in place an enhanced governance framework aimed at improving the sustainability of wastewater management services in Gaza. International Bank for Reconstruction and Development/International Development Association is considering financing the WMSP Project.

## Project Description

A detailed technical audit has been prepared for the existing NGEST project based on the standard asset management methodology as outlined in international standards. The output of this audit includes the condition of every electromechanical and civil assets includes ranking the equipment according to levels of deterioration (from unserviceable to new or excellent condition. The results of the performance audit informed the specific investments under the WMSP project components described below:

1. **Component 1: Support the operation of the Northern Gaza (NG) WWTP and associated facilities including rehabilitation and retrofitting.** Under this component the Project will finance the PWA's hiring of qualified staff to operate and maintain the NG WWTP to its design capacity, along with the provision of chemical inputs, tools and consumables for operating NGEST facilities for three years (from March 2020 to March 2023). The PA will finance energy costs under agreed standards and protocols. This component will also finance the cost of rehabilitation works of underperforming or environmentally sensitive wastewater pumping and treatment facilities, including: (i) the Terminal Pumping Station (TPS) that has been poorly maintained and is only working on 1 out of 5 pumps; and (ii) a reliable voltage regulation system at the NG WWTP.

2. **Component 2: Limited upgrade of NGEST and TPS facilities to build resiliency and address emergencies.** This component will finance: (i) an emergency overflow system for the terminal pumping station; (ii) upgrading of the existing pond #7 that is adjacent to the Terminal Pumping Station to a 24 hours flow capacity. This pond should include special lining in order to prevent raw sewage from seeping into the environment and submerged aerators that can aerate the sewage to prevent odor emissions. See results chain for detailed investments.

3. **Component 3: Capacity building for sustainability of wastewater services in northern Gaza.** It would finance: (i) technical assistance to build capacity of the Technical Team for wastewater management within the existing organizational structure, to address the current emergency and for the long term sustainable operation of the plant; and, (ii) technical assistance to design and implement an enhanced governance and institutional framework, based on a national wastewater strategy for efficient and reliable management of wastewater treatment services in northern Gaza in close coordination with similar efforts that are being conducted in central and south Gaza. This component will be supported by a series of actions that need to be complied with before the project is effective, namely: (i) a comfort letter that a Utility establishment by-Law will be endorsed and effective by the first year of the project; (ii) an MoU between PWA and CMWU outlining roadmap for handing over O&M of NGEST to CMWU; (iii) development of a ToR for an independent consultant to undertake a rapid assessment to examine WWS in North Gaza and produce time-bound actions to achieve sustainability of the sector in North Gaza in accordance to on-going national reforms at the three levels; (iv) a proposed organizational structure to operate TPS and WWTP as one scheme and (v) Service Agreements between CMWU and Municipalities are included in the MoU.

**Component 4: Project management and implementation support.** It would finance: (i) PWA's Project supervision and Project management; and (ii) consulting services for the development of engineering designs and preparation of safeguard instruments.

## Environmental and Social Requirements

During preparation of the Project the PWA prepared an Environmental and Social Audit (ESA) for the existing assets (TPS, NGWWTP, Pond 7 and other lakes), and this Environmental and Social Management Plan (ESMP) for the new suggested installations and works (under Components 1.2 and 2). The ESMP instrument is selected because the project entails some new equipment that would be installed in existing facilities (the TPS and the NGWWTP) to replace/repair damaged equipment. Also

some civil works would be needed in an existing wastewater pond to make it function as an equalization tank. No any works would be done in greenfield or outside the footprint of existing facilities (no any land acquisition or horizontal expansion of existing facilities). The ESA looked at the different E&S aspects of the current operations, checked on the compliance with the ESIA/ESMP of the NGEST Project and identified areas that needs improvements to meet the ESF requirements during future operations. The ESA found that the ESMP measures are complied with the environmental controls of NGWWTP (operation of the infiltration basins, control of neighboring wells, noise and odor control systems). The ESA found partial compliances / non compliances with the ESMP on the following: the monitoring program was not conducted at the required frequencies, malfunctioning of the odor control system at the TPS, staff training for handling oils were not conducted, polymers and lubricants were not purchased timely, some poor management OHS issues were observed and absence of emergency repose plan.

This ESMP for the new suggested installation and works has been prepared to identify different E&S risks and impacts, according to the requirements of ESS1, and to identify measures to mitigate negative impacts. This ESMP is intended to identify different environmental and social risks during the construction and operation of the Project and recommended mitigation measures relevant to each phase. This ESMP is highly aligned with the ESA in identifying the mitigation measures related to the operation of the whole system.

This ESMP covers the upgrade of TPS, NGWWTP, the pressure line and the upgrade of pond # 7. The different components of the project are located in two main sites in the Northern governorate in the Gaza Strip, namely the NG WWTP site in Jabalia Municipality and the TPS and Pond #7 sites in Beit Lahia Municipality, in addition to the pressure pipeline that connects these two sites, where some rehabilitation works will take place.

The ESMP is prepared in compliance with the national Environmental Law and Environmental Assessment Policy which requires Initial Environmental Evaluation (IEE) as well as the World Bank's Environmental and Social Framework and ESSs. PWA prepared an Environmental and Social Audit (ESA) for the existing assets (TPS, NGWWTP, Pond 7 and other lakes), and all recommendations from this study are included in this ESMP. The ESMP is designed to detail (a) the potential environmental and social impact of the project, (b) the measures to be taken during the implementation and operation of the project to eliminate or offset adverse environmental and social impacts, or to reduce them to acceptable levels, and (c) the actions needed to implement these measures.

## Applicable National Regulations and World Bank Environmental and Social Standards

Environmental and Social legislation and regulations are vital tools to protect public health and the environment and give consideration to sustainable development. The project is guided by the national Environmental Law and Environmental Assessment Policy set by the Palestinian Authority along with the World Bank Environmental and Social Framework (ESF) requirements.

The Environmental and Social Framework (ESF) that was launched on October 1, 2018 sets out the World Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social Standards ESS1 to ESS10 that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity.

Out of the ten World Bank Environmental and Social Standards, only ESS1, EES2, ESS3, ESS4, ESS8 and ESS10 are found applicable to the project. ESS6 is not considered relevant to the Project since most of the project sites are in urban areas that do not have high biodiversity conservation value and no ecosystem services are likely to be impacted by the Project. However, there are potential impacts on groundwater, seashore and other coastal water which have been dealt with under ESS1. Based on the requirements of those standards, the project has prepared this ESMP. In addition, several the other Environmental and Social ESF documents are being prepared including Labor Management Procedures (LMP), an Environmental and Social Audit for the NGWWTP and the TPS and a Stakeholder Engagement Plan (SEP). The various future actions, recommendations and major management measures will be defined in an Environmental and Social Commitment Plan (ESCP) for the project.

## Risk Assessment and Potential Environmental and Social Impacts

During construction, it is anticipated that the construction activities will create job opportunities for the local community and will provide a temporary source of income over the construction period. During operation, number of new jobs will be created for operation and maintenance activities; these include engineers, technicians, shift operator, labor, SCADA technicians, and guards.

The main potential impacts that could arise from the different phases of the Project were identified and their significance was assessed so that any potentially significant impacts can be properly mitigated and monitored. As mention under section Environmental and Social Requirement above, the ESMP is highly aligned with the ESA in identifying the mitigation measures related to the operation of the whole system. The ESA addresses many of the same problems and presents mitigation measures which are incorporated in this ESMP and therefore the issues described in this ESMP are incremental over and above those described in the ESA.

The Project entails substantial risks including risk to ground water pollution from infiltration of non-compliant effluent to the underlying aquifer, transmission of diseases due to exposure of the nearby Bedouin community to uncontrolled sludge dumping sites near the existing ponds and facilities which also create breeding grounds for mosquitos and flies, risks to occupational health and safety during construction and operation of plant, risks associated with dewatering of pond 7 and handling and disposal of sludge from cleaning pond 7 and the generated sludge from the opearation of the treatment plant. The Project is not likely to cause significant environmental impacts. The environmental risks/impacts could be summarized as follows:

- -Possible groundwater pollution from uncontrolled discharges of wastewater from random lakes during flooding and infiltration basin at the NGWWTP, or unsafe disposal of sludge. To mitigate this risk, PWA shall prepare and implement a groundwater monitoring plan which includes water quality monitoring for all municipal wells determined at risk of pollution from the infiltration of wastewater at all project sites in addition to upgrading the NGEST groundwater model.

-Risk of improper dewatering and clearing the bed of Pond 7 during construction. The dewatering of Pond 7 (Component 2) would be needed to install the lining system and other hydraulic structures that would enable the control of wastewater during peak hours or emergency overflow situations. If the capacity of the NGWWTP is full and adjacent random lakes are saturated during this rehabilitation period, the dewatering of Pond 7 may lead to discharge of wastewater at other areas leading to temporarily expanding the impacted area. Another related risk is the handling of the soil forming the bed of Pond 7 that would be cleared to prepare for the lining, this soil would include sediments/sludge that need to be stabilized before disposal. This risk will be mitigated through adequate planning of the dewatering/soil

clearance activities to allow draining Pond 7 either to the NGWWTP or temporarily to the adjacent lakes, and to plan for stabilization of bed soil before disposal.

-OHS risks during operation are mainly the risk to technicians/operators health due to contact with raw or partially treated wastewater as well as safety risk during the operation of different facilities and the health risk due to suffocation or poisoning to presence of hydrogen sulfide ($H_2S$); methane (CH4), and carbon dioxide (CO2). Workers and members of the community could be subject of drowning risk at the random lakes and the installation and electrical works at the TPS and the NGWWTP (Component 2) as well as operators of the TPS/NGWWTP could be subject of occupational health and safety risks. Also, the upgrade of Pond 7 and random lakes (Component 2) would be associated with some occupational health and safety risks for the workers during the installation of equipment and clearing of the Pond 7 bed. The community risk is rated substantial due to legacy of previous incidents around the TPS before the big lake was drained through the NGEST project. The risk would be mitigated through the measures already included in the Project design (fencing and improving the embankments), therefore its occurrence is unlikely, and would be further mitigated through awareness campaigns. Risks to the health and safety of workers and community is substantial.

-Risks related to waste management, sludge disposal during the operation of the system. The sludge is currently stabilized and dried at the NGWWTP, therefore their associated impacts are not significant. The challenge would be to timely transfer the waste to the landfill to avoid random disposal or accumulation at the NGWWTP. To mitigate this risk, PWA should prepare sludge management plan for the NGWWTP to ensure its safe handling and disposal in an environmentally accepted manner. The plan should include agreement between PWA and Municipality of Gaza for the disposal of the sludge of NGWWTP to Joher El Deek landfill.

-Noise, air emissions and traffic during construction.

- The main social risk may include: (i) The risk of overflow and flooding of the wastewater from the existing northern lagoons (lakes) and pond #7 at the time of stoppage or malfunctioning of the plant due to unforeseen circumstances such as excessive flooding, cut off the electricity, conflict, etc. The overflow and the poorly maintained embankment of these lagoons and pound #7 will have a flooding risk to the surrounding communities especially in the downstream of the lagoons. (ii) Poor safety measures such as proper fencing around these facilities and missing of warning signs around the site can be a health hazard to the community, especially children (iii) the presence of children and the nearby community in general near the dried lakes pose a serious health risk, mainly skin diseases. (iv) risk of getting equal job opportunities for women in the project as a result of the stereotype of women's work in the construction activities; (v) poor opportunities for vulnerable groups to participate in the various stages of the project; (v) weak community interaction with the project, due to the lack of trust and confidence between the community and municipalities related to the ability of the municipalities in accomplishing and operating the project components; (vi) expected conflicts between municipalities and their ownership of the project or their contributions that may adversely affect the implementation of the project; (vii) community health impact due to excessive movement of vehicles during transferring of solid waste, construction debris, and sludge, as well as exposure of children to uncontrolled sludge dumping sites near the existing ponds and facilities which also create breeding grounds for mosquitos and flies. The major impacts are related to health problems to the nearby Bedouin community from spread of diseases and risk to the community from possible flooding. To mitigate these risks, PWA should (i) prepare and implement a Pest Management Plan at the Beit lahia Wastewater Facilities to ensure proper control of mosquitos, flies, and other pests at the site, to ensure no adverse impacts to the Bedouin community adjacent to the random lake and (ii) Ensure an emergency preparedness plan is in

place for the facilities at the Old Beit Lahia wastewater facilities and the random lake. This plan will include, inter alia, an early warning system to allow evacuation of the surrounding communities at risk if and when a flood risk or breach of embankments is imminent.

Risk classifications were carried out for the project components and are outlined in this report. The environmental and social risk for this project is classified as Substantial. All essential environmental and social instruments needed to mitigate the assigned risk of the project components are listed below.

- For Comonent 1 and 2: This ESMP is prepared for construction and rehabilitation of TPS, NGWWTP, the pressures line and the decommissioning of pond # 7 and for the operation of the NGEST project.
- For Component 1: A sludge management plan needs to be developed by PWA for sludge that will be generated from the operation of the treatment plant and desludging of pond # 7. TOR for the sludge management plan shall be prepared prior to project effectiveness and plan to be in place by the end of August 2020.
- For Component 1: Environmental and Social Audit is prepared for O&M during project operation.

Labor management procedure (LMP) is prepared to set out the Project's approach to meeting national requirements as well as the objectives of the Bank's ESF, specifically objectives of Environmental and Socials Standard 2: Labor and Working Conditions (ESS2) and Standard 4: Community Health and Safety (ESS4). Stakeholder Engagement Framework (SEP) is prepared for the project sites under ESS10.

## Environmental and Social Management Plan (ESMP) Matrix

The Environmental and Social Management Plan (ESMP) is a combination of the proposed mitigation measures for the anticipated impacts and the monitoring plan, which is designed to: 1) ensure that the prediction for the impacts is accurate and 2) assure that the mitigation measures are implemented and they are effective in performing the objectives. The monitoring plan includes the monitoring activities (How?), the responsible party for monitoring (Who?), and the frequency of monitoring (How many?). The ESMP is designed to cover the different phases of the project. The generated ESMP is mainly built upon the national Environmental Law and Environmental Assessment Policy and Bank which require Initial Environmental Evaluation (IEE) with ESMP and the ESF, and ESSs (ESS1, ESS2, ESS3, ESS4, ESS8, and ESS10).

Environmental and Social Management Plan **Matrix**[1]

| Element and Impact | Mitigation Measures |
|---|---|
| **Construction Phase** | |
| **Air Quality**<br>During construction<br>• Minor impact due to vehicle movements and excavations.<br><br>During operation<br>• Air pollutant generated by diesel generators at NGWWTP and TPS.<br>• Bad smell from treatment units in NGWWTP ($H_2S$, $NH_3$, etc.)<br>• Bad smell in the inlet works of the screening building in the TPS.<br>• Air pollutant due to the discharge of biogas into the atmosphere either with or without burning using the existing flare<br>• Bad smell from the disposed sludge produced in NGWWTP and disposed at TPS site. | • Plan vehicle movements and do not overload vehicles to minimize exhaust emissions.<br>• Control the speed of transporting vehicles, select transportation routes to minimize dust impact on sensitive receivers.<br>• Assure the use of well-maintained mechanical construction equipment.<br>• Comply with relevant local emission standards from vehicles and heavy equipment where available and applicable.<br>• Schedule and monitor excavation and backfilling activities.<br>•<br>• Repairing the odor control system in the screening building in the **TPS**.<br>• Air sampling to be conducted as needed and in case of workers or community complains.<br>• In case of exceedance of indoor air quality levels, workers should be equipped with appropriate protecting gear (masks).<br>• In case of exceedance of outdoor air quality levels, carryout investigations and conduct necessary maintenance,<br>• Alert surrounding community about possible risks and precautionary measures.<br>• Establish a functional GRM and address relevant complains.<br>• Repairing the gas storage system in the. NGWWTP.<br>• Stop disposing the sludge from NGWWTP to the TPS and develop an agreement between PWA and Municipality of Gaza for the disposal of the sludge from NGWWTP to Joher El Deek landfill.<br>• Removing the accumulated sludge in the TPS to Joher El Deek landfill.<br>• Install a mixer to aerate pond #7 to prevent the occurrence of anaerobic condition and bad smell. |
| **Noise Quality**<br><br>Nuisance and health impacts on workers and local residents due to noise generating activities associated with operation of machinery, transport of materials in trucks, and installation of equipment in TPS, pond 7 and NGEST | • Comply with Palestinian Labor Law no (7) of (2000) regarding provision of protective hearing devices and appropriate safety equipment to workers on construction sites, where construction works are expected to produce noise over an appropriate level.<br>• Apply OSHA 1910.95 (a) and OSHA 1910.95 (b) regarding exposure periods to different noise levels. (International best practice).<br>• Provide well-maintained construction vehicles and machinery, in order to minimize noise.<br>• Restrict the movement of machinery within project boundaries and plan vehicle movements to and from sites. |

[1] This is a summary of Table 6-1 which provides additional details on institutional responsibilities, timelines and costs.

Environmental and Social Management Plan **Matrix**[1]

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|---|---|
| | • Prohibit operating heavy or noisy machinery between the hours of 6:00 pm (18.00) and 6:00 am during working days and all day during Fridays or designated local holidays (unless the public will be best served during these hours and approval has been provided by local government.<br>• Schedule working hours and work days taking into consideration sensitive receptors, especially the rehabilitation works of chambers along the pressure line. |
| **Biological Resources (Fauna and Flora)**<br><br>Minor disturbance or displacement of species and habitats during site clearance and construction | • Protect trees and plants (including root systems). However, if it is necessary to uproot any plant or tree then it should be replanted in a location with the same conditions that is agreed upon by the appropriate authorities.<br>• Limit working activities to daytime hours only because most mammalian species are of nocturnal life styles.<br>• Restore original site characteristics as much as possible after the construction works are completed. |
| **Groundwater**<br><br>There may be risks of pollution from uncontrolled spillage of fuels and lubricants<br><br>Possible groundwater pollution from uncontrolled discharges of wastewater from random lakes during flooding and infiltration basin at the NGWWTP, or unsafe disposal of sludge | • Ensure all necessary equipment is available and in good working condition and well maintained, along with backup power in order to minimize leaks and spills.<br>• Maintain a clean construction site, and dispose of waste material at approved disposal site, to protect the existing groundwater resources from contamination by debris, soil and sludge<br><br>prepare and implement a groundwater monitoring plan which includes water quality monitoring for all municipal wells determined at risk of pollution from the infiltration of wastewater at all project sites in addition to upgrading the NGEST groundwater model |
| **Traffic**<br>The impacts on traffic will be due to the construction activities associated with the rehabilitation of chambers along the pressure line, transferring of waste, pond outputs and construction debris. | • Include into bidding documents for civil works requirement for bidders to submit their Management Strategies and implementation Plans (MSIP) for addressing Environmental, Social, Health and Safety (ESHS) risks and the ESHS Code of Conduct and cause Contractor(s) to act by these documents.<br>• Cause Contractor(s) to develop and adhere to the method statement for traffic management<br>• Coordination between the PWA with local Municipality regarding possible closure of the road under maintenance and inform the local community in advance to avoid any risk on the public health and safety commercial loss. |
| **Labor and working condition Risks and Impacts**<br><br>Physical hazards from falling and injuries, risks from movement of heavy machinery, and physical hazards during working in all activities in pond #7, overflow to pond #7, rehabilitation of chambers along the pressure | • The contractor shall Prepare, submit and implement health and safety plan (OHS) for PWA approval prior to starting any project activities.<br>• The contractor shall prepare an Emergency Response Plan (ERP) in coordination with the relevant local authorities. (Annex 2 presents an example of Emergency plan) |

Environmental and Social Management Plan **Matrix**[1]

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| line, as well as installation and electrical works at the TPS and the NGWWTP.<br><br>**<u>Supply chain risks and impacts</u>**<br><br>Risks including workers' health and safety if the subcontractors are not reputable and legitimate entities and lacking appropriate ESMS that will allow them to operate in a manner consistent with the requirements of ESS2. | • Comply with the Secondary Legislations associated with the Palestinian Labor Law, particularly the Ministerial Cabinet Order No.49, Year 2004 about protection measures from work risks and illnesses and Guidelines No.1, year 2005 on provision of precautionary measures to protect workers at construction sites.<br>• Comply with the Labour Management Procedures (LMP) of WMSP where a child under the age of 18 will not be employed or engaged in connection with the Project (This is according to the Palestinian Labor Law No. 7 of 2000, article No. 93; and ESS2 requirements). In addition, according to the Palestinian Child Law article 14 and International labor Organization (ILO) agreement, the child of age under 18 years will not employed. All workers shall be insured by the contractor for any potential work accidents and injuries according to the Palestinian Labor Law.<br>• Provide adequate personal protective equipment (PPE) including hard hats, safety goggles, brightly colored vests, and other appropriate safety equipment to protect workers from injury.<br>• Provide first aid kits on construction sites and ensure the presence of personnel with the minimum first aid skills at construction site all times.<br>• Respect all safety measures required for working on rooftops. Apply the OSHA roofing works measures (OSHA 29 CFR 1926.502 (j) (7)).<br>• Use safety nets where roofs facing roads to prevent debris accidentally falling to the street. In addition, place appropriate warning sign on the road.<br>• Identify and isolate construction zones by using warning signs, pylons, fencing, and ribbon barriers.<br>• Consider suitable engineering and occupational health and safety practices during site preparation in areas where unprotected electrical cables and unstable objects are stored and exist.<br>• Maintain and consider safe and careful movement and access of heavy machinery and vehicles in access to and operations within all construction sites.<br>• Coordinate with relevant municipality to announce and inform people within the facility and surrounding areas of planned schedule for construction works, including residential areas.<br>• Take appropriate measures to prevent unauthorized persons from entering the work area and construction sites, particularly school students and unattended children. Provide guards when and where it is found necessary to provide adequate security of the work and protection of the public.<br>• Adopt appropriate noise and dust control measures.<br>• Ensure safe access and passages are provided for the public.<br>• GBV, HIV/AIDS, Child protection training/awareness campaign for contractor, sub-contractors and communities (and HIV/health);<br>• Provisions for handling of GBV in the GRM<br>• Update and implement the stakeholder engagement plan (SEP) |

Environmental and Social Management Plan **Matrix**[1]

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| | • Communication through contractor environmental and social specialist when stringing activities will take place to ensure children are not playing in the work area;<br>• Project sites to be marked off with fencing and signage to prevent people from entering the dangerous sites; |
| **Solid Waste**<br>The solid waste materials during construction are limited to construction waste materials and packaging materials from rehabilitation activities in pond #7 and construction of the overflow to pond #7, soil from excavation of the overflow pipe and sludge from pond #7 | • Provide all necessary Personal Protective Equipment (PPE) for handling hazardous material depending on type and status of material<br>• Perform storage and disposal of residual hazardous material by an experienced professional, in coordination with local and competent authorities to identify appropriate disposal sites. |
| **Society and Surrounding Communities** | |
| Weak participation of women in planning and identifying project needs. The weakness of getting equal job opportunities for women in the project as a result of the stereotype of women's work in the construction activities | • Increasing the number of community meetings during the construction period by prompting the participation of women, girls and the elderly.<br>• Ensure that employers and implementing companies (contractors) comply with equal criteria in employment opportunities.<br>• Develop joint benefit contracts (need for legal development that guarantees the benefit of the family, not Persons with joint ownership) |
| Poor opportunities for vulnerable groups to participate in the various stages of the project. | • Increasing the number of community meetings during the construction period by prompting the participation of vulnerable groups as indicated in the SEP. |
| Weak community interaction with the project, due to the lack of trust and confidence between the community and municipalities related to the ability of the municipalities in accomplishing and operating the project components. | • Forming community accountability and follow-up committees that carry out a part of their social roles.<br>• Conduct community meetings that clarify the responsibilities of the parties, including the municipality<br>• Distributing brochures that present the progress of the project and its future phases<br>• Promote transparency values by publishing project budgets (read budgets understand by citizens). |
| Poor confidence of citizens and workers of the municipalities related to the construction system, and the potential of any sudden breakdown that may lead to the suspension of the work. | • Maintaining the existing ponds for a period of time estimated by experts until the actual start of work and ensuring the capacity of the new system to avoid any problem that might occur if the work interrupted, for example<br>• Prepare an emergency plan to avoid any problem.<br>• Conduct public meeting as indicated in the SEP that enhance the confidence of citizens and workers in the project's capabilities to avoid any defect.<br>• Promote the information transparency values and share it with the community in the project stages. |

Environmental and Social Management Plan **Matrix**[1]

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|---|---|
| Expected conflicts between municipalities and their ownership of the project or their contributions that may adversely affect the implementation of the project. | • Analyse risks and prepare a response plan for compensation and Risk aversion<br>• Conduct community meetings to clarify the risks and their management mechanisms and to explain the arising rights for the contracting parties |
| Lack of integrity and transparency during the distribution of job opportunities in the project, especially for the targeted areas. | • Incorporating civil society institutions within monitoring the project<br>• Developing community monitoring tools such as community accountability committees<br>• Obligate the employers by the integrity and transparency standards in the employment<br>• Activate and publish the complaints system and make it available to the public. |
| The weak capacity of obtaining information from its main sources, such as municipalities and supervising construction institutions. | • Develop a strategy for publishing information and making it available to the public.<br>• Conduct extended community meetings.<br>• Publishing data and plans through various and multiple channels available to all, such as the Internet, municipalities, mosques, clubs and offices. |
| Transferring of waste, pond outputs and construction debris may bring a risk to citizens as a result of the excessive movement of vehicles. | • Analyse risks and prepare a response plan for compensation and Risk aversion؛<br>• Conduct community meetings to clarify the risks and their management mechanisms and to explain the subsequent rights for the contracting parties. |
| Risk on community health and safety, including impacts associated with sludge hauling to final disposal | • Use signs, barriers, and education/public outreach to prevent public contact with potentially dangerous equipment and/or materials.<br>• Maintain and consider safe and careful movement of sludge hauling vehicles.<br>• Public consultation as indicated in the SEP |
| Impacts to the Bedouin community adjacent to the random lake: skin diseases, spread of mosquitos, flies, and other pests. | • Prepare and implement a Pest Management Plan at the Beit lahia Wastewater Facilities |
| Flooding risk to the surrounding communities especially in the downstream of the lagoons Flooding risk to random lacks causing fatalities in the communities downstream | • Prepare an emergency preparedness plan for the facilities at the Old Beit Lahia wastewater facilities and the random lakes |
| Transmission of diseases due to exposure of the Nearby Bedouin community to uncontrolled sludge dumping sites near the existing ponds and facilities which also create breeding grounds for mosquitos and flies; | • Use signs, barriers, and education/public outreach to prevent public contact with potentially dangerous materials.<br>• Take appropriate measures to prevent unauthorized persons from entering the work area and construction sites, particularly school students and unattended children. Provide guards when and where it is found necessary to provide adequate security of the work and protection of the public.<br>• Public consultation as indicated in the SEP. |
| Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Child Abuse/Exploitation (CAE) risks. | • A stand-alone GBV Action Plan, to assess and manage the risks of GBV, SEA, and CAE will be prepared and implemented.<br>• Organize awareness raising sessions and educate the workers and the community in the Project site on issues of GBV/SEA/CAE, legal rights, GRM and referral path for victims; |

Environmental and Social Management Plan **Matrix**[1]

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|---|---|
| | • GRM for GBV/SEA/CAE will be strengthened and integrated to track related complaints, including a feedback system for regular and timely feedback on actions taken to respond to complaints. |
| **Operation and Maintenance Phase** | |
| **Air Quality**<br>• Impact on air quality due to the emissions from the diesel generators in the TPS and NG WWTP.<br>• Impact on air quality due to releasing of the biogas to the environment or burning it using the existing flare.<br>• Bad smell from the disposed sludge produced in NGWWTP and disposed at TPS site.<br>• Bad smell from treatment units in NGWWTP ($H_2S$, $NH_3$, etc.)<br>• Bad smell in the inlet works of the screening building in the TPS.<br>• | • Using emissions filter for all the diesel generators in the project. This type of filters is available in the market and has high efficiency of CO, NOx, and PM 2.5.<br>• Producing electricity using PV.<br>• Using Bio-gas generators instead of diesel generators if possible. This will considerably reduce the gas emissions (may reach to more than 80% emissions reduction). (See Annex 3 for Electricity Management Plan)<br>• Reducing the operating hours of the standby generators by supplying the pumping stations and the reservoirs distribution pumps with electricity connections that enable more supply hours in the Gaza electricity distribution schedule.<br>• Comply with relevant local emission standards from heavy equipment where available and applicable.<br>• More protection of the biogas balloon is needed to protect from stray ammunition that comes from the nearby troubled boards<br>• Repairing the gas storage system in the. NGWWTP.<br>• Repairing the odor control system in the screening building in the TPS.<br>• Air sampling to be conducted as needed and in case of workers or community complains.<br>• In case of exceedance of indoor air quality levels, workers should be equipped with appropriate protecting gear (masks).<br>• In case of exceedance of outdoor air quality levels, carryout investigations and conduct necessary maintenance,<br>• Alert surrounding community about possible risks and precautionary measures.<br>• Stop disposing the sludge from NGWWTP to the TPS and develop an agreement between PWA and Municipality of Gaza for the disposal of the sludge from NGWWTP to Joher El Deek landfill.<br>• Removing the accumulated sludge in the TPS to Joher El Deek landfill.<br>• Install a mixer to aerate pond #7 to prevent the occurrence of anaerobic condition and bad smell.<br>• |
| **Noise Quality**<br>• Nuisance and health impacts on workers and local residents;<br>• Disturbance to terrestrial fauna. | • Replace and maintain noise muffling equipped or other used acoustic reduction technologies as needed.<br>• Confirmation of expected noise levels from installed equipment against safe working levels, and provision of warning signs and protective equipment for workers by the operator. |
| **Labor and working condition Risks and Impacts**<br>• Risk on engineer/technician health during the operation and maintenance TPS and NGEST. | • Training of the O & M departments in the health facilities on the operation and maintenance TPS and NGEST as well as best practice maintenance activities.. |

Environmental and Social Management Plan **Matrix**[1]

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|---|---|
| • Risk to life and health by suffocation or poisoning to presence of hydrogen sulfide (H2S); methane (CH4), and carbon dioxide (CO2). | • Good storage of chemicals to be used in the O&M i.e. polymers for sludge dewatering.<br>• All protective equipment must be installed and checked. These include personal protective equipment like electrically isolated rubber gloves and hard hats when working with mechanical reconstructions as well as appropriate gloves to deal with lead batteries.<br>• Works on electrical instrumentation and protective equipment must be carried out only by a qualified engineer and technician/s. Staff is not allowed to continue with maintenance unless the functional state of protective equipment is ensured.<br>• Power supply connections and breakers should be kept secure against unexpected restart and a warning label must be attached against restarting.<br>• Protective devices must be serviced regularly according to the manufacturer's instructions.<br>• Loose connections and scorched cables must be removed immediately.<br>• The system control room/cabinet must contain all safety measures such as fire-fighters, free of flammable materials, natural and artificial ventilation, and under the eyes of safety guards.<br>• A drawing on the control room/cabinet shall provide warning about safety hazards, e.g. smoking, acid handling, etc. as well as emergency shutdown procedures. (See Annex 4 for Occupational Health and Safety Plan).<br>• The operation and maintenance of the biogas system is only to be carried out by specially trained personnel who are familiar with the systems, the operating instructions and with the safety requirements.<br>• All system equipment to be inspected, serviced and maintained in accordance with the manufacturer's recommendations by an approved and qualified engineer or suitably trained and qualified person under a strict permit to work system.<br>• All records relating to periodic inspections, servicing and maintenance to be retained. |
| **Wastewater discharge**<br>• Improper disposal of treated wastewater[2] to the infiltration basins at the NGWWTP.<br>• Risk of raw wastewater flooding to surrounding areas in the TPS site due to the malfunctioning of the TPS equipment creating health and safety hazards.<br>Risk of raw wastewater flooding to surrounding areas in the TPS site due to the decreased capacity of the NGWWP of the plant equipment creating health and safety hazards. | • Replacing the malfunctioning equipment in TPS by new ones as indicted in the project description/section 2 (pumps, bar screens, SCADA, etc.)<br>• Initiate building capacity program for the operational staff to properly operate and maintain different facilities of the project.<br>• Starting preparation for constructing phase II of the NGWWTP by updating/preparing tender documents.<br>• Constructing an over flow system at the TPS with adequate storage capacity as indicated in the project description/section 2 (overflow line, overflow pond #7, etc.) |

[2] Treatment standards applied to this project is 20/30 (BOD/SS)

Environmental and Social Management Plan **Matrix**[1]

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|---|---|
| | • Replacing/repairing the malfunctioning equipment in NGWWTP by new ones as indicted the project description/section 2 (bar screens, gas balloon).<br>• Initiate building capacity program for the operational staff to properly operate and maintain different facilities of the NGWWTP.<br>• Implement a comprehensive wastewater quality monitoring program. |
| **Hazardous waste**<br>• Risk of spill of hazardous waste such as oils, lubricants, polymers.<br>Risk of storage and handling hazardous materials used in the NGWWTP and TPS such as polymers | • Training employees on the hazards, precautions and procedures for safe storage, handling and use of all potentially harmful materials relevant to each employee's task and work area.<br>• Follow safety instructions, worker should wear proper clothing.<br>• A first aid station with trained staff, which is able to coordinate with local hospitals in case of emergencies.<br>• Preparing and implementing spill response and emergency plans to address their accidental release. |
| **Solid Waste/Sludge**<br><br>• The risk of the sludge and screening materials produced from NGWWTP and transferred close to pond #7,<br>• Improper storage/disposal/reuse of produced sludge from the NGWWTP leading to:<br>-Ground water pollution<br>-Soil pollution<br>-Air pollution<br>-health hazards (workers and community).<br><br>• Improper handling and disposal of solid waste generated at the NGWWTP and TPS | • Prepare sludge management plan for the NGWWTP to ensure its safe handling and disposal in an environmentally accepted manner. The plan should include agreement between PWA and Municipality of Gaza for the disposal of the sludge of NGWWTP to Joher El Deek landfill.<br>• Stop disposing the sludge from NGWWTP to the TPS and dispose the accumulated sludge at TPS to an authorized land fill (e.g. Joher El Deek landfill). |
| **Society and Surrounding Communities** | |
| Flood risk due to the overflow of wastewater to the northern lagoons and pond 7, the flood risk is also due the poorly maintained embankment of the lagoons and pound #7 | • PWA should take measures to close these lagoons and make sure that the municipalities stop pumping the waste water at the start of the project.<br>• In case PWA needs to keep using these lagoons for emergency when there is a frailer in TPS, PWA should take immediate safety measures and ensuring that the two lagoons are well fenced and the embankments of the lagoons are reinforced.<br>• Improve and reinforce the embankments of the pond 7.<br>• Install safety signs on the fence of the northern lagoons and pond 7. |
| Health and safety risk on children in the area surrounding the northern lagoons and pond 7 | • Reinforce the fencing of the lagoons with hard rigid fence type.<br>• Improve and reinforce the embankments of the pond 7,<br>• Develop an emergency and community outreach plan. |

Environmental and Social Management Plan **Matrix**[1]

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|---|---|
| The presence of children into and near the dried lakes pose a serious health risk, mainly skin diseases. | • PWA/municipalities need to ensure that the random lakes are well fenced<br>• Close any openings in the fence of these lakes.<br>• Municipalities' staff need to conduct frequent visits to the lakes to ensure that safety measures are in place. |
| Concerns related to the disability of municipalities in operating the project. | • Analyse risks and prepare a response plan for compensation and Risk aversion<br>• Conduct community meetings to clarify the risks and their management mechanisms and to explain the arising rights for the contracting parties |
| Conflicts that may arise due to the distribution of responsibility between municipalities for the operation of the project. | • Organizing inter-municipal cooperation agreements to clarify roles and responsibilities<br>• Develop a dealing blog that regulates relationships and roles between municipalities and follow-up community bodies, such as community accountability committees and NGOs in the same geographic region<br>• Organizing contracts with the donor in a way that clarifies the roles and responsibilities of each municipality and published them to the public<br>• Holding sharing meetings regularly between the municipalities to avoid any conflict that may occur. |
| The injustice feeling among the citizens of Beit Lahia, as they are the most affected by the project comparing with the project benefits. | • Holding regular meetings with the local community to explain the positive effects on the society as a whole<br>• Adopting a strategy to distribute the benefit according to the degree of effect<br>• Activating the complaints system and publishing it to the public<br>• Clarify the channels of complaints and the mechanisms to reach them easily<br>• Publish project outputs and beneficiaries, their numbers and status to the first phases of operation |
| The weak opportunity for persons with disabilities and women to work in the operation and maintenance of the project. | • The municipalities and project's implementing institutions adopted initiatives that encourage increasing women opportunities to work in project operation |
| Risk of GBV/ SEA / CEA | • Organize awareness raising sessions and educate the workers and the community in the Project site on issues of GBV/SEA/CEA, legal rights, **GRM** and referral path for victims of GBV/SEA;<br>• GBV/SEA risks should be monitored continuously through the life cycle of the Project;<br>• **GRM** for GBV/SEA/CEA should be strengthened and integrated to track complaints related to GBV/SEA, including a feedback system for regular and timely feedback on actions taken to respond to complaints. |

## Organizational Capacity

The successful implementation of the monitoring program will depend on the commitment and capacity of the PWA-PMU, Environmental and Social Officer (ESO), Consultant Engineering Office (CEO) and other third parties (institutions) to implement the program effectively. The PWA-PMU, during construction of the project components, ESO who will have the overall responsibility for implementing the ESMP and shall report directly to the PMU Director. The PMU-ESO will have a supervisory role over different stakeholders and will be responsible to include the proposed mitigation measures and monitoring activities in the tender documents and equipment supply contracts.

PWA has developed an Environmental and Social Management Plan for the NGEST project to keep up with the environmental and social policy of the Bank since year 2006. Since then there was a lack of producing E&S reports, keeping records and there was no hiring of ESO to follow the ESMP. For the current project during the construction phase (before starting) the contract of the Consulting Engineering Office (CEO), who will supervise construction work, should include supervision component on the relevant environmental and social measures that will be implemented by the construction contractor. The CEO Representative in each construction site should report directly to the PMU-ESO about the performance of the contractor in implementing the environmental and social instruments including ESMP, LMP, and SEP during his work, the approval of the contractor's invoices should include the signature of the PMU-ESO based on the reports he receives about the contractor performance in implementing the environmental and social instruments.

During operation, PWA responsible for the operation and maintenance of the project shall appoint a manager in addition to ESO who will generally be responsible for implementing mitigation measures and monitoring activities prior to initiation of the project activities. The manager will supervise the ESMP measures at the different project sites, in addition to corresponding and cooperating with different authorities for monitoring the operation of the site, and will be the staff in charge of implementing the social mitigation measures.

## Monitoring and Reporting

For an effective integration of environmental and social standards into the project implementation, the Contractor will need to adopt this ESMP and prepare a comprehensive Construction Environment and Social Management Plan (C-ESMP) that will provide the key reference point for compliance. The environmental supervision will also adopt the C-ESMP.

PWA will be responsible for monitoring the overall implementation of the ESMP. In particular, ESO will (i) monitor the implementation of mitigation measures and the environmental and social performance of contractors, (ii) Monitor training of project staff and contractors (list of persons, dates and places).

ESO will also prepare (i) quarterly reports summarizing monitoring results, to be included in the Project's Quarterly Reports to the World Bank, (ii) reports that aggregate and analyze monitoring results ahead of regular World Bank implementation support missions with PWA, (iii) an annual evaluation of all environmental and social monitoring results, which will be submitted to the World Bank as part of overall project implementation reporting.

## Competency and Training

Training is essential for ensuring that the ESMP provisions are implemented efficiently and effectively. The PWA shall therefore ensure that all persons that have roles to play in the implementation of the ESMP are competent with appropriate education, training or experience. Similarly, the contractors shall be required to undertake general HSE awareness for their project workforce and specific training for those whose work may significantly have impact on the environment. This is to ensure that they are fully aware of the relevant aspects of the ESMP and are able to fulfill their roles and functions. The contractor will be required to submit internal HSE training and procedures to PWA for approval before commencement of civil works. Based on the assessment of the institutional capacities of the different agencies that will be involved in the implementation of the ESMP, four broad areas of capacity building have already been identified and recommended for effective implementation of the ESMP.

## Cost Estimates for ESMP Implementation

To effectively implement the mitigation and monitoring measures recommended in this ESMP, necessary provision will have to be made. The cost of mitigation by the Contractor will be included in the contract as part of the implementation cost by the Contractor. The total estimated cost for the ESMP implementation and monitoring, for the three years is **US$**203,313.

**Estimated Budget for the Implementation of ESMP**

| **Item** | **Responsibility** | **First Year (US$)** | **First Year (US$)** | **First Year (US$)** | **Total US$ (3 years)** |
|---|---|---|---|---|---|
| SEP budget | PWA | 13,350 | 4,330 | 11,150 | 28,830 |
| Staff salaries (ESO, OHS) (1,500 per month) (The ESO will dedicate a time effort of 25% for the implementation of the SEP) | PWA | 18,000 | 18,000 | 18,000 | 54,000 |
| Monitoring the air parameters in operation phase | PWA | 15,000 | 5000 | 5000 | 25,000 |
| Noise Monitoring | PWA | 1,000 | 1,000 | 1,000 | 3,000 |
| Groundwater and Wastewater monitoring program | PWA | 20,000 | 20,000 | 20,000 | 60,000 |
| Capacity building | PWA | 9,000 | 2,500 | 2,500 | 14,000 |
| **Subtotal** | | 84,350 | 53,830 | 60,650 | 184.83 |
| Contingency | 10% of subtotal | 8,435 | 5,383 | 6,065 | 18,483 |
| **Total** | | 92,785 | 59,213 | 66,715 | 203,313 |

## Stakeholder Engagement

A stakeholder engagement mechanism in the form of the Stakeholders Engagement Plan (SEP) is already

prepared by PWA for the project. Main stakeholders have been identified in the SEP and need for their engagement throughout the project cycle has been outlined. The SEP details out the communicating methods including public meetings, mass/social media communication, communication materials, project tours for media, NGOs, and CBOs and Information Desks. The SEP details out the enhanced requirement to engage with the project affected people during preparation and implementation of ESMP. The project specific Grievance Mechanism has also been detailed out, see also the section on GRM below.

## Grievance redress mechanism

In compliance with the World Bank's ESS10 requirement, the existing GRM at PWA will be adapted for this project. Dedicated communication materials (GRM pamphlets, posters) will be developed to help local residents familiarize themselves with the grievance redress channels and procedures. A GRM guidebook/manual will also be developed. Internal GRM training will take place for PWA and contractor staff. The PWA's website will include clear information on how feedback, questions, comments, concerns and grievances can be submitted by any stakeholder or Project affected people (PAPs) and will include the possibility to submit grievances electronically. It will also provide information on the way the GRM works, both in terms of process and deadlines.

## Disclosure of Information

The current PWA website (http://pwa.ps/) is being used to disclose project documents, including those on environmental and social performance in Arabic. PWA will create a webpage for the Project on its existing website. All future project related environmental and social monitoring reports, will be disclosed on this webpage. Project updates (including news on construction activities and relevant environmental and social data) will also be posted on the homepage of PWA's website. The PWA's website will also include: An easy-to-understand guide to the terminology used in the environmental and social reports or documents, all information brochures/fliers, details about the project Grievance Redress Mechanism, and the electronic grievance submission form. PWA will update and maintain the website regularly (at least once on quarterly basis). Further, PWA will create a dedicated project Facebook page and a WhatsApp group for PAPs and other stakeholders. Project documents will also be disclosed on the World Bank website.

# 1. Scope and Purpose

## 1.1. Background

Since late 1990's and early 2000s, increasing sewage flows in northern Gaza and insufficient capacity to treat and dispose such flows led to overflowing from the treatment plant into the surrounding sand dunes, creating a lake of nearly 1.5 million cubic meters of foul water (the Beit Lahia lake), which in 2004 covered over 30 hectares. The water level in the Lake rose without control causing severe flooding events in 1989, 1992 and 2007, when sand barriers collapsed under the hydrostatic pressure of the rising level of foul water. These foul water floods had a very high cost in terms of human lives, spreading of diseases to the neighboring population, particularly in children, elderly and women; and by the cost of substantial damage to residential areas in Beit Lahia.

To address this situation, the World Bank with the support of other donors and technical partners such as the Agence Francaise de Development (AFD) approved NGEST in 2004. This project suffered from numerous delays, due to three wars and other external factors, and after 14 years of implementation, the project closed in June 2018 after constructing: (i) a pressure pipeline and a terminal pumping station (TPS) to transfer sewage to the new North Gaza treatment site; (ii) nine infiltration basins for aquifer recharge; (iii) a new North Gaza Wastewater Treatment Plant (NG WWTP) with a 35,600 $m^3$/day capacity; (iv) fourteen recovery wells and five monitoring wells; and (v) an irrigation booster station with a 4,000 $m^3$ reservoir to provide long-term protection for the underlying aquifer, as well as to ultimately supply irrigation water for agricultural land. The project was supposed to finance the first three years of operation of the NG WWTP and develop arrangements to operate and maintain the facilities at an adequate level of efficiency and reliability. However, because of continuous delays in implementation, the project was restructured, and after fourteen years of project implementation, the Bank decided to close it after the Ministry of Finance and Planning (MoFP) agreed to finance the O&M costs, including the international contractor/operator for the NG WWTP. MoFP paid the contractor for few months but could not sustain payments.

The Northern Gaza Emergency Sewage Treatment (NGEST) project has successfully contributed to improving environmental health conditions in targeted communities, as the effluent lake at Beit Lahia posed acute health and safety threats to the nearby communities before it was drained. The Project also brought an effective solution to treat wastewater effluents and prevent the degradation of the aquifer while providing improved sanitation services to the targeted beneficiaries (368,978 people).

However, the financial collapse of the Palestinian economy in 2018 compromised the already weak capacity of the PWA to continue funding the operating expenditures of the NG WWTP. The Palestinian economy has been on a declining growth trajectory and experienced almost zero growth in 2017. This trajectory further deteriorated in July 2018 following a sharp decrease on foreign aid flows and the standoff on the transfer of clearance revenues - nearly US$144 million - which Israel is withholding from revenues it collects on behalf of the PA. Despite the fact that clearance revenues are being resolved and some money has been recently released, the economic hardship is still an issue.

This situation limited the ability of the MoFP to process on time the payments due to the contractor in charge of the operation of the NG WWTP, which consequently decided to terminate the contract in July 2019. Since then, the PWA has been operating the NG WWTP at a precarious level with its own staff. PWA has received an emergency grant from AFD to procure essential chemical products and consumables to run the plant until the end of February 2020. PWA is struggling to pay the salaries of a

minimum number of operational staff and trying hard to retain qualified personnel to manage the plant. Without an additional short-term financial injection, the operations of NGEST facilities will be halted in March 2020. If no support is provided after March 2020, wastewater effluents will start filling the Beit Lahia lake again and infiltrating the aquifer with untreated wastewater, posing a serious humanitarian and environmental crisis in Gaza, with spill-over consequences to Israel.

The proposed Gaza Wastewater Management Sustainability Project (WMSP) aims to: (i) Prevent the collapse of the Northern Gaza Wastewater Treatment System to mitigate adverse environmental impacts on surrounding communities; and (ii) improve managerial capacity and financial resilience of wastewater treatment services in the Gaza strip.

The proposed WMSP would provide financial and technical support to PWA to: (i) operate the NG WWTP under strict parameters of efficiency and reliability; (ii) rehabilitate and operate its associated facilities; and, (iii) design and put in place an enhanced governance framework aimed at improving the sustainability of wastewater management services in Gaza. Each of these areas corresponds to one of the four project components: Component 1: Support to the operation of the NG WWTP and associated facilities including rehabilitation and retrofitting, Component 2: Limited upgrade of NGEST and TPS facilities to build resiliency and address emergencies, Component 3: Capacity building for sustainability of wastewater services in northern Gaza and Component 4: Project Management and Implementation Support. International Bank for Reconstruction and Development/International Development Association has agreed to provide financing for WMSP Project.

## 1.2. ESMP Scope and Objectives

The ESMP is prepared in compliance with national requirements as well as the objectives of the Bank's Environmental and Social Framework.

The ESMP instrument is selected because the project entails some new equipment that would be installed in existing facilities (the TPS and the NGWWTP) to replace/repair damaged equipment. Also some civil works would be needed in an existing wastewater pond to make it function as an equalization tank. No any works would be done in greenfield or outside the footprint of existing facilities (no any land acquisition or horizontal expansion of existing facilities).

ESS1 applies to all projects for which Bank Investment Project Financing is sought. ESS1 establishes the importance of: (a) the PWA's existing environmental and social framework in addressing the risks and impacts of the project; (b) an integrated environmental and social assessment to identify the risks and impacts of a project; (c) effective community engagement through disclosure of project-related information, consultation and effective feedback; and (d) management of environmental and social risks and impacts by PWA throughout the project life-cycle. The Bank requires that all environmental and social risks and impacts of the project be addressed as part of the environmental and social assessment conducted in accordance with ESS1.

According to ESS1, ESMP is an instrument that details (a) the measures to be taken during the implementation and operation of a project to eliminate or offset adverse environmental and social impacts, or to reduce them to acceptable levels; and (b) the actions needed to implement these measures. ESMP will consist of the set of mitigation, monitoring, and institutional measures to be taken during implementation and operation of a project to eliminate adverse environmental and social risks and impacts, offset them, or reduce them to acceptable levels.

Specifically, this ESMP is designed to ensure the following:

- Potential environmental and social impacts during the implementation of project activities are identified;
- Detailed specific mitigation measures are developed with relevant costs implication that will need to be achieved during and after sub-project implementation;
- Monitoring objectives and the type of monitoring, with linkages to the impacts assessed in the environmental and social assessment and the mitigation measures are identified. Implementation and monitoring schedules (parameters to be measured, methods to be used, sampling locations, frequency of measurements and detection limits) and reporting mechanism are provided.
- Responsibilities and institutional arrangement for the implementation of the mitigation measures, Cost estimates and sources of funds for implementing the ESMP are specified;

# 2. Project Description

## 2.1 Project Outline

### 2.1.1 Project objectives

The key objectives of the WSM project are to mitigate adverse environmental impacts on communities in the northern governorate by preventing the collapse of the Northern Gaza Emergency Sewage Tratment (NGEST) System; and to improve managerial capacity and financial resilience of wastewater treatment services in the Gaza strip.

### 2.1.2 Project components

A detailed technical audit has been prepared for the NGEST system, comprising of North Gaza Wastewater Treatment Plant (NG WWTP, pressure pipeline, Terminal Pumping Station (TPS) and Pond # 7, based on the standard asset management methodology as outlined in international standards. The output of this audit includes the condition of every electromechanical and civil assets includes ranking the equipment according to levels of deterioration (from unserviceable to new or excellent condition. The results of the performance audit informed the specific investments under the project components below.

**Component 1: Support the operation of the Northern Gaza (NG) WWTP and associated facilities including rehabilitation and retrofitting.** Under this component the Project will finance the PWA's hiring of qualified staff to operate and maintain the NG WWTP to its design capacity, along with the provision of chemical inputs, tools and consumables for operating NGEST facilities for three years (from March 2020 to March 2023). The PA will finance electricity costs under agreed arrangements. This component will also finance the cost of rehabilitation works of underperforming or environmentally sensitive wastewater pumping and treatment facilities, including: (i) the Terminal Pumping Station (TPS) that has been poorly maintained and is only working on two out of five pumps; and (ii) a reliable voltage regulation system at the NG WWTP. Specifically, the following works are needed:

I. **For the terminal pumping station:** reparation of two out of five of the pumps; replacing three out of five pumps damaged by the flooding of the dry pit; replacing the VFD for the pumps;

replace the current bar screens; adding additional instrumentation that allows for automatic control and remote monitoring; implementing a SCADA system for the pumping station; transmitting the SCADA data to the central control center at the NG WWTP.

II. **For the transmission line:** Instrumentation that monitors the transmission line and its integrity such as flow meters, pressure meters etc.; procurement of spare pipe sections that allow for rapid repairs if the main pipe bursts; rehabilitation maintenance for the chambers, valves and related fittings along with the ductile iron pressure pipeline.

III. **For the NG WWTP:** Replacing equipment that is damaged beyond repair; repairing equipment with major/minor defects; provide a sustainable solution to the biogas balloon that does not get punctured again – reduce the volume, provide protection and replace the existing balloon; operate the biogas system and cogeneration plant for electricity production; provide technical service to the operators on electromechanical, process and SCADA issues; provision of capacity building including on-site training to the local engineers and technicians; provision of spare parts; provision of chemicals and consumables (excluding fuel and electricity); develop in house capabilities for testing Sodium, Calcium, Magnesium and Boron; provide the salaries for the employees of the NG WWTP; include sludge disposal costs and voltage stabilizer.

**Component 2: Limited upgrade of NGEST and TPS facilities to build resiliency and address emergencies.** The current design does not provide a sustainable solution of emergency overflows. In an event of an overflow the surrounding areas are flooded with raw sewage causing both environmental damage and a public health crisis. This component will finance:

I. an emergency overflow system for the terminal pumping station (overflow will be discharged into a dedicated emergency overflow);

II. upgrading of the existing pond #7 that is adjacent to the Terminal Pumping Station to a 24 hours flow capacity. This pond should include special lining (e.g. HDPE lining) in order to prevent raw sewage from seeping into the environment and submerged aerators that can aerate the sewage to prevent odor emissions.

III. Construction of a pumping station at the existing pond #7 that enables pumping the wastewater collected in pond #7 and return it to the Terminal Pumping Station

**Component 3: Capacity building for sustainability of wastewater services in northern Gaza.** Advanced wastewater treatment facilities requires highly trained engineers and technicians. In countries where advanced wastewater treatment plants are built there is a time period where technical infusion to the local engineers is required. Again, due to limited access and travel limitations this natural process of technical and knowledge infusion is extremely hindered. Without this operational and maintenance knowledge the wastewater facilities will not operate successfully, and the effluent/sludge quality will not be achieved. To finance: (i) technical assistance to build capacity of the Technical Team for wastewater management within the existing organizational structure, to address the current emergency and for the long term sustainable operation of the plant; and, (ii) technical assistance to design and implement an enhanced governance and institutional framework, based on a national wastewater strategy for efficient and reliable management of wastewater treatment services in northern Gaza in close coordination with similar efforts that are being conducted in central and south Gaza.

**Component 4: Project Management and Implementation Support**. To finance: (i) PWA's Project supervision and Project management; and (ii) consulting services for the development of engineering designs and studies.

According to the conducted technical audit, the following list of activities requires ESMP:

1. Replacing three out of five pumps in the TPS damaged by the flooding of the dry pit, Repairing two out of five of the pumps and replacement of the current bar screens
2. Build overflow system to emergency reservoir (Pond #7)
3. Upgrade pond #7 for 24 hours flow capacity as part of decommissioning of old plant
4. Construction of a pumping station at the existing pond #7 that enables pumping the wastewater collected in pond #7 and return it to the TPS
5. Rehabilitations of chambers along the pressure line and add instrumentation to monitor pressure line
6. Provide sustainable solution to biogas balloon and provide a reliable voltage regulation system.

### 2.1.3 Beneficiaries

The project is designed to directly serve the four municipalities in the northern governorate of the Gaza Strip with a total population of about 400,000 persons of whom 49% are females. However, the capacity building components will benefit the entire population of the Gaza Strip.

## 2.2 Project Location

The different components of the project are located in two main sites in the Northern Governorate in the Gaza Strip, namely the NG WWTP site in Jabalia Municipality and the TPS and Pond #7 sites in Beit Lahia Municipality, in addition to the pressure pipeline that connects these two sites, where some rehabilitation works will take place (See Figure 2-1).

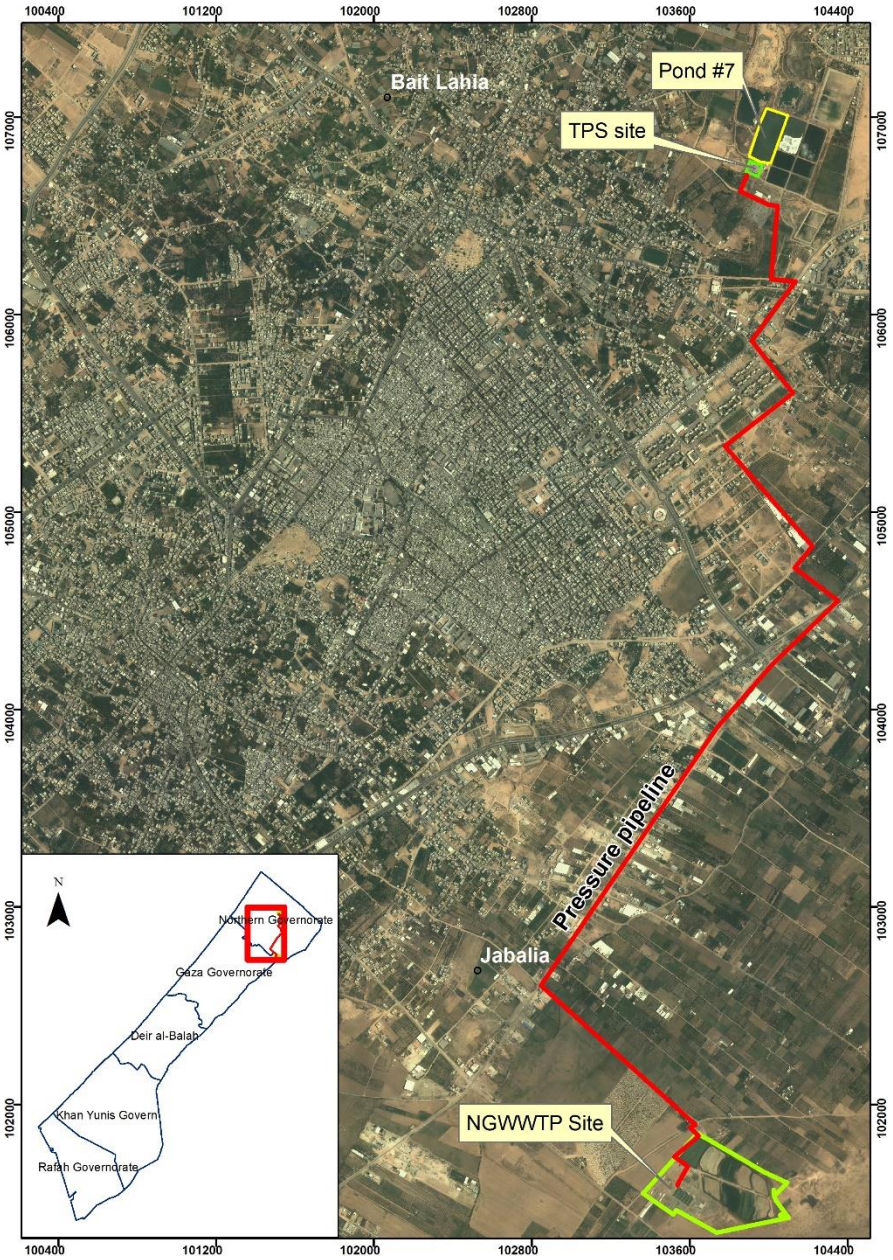


**Figure 2-1: Project Location**

Activities will take place within the boundaries of the existing sites of the NG WWTP, the TPS and Pond #7. The site of the NG WWTP is located in an agricultural area close to the eastern border of the Gaza Strip; no residential areas are found near the site. The most obvious feature characterizing the area is the Al Shuhada cemetery located just to the west of the site. The activities related to the biogas system and the voltage stabilizer will take place inside the existing buildings (See Figure 2-2 and Figure 2-3).

**Figure 2-2: The biogas balloon site at NG WWTP**

**Figure 2-3: Proposed areas for the installation of the voltage stabilizer at NG WWTP**

The TPS and Pond #7 are located in a densely populated residential area, where three main residential complexes are found to the east and south of the project sites, namely Al Awda Towers, Al Nada neighborhood, and Ezbit Beit Hanoun. Some scattered residential buildings are also found to the north of the site (See Figure 2-4). Main rehabilitation activities at the TPS site will take place inside the existing building (See Figure 2-5). On the other hand, the pipeline is aligned within the existing roads right of way, passing through different land uses.

**Figure 2-4: Residential buildings near the TPS and Pond #7 sites**

**Figure 2-5: Sites for rehabilitation works at the TPS location**

### Northern Emergency Lagoons (Lakes)

There are two random emergency lagoons (lakes) located to the north of the Beit Lahia WWTP and very close to Um-Nasser village (Figure 2-6). The quantities of wastewater is pumped to these lagoons when there is a frailer in the TPS with a rate of 500 $m^3$/hr. At the time of preparing this ESMP, these two lagoons are filled with waste water. In addition, the two lagoons are lack basic safety requirements such as fences and warning signs. The pools constitute health and safety risk to the surrounding neighborhood and farmers especially drowning risk due to the weak sand embankments surrounding the lagoons.

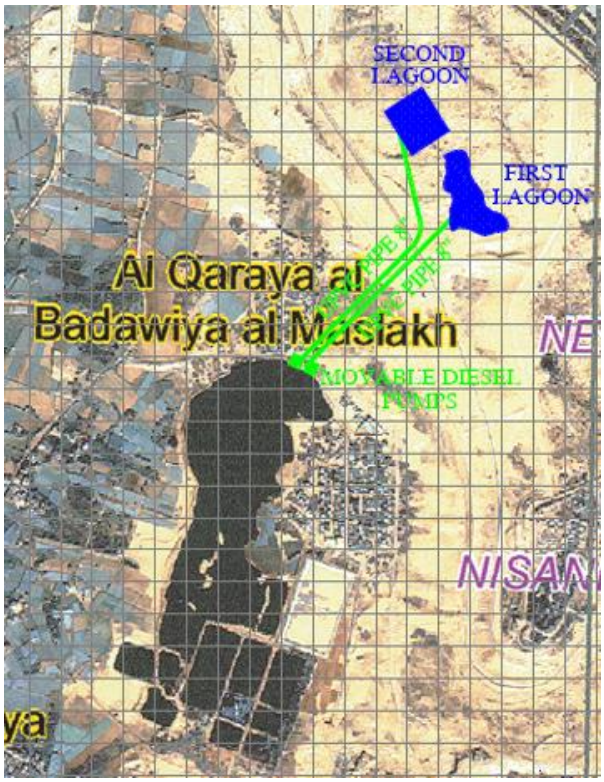


**Figure 2-6: Northern Emergency Lagoons**

# 3. Government Regulations and World Bank Environmental and Social Standards

Environmental and Social legislation and regulations are vital tools to protect public health and the environment and give consideration to sustainable development. The project is guided by the local laws and regulations set by the Palestinian Authority along with the World Bank Environmental and Social Framework (ESF).

## 3.1 Governmental Polices, Regulation and Standards

### 3.1.1 Palestinian Environmental Assessment Policy

The Palestinian Environmental Assessment Policy (PEAP) was approved by decree No: 27- 23/4/2000. The PEAP supports the sustainable economic and social development of the Palestinian people. Specifically, the PEAP promulgates the following:

- Ensure an adequate quality of life in all aspects, and ensure that the basic needs and social, cultural, and historical values of the people are not negatively impacted as a result of development activities.
- Preserve the capacity of the natural environment.
- Conserve biodiversity and landscape, and promote the sustainable use of natural resources.

- Avoid irreversible environmental damage, and minimize reversible environmental damage from development activities.

Under the PEAP, proponents of public and private projects are required to submit an Application for Environmental Approval that informs the Environment Quality Authority (EQA) and relevant approving authorities of the intended project activities. Subsequently, a determination is made whether an Initial Environmental Evaluation (IEE) or a detailed EA is required. If neither an IEE nor EA report is required, the EQA, in coordination with the EA Committee, will determine if an Environmental Approval will be granted and, if so, under what conditions. An IEE is required for projects where significant environmental impacts are uncertain, or where compliance with environmental regulations must be ensured

In accordance with this policy, an IEE study should include the predicted impacts and benefits of the project, and the proposed mitigation and environmental monitoring and management measures.

### 3.1.2 Palestinian Environmental Law

The Palestinian Environmental Law (PEL) No. 7 of 1999 was developed by EQA to protect environmental resources, including land environment; air environment; water resources and aquatic environment; and natural, archaeological and historical heritage. According to the PEL, the protection of these resources shall be addressed in all social and economic development plans in view of sustainable development and protection of the rights of future generations.

The core issues of concern in the PEL are the protection of public health and social welfare, as well as the conservation of ecologically sensitive areas, biodiversity and rehabilitation of environmentally damaged areas. The PEL also sets penalties for violating any article presented under this law. The main objectives of the PEL include the following:

- Protecting the environment from pollution.
- Protecting public health and social welfare.
- Incorporating environmental resources protection in all social and economic development plans and promoting sustainable development to protect the rights of future generations.
- Conserving ecologically sensitive areas, protecting biodiversity, and rehabilitating environmentally damaged areas.
- Establishing inter-ministerial cooperation.
- Promoting environmental information collection and publication.
- Promoting public awareness, education and training.

Article 8 of this law reads, "*The competent authorities, consistent with their respective specialization, shall encourage undertaking appropriate measures to reduce the generations of solid waste or any other hazardous waste to the lowest level possible, and to the best extent possible, shall encourage solid waste treatment, recycling or processing*".

In accordance with Article 12, and 13, the disposal of any hazardous substance or waste should not be done, unless such a process is conform with the terms, regulations, instructions and norms specified by EQA, in coordination with specialized agencies.

EQA, according to Article 57, is empowered to stop, for a period not exceeding two weeks, any project works that could constitute a serious hazard to the environment. The stoppage can only be extended by a judicial order from the competent court.

### 3.1.3 Palestinian Water Law

Legislation for the regulation and management of the water sector was encompassed in the approved Water Law No. 3, which was signed on July 2002. The objective of this law as stated in Article 2 is to develop and manage the water resources, increasing their capacity, improving their quality and preserving and protecting them from pollution and depletion.

A new Water Law No. 14 was issued in 2014 to establish for a new phase for the water and wastewater sector and its governance and management. This law aims to develop and manage water resources, increase their capacity, improve their quality, preserve and protect them from pollution and depletion, and to improve the level of water services through the implementation of integrated and sustainable water resources management principles.

### 3.1.4 Palestinian Public Health Law

In accordance with the Palestinian Public Health Law (PPHL) No. 20, developed by the Ministry of Health (MoH) and issued upon resolution by the Legislative Council in 2004. The role of the PA as represented by the MoH and other authorities is to ensure the control of communicable, non-communicable, and genetic diseases by practicable means, including the removal of health nuisances.

In accordance to Article 43, i*t is forbidden for any individual to use wastewater for fertilization or irrigation of agricultural land, only in accordance with the bases and standards specified by the competent authority*.

### 3.1.5 The Palestinian Law on Agriculture

In accordance with the Palestinian Low on Agriculture No. 2 (PLC, 2003), issued upon resolution by the Legislative Council in 2003, as stated in Article 54, *the Ministry of Agriculture shall put forward, in cooperation and liaison with the Water Authority and other competent authorities, the water plans and policies related to the agricultural sector in accordance with a list of principles that includes*:

- The best use of water and the use of modern irrigation systems and methods.
- Preserve water sources and purify them in a manner that makes them usable.
- Conduct regular tests and analyses on agricultural water and verify the extent of its suitability for agriculture.
- Benefit from the non-potable water and treated water.

Article 24 of this law reads, *Crops may not be fertilized by human excrements or by any fertilizer, which is mixed with or derived from liquid or solid wastes, except after being treated in accordance with accredited specifications and standards*.

According to Article 55 of this law, *the irrigation of agricultural crops with waste water shall be totally prohibited unless it has been treated in accordance with the national standards which are certified by the competent technical authorities.*

### 3.1.6 Palestinian Ambient Air Quality Standards

The Palestinian Ambient Air Quality Standards (PS 801- 2010) were developed by the Palestinian Standards Institution (PSI) through the Environment Committee. The result is health based standards and objectives for a number of pollutants in air, including particulate matter, nitrogen oxides, ozone and

sulfur oxides as shown in Table 3-1 for the comparison between the Palestinian and the WHO ambient air standards. The Palestinian standards will apply to this Project and all monitoring of relevant parameters will be carried out to according to those standards.

**Table 3-1: WHO and Palestinian Ambient Air Quality Guidelines**

| Parameter | Averaging Period | WHO Guideline value* (µg/m³) | Palestinian Guideline value (µg/m³) |
|---|---|---|---|
| $PM_{10}$ | 24-hour | 150 (Interim target-1)<br>100 (Interim target-2)<br>75 (Interim target-3)<br>50 (guideline) | 150 |
| | 1-year | 70 (Interim target-1)<br>50 (Interim target-2)<br>30 (Interim target-3)<br>20 (guideline) | 70 |
| $NO_2$ | 1-hour | 200 (guideline) | 400 |
| | 24-hour | -- | 200 |
| | 1-year | 40 (guideline) | 100 |
| O3 | 1-hour | -- | 200 |
| | 8-hour | 160 (Interim target-1)<br>100 (guideline) | 120 |
| $SO_2$ | 1-hour | -- | 350 |
| | 24-hour | 125 (Interim target-1)<br>50 (Interim target-2)<br>20 (guideline) | 250 |
| | 1-year | -- | 60 |
| | 10-minute | 500 (guideline) | -- |

* PM 24-hour value is the 99th percentile.

### 3.1.7 Palestinian Noise Level Guidelines

The Palestinian Standards Institution have established the Outdoor Noise Standards (PS 840- 2005), through the Environment Committee, to Provide information for the protection of public health against the outdoor noise level. These guidelines are shown in Table 3-2. The Palestinian and the WHO guidelines have almost the same levels, with the Palestinian guidelines having more detailed types of receptors. The Palestinian standards will apply to this Project and all monitoring of relevant parameters will be carried out to according to those standards.

**Table 3-2: Palestinian Outdoor Noise Level Guidelines**

| Receptor | One Hour $L_{Aeq}$ (dBA) | |
|---|---|---|
| | Daytime (07 am – 08 pm) | Nighttime (07 am – 08 pm) |
| Rural residential areas, hospitals, schools | 40 | 30 |
| Residential | 50 | 40 |
| Residential with some commercial activities, or along main roads | 55 | 45 |

| | | |
|---|---|---|
| Commercial | 65 | 60 |
| Industrial | 75 | 65 |

## 3.2 WHO Guidelines and Standards

### 3.2.1 WHO Ambient Air Guidelines

The WHO Air Quality Guidelines (2005) are recommended by the WB Environmental, Health and Safety Guidelines to be applied in the absence of national legislated standards, in order to prevent or minimize significant to ambient air, by ensuring that emissions do not result in pollutant concentrations that reach or exceed these guidelines and standards. Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines. Table 3-1 sets a comparison between the WHO and Palestinian ambient air quality standards.

### 3.2.2 WHO Noise Level Guidelines

Guidelines for Community Noise, World Health Organization (WHO), 1999, provided guidelines values for noise levels measured out of doors. These levels, presented in Table 3-3, should not be exceeded by any noise source. Since there is no Palestinian standards for noise, The WHO standards will apply to the Project and all monitoring of relevant parameters will be carried out to according to this standard.

**Table 3-3: WHO Outdoor Noise Level Guidelines**

| **Receptor** | **One Hour $L_{Aeq}$ (dBA)** | |
|---|---|---|
| | Daytime (07 am – 10 pm) | Nighttime (07 am – 10 pm) |
| Residential, institutional, educational | 55 | 45 |
| Industrial, Commercial | 70 | 70 |

## 3.3 World Bank Environmental and Social Standards

The Environmental and Social Framework (ESF) that was launched on October 1, 2018 sets out the World Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social Standards ESS1 to ESS10 that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity. The ten Environmental and Social Standards, which establish the standards that the Borrower and the project should meet through the project life cycle, as follows:

### 3.3.1 ESS 1: Assessment and Management of Environmental and Social Risks and Impacts

ESS 1 sets out the Borrower's responsibilities for assessing, managing and monitoring environmental and social risks and impacts associated with each stage of a project supported by the Bank through Investment Project Financing, in order to achieve environmental and social outcomes consistent with the ESS's.

### 3.3.2 ESS 2: Labor and Working Conditions

ESS2 sets out the Borrowers responsibilities to promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions.

### 3.3.3 ESS 3: Resource Efficiency and Pollution Prevention and Management

This ESS sets out the requirements of the Borrower to address resource efficiency and pollution prevention and management throughout the project life cycle consistent with Good International Industry Practice (GIIP).

### 3.3.4 ESS 4: Community Health and Safety

ESS 4 addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize such risks and impacts, with particular attention to people who, because of their particular circumstances, may be vulnerable.

### 3.3.5 ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

ESS5 sets out the responsibilities of the borrowers to address project-related land acquisition and restrictions on land use. Project-related land acquisition or restrictions on land use may cause a physical displacement (relocation, loss of residential land or loss of shelter), economic displacement (loss of land, assets or access to assets, leading to loss of income sources or other means of livelihood), or both.

### 3.3.6 ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

This ESS is applicable to projects that potentially affect biodiversity or habitats, either positively or negatively, directly or indirectly, or that depend upon biodiversity of their success. ESS 6 recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development.

### 3.3.7 ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

This ESS also applies to communities or groups of Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities who, during the lifetime of members of the community or group, have lost collective attachment to distinct habitats or ancestral territories in the project area, because of forced severance, conflict, government resettlement programs, dispossession of their land, natural disasters, or incorporation of such territories into an urban area.

### 3.3.8 ESS 8: Cultural Heritage

ESS 8 recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present and future. People identify with cultural heritage as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions. Cultural heritage, in its many manifestations, is important as a source of valuable scientific and historical information, as an economic and social asset for development, and as an integral part of people's cultural identity and practice. ESS 8 sets out measures designed to protect cultural heritage throughout the project life cycle. This ESS sets out general provisions on risks and impacts to cultural heritage from project activities.

### 3.3.9 ESS 9: Financial Intermediaries

ESS9 recognizes that strong domestic capital and financial markets and access to finance are important for economic development, growth and poverty reduction. The Bank is committed to supporting sustainable financial sector development and enhancing the role of domestic capital and financial markets. This ESS applies to Financial Intermediaries (FIs) that receive financial support from the Bank. FIs include public and private financial services providers, including national and regional development banks, which channel financial resources to a range of economic activities across industry sectors.

### 3.3.10 ESS 10: Stakeholder Engagement and Information Disclosure

This ESS recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

ESS1 and ESS 10 applies to all projects supported by the Bank through Investment Project Financing. The Borrower will engage with stakeholders as an integral part of the project's environmental and social assessment and project design and implementation.

## 3.4. Environment, Health and Safety Guidelines

The World Bank Group Environment, Health and Safety (EHS) guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). They define acceptable pollution prevention and abatement measures and emission levels in World Bank financed projects.

The project will apply the General Guidelines including (i) Environmental, (ii) Occupational Health and Safety, (iii) Community Health and Safety, and (iv) Construction and Decommissioning.

# 4. Baseline Conditions

This section presents biological resources, air quality and noise levels, and historical and cultural heritage. It also provides general information regarding employment and workforce in the Gaza Strip.

## 4.1. Biological Resources

### 4.1.1. Flora

In spite of its very small area and crowded population, the Gaza Strip has interesting biodiversity elements in terms of species, habitats and ecosystems (Abd Rabou, 2009). The Gaza Strip harbors a diversity of wild vascular plant species including Monocot and Dicot trees, shrubs and herbs. Table 4-1indicates the most common floristic species prevailing in the vicinity of the project area. The plant cover of the area has many traditional uses, e.g. medicinal, nutritional and economical. The role of floristic species in providing vertebrate and invertebrate fauna with nesting, resting, feeding, roosting, sheltering and protection values is very considered.

The Acacia or Orange Wattle Acacia cyanophyllais about 5-meter high shrub growing in the sand dune ecosystem characterizing the western belt of the Gaza Strip. The plant is often used as windbreaks, sand soil fixation and for grazing. The shrubs were considered as a vital resource to the Palestinian community in the last few decades due to its exploitation as a fuel material. The Sycamore Fig Ficus sycamorus is one of the old and historic plant species in the Palestine coastal valley. It may grow to 20 meters tall. The tree carries its fruits nearly yearlong and these fruits are usually eaten fresh by locals. Based on the conducted sites visits, it was confirmed that no specific significant floristic species are witnessed in the project area.

**Table 4-1: Common floristic species recorded in the sand dunes of the Gaza Strip**

| Scientific Name | Common Name |
|---|---|
| Cupressus sempervrens | Evergreen Cypress |
| Pancratium maritimum | Sea Daffodil |
| Phoenic dactylifera | Date Palm |
| Opuntia ficus-indica | Tuna Cactus |
| Salsola kali | Russian Thistle |
| Artemisia monosperma | Sagebrush |
| Silybum marianum | Blessed Milk-thistle |
| Ricinus communis | Castor Oil Plant |
| Acacia cyaophylla | Acacia |
| Acacia Arabica | Gum Arabic Tree |
| Alhagi maurorum | Camel-thorn |
| Ficus sycamoruz | Sycamore Fig |
| Eucalyptus camaldulensis | River Red-gum Tree |
| Ziziphus spina-christi | Christ's thorn |
| Nicotina glauca | Tree Tobacco |
| Tamarix nilotica | Nile Tamarisk |

### 4.2.1. Fauna

Mainly aquatic birds and reptiles reside in Pond #7 site and the other ponds that are not completely dried. The ponds provide breeding, nesting, roosting and feeding habitats for different bird species. The community (both children and adults) surrounding the sites is targeting aquatic bird species by hunting

or trapping them using different means. Table 4-2 presents the different birds' species found surrounding the sites (BLWWTP and Effluent Lake). According to the International Union for the Conservation of Nature (IUCN) Red list, all of these species are assessed as Least Concern (LC) species (evaluated to have a low risk of extinction) with different population trends (increasing, decreasing, stable, or unknown).

**Table 4-2: The Main Targeted Aquatic Birds Species Hunted in the Effluent Lake**

| Family | Scientific Name | Common Name | Conservation Status |
|---|---|---|---|
| Threskiornitthidae | Plegadis falcinellus | Glossy Ibis | LC (decreasing) |
| Ardeidae | Nycticorax Nycticorax | Black crowned Night Heron | LC (decreasing) |
| | Ardeeola ralloides | Squacco Heron | LC (Unknown) |
| | Egretta garzetta | Little Egret | LC (Increasing) |
| | Bubulcus Ibis | Cattle Egret | LC (Increasing) |
| | Ardea purpurea | Purple Heron | LC (decreasing) |
| Anatidae | Alopochen aegyptiacus | Egyptian Goose | LC (decreasing) |
| | Anas platyrhynchos | Mallard | LC (Increasing) |
| | Anas querquedula | Garganey | LC (decreasing) |
| | Anas clypeata | Shoveler | LC (decreasing) |
| Rallidae | Gallinula chloropus | Common moorhen | LC (Stable) |
| | Fulica atra | Coot | LC (Increasing) |
| Recurvirostrida | Himantopus himantopus | Black-winged Stilt | LC (Increasing) |
| Charadriidae | Vanellus spinosus | Spur-winged lapwing | LC (Increasing) |

Aquatic ecosystems including wetlands are good habitats for wildlife of both vertebrate and invertebrate species. They provide wildlife with all necessary requirements such as shelter, protection, food and breeding, resting and roosting place.

Rats, snake crows, barn owl and other wild species are common vertebrates found in North. These animals were found to pose a variety of dangers to the people's cultivated and stored crops, possession and other properties. The thee cosmopolitan nocturnal commensal rodent species (the house mouse, house or black rat, and Norway or brown rat) are known to occur in the Gaza Strip, and were reported by inhabitants in the vicinity of the TPS and pond #7 sites.

## 4.3. Air Quality and Noise level

Available data on ambient air quality in Gaza are very limited. Some site-specific monitoring campaigns were carried out during the past five years. The only integrated study that covers different areas in the Gaza Strip was carried out in 2005 by the Environmental Protection and Research Institute. The pollutants of concern included sulfur dioxide (SO2), nitrogen oxides (NOx), and Lead (Pb) (EPRI, 2006).

According to this study (EPRI, 2006); the average annual $SO_2$ concentration, in Gaza, North Gaza, Middle Area, and Khanyounis governorates, is about 180, 70, 100, and 60 µg/m$^3$, respectively. While the average annual NOx concentration is about 42, 19, 27, and 17 µg/m$^3$ in Gaza, North Gaza, Middle Area, and Khanyounis governorates, respectively. Moreover, the average annual lead concentration according to the same study is about 0.15 µg/m$^3$.

Another study conducted in 2016 (Al Madhoun et al., 2016) revealed that the mean CO2 concentrations at different locations in the Gaza Strip, which included main crowded streets as well as minor streets, range between 341-518 ppm, which is very close to or higher than the agreeable international level of CO2 (350 ppm).

Also, there is a recent study conducted in 2019 in North Gaza specifically by (EcoConServ & UG), the study aimed to update the environmental and social impact assessment (ESIA) of the proposed recovery and reuse scheme namely the recovery scheme infrastructure, the irrigation network and the related environment. In this study (EcoConServ & UG, 2019) some measurements have been carried out on ambient air quality (Concentrations of CO and CO2) nearby El Shuhada Cemetery where the booster pumps and storage tanks will be constructed as a part of the water distribution networks for irrigation are expected to be low since the areas have low population densities.

**Table 4-3: Coordinates of Sampling location for air and noise**

| Location | Coordinates | |
|---|---|---|
| Air and noise1 (AN1) | 31°33'15.15"N | 34°30'54.11"E |
| Air and noise1 (AN1) | 31°33'3.19"N | 34°30'58.43"E |

**Table 4-4: Air Quality at project sites (CO and CO2)**

| Parameter | Unit | Effluent Lake (AN2) | El Shuhada Cemetery (AN1) |
|---|---|---|---|
| CO | ppm | 0.1 | 0.1 |
| CO2 | ppm | 380 | 344 |
| $PM_5$ | ppm | 306 | 345 |
| $PM_{2.5}$ | ppm | 53 | 60 |

With regards to noise levels, also some measurements have been carried out by (EcoConServ & UG, 2019) on noise levels at similar points as air ambient measurements are expected to be low since the area is of low population density.

**Table 4-5: Noise measurements at project sites**

| Location | Time | Result (dB) | Average (dB) |
|---|---|---|---|
| Effluent Lake (AN2) | 9:00 | 42.7 | 40.5 |
| | 11:00 | 42 | |
| | 13:00 | 40 | |
| | 15:00 | 39 | |
| | 17:00 | 39 | |
| El Shuhada Cemetery (AN1) | 9:00 | 43.3 | 43.3 |
| | 11:00 | 43.3 | |
| | 13:00 | 43.3 | |
| | 15:00 | 43.3 | |
| | 17:00 | 43.3 | |

## 4.4 Groundwater

The Gaza Strip lies over about 2% of the area of the 18,370 $km^2$ Coastal Aquifer Basin. The general direction of groundwater flow in the Gaza Strip follows the dip of the aquifer towards the coast. The western boundary of the aquifer follows the coastline, where both outflows of freshwater to the sea and inflows (intrusion) of seawater are observed to occur (UN-ESCWA and BGR, 2013).

The groundwater level over the aquifer lies at depths varying between a few meters from the surface up to 110 m. These variations are linked to topographical and geological conditions. The analysis of the available data for the groundwater level and the topography in the project area for the year 2018, revealed that the estimated depth to groundwater table in the project area varies between 30 and 60 m from the ground surface. In October 2018, the water level, as shown in Figure 4-1, was between -2 and -3 m below mean sea level in the TPS and pond #7 site, and between 0 and -1 m below mean sea level in the NGWWTP site.

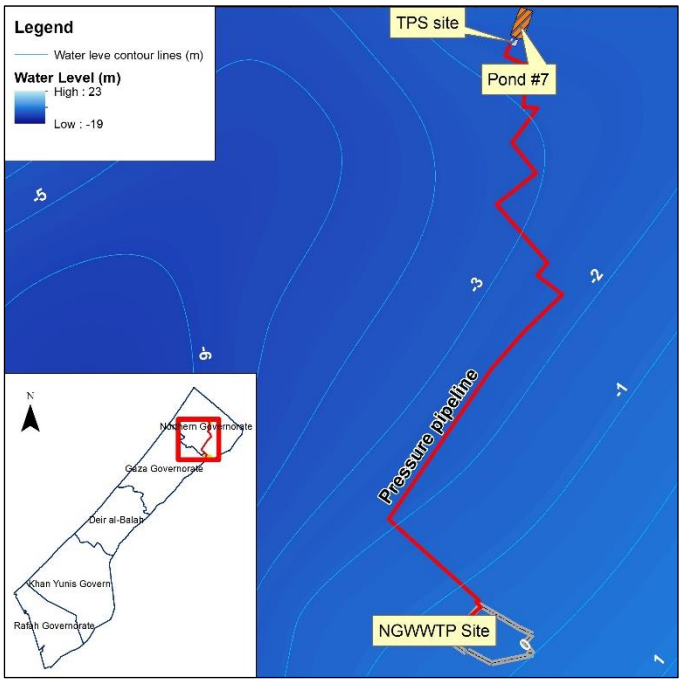


**Figure 4-1: Water level in the project area in October, 2018**

On the other hand, with regards to groundwater quality, the available data on nitrate concentration in the groundwater within the project area before the operation of the NGWWTP shows that the nitrate concentration in the plant site and the area to the west of the site is between 50 and 100 mg/l, these high levels of nitrate are due to the infiltration of partially treated wastewater received from BLWWTP into the infiltration basins. While higher concentrations that exceed 200 mg/l are found to the south of old BLWWTP site.

Other parameters were measured in late 2017 to identify the best locations and designs of the monitoring wells around the NG WWTP site. The measured parameters included Ammonia, detergents, and phenols, which can be used as indicators of water pollution with wastewater. The measurement of ammonia concentration indicated high levels of Ammonia in the wells that are close to the infiltration basins, while lower concentrations were recorded in farther wells. The obtained results for detergents ranged from 1.1-7.8 mg/l, which are considered to be high for groundwater wells and indicate an entry of external source of pollution. Relatively high levels of phenol that reached 18 mg/l at some locations were also recorded.

In order to study the impact of the operation of the NGWWTP, started in March 2018, on the groundwater quality, a calibrated groundwater flow model was used. Results of the model shows that the groundwater quality in the NGWWTP area is improved after the operation of the treatment plant,

where the average concentration of the infiltrated treated wastewater is 10 mg/l. The improvement, however, is still local and a polluted zone is still found in the north-west direction (See Figure 4-2), given the extensive amounts of partially treated wastewater that has been infiltrated into the aquifer since 2009, and the delays in the operation of the recovery wells system, that has been designed to restrict the expansion of the pollution plume.

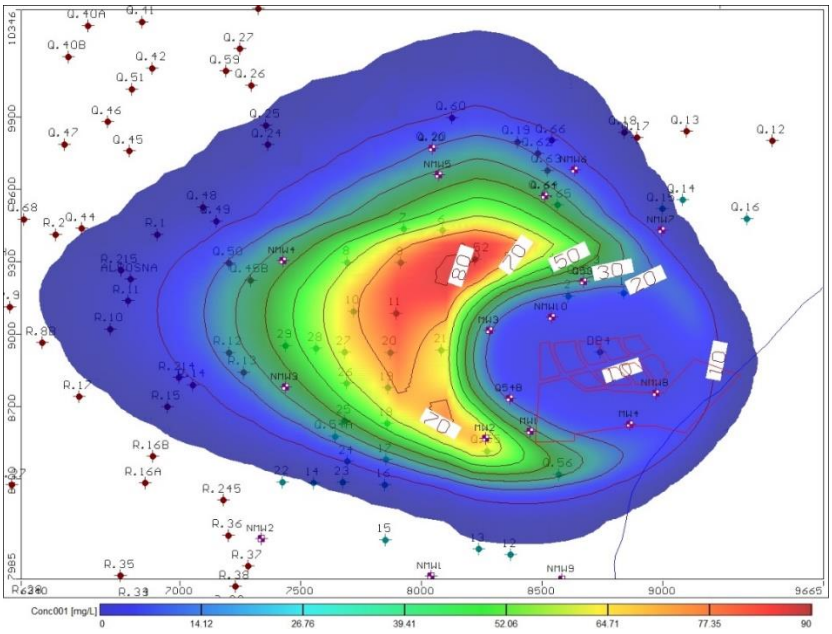


**Figure 4-2: The Nitrate plume at the end of 2019 (about 35,600 $m^3$ of treated wastewater is infiltrated starting from March 2018)**

## 4.5. Wastewater

The NGEST project was designed to properly manage the wastewater treatment and disposal in the four municipalities in the North governorate in the Gaza Strip. This system comprises mainly the NGWWTP (including nine infiltration basins), the TPS, the transmission pressure pipeline and the recovery scheme. The TPS and the pressure pipeline were constructed, completed and entered into service by the end 2009 and early 2010. Since that time, the TPS and the pressure pipeline started to pump and convey the raw/partially treated sewage generated from North Gaza municipalities (Jabalia, Beit Lahia, Beit Hanoun and Um Al Naser) to the nine infiltration basins at the NGWWTP. The infiltration of partially treated wastewater continued to be applied until March 2018 when the NGWWTP was commissioned and treated wastewater started to be infiltrated through the nine infiltration basins.

The current capacity of the NGWWTP is 36,000 $m^3$/day and it is currently receiving about 34,400 $m^3$/day. The anticipated average daily flows will increase in the coming years to reach the current design capacity of 36,000 $m^3$/day in 2021, the design capacity of about 49,300 $m^3$/day in 2031.

The recovery scheme project, which is designed to recover the water infiltrated into the aquifer from the NG WWTP, is one of the major reuse projects in the Gaza Strip. About 34,400 $m^3$/day are currently being infiltrated into the aquifer through nine infiltration basins. The recovery system comprising of 28 recovery wells with all associated reservoirs, pumping station and pressure force main is designed to

abstract the infiltrated treated effluent and pump it for agricultural purposes by using it for irrigation of 15,000 dunam in the eastern part of the North Gaza Governorates. By the end of May 2018 the first phase of the recovery system was constructed and completed including 14 water wells, 4,000 $m^3$ concrete reservoir and 5 booster stations and it is currently under care taker operation scheme by PWA, the system is operated for 10 to 20 minutes every two weeks, where the abstracted water is collected at the reservoir and then discharged into Wadi Bait Hanoun. The system will be fully operated at the time of having both irrigation water carrier and distribution networks constructed and commissioned.

## 4.6. Employment and Workforce

Unemployment in the Gaza strip has been persistently high. According to percentage distribution of labor force participants, the general unemployment rate was 48.2% among labor force participants. The working youth in the Gaza Strip engages is somewhat different economic activities. Most employed young persons in the Gaza Strip work in trading, followed by services and industry (PCBS, 2018).

Temporary employment is dominant in the Gaza Strip. Many jobs are characterized by daily wages and short-term contracts. In 2017, the average daily wage recorded in the Gaza Strip was NIS 59.5 per day. Although this might be a relatively higher rate compared to other developing countries, it is still too low to allow families to meet daily basic needs, given relatively high prices for basic commodities as a result of blockade and several economic restrictions.

In addition, according to patterns of consumption, the poverty rate is considered to be growing amongst Palestinians. The Gaza Strip experiences extreme poverty amounting to over 65%. The number of people receiving relief aid from UNRWA and international relief agencies is more than a million, which is up to 50% of the population of the Gaza Strip.

## 4.7. Historical and Cultural Heritage

The archaeological sites and historical buildings in the Gaza Strip vary between monuments, mosaic sites, mosques, churches and others. The nearest archaeological remains in the project area is Tell al-Khirb, situated in the eastern part of Beit Lahia, 500 m south of the TPS and Pond #7 site. In the area, archaeological remains such as mosaic fragments and pottery shards can be found over the whole of the mound. They are dated to be from the Roman Byzantine period. Beit Lahia has an ancient hill and nearby ruins of an abandoned village. A mihrab, or mosque alcove indicating the direction of salaah (prayer), is all that remains of an ancient mosque to the west of Beit Lahia, dating to the end of the Fatimid period and beginning of the Ayyubid Dynasty of Saladin. In addition, there are two other mosques dating to the Ottoman period within the area. Based on desk study review and observations from the conducted site visits, it is confirmed that no traces of archaeological and cultural heritage, other than the Al Shuhada Islamic Cemetery which neighbors the NG WWTP, have been found at the project sites.

# 5. Risk Assessment and Potential Environmental and Social Impacts

## 5.1 Relationship between ESA and ESMP

During preparation of the Project the PWA prepared an Environmental and Social Audit (ESA) for the existing assets (TPS, NGWWTP, Pond 7 and other lakes), and this Environmental and Social Management Plan (ESMP) for the new suggested installations and works (under Components 1.2 and 2). The ESA looked at the different E&S aspects of the current operations, checked on the compliance with the ESIA/ESMP of the NGEST Project and identified areas that needs improvements to meet the ESF requirements during future operations. The ESA found that the ESMP measures are complied with the environmental controls of NGWWTP (operation of the infiltration basins, control of neighboring wells, noise and odor control systems). The ESA found partial compliances / non compliances with the ESMP on the following: the monitoring program was not conducted at the required frequencies, malfunctioning of the odor control system at the TPS, staff training for handling oils were not conducted, polymers and lubricants were not purchased timely, some poor management OHS issues were observed and absence of emergency repose plan.

This ESMP for the new suggested installation and works has been prepared to identify different E&S risks and impacts, according to the requirements of ESS1, and to identify measures to mitigate negative impacts. This ESMP is intended to identify different environmental and social risks during the construction and operation of the Project and recommended mitigation measures relevant to each phase. This ESMP is highly aligned with the ESA in identifying the mitigation measures related to the operation of the whole system.

## 5.1 Potential Environmental and Social Impacts

The main potential impacts that could arise from the different phases of the Project were identified and their significance was assessed so that any potentially significant impacts can be properly mitigated and monitored.

The identification and analysis of impacts is based on information collected from the technical audit and technical design information of the project, in conjunction with the baseline information of the project sites. Impacts from similar projects are also examined to identify potentially significant impacts on the environment and surrounding communities.

Identification of potential environmental and social impacts was facilitated by the use of a matrix that shows the main activities and operations anticipated at the project sites, the major impacts, and the environmental and social components affected.

Table 5-1 presents the matrix that was used to summarize the impacts expected on different environmental and social elements during the construction and operation and maintenance component 1 and 2 activities.

**Table 5-1: Impact Identification Matrix**

| Activity \ Element | Air Quality | Noise Quality | Biological Resources | Groundwater | Traffic Movement | Public Health | Occupational health & Safety | Solid Waste | Society and communities | Employment | Cultural Hiretage |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Construction Phase:** | | | | | | | | | | | |
| Replacing three out of five pumps in the TP damaged by the flooding of the dry pit, Repairing two out of five of the pumps and replacement of the current bar screens | - | - | - | - | - | - | x | x | x | x | - |
| Build overflow system to emergency reservoir (Pond #7) | x | x | x | x | - | X | x | x | x | x | - |
| Upgrade pond #7 for 24 hours flow capacity as part of decommissioning of old plant | x | x | x | x | - | X | X | x | x | x | - |
| Construction of a pumping station at the existing pond #7 that enables pumping the wastewater collected in pond #7 and return it to the TPS | - | x | - | - | - | X | x | - | x | x | - |
| Rehabilitations of chambers along the pressure line and add instrumentation to monitor pressure line | x | x | - | - | x | X | x | - | x | x | - |
| Provide sustainable solution to biogas balloon and provide a reliable voltage regulation system. | - | - | - | - | - | X | x | x | x | x | - |
| **Operation Phase:** | | | | | | | | | | | |
| Normal Operation | - | x | - | x | - | X | x | x | X | x | - |
| Maintenance Activities | - | - | - | - | - | X | x | - | X | - | - |

The affected environmental and social parameters were identified based on the ESF related standards (ESS1, ESS2 and ESS4), the public consultations, the sites visits, and the experience of the consultant with similar projects. Then, the significance of the identified impacts was assessed taking into consideration different factors including nature, magnitude, geographical extent, timing, duration and reversibility of the impact. For each impact the extent (spatial scale), intensity (size or degree scale) and duration (time scale) are evaluated.

Responding to the impacts identification and assessment, detailed site-specific mitigation measures were identified and evaluated in order to avoid, reduce or remedy the impacts associated with the project implementation during different phases. The following impacts and mitigation measures are specific for component 1 and 2 activities as listed in Table 5-1.

### 5.1.1. Impacts on Air Quality

Based on the assessment of the baseline conditions of air quality as provided in section 4.3 in relation to the proposed project activities sites, the following Impacts have been recognized.

During Construction phase, the extent and nature of project activities should be considered, where transporting vehicles movement is limited and the excavation and backfilling works are limited to build overflow to pond 7, upgrading pond 7 and rehabilitation of pressure line chambers. In addition to the baseline characteristics of air quality in different sub-projects sites, where diesel generators are being used and vehicles movement on roads around the sites is taking place. Reducing air quality through airborne particles, dust from soil disturbance, fugitive emissions and gases are expected. It can be concluded that the construction activities will have significant impact on the air quality parameters at these sites.

The impacts on air quality from dust and construction vehicles emissions are restricted spatially to the areas directly close to generation and decreasing significance with distance. After the implementation of the mitigation measures, the impacts on air quality during construction in all sub-projects components are considered low in significance and short term in nature.

During operation and maintenance phase, there will be low impacts on air quality due to the standby power generators installed in the TPS and NGEST sites. A typical rate of emissions from diesel generators is 0.7 kg CO2–equivalent/kWh. The impact on air quality during the operational phase after mitigation is assed as low in significance and long term in nature. On the other hand, there is a risk of air pollution due to release of biogas to the environment in case of the biogas storage balloon puncturing or burning of the biogas using the existing flare. Therefore, more protection of the balloon is needed to protect from stray ammunition that comes from the nearby troubled boards.

### 5.1.2. Impacts on Noise Quality

The relevant baseline information for this section is presented in Section 4.3. Based on the assessment of baseline findings in relation to the proposed project activities, the following impacts have been identified during different project phases.

During construction phase, for some activities of the project such as: build overflow to pond 7, upgrading pond 7, Construction of a pumping station at the existing pond #7 and rehabilitation of pressure line chambers, there will include noise generating activities associated with operation of machinery, transport of materials in trucks, and application of civil works in these sites. In general, the impact of construction noise depends on the proximity of the construction activities to noise sensitive receptors (NSRs), including residential areas, schools, worship places, clinics and hospitals. Therefore, as most of the sub-project sites are within the old Beit Lahya treatment plant site (BLWWTP) and away from residential area, then the impact of construction noise will be very low and out of concern. Only the noise impact may be encountered in constructing the rehabilitation of the chambers along the pressure line. This impact, however, is anticipated to cause temporary and local nuisance.

The residual impacts from noise during construction in all sub-projects sites are considered moderate in significance and short term in nature, given that the impacts are reduced with the application of the mitigation measures stated below.

During operation phase, the impact is limited to the noise from pumps and generators in the TPS and NEGEST sites. Pumps are expected to create a significant level of noise (in the range of 70 to 90 dB) that may exceed the limits of Palestinian standard for outdoor noise PS 840-2005 mentioned in item 2.1.10 of this study. Moreover, TPS and NGEST site will be provided with backup diesel generators that may produce a noise in the range of 72 to 82 dB for each generator. Thus, the workers will be the main

receptor of the noise impact. The workers and operators in TPS and NGEST will be at medium risk due to proximity and short period of exposure to the health hazards of noise (short time of the generators deployment). The residual impacts from noise during operation and maintenance phase are considered moderate in significance and long term in nature. The neighbourhood public will not influenced since TPS and NGEST are far away from residential areas.

### 5.1.3. Impacts on Biological Resources (Fauna and Flora)

No direct habitat loss or disturbance are anticipated during construction since the works will be in local and closed area within BLWWTP site. In addition, based on the habitat types of the sites with no particularly sensitive ecology and lack of identified fauna during site visits, the residual impacts on biological resources during construction and operation considered low in significance and short term in nature.

### 5.1.4. Impacts on Groundwater

There may be risks of pollution from uncontrolled spillage of fuels and lubricants (during construction/rehabilitation) or uncontrolled discharges of wastewater or unsafe disposal of sludge (during operation). Whilst an overall positive impact is anticipated on groundwater quality and quantity during operation, as no more amounts of untreated wastewater will be discharged in the BLWWTP, and more amounts of treated wastewater will be infiltrated. To mitigate the risk of ground water pollution that could result from the project, PWA should prepare and implement to the satisfaction of the Bank a groundwater monitoring plan, which includes water quality monitoring for all municipal wells determined at risk of pollution from the infiltration of wastewater at all project sites.

### 5.1.5 Impacts on Traffic

During construction phase, the impacts on traffic movements will be due to construction activities associated with rehabilitation of chambers along the pressure line, transferring of waste, pond outputs and construction debris. Some roads that crossing the pressure line will be interrupted especially in densely populated and heavy traffic areas. The risk of traffic movement is assessed to be moderate short term with respect to construction, localized and can be mitigated with development of a traffic management plan. The Contractor(s) shall develop to the satisfaction of PWA, and adhere to the method statement for traffic management. This will be Include into bidding documents for civil works requirement for bidders to submit their Management Strategies and implementation Plans (MSIP) for addressing Environmental, Social, Health and Safety (ESHS) risks and the ESHS Code of Conduct and cause Contractor(s) to act by these documents. The impact on roads and traffic during operation is assessed to be moderate.

### 5.1.6 Labor and working condition Risks and Impacts

The construction and rehabilitation activities will attract workers whose number cannot be estimated at this point until the detail design is completed and contractors of the subprojects are consulted. The workforce will be skilled and unskilled labor secured from outside localities. Project contracted workers may include among others:

- Managers and Engineers-Skilled experts (civil, electrical and mechanical)
- Supervisors, inspectors, foremen and operators-Skilled experts
- Technicians (lab technician, inspectors, drivers)-Skilled experts
- Flagmen, diggers, cleaning, watering-Unskilled workers

Potential risks/issues related to employment of workers have been identified associated with the project which may relate to:

- Indiscriminate human resources policies and procedures;
- Indiscriminate working hours and leaves;
- Indiscriminate wages and benefits
- Discrimination on equal opportunities;
- Grievances;
- Child labor
- Force labor; and
- Occupational health and safety

With regard to occupational health and safety during construction phase, workers are particularly susceptible to impacts from working in all activities in pond #7, overflow to pond #7, rehabilitation of chambers long the pressure line, as well as installation and electrical works at the TPS and the NGWWTP. LMP has been prepared for the project where risk and mitigation measures associated with labor and working conditions have been addressed including Establish and implement a Workers' Grievance Redress Mechanism.

During operation, impacts and risks on occupational health and safety are mainly the risk on engineers/technicians health during the operation and maintenance TPS and NGEST that includes the risk of contact with raw or partially treated wastewater as well as the risks associated with the operation of different equipment, and the risk to life and health due to suffocation or poisoning to presence of hydrogen sulfide (H2S); methane (CH4), and carbon dioxide (CO2) in the biogas storage facility. The impact on labor and working condition during construction and operation is assessed as moderate.

### 5.1.7 Impacts Due to Solid Waste

Solid waste will be produced during construction works include construction waste materials and packaging materials from rehabilitation activities in pond #7 and construction of the overflow to pond #7, soil from excavation of the overflow pipe and sludge from pond #7. During operation, wasted sludge and screening materials from NGWWTP will be produced. In case of improper management and disposal of sludge and screening materials, the local environment will be negatively impacted in terms of pollution and risking wildlife. Moreover, public health and safety of the local community will be negatively impacted. The excess soil from excavation can be used for backfilling the overflow pipe line. The risk from solid waste during construction are considered low. However the risk associated with sludge disposal is moderate. The contractor should set a solid waste management plan in coordination with local authorities including the solid waste transfer routs and the proper dumpsites.

### 5.1.8. Impacts on society and project surrounding communities

Public will be less susceptible to safety risks during construction given that the activities will take place within the footprint of the existing facilities except during rehabilitation of chambers along the pressure line. On the other hand, overall positive long-term impacts are expected during the operation phase as the project will help in eliminating health, environmental and safety threats to the surrounding communities caused by poorly treated and managed sewage.

During the construction phase several impacts may be encountered on the society of the project, the followings summarize these impacts:

- Weak participation of women in planning and identifying project needs.
- The weakness of getting equal job opportunities for women in the project as a result of the stereotype of women's work in the construction activities.
- Poor opportunities for vulnerable groups to participate in the various stages of the project.
- Weak community interaction with the project, due to the lack of trust and confidence between the community and municipalities related to the ability of the municipalities in accomplishing and operating the project components.
- Poor confidence of citizens and workers of the municipalities in related to the construction system, and the potential of any sudden breakdown that may lead to the suspension of the work.
- Expected conflicts between municipalities and their ownership of the project or their contributions that may adversely affect the implementation of the project.
- Lack of integrity and transparency during the distribution of job opportunities in the project, especially for the targeted areas.
- The weak capacity of obtaining information from its main sources, such as municipalities and supervising construction institutions.
- Transferring of waste, pond outputs and construction debris may bring a risk to citizens as a result of the excessive movement of vehicles.
- Health impacts associated with sludge hauling to final disposal;
- Transmission of diseases due to exposure of children to uncontrolled sludge dumping sites near the existing ponds and facilities which also create breeding grounds for mosquitos and flies;
- Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Child Abuse/Exploitation (CAE) risks. The risk on this aspect is relatively moderate whereas three main residential complexes are found to the east and south of the site.

During operation some impacts can be reported as follows:

- The risk of overflow of the wastewater to the existing northern lagoons (lakes) and pond #7 at the time of stoppage or malfunctioning of the plant due to unforeseen circumstances such as excessive flooding, cut off the electricity, conflict, etc. The overflow will have a flooding risk to the surrounding communities especially in the downstream of the lagoons causing mosquitos, flies, and other pest problems in addition to fatalities in the communities downstream, mainly poor and vulnerable.
- The poorly maintained embankment of these lakes and pound #7 is another risk in the case of breaking can flood the surrounding communities.
- Poor safety measures such as proper fencing around these facilities can be a health hazard to the community, especially children.
- Children were present at the random lagoon site, who were able to reach the site through openings in the protection fence, and also because there are no warning signs around the site. This will pose a health and safety risk on children.
- The presence of the Bedouin community adjacent to the random lakes pose a serious health risk, mainly skin diseases, so many cases has been reported. One of the community members of Um-Nasser mentioned in the consultation meeting that more than 15 cases have been reported recently.
- Concerns related to the disability of municipalities in operating the project.
- Conflicts that may arise due to the distribution of responsibility between municipalities for the operation of the project.

- The injustice feeling among the citizens of Beit Lahia, as they are the most affected by the project comparing with the project benefits.
- Poor municipalities' ability to collect sewage fees from citizens.
- The weak opportunity for persons with disabilities and women to work in the operation and maintenance of the project.

### 5.1.9. Land Acquisition, Restrictions on Land Use and Involuntary Displacement Risks

There are no locations where land acquisition or resettlement is required. The construction works and O&M activities will be within the footprint of the NGEST project. Therefore land acquisition or resettlement is not relevant at this point. In case there will be any impact on land site-specific Resettlement Plan (RP) will be prepared.

### 5.1.10. Impacts on Cultural Heritage

During Construction and operation stages, there are no cultural sites already identified within the project sites which may be adversely affected since the works will be within the footprint of BLWWTP and NGEST and no excavation will be carried out except for small segment within BLWWTP site for the overflow pipe line.

The risk on archeological and cultural sites already identified is low in nature due to avoidance of these sites, short term in terms of duration, only during construction. A chance find Procedures will be developed to address and guide impacts associated with chance finds.

### 5.1.11 Supply Chain Risk and Impacts

The construction activities will entail engagement of contractors and subcontractors which will form part of supply chain. Risks including workers' health and safety if these subcontractors are not reputable and legitimate entities and lacking appropriate ESMS that will allow them to operate in a manner consistent with the requirements of ESS2. Spare parts, chemicals and materials (used in construction) will originate from various suppliers.

The risk is assessed to be moderate and short term during construction phase, likely to occur but could be mitigated through inclusion due diligence of suppliers and binding provisions in contractor contracts. LMP has been prepared for the project where risk and mitigation measures associated with subcontractors and primary suppliers have been addressed.

Table 5-2 summarizes the environmental and social impacts of the project. It provides the duration and time scale of each impact as well as the residual impact after the implementation of the proposed mitigation measures.

**Table 5-2: Potential Impact Significance**

| Issue | Phase | Time scale | Risk classification |
|---|---|---|---|
| **Air Quality** | Construction | Short-term | Negative with low significance |
| | Operation | Long-term | Negative with low significance |
| **Noise Quality** | Construction | Short-term | Negative with moderate significance |

**Table 5-2: Potential Impact Significance**

| Issue | Phase | Time scale | Risk classification |
|---|---|---|---|
| | Operation | Long-term | Negative with moderate significance |
| **Biological Resources** | Construction | Short-term[3] | Negative with low significance |
| | Operation | --- | --- |
| **Groundwater** | Construction | Short-term | Negative with low significant |
| | Operation | Long-term | Positive with high significance |
| **Impact on Traffic** | Construction | Short-term | Negative with moderate significance |
| | Operation | long-term | Negative with moderate significance |
| **Labor and working condition** | Construction | Short-term | Positive with moderate significance |
| | Operation | Long-term | Positive with low significance |
| **Public and Occupational Health and Safety** | Construction | Short-term | Negative with moderate significance |
| | Operation | Short-term | Positive with high significance |
| **Solid Waste** | Construction | Short-term | Negative with low significance |
| | Operation | ---- | ---- |
| **Society and Surrounding Communities** | Construction | Short-term | Negative with moderate significance |
| | Operation | Short-term | Negative with high significance |
| **Land Acquisition, Restrictions on Land Use and Involuntary Displacement** | | ---- | insignificance |
| | | ---- | insignificance |
| **Cultural Heritage** | Construction | Short-term | Negative insignificant |
| | Operation | --- | --- |
| **Supply Chain Risk and Impacts** | Construction | Short-term | moderate significance |
| | Operation | Short-term | moderate significance |

# 6. Environmental and Social Management Plan (ESMP) Matrix

The Environmental and Social Management Plan (ESMP) matrix is a combination of the proposed mitigation measures for the anticipated impacts and the monitoring plan, which is designed to: 1) ensure that the prediction for the impacts is accurate and 2) assure that the mitigation measures are implemented and they are effective in performing the objectives. The monitoring plan includes the monitoring activities (How?), the responsible party for monitoring (Who?), and the frequency of monitoring (How many?). The ESMP is designed to cover the different phases of the project. The ESMP Matrix which is developed in this section covers the results and findings from the ESA and the impacts and mitigation measures for the new suggested installation and works (under Components 1.2 and 2) of the Project.

The generated ESMP matrix is mainly built upon ESF, the WB ESSs (ESS1, ESS2, ESS3, ESS4, ESS5, ESS8, and ESS10) and based on the findings of the data collection and impact assessment processes for this assignment.

The ESMP provided in Table 6-1 lists the main expected impacts in all sub projects' sites. Mitigation measures to be implemented during the construction and operational and maintenance phases are also listed. Environmental and social mitigation and monitoring actions are presented in a matrix format. The matrix includes an identification of the issues, mitigation measures, and responsibility for executing the mitigation measures and monitoring actions.

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | |
| **Air Quality**<br>• Minor impact due to vehicle movements and excavations. | • Plan vehicle movements and do not overload vehicles to minimize exhaust emissions.<br>• Control the speed of transporting vehicles, select transportation routes to minimize dust impact on sensitive receivers.<br>• Assure the use of well-maintained mechanical construction equipment.<br>• Comply with relevant local emission standards from vehicles and heavy equipment where available and applicable.<br>• Schedule and monitor excavation and backfilling activities. | • Contractor | • Document air quality concerns<br>• Document complaints and how they were resolved. | • Monitoring – CONTRACTOR<br>• Oversight – ENGINEER, ESO-PWA and EQA | Daily – Work activities. | Costs as part of the project budget and paid by the contractor. |
| **Noise Quality**<br>• Nuisance and health impacts on workers and local residents due to noise generating activities associated with operation of machinery, transport of materials in trucks, and installation of equipment in TPS, pond 7 and NGEST | • Comply with Palestinian Labor Law regarding provision of protective hearing devices and appropriate safety equipment to workers on construction sites, where construction works are expected to produce noise over an appropriate level.<br>• Apply OSHA 1910.95 (a) and OSHA 1910.95 (b) regarding exposure periods to different noise level. . (International best practice).<br>• Provide well-maintained construction vehicles and machinery, in order to minimize noise.<br>• Restrict the movement of machinery within project boundaries and plan vehicle movements to and from sites.<br>• Prohibit operating heavy or noisy machinery between the hours of 6:00 pm (18.00) and 6:00 am during working | • Contractor | • Document noise concerns<br>• Document complaints and how they were resolved. | • Monitoring – CONTRACTOR<br>• Oversight – ENGINEER, ESO-PWA, EQA | Daily – Work activities. | Costs as part of the project budget and paid by the contractor. |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | days and all day during Fridays or designated local holidays (unless the public will be best served during these hours and approval has been provided by local government.<br>• Schedule working hours and work days taking into consideration sensitive receptors, especially the rehabilitation works of chambers along the pressure line. | | | | | |
| **Biological Resources (Fauna and Flora)**<br>• Minor disturbance or displacement of species and habitats during site clearance and construction | • Protect trees and plants (including root systems). However, if it is necessary to uproot any plant or tree then it should be replanted in a location with the same conditions that is agreed upon by the appropriate authorities.<br>• Limit working activities to daytime hours only because most mammalian species are of nocturnal life styles.<br>• Restore original site characteristics as much as possible after the construction works are completed. | • Contractor | • Log any presence of wild or domestic animals within the project site and action taken.<br>• Take photographs prior, during, and post-construction to ensure site restoration back to original characteristics as much as practical.<br>• Document agreed landowner decision if removal of trees or plants are required. | • Monitoring – CONTRACTOR<br>• Oversight – ENGINEER, ESO-PWA, and EQA | • Weekly<br>• Periodically – Same-point vantage photograph.<br>• As needed – Wild or domestic animals entry. | • No cost is required. |
| **Groundwater**<br>• There may be risks of pollution from uncontrolled spillage of fuels and lubricants | • Ensure all necessary equipment is available and in good working condition and well maintained, along with backup power in order | • Contractor | • Maintain a log of all equipment and its condition.<br>• Maintain licenses of | • Monitoring – CONTRACTOR.<br>• Oversight – ENGINEER, in | Daily – Work activities | Costs as part of the project budget and paid by the contractor. |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| • Possible groundwater pollution from uncontrolled discharges of wastewater from random lakes during flooding and infiltration basin at the NGWWTP, or unsafe disposal of sludge | to minimize leaks and spills.<br>• Maintain a clean construction site, and dispose of waste material at approved disposal site, to protect the existing groundwater resources from contamination by debris, soil and sludge<br>• Prepare and implement a groundwater monitoring plan , which includes water quality monitoring for all municipal wells determined at risk of pollution from the infiltration of wastewater at all project sites. | PWA | all operators.<br>• Inspect and document that chemicals and residues are safely stored.<br>• Document confirmation made with survey and design layout of potential cesspits identified.<br>• Document location of septic tank disposal.<br>• Document any significant spillage accidents and resolutions.<br>• Plan is prepared and implemented | coordination with local authority and PWA and EQA.<br>PWA | Through out project operation. | Costs as part of the project budget. |
| **<u>Traffic</u>**<br>• The impacts on traffic will be due to the construction activities associated with the rehabilitation of chambers along the pressure line, transferring of waste, pond outputs and construction debris. | • Include into bidding documents for civil works requirement for bidders to submit their Management Strategies and implementation Plans (MSIP) for addressing Environmental, Social, Health and Safety (ESHS) risks and the ESHS Code of Conduct and cause Contractor(s) to act by these documents.<br>• Cause Contractor(s) to develop and adhere to the method statement | • Contractor and PWA | • Document when and how the public was informed of work schedules and management plans<br>• Document compliance with the engineer approved Traffic Plan<br>• Document potential health and safety | • Monitoring – CONTRACTOR, in coordination with local authority and the traffic police | • Daily – Site preparation and all construction works<br>• Daily – Heavy equipment works<br>• As needed – Work complaints and resolution | • No cost is required. |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | for traffic management.<br>• Coordination between the PWA with local Municipality regarding possible closure of the road under maintenance and inform the local community in advance to avoid any risk on the public health and safety commercial loss. | | concerns and resolutions<br>• Document complaints and how they were resolved. | | • Daily – All work activities.<br>• | |
| **Labor and working condition Risks and Impacts**<br>• Physical hazards from falling and injuries, risks from movement of heavy machinery, and physical hazards during working in all activities in pond #7, overflow to pond #7, rehabilitation of chambers along the pressure line, as well as installation and electrical works at the TPS and the NGWWTP.<br><br>**Supply chain risks and impacts**<br><br>Risks including workers' health and safety if the subcontractors are not reputable and legitimate entities and lacking appropriate ESMS that will allow them to operate in a manner consistent with | • The contractor shall Prepare, submit and implement health and safety plan (OHS) for PWA approval prior to starting any project activities.<br>• The contractor shall prepare an Emergency Response Plan (ERP) in coordination with the relevant local authorities. (Annex 2 presents an example of Emergency plan)<br>• Comply with the Secondary Legislations associated with the Palestinian Labor Law, particularly the Ministerial Cabinet Order No.49, Year 2004 about protection measures from work risks and illnesses and Guidelines No.1, year 2005 on provision of precautionary measures to protect workers at construction sites.<br>• All workers shall be insured by the contractor for any potential work accidents and injuries according to the Palestinian Labor Law.<br>• Provide adequate personal protective equipment (PPE) including hard hats, safety goggles, brightly | • Contractor | • Record when the public was informed of work schedules and management plans<br>• Conduct periodical site inspections<br>• Document and report potential health and safety concerns and their resolution<br>• Record and document any accidents and how they have been resolved<br>• Record vaccinations taken by workers<br>• Conduct site visits and document that workers are properly wearing their PPE<br>• | • Monitoring – CONTRACTOR<br>• Oversight – ENGINEER, ESO-PWA | Daily – Work activities. | The contractor is responsible for the occupational and workers health at site. These costs are covered by the contractor budget. The salaries of an environment, social and health and safety officers are estimated at US$30,000 per year. |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| the requirements of ESS2. | colored vests, and other appropriate safety equipment to protect workers from injury.<br>• Provide first aid kits on construction sites and ensure the presence of personnel with the minimum first aid skills at construction site all times.<br>• Respect all safety measures required for working on rooftops. Apply the OSHA roofing works measures (OSHA 29 CFR 1926.502 (j) (7)).<br>• Place appropriate warning sign on the road.<br>• Identify and isolate construction zones by using warning signs, pylons, fencing, and ribbon barriers.<br>• Consider suitable engineering and occupational health and safety practices during site preparation in areas where unprotected electrical cables and unstable objects are stored and exist.<br>• Maintain and consider safe and careful movement and access of heavy machinery and vehicles in access to and operations within all construction sites.<br>• Coordinate with relevant municipality to announce and inform people within the facility and surrounding areas of planned schedule for construction works, including residential areas.<br>• Take appropriate measures to prevent unauthorized persons | | | | | |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | from entering the work area and construction sites, particularly school students and unattended children. Provide guards when and where it is found necessary to provide adequate security of the work and protection of the public.<br>• Adopt appropriate noise and dust control measures.<br>• Ensure safe access and passages are provided for the public.<br>• GBV, HIV/AIDS, Child protection training/awareness campaign for contractor, sub-contractors and communities (and HIV/health);<br>• Provisions for handling of GBV in the GRM<br>• Update and implement the stakeholder engagement plan (SEP)<br>• Communication through contractor environmental and social specialist when stringing activities will take place to ensure children are not playing in the work area;<br>• Project sites to be marked off with fencing and signage to prevent people from entering the dangerous sites; | | | | | |
| **<u>Solid Waste</u>**<br>• The solid waste materials during construction are limited to construction waste materials and packaging materials from | • Provide all necessary Personal Protective Equipment (PPE) for handling hazardous material depending on type and status of material<br>• Perform storage and disposal of residual hazardous material by | • Contractor | • Record and document any accidents resulting chemical leakage and how they have been resolved. | • Monitoring – CONTRACTOR<br>• Oversight – ENGINEER, ESO-PWA and EQA | Daily – Work activities. | Costs as part of the project budget and paid by the contractor. |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| rehabilitation activities in pond #7 and construction of the overflow to pond #7, soil from excavation of the overflow pipe and sludge from pond #7 | an experienced professional, in coordination with local and competent authorities to identify appropriate disposal sites.<br>• | | • | | | |
| **Society and Surrounding Communities** | | | | | | |
| Weak participation of women in planning and identifying project needs. | • Increasing the number of community meetings during the construction period by prompting the participation of women, girls and the elderly. | • ESO at PWA | • Attendance reports,<br>• ESO reports, which highlight the effects of the vulnerable groups' participation such as women, girls, and the elderly people. | • ESO at PWA | As stated in the SEP | Part of SEP budget. |
| The weakness of getting equal job opportunities for women in the project as a result of the stereotype of women's work in the construction activities | • Ensure that employers and implementing companies (contractors) comply with equal criteria in employment opportunities.<br>• Develop joint benefit contracts (need for legal development that guarantees the benefit of the family, not Persons with joint ownership) | PWA and contractor | • Follow up employment and job announcements, Employment committees reports<br>• Gender audit reports for project personal<br>• Complaints reports | • PWA/ESO | Once during project construction | No cost is required. |
| Poor opportunities for vulnerable groups to participate in the various stages of the project. | • Increasing the number of community meetings during the construction period by prompting the participation of vulnerable groups as indicated in the SEP. | ESO at PWA | • Attendance reports,<br>• ESO reports, which highlight the effects of the vulnerable groups' participation<br>• Complaints reports | PWA/ESO | As stated in the SEP | Part of SEP budget. |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| Weak community interaction with the project, due to the lack of trust and confidence between the community and municipalities related to the ability of the municipalities in accomplishing and operating the project components. | • Forming community accountability and follow-up committees that carry out a part of their social roles.<br>• Conduct community meetings that clarify the responsibilities of the parties, including the municipality<br>• Distributing brochures that present the progress of the project and its future phases<br>• Promote transparency values by publishing project budgets (read budgets understand by citizens). | ESO at PWA | • Accountability committee reports,<br>• Published read budgets,<br>• Media publications about the project | PWA/ESO | As stated in the SEP | Part of SEP budget. |
| Poor confidence of citizens and workers of the municipalities in related to the construction system, and the potential of any sudden breakdown that may lead to the suspension of the work. | • Maintaining the existing ponds for a period of time estimated by experts until the actual start of work and ensuring the capacity of the new system to avoid any problem that might occur if the work interrupted, for example<br>• Prepare an emergency plan to avoid any problem.<br>• Conduct public meeting as indicated in the SEP that enhance the confidence of citizens and workers in the project's capabilities to avoid any defect.<br>• Promote the information transparency values and share it with the community in the project stages. | PWA and contractor | • Attendance reports,<br>• ESO reports<br>• Complaints reports | PWA/ESO | As stated in the SEP | Part of SEP budget. |
| Expected conflicts between municipalities and their ownership of the project or their contributions that may adversely affect the | • Analyze risks and prepare a response plan for compensation and Risk aversion<br>• Conduct community meetings to clarify the risks and their management mechanisms and to | ESO at PWA | • Complaints report<br>• outputs of the Community meeting<br>• Supervisors Notes | PWA/ESO | As stated in the SEP | Part of SEP budget. |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| implementation of the project. | explain the arising rights for the contracting parties | | • Outputs of the risk analysis pl. | | | |
| Lack of integrity and transparency during the distribution of job opportunities in the project, especially for the targeted areas. | • Incorporating civil society institutions within monitoring the project<br>• Developing community monitoring tools such as community accountability committees<br>• Obligate the employers by the integrity and transparency standards in the employment<br>• Activate and publish the complaints system and make it available to the public. | PWA /ESO | • Follow-up reports issued by civil society institutions<br>• Reports and observations of the co-accountability committees.<br>• Company compliance reports to the integrity and transparency standards<br>• Complaints response reports and provided solutions.<br>• | PWA/ESO | As stated in the SEP | Part of SEP budget. |
| The weak capacity of obtaining information from its main sources, such as municipalities and supervising construction institutions. | • Develop a strategy for publishing information and making it available to the public.<br>• Conduct extended community meetings.<br>• Publishing data and plans through various and multiple channels available to all, such as the Internet, municipalities, mosques, clubs and offices. | PWA /ESO | • Develop number of publishing channels for data and information as stated in SEP | PWA/ESO | As stated in the SEP | Part of SEP budget. |
| Transferring of waste, pond outputs and construction debris may bring a risk to citizens as a result of the excessive movement of vehicles. | • Analyse risks and prepare a response plan for compensation and Risk aversion.<br>• Conduct community meetings to clarify the risks and their management mechanisms and to explain the subsequent rights for the contracting parties. | PWA /ESO | • Complaints report<br>• outputs of the Community meeting<br>• Supervisors Notes<br>• Outputs of the risk analysis plan | • PWA/ESO | • As stated in the SEP | • No cost is required |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| Risk on community health and safety, including impacts associated with sludge hauling to final disposal | • Use signs, barriers, and education/public outreach to prevent public contact with potentially dangerous equipment and/or materials.<br>• Maintain and consider safe and careful movement of sludge hauling vehicles.<br>• Public consultation as indicated in the SEP | PWA | • Complaints report<br>• outputs of the Community meeting<br>• Supervisors Notes | Monitoring and Oversight by PWA | Monthly or as needed | Costs as part of the project budget and paid by the contractor. |
| Transmission of diseases due to exposure of children to uncontrolled sludge dumping sites near the existing ponds and facilities which also create breeding grounds for mosquitos and flies; | • Use signs, barriers, and education/public outreach to prevent public contact with potentially dangerous materials.<br>• Take appropriate measures to prevent unauthorized persons from entering the work area and construction sites, particularly school students and unattended children. Provide guards when and where it is found necessary to provide adequate security of the work and protection of the public.<br>• Public consultation as indicated in the SEP. | PWA | • Complaints report<br>• outputs of the Community meeting<br>• Supervisors Notes | Monitoring and Oversight by PWA | Monthly or as needed | Costs as part of the project budget and paid by the contractor. |
| Impacts to the Bedouin community adjacent to the random lake: skin diseases, spread of mosquitos, flies, and other pests. | • Prepare and implement a Pest Management Plan at the Beit lahia Wastewater Facilities | PWA | • Plan is prepared and implemented | Monitoring and Oversight by PWA | Monthly or as needed | Costs as part of the project budget |
| Flooding risk to the surrounding communities especially in the downstream of the lagoons Flooding risk to | Prepare an emergency preparedness plan for the facilities at the Old Beit Lahia wastewater facilities and the random lakes | PWA | • Plan is prepared and implemented | Monitoring and Oversight by PWA | Monthly or as needed | Costs as part of the project budget |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| random lacks causing fatalities in the communities downstream | | | | | | |
| Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Child Abuse/Exploitation (CAE) risks. | • A stand-alone GBV Action Plan, to assess and manage the risks of GBV, SEA, and CAE will be prepared and implemented.<br>• Organize awareness raising sessions and educate the workers and the community in the Project site on issues of GBV/SEA/CAE, legal rights, GRM and referral path for victims;<br>• GRM for GBV/SEA/CAE will be strengthened and integrated to track related complaints, including a feedback system for regular and timely feedback on actions taken to respond to complaints. | PWA and Contractor | • Complaints report<br>• outputs of the FG meetings<br>• Supervisors Notes | • Monitoring – CONTRACTOR Oversight – ENGINEER, PWA | Monthly or as needed | Part of SEP budget |
| **Cultural Heritage**<br>• No traces of archaeological and cultural heritage have been identified in the sites where project activities will be implemented. | • If unexpected or buried archaeology is discovered during excavation works in overflow pipeline to pond #7, the chance find procedures will be used.<br>• Work activities will be stopped immediately and the responsible competent authority (MoTA) needs to be contacted<br>• Work will not be allowed to proceed without a written approval from the relevant agencies. | Contractor | • Document any archaeological findings and actions taken. | • Monitoring by Contractor and Oversight by PWA | • Weekly<br>• As needed – Findings and actions taken. | No cost is required |
| **Operation and Maintenance Phase** | | | | | | |
| **Air Quality**<br>• Impact on air quality due to the emissions from the diesel generators in the | • Using emissions filter for all the diesel generators in the project. This type of filters is available in the market and has high | PWA | • Carry out Complaint monitoring and ambient air sampling. | • Monitoring and Oversight by PWA | Monthly or as needed | • $15,000 for Air Quality measurements instruments and training |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| TPS and NG WWTP.<br>• Impact on air quality due to releasing of the biogas to the environment or burning it using the existing flare.<br>• Bad smell from the disposed sludge produced in NGWWTP and disposed at TPS site.<br>• Bad smell from treatment units in NGWWTP ($H_2S$, $NH_3$, etc.)<br>• Bad smell in the inlet works of the screening building in the TPS. | efficiency of CO, NOx, and PM 2.5.<br>• Producing electricity using PV.<br>• Using Bio-gas generators instead of diesel generators if possible. This will considerably reduce the gas emissions (may reach to more than 80% emissions reduction). (See Annex 3 for Electricity Management Plan)<br>• Reducing the operating hours of the standby generators by supplying the pumping stations and the reservoirs distribution pumps with electricity connections that enable more supply hours in the Gaza electricity distribution schedule.<br>• Comply with relevant local emission standards from heavy equipment where available and applicable.<br>• More protection of the biogas balloon is needed to protect from stray ammunition that comes from the nearby troubled boards<br>• Repairing the gas storage system in the. NGWWTP.<br>• Repairing the odor control system in the screening building in the TPS.<br>• Air sampling to be conducted as needed and in case of workers or community complains.<br>• In case of exceedance of indoor air quality levels, workers should be equipped with appropriate protecting gear (masks). | | • Refer to the operation manual to be implemented by Pumping stations and NG WWTP operators. | | | of the operation staff on air measurements<br>• Some mitigation measures will be part of the SEP budget.<br>• Part of the WMS project budget to pay for the repair of the balloon and operationalize the overall gas system<br>• Part of the WMS project budget to pay for sludge transport and the fees of the Land fill.<br>• Part of the WMS project budget to pay for supplying and installation of the mixer. |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | • In case of exceedance of outdoor air quality levels, carryout investigations and conduct necessary maintenance,<br>• Alert surrounding community about possible risks and precautionary measures.<br>• Stop disposing the sludge from NGWWTP to the TPS and develop an agreement between PWA and Municipality of Gaza for the disposal of the sludge from NGWWTP to Joher El Deek landfill.<br>• Removing the accumulated sludge in the TPS to Joher El Deek landfill.<br>• Install a mixer to aerate pond #7 to prevent the occurrence of anaerobic condition and bad smell. | | | | | |
| **Noise Quality**<br>• Nuisance and health impacts on workers and local residents<br>• Disturbance to terrestrial fauna. | • Replace and maintain noise muffling equipped or other used acoustic reduction technologies as needed.<br>• Confirmation of expected noise levels from installed equipment against safe working levels, and provision of warning signs and protective equipment for workers by the operator. | • PWA | • Carry out complaint monitoring for noise measurements.<br>• Refer to the operation manual to be implemented by NG WWTP operator | • Monitoring and Oversight by PWA, EQA. | Monthly or as needed | USD 1,000 for measuring the noise level. |
| **Groundwater Quality**<br>Risk of pollution from uncontrolled discharges of wastewater, from infiltration basin at the NGWWTP, or unsafe disposal of sludge | • Prepare and implement a groundwater monitoring plan , which includes water quality monitoring for all municipal wells determined at risk of pollution from the infiltration of wastewater at all project sites<br>• Regular monitoring of the effluent's quality from the NG WWTP and | • PWA | • Plan is prepared and implemented<br>• Effluent and ground water sampling for biological, physical and chemical parameters including | • Monitoring and Oversight by PWA, EQA. | Monthly for all parameters and yearly for heavy metals | • 5000 USD for groundwater modeling expert or each update. |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | the surrounding monitoring wells.<br>• Regular infiltration performance check.<br>• Updating the NGEST groundwater model (flow and solute transport) that was prepared to monitor the aquifer underlying the project area, and ensure its safeguard. | | heavy metals as per Table 8.3. | | | |
| **Labor and working condition Risks and Impacts**<br>• Risk on engineer/technician health during the operation and maintenance TPS and NGEST.<br>• Risk to life and health by suffocation or poisoning to presence of hydrogen sulfide (H2S); methane (CH4), and carbon dioxide (CO2) | • Abide to LMP and C-LMP<br>• Training of the O & M departments in the health facilities on the operation and maintenance TPS and NGEST as well as best practice maintenance activities.<br>• Good storage of chemicals to be used in the O&M i.e. polymers for sludge dewatering.<br>• All protective equipment must be installed and checked. These include personal protective equipment (PPE) like electrically isolated rubber gloves and hard hats when working with mechanical reconstructions as well as appropriate gloves to deal with lead batteries.<br>• Works on electrical instrumentation and protective equipment must be carried out only by a qualified engineer and technician/s. Staff is not allowed to continue with maintenance unless the functional state of protective equipment is ensured.<br>• Risk of the workers and staff electrocution due to the possible flood in the pumps room in the TPS, where the electric | • O&M Department of TPS and NGEST (PWA) | • Inspect and test all safety features and measures focusing on personal protective features and tools used.<br>• (The inspection should verify that issued PPE continues to provide adequate protection and is being worn as required).<br>• document any accidents and how they have been resolved<br>• Record vaccinations taken by workers<br>• Conduct site visits and document that workers are properly wearing their PPE. | PWA | Monthly – During operation | The cost is part of operation budget |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | distribution boards are installed at low level<br>• Risk of the pressure line explosion at the TPS due to water hammer action that my cause casualties in the operation staff and health hazards<br>• Risk of biogas holder explosion due to stray ammunition coming from the nearby troubled boarder<br>• Power supply connections and breakers should be kept secure against unexpected restart and a warning label must be attached against restarting.<br>• Protective devices must be serviced regularly according to the manufacturer's instructions.<br>• Loose connections and scorched cables must be removed immediately.<br>• The system control room/cabinet must contain all safety measures such as fire-fighters, free of flammable materials, natural and artificial ventilation, and under the eyes of safety guards.<br>• A drawing on the control room/cabinet shall provide warning about safety hazards, e.g. smoking, acid handling, etc. as well as emergency shutdown procedures. (See Annex 4 for Occupational Health and Safety Plan requirements).<br>• The operation and maintenance of the biogas system is only to | | | | | |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | be carried out by specially trained personnel who are familiar with the systems, the operating instructions and with the safety requirements.<br>• All system equipment to be inspected, serviced and maintained in accordance with the manufacturer's recommendations by an approved and qualified engineer or suitably trained and qualified person under a strict permit to work system.<br>• All records relating to periodic inspections, servicing and maintenance to be retained. | | | | | |
| **<u>Wastewater discharge</u>**<br>• Improper disposal of treated wastewater to the infiltration basins at the NGWWTP.<br>• Risk of raw wastewater flooding to surrounding areas in the TPS site due to the malfunctioning of the TPS equipment creating health and safety hazards.<br>• Risk of raw wastewater flooding to surrounding areas in the TPS site due to the decreased capacity of the NGWWP of the plant equipment | • Ensure replacement the malfunctioning equipment in TPS by new ones as indicted in the project description/section 2 (pumps, bar screens, SCADA, etc.)<br>• Initiate building capacity program for the operational staff to properly operate and maintain different facilities of the TPS.<br>• Starting preparation for constructing phase II of the NGWWTP by updating/preparing tender documents.<br>• Constructing an over flow system at the TPS with adequate storage capacity as indicated in the project description/section 2 (overflow line, overflow pond #7, etc.)<br>• Replacing/repairing the malfunctioning equipment in NGWWTP by new ones as indicted the project | • PWA-PMU | Implementing Comprehensive wastewater quality monitoring program as indicated in (Table 8.3, in the ESMP, presented in Annex1, this report) | PWA-PMU | The frequency of monitoring given in Table 8.3 along the project life. | • $20,000 Per Year for the cost of analysis of wastewater quality monitoring program<br>• Part of the WMS project budget to pay for the consultant to prepare tender documents.<br>• Overflow system construction cost is part of the project budget.<br>• Capacity building Budget and Equipment replacements budget are part of the WMS |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| creating health and safety hazards. | description/section 2 (bar screens, gas balloon).<br>• Initiate building capacity program for the operational staff to properly operate and maintain different facilities of the NGWWTP.<br>• Implement a comprehensive wastewater quality monitoring program. | | | | | project budget. |
| **<u>Hazardous waste</u>**<br>• Risk of spill of hazardous waste such as oils, lubricants, polymers.<br>• Risk of storage and handling hazardous materials used in the NGWWTP and TPS such as polymers | • Training employees on the hazards, precautions and procedures for safe storage, handling and use of all potentially harmful materials relevant to each employee's task and work area.<br>• Follow safety instructions, worker should wear proper clothing.<br>• A first aid station with trained staff, which is able to coordinate with local hospitals in case of emergencies.<br>• Preparing and implementing spill response and emergency plans to address their accidental release. | • O&M Department of TPS and NGEST (PWA) | • Field observations and documentation of sludge and screening materials disposal practices | PWA/ESO | Daily | • The cost is part of operation budget (WMS project]<br>• Part of the WMS project budge to pay the preparation of the first aid station and staff training.<br>• Part of the WMS project budget to pay for consultant to prepare the spill response and emergency plan.<br>• The budget is funded by other donors<br>• Part of the WMS project budget to pay for repairing and commissioning of the biogas system in the NGWWTP |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | | | | | | |
| **Energy conservation**<br>• Risk of energy shortage<br>• Risk of air pollution from fossil fuel burning for energy production. | • Using solar energy such as photovoltaic technology (PV).<br>• Using the produced biogas in the NGWWTP for energy production. | • O&M Department of TPS and NGEST (PWA) | • Field observations and air quality monitoring | PWA/ESO | Per quality monitoring Frequency | • **The budget is funded by other donors**<br>• Part of the WMS project budget to pay for repairing and commissioning of the biogas system in the NGWWTP |
| **Solid Waste/Sludge**<br>• The risk of the sludge and screening materials produced from NGWWTP and transferred close to pond #7,<br>• Improper storage/disposal /reuse of produced sludge from the NGWWTP leading to:<br>-Ground water pollution<br>-Soil pollution<br>-Air pollution<br>-health hazards (workers and community).<br>• Improper handling and disposal of solid waste generated at the NGWWTP and TPS | • Prepare sludge management plan for the NGWWTP to ensure its safe handling and disposal in an environmentally accepted manner. The plan should include agreement between PWA and Municipality of Gaza for the disposal of the sludge of NGWWTP to Joher El Deek landfill.<br>• Stop disposing the sludge from NGWWTP to the TPS and dispose the accumulated sludge at TPS to an authorized land fill (e.g. Joher El Deek landfill).<br>• | • O&M Department of TPS and NGEST (PWA) | • Field observations and documentation of sludge and screening materials disposal practices | PWA/ESO | Daily | • Part of the WMS project budget to pay for sludge hauling and disposal fees.<br>• Part of the WMS project budget to pay for sludge hauling and disposal fees.<br>• |
| **Society and Surrounding Communities** | | | | | | |
| Concerns related to the disability of municipalities in operating the project. | • Analyse risks and prepare a response plan for compensation and Risk aversion | • PWA | • Complaints report<br>• Outputs of the | PWA | As stated in the SEP | No cost is required |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | • Conduct community meetings to clarify the risks and their management mechanisms and to explain the arising rights for the contracting parties | | Community meeting<br>• Supervisors Notes<br>• Outputs of the risk analysis plan | | | |
| Conflicts that may arise due to the distribution of responsibility between municipalities for the operation of the project. | • Organizing inter-municipal cooperation agreements to clarify roles and responsibilities<br>• Develop a dealing blog that regulates relationships and roles between municipalities and follow-up community bodies, such as community accountability committees and NGOs in the same geographic region<br>• Organizing contracts with the donor in a way that clarifies the roles and responsibilities of each municipality and published them to the public<br>• Holding sharing meetings regularly between the municipalities to avoid any conflict that may occur. | • PWA | • Publish agreements and make them available to the public.<br>• Publish dealing blogs. | PWA/ESO | As stated in the SEP | No cost is required |
| The injustice feeling among the citizens of Beit Lahia, as they are the most affected by the project comparing with the project benefits. | • Holding regular meetings with the local community to explain the positive effects on the society as a whole<br>• Adopting a strategy to distribute the benefit according to the degree of effect<br>• Activating the complaints system and publishing it to the public<br>• Clarify the channels of complaints and the mechanisms to reach them easily | • PWA/ESO | • Meeting Outputs<br>• Complaints and response reports<br>• Awareness and informational brochures of the project. | • PWA/ESO | • As stated in the SEP | Part of SEP budget. |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | • Publish project outputs and beneficiaries, their numbers and status to the first phases of operation | | | | | |
| The weak opportunity for persons with disabilities and women to work in the operation and maintenance of the project. | • The municipalities and project's implementing institutions adopted initiatives that encourage increasing women opportunities to work in project operation | PWA/ESO | • Follow up employment and job announcements, Employment committees reports<br>• Gender audit reports for project personal<br>• Complaints reports | PWA/ESO | Once during project operation | No cost is required. |
| Flood risk due to the overflow of wastewater to the northern lagoons and pond 7, the flood risk is also due the poorly maintained embankment of the lagoons and pound #7 | • PWA should take measures to close these lagoons and make sure that the municipalities stop pumping the waste water at the start of the project.<br>• In case PWA needs to keep using these lagoons for emergency when there is a frailer in TPS, PWA should take immediate safety measures and ensuring that the two lagoons are well fenced and the embankments of the lagoons are reinforced.<br>• Improve and reinforce the embankments of the pond 7.<br>• Install safety signs on the fence of the northern lagoons and pond 7. | PWA/ESO | • Field observations and documentation of status of the safety measures in the lagoons and pond 7 | PWA/ESO | Monthly – During operation | The cost of the mitigation measures should be part of WSMP project |
| Health and safety risk on children in the area surrounding the northern lagoons and pond 7 | • Reinforce the fencing of the lagoons with hard rigid fence type.<br>• Improve and reinforce the embankments of the pond 7,<br>• Develop an emergency and community outreach plan. | PWA/ESO | • Field observations and documentation of status of the safety measures in the lagoons and pond7. | PWA/ESO | Monthly – During operation | The cost of the mitigation measures should be part of WSMP project |

**Table 6-1: Environmental and Social Management Plan**

| Element and Impact | Mitigation Measures | Execution Responsibility | Monitoring Activity | Monitoring Responsibility | Monitoring Frequency | Implementation and budget (US$) |
|---|---|---|---|---|---|---|
| | | | • Obtain records of the children health status in the area close to the lagoons and pond 7. | | | |
| The presence of children into and near the dried lakes pose a serious health risk, mainly skin diseases. | • PWA/municipalities need to ensure that the random lakes are well fenced<br>• Close any openings in the fence of these lakes.<br>• Municipalities' staff need to conduct frequent visits to the lakes to ensure that safety measures are in place. | PWA/ESO | • Field observations and documentation of status of the safety measures in the dried lakes.<br>• Obtain records of the children health status (skin diseases) in the area close to the dried lakes. | PWA/ESO | Monthly – During operation | The cost of the mitigation measures should be part of WSMP project |
| Risk of GBV/ SEA / CEA | • Organize awareness raising sessions and educate the workers and the community in the Project site on issues of GBV/SEA/CEA, legal rights, **GRM** and referral path for victims of GBV/SEA;<br>• GBV/SEA risks should be monitored continuously through the life cycle of the Project;<br>• **GRM** for GBV/SEA/CEA should be strengthened and integrated to track complaints related to GBV/SEA, including a feedback system for regular and timely feedback on actions taken to respond to complaints. | PWA/ESO | • Complaints report<br>• Operators Notes | • Monitoring , PWA/ESO | Monthly or as needed | • GRM staff (ESO) covered under the **SEP budget**.<br>• Cost for Training and awareness raising sessions is covered under training mentioned in section 9.2 |

# 7. The Contractor's Duties and Responsibilities

## 7.1 Construction Phase:

The construction management contractor (ENGINEER), is responsible for managing ESMP and for periodic monitoring of the environmental and social aspects and overall compliance with the mitigation measures of this plan during the construction phase.

For an effective integration of environmental and social standards into the project implementation, the Contractor will need to adopt this ESMP and prepare a comprehensive Construction Environment and Social Management Plan (C-ESMP) that will provide the key reference point for compliance. The environmental supervision will also adopt the C-ESMP.

It is the construction contractor (CONTRACTOR)'s responsibility to take into account all the construction-related mitigation measures listed in this report and through the C-ESMP; when planning and during the construction phase. And it is the ENGINEER's responsibility to monitor and document any changes in scope of the proposed project from any of the terms and conditions stated in this report. Both the CONTRACTOR and ENGINEER are the primary responsible parties for the mitigation and monitoring tasks during construction; and both shall adhere to informing and coordinating with all applicable stakeholders with relevance to their corresponding mandates.

The CONTRACTOR shall read, consider, and comply with the ESMP for this project. The CONTRACTOR shall act responsibly to provide notification of CONTRACTOR'S schedule to enable the ENGINEER to carry out his responsibilities.

The CONTRACTOR shall designate an environmental and social coordinator. This individual(s) shall have good general knowledge of environmental and social issues that are included in Table 6-3. This individual(s) shall be responsible for:

- Coordinating the CONTRACTOR'S work related to compliance with environmental and social mitigation measures.
- Working closely with the ENGINEER to ensure that the CONTRACTOR adequately understands the potential impacts, mitigation and monitoring requirements for implementation.
- Working closely with the ENGINEER to ensure that the CONTRACTOR modifies or incorporates necessary mitigation actions and monitoring plans to reflect on-site field conditions.
- The cost of mitigation measures and monitoring activities will be part of the contract of the project and it will be paid by the contractor.

## 7.2 Operational and Maintenance Phase

Mitigations measures in the ESMP that are beyond the construction phase are not within the scope of the CONTRACTOR's work; t is solely the responsibility of the Operation and Maintenance (O&M) Departments in PWA. In addition, the monitoring activities will be taken by PWA/EQA. The operational phase includes all O&M activities, which begin as soon as the project is handed to the project owner. The cost of mitigation measures and monitoring activities will be part of the yearly O&M budget NGEST project.

# 8. Organizational Capacity

## 8.1 Roles and Responsibilities

The successful implementation of the monitoring program will depend on the commitment and capacity of the PWA-PMU, Environmental and Social Officer (ESO), Consultant Engineering Office (CEO) and other third parties (institutions) to implement the program effectively. The roles and responsibilities of those that will be involved in the implementation and monitoring of this ESMP are discussed in Table 8-1 while the institutional arrangement is shown in Figure 8-1.

**Table 8-1: Institutional Responsibilities for ESMP Implementation**

| Authorities and Agencies | Responsibilities |
|---|---|
| **Palestinian Water Authority (PWA)**<br>**(Via: PMU)** | Lead role - provision of advice on screening, scoping, review of draft ESMP report (in liaison with State Ministry of Environment and Water Resources), receiving comments from stakeholders, public hearing of the project proposals and social liability investigations, monitoring and evaluation process and criteria. |
| **Environmental and Social officer (ESO)** | **Environmental Safeguards**:<br>• Collate environmental baseline data on relevant environmental characteristics of the selected project sites;<br>• Analyze potential social and environmental impacts of the project components<br>• Ensure that project activities that are implemented will in accordance to best practices and guidelines set out in the ESMP;<br>• Identify and liaise with all stakeholders involved in environment related issues in the project; and be responsible for the overall monitoring of mitigation measures and the impacts of the project during implementation.<br>• Report to PWA-PMU.<br>**Social Safeguards**<br>• Develop , coordinate and ensures the implementation of the social aspects of the ESMP<br>• Identify and liaise with all stakeholders involved in social related issues in the project;<br>• Conduct impact evaluation and beneficiaries assessment; and<br>• Establish partnerships & liaise with organizations, Community Based Organizations (CBOs), Civil Society |
| **Consultant Engineering Office (CEO)** | • Preparation of the engineering designs for the project.<br>• Provides an independent oversight ensuring contractor adhere strictly to the engineering specifications<br>• Supervised the implementation of ESMP<br>• Report to ESO. |
| **The contractor** | • Compliance to BOQ specification in procurement of material and construction<br>• Implement ESMP during project construction stage |
| **Environmental Quality Authority (EQA)** | • Environmental monitoring and compliance overseer at the National level<br>• Review of draft ESMP report (in liaison with PWA)<br>• Site assessment and monitoring of ESMP implementation. |
| **World Bank** | • Overall supervision and provision of technical support and guidance.<br>• Recommend additional measures for strengthening the management framework and implementation performance;<br>• Supervising the application and recommendations of sub- project ESMPs. |

The PWA-PMU, during construction of the project components, ESO who will have the overall responsibility for implementing the ESMP and shall report directly to the PMU Director. The PMU-ESO will have a supervisory role over different stakeholders and will be responsible to include the proposed mitigation measures and monitoring activities in the tender documents and equipment supply contracts.

PWA has developed an Environmental and Social Management Plan for the NGEST project to keep up with the environmental and social policy of the Bank since year 2006. Since then there were a lack of producing E&S reports, keeping records and there was no hiring of ESO to follow the ESMP. For the current project and during the construction phase (before starting) the contract of the Consulting Engineering Office (CEO), who will supervise construction work, should include supervision component on the relevant environmental and social measures that will be implemented by the construction contractor. The CEO Representative in each construction site should report directly to the PMU-ESO about the performance of the contractor in implementing the environmental and social instruments including ESMP, LMP, and SEP during his work, the approval of the contractor's invoices should include the signature of the PMU-ESO based on the reports he receives about the contractor performance in implementing the environmental and social instruments.

The PMU-ESO should not totally depend on the reports he receives from the CEO, but he should also make site visits on regular basis to confirm the reports he receives about the implementation of the ESMP measures by the construction contractor.

Efficient implementation for the social management plan should involve tailored efforts for maximizing the positive social impacts and ensuring that they are reaching the local communities and minimizing the negative impacts that may hit the poor and vulnerable groups.

The potentially-affected groups through Stakeholder Engagement Plan (SEP) is developed in conjunction with this ESMP where they will be consulted along the process in order to ensure that their views are considered and that suitable measures are in place to eliminate the severity of negative impacts. Efficient consultations with stakeholders and high level of participation are seen as a prerequisite for a successful ESMP. It is strongly recommended to appoint a ESO within the PMU. The ESO should be leading the various participatory activities.

During operation, PWA responsible for the operation and maintenance of the project shall appoint a manager in addition to ESO who will generally be responsible for implementing mitigation measures and monitoring activities prior to initiation of the project activities. The manager will supervise the ESMP measures at the different project sites, in addition to corresponding and cooperating with different authorities for monitoring the operation of the site, and will be the staff in charge of implementing the social mitigation measures.

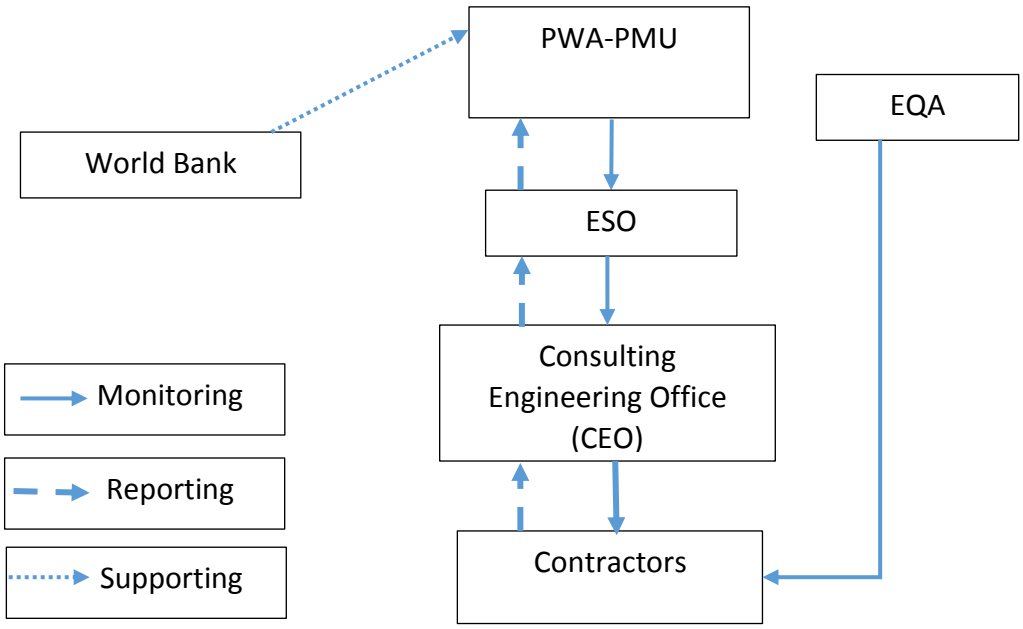


**Figure 8.1: Institutional Arrangement for ESMP implementations**

## 8.2 Monitoring and Reporting

### 8.2.1 Monitoring Activities

The monitoring plan (Internal and External Monitoring) for the ESMP is presented in Table 8-2. Monitoring results shall be documented with preventive/corrective actions to be implemented.

**Table 8-2: Internal and External Monitoring**

| Monitoring | Actions | Responsibility | When | Deliverables |
|---|---|---|---|---|
| **Internal Monitoring** | Regular site visit (Frequency is defined in Table 6.1) to ensure that the mitigation measures and actions specified in the monitoring plan and as bound by the contract is satisfactorily implemented. | CEO and ESO PWA-PMU | During Preconstruction Construction and Operation Phases | Monitoring Reports and documentation as described in Subsection 8.2.2 |
| | Site visit for monitoring and inspection to ensure contractor adhere strictly to the engineering designs and specifications for the project | CEO and ESO | During Construction Phase | Observations and Monitoring Reports to be compiled and presented to the contact |
| **External Monitoring** | Regular site visit to ensure project is implemented in an environmentally & | PWA and EQA | During Preconstruction Construction and Operation Phases | Inspect monitoring reports from Safeguard unit and provide feedback on |

| | | | | |
|---|---|---|---|---|
| | socially sustainable manner using the monitoring indicators specified in the monitoring plan and other national and international environmental & social requirements | | | observations. Enforce corrective actions where necessary. |

Table 8-3 shows a list of parameters that should be monitored at different frequency for the different project phases. This table was designed based on local experience and the experience from the Dan region monitoring program. Samples from the observation wells are taken after at least half an hour of pumping in order to exchange the water in the well. After the start of operation of the new NGWWTP measurements for influent and effluent should be performed daily for all the proposed parameters in the table.

**Table 8.3: Proposed Monitoring Parameters for Effluent Aquifer Water**

| Parameter | Pumped Effluent | Aquifer | |
|---|---|---|---|
| | Every Month | Every Month | Every six Months |
| Later level | N/A | X | X |
| pH | X | X | X |
| EC | X | X | X |
| TDS | X | X | X |
| SS | X | | |
| BOD | X | X | X |
| COD | X | X | X |
| NO3 | X | X | X |
| NH3/NH4 | X | X | X |
| Cl | X | X | X |
| SO4 | X | X | |
| P | X | X | |
| Ca | X | X | |
| Mg | X | X | |
| K | X | X | |
| Na | X | X | |
| Faecal Coliform | X | X | X |
| Total Coliform | X | X | |
| B | X | X | X |
| Detergents (HPLC) | X | X | X |
| Heavy metals | X | X | |

### 8.2.2 Reporting Procedures

The reporting procedures presented in Table 8-3 have been developed in order to ensure that the PWA is able to receive feedback from the implementation of the ESMP on an ongoing basis and to take rapid corrective actions if there are issues of non-conformance.

**Table 8-4: Reporting Procedures**

| Phase | Responsibility | Deliverables | Accountability |
|---|---|---|---|
| Preconstruction | PWA-PMU | Report of monitoring activities including any specific events | PWA on request |
| Construction | CEO<br>ESO<br>ESO | • Monthly reports prepared by CEO<br>• Quarterly report prepared by ESO<br>• Report upon the completion of all construction activities. | ESO<br>PWA<br>PWA |
| Completion of construction and demobilization of contractor from site | ESO | • Final Monitoring Report including all monitoring activities throughout project<br>• Implementation | PWA<br>World Bank |
| Operation and Maintenance | ESO | • Regular monitoring report on the operation and maintenance of NGEST | PWA |

### 8.2.3 ESO Qualification and Responsibilities

ESO should have a degree in social science or social development practice or environmental engineering/science. He/she should be familiar with work in projects with similar scope and has very high communication and facilitation skills. Local university graduates, particularly women, should be encouraged to apply. To enable the ESO to efficiently fulfill his/her responsibilities, the capacity building and training modules presented in Section 9 are proposed. The ESO should receive these capacity building programs before start of the construction phase of the project.

# 9. Environmental competency, awareness, and Training

## 9.1 Awareness

Regarding the environmental and public health issues related to different orientation sessions and awareness raising activities, the ESO should prepare, implement and document the awareness raising activities provided to community people and project stakeholders. The main topics that will be covered by the ESO are:

- Water problems in Gaza Strip and mechanisms to solve them
- Sludge and recovered water benefits
- Health preventive methods to be applied during usage of sludge/ recovered water

- How to combat insects in an environmentally safe way

Some of the proposed awareness sessions will require the ESO both in coordination with the Ministry of Health and Ministry of Agriculture

## 9.2 Competency and Training

Training is essential for ensuring that the ESMP provisions are implemented efficiently and effectively. The PWA shall therefore ensure that all persons that have roles to play in the implementation of the ESMP are competent with appropriate education, training or experience. Similarly, the contractors shall be required to undertake general HSE awareness for their project workforce and specific training for those whose work may significantly have impact on the environment. This is to ensure that they are fully aware of the relevant aspects of the ESMP and are able to fulfill their roles and functions. As a minimum, the contractors shall ensure they provide the training in Table 9-1 to their personnel:

**Table 9-1: Contractor's Training Program**

| S/N | Training Program Courses | Courses |
|---|---|---|
| 1 | General Awareness Health, Safety and Environment (HSE). | HSE Induction/Orientation Course (site safety rules, PPE requirements, Emergency Preparedness and Response); Daily tool box talk for workers at the start of each day's job; Refresher HSE Courses as at when required. |
| 2 | Project Specific Occupational Health and Safety (OHS). | Manual Handling Techniques; First Aid Training (for Site First Aiders); Safe Driving Techniques (for drivers). |

The contractor will be required to submit internal HSE training and procedures to PWA for approval before commencement of civil works. Based on the assessment of the institutional capacities of the different agencies that will be involved in the implementation of the ESMP, four broad areas of capacity building have already been identified and recommended for effective implementation of the ESMP. The proposed training program, course content and estimated costs are shown in Table 9.2.

**Table 9-2: Proposed Training Program for ESMP implementation**

| Training Module | Learning objectives | Duration and Date | Proposed trainees | Proposed cost |
|---|---|---|---|---|
| World Bank new policies related to Environmental Social Framework and Standards [ESS1 to ESS10] | Having a full understanding of the new guidelines and common practice of the WB regarding ESF, ESMP, Enironmntal and Scocial Standards monitoring and evaluation | - 2 day theoretical presentation.<br>- One month Before the commencement of the WMSP project construction | PWA/PMU/ESO staff and public relations<br>-One representative from MoLG and EQA<br>-One represintitive from each Municiability<br>-Represintitive from CMWU | 3000 USD |

| | | | | |
|---|---|---|---|---|
| Skills for ESMP | • Communication Skills<br>• Community Participation Tools<br>• Participatory Monitoring and Evaluation (PM&E)<br>• | • 2 day theoretical presentation.<br>• One month Before the commencement of the WMSP project construction | PWA/PMU/ESO staff and public relations<br>-One representative from MoLG and EQA<br>-One represintitive from each Municiability<br>-Represintitive from CMWU | 3000 USD |
| Environmental and Social Management Plan (ESMP) Implementation | • Overview of Environmental<br>• Impact Assessment<br>• Overview of Potential Impacts of<br>• Project<br>• Environmental Pollution & Control<br>• Environmental and Social Management Plan<br>• Basic Environmental<br>• Management<br>• Environmental Performance<br>• Monitoring – Monitoring<br>• Mitigation Measures<br>• Environmental Reporting | • 1 day theoretical presentation.<br>• One month Before the commencement of the WMSP project construction | PWA/PMU/ESO staff and public relations<br>-One representative from MoLG and EQA<br>-One represintitive from each Municiability<br>-Represintitive from CMWU | 1500 USD |
| Construction HSE | • Introduction to Construction HSE<br>• Overview of Health and Safety<br>• Hazards in Construction<br>• Incidents: Causation,<br>• Investigation & Reporting<br>• Excavation Safety<br>• Site Specific OHS<br>• Construction Site Inspection<br>• Personal Protective Equipment | • 1 day theoretical presentation.<br>• One month Before the commencement of the WMSP project construction | PWA/PMU/ESO staff and public relations<br>-One representative from MoLG and EQA<br>-One represintitive from each Municiability<br>-Represintitive from CMWU | 1500 USD |
| GBV/SEA/CEA | • Organize awareness raising sessions and educate the workers and the community in the Project site on issues of GBV/SEA/CEA, legal rights, **GRM** and referral path for victims of GBV/SEA; | • 3 day theoretical presentation.<br>• One month Before the commencement of the WMSP project construction | PWA/PMU/ESO staff and public relations<br>-One representative from MoLG and EQA | 5000 USD |

| | | | | |
|---|---|---|---|---|
| | • | | -One represintitive from each Municiability<br>-Represintitive from CMWU | |
| | | | **Total** | **14,000 USD** |

## 9.3 Cost Estimates for ESMP Implementation

To effectively implement the mitigation and monitoring measures recommended in this ESMP, necessary provision will have to be made. The cost of these measures have been estimated and included in the ESMP and presented in Table 9-3. The cost of mitigation by the Contractor will be included in the contract as part of the implementation cost by the Contractor. The total estimated cost for the ESMP implementation and monitoring for the three years is **US$** 218,713.

**Table 9-3: Estimated Budget for the Implementation of ESMP**

**Table 9-3: Estimated Budget for the Implementation of ESMP**

| **Item** | **Responsibility** | **First Year (US$)** | **Second Year (US$)** | **Third Year (US$)** | **Total US$ (3 years)** |
|---|---|---|---|---|---|
| SEP budget | PWA | 13,350 | 4,330 | 11,150 | 28,830 |
| Staff salaries (ESO, OHS) (1,500 per month)<br>(The ESO will dedicate a time effort of 25% for the implementation of the SEP) | PWA | 18,000 | 18,000 | 18,000 | 54,000 |
| Monitoring the air parameters in operation phase | PWA | 15,000 | 5000 | 5000 | 25,000 |
| Noise Monitoring | PWA | 1,000 | 1,000 | 1,000 | 3,000 |
| Groundwater and Wastewater monitoring program | PWA | 20,000 | 20,000 | 20,000 | 60,000 |
| Capacity building | PWA | 9,000 | 2,500 | 2,500 | 14,000 |
| **Subtotal** | | 84,350 | 53,830 | 60,650 | 184.83 |
| Contingency | 10% of subtotal | 8,435 | 5,383 | 6,065 | 18,483 |
| **Total** | | 92,785 | 59,213 | 66,715 | 203,313 |

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Note: This budget does include the SEP budget which is given in Table 10.2 below.

# 10. Stakeholder Engagement

A Stakeholder Engagement Plan (SEP) is already prepared by PWA for the Project as required by ESS10. This chapter is a summary of the SEP document. For more details on the SEP requirements and activities, please refer to the SEP document.

## 10.1 Stakeholders of the Project

The project has a broad range of stakeholders, who directly or indirectly affected by the project activities. These stakeholders are broadly categorized in to the following two categories in accordance with ESS 10:

### 10.1.1: Project-affected parties (PAPs)

PAPs includes "those likely to be affected by the project because of actual impacts or potential risks to their physical environment, health, security, cultural practices, well-being, or livelihoods. These stakeholders may include individuals or groups, including local communities. They are the individuals or households most likely to observe changes from environmental and social impacts of the project.

Within the scope of this project, there are two main categories for the project-affected parties, namely the local communities residing in the project areas including farmers and the municipalities in the northern governorate of the Gaza Strip.

#### *a) Local communities residing in the project areas*

This category of PAPs includes the people identified based on their geographical location in the vicinity of the project sites (See Figure 3-1), the local communities in the northern municipalities who will benefit from the improved sanitation services, and the farmers who will benefit from the improvement of the treated wastewater quality after the implementation of the recovery scheme The farmers will use the recovered water to irrigate their farms, thus, they are considered as indirect beneficiaries of the current project.

#### *b) Municipalities in the northern governorate*

The northern governorate in the Gaza Strip comprises four municipalities, namely municipality of Beit Lahia, municipality of Jabalia, municipality of Beit Hanoun, and municipality of Um Al Naser. These municipalities are identified as project-affected parties given that they are the key beneficiaries of the project, where the wastewater infrastructure will be improved along with the wastewater treatment, disposal and/or reuse. However, Beit Lahia and Jabalia municipalities will be concerned more as the project components are located within their governance.

### 10.1.2 Other interested parties (OIPs)

Table 10-1 below summarizes the key categories of OIPs and the respective justification for their interest in the project. Along with these external OIPs, there are number of internal interested parties with stakes in the project including PWA staff; supervision consultants; contractors; sub-contractors and their workers.

**Table 10-1: Other interested parties**

| Category | Institution | Interest |
|---|---|---|
| **Ministries and Government agencies** | EQA | Engage with the public and approve and disclose the ESIA Report and Environmental Decision |
| | MoH | Impacts on public health due to the current and the proposed wastewater treatment and disposal practices |
| | MoA | Anticipated impacts of the project on the quality of the treated wastewater and the resulted sludge, including the possible options for reuse |
| | Ministry of Awqaf | The land of old BLWWTP is a Waqf land |
| | MoLG | Land acquisition arrangements between PWA and Ministry of Awqaf. |
| | PENRA and GEDCo | Arrangements regarding the voltage regulation system. |
| **Non-governmental and civil society organizations** | WASH Cluster, Oxfam, and CBOs | Emergency and humanitarian interventions regarding sanitation services in the north governorate;<br>May have in-depth knowledge about the environmental and social characteristics of the project area and the nearby populations, and can play a role in identifying risks, potential impacts, and opportunities to be addressed in the assessment process;<br>Public consultation activities. |
| **Academic institutions** | Universities, and academic experts | Potential concerns regarding environmental and social impacts;<br>Potential educational/outreach opportunities to increase awareness and acceptance of the project. |
| **Press and media** | TV and radio, social media platforms | Inform residents in the project area and the wider public about the Project implementation and planned activities. |

## 10.2 Stakeholders Engagements

A stakeholder engagement mechanism in the form of the Stakeholders Engagement Plan (SEP) is already prepared by PWA for the project and submitted to World Bank together with this ESMP. The ESO of the project is responsible for regularly communicating with the stakeholders through the following mechanisms:

### 10.2.1. Public meetings

At the start of the project, PMU-PWA will organize project launch meetings in each of the four municipalities. From then on, the municipalities will help organize community public meetings throughout the project's lifecycle. Public meetings shall include small size meetings at the targeted municipalities and announcements through the mosques.

### 10.2.2. Mass/social media communication

A social media expert (from PWA's Public Relations Department) will be engaged on the project in order to post information on the dedicated project and PWA Facebook page, and to communicate with the local population via social media campaigns or tools like WhatsApp throughout the project's lifecycle.

### 10.2.3. Communication materials

Written information will be disclosed to the public via a variety of communication materials including brochures, flyers, posters, etc. PWA will also update its website regularly (at least on a quarterly basis) with key project updates and reports on the project's environmental and social performance both in English and Arabic.

### 10.2.4. Grievance redress mechanism

In compliance with the World Bank's ESS10 requirement, the existing GRM at PWA will be adapted for this project. Dedicated communication materials (GRM pamphlets, posters) will be to help local residents familiarize themselves with the grievance redress channels and procedures. A GRM guidebook/manual will also be developed. Internal GRM training will take place for PWA and contractor staff. The PWA's website will include clear information on how feedback, questions, comments, concerns and grievances can be submitted by any stakeholder or Project affected people (PAPs) and will include the possibility to submit grievances electronically. It will also provide information on the way the GRM works, both in terms of process and deadlines.

### 10.2.5. Project tours for media, NGOs, and CBOs

At appropriate points during the construction phase, site visits or demonstration tours will be organized for selected stakeholders from media organizations or NGOs and CBOs. On average, it is planned that two such tours are planned during the construction period.

### 10.2.6. Information Desks

Information Desks in each municipality will provide local residents with information on stakeholder engagement activities, construction updates, contact details of the PWA Grievance Redress Officer etc. PWA in coordination with the affected municipalities will set up these information desks, either in their offices or in other easily accessible places where they can meet and share information about the project with PAPs and other stakeholders. Brochures and fliers on various project related social and environmental issues would be made available at these information desks.

## 10.3 Disclosure of Information

The current PWA website (http://pwa.ps/) is being used to disclose project documents, including those on environmental and social performance in Arabic. PWA will create a webpage for the Project on its existing website. All future project related environmental and social monitoring reports, will be disclosed on this webpage. Project updates (including news on construction activities and relevant environmental and social data) will also be posted on the homepage of PWA's website. The PWA's website will also include: An easy-to-understand guide to the terminology used in the environmental and social reports or documents, all information brochures/fliers, details about the project Grievance Redress Mechanism, and the electronic grievance submission form. PWA will update and maintain the website regularly (at least once on quarterly basis). Further, PWA will create a dedicated project Facebook page and a WhatsApp group for PAPs and other stakeholders. Project documents will also be disclosed on the World Bank website.

## 10.4 Estimated Budget for the SEP

The budget for implementing the stakeholder engagement plan over three years is attached in Table 10.2. The stakeholder engagement activities featured in the budget cover a variety of environmental and social issues, which may be part of other project documents. All of these activities, however, will only be budgeted in this plan that will be covered under Component 4 of the project.

Table 10.2: Estimated budget for three years

| Activities | Quantity | Unit Cost (USD) | Times/3 years | Total Cost (USD) |
|---|---|---|---|---|
| **Stakeholder Engagement Activities** | | | | |
| Project Launch meeting (one for the four the municipalities) | 1 | 800 | 1 | 800 |
| Community meetings | 3 | 800 | 1 | 2,400 |
| Communications materials (posters, pamphlets,… including design) | 3 | 1,500 | 1 | 4,500 |
| Survey | 2 | 3,000 | 1 | 6,000 |
| Short video | 1 | 2,000 | 1 | 2,000 |
| Project tours for media | 1 | 1,200 | 2 | 2,400 |
| Contingency (10%) | | | | 7,210 |
| **Sub-total - Stakeholder Engagement** | | | | 25,310 |
| **Grievance redress activities** | | | | |
| Communications materials (GRM manual including design) | | | | 1,200 |
| Internal GRM training for PWA and contractor staff (Quantity: training hours) | 10 | 200 | 1 | 2,000 |
| Contingency (10%) | | | | 320 |
| **Sub-total – GRM** | | | | 3,520 |
| **Total** | | | | 28,830 |

## References

Abd Rabou, A., 2009. On the occurrence of some carnivores in the Gaza Strip, Palestine (Mammalia: Carnivora). Zoology in the Middle East, 46: 109-112.

EPRI, 2006. Transboundary Air Quality Effects from Urbanization, Gaza, Palestine.

Al Madhoun, W.A., Mokat, R.M., Hein, Z.A. and Isahak, M., 2016. Assessment of Carbon Dioxide Emissions from Traffic and Its Health Impact in Gaza, Palestine. Public Health Research 2016, 6(1): 18-23.

EcoConServ & UG, 2019. Update the Environmental and Social Impact Assessment (ESIA) and Develop the Resettlement Action Plan of The Proposed Recovery and Reuse Scheme Namely the Recovery Scheme Infrastructure, The Irrigation Network and The Related Environment

PCBS, 2018. Preliminary Census Results, Population, Housing, and Establishments (Census, 2017). Ramallah, Palestine.

United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe, (2013). Inventory of Shared Water Resources in Western Asia. Beirut.

# Annex 1: Waste Management Plan

During the construction and operation phase, waste will be produced. Table A1.1 presents the waste management plan that should be considered as a part of this ESMP. The plan consists of the potential source of waste, waste type, waste stream and the appropriate management of the waste.

**Table A1-1: Waste Management Plan**

| N | Potential Source | Waste Type | Waste Stream | Management |
|---|---|---|---|---|
| | **Construction Phase** | | | |
| 1. | Movement of vehicles on unpaved surface and engine exhaust | Emission | COx, SOx, NOx, CO, Dust | • Use water suppression to prevent dust emission<br>• Maintain vehicles and machineries to reduce emission<br>• Maintain low speed to reduce dust and gaseous emission<br>• Allow aerial dispersal over a large area. |
| 2. | Civil works | Non-Hazardous /Industrial | • Spoils<br>• Waste Packaging and Dunnage such as scrap wood, scrap metal, steel, glass, plastic, paper and cardboard, empty metal containers**,** excess concrete, broken equipment, or components | • Reuse spoils as fill materials as much as possible<br>• Kept securely in closed containers on site and to be transferred onward disposal at approved sites. |
| | Workers' camp/offices | | Domestic-type waste: wastepaper and food scraps, metal cans | • Kept securely in closed containers on site and to be transferred onward disposal at approved sites. |
| 3. | Civil Works | Hazardous Waste | • Solid Wastes: sludge from pond #7 and sludge of NGWWTP.<br>• Liquid Waste: spent lubricating oils, hydraulic fluids, brake fluids, battery electrolyte, and dielectric fluids, chemical cleaning agents, paints, primers, thinners, and corrosion control coatings; sealants and adhesives etc<br>• | • Transfer onward disposal at approved site.<br>• Store on site in closed containers with secondary containment and transferred to disposal facilities. |
| | | Waste water | Waste water from equipment washing and concrete production | Discharged to the ground as only very small quantity is envisaged at this stage. |
| 4. | Workers' camp/offices | Waste water | • Food remnant, kitchen wastes.<br>• Food packaging etc | Store on site in closed containers with secondary containment and transferred to disposal facilities. |

| | | | | |
|---|---|---|---|---|
| | | | • Domestic Sewage | |
| | **Operation and Maintenance phase** | | | |
| 1. | Movement of vehicles and operation of deasil generators | Emission | • COx, SOx, NOx, CO, Dust | • Use water suppression to prevent dust emission<br>• Maintain vehicles and machineries to reduce emission<br>• Maintain low speed to reduce dust and gaseous emission<br>• Allow aerial dispersal over a large area. |
| **2** | Maintenance of NGEST components (TPS and NGWWTP, pond #7) | Non-Hazardous /Industrial | • Packaging waste, scrap metals, plastic, paper and cardboard, empty metal containers, broken equipment, or components | • Kept securely in closed containers on site. To be transferred onward disposal at approved sites. |
| | Workers' offices | | Domestic-type waste: wastepaper and food scraps, metal cans | |

# Annex 2: Emergency Preparedness and Response Plan Requirements

## 1. Emergency plan, in case a malfunction in TPS occurred during the project activities

The Emergency Response Plan (ERP) is a document that provides a step-by-step response to, and recovery from incidents related to situations of emergency. The plan that should be applied in case of TPS failure is as follows:

1- The lagoons 1 to 6 should be restructured to be two drying sludge basins and must be well prepared as a first step in the decommissioning works in terms of evacuation of sludge, adjusting of the perms and walls and their connection to the pond 7.
2- In case of power failure, an additional power generator for emergency should be ready to use at any time.
3- Portable pumping machines should be available close to the pond.
4- A set of sanitary transporting vehicles should be standing by at any time.
5- The manpower needed must be employed to carry out the required tasks as soon as the disaster occurs. The ability of wastewater utility staff to respond rapidly in an emergency will help prevent unnecessary complications and protect the people's health and safety. It may also save money by preventing damage to the wastewater systems.

## 2. Emergency plan for Pond #7 Failure

The expected emergency situation that may be encountered under the scope of this study is related to the sudden failure of pond # 7, as it will be used as an overflow pond for the TPS under this project. The following is an illustration of the response plan for the anticipated emergency situation.

## 3. Emergency Response Plan Components

The emergency plan includes but is not limited to the following:
1. Facility description.
2. Definition of the emergency situation
3. Risk assessment
4. Crises management center and assigning emergency personnel
5. Emergency response actions
6. Testing the emergency response plan
7. Emergency budget availability.
8. Incident investigation and documentation

The following is description of the emergency plan components.

**a. Facility Description**
According to the plans, during the transitional phase, the rehabilitated BLWWTP for emergency will be kept to be used as an overflow pond for the TPS. Based on the current capacity of the BLWWTP ponds (1 to 7) and the estimated daily volume of wastewater received 32,000 m3/d, the total volume of wastewater that BLWWTP can retain is estimated with 400,000 $m^3$ which can serve for 13 days of emergency.

According to Eco conserve, 2018, after the decommissioning of the BLWWTP, the existing pond # 7 will be kept to be used as an overflow pond for the North central pump station. The area of this pond is 25,600 $m^2$; its water depth is 6m and has an approximate storage volume of 172,800 $m^3$. The pond will be empty under normal situations. Since the recent daily wastewater inflow to the treatment plant is

32,000 $m^3$/d, the emergency storage capacity of pond #7 is 5.4 days when the central pumping station is completely broken. However, at the design year of the pumping station the flow will increase to 35,000 $m^3$/d and the storage capacity will decrease to 4 days.

**b. Definition of the Emergency Situation**

1. Failure of embankments due to heavy rains event.
2. Failure of embankments due to increase of the wastewater level in the pond during the failure of the TPS or any failure in the pressure line
3. Failure of embankments due to possible air strikes during military clashes that usually occur in the BLWWTP vicinity.

**c. Risk Assessment**

The main expected risks that will be created due to the failure during the transitional phase and of pond #7 are:

1. Loss of lives of some of the workers in the TPS.
2. Loss of lives of farmers and residents in the vicinity especially at the western side of the pond.
3. Destruction of the crops and killing livestock in the farms west of the pond.
4. Soil pollution and possible groundwater pollution since the full storage of the pond is 145000 $m^3$ which is a considerable amount.
5. Public health deterioration in the vicinity of the pond.

**d. Crisis Management Center and Personnel**

A crises management center (CMC) should be prepared and equipped with all the necessary communication means to be used for the management of the emergency situation. It is proposed to establish this center in the building of the TPS. A stand by generator should be available in the CMC and wireless communication devices since during emergency the CMC will not rely on the existing systems in the TPS.

The CMC should contain the following documents:

- Hard copy of the ERP.
- Hard copy of "Emergency Call Lists"
- Hard copy of "Building and Site Maps" (effluent pond # 7 and the detailed pumping station plans including power control plans)
- Hard copy of "Resource Lists" (equipment available and there location, contractors, suppliers,..)

The proposed Crisis management unit personnel are as follows:

1. Crisis Manager.
2. Communication officer.
3. The TPS manager.
4. The TPS operator.

The crises manger should be a well experienced person who is involved in the water and wastewater sector and should be selected by PWA and CMWU. The communications officer can be selected from the public relations officers already working in PWA or CMWU. The other members of the crises

management unit are already working in the wastewater system and occupying the mentioned titles. Following is a sample of the emergency call list for Pond#7 during the crises:

- Civil defense
- Ambulance station
- Ministry of health
- Environmental Quality Authority
- Police department
- Mayors of North Municipalities
- Ministry of local Government
- Neighbors of the ponds
- Media (TV and Radio stations)
- Pre-qualified contractors.

**e. Failure Emergency Response Procedure**

The following is a brief description of the emergency procedures to be followed:

1. The PWA manager activates the crises management center and calls the CMU members to the center. A situation assessment is to be conducted to see the crises magnitude and to figure out the needed assistant and the parties to call to the site.
2. The communication officer should communicate with all the related parties especially the population in the vicinity to alert them so that they can help in avoiding any risk that my reach them.
3. The first priority should be given to the evacuation of any injured or trapped population.
4. After saving the population or any trapped workers, the priority should be to contain the spill and isolate the spill site in an effort to avoid any human contact that may result in health hazards.
5. A public relation campaign should start immediately to calm the population who may lose their properties or even lose family members or get injured. This campaign should be directed by the CMU and implemented by the public communication officer with the help of community leaders and selected government officials.
6. The next step should be to eliminate the cause of the failure of the pond's embankment. If the failure was due to heavy rain, the rebuild work will start when the weather conditions gets better. If the failure is due to military actions, a coordination with the international organizations to help in reaching the site and manage the crises. If the failure is due to a technical problem in the TPS, all required technical staff and resources should be mobilized to get the station working again.
7. Spill clean should then start by evacuating the wastewater and the sludge using vacuum tankers, portable pumps, trucks and front loaders. The evacuated wastewater can be transferred by vacuum tankers and emptied at the inlet works of the NGWWTP.
8. Rebuilding the embankment by supplying the required soil and the construction equipment. Pre-qualified contractors trained for emergency conditions should be employed to repair the embankments.

**f. Testing the Emergency Response Plan (drill)**

Regular testing of the ERP is very important. The purpose of conducting the exercise (drills) is to ensure that the ERP is functional and to train the crises management unit and the employees and all related bodies.

The main goals and objectives of the exercises are:

- To reveal weaknesses in the plan
- To identify shortages in material and personnel
- To improve coordination between various people and organizations
- To gain confidence in the organization's leadership and stability
- To improve knowledge, skills, abilities, and confidence of employees
- To ensure that personnel understand roles and responsibilities
- To improve the relationship between the organization and the local government
- To enhance overall emergency response capabilities

It is recommended to make at least one drill per year to guarantee the preparedness of all the involved persons and agencies and to assure the reliability of the ERP.

**g. Emergency Budget Availability**

An emergency budget should be allocated and kept in the account of the PWA so that the crises manager can respond rapidly to the crises financial needs. The budget should be estimated based on the expected resources that will be needed during the crises such as fuel, emergency contractors, first aid and shelters to the population, etc… Moreover, the support of relief agencies may be used but needs preset agreements and memorandums of understanding (MOUs) to grantee the commitment of these agencies during the crisis.

**h. Incident Documentation and Investigation**

The emergency situation should be documented by the CMU. All reports, photos, video tapes, and communications during the crises should be properly filed and kept. An investigation should immediately start after the recovery from the crises to draw conclusions and to minimize future similar incidents. The investigation team should be formed by PWA in coordination with the related governmental bodies such as the Ministry of local government, Civil defense, Ministry of public works and ministry of Justice.

# Annex 3: Electricity Resources and Management

NGEST project components (TPS and NGWWTP) are operated by two sources of electricity: Grid system and diesel generators. In NGWWTP, the monthly consumption of electricity from the grid system for November/2019 was 237,566 KWH (7,918 KWH per day) while the consumption from deasil generators was 4761 KWH which forms 2% of the consumption from the grid system. In the TPS, the pumps electrical consumption in December/2018 was 161,360 KWH (5,205 KWH per day).

PWA put a strategy for management of the electricity in NGEST project using the following procedures

1. PWA will supply the NGWWTP of electricity by PV panels. There are two separated projects:
    a. The first project will be under AFD & GCF fund which comprises the two sites located in the NGWWTP and recovery wells. Both sites WWTP and RRS will produce 5,127 kWp.
    b. The second project will be funded by Irish. The PV will be located in the eastern side of the site between the WWTP edge and the Israeli border with an area of 35 dunums and produces 3500 kWp
2. The biogas balloon which will repaired through the current project, in addition to the electrical/gas generators will be another sustainable electricity to NGEST. It is expected that the generated gas will feed about 50% of the NGWWTP electrical consumption.
3. By applying the tow above mentioned strategies, the electrical consumption form the grid system will be reduced.

# Annex 4: Occupational Health and Safety (OHS) Plan Requirements

## 1.1 INTRODUCTION

Every project poses its HSE risks. This plan was necessitated to meet up with OHS standards and to achieve the objectives set for the proposed project. The project team shall undertake to ensure high performance standards and conformity with contract requirements by managing the works in a systematic and thorough manner.

## 1.2 HSE Objectives

The Objectives for this plan are to:

- Adopt a positive Health & Safety Culture.
- Adopt the principles of prevention to avoid risk.
- Complete the project without incident (Zero fatalities, Zero Lost Time Injury (LTI) or occupational illness).

## 1.3 Scope of Work

The Project Occupational Health and Safety (OHS) plan covers the scope of works defined in the contract. This includes Preconstruction, Construction, Operation & Maintenance and Decommissioning phases.

## 1.4 Policy Statement

In addition to the existing HSE policy, other policies shall be developed which includes:

- Substance Abuse Policy – Prohibiting the consumption or possession of narcotics, drugs, alcohol and other banned substances
- Emergency Response Policy – Stating commitment to ensure adequate resources and arrangement are in place in the case an emergency.
- Community Affairs Policy – Stating commitment to foster healthy relationships with communities through observance of the highest standard of conduct.
- Road Safety Policy–Stating commitment to complying with Road Traffic regulations and continuously improving its road safety performance by implementing a Road Safety Management Plan (RSMP)

## 1.5 KEY RESPONSIBILITIES

Involvement of all in implementing, maintaining and continually improving OHS processes is the key to successful completion and achievement of quality objectives set by the management. All project personnel shall therefore be required to be familiar with the content of this OHS plan and shall participate in implementing, maintaining and improving the management system.

It is the responsibility of the project manager and all key personnel to ensure that the requirements for quality are fulfilled for works under their responsibility.

All new staff and staff who are given new responsibilities are to be inducted into the requirements set out in this plan in general and into their function and responsibilities in particular.

### 1.5.1 ESO Responsibilities in OHS

- Set good example in HSE issues.
- Ensure the availability of resources essential to establish, implement, maintain and improve the OHS Management System.
- Define, document and communicate roles, allocate responsibilities and accountabilities, delegating authorities, to facilitate
- Effective OHS management.
- Ensure that all of the activities undertaken in the Project conform to Nigerian legislation, client requirements or international
- Standards when applicable.

- Review objectives achievements throughout the year.

### 1.5.2 CEO Responsibilities in OHS

- Enforcing all phases of the established HSE plan.
- Set good example in HSE issues.
- Preparing Job Hazard Analysis when required.
- Ensuring the safety of all workers associated with the site.
- Conducting HSE inspections.
- Ensuring workers are competent for their allocated tasks
- Attending and participating in HSE meetings.
- Participating in accident investigations.

### 1.5.3 HSE Manager/Supervisor (from Contractor Team) Responsibilities

- Prepare relevant OHS documentation and procedures.
- Monitor the efficient implementation of OHS requirements.
- Participate and organize the OHS risk assessments.
- Advise management of compliance and of conditions requiring attention.
- Conduct regular HSE inspections.
- Make thorough analysis of statistical data and inspections; delineates problem areas; and makes recommendation for solutions.
- Take part in the review of all OHS incidents and assist in investigating incident.
- Monitor the efficient implementation of the Project's OHS requirements.
- Organize the Project's OHS risk assessment exercises.
- Check on the use of all types of personal protective equipment specifies the use of appropriate PPE for the various work activities. Evaluates their effectiveness and suggests improvements where indicated.
- Check on the use of all types of personal protective equipment specifies the use of appropriate PPE for the various work activities. Evaluates their effectiveness and suggests improvements.
- Conduct independent inspections to observe conformance with established OHS Plan and determines the effectiveness of individual elements of the plan (pre-task briefing, weekly toolbox talk, etc)
- Establish contact with Subcontractors with the objective of maintaining good relations and coordination of accident prevention activities and compliance with the established OHS plan.
- Correct unsafe acts and unsafe conditions.
- Deliver HSE induction/orientation course to all employees, including subcontractors.
- Deliver HSE awareness course and toolbox talk.
- Advise employees on OHS matters.

### 1.5.4 All employees Responsibilities

- Take all reasonable and practical steps to care for their own health and safety and avoid affecting the health and safety of coworkers and the general public.
- Follow all instructions and use the equipment properly
- Not interfere with any safety arrangements.
- Report any circumstances which may not comply with the project's OHS management system.

## 1.6 Competency

All personnel required to operate or work with any equipment or machine must be competent, be tested for each equipment that he/she shall be operating. All personnel who as part of their profession require licensing or certification must obtain the necessary certification before he/she shall be allowed to work on the site.

### 1.7 Fitness

All personnel working on site shall be required to be certified medically fit to do so by an approved medical facility or Medical Doctor (pre-employment medical examination)

### 1.8 HSE Training

#### 1.8.1 Induction/Orientation

Every new or rehired employee and Subcontractors employees must undergo mandatory OHS orientation / induction. The purpose of the Induction is to educate workers and make them aware of the major potential hazards he or she shall come into contact with while working on the site; also, it is one more opportunity to stress the importance of HSE being the first priority in the operations.
The content of the HSE orientation / induction shall cover the following subjects:

- Site safety rules.
- Personnel protective equipment requirements (PPE).
- Environmental sensitivity and protection.
- Preparation and planning of the job (Daily Pre-task talk).
- Emergency plan and muster points.

#### 1.8.2 Project Specific HSE Training

In addition to the HSE orientation /induction, there shall be specific site HSE trainings which shall cover the following topics:

- Manual handling.
- Electrical Safety
- Emergency Prevention, Preparedness and Response
- Work at height training
- First Aid training ( for site First Aiders)
- Lifting and Rigging
- Safe Driving techniques (for drivers)

### 1.9 Hazard identification & HSE risk assessment

#### 1.9.1 Project HSE Risk Assessment

The project HSE risk assessment shall be developed and recorded. The Project's HSE risk assessment shall be conducted by a team consisting of HSE Manager/ Supervisor and technical managers/supervisors. It must be approved by the Project manager.

#### 1.9.2 Fire Risk Assessment

A fire risk assessment shall be developed and recorded. A fire safety plan shall be in place in the site.

#### 1.9.3 Job Hazard Analysis

Job hazard analysis is required when the hazards and risks associated with a specific task is to be identified so as to implement control measures. The HSE department together with the technical managers/supervisors shall develop a job hazard analysis when applicable.

### 1.10 EMERGENCY PREPAREDNESS AND RESPONSE

Emergency procedures and evacuation plan shall be developed by the HSE Department and displayed on the notice board. These procedures shall be communicated to all staff. Also each section/department shall have at least a trained first aider at all times.

### 1.11 HSE IMPLEMENTATION AND PERFORMANCE MONITORING

#### 1.11.1 HSE Meetings

HSE management meetings shall be held once a month. The meeting is to help identify safety problems, develop solutions, review incident reports, provide training and evaluate the effectiveness of our safety program. Some of the meetings shall be:

- Project/Site Management HSE Meeting for management and supervision (Monthly).
- Tool box talk meetings for all workforce (Weekly).
- Pre-task briefing for all workforces (Daily).
- Special situation meeting (As required).

### 1.11.2 HSE Reporting

All incidents and illnesses must be reported to site supervisor after which investigation shall commence and recorded so that appropriate corrective actions shall be implemented to prevent any re-occurrence and report findings shall be forwarded to management for review. Reporting requirements shall include notification of incident, investigation report, and monthly report. Notification of Incident form shall be developed which shall be filled and submitted to HSE department for investigation.

### 1.11.3 HSE Inspection and Audits

For continual improvement of HSE management system, HSE inspection and audit shall be conducted. An inspection checklist shall be developed. This is to ensure that the HSE management system is being adhered to. The inspection shall be conducted by the HSE department together with site management.

### 1.11.4 Corrective and Preventive Actions and Non Conformities

During the cause of inspections, concerns raised shall be addressed and closed out. It is expected that in a period of two weeks, a close out inspection shall take place to verify that the corrective actions have been closed.

## 1.12 Project HSE Rules

The project HSE rules shall be developed and supervision shall develop specific rules and procedures when necessary. The following site rules shall be implemented at all times. The Site Manager shall draw these rules to the attention of their own workmen or staff. All sub-contractors must ensure that these rules are drawn to the attention of their workmen and staff.

The Principal Contractor may implement additional site rules during the contract program. Any such additional rules shall be notified to all personnel engaged on the project prior to their implementation. The HSE rules shall include but not limited to:

1. Personal Protective Equipment must be worn at all times.
2. All instructions issued by the Site Manager regarding the storage, handling or cleaning of materials, plant and equipment must be followed.
3. All vehicles must be parked in the designated areas.
4. Any workman suffering from a medical condition that might affect his work and/or that could require specific Medical treatment must inform the supervisor before commencing work.
5. All site tools shall either be battery operated or 110 volts.
6. No one shall be permitted on site if it is believed that they are under the influence of alcohol or drugs.
7. Vehicles must not reverse without a banksman in attendance.
8. All visitors to site must undergo a site-specific induction and operative Identity badges must be worn at all times.
9. All excavations must be secured.
10. Smoking and eating shall only be permitted in the designated area. This area shall be identified during induction.
11. No hot works operations are permitted without a hot work permit in place.

12. There shall be no radios or other music playing devices on site.
13. Good housekeeping practices to be adopted.
14. Compliance with all Ethical Power Permit to Work systems
15. The site keyed access procedure must be strictly adhered to.
16. All Contractors must comply with Site Health & Safety Guidelines / Site Safety Method Statement
17. No untrained worker shall be permitted to operate heavy machineries.

### 1.13 SAFE WORK PRACTICES

Implementing safe work practices is one of the keys to achieving our HSE objectives and some of these safe work practices include:

### 1.13.1 Personal Protective Equipment (PPE)

The basic PPE required for the project shall be Safety Glasses, Safety Boots, Hand Gloves, Hard Hat and Coverall. Any other PPE shall be used as applicable. Management is responsible for the provision of PPE and usage shall be enforced at all time.

PPE shall be provided in circumstances where exposure to hazards cannot be avoided by other means or to supplement existing control measures identified by a risk assessment. An assessment shall be made to ensure that the PPE is suitable for purpose and is appropriate to the risk involved.

Information, instruction & training shall be given to all employees on safe use, maintenance and storage of PPE. Employees shall, in accordance with instructions given, make full use of all PPE provided and maintain it in a serviceable condition and report its loss or defect immediately to the maintenance department where it shall be replaced. PPE shall be replaced when it is no longer serviceable and returned on a new for old basis. Employees shall sign to state that they have received PPE when issued.

### 1.14 WELFARE FACILITIES

The provision of welfare facilities on the site shall be communicated to all operatives at site induction. A cleaning regime shall be implemented and maintained for the duration of the construction phase to ensure the site welfare facilities remain in a clean and tidy condition. If mains drinking water becomes unavailable during the construction phase bottled water shall be brought to site for all operatives for the necessary period.

### 1.15 SIGNAGE

Adequate provision for warning and directional signs shall be made.

### 1.16 PROJECT HSE PROCEDURES

OHS procedures shall be developed. Project activities shall generally be controlled in accordance with OHS Procedures. These procedures shall include:

1. Lifting and Rigging Procedure
2. HSE Reporting Procedure
3. Working at Height Procedure.
4. Emergency Procedure.