SFG3575 V3

Republic of Iraq – Baghdad Mayoralty

Baghdad Water Supply and Sewerage Improvement Project (P162094)

Environmental and Social Management Plan (ESMP)

For

Rehabilitation of

Twenty Two Sewerage Pumping Stations in Rusafa

World Bank Group

Generic ESMP Report – August, 2017

TABLE OF CONTENTS

List of Tables

List of Figures

List of Acronyms and Abbreviations

°C	Degree Celsius
ACGIH	American Conference of Governmental Industrial Hygienists
Ag	Silver
Al	Aluminum
APHA	American Public Health Association
ARAP	Abbreviated Resettlement Action Plan
As	Arsenic
AWWA	American Water Works Association
B	Boron
Ba	Barium
BCM	Billion Cubic Meter
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BOQs	Bill of Quantities
Br_2	Bromine
BSA	Baghdad Sewerage Authority
BWA	Baghdad Water Authority
BWSIP	Baghdad Water Supply and Sewerage Improvement Project
CaC	Calcium Carbide
Cd	Cadmium
CEMP	Construction Environmental Management Plan
CH4	Methane
Cl	Chloride
Cl2	Free Chlorine
CN	Cyanide
CO	Carbon monoxide
Co	Cobalt
CO2	Carbon dioxide
COD	Chemical Oxygen Demand
CPS	Country Partnership Strategy
Cr	Chromium
Cu	Cupper
dB(A)	A-weighted decibels
DDT	Dichlorophyneltrichloroethane
Dept.	Department
DO	Dissolve Oxygen
E. coli	Escherichia coli
EA	Environmental Assessment
EH	Environmental Health
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMM	Environmental and Social Monitoring Matrices
ESMP	Environmental and Social Management Plan
ESO	Environmental and Social Officer
F	Fluoride
Fe	Iron
GDP	Gross Domestic Product
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
H2S	Hydrogen Sulfide
ha	Hectare
Hg	Mercury
hr	Hour
HSE-MP	Health, Safety and Environment Management Plan
Hz	Hertz
IBA	Important Birds Area
ID	Iraqi Dinar
IDP	Internally Displaced People
IFC	International Funding Corporation
M&E	Monitoring and Evaluation
MCM	Million Cubic Meter
MIGA	Multilateral Investment Guarantee Agency
min	Minute
MIS	Management Information System
mm	Millimeter
Mn	Manganese
MOB	Mayoralty of Baghdad
MOE	Ministry of Environment
MTR	mid-term review
MWth	Megawatt thermal
N/A	Not Applicable
NH4	Ammonium
Ni	Nickel
NO_2	Nitrogen dioxide
NO_3	Nitrate
NO_x	Nitrogen Oxides
NRW	Non-Revenue Water
O_2	Oxygen
OH	Occupational Health
OHS	Occupational Health and Safety
OP/BP	Operational Procedure/ Bank Policy
PAHs	Polycyclic Aromatic Hydrocarbons
PAPs	Project Affected Persons
Pb	Lead
PCBs	Polychlorinated biphenyls
PCN	Project Concept Note
PDO	Project Development Objective
PH	Public Health
pH	Used to express acidity
PIC	Project Implementation Consultant
PID	Project Information Document
PM	Particulate Matter (sizes: 2.5 micrometer, 10 micrometer)
PMT	Project Management Team
PMU	Project Management Unit
PO_4	Phosphate
PPE	Personal Protective Equipment
PS	Pumping Station
PS3	Pumping Station 3
Q/H	Flow per head
RAP	Resettlement Action Plan
RES	UN Resolution
RPF	Resettlement Policy Framework
S	Second
S^{2-}	Sulfide
SCADA	Supervisory Control And Data Acquisition
Se	Selenium
Sec	Second
SO_2	Sulfur dioxide
SO_4	Sulfate
SOP	Standard Operating Procedure
SPS	Sewerage Pumping Station
SS	Suspended solids
TDS	Total Dissolved Solids
TLVs	Threshold Limit Values
TOR	Terms of Reference
TSS	Total Suspended Solids
UN	United Nations
UNECE	United Nations Economic Commission for Europe
US$	United States Dollars
USD	United States Dollar
USGS	United States Geological Survey

IQD	Iraqi dinar
ISIS	Islamic State in Iraq and Syria
JICA	Japan International Cooperation Agency
Km	Kilometer
KPI	Key Performance Indicator
kW	Kilowatt
L	Liter
LOAEL	Lowest Observed Adverse Effect Level
LT	Low Tension
M	Meter
V	Volt
VOCs	Volatile Organic Compounds
WB	World Bank
WBG	World Bank Group
WEF	Water Environment Federation
WHO	World Health Organization
WWTP	Waste Water Treatment Plant
Zn	Zinc

EXECUTIVE SUMMARY

0.1. Preamble

In 2013, the population of the Republic of Iraq was estimated at around 33 million, of which 66 percent lived in urban areas. Currently the country has an estimated 3.3 million internally displaced people (IDPs). About 27 percent of the total urban population in Iraq resides in Baghdad, which is by far the largest city in the country with an estimated population of 6 million, not including an estimated 289,000 of IDPs. A 2012 household survey indicates that Iraq's national poverty stood at 19 percent. The poverty rate in 2012 in Baghdad was at 12 percent; this figure is likely to have risen significantly due to the recent conflict. Unemployment is high and labor force participation remains low, especially for women and youth. Official figures from 2011 have labor force participation and youth at 11 percent although actual levels, particularly among youth, were likely much higher.

Poor public service delivery, reflected especially in significant water and electricity shortages, are binding constraints on the population's quality of life and private sector development. Safe drinking water and basic sanitation is of crucial importance to the preservation of human health, especially among children. Baghdad is one of the governorates most impacted by outbreaks of waterborne diseases. About 14 percent of diarrhea cases registered in 2011 occurred in Baghdad, which also topped the governorates in terms of number of deaths from diarrhea. Similarly, the incidents of typhoid and other waterborne diseases are higher in Baghdad compared to national averages. Contaminated water supplies and improper disposal of sewage force families to spend a significant fraction of their income to medical treatment and to purchase bottled water. This has implications for gender inequality in addition to the adverse effects on children's health, by increasing the burden of care on mothers, who are the primary caregivers of children.

The city of Baghdad and its suburbs cover 950 km^2 and are administered by the Mayoralty of Baghdad (MOB). The city is divided into 14 municipalities. The water and wastewater services are centrally administered by the Baghdad Water Authority (BWA) and Baghdad Sewerage Authority (BSA), respectively, which are responsible for all infrastructure assets. As far as water supply and sewerage are concerned, the municipalities' role is limited to installing house connections and to maintaining neighborhood networks (pipes under 200 mm diameter). The planning and implementation of investment projects in the municipalities is the responsibility of the MOB.

The sewer system consists of a network which covers about 92 percent of the city area. Baghdad has two main wastewater treatment plants, one in Rusafa called "Rustomiya", and another one in Karkh. The efficiency with which these wastewater treatment plants and the (old) pumping stations are operated has dropped significantly (by an estimated 30 to 50 percent). The wastewater treatment plants, therefore, are not operating effectively and are under-utilized. The bulk of the city's sewage is discharged untreated and constitutes a major source of pollution to surface water and groundwater and a risk to public health.

The Baghdad Water Supply and Sewerage Improvement Project (BWSIP) will support improvements in high-priority water and wastewater services that were identified in the recent Master Plan for Baghdad to help the MoB to improve its performance in water and wastewater service delivery. The

proposed project combines institutional, technical and operational steps to be undertaken by the BWA and BSA, while ensuring that they improve their financial situations.

The Project Development Objective (PDO) is to improve the quality of drinking water supply and wastewater services in Baghdad BWSIP consists of the following components:

Component 1: Institutional strengthening for integrated urban water management and utility management, and creating an enabling environment for private sector engagement (US$11.48 million): this will include – *inter alia* – support in decision making, institutional knowledge and preparedness concerning water security, management, and resilience, and sustainability.

Component 2: Investment in drinking water supply and wastewater infrastructure (US$188 million): this will include the following activities:

a. Construction of the "R2" reservoir (US$71 million)
b. Rehabilitation of pumping stations including main sewerage network (US$68 million)
c. Non-revenue water reduction (US$39 million)
d. Engineering, construction supervision, and quality control (US$10 million)

Component 3: Project implementation, studies and M&E component (US$10 million): this will include financing a project implementation consultant (engineering and construction supervision and quality control). In addition to financing operational costs of the subprojects.

The twenty two sewerage pumping stations in Rusafa are more than 30 years old. Big quantities of untreated wastewater were discharged to Tigris River because of the aging of the mechanical and electrical components of the pumping stations, being beyond design capacity to receive from increasing populations. And because of the bad operations and maintenance performed at these pumping stations.

Unfortunately, the works of installation of pumping stations and their electrical and mechanical requirements were not completed because if the Gulf War. Consequently, deteriorating sewer pipes are contaminating the potable water network and underground water, adding further impact to the health and environmental problems.

The proposed project falls under the Bank's Environmental Category "B" due to potential adverse environmental and social impacts that are site-specific and reversible and thus easily remediable by applying appropriate mitigation measures. These potential adverse environmental impacts may include the following: air quality and noise; construction debris, including old piping and sewerage infrastructure requiring proper disposal; employee health and safety issues; vehicular and pedestrian traffic disruptions; disruptions in water supply; and risk of water contamination in the existing system. According to the provisions of "OP/BP 4.01: Environmental Assessment", the Project is categorized "B" and requires the preparation of Environmental and Social Management Plan (ESMP). This is a generic ESMP for all 22 pumping stations due to big similarities among all 22 subprojects.

The purpose of this Environmental and Social Management Plan is to:

1. Describe the Project setting;

2. Briefly describe the components of the rehabilitation project, including timeline for implementation;
3. Highlight areas where the new interventions would have adverse impacts on environmental and social aspects;
4. Briefly discuss consequences of the "No Project" alternative;
5. Provide an overview of environmental and social issues brought about by the Project during, construction and operation phases;
6. Propose mitigation measures during construction and operation phases of the project;
7. Develop an Environmental & Social Management Plan (ESMP) and a Monitoring Plan for the Project's construction and operation phases.

0.2. Project Description

The Project of rehabilitating 22 sewerage pumping stations (subprojects) is part of BWSIP and is located in Baghdad, the capital city of Iraq, in Rusafa side of Tigris River.

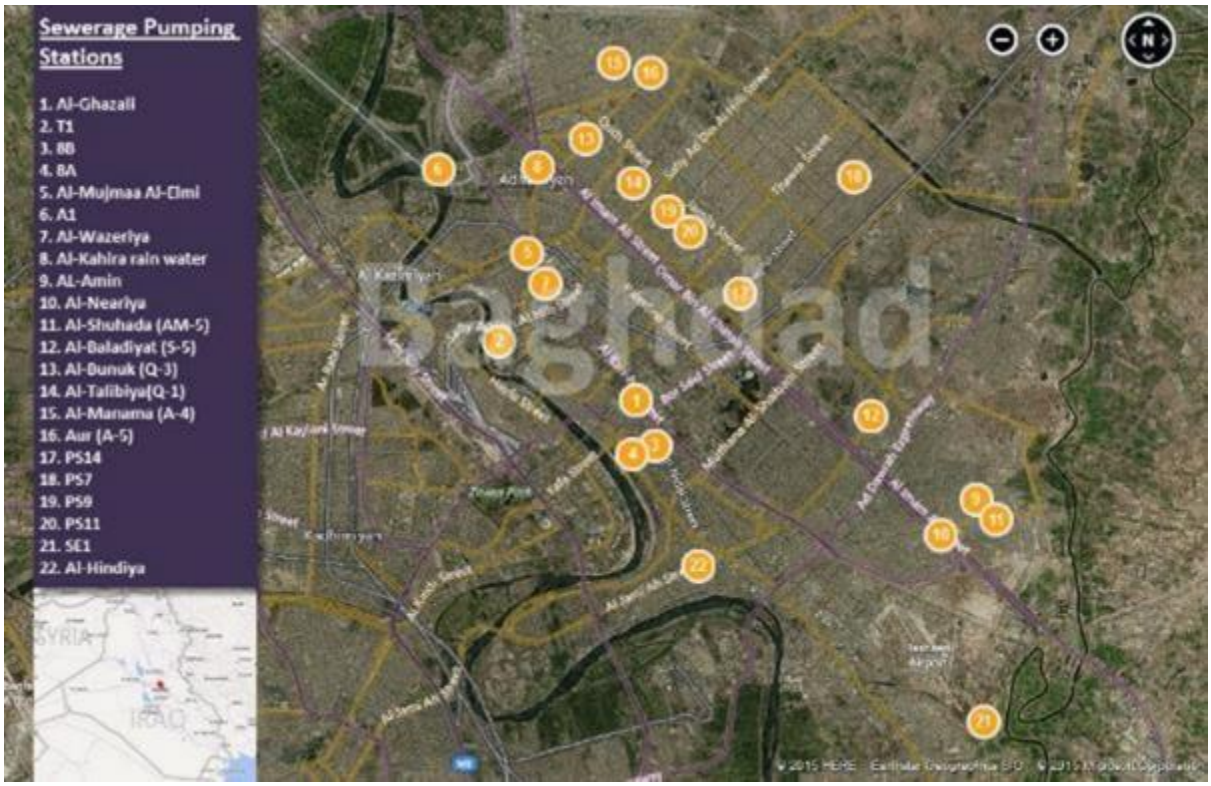

Figure A: Twenty two sewerage pumping stations – Baghdad

The subprojects will include interventions for replacement of old and out of order mechanical and electrical parts from 22 sewerage pumping stations in Rusafa side of Baghdad. The rehabilitation interventions are expected to span 27 months. Rehabilitation work will include:

- Decommissioning of all old mechanical and electrical parts, including needed civil works;
- Installing new vertical shaft pumps and their associated motors;
- Installing the required quantities of valves, penstocks, motorized bar screens, cranes, ventilation systems, fire-fighting systems, biological odor control systems, and other secondary part replacements, like handrails, covers, meshes, frames, steel ladders;

- All electrical panels, switches, and wiring

0.3. Expected Activities during Rehabilitation Phase

Activities during rehabilitation include utilizing available spaces inside the stations for daily work preparation. No additional areas will be used outside perimeters of the 22 stations. Working equipment will be placed inside the stations while spare parts will be transported from warehouses to the site. Needed workforce will be acquired locally (to the extent possible). This will include both skilled and non-skilled (50 – 75 per station). Additionally, workers will not reside in the site, but they will enter the working site on daily basis according to work load at a specific day. The amount of work load is decided by the implementation contract and will be supervised by a supervision contract. Civil works will include some limited excavations for laying pipes and wiring, as well as dismantling valuable materials, all in close coordination with MOB. The following table shows approximate areas of available yards within the 22 pumping stations that could be utilized as working areas.

Table A: Estimated available areas for work preparations (m2)

Al-Ghazali	**T1**	**8B**	**8A**	**Al-Mujmaa Al-Elmi**	**A1**	**Al-Wazeriya**	**Al-Kahira rain water**	**AL-Amin (AM-4)**	**Al-Neariya**	**Al-Shuhada (AM-5)**
150	300	150	100	150	200	200	200	100	100	150
Al-Baladiyat (S-5)	**Al-Bunuk (Q-3)**	**Al-Talibiya(Q-1)**	**Al-Manama (A-4)**	**Aur (A-5)**	**PS14**	**PS7**	**PS9**	**PS11**	**SE1**	**Al-Hindiya**
170	200	150	200	150	150	150	150	150	700	100

Work will be assigned to several contractors due to the fact that locations are scattered and rehabilitation needs to proceed in parallel. Distances between adjacent pumping stations can be estimated in the range of 0.5 – 6 km.

Only partial shutdown for any of the 22 pumping stations will be pursuit to complete rehabilitation works. Work will proceed sequentially until all parts are replaced. However, contractors should have their overflow and emergency bypass plans ready and approved before they commence work.

0.4. Environmental and Social Settings

The climate of Baghdad is arid, subtropical, and continental. The mean maximum temperature in July and August is about 43°C, which could reach up to 49°C in hot seasons. Dust storms are common in summer and the winter is chilly. The mean annual rainfall ranges from about 120 mm in the south to about 160 mm in the northeast. Prevailing wind direction is Northwestern. And an exceptional

flood is expected every 30 years. Floods in general take many days to drain from streets. Baghdad city is severely impacted by air pollutants, mostly emitted by mobile sources, industrial activities, and private generators, as well as poor quality of fuel. Dust is a persistent problem in spring and summer months. Measurements show that noise level could reach 92 dB (A) three meters from the traffic lane at all hospitals during daily hours.

Baghdad is part of a geological formation called the Mesopotamian Plain Region. The land is considered highly flat with no clear natural drainage pattern. This type of topography brings the area at risk of floods, especially in rainy seasons. However, at the confluence of the two rivers in the south, land is even below the level of the river bed. Baghdad has a Calcaric Fluvisols soil type with about 20% of lime. Organic matter content is low and the carbon nitrogen ration is narrow

Tigris is the only water source for drinking water in Baghdad. It is fed by a number of tributaries. Udhaim is the immediate one before Tigris enters Baghdad. The next, and last, downstream tributary to the south of Baghdad, is the Diyala River with a mean daily flow of 182 m^3/s at the confluence with Tigris. Water quality of the Tigris is poor due to the return flows from irrigation projects. Tigris receives more damage by discharges of sewage at a rate of 500,000 m^3/day or more. Dams and groundwater are also another source of water in Baghdad. Water tables could be found at shallow levels, which are contained in relatively permeable layers, thus, increasing possibility of cross-contamination by activities above the ground surface.

The Project area is heavily urbanized, leaving behind very sparse natural habitats. Some wild flora species could still be found, like deciduous flowering trees and shrub. There is an Important Birds Area (IBA) on the Tigris River, which comprises one stop of international flyways between Africa and Eurasia. The area also includes a wide range of invertebrates and vertebrates. However, the Project area does not include a significant wildlife.

Baghdad's population is estimated at 7,216,040 in 2011. And has a growth rate of 2.3% (in 2010 – 2015). The majority of population lies in the age category 64 – 50. Gross Domestic Product (GDP) per capita in Baghdad was 3,630 USD in 2008.

Access to improved water supply and sanitation is relatively high, but the quality of service is often low. In 2012, 94% of the population had access to safe sanitation. While, 87% of them had access to piped water supply. Conflicts in Iraq have further damaged sanitation infrastructure, leading to more decline in service quality.

As for land use, Baghdad governorate, in general, has a fragmented and inefficient land use, with very limited areas for future expansion.

0.5. Legal and procedural framework

A full account was given for all local and international legal, regulatory, and technical guiding frameworks pertinent to the Project in the Main report. Additionally, a special focus was made on the applicable WB's environmental and social safeguards. And how both Iraqi's and WB's environmental assessment requirements can match and contradict. However, the following is a quick overview of the legal framework:

Iraqi's framework:

- Public Health Law no. 89 – 1981;
- Protection and Improvement of the Environment Law no. 27 – 2009;
- Establishing the Ministry of Environment Law No. 37 – 2008;
- Protection of Wild Animals and Birds Law no. 21 – 1997;
- Forest Law no. 30 – 2009;
- Noise Prevention Law no. 21 – 1966;
- Labor Law no. 71 – 1987;
- Decision Concerning the Cutting of Trees no. 1 – 1991;
- Preservation of Water Resources Regulation no. 2 – 2001;
- Protection of Ambient Air Quality Regulation no. 4 – 2012;
- The new determinants for the Prevention of Pollution of Rivers and Public Water – Regulation, no. 25 – 1967;
- National Air Emissions Standards, instructions no. 3 – 2012;
- Noise – Instructions no. 2 – 1993;
- Vibration – Instructions no. 4 – 1993;
- Safe storage and handling of chemicals – Instructions no. 4 – 1989;
- Environmental Criteria for Carrying out Projects and Monitoring Appropriateness of Implementation Instructions no. 3 – 2011;

World Bank's framework:

Environmental Assessment OP/BP 4.01

According to OP/BP 4.01, the Project is categorized “B” due to potential adverse environmental and social impacts that are site-specific and reversible and thus easily remediable by applying appropriate mitigation measures. OP/BP 4.01 requires the preparation of Environmental and Social Impact Assessment (ESIA) inclusive of an Environmental and Social Management Plan (ESMP).

Involuntary Resettlement OP/BP 4.12

The subprojects of rehabilitating 22 SPSs in Rusafa will not involve land acquisition, loss of land, loss of livelihood and/or socio-economic displacement/obstruction. Rehabilitation will be applied on existing locations and structures. However, Involuntary Resettlement OP/BP 4.12 is triggered as a precautionary measure, thus a Resettlement Policy Framework (RPF) has been prepared for the entirety of BWSIP. This RPF would establish a reference for addressing socio-economic impacts (not resulting from land taking), and provide a suitable Grievance Redress Mechanism (GRM) information for Project Affected Persons (PAPs) throughout the project’s lifecycle.

Projects on International Waterways – OP/BP 7.50

The World Bank recognizes the issues involving projects on international waterways and attaches importance to the riparian countries making appropriate agreements or arrangements for the entire waterway, or parts thereof. In the absence of such agreements or arrangements, the Bank requires, as a general rule, that the prospective borrower notify the other riparian countries of the project. The Policy lays down detailed procedures for the notification requirement, including the role of the

Bank in affecting the notification, period of reply and the procedures in case there is an objection by one of the riparian countries to the project.

Note: The project area is located on the Tigris which is an international waterway. However, the project involves rehabilitation of existing pumping stations, construction of potable water reservoir, and non-revenue water including replacement of old drinking water distribution network. The project does not involve works and activities that would exceed the original capacity of the pumping stations and will not increase water off-take from the Tigris. Therefore, the project falls within the exception to the notification requirements of OP 7.50, set forth in paragraph 7(a) of OP 7.50.

Other applicable regulations include the Environmental, Health and Safety (EHS) Guidelines[1], of the World Bank Group (WBG)/ International Finance Corporation (IFC) 2008, as the project will involve a range of risks related to occupational health and safety during construction and operation.

Other references:

- WHO Air Quality Guidelines – 2006;
- WHO Drinking Water Quality, 4th ed – 2011;
- WHO Guidelines for Community Noise – 1999;
- UN Framework Convention on Climate Change and Kyoto Protocol; and
- Convention on Biological Diversity.

WB's and Iraqi's EIA Procedure:

The Project proponent is required by the two aforementioned Iraqi and WB frameworks to follow the following procedures in order to get the final approval on this ESMP study.

0.6. Public Consultation

Public meetings

The 22 pumping stations are quite dispersed, and located in 8 different municipalities. Therefore, it was not possible to gather people from all areas in a single public meeting, due to security reasons, and because of the subprojects were publically perceived as merely a rehabilitation of existing structures and will not involve new constructions. Against this drawback, the study team has extrapolated public meeting results of similar but larger sewerage pumping station projects (Al-Habibiya SPS meeting held on 15 Nov, 2015, and Al-Doura SPS meeting held on 16 Dec, 2015 – BWSIP). The questionnaire applied has concentrated on environmental impacts and those related to public health issues for people working and/or living in the vicinity of the Project area. Additionally, the questionnaire has provided a space for writing expectations and suggestions of the rehabilitation

[1] WBG EHS General Guidelines is available on: http://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES
WBG EHS for Water and Sanitation is available on:
http://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES

Project. See the following table for participants' information. Annex VII provides a copy of the questionnaire.

Table B: Distribution of participants in similar public consultations (Habibiya & Doura)

Total participants: 52 **Gender**: Male: 38 (69%), Female: 14 (31%) **Education level**: Literate: 2 (3.8%), Basic school: 32 (61.5%), High school: 1 (1.9%), Diploma: 3 (5.8%), First degree: 13 (25%), PhD: 1 (1.9%) **Profession**: None: 4 (7.7%), Retired: 2 (3.8%), Housekeeper: 5 (9.6%), Student: 2 (3.8%), Worker: 1 (1.9%), Technician: 1 (1.9%), Free business: 25 (48.1%), Teacher: 1 (1.9%), Civil service: 11 (21.2%)

Feedback collected from similar projects in the area (Habibiya and Doura) was as following.

Table C: Feedback collected from similar public consultations (Habibiya & Doura)

#	Question	Answer		
		Yes	No	No answer
1	Are you impacted by noise when operating pumps, motors, and other parts of the SPS?	38 (73.1%)	14 (26.9%)	0
2	Are you impacted by odors and fumes generating from the SPS?	48 (92.3%)	4 (7.7%)	0
3	Do you have any health problems connected to emissions from the SPS?	30 (57.7%)	22 (42.3%)	0
4	Do you expect the rehabilitation work will provide job opportunities in your neighborhood?	49 (94.2%)	2 (3.8%)	1 (2%)
5	Do you think installing fumes and odor scrubbers in the SPS will help reduce risk of harmful emissions?	52 (100%)	0	0

Participants were also given the opportunity to express their expectations:

- Enhancing air quality through reducing bad smells and air pollutants generating from the pumping stations;
- Reducing communicable diseases and enjoying a healthier and more hygienic life,
- Adopting sound operational procedures that would result in avoiding overflows caused by floods;
- Providing job opportunities for the local community;
- Positive impacts on the surrounding environment, increasing green areas, and reducing environmental pollution;
- Avoiding incidents of clogging the piping system and decreasing overflows.

Additionall suggestions for further improvements were as follows:

- Providing an enclosed design to help avoid emissions to outer environment,
- Providing proper ventilation systems to get rid of air emissions in a modernized way,
- Locating pumping station in as far away as possible from populated areas, in order to reduce noise and contamination,
- Providing a better landscape to the area and planting trees to avoid topsoil erosion,
- Targeting local people for jobs,
- Fulfilling the neighborhood's needs of power supply,

- Rehabilitating pumping station by the team of the BSA and through selecting competent international companies,
- Flushing sewerage pipelines and mains,
- Fixing damages in main lines.

Grievance Redress Mechanism

A Grievance Redress Mechanism (GRM) is required to enable Project Affected Persons (PAPs) to address their grievance as a result of the project. GRM should be managed and maintained at the MOB level, and made available at the project level. This mechanism could also be integrated into the already existing complaining system at MOB. During public meetings, PAPs had the opportunity to learn about the current complaining system of MOB. The GRM should also facilitate lodging a complaint easily and anonymously. However, the form of the GRM should be posted at each subproject site in Arabic Language with the contact information of the person in charge. Information to be deposited in the complaining system, include contact information, a full description of the issue, and attaching to it all necessary material. GRM should be accessible to all PAPs (by writing, phone, email, official portals) and should be able to receive grievances and complaints at any time of the Project lifecycle. Personnel responsible for processing complaints have to inform complainers on the legal time period for responding to the grievance/ complaint in final. Responses to complainers should be returned in no more than 14 calendar days, and before starting project activities.

The complainers will have the right to appeal their case at a tribunal should the offered compensation(s) deemed unsatisfactory. The GRC should continuously report updates to the MOB higher management and to the World Bank Group.

0.7. Environmental and Social Management Plan

Impacts Overview

The environmental assessment has taken into consideration impacts on the following main aspects:

- Physiochemical aspects: land, soil, water, air, etc.
- Biological aspects: habitats, flora, fauna, etc.
- Socio-economic aspects: public health, infrastructural services, etc.

Impacts were ranked according to their level of significance (H: High, M: Moderate, L: Low, Negligible and None), as well as against their nature: Direct and indirect, Cumulative, and noncumulative, Short term and long term.

Only two alternatives were evaluated through this study. They are the "No-Project" alternative and the "Project" alternative. A full discussion was given to the negative impacts by having "No-Project", and they are summarized as follows:

Table D: Impact assessment of "No-Project" alternative

Area of concern	Impact	Sensitive receptor	Level of significance
Abiotic environment (Cross-media interaction)	Land and soil contamination due to accidental discharges	Land and soil at discharge point	H
	River water contamination due to flooding discharges,	Receiving river bed (Diyala, Tigris)	H
	Aquifer water contamination due to infiltration and water influx with river	Receiving aquifer basin (under-ground resources that could coexist)	H
Biotic environment (flora and fauna species)	Biological life poisoning due to high loads of chemical and microbial constituents	- Endangered and not threatened flora at discharge point, - Endangered and not threatened fauna at the discharge point, - Aqua life (Diyala and Tigris)	H
Occupational Health and Safety (OHS)	Suffocation and/or death due to inhalation of hazardous air emissions (H2S, CH4, VOCs, etc) for prolonged times.	- On-site operators, - Maintenance staff, - Supervisors, - The station guards.	H
	Hearing nuisance due to exposure to excessive noise levels for prolonged times.	- On-site operators, - Maintenance staff, - Supervisors, - The station guards.	H
	Vibration nuisance due to contact with unstiffened floors and vibrating parts (motors, pumps) for prolonged times.	- Operators, - Maintenance staff	M
	Electrical shock due to uncovered wiring and misused/ unmaintained switches and control panels	- Operators, - Maintenance staff	M
Community Health & Safety	Various health issues due to direct and indirect contact with waterborne pathogens (sanitary and emergency discharges to canals and rivers),	Populations in close proximity to raw sewage outlets,	H
	Noise and odor nuisances	Populations living or staying shortly in the vicinity of the pumping station.	M

The Project of rehabilitating 22 sewerage pumping stations will have a range of positive impacts on the quality of Tigris River water through minimizing emergency discharges due to blockage and overflow events. There would be also indirect positive impacts on soil, land, and groundwater in the long term.

Although Project locations do not intersect with biologically sensitive areas, decreasing discharges to the surrounding environment would prevent further degradations of the ecological life indirectly and in the long term.

Occupational health and safety of workers will certainly be improved, due to introducing more reliable mechanical and electrical parts and facilitating needed maintenance works. The Project will also engage workers in capacity building activities, including participation in educational workshops on best management practices and working with hazards and contingencies.

The Local community will enjoy more developed and safe sanitation services, allowing for more subscribers to join the service, thus, improving environment and preventing diseases in whole.

Environmental and Social Management Plan

Project Affected Persons are not expected to have significant socio-economic impacts. Socio-economic impacts if occurred are not associated with land taking, since these sub-projects will not involve additional land. However, A Grievance Redress Mechanism (GRM) should be set up in early stages of the Project, which is to be accommodated and maintained within the formal complaining system at MOB. The complaining process should be described to PAPs, their rights should be explained, and the timeframe to respond to their cases is to be made clear. All means of compensation should be considered for PAPs. Entitlements include monetary, and in-kind assistance, as well as providing job opportunities during construction phase. The complainer has the right to appeal his/her case at a tribunal if compensation was deemed unsatisfactory.

The two tables below present ESMP against expected negative impacts during construction and operation phases, including proposed mitigation measures, responsible parties, requirements, and time for implementation.

Table E: Environmental and Social Management Plan – Construction

#	Area	Impact	Ranking	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
1	**Occupational Health and Safety**	Health issues related to over-exertion and ergonomic injuries and illnesses	M	• Prevent and control through training of workers in lifting and material handling techniques, • Plan work site layout to minimize the need for manual transfer of heavy loads, • Select tools and design work stations that reduce force requirements and holding times, • Implement administrative controls into work processes	• Contractor to implement, • Supervision contract, • BSA to follow up	• Training on OHS, • Site layout, • The best design of work station, • Personnel rotation system, • First aid.	• Prior to construction for training and work station, • Weekly for rotation, • Daily for others
2		Health issues related to accidental slips and falls	H	• Implement good house-keeping practices, • Clean up excessive waste debris and liquid spills regularly, • Locate electrical cords and ropes in common areas and marked corridors, • Use slip retardant footwear.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Housekeeping practices, • Cleanup kits, • First aid, • PPE, • Site layout	On daily basis
3		Health issues related to working in heights	H	• Train and use temporary fall prevention devices, • Train and use personal fall arrest systems, • Use control zones and safety monitoring systems	• Contractor to implement, • Supervision contract, • BSA to follow up	• Education, • Acquisition of right expertise, • Provision of safety devices, • Provision of safety monitoring systems, • PPE, • First aid, • Site layout	• Prior to construction for Education and right expertise, • Daily for other provisions
4		Health issues related to getting struck by objects	H	• Use a designated and restricted waste drop or discharge zones, • Conduct sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable, • Maintain clear traffic ways, • Use temporary fall protection measures, • Wear appropriate PPE.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Education, • Acquisition of right expertise, • Provision of safety devices, • First aid, • PPE	• Prior to construction for Education and right expertise, • Daily for other provisions

#	Area	Impact	Ranking	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
5		Health and accidental issues related to exposing to moving machinery	M	• Ensure the visibility of personnel through their use of high-visibility vests, • Ensure moving equipment is outfitted with audible back-up alarms, • Use inspected and well-maintained lifting devices.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Provision of safety devices, • Provision of safety monitoring systems, • Provision of suitable equipment, • First aid, • PPE.	• Prior to construction for devices and systems, • Daily for other provisions
6		Health issues related to working with exposed electrical parts	H	• Conduct detailed identification and marking of all buried electrical wiring, • Lock out and tag-out devices during dismantling and maintenance, • Check all electrical cords, cables, and hand power tools for frayed or exposed cords, • Ensure circuit breaking before starting work, • Use electricity-specific PPE, • Use specially trained personnel.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Education, • Acquisition of right expertise • Provision of safety devices, • PPE, • First aid, • Site layout	• Prior to construction for education and right expertise, • Daily for safety devices and PPE
7		health issues related to respiratory hazards mismanagement	H	• Minimize dust from material handling sources, • Minimize dust from open area sources (storage piles), • Remove potential hazardous air pollutants such as asbestos, from existing infrastructures, • Use PPE, such as dust masks, where dust levels are excessive, • Avoid burning of solid wastes.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Provision of respiratory controls, • PPE, • Best management practices.	• Daily for controls, • Weekly for local communication
8		Health issues related to working in confined places	H	• Provide safe means of access and egress from confined places, • Avoid operating combustion equipment	• Contractor to implement, • Supervision contract,	• Education, • Provision of safety devices,	• Prior to construction for education,

#	Area	Impact	Ranking	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
				for prolonged periods, • Use special PPE.	• BSA to follow up	• Ventilation system, • PPE, • First aid.	• Daily for safety devices, ventilation, and PPE
9		hazardous solid and liquid materials mismanagement	H	• Provide adequate secondary containment for lubricating oils and hydraulic fluids, • Provide adequate ventilation, • Use impervious surfaces for refueling areas, • Train workers on the correct transfer and handling of fuels and chemicals and the required response to spills, • Provide portable spill containment and cleanup equipment, • Assess the contents of the hazardous materials and petroleum-based products in building systems and process equipment, • Provide awareness to workers on EHS related risks, • Remove contents of hazardous materials prior to construction, • Identify types and quantities of hazardous waste expected, • Identify available collection and treatment programs and infrastructure, • Put procedures and operational controls for on-site storage.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to approve final treatment.	• Education, • Secondary containment, • Ventilation, • Refueling areas, • Spill and cleanup, • Waste management plan, • Material storage plan	• Prior to construction for education, • Daily for management
10		health issues related to noise and vibration mismanagement	H	• Use noise control devices, such as exhaust muffling devices for combustion engines, • Use vibration protecting gear, like gloves and clothing, • Install vibration damping pads or devices, and minimize exposure duration.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Education to workers, • Preventive and corrective Maintenance, • PPE,	• Prior to construction for education, • Daily for management
11	**Public health and & safety**	public issues related to spread of pests and communicable diseases	M	• Provide surveillance and active screening and treatment of workers, • Prevent illness among workers in local communities,	• Contractor to implement, • Supervision contract, • Health centers to	• Immunization programs, • Municipalities to apply pest control	• Prior to construction for immunization, • monthly for pest

#	Area	Impact	Ranking	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
				• Train health workers in disease treatment, • Conduct immunization programs, • Provide treatment on-site or in community health care facilities, *vector-borne diseases* • Eliminate unusable impounded water, • Consider application of residual insecticide to dormitory walls, • Implement integrated vector control programs, • Promote use of personal protective means and barriers, • Communicate with public health officials, • Educate project personnel and area residents on risks, prevention, and available treatment, • Monitor communities during high-risk seasons, • Follow safety guidelines for the storage, transport, and distribution of pesticides.	immunize, • Municipalities to apply controls (in liaison with the environmental dept of MOB), • BSA to follow up,	programs	management
12		Public health and safety issues due to excavation	M	• Plan activities in consultation with local communities (during the days with least disturbance); • Use dust suppression techniques (like watering); • Coordinate with utility service providers (power lines, water lines, gas etc.); • Post warning signs and warning lights near the residential areas. And use safety fences; • Avoid piling excavation soil or debris as well as building materials and water pipes on the narrow roads in high densely populated areas.	• Contractor to implement and coordinate, • Supervision contract, • BSA to follow up	• Public outreach • Warning signage	• Daily during construction
13		public safety issues due to unauthorized access to working sites	M	• Restrict access to the working site, (institutional and administrative controls, fencing, signage, and communication of risks),	• Contractor to implement, • BSA to follow up,	• Education, • Acquisition of right expertise, • Collection and	• Prior to construction for education and right expertise,

#	Area	Impact	Ranking	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
				• Remove hazardous conditions on construction sites that cannot be controlled by restricting access, such as covering opening to small confined spaces, and ensuring means of escape, like in case of locked storage of hazardous materials.		disposal plan, • Provision of safety devices, • PPE, • First aid, • Site layout, • Site security.	• Daily for other provisions
14		Traffic safety	M	• Emphasize safety aspects among drivers, • Avoid or minimize driving through community areas and dangerous routes and times of day, • Alert drivers on local speed limits, and monitor implementation, • Apply regular maintenance of vehicles, • Collaborate with local communities and responsible authorities to improve signage and visibility, • Minimize traffic by purchasing from the local markets.	• Contractor to implement, • Supervision contract, • BSA to follow up, • Traffic department to advise, • Local representatives to get in touch	• Education, • Provisions of suitable means of transportation, • Best management practices, • Provision of regular maintenance, • Provisions of traffic safety measures, • Considering local market	• Daily for education, • Weekly for traffic communication, • Weekly for local communication, • Periodically for local market inclusion.
15	**Waste Management**	solid waste mismanagement	M	• Identify types and estimate quantities of waste; • Identify available collection and treatment programs and; • Establish collection and treatment priorities; • Identify opportunities for reduce, reuse, and recycle; • Put procedures and operational controls for on-site storage.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to approve dumpsite.	• Waste management plan, • Material storage plan	• Prior to construction for plans, • Daily for management

#	Area	Impact	Ranking	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
16		domestic wastewater mismanagement	H	• Identify types and estimate quantities of wastewater, • Segregate wastewater streams, • Segregate and pre-treat oil and grease containing effluents, • Discharge to sanitary network only after confirming compliance, • Contain in septic tanks if discharge to sanitary sewer network is not possible, • Avoid direct contact with wastewater through applying an enclosed system for collection, containment, and disposal. • Monitor groundwater quality that could exist close to the working areas to ensure compliance.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to approve dumpsite.	• Waste management plan, • Storage plan, • Quality testing for groundwater resources • Provisions for on-site treatment	• Prior to construction for plans, • Daily for management • Quarterly for water quality monitoring
17	**Physical environment**	contamination of land	H	• Manage contaminated land (to protect safety and health of the occupants of the site, the community, and the environment), • Understand the historical use of the land with regard to the potential presence of hazardous materials or oil, • Prepare a management plan to manage contaminated land remaining, • Transfer contaminated land remaining to a legal dumpsite, • Avoid direct contact to the extent applicable.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to designate and approve dumpsite.	• Waste management plan, • Best management practices,	Upon earth work

#	Area	Impact	Ranking	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
18		soil erosion and sediment mobilization	M	• Schedule to avoid heavy rainfall periods, • Minimize steepness of slopes, • Re-vegetate if applicable, • Design channels and ditches for expected flows, • Reduce or prevent off-site sediment transport, • Modify/ suspend activities during extreme rainfall and high winds, • Segregate or divert clean runoffs from water containing high solids content, • Provide adequate drainage system onsite. • Monitor groundwater quality that could exist close to the working areas to ensure compliance.	• Contractor to implement, • Supervision contract, • BSA to follow up, • Meteorological department for weather forecast	• Best management practices, • Provision of drainage/ segregation systems, • Weather forecast • Quality testing for groundwater resources	• Daily for best practices, • Seasonally for rainfall seasons • Quarterly for water quality monitoring
19	**Biotic environment**	altering/ endangering biological life	L	• Ensure full adherence to the zero-discharge criterion, • Oblige by available and approved routes, and avoid driving off-roads, or through naturally valued areas, • Oblige by legal transportation and dumping of materials in their pre-designated and approved dumpsites, • Stay in constant contact with the concerned authorities should any emergent spillage occurs, and apply prompt and approved site cleanup procedures, • Raise awareness on the importance of natural life.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to designate and approve dumpsite, • Environment department to advise,	• Best management practices, • Provisions of off-site cleanup, • Waste and spill management plan, • Flora and fauna mapping, • Awareness on natural life	• Prior to construction for flora and fauna mapping, • Daily for zero-discharge, driving routes, • Weekly for awareness, • Continuously for contact with environment dept.

#	Area	Impact	Ranking	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
20	**Socio-economic**	temporary loss of livelihoods and interruption of social and economic activities (not related to land taking)	L	• Establish a Grievance Redress Mechanism, and respond to grievances, • Provide alternative entrances to clientele, and proper signage around sites under work, in addition to public announcements • Educate local people about the project and importance of local engagement, • Engage the local market and create job opportunities.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to host a GRM,	• Public participation plan, GRM	• Prior to construction for public participation, • Ongoing for GRM, Quarterly for GRM review

Table F: Environmental and Social Management Plan – Operation

#	Area	Impact	Ranking	Mitigation	Responsibility	Requirement	Frequency
1	**Public health and safety**	public health issues and contamination of environment due to mismanagement of overflows	L	• Develop and implement appropriate protocols to reduce risks to safety, public health, and environment, • Develop a contingency plan (site-specific), • Respond to overflows by preventing, containing, minimizing, the overflow, • Protect SPS's components from flood damage (i.e. protecting components from rising flood water), • Notify responsible parties (BSA).	• Working personnel to implement, • BSA to monitor, • Environment dept to advise, • Local representatives,	• Contingency plan, • Public health standards, • Maintenance plans, • Community outreach	• Daily for contingency, and maintenance, • Seasonally for community outreach
2		Odor and noise nuisance to adjacent sensitive receptors	L	• Apply preventive and corrective maintenance procedures on odor and noise generating equipment and facilities, • Apply preventive and corrective maintenance on odor control units, • Establish a Standard Operating Procedure (SOP) to include requirements for maintenance, monitoring, and personnel training, • Monitor outdoor odor and noise levels within pumping station boundary, • Create retrofitting noise controls where practical, like fencing and enclosures, • Keep records of the maintenance logs, local complaints, and analyze trends.	• Working personnel to implement, • BSA to monitor, • Environment dept to advise, • Local representatives,	• Provision of noise and odor controls, • Maintenance plans and procedures, • Monitoring plans, • Community outreach	• Daily for management and maintenance plans, • Weekly for monitoring, • Seasonally for community outreach

#	Area	Impact	Ranking	Mitigation	Responsibility	Requirement	Frequency
3		Pest spreading issues	L	• Use of pesticides that are compatible with "Recommended Classification of Pesticides by Hazard and Guidelines to Classifications" of the WHO	• Working personnel to implement, • BSA to monitor, • Environment dept to advise,	• Pesticides compatible with WHO guidance	Monthly

#	Area	Impact	Ranking	Mitigation	Responsibility	Requirement	Frequency
4		public health issues and contamination of environment due to mismanagement of hazardous waste and materials	H	• Train operators on release prevention, including drills specific to hazardous materials, • Implement inspection programs to maintain the mechanical integrity and operability of parts and systems, • Prepare written Standard Operating Procedures (SOPs) for filling containers or equipment and for transfer operations, • Apply SOPs for the management of secondary containment structures, • Identify locations of hazardous materials and associated activities, • Transport and dump waste residues from screens in legal and approved dumpsites, • Make available specific PPE and training needed to respond to an emergency, • Make available spill response equipment sufficient to handle at least initial stages of a spill, • Train and educate operational personnel on response activities in the event of spill, release, or chemical emergency. • Provide quality monitoring tests for groundwater resources adjacent to subproject locations	• Working personnel to implement, • BSA to monitor, • Environment dept to advise, • Local representatives,	• Capacity building, • Inspection programs, • Documented procedures, • Best management practices, • Legal and approved dumpsite, • Provision of PPE, • Provision of spill equipment. • Provision of water quality monitoring	On daily basis Semiannual for water quality monitoring
5	**OHS**	Health issues related to over-exertion and ergonomic injuries and illnesses	M	• Prevent and control by training workers on lifting and material handling techniques, including placing of weight limits above which mechanical assists or two-person lifts are necessary, • Plan work site layout to minimize the need for manual transfer of heavy loads, • Select tools and design work stations that reduce force requirements and holding times,	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Capacity building, • Best practices, • Personnel rotation system, • First aid and medical insurance.	• Daily for best practices and medical care, • Periodically for capacity building and job rotation,

#	Area	Impact	Ranking	Mitigation	Responsibility	Requirement	Frequency
				• Implement administrative controls into work processes.			
6		Health issues related to accidental slips and falls	H	• Implement good house-keeping practices, • Clean up excessive waste debris and liquid spills regularly, • Locate electrical cords and ropes in common areas and marked corridors, • Use slip retardant footwear.	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Capacity building, • Best practices, • Cleanup kits, • First aid and medical insurance, • PPE,	• Daily for best practices, medical care, and PPE, • Periodically for capacity building and job rotation,
7		Health issues related to working in heights	H	• Train and use temporary fall prevention devices, • Train and use personal fall arrest systems, • Use control zones and safety monitoring systems	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Capacity building, • Best practices, • Provision of safety devices, • Provision of monitoring systems, • First aid and medical insurance, • PPE,	• Daily for best practices, medical care, safety devices, monitoring systems PPE, • Periodically for capacity building,
8		Health issues related to working with electrical equipment and control panels	H	• Conduct detailed identification and marking of all buried electrical wiring, • Lock out and tag-out devices during dismantling and maintenance, • Ensure circuit breaking before starting work, • Use electricity-specific PPE, • Use specially trained personnel.	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Capacity building, • Best practices, • Acquisition of right expertise, • Provision of safety devices, • Provision of monitoring systems, • First aid and medical insurance, • PPE,	• Daily for best practices, medical care, safety devices, monitoring systems PPE, • Periodically for capacity building and employing right expertise
9		Health issues related to working in confined places	H	• Provide safe means of access and egress from confined places, • Avoid operating combustion equipment for prolonged periods, • Use special PPE. • Minimize exposure period to the extent	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Education, • Provision of safety devices, • Ventilation system, • PPE,	• Daily for best practices, medical care, safety devices, PPE, • Periodically for capacity building

#	Area	Impact	Ranking	Mitigation	Responsibility	Requirement	Frequency
				possible.		• First aid.	
10		health and stress issues due to noise and vibration in work environment	L	• Effectively isolating control room against noise and vibration, • Avoid prolonged exposure periods beyond permissible times, • Avoid exposure to excessive levels beyond permissible limits, • Monitor noise and vibration levels, • Use noise hearing protection gear and vibration resistant boots, gloves, and clothing, • Keep records of breaching incidents, and report to the higher management.	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Education, • Provision of isolation, • Provision of monitoring devices and programs, • PPE, • Medical insurance, • Record keeping	• Daily for best practices, medical care, PPE, • Weekly and monthly for monitoring, • Periodically for capacity building

0.8. Monitoring Plan

Table G: Environmental and Social Monitoring Plan – Construction

#	Parameter to be monitored	Target KPI/limit	Monitoring requirements	Monitoring Responsibility	Frequency	location	Cost estimate
1	Health issues linked to nature of work	• Zero medical complaint/ assistance, • 100% clear inspection report	• Contractors' incident records • Keeping records at medical care centers	• Resident engineer of PIC • Resident engineer of BSA • ESO- BSA	Monthly, Annual review	Construction site	• PIC's budget. • BSA's resident engineer daily rate (approx. 50 USD/day) • ESO-BSA's daily rate (approx. 50 USD/day)
2	Training effectiveness	• Zero incident reports related to training, • 100% clear inspection report	• Contractor's incident reports	• Resident engineer of PIC • Resident engineer of BSA • ESO- BSA	Monthly, Annual review	Construction site	• PIC's budget. • BSA's resident engineer daily rate (approx.. 50 USD/day) • ESO-BSA's daily rate (approx. 50 USD/day)
3	Housekeeping in-situ	• Zero incident reports, • Zero complaints, • 100% clear inspection report	• Contractor's incident records, • Contractor's complaining system, • Site engineer's reporting	• Resident engineer of PIC • Resident engineer of BSA	Bi-weekly, Monthly, Annual review	Construction site	• PIC's budget. • BSA's resident engineer daily rate (approx. 50 USD/day) • ESO-BSA's daily rate (approx. 50 USD/day)
4	Right expertise	• Zero incident reports related to failure testing, • 100% clear inspection report	Mechanical and electrical testing records, Site engineer's reporting	• Contractor, • Contractor's environmental engineer	Quarterly	Construction site	• Costs of record keeping included in the Contract price (estimate: 2,000 USD/quarter) • Costs incurred by Contractor's environmental engineer included in Contract budget (estimate: 100 USD/day)
5	PPE effective usage	• Zero incident reports related to misusing PPE, • 100% clear inspection report, • 100% clear OH report	• Contractor's incident records, • Contractor's complaining system, • Site engineer's reporting, • OH inspection system	• Contractor • Resident engineer of PIC • Resident engineer of BSA	Monthly	Construction site	• Contractor's budget • PIC's budget. • BSA's resident engineer daily rate (approx. 50 USD/day)
6	Site hygiene	• Zero incident reports related to waste mismanagement,	• Contractor's incident records, • Contractor's	• Contractor • Resident engineer of PIC	Monthly, Quarterly, Annual	Construction site	• Contractor's budget • PIC's budget. • BSA's resident engineer daily

#	Parameter to be monitored	Target KPI/limit	Monitoring requirements	Monitoring Responsibility	Frequency	location	Cost estimate
		• 100% clear inspection report, • 100% clear PH report	complaining system, • Site engineer's reporting, • PH inspection system	• Resident engineer of BSA	review.		rate (approx. 50 USD/day)
7	Off-site hygiene	• Zero complaints related to illegal dumping off-site, • 100% clear PH report	• BSA's complaining system, • PH inspection system	• Resident engineer of PIC • MOB	Monthly, Quarterly, Annual review	Transporting routes	• PIC's budget. • MOB budget (daily rates of field inspectors approx. 50 USD/day)
8	Ambient air quality and noise	• Zero complaints related to air and noise nuisance, • 100% clear Environmental Health (EH) report, • Thresholds are fully complied with.	• BSA's complaining system, • EH. inspection system, • Air and noise monitoring equipment, measurements and analyses.	• Resident engineer of PIC • Resident engineer of BSA • ESO- BSA	Quarterly, Annual review.	Site vicinity	• PIC's budget (monitoring cost estimated at 10,000 USD quarterly). • BSA's resident engineer daily rate (approx. 50 USD/day) • ESO-BSA's daily rate (approx. 50 USD/day)
9	Surface and groundwater quality	• Physical, chemical, and bacteriological parameters are within national limits	• Water quality monitoring services	• Resident engineer of PIC • ESO-BSA for final reporting	Quarterly	• Intake points from Tigris, • Discharge points of untreated sewage, • Groundwater wells within 1km of point of discharge into Tigris, and • Groundwater wells within 1 km distance along open canals of untreated sewage.	• 6,100 USD per each round of testing from 4 locations • ESO-BSA's daily rate (approx. 50 USD/day)
10	Public health	• Zero complaints related to vector nuisance and communicable diseases, • Zero incidents of Project related infections/diseases.	• Immunization program, • Records of BSA's complaining system, • Records of Health inspection system, • Records of Health care systems.	• Health care provider • Resident engineer of PIC • MOB • ESO-BSA for final reporting	Monthly, Annual review.	On-site, localities	• Cost of health care program included in the contractor's budget (estimate: 200 USD/worker/year), • Cost of MOB's complaining system included in MOB's budget, • PIC's budget • ESO-BSA's daily rate (approx. 50 USD/day)
11	Traffic safety	• Zero traffic accident	• Traffic dept records,	• Traffic dept,	Monthly,	Public road network	• Costs of accidents recording

#	Parameter to be monitored	Target KPI/limit	Monitoring requirements	Monitoring Responsibility	Frequency	location	Cost estimate
		reports related to the Project, • Zero complaints of project related traffic accidents	• Records of BSA's complaining system, • Contractor's record.	• MOB • Resident engineer of PIC for reporting • ESO-BSA for final reporting	Annual review		included in Traffic Department's budget, • Cost of MOB's complaining system included in MOB's budget, • PIC's budget • ESO-BSA's daily rate (approx. 50 USD/day)
12	Natural life (flora & fauna)	• Zero incident reports related to altering/ endangering natural life	• Environmental inspection system, • Incident records.	• Environmental dept at MOB • Resident engineer of PIC for reporting • ESO-BSA for final reporting	Monthly, Annual review	Natural life in vicinity and downstream	• Costs of environmental monitoring included in environmental dept's budget, • PIC's budget • ESO-BSA's daily rate (approx. 50 USD/day)

Table H: Environmental and Social Monitoring Plan – Operation

#	Parameter to be monitored	Target KPI/limit	Monitoring requirements	Monitoring Responsibility	Frequency	location	Cost estimate
1	Water quality	• River water quality within thresholds, • Zero complaints related to overflows	• Water quality monitoring services	• MOB for complaining • BWA's central labs • ESO-BSA	Semiannual	• Intake points from Tigris, • Discharge points of untreated sewage, • Groundwater wells within 1km of point of discharge into Tigris, and • Groundwater wells within 1 km distance along open canals of untreated sewage.	• MOB's budget for running complaining system, • 6,100 USD per each round of testing from 4 locations • ESO-BSA's daily rate (approx. 50 USD/day)
2	Land and soil quality	• Land and soil quality within thresholds, • Zero complaints related to overflows	• MOB/BSA's complaining system, • Land and soil monitoring equipment, measurements, and analyses.	• MOB's Environmental Health dept. • ESO-BSA	Monthly, Annually.	SPS vicinity, Downstream	• MOB/BSA's budget for running complaining and inspection, • MOB/BSA's budget for running soil monitoring • ESO-BSA's daily rate (approx. 50 USD/day)
3	Ambient air quality and noise	• Zero complaints related to air and noise nuisance, • 100% clear EH report, • Thresholds not exceeded.	• MOB/BSA's complaining system, • Air and noise monitoring measurements and analyses	• MOB • ESO-BSA	Monthly, Annually.	SPS vicinity	• MOB/BSA's budget for running complaining and inspection, • MOB/BSA's budget for running air and noise monitoring • ESO-BSA's daily rate (approx. 50 USD/day)
4	Public health related to overflows	• Zero complaints of operation-related public health, • Zero incidents of Project related infections/diseases.	• Records of BSA's complaining system, • Records of Health inspection system, • Records of Health care systems.	• MOB • ESO-BSA	Monthly, Annual review.	localities	• MOB/BSA's budget for running complaining and inspection, • ESO-BSA's daily rate (approx. 50 USD/day)
5	Health issues linked to nature of work	• Zero medical complaint/ assistance, • Zero incident reports	• Incidents records, • Records at medical care centers	• SPS operator, • BSA • ESO-BSA	Monthly, Annual review	SPSs	• Costs of medical care included in BSA's budget (estimate: 200 USD/personnel/month) • ESO-BSA's daily rate (approx. 50 USD/day)

#	Parameter to be monitored	Target KPI/limit	Monitoring requirements	Monitoring Responsibility	Frequency	location	Cost estimate
6	Capacity building	• Zero incident reports related to operational and maintenance activities, • Staff evaluation (highest score)	Human resources system	• HR at MOB/BSA • ESO-BSA	Semi-annual Annual review	SPSs	• Costs of capacity building and training included in MOB/BSA's budget (estimate: 1,000 USD/worker/year) • Costs of staff evaluation included in MOB/BSA's HR budget.
7	Housekeeping in-situ	Zero incident reports related to operational and maintenance activities,	Site inspection system and records	• SPS operator, • ESO-BSA	Bi-weekly, Monthly, Annual review	SPSs	• Costs of inspection and incidents record keeping included in the SPS's and MOB/BSA's budget (estimate: 2,000 USD/year) • ESO-BSA's daily rate (approx. 50 USD/day)
8	PPE effective usage	Zero incident reports related to misusing PPE,	Site inspection system and records	• SPS operator, • ESO-BSA	Monthly	SPSs	• Costs of inspection and incidents record keeping included in the SPS's and MOB/BSA's budget (estimate: 2,000 USD/year) • ESO-BSA's daily rate (approx. 50 USD/day)
9	Site hygiene	Zero incident reports related to waste mismanagement.	Site inspection system and records	• SPS operator, • ESO-BSA	Monthly, Quarterly, Annual review.	SPSs	• Costs of inspection and incidents record keeping included in the SPS's and MOB/BSA's budget (estimate: 2,000 USD/year) • ESO-BSA's daily rate (approx. 50 USD/day)

Site visits and reporting

Table I: Site visits and reporting requirements for monitoring plan

#	Type of reporting	Timing	Reporting (from whom to whom)	Description
1	Monitoring Project site before starting civil work	Once before start of civil works	**From** Representatives of BSA, Municipalities, and Contractor's environmental engineer **to** the higher management of BSA, MOB, and WB	This stems from BSA's responsibility to ensure preparedness of the Project site to receive the new interventions (environmentally, socially, etc.). This site report is a descriptive one, and should contain expert observations and feedback from surrounding people.
2	Monitoring Contractor's obligation towards EMP	Once upon starting the Project	**From** Representatives of BSA, Municipalities, and Contractor's environmental engineer **to** the higher management of BSA and MOB Then **from** BSA to Contractor for action	This stems from BSA's responsibility to ensure Contractor's full compliance to EMP. This visit report is a qualitative and quantitative one on the Contractor's environmental and social provisions (for example. Handheld monitoring devices, spill containment, workforce training records, etc.)
3	Monitoring safeguards	On daily basis	**From** the Contractor's environmental engineer **to** the BSA 's supervision team, Then **from** BSA **to** Contractor for action	This is to ensure full compliance to environmental and social safeguards by the Contractor throughout Project construction. This report is essentially technical in heart, which should include figures and trend analyses for key environmental and social parameters.
4	Monitoring safeguards	Quarterly progress reporting	**From** the Contractor's environmental engineer **to** the BSA 's supervision team, **to** the higher management at BSA / MOB and WB Then **from** BSA **to** the Contractor for action	Aims to engage higher management in monitoring progress, and to ensure their buy-in. This report should include summary information on parameters above limits and how they were rectified, and other issues and challenges and actions responded.
5	Monitoring complaints/concerns of local community	Quarterly from starting constructions	**From** Representatives of BSA, Municipalities, and Contractor's environmental engineer **to** the higher management of BSA and MOB, Then **from** BSA **to** Contractor for action	Aims to rectify proceedings of the Project for healthier environmental and social aspects during construction, in addition to measure local community's satisfaction/ concerns. This reporting could be integrated within the same quarterly report (as in # 4).

Training Requirements

Table J: Training requirements for MOB's working staff

Target Group	Workshop/ Training Sessions	Training Provider	Costs (USD)
Coordinators and Project Officers (MOB, BSA)	- Training session on planning and design of ESIAs/ESMPs.	BSA's Environmental and Social Officer	7,000
Project Beneficiaries and Stakeholders	- Consultation sessions on potential environmental and social impacts of the Project.	Project Unit with assistance from the Environmental and Social Officer	10,000
Project Proponent (BSA), Site personnel, OHS dept.	- Training session on planning and design of ESIAs/ESMPs. - The design and implementation of mitigation measures. - Occupational health and safety guidelines.	Project Unit with assistance from the Environmental and Social Officer, External training provider for OHS	18,000
Specialized training			
BSA operational staff	- Contingency planning	Department of civil defense	5,000
Technical staff at the site	- Water and Wastewater monitoring and testing	Central laboratories	10,000
		Sub Total (USD)	**50,000**
		Environmental and Social Officer Salary	**40,000**
		Total (USD)	**90,000**

0.9. Conclusions and Additional Information

In conclusion, the Project if implemented as planned will have great positive impacts on the sanitation services and on the surrounding environments (including public health in particular). Adverse impacts brought by the Project in construction and operation phases can be mitigated, managed, and monitored to the levels required by pertinent safeguards. Responsibilities must be defined in early stages of the Project and just before commencing work. Building institutional capacities is also of high importance to ensure full compliance and for the sake of handling further monitoring activities. More details could be found in the main report, along with annexes.

Annex I: Contingency Plan Template – emergency discharge
Annex II: Sample checklist for construction phase ESMP
Annex III: Terms of Reference – BSA's Environmental & Social Officer
Annex IV: Environmental Requirements for Contractors
Annex V: Environmental and Social Liabilities of BWSIP Contractors
Annex VI: Pesticides Use and Management
Annex VII: Sample Grievance Registration Form

Annex VIII: Public Consultation – Questionnaire template

1. INTRODUCTION

In 2013, the population of the Republic of Iraq was estimated at around 33 million, of which 66 percent lived in urban areas. Currently the country has an estimated 3.3 million internally displaced people (IDPs). About 27 percent of the total urban population in Iraq resides in Baghdad, which is by far the largest city in the country with an estimated population of 6 million, not including an estimated 289,000 of IDPs. A 2012 household survey indicates that Iraq's national poverty stood at 19 percent and that 20 percent of the population lived on less than US$2 a day, and 70 percent on less than US$4 a day. The poverty rate in 2012 in Baghdad was at 12 percent; this figure is likely to have risen significantly due to the recent conflict. Unemployment is high and labor force participation remains low, especially for women and youth. Official figures from 2011 have labor force participation and youth at 11 percent although actual levels, particularly among youth, were likely much higher.

Poor public service delivery, reflected especially in significant water and electricity shortages, are binding constraints on the population's quality of life and private sector development. Safe drinking water and basic sanitation is of crucial importance to the preservation of human health, especially among children. Baghdad is one of the governorates most impacted by outbreaks of waterborne diseases. About 14 percent of diarrhea cases registered in 2011 occurred in Baghdad, which also topped the governorates in terms of number of deaths from diarrhea. Similarly, the incidents of typhoid and other waterborne diseases are higher in Baghdad compared to national averages. Contaminated water supplies and improper disposal of sewage force families to spend a significant fraction of their income to medical treatment and to purchase bottled water. This has implications for gender inequality in addition to the adverse effects on children's health, by increasing the burden of care on mothers, who are the primary caregivers of children.

The city of Baghdad and its suburbs cover 950 km^2 and are administered by the Mayoralty of Baghdad (MOB). The city is divided into 14 municipalities. The water and wastewater services are centrally administered by the Baghdad Water Authority (BWA) and Baghdad Sewerage Authority (BSA), respectively, which are responsible for all infrastructure assets. As far as water supply and sewerage are concerned, the municipalities' role is limited to installing house connections and to maintaining neighborhood networks (pipes under 200 mm diameter). The planning and implementation of investment projects in the municipalities is the responsibility of the MOB.

The sewer system consists of a network which covers about 92 percent of the city area. Baghdad has two main wastewater treatment plants, one in Rusafa called "Rustomiya", and another one in Karkh. The efficiency with which these wastewater treatment plants and the (old) pumping stations are operated has dropped significantly (by an estimated 30 to 50 percent). The wastewater treatment plants, therefore, are not operating effectively and are under-utilized. The bulk of the city's sewage is discharged untreated and constitutes a major source of pollution to surface water and groundwater and a risk to public health.

The 22 lifting pumps in 8 municipalities (the subject of this report) are very old; most of them have crossed their normal life. Corrective measures are being carried out by the MOB often in order to keep these pumps working and facilitate minimum services. Some of the PSs, pumps and/or motors were replaced with new ones in the year 2000 under the "Oil for Food Program". However, after

the replacements were completed, several repairs had to be conducted for these pumps within short periods of time. The main reason for this was the poor quality of products due to the sanctions in past, it has not been possible to get products of better quality for rehabilitation of the pumping stations. On average, most of the subject pump stations are working at about 50-75% of their designed capacity with frequent corrective maintenance. Therefore, BSA has recommended that such pumps/motors should be replaced with new ones in order to reduce the annual maintenance budget required to keep repairing such equipment.

1.1. The Baghdad Water Supply and Sewerage Improvement Project (BWSIP)

The proposed project will support improvements in high-priority water and wastewater services that were identified in the recent Master Plan for Baghdad to help the MOB to improve its performance in water and wastewater service delivery. The proposed project combines institutional, technical and operational steps to be undertaken by the BWA and BSA, while ensuring that they improve their financial situations. In addition, this project aims to identify (and selectively address) key challenges and opportunities in the decentralized institutional framework in Baghdad in order to support decentralization in other parts of the country. **The Project Development Objective (PDO)** is to improve the quality of drinking water supply and wastewater services in Baghdad, BWSIP consists of the following main components:

Component 1: Institutional strengthening for integrated urban water management and utility management, and creating an enabling environment for private sector engagement (US$11.48 million):

This component will support the MOB in operational and strategic decision making with regard to the city's water security and water conservation. The focus will be on improving the institutional knowledge and preparedness with regard to all aspects of water security and urban water management, including resilience (climate change adaptation measures), sustainability of water use, the potential use of groundwater, the use of non-conventional water (reuse of wastewater), and storm water management

This component will support the BWA and the BSA in strengthening their revenue administration and financial management. This component aims to strengthen BWA and BSA revenue management through two main schemes: i) strengthening BWA and BSA's revenue administration through preparation of a revenue administration manual, business process re-engineering and training of staff, and ii) digitization of consumer records and computerization of billing and collection practices. At the same time, this component will be supporting BWA and BSA in strengthening their financial management by improving their accounting and financial reporting, improving cost accounting of service delivery, and computerizing the asset register and adoption of modern asset management practices.

This component will also explore innovative private financing models, and conduct capacity building for structuring bankable projects and managing contracts. Capacity in the areas of innovative financing, PPP procurement and contract management will be strengthened through a series of training courses and South-South Knowledge Exchanges in the form of study tours. Training courses

will include private sector participation in service delivery; performance based contracts; financing options and risk-sharing instruments. Other aspects of institutional strengthening such as variability in budget allocations by the GoI to the MoB and the coordination issues across central ministries and between the central ministries and the MoB, will be studied and addressed during implementation.

Component 2: Investment in drinking water supply and wastewater infrastructure (US$188 million): This will cover:

(a) Construction of the "R2" reservoir (US$71 million). The main works will comprise: a twin-compartment concrete ground-level reservoir with a total capacity of 135,000 cubic meters; inlet and outlet works, reservoir overflow systems; pumps, piping system; and chlorination station. The reservoir will ensure improved quality and reliability of the water supply services in the area served by it, which is in the Shaab municipality and has a population of more than 550,000. The construction of the reservoir will help the city to manage its water supply better in case of climate-induced droughts.

(b) Rehabilitation of pumping stations including main sewerage network (US$68 million). This will include rehabilitation of 29 sewerage pumping stations by replacing old pumps and associated electro-mechanical works. This will also include rehabilitation of the main trunk sewer system and manholes. The untreated wastewater is currently flowing out of sewers into the streets and the Tigris. The project will make sure this untreated wastewater reaches the underutilized waste water treatment plants, thus reducing the public health effects of untreated wastewater exposure in the event of Tigris flooding induced by climate change.

(c) Non-revenue water reduction (US$39 million). This will include the creation of district metering areas and a Non-Revenue Water (NRW) management system and the reduction of physical losses by replacing about 13 km of water supply distribution network in Rasheed and Shaab municipalities. The distribution networks to be rehabilitated include trunk, primary and secondary pipes ranging from 100mm to 700mm in diameter which are old and are exhibiting frequent breaks with high leakage resulting in intermittent supplies of poor quality water. A Supervisory Control And Data Acquisition (SCADA) system will be established. This will provide BWA with the means to monitor and control the water supply system and to improve operational performance. Reducing non-revenue water will have energy efficiency gains. Reduced leakages will also improve the city's ability to handle any future climate-related water shortages.

(d) Engineering, construction supervision, and quality control (US$10 million). A multi-disciplinary engineering and management consulting firm will assist the PMU with the overall implementation of the project. Consultants support to the PMU will include support to engineering, construction supervision, quality control, procurement, non-revenue water, environment and assistance with the monitoring of the physical and financial progress.

Component 3: Project management, studies and M&E component (US$10 million):

This component will support the operation of the Project Management Unit in the MoB. The PMU has been well established and comprises staff from the BWA, BSA and MoB. The PMU will coordinate the overall planning, coordination, implementation and supervision of project activities including central procurement and management of funds.

The component will provide funding for: citizen engagement including the establishment and operation of a grievance redress mechanism, communication and water conservation awareness; environmental and social management plan; monitoring and evaluation (M&E), including carrying out a detailed baseline study, periodic monitoring during implementation, beneficiary satisfaction surveys; Mid-term review (MTR) in collaboration with International Finance Corporation (IFC) and Multilateral Investment Guarantee Agency (MIGA) and completion report. The component will also provide funding for preparation of four feasibility studies for the water treatment plant and the three sewerage systems. Finally, this component will finance capacity building activities targeted to female technical and managerial, staff in the MoB, BSA and BWA.

The 22 sewerage pumping stations, the subject of this report, are more than 30 years old. Large quantities of untreated wastewater were discharged to Tigris River due to several reasons:

- Some parts are out of order;
- Aging of the mechanical and electrical components of the pumping stations, being beyond design capacity to receive from increasing populations;
- Bad operations and maintenance due to the recent war circumstances; and
- Lacking proper knowledge and capacity needed for managing and guarding the sites.

The proposed project falls under the Bank's Environmental Category "B" due to potential adverse environmental and social impacts that are site-specific and reversible and thus easily remediable by applying appropriate mitigation measures. These potential adverse environmental impacts may include the following: air quality and noise; construction debris, including old piping and sewerage infrastructure requiring proper disposal; employee health and safety issues; vehicular and pedestrian traffic disruptions; disruptions in water supply; and risk of water contamination in the existing system. According to the provisions of "OP/BP 4.01: Environmental Assessment", the Project is categorized "B" and requires the preparation of an Environmental and Social Management Plan (ESMP), which is generic to all 22 pumping stations.

1.2. ESMP Objectives

The subproject activities could create adverse impact to the natural and social environment on the surrounding areas caused by carrying out the works if not properly planned, managed, and implemented. The water of Tigris River has been confirmed to decline in quantity and quality. Many serious environmental problems will continue to arise in the river basin.

The purpose of this Environmental and Social Management Plan (ESMP) is to:

- Describe the Project setting;
- Briefly describe the components of the rehabilitation project, including timeline for implementation;
- Highlight areas where the new interventions would have adverse impacts on environmental and social aspects;
- Briefly discuss consequences of the "No Project" alternative;
- Provide an overview of environmental and social issues brought about by the Project during, construction and operation phases;
- Propose mitigation measures during construction and operation phases of the project;

- Develop an Environmental & Social Management Plan (ESMP) and a Monitoring Plan for the Project's construction and operation phases.

2. BACKGROUND INFORMATION

2.1. Location

The subprojects of rehabilitating 22 sewerage pumping stations are located in Baghdad, the capital city of Iraq. Specifically, the 22 pumping stations lie in Rusafa side of Tigris River.

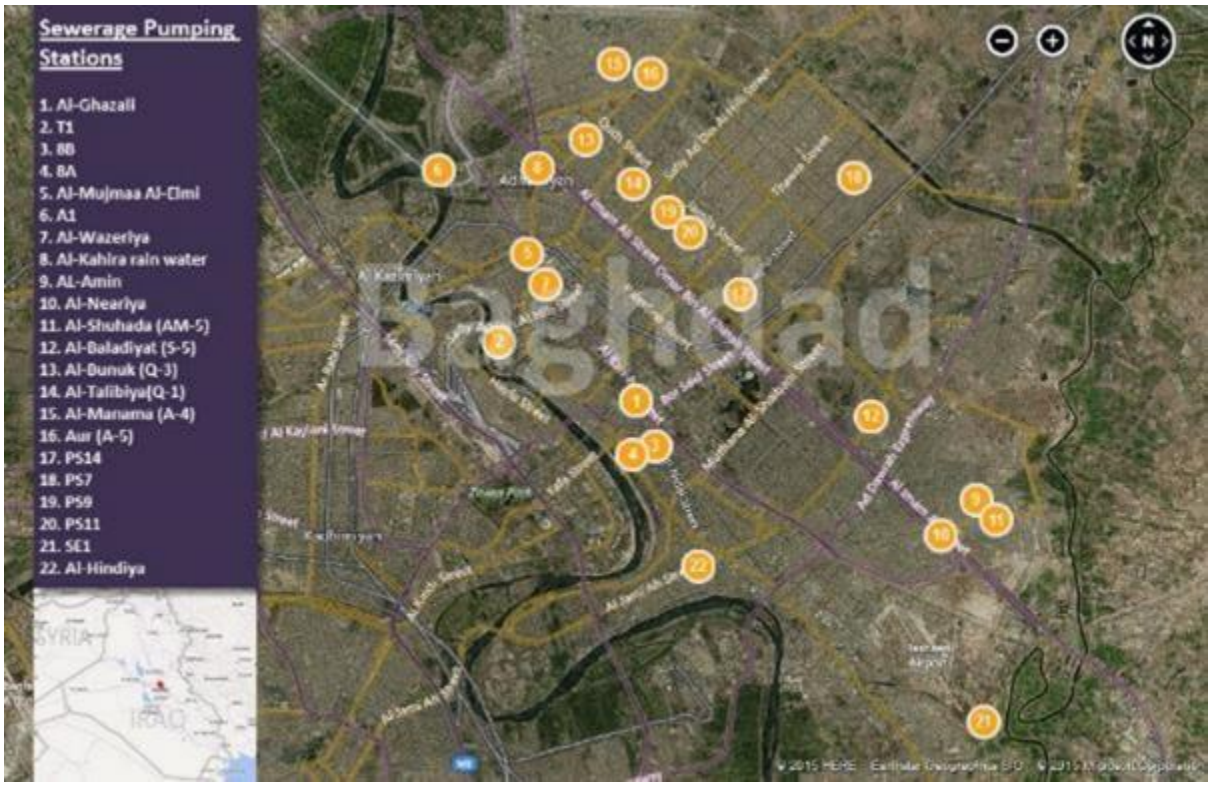

Figure 1: Twenty two sewerage pumping stations – Baghdad

In principle, the pumping stations include above-ground and under-ground structures and facilities. Above-ground structures include receiving and conveying networks; screens/ grit removal chambers; control room (including motors and electrical switch panels); and air ventilation systems. While, under-ground structures include storage pits (wet wells); submersible pumps (end-suction-centrifugal pumps with open impellers); the pump room (dry well); and vertical shafts connecting pumps with their relevant motors above the ground level; as well as force main with gravity manhole. All 22 sewerage pumping station transfer their sewerage flows to Al-Rustomiya WWTP. During the 5-year period (2010 – 2015) the physical and chemical characteristics of influent and effluent of the Al-Rustomiya are shown in the following table.

Table 1: 5-year Average physical and chemical characteristics of treated and untreated wastewater in Al-Rustomiya WWTP (2010 – 2015)

#	Parameter	Influent	Effluent	Threshold (influent)	Threshold (effluent)
1	Biological Oxygen Demand (BOD)	200 – 400	17	350 – 400	<20
2	Chemical Oxygen Demand (COD)	300 – 600	39	300 – 750	<50
3	pH	7.15 – 7.20	7.36	6 – 9.50	6 – 9.50
4	Temperature	<30	<30	<30	<30
5	Suspended solids (SS)	200 – 500	30	200 – 500	<30

#	Parameter	Influent	Effluent	Threshold (influent)	Threshold (effluent)
6	Ammonium (NH4)	15 – 20	…	15 – 30	<10
7	Chloride (Cl)	300 – 400	234	300 – 400	<250
8	Sulfate (SO4)	500 – 650	400 – 550	550 – 650	400 – 550
9	Nitrate (NO3)	15 – 20	8 – 10	15 – 20	<15
10	Phosphate (PO4)	3 – 7	2 – 2.5	3 – 7	<3
11	Phenol	0.5 – 0.1	…	0.5 – 0.1	<0.05 – 0.01
12	Hydrocarbons	5	…	5	…
13	Heavy metals (Pb, Cd, Ni)	0.5	0.05	0.5	<0.05
14	Oil and grease	10 – 50	1 – 3	50 – 75	<10
15	Cyanide (CN)	0.08 – 0.06	0.003 – 0.005	0.08 – 0.06	<0.05

Source: Baghdad Sewerage Authority – Central labs – 2017

2.2. Current Situation

Currently, all 22 pumping stations are lacking necessary maintenance and replacement of major mechanical and electrical parts. Pumps and their associated motors and generators, as well as many other parts like valves, penstocks, screens, are more than 30 years old, and do not receive enough parts replacement and/or maintenance. Spare parts are not easy to acquire from the market, since the country is already exhausted following the war and insecure conditions. In general, most of sewerage pumping stations, in Baghdad, are not able to receive increasing flows from their catchment areas. Flooding events occur frequently in Baghdad, leaving the city with flooded streets for many days without proper drainage. At the pumping stations, overflows may occur around the season, because of the loads that much exceed the design capacity.

The following sections provide more insight about the status of 22 sewerage pumping stations under the jurisdiction of Mayoralty of Baghdad, which existed in 8 municipalities of the Rusafa side.

2.2.1. Al-Rusafa Center Municipality

There are 4 sewerage pumping stations of the Project in Al-Rusafa municipality:

- **Al-Ghazali SPS:-** Established in 1971, it serves Al-Adhamiya distract through receiving sewage from ET – Line and pumps it to ET - line,
- **T1:-** Established in 1983, it receives storm water from T – Line at depth 6.65m and lifts it to Tigris river
- **8B:-** Established in 1963, it receives sewage from Mahala 138 and 8 – A pumping station and pumps it to ET - LINE,
- **8A:-** Established in 1963, it receives sewage from Mahala 101 and pumps it to ET - LINE.

Table 2: Pumping stations in Al-Rusafa center municipality and specs

#	Pumping station	Design capacity (l/s)	Existing capacity (l/s)	Electric power (kw)	Vertical pumps		Submersible	Generators	Station area (m^2)	No. of people served
					Motor	Pump				
1	Al-Ghazali	4,000	1,850	662	5	5	1	3	51,000	350,000
2	T1	13,700	6,000	2,920	6	6	2	2	23,000	150,000
3	8B	180	100	35	3	3	-	2	500	8,000
4	8A	150	100	20	3	3	1	2	400	11,000

Figure 2: Locations of 4 SPSs in Al-Rusafa center municipality

Al-Ghazali sewerage pumping station


T1 sewerage pumping station




8B sewerage pumping station

8A sewerage pumping station

Figure 3: Photos of 4 SPSs in Al-Rusafa center municipality

2.2.2. Al-Adhamiya Municipality

There are 4 sewerage pumping stations of the Project exist in Al-Adhamiya municipality:

- **Al-Mujmaa Al-Elmi:-** Established in 1984. It receives sewage from sectors 324, 322, Al-Jawazat, Hay Al-Dubat pumping station, Al-Shamasiya, Aswaq Zuhair and Ragiba Katon, and pumps it to ET - line,
- **A1:-** Established in 1982. It receives storm water from Hay Tunis, Hay Al-Rabee, Al-Kahira, Al-Griaat, and pumps it to the river,
- **Al-Wazeriya:-** Established in 1971. It receives storm water from Al-Waziriya, Al-Kasra and Al-Magrib sectors (M 301, M 302, M304, M306), and pumps it to T1 pumping station,
- **Al-Kahira rain water:-** It receives storm water from Al-Kahira, Al-Dubat sectors, Ragiba Khaton and Al-Kamp, and pumps it to A1 pumping station.

Table 3: Pumping stations in Al-Adhamiya municipality and specs

#	Pumping station	Design capacity (l/s)	Existing capacity (l/s)	Electric power (kw)	Vertical pumps		Submersible	Generators	Station area (m^2)	No. of people served
					Motor	Pump				
5	Al-Mujmaa Al-Elmi	1,400	650	150	4	4	4	2	21,000	200,000
6	A1	3,300	1,600	752	3	3	5	2	11,000	15,000
7	Al-Wazeriya	450	200	92	3	3	4	3	2,500	35,000
8	Al-Kahira rain water	450	270	92	4	4	4	2	1,000	58,000

Figure 4: Locations of four SPSs in Al-Adhamiya municipality

Al-Mujmaa Al-Elmi sewerage pumping station

A1 sewerage pumping station

Al-Wazeriya sewerage pumping station

Al-Kahira rain water sewerage pumping station

Figure 5: Photos of 4 SPSs in Al-Adhamiya municipality

2.2.3. Baghdad Al-Gadida Municipality

There are 3 sewerage pumping stations of the Project exist in Baghdad Al-Gadida municipality:

- **Al-Amin (AM-4):-** Established in 1984. It receives sewage from Sectors (735, 733, part of 737), and pumps it to ZIBLIN trunk sewer,
- **Al-Neariya:-** Receives storm water from Baghdad Al-Gadida distract, and pump it to F1 pumping station,
- **Al-Shuhada (AM-5):-** Established in 1984. It receives sewage from Sectors (739, 741, part of 737) and pumps it to ZIBLIN trunk sewer.

Table 4: Pumping stations in Baghdad Al-Gadida municipality and specs

#	Pumping station	Design capacity (l/s)	Existing capacity (l/s)	Electric power (kw)	Vertical pumps		Submersible	Generators	Station area (m^2)	No. of people served
					Motor	Pump				
9	AL-Amin (AM-4)	450	225	92	3	3	1	2	1,500	30,000
10	Al-Neariya	1,950	700	398	3	3	3	3	1,500	75,000
11	Al-Shuhada (AM-5)	450	200	92	3	3	1	2	1,000	30,000

Figure 6: Locations of 3 SPSs in Baghdad Al-Gadidah municipality

Al-Amin (AM-4) sewerage pumping station

Al-Neariya sewerage pumping station

Al-Shuhada (AM-5) sewerage pumping station

Figure 7: Photos of 3 SPSs in Baghdad Al-Gadida municipality

2.2.4. Al-Ghadir Municipality

There is one sewerage pumping station of the Project exists in Al-Gadir municipality:

- **Al-Baladiyat (S-5):-** Established in 1984. It receives sewage from Al-Baladiyat, Hay Al-Tujar, Al-Midmar, Filstusnyen Buildings, and pumps it to ZIBLIN trunk sewer.

Table 5: Pumping stations in Al-Ghadir municipality and specs

#	Pumping station	Design capacity (l/s)	Existing capacity (l/s)	Electric power (kw)	Vertical pumps		Submersible	Generators	Station area (m^2)	No. of people served
					Motor	Pump				
12	Al-Baladiyat (S-5)	600	325	113	4	4	2	2	1,000	25,000

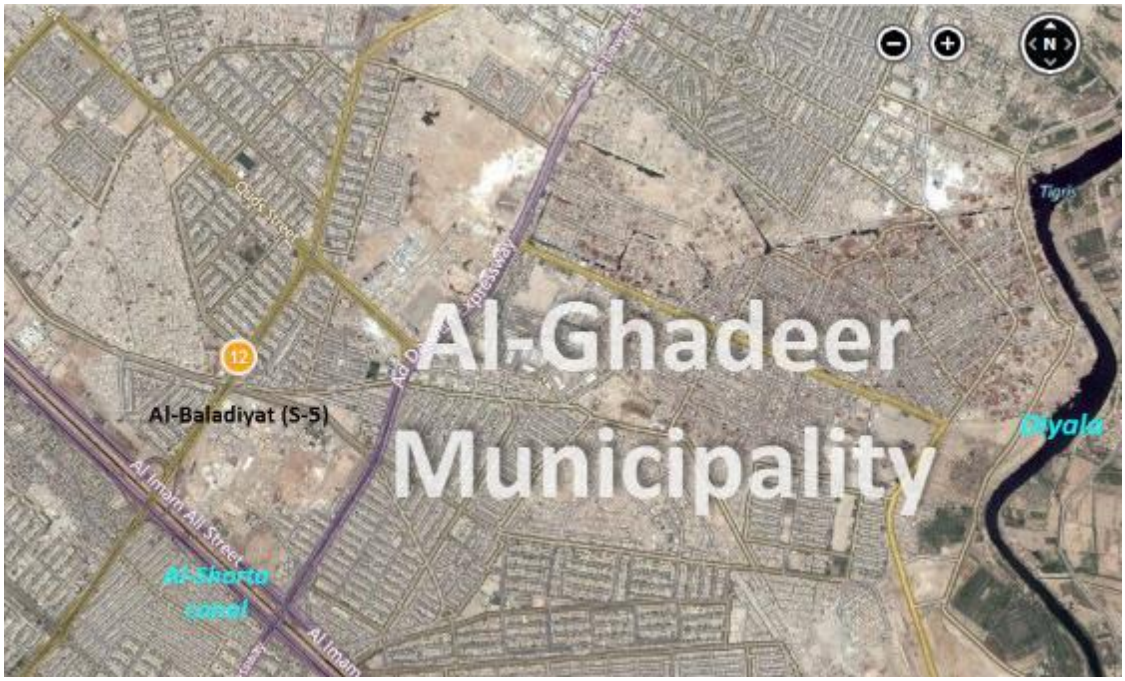

Figure 8: Location of one SPS in Al-Ghadir municipality

Al-Baladiyat (S-5) sewerage pumping station


Figure 9: Photos of one SPS in Al-Ghadir municipality

2.2.5. Al-Sha'ab Municipality

There are 4 sewerage pumping stations of the Project exist in Al-Sha'ab municipality:

- **Al-Bunuk (Q-3):**- Established in 1984. It receives sewage from Mahala 315, part of 319, 317 and Hay Al-Bunuk, and pumps it to ZIBLIN trunk sewer,
- **Al-Talibiya(Q-1):-** Established in 1984. It receives sewage from Mahala 315, part of 319, 317 and Hay Al-Bunuk and pumps it to ZIBLIN trunk sewer,
- **Al-Manama (A-4):-** Established in 1984. It receives sewage from Al-Gazaeer pumping station and pumps it to ZIBLIN trunk sewer,
- **Aur (A-5):-** Established in 1984. It receives sewage from Mahalas 343, 331, 329 and 327, and pumps it to Ziblin trunk sewer.

Table 6: Pumping stations in Al-Sha'ab municipality and specs

#	Pumping station	Design capacity (l/s)	Existing capacity (l/s)	Electric power (kw)	Vertical pumps		Submersible	Generators	Station area (m^2)	No. of people served
					Motor	Pump				
13	Al-Bunuk (Q-3)	600	250	113	3	3	1	2	1,500	70,000
14	Al-Talibiya(Q-1)	600	350	113	3	3	1	3	1,200	70,000
15	Al-Manama (A-4)	1,080	500	150	4	4	1	3	1,200	80,000
16	Aur (A-5)	600	270	113	3	3	1	2	1,200	70,000

Figure 10: Locations of 4 SPS in Al-Sha'ab municipality

Al-Bunuk (Q-3) sewerage pumping station

Al-Talibiya(Q-1) sewerage pumping station

Al-Manama (A-4) sewerage pumping station

Aur (A-5) sewerage pumping station

Figure 11: Photos of 4 SPSs in Al-Sha'ab municipality

2.2.6. Al-Sadder 1 Municipality

There are 2 sewerage pumping stations of the Project exist in Al-Sadder 1 municipality:

- **PS14:-** Established in 1984. It receives sewage from Sectors 1, 2, 3, 4, 5, 6, and pumps it to ZIBLIN Trunk sewer,
- **PS7:-** Established in 1984. It receives sewage from Sectors 46, 47, 48, 49, 50, 51, 52, and pumps it to ZIBLIN Trunk sewer.

Table 7: Pumping stations in Al-Sadder 1 municipality and specs

#	Pumping station	Design capacity (l/s)	Existing capacity (l/s)	Electric power (kw)	Vertical pumps		Submersible	Generators	Station area (m^2)	No. of people served
					Motor	Pump				
17	PS14	450	250	92	3	3	2	1	1,000	35,000
18	PS7	450	200	92	3	3	-	1	500	3,0000

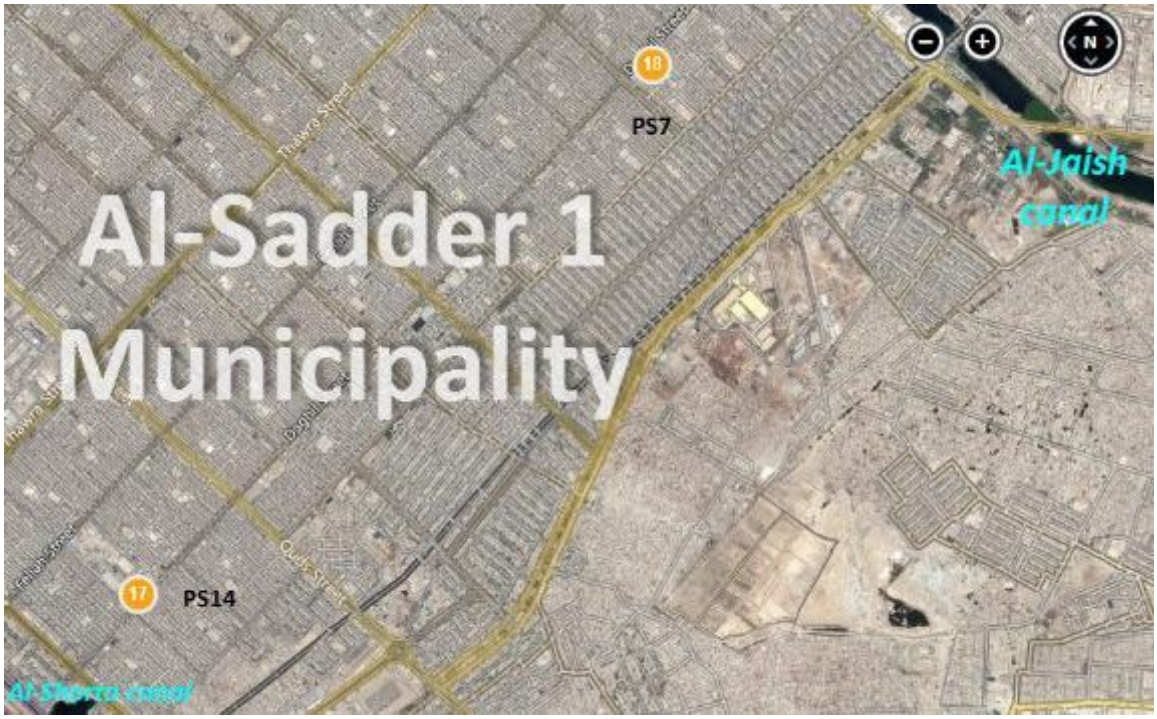

Figure 12: Locations of 2 SPSs in Al-Sadder 1 municipality

PS14 sewerage pumping station

PS7 sewerage pumping station

Figure 13: Photos of 2 SPSs in Al-Sadder 1 municipality

2.2.7. Al-Sadder 2 Municipality

There are 2 sewerage pumping stations of the Project exist in Al-Sadder 2 municipality:

- **PS9:-** Established in 1984. It receives sewage from Sectors 518, 516, and pumps it to ZIBLIN Trunk sewer,
- **PS11:-** Established in 1984. It receives Sewage from Sectors 512, 514, 518, and pumps it to ZIBLIN Trunk sewer.

Table 8: Pumping stations in Al-Sadder 2 municipality and specs

#	Pumping station	Design capacity (l/s)	Existing capacity (l/s)	Electric power (kw)	Vertical pumps		Submersible	Generators	Station area (m^2)	No. of people served
					Motor	Pump				
19	PS9	600	280	113	3	3	2	2	1,000	20,000
20	PS11	600	325	113	3	3	3	2	1,000	20,000

Figure 14: Locations of 2 SPSs in Al-Sadder 2 municipality

PS9 sewerage pumping station

PS11 sewerage pumping station

Figure 15: Photos of 2 SPSs in Al-Sadder 2 municipality

2.2.8. Al-Karada Municipality

There are 2 sewerage pumping stations of the Project exist in Al-Karada municipality:

- **SE1:-** Established in 2006. It receives sewage from main sewer line 2.1m dia. in AL-ZAFARANIYA, and pumps it to RUSTAMIYA WWTP,
- **Al-Hindiya:-** Established in 1956. It receives sewage from AL-KARADA and pumps it to ET-Line.

Table 9: Pumping stations in Al-Karada municipality and specs

#	Pumping station	Design capacity (l/s)	Existing capacity (l/s)	Electric power (kw)	Vertical pumps		Submersible	Generators	Station area (m^2)	No. of people served
					Motor	Pump				
21	SE1	2,230	1,000	1,880	5	5	5	3	2,000	55,000
22	Al-Hindiya	1,110	700	173	5	5	3	2	400	40,000

Figure 16: Locations of 2 SPSs in Al-Karada municipality

SE1 sewerage pumping station

Al-Hindiya sewerage pumping station

Figure 17: Photos of 2 SPSs in Al-Karada municipality

3. PROJECT DESCRIPTION

The Bank's Country Partnership Strategy (CPS) for Iraq FY13-17 (Report No. 73265-IQ), per the CPS Performance and Learning Review (Report No. 94767-IQ) is centered on: (i) delivering basic public services, especially in areas where the security threat has diminished, reducing poverty, and enhancing citizens' trust in government institutions, and (ii) addressing and helping to manage the country's critical fiscal situation, and helping to increase opportunities for private investors. The overarching project (BWSIP) contributes to the first pillar of delivering basis public services (drinking water and sanitation). However, the project also contributes to the second pillar, by increasing efficiency, accountability and transparency in public resource use for service at the governorate level. The Project Development Objective (PDO) is to increase the reliability and continuity in drinking water supply services as well as to improve wastewater collection and its treatment in Baghdad.

The subprojects will include interventions for replacement of old and out of order mechanical and electrical parts from 22 sewerage pumping stations in Rusafa side of Baghdad. The following sections provide more information on components, timeline, and rehabilitation works per each pumping station.

3.1. Project Components

The project of rehabilitating 22 sewerage pumping stations in Rusafa side is part of the biggest BWSIP (collectively referred to as "subprojects"). Major activities for these subprojects will be financed under component 2 – Investment in drinking water supply and wastewater infrastructure. This will mainly include replacement of old mechanical and electrical parts as well as performing all associated civil works.

Additionally, the 22 subprojects will be able to receive support from "Institutional strengthening for water security, integrated urban water management and decentralization" under Component 1. And will benefit from Component 3, which will finance a Project Implementation Consultant (PIC) (i.e. engineering, and construction supervision and quality control) and the operational costs of the project implementation teams who will coordinate, implement, supervise and monitor the project.

There are 22 sewage and storm water pumping stations that need full rehabilitation. The pumping stations are of different capacities (from 100 to 20,000 l/sec) and transfers the sewage to the Rustomiya wastewater treatment plant (capacity 550,000 m3/day). Currently the capacities are only 50%.

The construction phase is expected to span 27 months, while capacity building will be interim and will span around 6 years.

The Figure below presents the timeline for implementing the Project of 22 SPSs

Figure 18: Project implementation timeline

3.2. Replacement Works

The Project of rehabilitating 22 sewerage pumping stations (collectively referred to as "subprojects") is one part of the BWSIP, and will span 27 months to be accomplished. The subprojects will include removal of existing mechanical and electrical equipment, procurement, transportation, installation, and operation of new equipment and trial operation for handover. The subprojects are comprised of the following major works per each pumping station.

3.2.1. Al-Ghazali SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of Type A pumps, 2 sets of Type B pumps, 1 set of submersible pump, including complete sets of motors, accessories, spare parts, tools, consumables, and materials,
- Suctions and discharge valves of Types A & B,
- Check valves of Types A & B,
- Pipes and fittings,
- 2 sets of penstocks,
- 2 sets of screens (multi-rake bar screens),
- 1 set of cranes,
- Accessories and metal work: stainless steel ladders, handrails, and painting.

3.2.2. T1 SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;

- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:

- 5 sets of Type A pumps, 1 set of Type B pumps, with complete sets of motors, accessories, spare parts, tools, consumables, and materials,
- Discharge gate valves of Types A & B,
- Flap valves of Types A & B,
- Pipes and fittings,
- 2 sets of penstocks,
- Accessories and metal work: stainless steel ladders, handrails, and painting.

3.2.3. 8B SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:

- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 6 sets of ventilation systems,
- 1 set of cranes,
- Accessories and metal work: stainless steel ladders, handrails, and painting,

3.2.4. 8A SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:

- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,

- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: stainless steel ladders, handrails, and painting.

3.2.5. Al-Mujmaa Al-Elmi SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 4 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 8 units of suction and discharge gate valves, and 4 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: stainless steel ladders, handrails, and painting.

3.2.6. A1 SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of Type A pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- Screens (vertical bars),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: painting of handrails and replacement of damaged parts.

3.2.7. Al-Wazeriya SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: painting of stairs ladders and handrails, and replacement of damaged parts.

3.2.8. Al-Kahira Rain Water SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- Accessories and metal work: galvanized steel stairs, including civil work.

3.2.9. Al-Amin (AM-4) SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:

- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: galvanized steel stairs, including civil work, stainless steel ladders, cleaning and painting handrails, and replacement of damaged parts.

3.2.10. Al-Neariya SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of cranes,
- Accessories and metal work: cleaning and painting stairs ladders with handrails, and replacement of damaged parts.

3.2.11. Al-Shuhada (AM-5) SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),

- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: cleaning and painting stairs ladders, installing stainless steel ladders, cleaning and painting handrails, and replacement of damaged parts.

3.2.12. Al-Baladiyat (S-5) SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: cleaning and painting stairs ladders, installing stainless steel ladders, cleaning and painting handrails, and replacement of damaged parts.

3.2.13. Al-Bunuk (Q-3) SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: cleaning and painting stairs ladders, installing stainless steel ladders, cleaning and painting handrails, and replacement of damaged parts.

3.2.14. Al-Talibiya (Q-1) SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: cleaning and painting stairs ladders, installing stainless steel ladders, cleaning and painting handrails, and replacement of damaged parts.

3.2.15. Al-Manama (A-4) SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 4 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 8 units of suction and discharge gate valves, and 4 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: cleaning and painting stairs ladders, installing stainless steel ladders, cleaning and painting handrails, and replacement of damaged parts.

3.2.16. Aur (A-5) SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: cleaning and painting stairs ladders, installing stainless steel ladders, cleaning and painting handrails, and replacement of damaged parts.

3.2.17. PS14 SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: installation of galvanized steel stairs ladders, including civil work, installing stainless steel ladders, cleaning and painting handrails, and replacement of damaged parts.

3.2.18. PS7 SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;

- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, and 3 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: installation of galvanized steel stairs ladders, including civil work, installing stainless steel ladders, cleaning and painting handrails, and replacement of damaged parts.

3.2.19. PS9 SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 7 units of suction and discharge gate valves, and 4 units of check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: cleaning and painting stairs ladders, including replacement of damaged parts, installing stainless steel ladders, cleaning and painting handrails, including replacement of damaged parts.

3.2.20. PS11 SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;

- Installation of new facilities:
- 3 sets of volute casing vertical pumps, 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of suction and discharge gate valves, 1 unit of discharge gate valves for emergency pipe, and 3 units of check valves for pumps, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings, including replacement of ductile double flange concrete mounted with new double flange pipe with the civil work,
- 1 set of penstocks,
- 1 set of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: cleaning and painting stairs ladders, including replacement of damaged parts, installing stainless steel ladders, cleaning and painting handrails, including replacement of damaged parts.

3.2.21. SE1 SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;
- Installation of new facilities:
- 4 sets of Type A pumps, and 3 sets of Type B pumps, including all associated motors, sealing systems, accessories, spare parts, tools, consumables, and materials,
- 3 units of Type A discharge gate valves, 2 units of Type B discharge gate valves, 3 units of Type A discharge check valves, 2 units of Type B discharge check valves, and 2 units of double orifice air valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings, including civil work,
- Penstocks, including 1 unit of electrical actuators (1.2 kW) for main penstock, 1 unit of electrical actuator (1.0 kW) for wet well penstock, and 6 units of mechanical actuators for screens,
- 1 set of screens (multi-rake bar screens),
- Integrated ventilation system,

3.2.22. Al-Hindiya SPS

This new subproject will involve the following:

- Detailed design and shop drawings for the rehabilitation of the pump station, and submission to MOB for approval;
- Decommissioning of existing mechanical parts at the station, and transport to a pre-designated and approved place by MOB;

- Installation of new facilities:

- 3 sets of volute casing vertical pumps (capacity 270 l/s), 2 sets of volute casing vertical pumps (capacity 150 l/s), and 1 set of submersible pumps, including all associated motors, accessories, spare parts, tools, consumables, and materials,
- 6 units of Type A suction and discharge gate valves, 4 units of Type B suction and discharge gate valves, 3 units of Type A discharge check valves, 2 units of Type B discharge check valves, including all associated accessories, spare parts, tools, consumables, and materials,
- Pipes and fittings, including civil work,
- 1 set of penstocks,
- 2 sets of screens (multi-rake bar screens),
- 1 set of cranes,
- 6 sets of ventilation systems,
- Accessories and metal work: installation of galvanized steel stairs ladders, including civil work, installation of stainless steel ladders, and installation of galvanized mesh covers in the motor room.

3.3. Expected Activities in the Construction Phase

Work is expected to be tendered in packages, so that several contractors are expected to take part. Prior to rehabilitation, it is expected that contractors (for all 22 pumping stations) will mobilize equipment and spare parts from warehouses to the site. Working equipment will be kept in pumping stations' sites as work goes on, and will require no additional spaces outside stations' perimeters. Pumping stations are already secured with walls and a guard. The following table shows approximate areas of available yards within the 22 pumping stations that could be utilized as working areas.

Table 10: Estimated available areas for work preparations (m^2)

Al-Ghazali	**T1**	**8B**	**8A**	**Al-Mujmaa Al-Elmi**	**A1**	**Al-Wazeriya**	**Al-Kahira rain water**	**AL-Amin (AM-4)**	**Al-Neariya**	**Al-Shuhada (AM-5)**
150	300	150	100	150	200	200	200	100	100	150
Al-Baladiyat (S-5)	**Al-Bunuk (Q-3)**	**Al-Talibiya(Q-1)**	**Al-Manama (A-4)**	**Aur (A-5)**	**PS14**	**PS7**	**PS9**	**PS11**	**SE1**	**Al-Hindiya**
170	200	150	200	150	150	150	150	150	700	100

The following photos also show few examples of available working areas

Al-Ghazali SPS

T1 SPS

Al Bunuk SPS

Al Talibiya SPS (outer view)

Figure 19: Available working areas inside pumping stations

Additionally, contractors are expected to hire a number of skilled and non-skilled workers from the local market (to the extent possible) to undertake the work (estimated at 50 – 75 skilled and non-skilled workers in total per each subproject). Workers are not expected to reside within the pumping station boundaries, however, workers will enter the working sites in numbers relevant to the work load at a specific day. More detail about workers should be available by contractors before they start work.

Work will be assigned to several contractors due to the fact that locations are scattered and rehabilitation needs to proceed in parallel. Distances between adjacent pumping stations can be estimated in the range of 0.5 – 6 km. Any of the contractors will use local road network to transport equipment and spare part shipments to the working site, as well as to transport decommissioned and waste material from the working site to the place(s) designated and approved by the MOB. These activities and alike are expected to have close coordination between the Contractors and the

MOB on one hand, and between MOB and other responsible departments (for instance, the public security, and traffic) on another hand.

The rehabilitation of 22 SPSs in Rusafa will also involve carrying out limited civil works onsite. That would involve cut and fill works as well as transportation of excavation/building materials in and out of the site. Moreover, the contractors are expected to use water for washing, cleaning and flushing lines and parts sometimes. The supply and discharge of these amounts of water are the responsibility of the contractors, which must be done in close coordination with BWA and BSA.

During rehabilitation, a partial shutdown will be performed at a specific site to maintain the service while completing rehabilitation works for that station. No full stoppage will be performed at any of the 22 stations, however, a by-pass plan will be used if required. Over-pumping and flow diversions are expected to occur during this stage. This is expected for all 22 pump stations. However, contractors are required to submit their proposals for over-pumping and temporary diversion of flows to pertinent authorities for approval before the work starts.

4. BASELINE INFORMATION

4.1. Physiochemical Environment

4.1.1. Climate

The climate is arid subtropical continental with very hot and completely dry summers and cold winters having some rain. The mean maximum temperature in July and August is about 43°C but during heat waves the temperature shoots up to 49°C. Dust storms are common in summer. The winter is chilly with mean minimum temperature of 4.5°C in December and January but the minimum temperature drops down to -7°C during cold waves which are experienced intermittently during December and January. The mean annual rainfall ranges from about 120 mm in the south to about 160 mm in the northeast, occurring in winter and spring.

Baghdad may have exceptional flooding events almost every 30 years. Flooding events may require many days to drain water from the flooded streets. The prevailing wind direction in Baghdad is Northwestern, and is commonly known as "Shamal". Wind blows with mostly 59 degrees to the West, while the average wind speed is about 1.35 m/sec

4.1.2. Air quality and noise

Iraq has a persistent severe dust and sand storms, which are prevalent in the spring and summer months, as well as winter/summer seasonal transition period. Dust is even more agitated by the northwesterly winds that characterize the semi-arid conditions of central Iraq. Baghdad city is severely impacted by air pollutants, mostly emitted by mobile sources, industrial activities, and private generators, as well as poor quality of fuel. On another hand, road traffic in Baghdad is the most prevalent and perhaps damaging source of noise pollution. Measurements show that noise level could reach 92 dB (A) three meters from the traffic lane at all hospitals during daily hours.

4.1.3. Topography and Soils

Baghdad is part of a geological formation called the Mesopotamian Plain Region. This is a Sedimentary alluvial plain that runs along Tigris and Euphrates River beds and occupies a quarter of the country's total area. The total area of this plateau is estimated at 132,500 km^2. The land of Baghdad is considered highly flat with no clear natural drainage pattern. This type of topography brings the area at risk of floods, especially in rainy seasons. However, at the confluence of the two rivers in the south, land is even below the level of the river bed.

Baghdad has a Calcaric Fluvisols soil type. These are stratified soils of the lower Mesopotamian plain. Formed in the alluvial material deposited by the Tigris and Euphrates rivers these soils are strongly calcareous having about 20 percent of lime. Almost invariably soils contain gypsum. The organic matter content is low and the carbon to nitrogen ration is narrow. PH is 7.5 to 8.1. The texture ranges from silt loam to silty clay loam and silty clay.

4.1.4. Hydrology and water resources

Water resources in Iraq mainly come from river waters of Tigris and Euphrates. Average annual flow of the Tigris is estimated at 21.2 BCM. The World Bank has stated that the Euphrates is 100% sourced out of Iraqi borders, while the Tigris is nearly 67% sourced outside of Iraq.

Tigris is the only water source for drinking water in Baghdad. It is fed by a number of tributaries. Udhaim is the immediate one before Tigris enters Baghdad. The next, and last, downstream tributary to the south of Baghdad, is the Diyala River with a mean daily flow of 182 m^3/s at the confluence with Tigris. Water quality of the Tigris is poor due to the return flows from irrigation projects. Tigris water quality receives even more damage by direct discharge of raw sewage on daily basis, and at a rate of 500,000 m^3/day or more.

Groundwater resources in Iraq account for 0.9 BCM annually, covering the needs of around 64,000 ha of agricultural lands. Artesian water has been widely used to supplement irrigation in winter and to irrigate vegetables in summer, in addition to supplying populations.

Currently, groundwater abstraction can be achieved from within the right bank of Euphrates basin, at nearly 13m^3/s. Nevertheless, that water is found of high salinity (more than 1 mg/l) and increasing salinity when reaching estuaries to the south-east.

Water tables could also be found at shallow levels in Bagdad, and contained in relatively permeable layers, which therefore increases possibility of cross-contamination by activities above the ground surface. Quality of groundwater in Baghdad, is in continuous degradation due to intensive usage of fertilizers, seepage of contaminants through soil, intensive discharge of industrial and sanitary wastewaters to land and river, illegal commissioning of cesspits, and others. Groundwater quality in Baghdad is directly proportional to discharges to canals and rivers, and agricultural activities occurring above the ground.

4.2. Biological Environment

4.2.1. Habitats

The Project area is heavily urbanized, leaving behind very little and scattered natural habitats. However, areas of ecological features could still be found – but very limited – along the Tigris basin.

In Baghdad area, some wild flora species could be found, like deciduous flowering trees and shrubs. Examples include: *Eucalyptus*, *Populus*, *Albezea*, and *Ziziphus*. Other wild species could also be found like the *Phragmites*, which are endemic to temperate and tropical regions, along with *Typha*, which is a perennial herbaceous plant endemic to wetland and marshes.

Baghdad includes an Important Birds Area (IBA) on the Tigris River, which comprises one stop of international flyways used by huge numbers of birds moving between Africa and Eurasia. Baghdad includes habitats for endemic bird species of conservatory concern like the water birds, some of

which are classified as restricted-range species. Tigris watershed supports 71 native fish species (plus a further 21 introduced species) of which 28 are endemic to the basin.

The area also includes a wide range of invertebrates and vertebrates. However, the Project area does not include a significant wildlife, since the Project is to be implemented within boundaries of the existing pumping stations.

4.3. Socioeconomic Environment

4.3.1. Demographic characteristics

About 27 percent of the total urban population in Iraq resides in Baghdad, which is by far the largest city in the country with an estimated population of 6 million. A 2012 household survey indicates that Iraq's national poverty stood at 18.9 percent in that year and that a fifth of the population lived on less than US$2 a day, and 70 percent on less than US$4 a day. The poverty rate in 2012 in Baghdad was at 12 percent. The recent conflict will have exacerbated poverty levels. Progress made in poverty reduction between 2012 and 2014 has been reversed. Unemployment is high and labor force participation remains low, especially for women and youth. It was officially estimated at 11 percent in 2011, although actual levels, particularly among youth, were significantly higher.

Baghdad has four major universities including: The University of Baghdad (established in 1957); Al-Mustansiriya University (established in 1963); University of Technology (established in 1974); and Nahrain University. In addition, Baghdad has a much bigger number of private universities and colleges.

Also, there are more than 1,000 primary schools, hundreds of intermediate and secondary schools, several vocational, commercial and Islamic academies, many technical institutes and teachers' training institutes.

4.3.2. Economic characteristics

Between 2010 and 2015, population growth rate in Baghdad reached 2.33% (average annual) with a population density of 10,168 per sq km. Gross Domestic Product (GDP) per capita in Baghdad was 3,630 USD in 2008, while average annual real GDP growth rate in the period 2008 – 2025 is estimated at 5.8 (according to Price Waterhouse Coopers). However, non-oil-GDP has contracted by 5.1 percent in 2014 and 13.9 percent in 2015

In general, The Iraqi economy is facing severe and pressing challenges. The decline in oil prices and the financing needs associated with the ISIS insurgency have contributed to a sharp deterioration of economic activity, public finances and the balance of payments. Macroeconomic risks remain elevated due to Iraq's continued exposure to a volatile oil market. The government is facing the challenge of maintaining macroeconomic stability, undertaking structural reforms to improve the delivery of public services, and reconstructing core physical infrastructure amid ever-present risk of conflict relapse (World Bank, 2015).

4.3.3. Water and Sanitation

Conflict-related damages to water and sanitation services have further impacted service quality. During the Iraqi war in 2003, trunk mains and network pipelines were attacked. Lots of essential equipment was looted from pumping stations and treatment plants. Actual cost of sanitation service per cubic meter per capita is estimated at 155 ID (operational and maintenance). However, this cost is largely subsidized, so that the subscriber is only required to pay 7 ID per each 1 cubic meter of wastewater.

4.3.4. Land use

In general, Baghdad governorate has a fragmented and inefficient land use, with very limited areas for future expansion. Current land use is best described as:

- Wide urbanization without enough planning, especially the by housing sector,
- Rapid exploitation of land available for future development,
- Increased encroachment on the greenbelt,
- Scattered and disorganized industrial sector, and
- Centralized commercial and other services sectors.

5. LEGAL AND REGULATORY FRAMEWORK

This section aims to provide a concentrated view to the applicable laws, regulations, instructions, and safeguards in the field of environment and public health in Iraq, both at the national and international levels. The activities of this proposed development are expected to comply with the requirements of this legal register during construction and operation. And it is envisaged also that environmental monitoring during construction and operation will take place in reference to the minimum permissible limits set out in national and international guidelines described below.

Reviews of this framework are provided under thematic areas of concern as follows:

5.1. Access to Public Water and Sanitation Services:

The Human Right to Water and Sanitation, UN resolution A/RES/64/292 has through its meeting on 28 July, 2010, the United Nations General Assembly declared:

"Safe and clean drinking water and sanitation a human right essential to the full enjoyment of life and all other human rights".

5.2. Public Health, Water, and Environment

5.2.1. Public health and Safety

Public Health Law no. 89 – 1981

The Public Health Law is considered the backbone for protecting public health from harmful interaction with the environment and vice versa. In so doing, the Law tackles issues related to the environment that has direct and indirect impact on human health and wellbeing. The Law has dealt with a number of environmental aspects vulnerable to alteration by human activities like, preserving natural coherence, water, land, and air. The Law has already addressed areas of concern related to public health and the surrounding environment since the early development of the country, from which many national laws, regulations, and instructions have been stemmed later on. For instance, the Law has outlined the healthy burial of waste by determining fundamentals of this act, like site selection, methods of burial, machinery required, and staff involved, amongst many others. In opting for burial, cultivable lands and high groundwater tables should be avoided whenever possible, sought outside of urban/suburban areas, and operated in such a way to prevent odor and pest breeding.

The Law has also stipulated general provisions for the safe handling and storage of chemicals. Precautions involved the need for suitable signage, minimizing quantities and the need to store hazardous materials, and replacing them with less hazardous ones if possible.

Noise and vibration, on the other hand, has got a good level of attention, which is connected to the protection of workers from sources of noise and vibration. By the virtue of this Law, the employer is required to use low-vibration equipment, monitor levels of vibration in workplace, provide their workers with proper protection equipment, as well as offer their workers proper medical checks and

treatment for those directly exposed to noise and vibration sources. Last but not least, the Law, in its Article 99, has set out penalties for breaching cases in comparison to limits detailed in relevant regulations.

5.2.2. Environment protection

Preservation of Water Resources Regulation no. 2 – 2001

As mentioned in article 8 of this regulation, it is prohibited to discharge or throw any kind or any amount of waste from the location to the common water of any kind or quantity, whether the discharge is regular, irregular or temporary, for any reason, unless granted permission from the Office of Protection and Improvement of the Environment or whom it shall authorize.

Protection and Improvement of the Environment Law no. 27 – 2009

The law aims at protecting and improving the environment through elimination and treatment of existing damages or those likely to be caused. It also aims at preserving public health, natural resources, and biodiversity as well as natural and cultural heritage in coordination with the relevant authorities in a manner that ensures sustainable development through international and regional cooperation. Article 3 of this Law establishes the "Environment Protection and Improvement Council", which is associated with the Ministry of Environment and includes 22 representative members from all ministries and commissions. The objectives of this Council are concerned with (but not limited to): providing advice on environmental issues; reviewing plans, projects, programs, including emergency and environmental disaster plans, all in relation to environmental aspects before approval; internally coordinating between authorities and externally presenting the country in the environmental regional and international forums; implementing environment improvement project in Iraqi provinces; and taking part in formulating environmental legislations as well as preparing annual reports on the environmental situation. Article 7 of the Law entails the establishment of Environment Protection and Improvement Councils in each governorate with some power attached to their own environmental matters. Articles 11 and 12 relate to new and expansion projects respectively, and the need to prevent or encourage developments in line with protecting natural resources, adopting sustainable and environmentally sound systems, and exploring renewable energy sources.

However, this law addresses the following environmental areas in particular:

- Article 14 (protection of water resources from pollution) prohibits: Discharge of domestic, industrial, and agricultural effluents to inland water resources without proper treatment, in compliance with specifications set out in environmental-related legislations; Disposal of solid waste, animal waste and corpses, or scrap material into water resources; Discharge of waste oil, wastewater, or fuel from tankers to surface water or territorial waters; Any act that would lead to pollution of surface water bodies as a result of exploitation of the river, unless otherwise approved.

- Article 15 (Air pollution and noise reduction) prohibits: Emissions of fumes, gases, or vapors in excess from production processes, or burning fuel, and considers that a breach of national environmental legislations; Excessive emissions from engines and vehicles above permissible limits; Burning of solid waste outside of designated areas, given that this is done in an environmentally friendly manner.

- Article 16 prohibits high levels of noise that exceed permissible limits, in the operation of machinery, equipment, horns, and loudspeakers.

- Article 17 (Protection of land) which prohibits: Activities that would lead to degradation or pollution of soil either directly or indirectly; Non-compliant urban sprawl on land; Activities that would result in desertification or impacting natural environment, unless otherwise approved; Damage to designated areas of natural and cultural heritage, including unauthorized disposal of solid waste in such places.

- Article 18 (Protection of biodiversity) which prohibits: Damaging biota in their habitat; Fishing, hunting, killing, and transferring endangered/ protected species; Damaging plants/ herbs of medical, scientific, industrial, and trade values; Cutting perennial trees in public areas (30 years of age or more), logging in the forest, and introducing new animals and plants in the environment all unless otherwise permitted.

- Article 19 urges the development of a national register for hazardous materials in use in the country and establishment of a manifest system for hazardous wastes.

- Articles 20 addresses the need to: control the use of pesticides and chemical compounds; Apply an environmentally sound methods for transferring, handling, storing, and disposing hazardous materials including radioactive ones; ensure those materials not causing harm/ damage to the environment; prohibit treatment of hazardous waste without prior permit.

- Article 22 is related to the environmental monitoring for prohibited activities that impact the environment,

- Article 23 urges the operator of a facility, which is subject to environmental control, to maintain records of releases to the environment.

Protection of Ambient Air Quality Regulation no. 4 – 2012

This Regulation was derived from the Protection and Improvement of Environment Law no. 27 described above. It was intended to emphasize the need for protecting ambient air quality and controlling the various sources of pollution. According to the Regulation, the Ministry of Environment is responsible for: establishing a monitoring program on the national scale, including the provision of monitoring equipment and pursuing fund opportunities; using data collected from monitoring stations and utilizing them in preparing environmental reports; putting a national guide for air-polluting substances; issuing allowable limits of air pollutants; managing and controlling air pollution from stationary and mobile sources in collaboration with relevant authorities.

The Regulation requires that stationary emitting sources adhere to national thresholds and use monitoring devices to ensure compliance. It is also required that emissions from electricity

generators using a hydrocarbon fuel are kept within limits, applying corrective measures in case of exceeding limits, and seeking alternative/new technologies to replace the old ones.

According to the Regulation, it is prohibited to burn all types of plastics, rubber, used oils, materials containing heavy metals, medical wastes, domestic wastes, inside a facility, or in the open air, or next to a residential area or a water source. Dumping facilities and incinerators are to be established in full compliance with national and international standards.

Protection of Wild Animals and Birds Law no. 21 – 1997

As detailed in Article 2, implementation and monitoring shall be entrusted to the "Special Administration", whereas Article 3 is concerned with the breeding of wild animals in protected areas and creation of natural habitats for wild animals and birds. The law requires the Minister of Agriculture and Land Reclamation to issue a list of protected species of birds and animals, prohibited zones, and hunting seasons. Hunting may only be authorized by the Minister of Agriculture and Land Reclamation, which if not granted will result in a fine or an imprisonment or both.

Decision Concerning the Cutting of Trees no. 1 – 1991

By the virtue of this decision, it is prohibited to cut trees from natural forests and street sides, as well as from areas with young trees and green belts. Failing to comply with the Order will result in punishment according to the provisions of the "Protection and Improvement of the Environment Law no. 76 – 1986."

Forest Law no. 30 – 2009

According to this Law, forests are classified into three categories: State Forests, Endowed Forests, and Private Forests. The provisions of the Law are applicable to State Forests, though; Article 4 still contains general provisions for all forests. In particular, the Law is assigning administration of protected/reserved forests to the Directorate General of Forests and Plantation. The Law also deals with enforcement and sets out offences and penalties. Furthermore, the Law prohibits cutting forest trees for charcoal and commercial purposes in specified natural forests according to Article 1. However, villagers are allowed – for particular purposes – to cut trees for timber and to transport it within the forest region (Articles 3 & 4).

Projects on International Waterways – OP/BP 7.50

The World Bank recognizes the issues involving projects on international waterways and attaches importance to the riparian countries making appropriate agreements or arrangements for the entire waterway, or parts thereof. In the absence of such agreements or arrangements, the Bank requires, as a general rule, that the prospective borrower notify the other riparian countries of the project. The Policy lays down detailed procedures for the notification requirement, including the role of the Bank in affecting the notification, period of reply and the procedures in case there is an objection by one of the riparian countries to the project.

Note: The project area is located on the Tigris which is an international waterway. However, the project involves rehabilitation of existing pumping stations, construction of potable water reservoir, and non-revenue water including replacement of old drinking water distribution network. The

project does not involve works and activities that would exceed the original capacity of the pumping stations and will not increase water off-take from the Tigris. Therefore, the project falls within the exception to the notification requirements of OP 7.50, set forth in paragraph 7(a) of OP 7.50.

The new determinants for the Prevention of Pollution of Rivers and Public Water Regulation, no. 25 – 1967

This instruction lays down the new determinants for the prevention of pollution of rivers by the virtue of Regulation 25, 1967. These instructions set physical, chemical, and biological guidelines for water quality and wastewater discharges. The Regulation defines Water Resources as:

- Rivers and its tributaries and branches;
- Streams, waterways, canals, and their branches;
- Lakes, ponds, and other pools of water; and
- Springs, wells, and groundwater.

In particular, these instructions apply to wastewater from cities, industry, agriculture, and other activities including:

- Wastewater discharges to a public water source;
- Wastewater discharged to public sewer treatment works; and
- Wastewater discharged to the marshes.

The table below shows the limits defined for discharges to both natural waters (water resources) and sewers (which generally have higher permissible discharge limits).

Table 11: Discharge consent parameters

Pollutant	Limits for discharge to water resources	Limits for discharge to public sewers
Color	-	-
Temperature	Less than 35°C	45°C
Suspended solids	60	750
pH	6 – 9.5	6 – 9.5
Dissolved Oxygen (DO)	-	-
Biochemical Oxygen Demand (BOD)	Less than 40	1,000
Chemical Oxygen Demand (COD)	Less than 100	-
Cyanide (CN^-)	0.05	0.5
Fluoride (F^-)	5.0	10
Free Chlorine (Cl_2)	Traces	100
Chloride (Cl^-)	A. If the ratio of the amount of water discharged to the amount of source water is 1000:1 or less, the chloride concentration of the discharge is permitted at 1% of the concentration of the natural source before discharge. B. If the ratio of the amount of water discharged to the amount of source water is more than 1000:1 the wastewater discharge must not exceed a chloride concentration of greater than 600 mg/L. C. If the concentration of chloride in the source water is less than 200 mg/L then the permitted discharge limit must be established on a case by case basis	600
Phenol	0.01 – 0.05	5 – 10
Sulfate (SO_4^{2-})	A. If the ratio of the amount of water discharged to the amount of source water is 1000:1 or less, the sulfate concentration of the discharge is permitted at 1% of the concentration of the natural source before discharge. B. If the ratio of the amount of water discharged to the amount of source water is more than 1000:1 the wastewater discharge must not exceed a sulfate concentration of greater than 400 mg/L. C. If the concentration of sulfate in the source water is less than 200 mg/L then the permitted discharge limit must be established on a case by case basis	300
Nitrate (NO_3^-)	50	-
Phosphate (PO_4^{3-})	3	-
Ammonium (NH_4^+)	-	-
DDT	Nil	-
Lead (Pb)	0.1	0.1
Arsenic (As)	0.05	0.05
Cupper (Cu)	0.2	-
Nickel (Ni)	0.2	0.1
Selenium (Se)	0.05	-
Mercury (Hg)	0.005	0.001
Cadmium	0.01	0.1
Zinc (Zn)	2.0	0.1
Chromium (Cr)	0.1	0.1
Aluminum (Al)	5.0	20
Barium (Ba)	4.0	0.1

Pollutant	Limits for discharge to water resources	Limits for discharge to public sewers
Boron (B)	1.0	1.0
Cobalt (Co)	0.5	0.5
Iron (Fe)	2.0	15
Manganese (Mn)	0.5	-
Silver (Ag)	0.05	0.1
Total Hydrocarbons & Derivatives	Allows discharge of total hydrocarbons to water sources and A1 and A2 according to the concentrations and limitations set forth in the tables below; the concentration of hydrocarbons must be measured discharging to the water source. Hydrocarbons shall not be discharged to water sources A3 and A4. For rivers in continuous flow 10 mg/l according to the ratio of the amount of wastewater discharged to the amount of the water source should not be less than 1000:1. For a river in a continuous flow 3 mg/L and in accordance with the ratio of the amount of the wastewater discharged to the amount of water source should not be 300:1 or less.	-
Sulfide (S^{2-})	Nil	3.0
Ammonia (NH_3)	Nil	10
Ammonia gas (free NH_3)	Nil	6.0
Sulfur dioxide SO_2	Nil	7.0
Calcium Carbide CaC	Nil	Not allowed
Organic solvents	Nil	Not allowed
Benzene	Nil	0.5
Chlorobenzene	Nil	0.1
TNT	Nil	0.5
Bromine (Br_2)	Nil	1 – 3

The Iraqi authorities have classified public waters into four main grades (A1, A2, A3, and A4) according to environmental quality standards represented by chemical and physical values (see table below).

Table 12: Public water classification (grades A1 – A4) by chemical and physical determinants

Determinant	A1	A2	A3	A4
Color	Normal	Normal	Normal	Normal
pH	6.5-8.5	6.5-8.5	6.5-8.5	-
Dissolved oxygen	>5	>5	>5	-
BOD5	<5	<3	<3	-
Cyanide	0.02	0.02	0.02	0.02
Fluorine	0.2 or more depending on the concentration in the natural source			
Free chlorine	Traces	Traces	Traces	Traces
Chlorides	200 or more depending on the natural source			
Phenol	0.005	0.005	0.005	0.005
Sulfate	200 or more depending on the natural source			
Nitrate	15	15	15	50
Phosphate	0.4	0.4	0.1	0.4
Ammonium	1.0	1.0	1.0	-
Pesticides (DDT)	0.0	0.0	0.0	0.0
Lead, Arsenic, Copper,	0.05	0.05	0.05	0.05

Determinant	A1	A2	A3	A4
Chromium, Cobalt,				
Nickel, Manganese	0.1	0.1	0.1	0.1
Selenium, Silver	0.01	0.01	0.01	0.01
Mercury	0.001	0.001	0.001	0.001
Cadmium	0.005	0.005	0.005	0.005
Zinc	0.5	0.5	0.5	0.5
Aluminum	0.1	0.1	0.5	-
Barium, Boron	1.0	1.0	1.0	1.0
Iron	0.3	0.3	0.3	0.3

5.3. Occupational Health and Safety

The Project is expected to involve manpower of different levels (skilled and non-skilled) to carry out rehabilitation works in the construction phase, and afterward, to provide controlling and corrective/preventive measures in the operational phase. In principle, the workplace where construction and operation activities are performed has to meet certain criteria to protect against exceeding norms of ambient air, noise, and vibration. The following will provide reference limits for a range of parameters according to local and internationally-recognized regulators, in addition to showing values against which areas monitoring could be undertaken.

5.3.1. Air Quality

According to the Iraqi National Clear Air Act issued in 1979, the Air Quality Standards set out the following limits based on a medium-termed policy targets that take into consideration economic efficiency, practicability, technical feasibility, and timescales, which mostly agree with the WHO guideline limits. However, the table below compares ambient air quality standards set by the local regulator with those internationally indorsed by the World Health Organization (WHO). These limits are applicable to emissions from stationary sources by different activities rather than being industry-specific. Thus, they could be applied to the construction and operation/maintenance works at the target sewerage pumping stations in Baghdad.

Table 13: Maximum allowable limits for air pollutants (stationary sources) by different regulators

Pollutant	Government of Iraq		World Health Organization (WHO) – 2006		
	Maximum permissible concentration	Remarks	Limit	Monitoring period (averaging time)	Remarks
Sulfur Dioxide (SO_2)	500 mg/m^3	-	500 $\mu g/m^3$	10 min	Mean value
			-	1 hr	
			20 $\mu g/m^3$	24 hr	
			-	1 yr	
Carbon Monoxide (CO)	250 mg/m^3	other than fuel combustion sources	100 $\mu g/m^3$	15 min	Mean value
	500 mg/m^3	from old combustors	60 $\mu g/m^3$	30 min	

Pollutant	Government of Iraq		World Health Organization (WHO) – 2006		
	Maximum permissible concentration	**Remarks**	**Limit**	**Monitoring period (averaging time)**	**Remarks**
	250 mg/m^3	from new combustors	30 µg/m^3	1 hr	
			10 µg/m^3	8 hr	
Nitrogen Oxides (expressed as NO_2)	70 mg/m^3	From gaseous fuel combustion	200 µg/m^3	1 hr	Mean value
	150 mg/m^3	From liquid fuel combustion	-	24 hr	
			40 µg/m^3	1 yr	
Ozone	250 mg/m^3	-	100 µg/m^3	8 hr	Mean value
TSP	250 mg/m^3	From fuel combustion sources	-	-	-
$PM_{2.5}$	-	-	25 µg/m^3	24 hr	Mean value
			10 µg/m^3	1 yr	
PM_{10}	-	-	50 µg/m^3	24 hr	Mean value
			20 µg/m^3	1 yr	
Volatile Organic Compounds (VOCs)	20 mg/m^3	All sources	-	-	-
Emissions associated with sewer					
Hydrogen Sulfide (H_2S)	5 mg/m^3	Other sources than material industries	150 µg/m^3	24 hrs	Based on effects other than cancer or odor/annoyance
			7µg/m^3	24 hrs	for non-cancer effects other than cancer
Methane (CH_4)	-	-	5 – 10 %	-	As explosive
			O_2 < 16%	-	As asphyxiant: (suffocant)
			1,000 ppm (avg)	8 hr	Threshold limit value in work shift
Ammonia & Ammonium compounds	10 mg/m^3	measured as NH_3	270 µg/m^3	24 hr	Mean value
			8 µg/m^3	1 yr	Mean value, measured as NH_3

** Source: National Air Emissions Standards, instructions no. 3 – 2012*

The World Health Organization has published a research values of Hydrogen Sulfide at which Human health could be impacted. The study has revealed that the short–term tolerable concentration of Hydrogen Sulfide to the Human being is reached at 2.8 mg/m^3 (exposure durations from 1 – 14 days) measured as Lowest Observed Adverse Effect Level (LOAEL). The following table shows health impacts relative to different exposure concentrations.

Table 14: Human health effects at various hydrogen sulfide concentrations

Exposure (mg/m^3)	Effect/ Observation
0.011	Odor threshold
2.8	Bronchial constriction in asthmatic individuals
5.0	Increased eye complaints
7 or 14	Increased blood lactate concentration, decreased skeletal muscle citrate synthase activity, decreased oxygen uptake
5 – 29	Eye irritation
28	Fatigue, loss of appetite, headache, irritability, poor memory, dizziness
>140	Olfactory paralysis
>560	Respiratory distress
≥700	Death

Source: Concise International Assessment Document 53 by Dr. Selene J. Chou. WHO 2003

Other sources of air pollutants could significantly come from combustion facilities. Those facilities are systems designed to deliver electrical or mechanical power, steam, heat, or any combination of these, regardless of fuel type, with a total rated heat input capacity of between 3 Megawatt thermal (MWth) and 50 MWth. The Environmental Health and Safety Guide of IFC has set out limits of air pollutants by two types of fuel (see table below)

Table 15: Emissions from small-scale combustion facilities (3MWth – 50MWth) – Engine

Combustion Technology / Fuel	Particulate Matter (PM)	Sulfur Dioxide (SO_2)	Nitrogen Oxides (NO_x)	Dry Gas, Excess O_2 Content (%)
Gas	N/A	N/A	200 (Spark Ignition) 400 (Dual Fuel) 1,600 (Compression Ignition)	15
Liquid	50 or up to 100 if justified by project specific considerations (e.g. Economic feasibility of using lower ash content fuel, or adding secondary treatment to meet 50, and available environmental capacity of the site)	1.5 percent Sulfur or up to 3.0 percent Sulfur if justified by project specific considerations (e.g. Economic feasibility of using lower S content fuel, or adding secondary treatment to meet levels of using 1.5 percent Sulfur, and available environmental capacity of the site)	If bore size diameter [mm] < 400: 1460 (or up to 1,600 if justified to maintain high energy efficiency.) If bore size diameter [mm] > or = 400: 1,850	15

Source: Environmental, Health, and Safety Guidelines, Air Emissions and Ambient Air Quality – IFC

The above emission values are applicable to small combustion process installations operating more than 500 hours per year, and those with an annual capacity utilization of more than 30 percent. For combustion facilities using a mixture of fuel, emissions should be compared with these guidelines based on the sum of the relative contribution of each applied fuel. Lower emission values may apply where the facility is located in an ecologically sensitive airshed, or airshed with poor air quality.

5.3.2. Noise

Noise Prevention Law no. 21 – 1966

The Noise Prevention Law aims to protect against excessive noise levels in public areas. The Law prohibits the use of speakers between 10pm and 8am. And prohibits broadcasting in public places in order not to disturb the peaceful environment, although using internal speakers could be approved by the police department sometimes. Upon Article 3 of the Law, the use of noise-generating equipment should be notified to the police department 3 days beforehand, while sometimes the decision could be made on the same day as the application of that equipment. Article 4 makes clear the right for authorities to supervise and control media broadcast in public places, and to take needed actions in case of violation. Article 5 details violations and penalties should the provisions of the Law be breached.

Noise Prevention Law – Instructions no. 2 – 1993

According to the Iraqi Instructions, industrial and commercial operations have a maximum permissible limits of 70 dB (A), while the stated construction and operation noise level guidelines within residential locations is 55 dB (A) for day-time and 45 dB (A) for night-time (see table below).

Table 16: Noise limits for different working environments – Iraqi Instructions

Reception Zone	Level L_{Aeq} (daytime)	Level L_{Aeq} (nighttime)
Industrial	70	70
Commercial	70	70
Residential	55	45

Source: Iraqi national standards, Instructions no. 2 – 1993

These limits are consistent with the World Bank's guideline, which emphasizes that noise impacts should not result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site. According to the World Bank's guideline, daytime is between 7am – 10pm, while the nighttime is between 10pm – 7am.

The World Bank's Noise Guideline has presented more exposure environments as in table below

Table 17: Noise limits for different working environments – The World Bank Group

Location/ Activity	Equivalent level LA_{eq},8h	Single time event Maximum LA_{max}, fast
Heavy Industry (no demand for oral communication)	85 dB(A)	110 dB(A)
Light industry (decreasing demand for oral communication)	50 – 65 dB(A)	110 dB(A)
Open offices, control rooms, service counters, or similar	45 – 50 dB(A)	-
Individual offices (no disturbing noise)	40 – 45 dB(A)	-
Classrooms, lecture halls	35 – 40 dB(A)	-
Hospitals	30 – 35 dB(A)	40 dB(A)
For every 3 dB(A) increase in sound levels, the "allowed" exposure period or duration should be reduced by 50%		

Source: Environmental, Health, and Safety (EHS) Guidelines – IFC

The quoted national and the World Bank's noise levels also correlate with the Guideline values stated by the Guidelines for Community Noise, WHO, 1999. Moreover, the latter guideline is more concerned with health effects associated with different exposure environments (see table below).

Table 18: Health effects associated with noise level exceedances

Exposure environment	Health effects	L_{Aeq} (dB)	Exposure time continuous (hr)	Single time event L_{Amax} (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors,	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Dwelling indoors, inside bedrooms	Sleep disturbance, night-time	30	8	45
Industrial, commercial, shopping, and traffic areas, indoors and outdoors	Hearing impairment	70	24	110
Public addresses, indoors and outdoors	Hearing impairment	85	1	110

Source: WHO Guideline for community noise, WHO – 1999

Noting again, that for every increase of 3 dB (A) over permissible limits, exposure time should be cut in half, in order to avoid health consequences.

5.3.3. Vibration

Public Health Law no. 89 – 1981/ Instructions no. 4 – 1993

Pursuant to Article III, General Objectives/ paragraphs VI & VII of the Public Health Law no. 89, Instructions no. 4 (Occupational Health: Protection of Workers from Vibrations) has been issued in 1993, which is still effective since that date.

These Instructions are related to the protection of workers from sources of vibration in workplaces. These instructions stress the requirements for:

- Pre-examining workers before they commence at their job centers to ensure they medically fit to work in environments that involve vibration;
- Performing health surveillance every 6 months for workers exposed to vibration;
- Breaking for 10 minutes during each working hour, and prohibiting smoking;
- Providing vibration resistant gloves; and
- Promoting best practices for workers: like discouraging firm holding of vibration-producing machines, keeping the body warm, dry, and in the least contact possible with those machines.

The Instructions stipulate that the employer must minimize levels of equipment vibration, use low-vibration equipment; monitor levels of vibration in the workplace; and provide training for employees with respect to vibration in the workplace (as above).

The permitted levels of exposure to vibration and the duration of exposure for hands and arms are detailed in the following table.

Table 19: Maximum limit values for exposure of hand-arm to vibration – Iraqi Instructions

Total Daily Exposure (hr)	**Maximum Exposure Limit Value Frequency weighted acceleration in the dominant direction that should not be exceeded (g* or m/s^2)**
4 – 8	4 g, or 0.40 m/s^2
2 – 4	6 g, or 0.61 m/s^2
1 – 2	8 g, or 0.81 m/s^2
Less than 1	12 g, or 1.22 m/s^2

** Gravity (g) = 9.81 m/s^2*

The above limits is consistent with the Threshold Limit Values (TLVs) for exposure of the hand to vibration in X, Y, or Z direction set by American Conference of Governmental Industrial Hygienists (ACGIH), which is also adopted by the World Bank Group for exposure to vibration in workplace. The Instructions also suggest that vibration to hand is dependent on how a worker can feel it, and many factors can play a role in this feeling like frequency and the way the vibration-producing machine is held.

Public Health Law / Safe storage and handling of chemicals, instructions no. 4 – 1989

These instructions set out requirements of safe handling and storage of chemicals according to the provisions of Articles 3 & 105 of the Public Health Law. These instructions apply to activities involved in the manufacturing, using, storing, or handling of the following chemical types: explosives; flammables; oxidizing substances; corrosive, radioactive, and carcinogenic chemicals; chemical drugs; toxic chemicals and pesticides; chemical irritants; and inert chemicals. Article 2 outlines necessary precautions for handling and storing chemicals and the need for proper signage. Placement of hazardous with less hazardous materials is required if possible, along with storing hazardous materials at the minimum possible quantities.

Article 3 outlines the suitable signage and labeling, security and safety, as well as adopting an international classification system by the manufacturer.

Article 4 outlines factors that should be taken into consideration when planning for storage including properties of chemicals to be stored, chemicals protection against damage, exposure, or fire, as well as transporting chemicals containers to and from storage places.

Article 5 sets requirements for constructing new chemical stores. While Article 6 puts the rules for correct storage.

The remainder of the instructions details the requirements for safe storage and use of the chemicals, for disposal of waste chemical containers, and the actions to be taken on the event of the release of a chemical. The instructions also include the need to use Personal Protective Equipment (PPE) by individuals working with such chemicals.

5.3.4. Environmental Health and Safety Guidelines

The Environmental, Health and Safety (EHS) Guidelines, of the World Bank Group (WBG)/ International Finance Corporation (IFC) 2008[2], are the safeguard guidelines for environment, health and safety for the development of the industrial and other projects. They contain performance levels and measures that are considered to be achievable in new facilities at reasonable costs using existing technologies. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternative is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternative performance level is protective of human health and the environment. Section 4 of EHS Guidelines for "Construction and Decommissioning" provides additional specific guidance on the prevention and control of community health and safety impacts that may occur during a new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities.

5.4. Other Applicable Laws, Guides and Conventions

5.4.1. Labour Law no. 71 – 1987

All works under this Project must be carried out in compliance with the Iraqi Labor Law. Under this Law, equal working conditions and equal opportunities must be guaranteed to all Iraqi citizens able to work, with no discrimination on gender, race, language, or religion bases. All employers and managers, in virtue of the Law, take the responsibility for watching over good behaviors and maintaining decency of child labor, and apprentices less than 18 years old, as well as women work at their workplace. The Law also prohibits child work at hazardous or too strenuous workplaces if under 18. Workers must follow orders and instructions regarding measures of protection and occupational safety and must carefully use the protective devices entrusted to them.

5.4.2. Antiquities and Heritage Law no. 55 – 2002

It is considered a violation of the Law discovering, taking, purchasing or receiving as a gift any antiquity or heritage material that originated in Iraq, without promptly notifying and registering the object with the State Board of Antiquities and Heritage. No one is allowed, by means of excavating, digging, or discovering, to take antiquity material without a written permit. The same is applied to removing or transporting any antiquity or heritage material from Iraq to abroad.

[2] WBG EHS General Guidelines is available on: http://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES
WBG EHS for Water and Sanitation is available on:
http://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES

Violating the provisions of the Law could lead to imprisonment (up to 10 years) and a fine of 100,000 IQD. However, illegal excavation would lead to imprisonment (up to 15 years) and a fine of two times the value of the damages sustained. Trafficking in antiquities, on the other hand, is punishable with imprisoning for a period not exceeding 10 years and a fine of up to 1,000,000 IQD.

5.4.3. Acquisition Law no. 12 – 1981

This Law is applicable to all properties of agricultural, non-agricultural lands and orchards. Disposal rights of government-owned land. And other original specified rights relevant to property.

This law is the only Iraqi law that governs the rules of expropriation of property for the purposes of public benefit. According to the Law, acquisition includes: expropriation of property through acquisition, or is, by virtue of the acquisition, similar to taking over the compensations and replacement costs, cancelling the legal right and other applications of expropriation, for the public benefit. The law has adopted rules and foundations common to fair compensation for all property acquisition and guarantees the rights of possessor without prejudice to public interest.

The Law stresses the importance of fair compensation especially for agricultural lands. The Law highlights procedures for negotiating expropriation with the property owner, and addresses administrative acquisition cases.

The Law, so far, has no reference to compensation for lost assets, income, means of livelihood, or displacement from land of no legal right.

5.4.4. Involuntary Resettlement OP/BP 4.12 – The World Bank Group

This policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects. The 22 subprojects will not involve loss of land, loss of livelihood and/or socio-economic displacement/obstruction. Rehabilitation will be applied on existing locations and structures. However, Involuntary Resettlement OP/BP 4.12 is triggered as a precautionary measure, thus, the BWSIP will prepare a Resettlement Policy Framework (RPF) to establish a reference for addressing any unexpected socio-economic impacts that could result by implementing and operating the project.

5.4.5. UN Framework Convention on Climate Change and Kyoto Protocol

This Convention was adopted on 9th of May 1992. The 149 states and regional economic integration organizations of the Convention have deposited instruments of ratifications, accessions, approvals or acceptances. Kyoto Protocol constitutes an international and legally binding agreement to reduce

greenhouse gases emissions worldwide. The Convention calls for stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous man–made interference with the climate system. Sufficient timeframe should be adopted to allow ecosystems to adapt naturally to climate change. In so doing, food production will not be threatened and economic development will be enabled to proceed in a sustainable manner.

5.4.6. Convention on Biological Diversity

Signed in 1992, the Convention is the first global agreement on the conservation and sustainable use of biological diversity. And it is legally binding for member states. The Convention has three main goals:

- Conservation of diversity;
- Sustainable use of the components of biodiversity; and
- Sharing the benefits arising from the commercial and other utilization of genetic resources in a fair and equitable way.

Main issues include:

- Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protection areas with a view to ensure their conservation and sustainable use;
- Promote the protection of ecosystem, natural habitats and the maintenance of viable population of species in natural surroundings;
- Endeavour to provide the conditions needed for compatibility between present uses and the conservation of biological diversity and sustainable use of tits components;
- Where a significant adverse effect on biological diversity has been determined pursuant to Articles 7, regulate and manage the relevant processes and categories of activities;
- Encourage cooperation between its governmental authorities and its private sector in developing methods for sustainable use of biological resources; and
- Promote participation of stakeholder, particularly when it comes to assessing the environmental impacts of development projects that threaten biological diversity.

5.5. Environmental Assessment Regulatory Framework

5.5.1. The Iraqi framework

Environmental Assessment – Establishing the Ministry of Environment Law No. 37 – 2008

Because of the importance of protecting and improving the environment and since the Ministry of Environment bears the prime responsibility for protecting the environment and the public health to ensure sustainable development and to achieve international and regional cooperation, this Law was legislated to define the MOE structure, its goals and the means of implementing them.

Article 1: defines the "environmental impact assessment" as the study by which analysis and study of environmental feasibility is conducted for proposed projects. Projects under this requirement are

those expected to have effects on human health and environment integrity as a result of going through the project cycle,

Article 4: under item 3, the Ministry of Environment (MoE) is responsible for preparing regulations and issuing instructions for environmental measures and monitoring their best implementation. While under item 8, MoE has the authority to approve locations for new developments in terms of their environmental context, and give advice in coordination with other responsible ministries and entities. Item 14 of this article, however, is making clear the authority given to the MoE to either approve or reject EIAs according to further instructions issued for this purpose.

The Law also empowers the local councils for protection and improvement of the environment to perform field inspections, and monitor actual implementation of environmental management plans on the ground, as well as apply a fine system should provisions of the Law be breached.

EIA categorization – Environmental Criteria for Carrying out Projects and Monitoring Appropriateness of Implementation Instructions no. 3 – 2011

In the virtue of Item 3 of Article 4 of Ministry of Environment Law no. 37 – 2008, and Item 2 of Article 38 of the Protection and Improvement of Environment Law no. 27 – 2009, these instructions were issued by the MoE to set criteria for classifying projects in Iraq into 3 main categories: A, B, and C, which will be used later on to either approve or reject the proposed project location in light of identified impacts. The criteria were based on level of significance of adverse impacts and magnitude of impacts/ boundaries of influence. Accordingly, projects should be categorized under one of the following for an environmental assessment:

- **Category A:** Projects within this level are expected to have high significant impacts on the vulnerable biological environment, locations of cultural values, or impacts having a much broader area compared to where the project is taking place. Under this category, a resettlement could be triggered as a result of implementing the project. For each type of projects listed under Category A, a set of recommendations/ mitigation measures was proposed;

- **Category B:** Projects within this level are expected to have less significant impacts compared to those of Category A, but these impacts would be considered irreversible on the biological environment. Impacts of Projects under this category are described as being site-specific; a range of mitigation measures could be applied to alleviate negative impacts. A preliminary EIA is to be prepared.

- **Category C:** Projects within this level are expected to have no or minimal adverse impacts on the environment; any resulting impacts could be fully controlled/ minimized. No EIA is required in this case.

The project proponent is also required to apply for an environmental compliance certificate from the Ministry of Environment by initially undergoing an environmental screening/assessment to account for the expected impacts. If not clearly listed in any of the three categories' projects, the project will be screened out by the Ministry of Environment given the submission of necessary documentation by the project proponent.

Note: Projects of storm water and sewerage pumping/lifting stations are categorized "C" under Article 62 of these instructions.

EIA Content – Protection and Improvement of the Environment Law no. 27 – 2009

Article 3: declares the establishment of the "Council for Protection and Improvement of the Environment", which also defines composition, roles and responsibilities, and procedural matters. Such Council is also authorized to review EIA study reports (through a provincial office).

Articles 10 of this law further describes the procedures related to EIA studies as follows:

A project proponent must be committed to providing an EIA study prior to project commencement. The EIA study must include the following:

1. Assessment of positive and negative impacts as a result of project activities;
2. Proposition of mitigation measures to prevent or treat contamination and pollution sources in accordance with the acceptable environmental standards and guidelines;
3. Adoption and discussion of measures for the prevention of potential contamination and emergency pollution;
4. Assessment of alternatives in terms of utilizing proper means/technology that cause the least impact to the environment; in addition to rationalizing and managing the consumption of resources;
5. Reduction and management of wastes and adoption of measures for reuse of materials, and recycling, wherever possible;
6. Estimation of the environmental feasibility of the project and the cost of pollution to production ratio. The technical and economic feasibility study for any project must include the EIA study as described in the first item.

Common Procedure for Obtaining Environmental Compliance Certificate in Iraq

The following figure explains the common procedure that a project proponent should follow in order to obtain an environmental approval (Environmental Compliance Certificate) from the Iraqi Ministry of Environment.

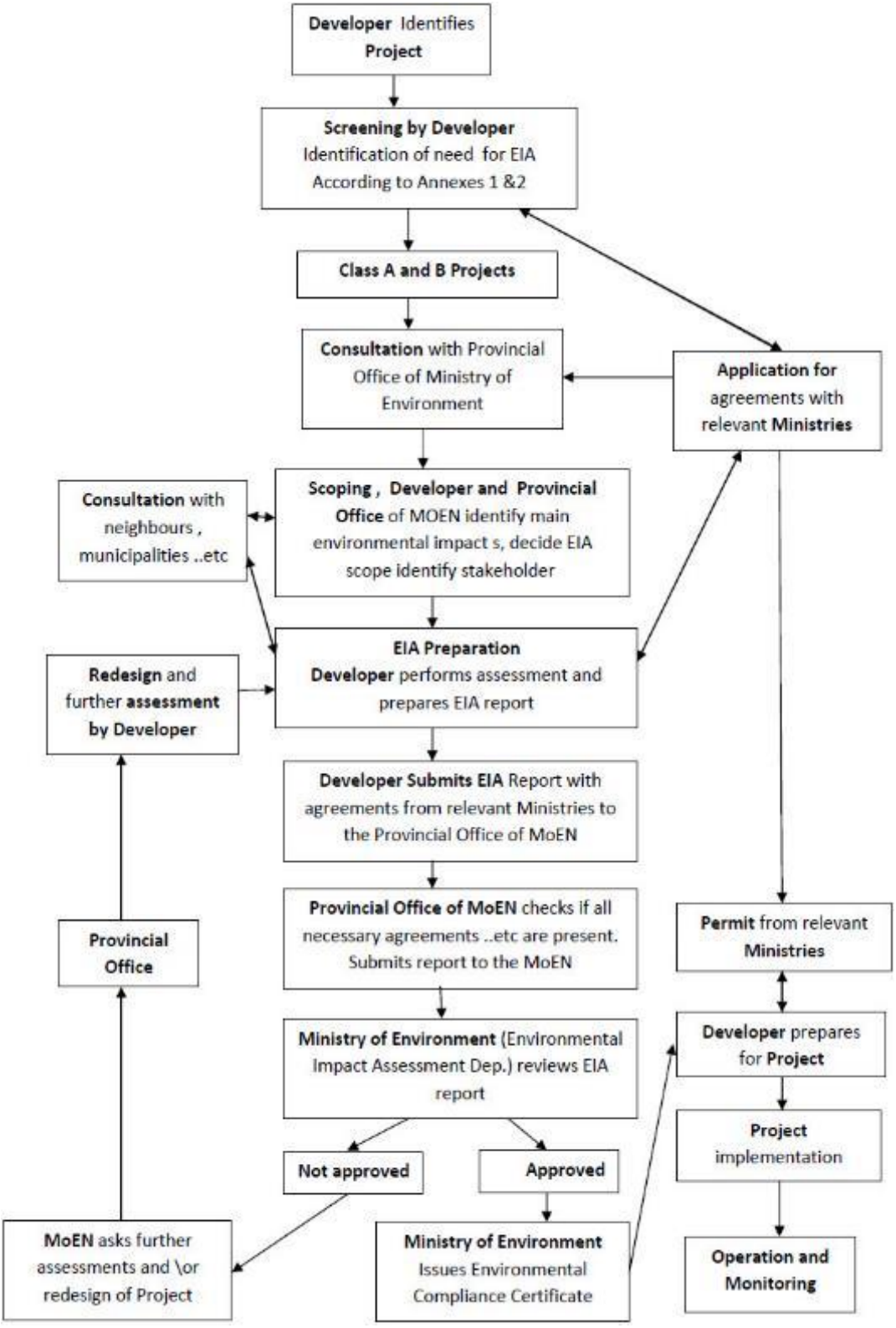

Figure 20: Simplified EIA process diagram in Iraq – categories A and B

Source: United Nations Economic Commission for Europe (UNECE) – 2010

5.5.2. The World Bank's EIA framework

Environmental Assessment – OP/BP 4.01

This OP/BP 4.01 of the World Bank sets objectives, triggers, and implementation mechanisms, which in whole constitute the overarching safeguard policy to identify, avoid, and mitigate the potential negative environmental and social impacts associated with the Bank's lending operations. In the World Bank operations, the purpose of Environmental Assessment (EA) is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted. The borrower is responsible for carrying out the EA and the Bank advises the borrower on the Bank's EA requirements. The Bank classifies the proposed project into three major categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its environmental impacts. These are as follows:

- Category "A": The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.
- Category "B": The proposed project's potential adverse environmental impacts on the human population or the environmentally important areas-including wetlands, forests, grasslands, or other natural habitats- are less adverse than those of Category "A" projects. These impacts are site-specific; few of them, if any, are irreversible; and in most cases, mitigation measures can be designed more readily than Category "A" projects.
- Category "C": The proposed project is likely to have minimal or no adverse environmental impacts.

Environmental Assessment Bank Procedure

The following diagram summarizes the procedure for obtaining the WB's environmental clearance.

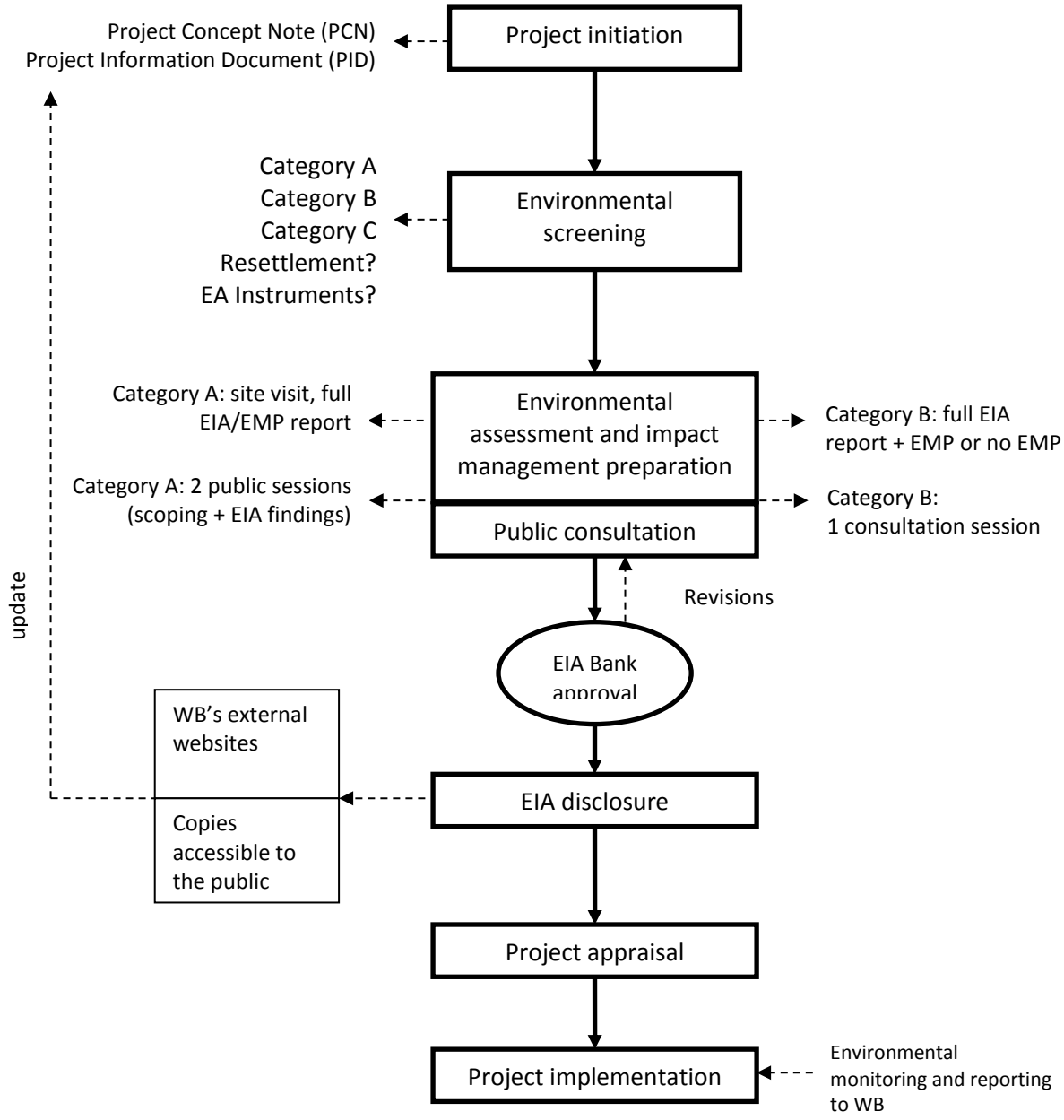

Figure 21: Simplified EIA process diagram according to the World Bank Operations Manual

5.5.3. Gap analysis

The Project – rehabilitation of twenty two SPSs in Rusafa – is financed by the World Bank, which entails fulfilling environmental and social safeguards issued by the World Bank Group. Once safeguards have been fulfilled, the financial assistance will be authorized for the borrower accordingly. At the same time, the Project needs to be approved locally from the Iraqi Ministry of Environment, which by the Law, is responsible for screening out the project, reviewing EIA study report, and accordingly issuing certificate of environmental compliance.

As mentioned above, the Council for Protection and Improvement of the Environment (established by the virtue of Law 27) has set out 3 categories/ levels of environmental assessment against which a project in Iraq should be classified. These 3 categories were based on the level of significance and magnitude/ boundaries of effect that a project would have on the environment. The 3 categories of Iraqi instructions furnished by the Iraqi Government were also based on as the same criteria as those set out by the WB; (severity on a proposed location, and magnitude/ boundaries of influence).

This subprojects are taking place on existing infrastructures, including no new constructions, no additional land, and no involuntary resettlement, thus, environmental and social impacts are much localized and could be managed easily. Therefore, the project is screened as category B in accordance to Environmental Assessment OP/BP 4.01 (i.e. partial assessment) should the new interventions, in general, have less significant and site-specific impacts on the surrounding environment. On the other hand, the Iraqi instructions no. 3 explicitly classifies storm water and sewerage pumping/lifting stations projects under category C (Article 62), which implies that a project of rehabilitating existing sewerage pumping/lifting stations could also be classified as category C. According to instructions 3, requirements of obtaining an environmental clearance under category C is less stringent than those of category B. which means that some instruments required by the WB could be dropped off by the Iraqi Ministry of Environment, yet no major mismatch is expected in the way impacts are analyzed. In any scenario, the project proponent (the BSA in this case) must approach the Ministry of Environment as early as possible to get the requirements for attaining an Environmental Clearance Certificate and to establish agreement and harmony between the Iraqi and WB's sets of requirements.

On another hand, the WB's requirements for category B projects would entail the undertaking of a public consultation, in order to share views with Project Affected Persons (PAPs) before commencing the Project; to collect feedback about the most pressing environmental and social areas to be assessed; and to put the most feasible and sound mitigatory measures that would ensure best attenuation of adverse impacts. A public participation requirement for development projects in Iraq is neither explicitly mentioned in the aforementioned Iraqi EIA instructions, nor is it referred to in the Iraqi Laws 37 and 27. This would also constitute another shortcoming. Conducting a public consultation for this project would fulfill WB's requirements and consequently would not cause any conflict with the Iraqi EIA process.

The subprojects of rehabilitating 22 SPSs are all about maintenance and replacement of major mechanical and electrical parts to an existing facility and does not require any additional land to expand. Nevertheless, the Project has triggered OP/BP 4.12 as a precautionary measure and hence, prepared a Resettlement Policy Framework (RPF).

It is worth mentioning that involuntary resettlement is addressed in the WB's "Involuntary Resettlement OP/BP 4.12" in terms of applicability and means for compensation. However, the Iraqi "Acquisition Law no. 12" does not entitle such vulnerable group (those who do not have the legal right on a property, and are subject to involuntary loss of livelihoods/assets) for any kind of compensation in return. Although this promotes a potential shortcoming in the area of involuntary resettlement, this is not going to be a concern, since no kind of resettlement is taking place.

With respect to disclosing EIA study findings, the Bank requires the disclosure of the EIA findings to the public in an accessible way and by using a language fairly understandable by the target community. This is attained through providing a non-technical summary of the study (officially referred to as an Executive Summary) in the same language as of the receiving community. The WB would also publish the whole EIA study on its external websites. This requirement is adequately explained in both "Environmental Assessment OP/BP 4.01" and "The World Bank Policy on Access to Information" of the World Bank Group. There is neither a clear mentioning on the need to disclose the findings of the EIA study publicly, by the Iraqi framework, nor is it specifying how such information could reach the hands of the target community.

The following table may provide a brief analysis of different EIA process requirements between the WB's and Iraqi frameworks/safeguards.

Table 20: the WB's and Iraqi EIA frameworks – analysis of requirements

EIA framework	**Requirements**					
	Classification of projects according to severity of impacts and magnitude	**Classification of Rehabilitation of 22 SPSs subproject**	**Level of EIA study**	**Public Participation**	**Involuntary Resettlement**	**EIA disclosure**
WB's	Fairly presented	Category B	Full EIA + EMP	Fairly presented in OP/BP 4.01	Fairly presented in OP/BP 4.12	Fairly presented in OP/BP 4.01 and Policy on Access to Information
Iraqi	Fairly presented	Anticipated category C	Anticipated EIA report (must be included in technical and feasibility study)	Not presented	Not presented	Not presented
Action proposed	N/A	Consult MoE at the earliest convenience	Proceed with full ESMP	Proceed with a public consultation meeting	Prepare RPF according to OP/BP 4.12	Disclose through a public consultation/ WB's external websites

6. PUBLIC CONSULTATION

Public consultations in general aim at introducing various interventions during the lifetime of the Project to the Project Affected Persons (PAPs), to enable discussing possible environmental and social impacts in much transparency; and to collect views on how to strengthen opportunities and diminish adverse consequences brought by the Project.

6.1. Public Meetings

Due to the prolonged preparation time, that the project management unit will design, hold, and document site-specific consultations prior to start of construction phase. And because the 22 pumping stations are quite dispersed, and located in 8 different municipalities, it was not possible to gather people from all areas in a single public meeting, due to security reasons, and because of the subprojects were publically perceived as merely a rehabilitation of existing structures and will not involve new constructions. Against this drawback, the study team has extrapolated public meeting results of similar but larger sewerage pumping station projects (Al-Habibiya SPS meeting held on 15 Nov, 2015, and Al-Doura SPS meeting held on 16 Dec, 2015 – BWSIP).

Note: These consultations will be detailed (including review of Executive Summaries in Arabic of all documents, and focus on impacts, mitigations, and GRM) in project management unit progress reports and documented in World Bank documents, especially the Implementation Status Report (ISR).

For consultations of bigger pumping stations, a questionnaire was applied and intended to be simple and straightforward. Questions have concentrated on environmental impacts and those related to public health issues for people working and/or living in the vicinity of the Project area. Questions were followed by Yes or No answers. Additionally, the questionnaire has provided a space for writing expectations and suggestions of the rehabilitation Project. Annex VIII provides a copy of the questionnaire. The following table summarizes participants' information according to gender, education, and profession.

Table 21: Distribution of participants in similar public consultations in the area (Habibiya & Doura)

Total participants: 52 **Gender**: Male: 38 (69%), Female: 14 (31%) **Education level**: Literate: 2 (3.8%), Basic school: 32 (61.5%), High school: 1 (1.9%), Diploma: 3 (5.8%), First degree: 13 (25%), PhD: 1 (1.9%) **Profession**: None: 4 (7.7%), Retired: 2 (3.8%), Housekeeper: 5 (9.6%), Student: 2 (3.8%), Worker: 1 (1.9%), Technician: 1 (1.9%), Free business: 25 (48.1%), Teacher: 1 (1.9%), Civil service: 11 (21.2%)

6.2. Consultation Results

The following table provides feedback collected from similar projects in the area (Habibiya and Doura).

Table 22: Feedback collected on a similar but larger pumping stations (Habibiya & Doura)

#	Question	Answer	

		Yes	No	No answer
1	Are you impacted by noise when operating pumps, motors, and other parts of the SPS?	38 (73.1%)	14 (26.9%)	0
2	Are you impacted by odors and fumes generating from the SPS?	48 (92.3%)	4 (7.7%)	0
3	Do you have any health problems connected to emissions from the SPS?	30 (57.7%)	22 (42.3%)	0
4	Do you expect the rehabilitation work will provide job opportunities in your neighborhood?	49 (94.2%)	2 (3.8%)	1 (2%)
5	Do you think installing fumes and odor scrubbers in the SPS will help reduce risk of harmful emissions?	52 (100%)	0	0

Participants were also given the opportunity to express their expectations:

- Enhancing air quality through reducing bad smells and air pollutants generating from the pumping stations;
- Reducing communicable diseases and enjoying a healthier and more hygienic life,
- Adopting sound operational procedures that would result in avoiding overflows caused by floods;
- Providing job opportunities for the local community;
- Positive impacts on the surrounding environment, increasing green areas, and reducing environmental pollution;
- Avoiding incidents of clogging the piping system and decreasing overflows.

Additionall suggestions for further improvements were as follows:

- Providing an enclosed design to help avoid emissions to outer environment,
- Providing proper ventilation systems to get rid of air emissions in a modernized way,
- Placing pumping stations in as far away as possible from populated areas, in order to reduce noise and contamination,
- Providing a better landscape to the area and planting trees to avoid topsoil erosion,
- More job creation for local people,
- Fulfilling the neighborhood's needs of power supply,
- Completing rehabilitation works as planned (by BSA), and selecting competent international companies to finish the job properly,
- Flushing sewerage pipelines and mains,
- Fixing damages in main lines.

6.3. Grievance Redress Mechanism

Throughout the lifetime of the Project, it is expected that the PAPs could receive very limited and less significant socio-economic impacts, rather not associated with land take. These minor impacts could include:

- Temporary Interruption of daily social and economic activities by the Project activities,

- Temporary Loss of comfort and welfare due to nuisance brought by the Project to the neighborhood,
- Potential loss of opportunities for the local community to take part in the construction phase.

For any of the above cases expected to arise during the lifecycle of the Project, It is required that, a Grievance Redress Mechanism (GRM) be set up in the early planning stages of the Project. This provision should be managed and maintained at the MOB level. This mechanism could also be integrated into the already existing complaining system at MOB. In addition to the official channel, it is encouraged to establish a Grievance Redress Mechanism at the project level to ensure any grievance can be addressed in an amicable manner. Resolving complaints at community level is always encouraged as it could address the problem of distance and cost the PAP may have to face in pursing grievance redress. However, the whole process of raising a complaint should be described to the Project Affected Persons (PAPs) prior to commencing construction activities. This could be done by reaching out the community or by conducting a meeting with community representatives. In this regard, PAPs had the opportunity to learn about the current complaining system of MOB during public meetings. The GRM should facilitate lodging a complaint by PAP(s) easily and anonymously. However, the form of the GRM should be posted at each subproject site in Arabic Language with the contact information of the person in charge. Information to be deposited in the complaining system, include contact information, a full description of the issue, and attaching to it all necessary material to support the case (see a sample form for GRM in Annex VII). GRM should be accessible to all PAPs (by writing, phone, email, official portals) and should be able to receive grievances and complaints at any time of the Project lifecycle. Personnel responsible for processing complaints have to inform complainers on the legal time period for responding to the grievance/ complaint in final. Responses to complainers should be returned in no more than 14 calendar days, and before handing the site over to the contractor(s), i.e. before the actual commencement of decommissioning/ construction activities. The complainers will have the right to appeal their case at a tribunal should the offered compensation(s) deemed unsatisfactory. The GRC should continuously report updates to the MOB higher management and to the World Bank Group. Refer to Resettlement Policy Framework (RPF) of BWSIP for more details.

7. THE "NO-PROJECT" SUMMARY IMPACTS

With the No-Project option, workers' health will remain in risk due to poor usage of Personal Protective Equipment (PPE) and shortage of emissions controlling measures, as well as insufficient precautionary measures and procedures. Public health, including people in residential areas and commercial establishments, will be largely impacted by flooding roads, vector nuisance, odor, and water-borne diseases from continuous failure at the pumping stations. The following table provides a better insight to the level of significance for the No-Project scenario.

Table 23: Summary impacts for the No-Project option and possibilities for mitigation

Area of concern	Impact	Sensitive receptor	Level of significance	Mitigation?
Abiotic environment (Cross-media interaction)	Land and soil contamination due to accidental discharges	Land and soil at discharge point	H	Minimize discharges
	River water contamination due to flooding discharges,	Receiving river bed (Diyala, Tigris)	H	Minimize discharges
	Aquifer water contamination due to infiltration and water influx with river	Receiving aquifer basin (under-ground resources that could coexist)	H	Minimize discharges
Biotic environment (flora and fauna species)	Biological life poisoning due to high loads of chemical and microbial constituents	- Endangered and not threatened flora at discharge point, - Endangered and not threatened fauna at the discharge point, - Aqua life (Diyala and Tigris)	H	Minimize discharges
Occupational Health and Safety (OHS)	Suffocation and/or death due to inhalation of hazardous air emissions (H2S, CH4, VOCs, etc) for prolonged times.	- On-site operators, - Maintenance staff, - Supervisors, - The station guards.	H	- Apply best management practices, - Provide PPE, - Provide training on first aid, - Spread awareness on hazards
	Hearing nuisance due to exposure to excessive noise levels for prolonged times.	- On-site operators, - Maintenance staff, - Supervisors, - The station guards.	H	- Apply best management practices, - Provide PPE, - Provide training on first aid, - Spread awareness on hazards
	Vibration nuisance due to contact with unstiffened floors and vibrating parts (motors, pumps) for prolonged times.	- Operators, - Maintenance staff	M	- Apply best management practices, - Provide PPE, - Provide training on first aid, - Spread awareness on hazards
	Electrical shock due to uncovered wiring and misused/ unmaintained switches and control panels	- Operators, - Maintenance staff	M	- Apply best management practices, - Provide PPE, - Provide training on first aid, - Spread awareness

Area of concern	Impact	Sensitive receptor	Level of significance	Mitigation?
				on hazards
Community Health & Safety	Various health issues due to direct and indirect contact with waterborne pathogens (sanitary and emergency discharges to canals and rivers),	Populations in close proximity to raw sewage outlets,	H	- Minimize discharges, - Spread awareness on hazards
	Noise and odor	Populations living or staying shortly in the vicinity of the pumping station.	M	- Minimize discharges, - Spread awareness on hazards

Most of the above impacts are considered highly significant, which entails putting prompt and sound measures. Improvements to affected environments can only occur by fixing pollution sources, stopping/ minimizing releases, and providing enough education to PAPs. These measures would never occur on the ground unless the Project is carried out.

8. THE "PROJECT" SUMMARY IMPACTS

8.1. Impacts in Construction and Operation

The following table summarizes impacts, their ranking before and after mitigation measures applied, in the construction (incl. decommissioning activities) and operation phases (incl. maintenance activities).

Table 24: Summary adverse impacts – Construction & Operation

Area of concern	Impact	Sensitive receptor	Ranking before mitigation	Ranking after mitigation
Construction phase				
Occupational Health & Safety	Health issues related to over-exertion and ergonomic injuries and illnesses	Working personnel	moderately significant, direct, and short and long term	Low
	Health issues related to accidental slips and falls	Working personnel	highly significant, direct, and short and long term	Low
	Health issues related to working in heights	Working personnel	highly significant, direct, and short and long term	Low
	Health issues related to getting struck by objects	Working personnel	highly significant, direct, and short term	Low
	Health and accidental issues related to exposing to moving machinery	Working personnel	moderately significant, direct, and short term	Negligible
	Health issues related to working with exposed electrical parts	Working personnel	highly significant, direct, and short term	Low
	health issues related to respiratory hazards mismanagement	Working personnel	highly significant, direct, cumulative, and short term	Low
	Health issues related to working in confined places	Working personnel	highly significant, direct, and short and long term	Low
	hazardous solid and liquid materials mismanagement	Working personnel & environment	highly significant, direct, cumulative, short and long term	Low
	health issues related to noise and vibration mismanagement	Working personnel	highly significant, direct, and short term	Negligible
Public health and safety	public issues related to spread of pests and communicable diseases	The public residing in project areas	highly significant, direct, indirect, and short and long term	Low
	health and safety issues due to excavation	The public residing in project areas	moderately significant, direct, and short term	Low
	public safety issues due to unauthorized access to working sites	The public residing in project areas	moderately significant, direct, and short term	Low
	Traffic safety	The public residing in project areas	moderately significant, direct, and short term	Negligible
Waste management	solid waste mismanagement	Working personnel, Local community, Surrounding environment.	moderately significant, direct, and short term	Negligible

Area of concern	Impact	Sensitive receptor	Ranking before mitigation	Ranking after mitigation
	domestic wastewater mismanagement	Working personnel, Local community, Surrounding environment.	highly significant, direct, short and long term	Low
Land	contamination of land	Surrounding environment	highly significant, direct, cumulative, and long term	Low
	soil erosion and sediment mobilization	Surrounding environment	moderately significant, indirect, and long term	Low
Biotic life	Altering/ endangering biological life	Biotic environment	Less significant, indirect, and long term	Negligible
Socio-economic	temporary loss of livelihoods and interruption of social and economic activities	The public residing in project areas	Less significant, direct & indirect, and short term	Negligible
Operation phase				
Public health and safety	Public health issues due to mismanagement of overflows	The public residing in project areas	Less significant, direct and indirect, short and long term	Low
	Odor and noise nuisance to adjacent sensitive receptors	The public residing in project areas	minor, direct, and short term	Negligible
	pest spreading issues	The public residing in project areas	less significant	Negligible
	public health issues and contamination of environment due to mismanagement of hazardous waste and materials	The public residing in project areas	highly significant, direct, and cumulative, both short and long terms	Low
Occupational Health & Safety	Health issues related to over-exertion and ergonomic injuries and illnesses	Working personnel	moderately significant, direct, short and long term	Low
	Health issues related to accidental slips and falls	Working personnel	highly significant, direct, short and long term	Low
	Health issues related to working in heights	Working personnel	highly significant, direct, and short and long term	Low
	Health issues related to working with electrical equipment and control panels	Working personnel	highly significant, direct, and short term	Low
	Health issues related to working in confined places	Working personnel	highly significant, direct, short and long term	Low
	health and stress issues due to noise and vibration in work environment	Working personnel	Less significant, direct, and short term	Negligible

8.2. Selection of Action Measures – Risk Assessment

In the Project lifecycle, contractors and operators are required to evaluate risk associated with their activities that have a hazardous nature. Consequently, risks associated with construction and operation activities of sanitation projects is getting more attention. Occupational health and safety related works can have a wide range of hazards in such field of activities, which are – fortunately – localized and easy to detect. Well-experienced staff should be commissioned and mobilized at the onset of the project, to extensively identify and evaluate principal risks and set out the most feasible and stringent precautions. Precautionary measures should be introduced according to the following priorities:

- Eliminating the hazard by removing the activity from the work process. Examples include substitution with less hazardous tools and materials, using different techniques, etc;
- Controlling the hazard at its source through use of engineering controls. Examples include using ventilators, isolation rooms, machine guarding, acoustic insulation, etc;
- Minimizing the hazard through design of safe work systems and administrative or institutional control measures. Examples include job rotation, training on and applying safe work procedures, lock-out and tag-out machinery according to their status, workplace monitoring, limiting exposure or work duration, etc.
- Providing appropriate personal protective equipment (PPE) in conjunction with training, use, and maintenance of the PPE.

Prioritization analysis could be done on hazards of high risks as in the table below.

Table 25: Risk ranking table to classify worker scenarios based on likelihood and consequences

Likelihood	**Consequences**				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A. Almost certain	L	M	E	E	E
B. Likely	L	M	H	E	E
C. Moderate	L	M	H	E	E
D. Unlikely	L	L	M	H	E
E. Rare	L	L	M	H	H

Legend
E: extreme risk; immediate action required
H: high risk; senior management attention needed
M: Moderate risk; management responsibility should be specified
L: low risk; manage by routine procedures

Source: Environmental, Health, and Safety (EHS) Guidelines – IFC

9. MANAGEMENT AND MONITORING

9.1. Environmental and Social Management Program

9.1.1. General principles

In order to mitigate expected impacts during construction (including decommissioning old parts and installing new ones) the Contractor is required to update and implement an Environmental and Social Management Plan (ESMP), which is usually called a Construction Environmental Management Plan (CEMP). This Plan will form a binding document to the agreement with the Contractor. Actions required by this Plan is embedded in the Contractor's daily activity in the construction site, who takes a full responsibility for maintaining enough provisions and safe environments for implementing the work. Mitigation measures proposed for this Project are in compliance with Iraqi standards for this type of industry. More stringent standards and Best Management Practices (BMPs) have also been considered for avoiding, minimizing, and mitigating adverse impacts brought about by various types of activities of the Project. Namely the Environmental, Health and Safety Guideline issued by the International Funding Corporation (IFC), which is one part of the World Bank Group. Therefore, the Plan sheds more light on impacts linked to occupational health and safety, and gives the best practices to alleviate them. As preventive and mitigation actions are inherent in the Contractor's daily activities, so are the costs incurred for implementation, which forms the overall contract price.

The Contractor is deemed responsible for collecting all necessary approvals before commencing constructions, one of which is the CEMP. The Contractor is also expected to carry out/ update all needed site surveys, like soil investigations. The Contractor should only start working in the site after MOB has resolved/ worked on all grievances raised by local community. Annex IV “Environmental Requirements for Contractors” provides more information, which is also must be included in the tender documentation, so that potential bidders are aware of environmental and social performance standards expected from them and are able to reflect that in their bids. Additionally, Annex V on “Environmental and Social Liabilities of BWSIP Contractors” should be added further to environmental compliance section where breakdown for the cost of each mitigation measure noncompliance is detailed in this section, and will be enclosed in bidding documents.

The BSA team will still hold responsibility for providing the Contractor with needed site plans (including mechanical and electrical layouts) and historical information. In post-construction phase, a supervision contract with a third party will be provided. All supervision works are also expected to be reported back to MOB/BSA. Costs of a supervision contract is covered by the project, however, follow-ups of BSA will be incurred as part of the BSA's budget.

In operation phase, BSA team is expected to follow their daily procedures to prevent, minimize, and mitigate all operational and maintenance-related impacts, on their working personnel, as well as on outdoor environments and local communities. Impacts should be managed effectively by continuously building staff capacities and by applying enough monitoring on the sensitive environmental and social parameters. Costs of managing impacts during operation are included in the BSA's budget. The following are tabulated formats for the ESMP in construction as well as in operation phases.

9.1.2. Proposed ESMP

Table 26: Environmental and Social Management Plan – Construction phase

#	Area	Impact	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
1	**Occupational Health & Safety**	Health issues related to over-exertion and ergonomic injuries and illnesses	• Prevent and control through training of workers in lifting and material handling techniques, including placing of weight limits above which mechanical assists or two-person lifts are necessary, • Plan work site layout to minimize the need for manual transfer of heavy loads, • Select tools and design work stations that reduce force requirements and holding times, and promote improved postures, including, where applicable, user adjustable work stations, • Implement administrative controls into work processes, such as job rotations and rest or stretch breaks.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Training on OHS, • Site layout, • The best design of work station, • Personnel rotation system, • First aid.	• Prior to construction for training and work station, • Weekly for rotation, • Daily for others
2		Health issues related to accidental slips and falls	• Implement good house-keeping practices, such as the sorting and placing of loose construction materials or demolition debris in established areas away from foot paths, • Clean up excessive waste debris and liquid spills regularly, • Locate electrical cords and ropes in common areas and marked corridors, • Use slip retardant footwear.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Housekeeping practices, • Cleanup kits, • First aid, • PPE, • Site layout	On daily basis
3		Health issues related to working in heights	• Train and use temporary fall prevention devices, such as rails or other barriers able to support a weight of 90.7kg at a minimum, when working at heights equal or greater than 2m or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface, • Train and use personal fall arrest systems, such as full body harnesses and energy absorbing lanyards, • Use control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones (if applicable). As well as secure, mark, and label covers for openings in floors and roads, roofs, or walking surfaces.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Education, • Acquisition of right expertise, • Provision of safety devices, • Provision of safety monitoring systems, • PPE, • First aid, • Site layout	• Prior to construction for Education and right expertise, • Daily for other provisions
4		Health issues related to getting struck by objects	• Use a designated and restricted waste drop or discharge zones, and /or a chute for safe movement of wastes from upper to lower levels, • Conduct sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable,	• Contractor to implement, • Supervision contract,	• Education, • Acquisition of right expertise, • Provision of safety	• Prior to construction for Education and right expertise,

#	Area	Impact	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
			• Maintain clear traffic ways to avoid driving of heavy equipment over loose scrap, • Use temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails an toe boards to prevent materials from being dislodged, • Wear appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes.	• BSA to follow up	devices, • First aid, • PPE	• Daily for other provisions
5		Health and accidental issues related to exposing to moving machinery	• Ensure the visibility of personnel through their use of high-visibility vests, • Ensure moving equipment is outfitted with audible back-up alarms, • Use inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Provision of safety devices, • Provision of safety monitoring systems, • Provision of suitable equipment, • First aid, • PPE.	• Prior to construction for devices and systems, • Daily for other provisions
6		Health issues related to working with exposed electrical parts	• Conduct detailed identification and marking of all buried electrical wiring prior to any excavation work, • Lock out (de-charge and leave open with a controlled locking device) and tag-out (by a warning sign placed on the lock) devices during dismantling and maintenance, • Check all electrical cords, cables, and hand power tools for frayed or exposed cords and follow manufacturer recommendations for maximum permitted operating voltage of the portable hand tools, • Ensure circuit breaking before starting the work on electrical parts, • Use electricity-specific PPE, including insulating clothing, suits, and gloves, • Use specially trained personnel to dismantle electrical parts.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Education, • Acquisition of right expertise • Provision of safety devices, • PPE, • First aid, • Site layout	• Prior to construction for education and right expertise, • Daily for safety devices and PPE
7		health issues related to respiratory hazards mismanagement	• Minimize dust from material handling sources, such as conveyors and bins, by using covers and/or water suppression, • Minimize dust from open area sources (storage piles) by applying control measures, like installing enclosures and covers, • Remove potential hazardous air pollutants such as asbestos, from existing infrastructures prior to demolition,	• Contractor to implement, • Supervision contract, • BSA to follow up	• Provision of respiratory controls, • PPE, • Best management practices.	• Daily for controls, • Weekly for local communication

#	Area	Impact	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
			• Use PPE, such as dust masks, where dust levels are excessive, • Avoid burning of solid wastes.			
8		Health issues related to working in confined places	• Provide safe means of access and egress from confined places, such as stairs and ladders, and safety ropes, • Avoid operating combustion equipment for prolonged periods unless the area is actively ventilated, • Use special PPE including respirators, protective suits, gloves, and eye protection.	• Contractor to implement, • Supervision contract, • BSA to follow up	• Education, • Provision of safety devices, • Ventilation system, • PPE, • First aid.	• Prior to construction for education, • Daily for safety devices, ventilation, and PPE
9		hazardous solid and liquid materials mismanagement	• Provide adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids. Adequate secondary containment will be included wherever liquid waste is stored in volumes greater than 220 liters. Available volume of secondary containment should be at least 110% of the largest storage container, or 25% of the total storage capacity (whichever is greater), in that specific location, • Provide adequate ventilation where volatile hazardous wastes are stored, • Use impervious surfaces for refueling areas and other fluid transfer areas, • Train workers on the correct transfer and handling of fuels and chemicals and the required response to spills, • Provide portable spill containment and cleanup equipment on site, and provide needed training, • Assess the contents of the hazardous materials and petroleum-based products in building systems (PCB containing electrical equipment, asbestos-containing building materials) and process equipment, • Provide awareness to workers on EHS related risks, • Remove contents of hazardous materials prior to initiation of construction activities, • Identify types and quantities of hazardous waste expected during construction, • Identify available collection and treatment programs and infrastructure to manage hazardous waste in an environmentally sound manner, • Put procedures and operational controls for on-site storage.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to approve final treatment.	• Education, • Secondary containment, • Ventilation, • Refueling areas, • Spill and cleanup, • Waste management plan, • Material storage plan	• Prior to construction for education, • Daily for management
10		health issues related to noise and	• Use noise control devices, such as exhaust muffling devices for	• Contractor to	• Education to	• Prior to

#	Area	Impact	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
		vibration mismanagement	combustion engines, • Use vibration protecting gear, like gloves and clothing, • Install vibration damping pads or devices, and minimize exposure duration.	implement, • Supervision contract, • BSA to follow up	workers, • Preventive and corrective Maintenance, • PPE,	construction for education, • Daily for management
11	**Public health and & safety**	public issues related to spread of pests and communicable diseases	• Provide surveillance and active screening and treatment of workers, • Prevent illness among workers in local communities by, undertaking health awareness and educational initiatives, • Train health workers in disease treatment, • Conduct immunization programs to improve health and guard against infection, • Provide treatment through standard case management in on-site or community health care facilities, *For vector-borne diseases the following are recommended:* • Eliminate unusable impounded water, • Consider application of residual insecticide to dormitory walls, • Implement integrated vector control programs, • Promote use of personal protective means and barriers to protect against insect bites, • Communicate with public health officials to help eradicate disease reservoirs, • Educate project personnel and area residents on risks, prevention, and available treatment, • Monitor communities during high-risk seasons to detect and treat cases, • Follow safety guidelines for the storage, transport, and distribution of pesticides, to prevent human exposure.	• Contractor to implement, • Supervision contract, • Health centers to immunize, • Municipalities to apply controls (in liaison with the environmental dept of MOB), • BSA to follow up,	• Immunization programs, • Municipalities to apply pest control programs	• Prior to construction for immunization • monthly for pest management
12		Public health and safety issues due to excavation	• Plan activities in consultation with local communities so that activities with greatest potential to generate dust and noise are planned during the days with least disturbance; • Use dust suppression techniques by applying water or non-toxic chemicals to minimize dust from vehicle movements; • Coordinate with utility service providers (power lines, water lines, gas etc.) and have a designated point of contact person for coordination requirements and have a representative available on site when utilities interruption is required; • Post warning signs and warning lights near the residential areas. In addition, use safety fences near residential areas, schools and roads;	• Contractor to implement and coordinate, • Supervision contract, • BSA to follow up	• Public outreach • Warning signage	• Daily during construction

#	Area	Impact	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
			and • Avoid piling excavation soil or debris as well as building materials and water pipes on the narrow roads in high densely populated areas.			
13		public safety issues due to unauthorized access to working sites	• Restrict access to the working site, through a combination of institutional and administrative controls, like fencing, signage, and communication of risks to the local community, • Remove hazardous conditions on construction sites that cannot be controlled by restricting access, such as covering opening to small confined spaces, and ensuring means of escape, like in case of locked storage of hazardous materials.	• Contractor to implement, • BSA to follow up,	• Education, • Acquisition of right expertise, • Collection and disposal plan, • Provision of safety devices, • PPE, • First aid, • Site layout, • Site security.	• Prior to construction for education and right expertise, • Daily for other provisions
14		Traffic safety	• Emphasize safety aspects among drivers, • Avoid or minimize driving through community areas and dangerous routes and times of day to reduce the risk of accidents, • Alert drivers on local speed limits, and monitor implementation, by using speed control devices on trucks, • Apply regular maintenance of vehicles, and use manufacturer approved parts, • Collaborate with local communities and responsible authorities to improve signage and enhance visibility and overall safety of roads, • Minimize traffic, to the extent possible, for instance, by purchasing from the local markets and provide transportation for site workers.	• Contractor to implement, • Supervision contract, • BSA to follow up, • Traffic department to advise, • Local representatives to get in touch	• Education, • Provisions of suitable means of transportation, • Best management practices, • Provision of regular maintenance, • Provisions of traffic safety measures, • Considering local market	• Daily for education, • Weekly for traffic communication, • Weekly for local communication, • Periodically for local market inclusion.
15	**Waste Management Physical environment**	solid waste mismanagement	• Identify types and estimate quantities of waste expected during construction; • Identify available collection and treatment programs and infrastructure to manage waste in environmentally sound manner; • Establish collection and treatment priorities according to potential EHS risks during the waste cycle; • Identify opportunities for reduce, reuse, and recycle; and • Put procedures and operational controls for on-site storage.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to approve dumpsite.	• Waste management plan, • Material storage plan	• Prior to construction for plans, • Daily for management

#	Area	Impact	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
16		domestic wastewater mismanagement	• Identify types and estimate quantities of wastewater expected during construction, • Segregate wastewater streams to ensure compatibility with selected treatment option, • Segregate and pre-treat oil and grease containing effluents, by using grease traps prior to discharge to the sewer system, • Discharge to sanitary network only after confirming compliance with discharge quality requirements, • Contain in septic tanks if discharge to sanitary sewer network is not possible. Transport to wastewater treatment plants for final treatment, by using tankers, • Avoid direct contact with wastewater through applying an enclosed system for collection, containment, and disposal. • Monitor groundwater quality that could exist close to the working areas to ensure compliance.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to approve dumpsite.	• Waste management plan, • Storage plan, • Quality testing for groundwater resources • Provisions for on-site treatment	• Prior to construction for plans, • Daily for management • Quarterly for water quality monitoring
17	**Physical environment**	contamination of land	• Manage contaminated land with the objective of protecting the safety and health of the occupants of the site, the surrounding community, and the environment post construction, • Understand the historical use of the land with regard to the potential presence of hazardous materials or oil prior to initiation of construction activities, • Prepare a management plan to manage contaminated land remaining similar to the management of obsolete, abandoned, hazardous materials found on-site, • Transfer contaminated land remaining to a legal dumpsite designated to this type of waste, • Avoid direct contact to the extent applicable.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to designate and approve dumpsite.	• Waste management plan, • Best management practices,	Upon earth work

#	Area	Impact	Mitigation	Roles & Responsibilities	Requirements	Time/frequency
18		soil erosion and sediment mobilization	• Schedule to avoid heavy rainfall periods, to the extent practical, during dry seasons, • Minimize steepness of slopes, • Re-vegetate if applicable, • Design channels and ditches for expected flows during construction, • Reduce or prevent off-site sediment transport by applying sediment ponds or silt fences, • Modify or suspend activities during extreme rainfall and high winds to the extent practical, • Segregate or divert clean runoffs from water containing high solids content to minimize treatment, • Provide adequate drainage system onsite to minimize and control infiltration. • Monitor groundwater quality that could exist close to the working areas to ensure compliance.	• Contractor to implement, • Supervision contract, • BSA to follow up, • Meteorological department for weather forecast	• Best management practices, • Provision of drainage/ segregation systems, • Weather forecast • Quality testing for groundwater resources	• Daily for best practices, • Seasonally for rainfall seasons • Quarterly for water quality monitoring
19	**Biotic environment**	altering/ endangering biological life	• Ensure full adherence to the zero-discharge criterion to the surrounding environment during dismantling and installing of new parts, • Oblige by available and approved routes, and avoid driving off-roads, or through naturally valued areas, • Oblige by legal transportation and dumping of materials in their pre-designated and approved dumpsites, • Stay in constant contact with the concerned authorities should any emergent spillage occurs, and apply prompt and approved site cleanup procedures, • Raise awareness on the importance of natural life in the area and possible ways for protection.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to designate and approve dumpsite, • Environment department to advise,	• Best management practices, • Provisions of off-site cleanup, • Waste and spill management plan, • Flora and fauna mapping, • Awareness on natural life	• Prior to construction for flora and fauna mapping, • Daily for zero-discharge, driving routes, • Weekly for awareness, • Continuously for contact with environment dept.
20	**Socio-economic**	temporary loss of livelihoods and interruption of social and economic activities (not related to land taking)	• Establish a Grievance Redress Mechanism, and respond to grievances, • Provide alternative entrances to clientele, and proper signage around sites under work, in addition to public announcements • Educate local people about the project and importance of local engagement, • Engage the local market and create job opportunities.	• Contractor to implement, • Supervision contract, • BSA to follow up, • MOB to host a GRM,	• Public participation plan, • GRM	• Prior to construction for public participation, • Ongoing for GRM, • Quarterly for GRM review

Table 27: Environmental and Social Management Plan – Operation phase

#	Area	Impact	Mitigation	Responsibility	Requirement	Frequency
1	**Public health and safety**	public health issues and contamination of environment due to mismanagement of overflows	• Develop and implement appropriate protocols to reduce risks to safety, public health, and environment that include well-written instructions, • Develop a contingency plan (site-specific), • Response to overflows by preventing, containing, minimizing, the overflow where it is feasible and safe to do so, • Protect SPS's components from flood damage where it is feasible to do so (by for instance, protecting components from rising flood water to enable reinstating more rapidly, • Notify responsible parties, which include the Baghdad Sewerage Department in this case.	• Working personnel to implement, • BSA to monitor, • Environment dept, • Local representatives,	• Contingency plan, • Public health standards, • Maintenance plans, • Community outreach	• Daily for contingency, and maintenance, • Seasonally for community outreach
2		Odor and noise nuisance to adjacent sensitive receptors	• Apply preventive and corrective maintenance procedures on odor and noise generating equipment and facilities, in a frequency applicable to manufacturer's instructions, • Apply preventive and corrective maintenance on odor control units, in a frequency applicable to the manufacturer's instructions, • Establish a Standard Operating Procedure (SOP) to include requirements for maintenance, monitoring, and personnel training, • Monitor outdoor odor and noise levels within pumping station boundary, to ensure limits are not exceeded, • Create retrofitting noise controls where practical, like fencing and enclosures, • Keep records of the maintenance logs, local complaints, and analyze trends.	• Working personnel to implement, • BSA to monitor, • Environment dept to advise, • Local representatives,	• Provision of noise and odor controls, • Maintenance plans and procedures, • Monitoring plans, • Community outreach	• Daily for management and maintenance plans, • Weekly for monitoring, • Seasonally for community outreach
3		Pest spreading issues	Use of pesticides that are compatible with “Recommended Classification of Pesticides by Hazard and Guidelines to Classifications” of the WHO	• Working personnel to implement, • BSA to monitor, • Environment dept to advise,	• Pesticides compatible with WHO guidance	Monthly

#	Area	Impact	Mitigation	Responsibility	Requirement	Frequency
4		public health issues and contamination of environment due to mismanagement of hazardous waste and materials	• Train operators on release prevention, including drills specific to hazardous materials as part of emergency preparedness response training, • Implement inspection programs to maintain the mechanical integrity and operability of pressure vessels, tanks, piping systems, relief and vent valve systems, containment infrastructure, emergency shutdown systems, controls and pumps, and associated process equipment, • Prepare written Standard Operating Procedures (SOPs) for filling containers or equipment as well as for transfer operations by personnel trained in the safe transfer and filling of the hazardous material, and in spill prevention and response, • Apply SOPs for the management of secondary containment structures, specifically the removal of any accumulated fluid, such as rainfall, to ensure that the intent of the system is not accidentally or willfully defeated, • Identify locations of hazardous materials and associated activities, • Transport and dump waste residues from screens in legal and approved dumpsites, • Make available specific PPE and training needed to respond to an emergency, • Make available spill response equipment sufficient to handle at least initial stages of a spill and a list of, • Train and educate operational personnel on response activities in the event of spill, release, or chemical emergency. • Provide quality monitoring tests for groundwater resources adjacent to subproject locations	• Working personnel to implement, • BSA to monitor, • Environment dept to advise, • Local representatives,	• Capacity building, • Inspection programs, • Documented procedures, • Best management practices, • Legal and approved dumpsite, • Provision of PPE, • Provision of spill equipment. • Provision of water quality monitoring	On daily basis Semiannual for water quality monitoring
5	**OHS**	Health issues related to over-exertion and ergonomic injuries and illnesses	• Prevent and control by training workers on lifting and material handling techniques, including placing of weight limits above which mechanical assists or two-person lifts are necessary, • Plan work site layout to minimize the need for manual transfer of heavy loads, • Select tools and design work stations that reduce force requirements and holding times, and promote improved postures, including, where applicable, user adjustable work stations, • Implement administrative controls into work processes, such as job rotations and rest or stretch breaks.	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Capacity building, • Best practices, • Personnel rotation system, • First aid and medical insurance.	• Daily for best practices and medical care, • Periodically for capacity building and job rotation,
6		Health issues related to	• Implement good house-keeping practices, such as the sorting and	• Working personnel	• Capacity building,	• Daily for best

#	Area	Impact	Mitigation	Responsibility	Requirement	Frequency
		accidental slips and falls	placing of loose materials or debris in established areas away from foot paths, • Clean up excessive waste debris and liquid spills regularly, • Locate electrical cords and ropes in common areas and marked corridors, • Use slip retardant footwear, especially when using stairs to access underground facilities.	to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Best practices, • Cleanup kits, • First aid and medical insurance, • PPE,	practices, medical care, and PPE, • Periodically for capacity building and job rotation,
7		Health issues related to working in heights	• Train and use temporary fall prevention devices, such as rails or other barriers able to support a weight of 90.7kg at a minimum, when working at heights equal or greater than 2m or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface (inspection hatches), • Train and use personal fall arrest systems, such as full body harnesses and energy absorbing lanyards, • Use control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones (if applicable). As well as secure, mark, and label covers for openings in floors, roofs, or walking surfaces.	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Capacity building, • Best practices, • Provision of safety devices, • Provision of monitoring systems, • First aid and medical insurance, • PPE,	• Daily for best practices, medical care, safety devices, monitoring systems PPE, • Periodically for capacity building,
8		Health issues related to working with electrical equipment and control panels	• Conduct detailed identification and marking of all electrical connections prior to any maintenance work, • Lock out (de-charge and leave open with a controlled locking device) and tag-out (by a warning sign placed on the lock) devices during demounting and lifting electrical devices for maintenance, • Ensure circuit breaking before starting work on electrical parts, • Use electricity-specific PPE, including insulating clothing, suits, and gloves, • Use specially trained personnel to demount electrical parts.	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Capacity building, • Best practices, • Acquisition of right expertise, • Provision of safety devices, • Provision of monitoring systems, • First aid and medical insurance, • PPE,	• Daily for best practices, medical care, safety devices, monitoring systems PPE, • Periodically for capacity building and employing right expertise
9		Health issues related to working in confined places	• Provide safe means of access and egress from confined places, such as stairs and ladders, and safety ropes, • Avoid operating combustion equipment for prolonged periods unless the area is actively ventilated, • Use special PPE including respirators, protective suits, gloves, and eye protection, • Minimize exposure period to the extent possible.	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide	• Education, • Provision of safety devices, • Ventilation system, • PPE, • First aid.	• Daily for best practices, medical care, safety devices, PPE, • Periodically for capacity building

#	Area	Impact	Mitigation	Responsibility	Requirement	Frequency
				training.		
10		health and stress issues due to noise and vibration in work environment	• Effectively isolating control room against noise and vibration, • Avoid prolonged exposure periods beyond permissible times, • Avoid exposure to excessive levels beyond permissible limits set out by local and international regulations, • Monitor noise and vibration levels frequently (within a SOP), • Use noise hearing protection gear and vibration resistant boots, gloves, and clothing, • Keep records of breaching incidents, and report to the higher management.	• Working personnel to implement, • BSA to provide medical insurance, monitor implementation, and provide training.	• Education, • Provision of isolation, • Provision of monitoring devices and programs, • PPE, • Medical insurance, • Record keeping	• Daily for best practices, medical care, PPE, • Weekly and monthly for monitoring, • Periodically for capacity building

9.2. Monitoring Plan

A monitoring program is required in both construction and operation phases. Monitoring aims at ensuring effective and timely implementation of environmental and social mitigation measures. A monitoring program should include all sensitive environmental and social parameters in both construction and operation; should be performed by well-trained personnel; within a pre-defined timeline; and by utilizing available management resources and systems. This would include for instance, water quality monitoring, records of incidents, complaints, traffic, health care, etc.

In construction phase, the Contractor holds responsibility for monitoring pollutant releases to the on-site and off-site environments. These include air pollutants, noise/vibration levels, ground and surface water quality, sediment and waste quantities, etc. the Contractor is also responsible for adherence to OHS measures and transportation measures, by analyzing and responding to incident and complaining reports (see Annex IV for more details). The project will have for supervision a Project Implementation Consulting (PIC) firm. This PIC will be responsible for monitoring contractors' implementation and specifically the implementation of environmental and social safeguards through having an Environmental and Social Safeguard Specialist onboard. The BSA team also may share responsibility along with a PIC firm for conducting site visits jointly with related municipalities and other concerned departments, including participation from the contractor's side. Site visits should result in furnishing visit reports by the PIC firm. On another hand, BSA should have within its team an **Environmental and Social Officer (ESO)** to represent his/her department in all communications, visits, and reporting (see more detail in institutional arrangements section). Feedback from local communities on environmental and social related issues – could also be received through community representatives, for instance. Section 9.2.3 below, details the schedule of visits to the construction site and reporting pathways between all related parties.

In operation phase, monitoring responsibility is foreseen within the capacity of operational staff and higher management of BSA and MOB. Releases to the environment will need to be monitored. That would include (but not limited to) impacts caused by accidental overflows, odor and noise emissions, ground and surface water pollutants, and vibration levels on working personnel. OHS measures at the site will be ones of the important issues to be followed up with site management. Adverse impacts will need to be monitored by utilizing available management systems, as well as performing site measurements for air, land, and water (both surface and underground). Feedback from the local community on environmental issues is also important for a sounder implementation of the corrective and preventive actions. In order to carry out this function, the BSA should have its ESO continue work from the previous construction phase. Duties include for example overseeing the day-to-day implementation of the Environmental Management Plan in the project sites and reporting back to the PMU and relevant higher management.

The monitoring program takes into account a number of KPIs and pollutant thresholds set out by regulators, against which parameters are to be monitored. Additionally, monitoring devices, either handheld or stationary, have to be well-maintained and calibrated with proper certified standard materials, especially in the cases of air, noise, vibration, land, and water measurements. A well-trained staff should be commissioned to perform and analyze measurements. The required expertise could be acquired from the existing laboratory staff. Finally, costs incurred for monitoring impacts during construction is embedded in the PIC's contract, while costs of monitoring during operation

phase will be part of the BSA budget. Tables 28 & 29 below provide monitoring programs pertinent to the construction and operation phases respectively, while table 31 shows timeline for implementation at both Project sites during construction.

9.2.1. Surface and Groundwater Quality Monitoring

A surface and groundwater monitoring program will be further developed in the onset of the project with technical support from the central labs of BWA. The monitoring program aims to monitor impacts of the project construction and operation activities on adjacent surface and groundwater resources. The monitoring program should at minimum include the following:

Full mapping of the affected water bodies, either surface or underground, including collection of baseline quality information and extraction/discharge capacities.

Monitoring locations are to be agreed on with BWA's personnel. And should basically include:

- Intake points from Tigris River to water projects;
- Discharge points of untreated sewage into Tigris River;
- Groundwater wells within 1km of point of discharge into Tigris River; and
- Groundwater wells within 1 km distance along open canals of untreated sewage.

Sampling is suggested to take place every two weeks for a total period of 2 months prior to construction for each of the 4 monitoring locations suggested above. This initial monitoring will provide a better understanding of the baseline quality information, which will be used later on to compare the effect of implementing and operating the project.

Another round of monitoring should be done every three months during construction phase from the same 4 suggested monitoring locations, in order to depict any deviation from baseline.

During operation of the project, monitoring can still continue but in a semiannual mode. However, an annual trend analysis should be conducted for each set of parameters for a specific monitoring location, with a possibility to update locations as necessary.

A grab sample will be taken from monitoring points using a verified sampling methods and suitably referenced to a handbook source like the "Standard Methods for the Examination of Water and Wastewater". Sampling should be done by specialized monitoring agencies like the water quality laboratories of BSA and BWA.

Testing parameters should include physical characteristics like temperature, color, and odor. Chemical characteristics like: pH, Turbidity, Electrical conductivity, TSS, TDS, Sulfate, Nitrate, Nitrite, Ammonia, Phosphate, BOD, COD, Total Halo Methanes, VOCs, and Heavy metals. As well as Microbiological characteristics: Plate count, Total coliform, E-coli, Salmonella.

All means of testing should be made available at the water quality labs, which include either handheld devices or bench-top analyzers. Additionally all standard materials, testing kits, and calibration services (if needed) should be provided.

Prior to construction phase, the central water laboratories of BWA may assume responsibility for preparing baseline quality information. During construction phase, the Project Implementing

Consultancy (PIC) firm can handle water quality monitoring as an independent party from the contractor and project proponent. Mitigation measures applied by the contractor have to be in full compliance with standards and limits. However, during operation, the water monitoring laboratories will again resume monitoring on a semiannual basis.

Monitoring costs include sampling, testing, and operational. For each round of testing (pre-construction, during construction, and operations) costs are estimated as follows:

Sampling: 100 USD per a chemical or microbiological sample per location. Total cost of sampling from 4 suggested locations would be: 200 USD * 4 = 800 USD.

Testing: 200 USD per physical, chemical, or microbiological parameter at a governmental monitoring agency like the central laboratories of BWA. Therefore, for all parameters, one round of testing would cost: 200 USD*22 parameter = 4,400 USD (either in pre-construction, during construction, or operation phases).

Human resources: 500 USD per each round of testing.

Overhead: estimated at 400 USD per each round.

Total cost: 6,100 USD per each round of testing (4 suggested locations)

9.2.2. Proposed monitoring plan

Table 28: Monitoring plan per one site – Construction phase

#	Parameter to be monitored	Target KPI/limit	Monitoring requirements	Monitoring Responsibility	Frequency	location	Cost estimate
1	Health issues linked to nature of work	• Zero medical complaint/ assistance, • 100% clear inspection report	• Contractors' incident records • Keeping records at medical care centers	• Resident engineer of PIC • Resident engineer of BSA • ESO- BSA	Monthly, Annual review	Construction site	• PIC's budget. • BSA's resident engineer daily rate (approx. 50 USD/day) • ESO-BSA's daily rate (approx. 50 USD/day)
2	Training effectiveness	• Zero incident reports related to training, • 100% clear inspection report	• Contractor's incident reports	• Resident engineer of PIC • Resident engineer of BSA • ESO- BSA	Monthly, Annual review	Construction site	• PIC's budget. • BSA's resident engineer daily rate (approx.. 50 USD/day) • ESO-BSA's daily rate (approx. 50 USD/day)
3	Housekeeping in-situ	• Zero incident reports, • Zero complaints, • 100% clear inspection report	• Contractor's incident records, • Contractor's complaining system, • Site engineer's reporting	• Resident engineer of PIC • Resident engineer of BSA	Bi-weekly, Monthly, Annual review	Construction site	• PIC's budget. • BSA's resident engineer daily rate (approx. 50 USD/day) • ESO-BSA's daily rate (approx. 50 USD/day)
4	Right expertise	• Zero incident reports related to failure testing, • 100% clear inspection report	Mechanical and electrical testing records, Site engineer's reporting	• Resident engineer of PIC • Resident engineer of BSA	Quarterly	Construction site	• PIC's budget. • BSA's resident engineer daily rate (approx. 50 USD/day)
5	PPE effective usage	• Zero incident reports related to misusing PPE, • 100% clear inspection report, • 100% clear OH report	• Contractor's incident records, • Contractor's complaining system, • Site engineer's reporting, • OH inspection system	• Contractor • Resident engineer of PIC • Resident engineer of BSA	Monthly	Construction site	• Contractor's budget • PIC's budget. • BSA's resident engineer daily rate (approx. 50 USD/day)
6	Site hygiene	• Zero incident reports related to waste mismanagement, • 100% clear inspection report, • 100% clear PH report	• Contractor's incident records, • Contractor's complaining system, • Site engineer's reporting,	• Contractor • Resident engineer of PIC • Resident engineer of BSA	Monthly, Quarterly, Annual review.	Construction site	• Contractor's budget • PIC's budget. • BSA's resident engineer daily rate (approx. 50 USD/day)

#	Parameter to be monitored	Target KPI/limit	Monitoring requirements	Monitoring Responsibility	Frequency	location	Cost estimate
			• PH inspection system				
7	Off-site hygiene	• Zero complaints related to illegal dumping off-site, • 100% clear PH report	• BSA's complaining system, • PH inspection system	• Resident engineer of PIC • MOB	Monthly, Quarterly, Annual review	Transporting routes	• PIC's budget. • MOB budget (daily rates of field inspectors approx. 50 USD/day)
8	Ambient air quality and noise	• Zero complaints related to air and noise nuisance, • 100% clear Environmental Health (EH) report, • Thresholds are fully complied with.	• BSA's complaining system, • EH. inspection system, • Air and noise monitoring equipment, measurements and analyses.	• Resident engineer of PIC • Resident engineer of BSA • ESO- BSA	Quarterly, Annual review.	Site vicinity	• PIC's budget (monitoring cost estimated at 10,000 USD quarterly). • BSA's resident engineer daily rate (approx. 50 USD/day) • ESO-BSA's daily rate (approx. 50 USD/day)
9	Surface and groundwater quality	• Physical, chemical, and bacteriological parameters are within national limits	• Water quality monitoring services	• Resident engineer of PIC • ESO-BSA for final reporting	Quarterly	• Intake points from Tigris, • Discharge points of untreated sewage, • Groundwater wells within 1km of point of discharge into Tigris, and • Groundwater wells within 1 km distance along open canals of untreated sewage.	• 6,100 USD per each round of testing from 4 locations • ESO-BSA's daily rate (approx. 50 USD/day)
10	Public health	• Zero complaints related to vector nuisance and communicable diseases, • Zero incidents of Project related infections/diseases.	• Immunization program, • Records of BSA's complaining system, • Records of Health inspection system, • Records of Health care systems.	• Health care provider • Resident engineer of PIC • MOB • ESO-BSA for final reporting	Monthly, Annual review.	On-site, localities	• Cost of health care program included in the contractor's budget (estimate: 200 USD/worker/year), • Cost of MOB's complaining system included in MOB's budget, • PIC's budget • ESO-BSA's daily rate (approx. 50 USD/day)
11	Traffic safety	• Zero traffic accident reports related to the Project, • Zero complaints of project related traffic accidents	• Traffic dept records, • Records of BSA's complaining system, • Contractor's record.	• Traffic dept, • MOB • Resident engineer of PIC for reporting	Monthly, Annual review	Public road network	• Costs of accidents recording included in Traffic Department's budget, • Cost of MOB's complaining system included in MOB's budget,

#	Parameter to be monitored	Target KPI/limit	Monitoring requirements	Monitoring Responsibility	Frequency	location	Cost estimate
				• ESO-BSA for final reporting			• PIC's budget • ESO-BSA's daily rate (approx. 50 USD/day)
12	Natural life (flora & fauna)	• Zero incident reports related to altering/ endangering natural life	• Environmental inspection system, • Incident records.	• Environmental dept at MOB • Resident engineer of PIC for reporting • ESO-BSA for final reporting	Monthly, Annual review	Natural life in vicinity and downstream	• Costs of environmental monitoring included in environmental dept's budget, • PIC's budget • ESO-BSA's daily rate (approx. 50 USD/day)

Table 29: Monitoring plan per one site – Operation phase

#	Parameter to be monitored	Target KPI/limit	Monitoring requirements	Monitoring Responsibility	Frequency	location	Cost estimate
1	Water quality	• River water quality within thresholds, • Zero complaints related to overflows	• Water quality monitoring services	• MOB for complaining • BWA's central labs • ESO-BSA	Semiannual	• Intake points from Tigris, • Discharge points of untreated sewage, • Groundwater wells within 1km of point of discharge into Tigris, and Groundwater wells within 1 km distance along open canals of untreated sewage.	• MOB's budget for running complaining system, • 6,100 USD per each round of testing from 4 locations • ESO-BSA's daily rate (approx. 50 USD/day)
2	Land and soil quality	• Land and soil quality within thresholds, • Zero complaints related to overflows	• MOB/BSA's complaining system, • Land and soil monitoring equipment, measurements, and analyses.	• MOB's Environmental Health dept. • ESO-BSA	Monthly, Annually.	SPS vicinity, Downstream	• MOB/BSA's budget for running complaining and inspection, • MOB/BSA's budget for running soil monitoring • ESO-BSA's daily rate (approx. 50 USD/day)
3	Ambient air quality and noise	• Zero complaints related to air and noise nuisance, • 100% clear EH report, • Thresholds not exceeded.	• MOB/BSA's complaining system, • Air and noise monitoring measurements and analyses	• MOB • ESO-BSA	Monthly, Annually.	SPS vicinity	• MOB/BSA's budget for running complaining and inspection, • MOB/BSA's budget for running air and noise monitoring • ESO-BSA's daily rate (approx. 50 USD/day)
4	Public health related to overflows	• Zero complaints of operation-related public health, • Zero incidents of Project related infections/diseases.	• Records of BSA's complaining system, • Records of Health inspection system, • Records of Health care systems.	• MOB • ESO-BSA	Monthly, Annual review.	localities	• MOB/BSA's budget for running complaining and inspection, • ESO-BSA's daily rate (approx. 50 USD/day)
5	Health issues linked to nature of work	• Zero medical complaint/ assistance, • Zero incident reports	• Incidents records, • Records at medical care centers	• SPS operator, • BSA • ESO-BSA	Monthly, Annual review	SPSs	• Costs of medical care included in BSA's budget (estimate: 200 USD/personnel/month) • ESO-BSA's daily rate (approx. 50 USD/day)

#	Parameter to be monitored	Target KPI/limit	Monitoring requirements	Monitoring Responsibility	Frequency	location	Cost estimate
6	Capacity building	• Zero incident reports related to operational and maintenance activities, • Staff evaluation (highest score)	Human resources system	• HR at MOB/BSA • ESO-BSA	Semi-annual Annual review	SPSs	• Costs of capacity building and training included in MOB/BSA's budget (estimate: 1,000 USD/worker/year) • Costs of staff evaluation included in MOB/BSA's HR budget.
7	Housekeeping in-situ	Zero incident reports related to operational and maintenance activities,	Site inspection system and records	• SPS operator, • ESO-BSA	Bi-weekly, Monthly, Annual review	SPSs	• Costs of inspection and incidents record keeping included in the SPS's and MOB/BSA's budget (estimate: 2,000 USD/year) • ESO-BSA's daily rate (approx. 50 USD/day)
8	PPE effective usage	Zero incident reports related to misusing PPE,	Site inspection system and records	• SPS operator, • ESO-BSA	Monthly	SPSs	• Costs of inspection and incidents record keeping included in the SPS's and MOB/BSA's budget (estimate: 2,000 USD/year) • ESO-BSA's daily rate (approx. 50 USD/day)
9	Site hygiene	Zero incident reports related to waste mismanagement.	Site inspection system and records	• SPS operator, • ESO-BSA	Monthly, Quarterly, Annual review.	SPSs	• Costs of inspection and incidents record keeping included in the SPS's and MOB/BSA's budget (estimate: 2,000 USD/year) • ESO-BSA's daily rate (approx. 50 USD/day)

9.2.3. Site visits and reporting

For construction phase, the BSA should put in place a communication and reporting system in order to achieve provisions of the Environmental Safeguards Monitoring Plan. The contractor should follow reporting requirements set forth in the contract according to the Standard Procurement Document – Appendix C (WB, 2017).The reporting system should outline frequency of field visits, communication pathways, and content of reporting at minimum. During construction phase, the Project proponent (through a supervision contract) is required to monitor all key environmental social, cultural indicators on the ground as outlined above. It is advisable to jointly conduct site visits to the Project site by the Project proponent (BSA) and representatives from municipalities of 22 pumping stations and the Contractor's environmental safeguard specialist. These visiting and reporting shall be part of the whole monitoring plan and must include at least the following functions:

1. Conduct one site visit to the Project site prior to starting constructions. This site visit will aim to depict any new environmental and/ or social development on the ground, upon which the Environmental Management Plan to be especially updated. This site visit should result in preparing a site visit report, which would include: date of visit, participants, specifics of the visit, observations, photos, names of interviewees, conclusions, and recommendations. The site report will then be submitted to the higher management (BSA/ MOB and WB) through a supervision contractor, for approval, and for EMP further amendment if any.

2. Similarly, conduct another one visit to the site (in liaison with the supervision contractor) after civil works have started already. This study will aim to ensure the Contractor understands required safeguards in the site and his obligations towards full implementation. The participants of the visit should make sure the Contractor has hired a safeguard specialist within his team capacity to handle all related monitoring tasks. The visiting team should report this visit to the higher management (BSA/ MOB). Reporting information should include at minimum: date of visit, participants, visit's specifics, observation, photos, names of interviewees, conclusions, and recommendations.

3. Reporting constantly (on daily basis) on safeguards implementation by the Contractor's environmental engineer. Reporting should be made to BSA (through a supervision contractor) for approval and comments. Then reporting back to the Contractor for further actions. See Annex II for a sample Checklist.

4. Reporting quarterly on safeguards implementation by the Contractor's environmental engineer. Reporting should be made to BSA (through a supervision contractor) for approval and comments. Then reporting back to the Contractor for further actions. Finalized quarterly reports should be submitted to the higher management (MOB) and the World Bank.

5. Monitoring process has to include consulting/ interviewing PAPs (recommended quarterly) throughout construction. This exercise aims to collect feedback from the surrounding communities on effectiveness of Environmental and Social Safeguards monitoring. This measure would be important to ground-truth actual and effectiveness of implementation of social mitigation measures, and the Grievance Redress Mechanism set forth is effective. All

feedback/ complaints should be documented in a site visit report and submitted to the higher management (BSA/ MOB). A full inventory of interviewees should be included in such report, which may include, among others, the following:

- Name, age, profession, educational level, place of residence, contact information,
- Daily observations by the interviewee on: dust, noise, air quality, traffic, waste releases, workforce interference with daily/ natural life, ability to integrate job opportunities, cases of communicable diseases, etc.
- Specific complaints and/or concerns about the Project,
- Photos if available,

The following table gives more insight to the visiting and reporting process.

Table 30: Monitoring and reporting schedule during construction phase

#	Type of reporting	Timing	Reporting (from whom to whom)	Description
1	Monitoring Project site before starting civil work	Once before start of civil works	**From** Representatives of BSA, municipalities, and Contractor's environmental engineer **To** the higher management of BSA, MOB, and WB	This stems from BSA's responsibility to ensure preparedness of the Project site to receive the new interventions (environmentally, socially, etc.). This site report is a descriptive one, and should contain expert observations and feedback from surrounding people.
2	Monitoring Contractor's obligation towards EMP	Once upon starting the Project	**From** Representatives of BSA, municipalities, and Contractor's environmental engineer **To** the higher management of BSA and MOB Then **From** BSA **To** Contractor for action	This stems from BSA's responsibility to ensure Contractor's full compliance to EMP. This visit report is a qualitative and quantitative one on the Contractor's environmental and social provisions (for example. Handheld monitoring devices, spill containment, workforce training records, etc.)
3	Monitoring safeguards	On daily basis	**From** the Contractor's environmental engineer **To** the BSA 's supervision team, Then **From** BSA **To** Contractor for action (through supervision contractor)	This is to ensure full compliance to environmental and social safeguards by the Contractor throughout Project construction. This report is essentially technical in heart, which should include figures and trend analyses for key environmental and social parameters.
4	Monitoring safeguards	Quarterly progress reporting	**From** the Contractor's environmental engineer **To** the BSA 's supervision team, **To** the higher management at BSA / MOB and WB Then **From** BSA **To** the Contractor for action (through supervision contractor)	Aims to engage higher management in monitoring progress, and to ensure their buy-in. This report should include summary information on parameters above limits and how they were rectified, and other issues and challenges and responses thereto.
5	Monitoring complaints/concerns of local community	Quarterly from starting constructions	**From** Representatives of BSA, municipalities, and Contractor's	Aims to rectify proceedings of the Project for healthier environmental and social aspects during

#	Type of reporting	Timing	Reporting (from whom to whom)	Description
			environmental engineer **To** the higher management of BSA and MOB, Then **From** BSA **To** Contractor for action (through supervision contractor)	construction, in addition to measure local community's satisfaction/ concerns. This reporting could be integrated within the same quarterly report (as in # 4).

During operation phase, the site management should constantly report on social and environmental impacts to their BSA's relevant environmental department on their daily management. Then feedback should be sought from BSA to the site management for further improvements. BSA should report to the higher management (MOB and WB) on a quarterly basis for quality-checks and areas for improvement.

9.2.4. Monitoring timeline

Table 31: Monitoring timeline for the construction phase

#	Parameter	Year 1						Year 2												Year 3													
Twenty Two Sewerage Pumping Stations in Rusafa																																	
1	Health issues linked to nature of work				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
2	Training effectiveness				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
3	Housekeeping in-situ				xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx		
4	Right expertise						x			x			x			x			x			x			x			x			x		
5	PPE effective usage				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
6	Site hygiene				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
7	Off-site hygiene				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
8	Ambient air quality and noise				xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx		
11	Surface and groundwater quality						x			x			x			x			x			x			x			x			x		
10	Public health & safety				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
11	Traffic safety				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
12	Natural life (flora & fauna)				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		

9.3. Institutional Arrangements and Training Requirements

9.3.1. Institutional Arrangements

The project will be implemented by the Mayoralty of Baghdad, which should allow for a smooth flow of information among Contractors, Supervision, and higher managements at BSA/MOB. Therefore, a Project Management Unit/Project Management Team (PMU/PMT) is foreseen important to ensure prompt response, liaison, and on-the-spot guidance. The PMU should be given a direct communication and reporting line to the Mayor and relevant higher management. The PMU will closely coordinate its daily activities with the different departments of the MOB, particularly with BWA and BSA. The PMU will also be held responsible for daily activities with different departments of MOB. As a minimum, the PMU should be responsible for ensuring adherence to Project tasks and time schedules, issuing approvals on deliverables, and authorizing/releasing installments according to payment schedules. However, full Roles and Responsibilities should be defined at early stages of the Project. The PMU will include nominated experienced staff seconded from existing technical and financial units (or a new hire if not available internally). Specifically, PMU should include two **Environmental and Social Officers (ESOs)**, one each for the R2 reservoir construction and for the sewerage pumping stations rehabilitation. The ESO is basically a focal point between the office and the field in matters concerning environmental and social requirements of the project. S/he reports to the Head of the PMU, and both office and field work are assigned to him/her. See Annex III for the Terms of Reference for this position. Every ESO will have the opportunity to represent his/her relevant department (BSA or BWA) through all stages of the Project, as well as participate in other projects within the MOB's development program.

Additionally, both the BWA and the BSA will appoint one Resident Engineer, to be supported by a team of mechanical engineers, electrical engineers, and other junior technical staff, who will be responsible for overall supervision and monitoring on both contractors and Project Implementation Consulting (PIC) firms. The Resident Engineer will be responsible for:

1. Quality control of the civil works;
2. On-site occupational health and safety; and
3. All other on-site aspects of environmental safeguards compliance.

The PMU's Resident Engineer will supervise the work of the PIC firm's Resident Engineers. The PMU's Resident Engineer is required to liaise with the two ESOs for environmental and social issues and will report directly to the Head of the PMU.

Both BWA and BSA have well-functioning Health and Safety units with written protocols for worker and equipment safety, as well as for worker injury. These Health and Safety units receive ongoing support from the General Association of Iraq for Health and Safety, located within the Ministry of Environment and Health. The General Association runs trainings on occupational health and safety, pesticide storage, fire safety, etc. and provides certification for Ministry and other government agency health and safety units. The BWA and BSA Health and Safety units are General Association certified. As these two Health and Safety units are understaffed per the workload of the two agencies, they will benefit from having the Resident Engineers provide additional oversight of occupational health and safety compliance at the World Bank financed sites.

The Project Implementation Consulting (PIC) firm will include an Environmental Safeguard Specialist (supervisor's engineer).

Basic Requirements – Environmental Safeguard Specialist (PIC's Engineer)

The Environmental Safeguard Specialist should have a bachelor or higher degree in environmental engineering/science/management and at least 10 years of Middle East based relevant experience in water and wastewater treatment projects. Previous experience in sewerage pumping station rehabilitation is highly desirable. The Specialist must be fluent in Arabic and in English. The Specialist will assist in the following, but not limited to:

1. *Review contractor implementation of the mitigating measures and monitoring program as detailed in the three ESMPs, noting areas of good practice, and areas for improvement;*
2. *Review contractor safety permits and records to be kept, to ensure that the contractor is fully in compliance with written documentation needed;*
3. *Supervise and report the progress of implementation of the ESMPs to MOB and the World Bank twice a year (through PMU);*
4. *Report any violation of environmental standards and the measures taken to restore compliance twice a year to MOB and World Bank (through PMU);*
5. *Assist the two ESOs, as well as the Resident Engineering team and contractor staff, by providing capacity building on environmental safeguards. This consultancy requires that the PIC Environmental Safeguards Specialist give two trainings per year to all relevant staff as noted above. The subject and outline of the training should be shared with the MOB and World Bank at least two months in advance, and the detailed content of the training should be shared with the MOB and World Bank one month prior to the training date.*

The following flow chart would explain the above institutional arrangement.

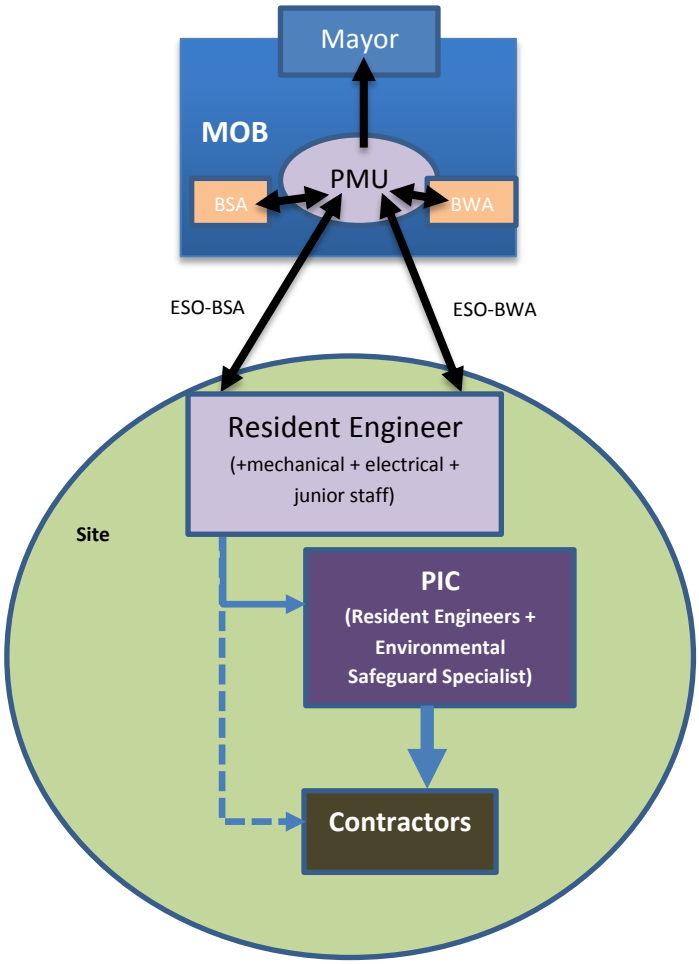

Figure 22: Institutional arrangement relationship

9.3.2. Training Requirements

The organization, on another hand, should provide enough training, and capacity building for the team responsible for monitoring implementation, after mapping needs prior to Project commencement. Training needs could include topics on: risk management, environmental management systems, environmental and social impact assessment, public outreach, documentation and record keeping, financial management, occupational health and safety measures, etc. The following table would provide examples on training workshops/sessions, and anticipated costs.

Table 32: Proposed training workshops and courses

Target Group	Workshop/ Training Sessions	Training Provider	Costs (USD)
Coordinators and Project Officers (MOB, BSA)	- Training session on planning and design of ESIAs/ESMPs.	BSA's Environmental and Social Officer	7,000

Target Group	Workshop/ Training Sessions	Training Provider	Costs (USD)
Project Beneficiaries and Stakeholders	- Consultation sessions on potential environmental and social impacts of the Project.	Project Unit with assistance from the Environmental and Social Officer	10,000
Project Proponent (BSA), Site personnel, OHS dept.	- Training session on planning and design of ESIAs/ESMPs. - The design and implementation of mitigation measures. - Occupational health and safety guidelines.	Project Unit with assistance from the Environmental and Social Officer, External training provider for OHS	18,000
Specialized training			
BSA operational staff	- Contingency planning	Department of civil defense	5,000
Technical staff at the site	- Water and Wastewater monitoring and testing	Central laboratories	10,000
		Sub Total (USD)	**50,000**
		Environmental and Social Officer Salary*	**40,000**
		Total (USD)	**90,000**

* The Environmental and Social Officer (ESO) will be involved in all the above training topics, in addition to his/her daily duties set out in Annex III. Monthly rate of the ESO is expected at 3,000 USD, inclusive of social charges and taxes.

Upon accomplishment of new interventions (post-construction), the Unit/team should have the full capacity and knowledge on the residual impacts left behind in the site. The unit/team has to be familiar with the contract's provisions and penalties, should the obligations toward restoring working environment unfulfilled.

Upon operating the newly rehabilitated pumping stations, new professional challenges may arise. New challenges may include running and operating new equipment and facilities, performing maintenance and troubleshooting according to manufacturers' instructions, referring to manuals for replacing parts and troubleshooting, and many others. The Project was planned in such a way to fulfil training and capacity building requirements.

Special training for monitoring levels of pollutants (air, noise, vibration, land/soil, water, wastewater) would entail providing special training courses on operating, servicing, and calibrating testing apparatus (portable/handheld, and stationary) in the field. Training should also include sampling and sample storage techniques against internationally followed testing and sampling

procedures (examples include WHO and USGS methods, as well as Standard Methods for the Examination of Water and Wastewater by APHA, AWWA, WEF)

As mentioned above in the public consultation chapter and suggested GRM, a well-established complaining system at BSA level or at a higher level (MOB) has to be activated to receive and address complaints from the communities under the Project influence. A secure and accessible hot line (or alternatively other written formats) should be dedicated. Anonymity/ Confidentiality and adequate responses should be maintained. A well-trained staff should be commissioned to manage the system who have to be acquainted with the local community needs and concerns. Special communication with the local community must include local representatives' engagement. This could be performed directly by BSA/MOB or by relevant municipalities through continuous meetings and workshops.

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ANNEXES

Annex I: Contingency Plan Template – emergency discharge

I. Document Quality Assurance

Revision no. ----------	Date issued. ----------
Prepared by. ----------	Approved by. ----------
Next revision due date. ----------	Document is available in the following places. ----------

II. **Scope:** This Plan should be followed and further reviewed upon overflow emergency cases of the 22 sewerage pumping stations in Al-Rusafa side. Applicable emergencies include:
1. Pumping failure, including: accidental blockage, mechanical and electrical failure, power shortage/cut;
2. Overflows during wet weather conditions;
3. A major public health outbreak occurred upstream and downstream according to authorities.

III. **Receiving water bodies:** This includes all canals that receive sewage and eventually drain into Tigris River.

IV. **Problem Indicators:** receiving and/or pumping/lifting sewage capabilities have been compromised due to either one or part of the following indicators:
- Control panels have shown beyond-design-capacities inflows {yes, No},
- Malfunctioning of pumps was evident {yes, No}
- Leakage of sewage was evident in-door {yes, No}, outdoor {yes, No},
- Out-of-control alarm has been triggered by working personnel {yes, No},
- Serious stoppage at the receiving treatment plant has been announced {yes, No}
- Unusual stormwater conditions have been announced by state authorities {yes, No}

V. Specific Actions:
1. Site management to communicate the problem with BSA,
2. Operate standby pumps immediately,
3. Bypass inflows through the emergency discharge pipe to the pre-designated discharge channel,
4. Apply safety working measures,
5. Drain leakages from the facility,
6. Fix the problem(s) in case of malfunction,
7. Evacuate the site in extreme cases,
8. Return inflows and pumping capacities ASAP,

9. Announce the situation is "Back to normal".

VI. Responsibilities:

- Site management to announce emergency discharge,
- Maintenance personnel to perform stoppage, checks, and re-pumping,
- BSA to liaise with other departments and reach out the public.

VII. Emergency contacts

1. Site management**:** Name: ----------, Land line: ----------, mobile: ----------
2. Maintenance personnel: Name: ----------, Land line: ----------, mobile: ----------
3. BSA inspection department: Name: ----------, Land line: ----------, mobile: ----------
4. MOB's Mayor Office: Name: ----------, Land line: ----------, mobile: ----------
5. Testing laboratory (land contamination): Name: ----------, Land line: ----------, mobile: ----------

VIII. Laboratory checks

Water quality	**Test**
Chemical	Heavy metals, organic matter, chlorinated phenols, Polycyclic Aromatic Hydrocarbons (PAHs)
Microbiological	Total plate counts, T. coliforms, Fecal coliforms, E. Coli, protozoa, Clostridium, as required by the national wastewater standards
References	WHO and USGS methods, as well as Standard Methods for the Examination of Water and Wastewater by APHA, AWWA, WEF

Annex II: Sample checklist for construction phase ESMP

Project Proponent: ……
Project Name:……
Visit Date:……
Participants:……

	Impact to check	Yes	No	Remarks	Safeguards/ Mitigation measures carried on
1	Disturbance to social daily life				
2	Disturbance to economic daily life				
3	Water Services problems				
4	Sewerage Services problems				
5	Solid Waste Services problems				
6	Traffic problems (hindering, detours, closure etc.)				
7	Pedestrians' safety endangered				
8	Landscape / aesthetic element/s deteriorated				
9	Natural Resources negatively affected				
10	Biodiversity and Wildlife threatened				
11	Dust spreading out				
12	Odor emission				
13	Noise/alarm generation				
14	Workers safety and health considered				
15	Workers commitment to OHS (vests, gloves, Heavy Duty wearing apparel etc.)				
16	Working machines suitability				
17	Improper storage of materials and equipment				
18	Security breaching at the working site				
19	Additional Impact (please add here) …… ……				

20. Comments: ……..

21. Recommendations: ……

Environmental and Social Officer's Signature……
Date……

Annex III: Terms of Reference – BSA's Environmental & Social Officer

The Environmental and Social Officer (ESO) is expected to be internally assigned from BSA, or acquired externally if not available. ESO's duty station will be within the Project Management Unit (PMU)/ Project Management Team (PMT). Accordingly the ESO will be a staff member to whom the following main tasks are attached:

I. Scope of Work

- Serve as focal point between PMU and work personnel in the field, and report directly to the Head of the PMU;
- Liaise environmental and social-related tasks and issues with the PMU's Resident Engineer;
- Serve as a BSA liaison to the MOB as well as to the World Bank Group environmental safeguards team member assigned to the Project;
- Contribute to the preparation and execution of the Project monitoring and evaluation framework, which covers environmental and social safeguards monitoring, as well as medium-term results monitoring and evaluation in line with BSA's responsibilities;
- Monitor socio-economic impacts on PAPs, especially affected businesses and/or land related impacts, and assist in reporting grievances and provide guidance through GRM;
- Contribute to the Project's monthly, quarterly, and annual progress report documentation;
- Support the BSA in designing, facilitating, and documenting Project's specific stakeholder meetings and public consultations and formulating environmental safeguards and social specific annual work plans in agreement with Project legal documents;
- Screen, plan, prepare and support potential entities to implement other projects within the BSA 's infrastructure development program;
- Support the execution (including implementation, supervision, monitoring, and reporting) of the Project's safeguards instruments, including the Project's Environmental and Social Impact Assessments (ESIAs) and Environmental and Social Management Plan (ESMPs), as applicable; the incumbent is expected to conduct site visits to the Project location whenever required;
- Support the implementation and reporting functions of the Project-related Grievance Redress Mechanism specific to inquiries related to environmental and social aspects;
- Deliver training and capacity building programs to relevant Project's participants on OP/BP 4.01 Environmental Assessment; Social Risk issues; relevant Performance Standards; ESIA/ESMP contents, implementation, and compliance;
- Prepare/update ESIA/ESMP; Project construction- and operational-phase ESMP supervision and monitoring; and other subject matter as needed; and

II. Minimum Requirements

The BSA's Environmental and Social Officer would need to have:

- An advanced degree in environmental and social related sciences; and at least 10 years of experience in environmental impact assessment, with 2 years in implementing ESIA and ESMPs;

- A demonstrated field experience in supervising and monitoring projects; and
- An experience in preparing and conducting environmental impact assessment training.

S/he will be familiar with the environmental safeguards policies of the World Bank and those of the Iraqi Government, and will be responsible to assess the extent of the Project's compliance with relevant national and international laws and regulations. Experience with work related to wastewater infrastructure would be of advantage.

Annex IV: Environmental Requirements for Contractors

General

1. A specific Environmental and Social Management Plan (ESMP) has been prepared to address the above-mentioned specific issues. The Contractor shall be informed about such an ESMP for construction site of this Project, and prepare his work strategy and plan to fully take into account relevant provisions of that ESMP.

2. If the Contractor fails to implement the approved ESMP to fulfill his obligation within the requested time, the Client reserves the right to arrange for execution of the missing action by a third party on account of the Contractor.

3. The Contractor shall implement all measures necessary to avoid undesirable adverse environmental and social impacts wherever possible, restore work sites to acceptable standards, and abide by the ESMP.

4. These provisions also apply to any sub-contractors present on Project work sites.

General Environmental Protection Measures

5. In general, environmental protection measures to be taken at any work site shall include:

5.1. Minimize the effect of dust on the environment resulting from earth mixing sites, vibrating equipment, construction related traffic on temporary or existing access roads, etc.
5.2. Ensure that noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) comply with Iraqi standards.
5.3. Ensure that existing water flow regimes in rivers, streams and other natural or irrigation channels are maintained and/or re-established where they are disrupted due to works being carried out.
5.4. Prevent any substances, including bitumen, oils, lubricants and waste water used or produced, from entering into rivers, streams, irrigation channels, and natural water bodies/reservoirs.
5.5. Avoid or minimize the occurrence of standing water in holes, trenches, borrow areas, etc.
5.6. Upon discovery of remains of archeological or historical importance during work, immediately report to the Client (BSA and MOB).
5.7. Prohibit workers from exploiting natural resources: hunting, fishing, etc.
5.8. Prohibit the transport of firearms and/or third parties in Project-related vehicles.
5.9. Implement soil erosion control measures.
5.10. Ensure garbage, sanitation and drinking water facilities are provided in construction areas.
5.11. Ensure that, local materials are used in lieu of transporting foreign materials, whenever possible.
5.12. Ensure public safety and avoid traffic accidents, and comply with speed limits.
5.13. Ensure enough demarcation to any trench, pit, excavation, hole or other hazardous feature.
5.14. Ensure hiring from neighboring communities if unskilled daily-hired workforce is necessary.

6. Besides the regular inspection of the sites by the supervisor appointed by the Client for ensuring adherence, the Client may appoint an Environmental and Social Officer (ESO) to oversee the compliance with these environmental conditions and any proposed mitigation measures.

Pipelines

7. No trench shall be left open for more than 7 days, unless duly authorized by the supervisor upon Contractor's request. Provided enough demarcation

8. General conditions related with topsoil stripping, storage and restoration apply.

9. The Contractor shall dispose of water of pressure tests in a way not affecting neighboring settlements

Waste Management

10. All drums, containers, bags, etc. containing oil/fuel/surfacing materials and other hazardous chemicals (including oils from maintenance) shall be stored on a sealed and/or bonded area. All waste containers litter and any other wastes shall be disposed of at designated disposal sites as approved by MOB.

11. All drainage and effluent from storage areas, workshops, and working sites shall be captured and treated before being discharged into the drainage system, in line with water pollution control regulations.

12. Entry of runoff into construction sites, and working sites, shall be restricted by constructing diversion channels or holding structures such as berms, drains, dams, etc.

13. Construction waste shall not be left in stockpiles along the road, but removed and reused or disposed of on a daily basis.

14. Areas for temporary storage of hazardous materials such as contaminated liquid and solid materials shall be approved by the supervisor and appropriate local and/or relevant national or local authorities before the commencement of work. Disposal of such waste shall be in existing, approved sites.

Rehabilitation of Work and Preparation Sites

15. Topsoil shall be stripped, removed and stored for subsequent rehabilitation. Soils shall not be stripped when wet, and not stored in large or high heaps.

16. Reinstate natural drainage patterns where they have been altered or impaired.

17. Remove toxic materials and dispose of in designated sites. Backfill with soils free of foreign material.

18. Ensure reshaped land is returned stable, and adequately drained.

19. Minimize erosion by wind and water both during and after the process of reinstatement.

20. Compacted surfaces shall be deep ripped to relieve compaction unless dictated otherwise.

Management of Water Needed for Construction Purposes

21. The Contractor shall at all costs avoid conflicting with water needs of local communities. Any temporary water abstraction for construction needs shall be consulted with community. No abstraction to be made before obtaining a permit from MOB.

22. No construction water containing spoils or site effluent, especially cement and oil, shall be allowed to flow into natural water drainage courses, including wash water.

23. Site spoils/temporary stockpiles shall be located away from the drainage system and surface run off.

Traffic Management and Community Safety

24. Location of temporary access roads shall be done in consultation with the local community especially in important or sensitive environments. Access roads shall not traverse wetlands/ecologically sensitive areas. Consultations shall be documented.

25. Upon the completion of civil works, all temporary access roads shall be ripped and rehabilitated.

26. Measures shall be taken to suppress dust emissions generated by Project traffic.

27. Maximum speed limits for any construction-related traffic shall not exceed 50km/h in inhabited areas.

Salvaging and Disposal of Obsolete Components Found by Rehabilitation Works

28. Obsolete materials and construction elements such as electro-mechanical equipment, pipes, accessories and demolished structures shall be salvaged and disposed of in a manner approved by the supervisor. The Contractor has to agree with the supervisor which elements are to be surrendered to the Client's premises, which will be recycled or reused, and which will be disposed of at approved landfill sites.

29. Any asbestos cement material that might be uncovered when performing rehabilitation works will be considered as hazardous material and disposed of in a designated facility.

Damage to Property

30. In case of damages to property, the Contractor shall repair to the owner's satisfaction and at his own cost. A certificate from the owner/user shall be obtained for each repair.

31. For each repair, the Contractor shall obtain from the owner/user a certificate that the damage has been made good satisfactorily in order to indemnify the Client from subsequent claims.

Contractor's Health, Safety and Environment Management Plan (HSE-MP or CEMP)

32. The Contractor shall prepare an HSE-MP or CEMP within 6 weeks of signing the Contract. The Contractor's EHS-MP/ CEMP shall provide:

32.1. a description of procedures and methods for complying with environmental management conditions, and any specific conditions specified in an ESMP;
32.2. a description of specific mitigation measures that will be implemented in order to minimize adverse impacts;
32.3. a description of all planned monitoring activities and the reporting thereof;
32.4. the internal organizational, management and reporting mechanisms put in place for such.

33. The Contractor's HSE-MP/ CEMP will be reviewed and approved by BSA before start of the works.

HSE Reporting

34. The Contractor shall prepare bi-monthly progress reports to the Client on compliance with these general conditions, the project ESMP, and his own HSE-MP/ CEMP. These to include:

34.1. HSE management actions/measures taken, including approvals sought from local or national authorities;
34.2. Problems encountered in relation to HSE aspects (incidents, including delays, cost consequences, etc. as a result thereof);
34.3. Non-compliance with contract requirements on the part of the Contractor;
34.4. Changes of assumptions, conditions, measures, designs and actual works in relation to HSE aspects; and
34.5. Observations, concerns raised and/or decisions taken with regard to HSE management during site meetings.

35. The reporting of any significant HSE incidents shall be done as soon as practicable, within an incident report. Records shall be kept. They could also be attached to progress reports.

Training of Contractor's Personnel

36. The Contractor shall provide sufficient training to his own personnel to ensure awareness on aspects of these general conditions, any project ESMP, and his own HSE-MP/ CEMP. Specific training will be provided to those Employees that have particular responsibilities associated with the implementation of the HSE-MP/ CEMP. Training activities will be documented for potential review by the BSA.

Annex V: Environmental and Social Liabilities of BWSIP Contractors

Further to enforcing the compliance of environmental management, contractors are responsible for complying with health and safety requirements where they are to provide insurance for construction laborers, staff attending to the construction site, and citizens for each sub-project. The insurance requirements and clauses are stated in the procurement manual and reflected in the bidding documents complying to the Iraqi labor law. Monitoring of these components is integrated in bidding evaluation, and site visits reports.

Implementation of BWSIP program provides some short-term and fewer long-term job opportunities for local community; this information is cited from BWSIP baseline section.

The environmental and social management of the construction works becomes essential parts of a works contract upon its conclusion and their implementation is mandatory for a contractor. The MOB, as an owner of construction works, will be responsible for enforcing compliance of contractor with the terms of the contract, including adherence to the ESMPs.

The following procedures prevail, in addition to the supervisor engineer judgment:

- Deduction of environmental noncompliance will be added as a clause in the Bill of Quantities (BOQs) section, referring to annex in the bidding document detailing the deduction procedures;
- Environmental penalties shall be calculated and deductions are to be included in each submitted invoice;
- Mitigation measures in Environmental and Social Monitoring Matrices (ESMM) annexed to the relevant ESMP is the reference for environmental notes and penalties;
- Each impact depicted in the ESMM if not properly mitigated to be counted an environmental/social note;
- For minor infringements and social complaints, an incident which causes temporary but reversible damage, the contractor will be given environmental and social note/ stop and alert to remedy the problem and to restore the environment. If reviewing the action by the Environmental and Social Officer (ESO) showed that restoration is done satisfactorily no further actions will be taken;
- For social notes: the ESO will stop and alert the contractor to remedy the social impact, the ESO will follow the issue until solved. If contractor didn't comply to remediation request, stop will be considered under no excused delay;
- If the contractor hasn't remedied the environmental impact during this given time, the ESO/supervisor engineer in cooperation with Local Technical Consultant will:
  - Stop the work and give the contractor an environmental and social note correlated to financial penalty according to the non-complied mitigation measure depicted in the biding document and the following procedures for National Competitive Bids and Shopping Bidding Documents;
  - The ESO after the given time frame are to review the action, if ESO sees that restoration is done satisfactorily no further actions will be taken, otherwise and if Contractor hasn't remedied the situation within 1 day any additional days of stopping work will be considered no excused delay;
- When ESO issue an environmental/social note, it might depict one or more environmental penalty; and
- If repeating the noncompliance to ESMF penalties approached (3-5) % of the contract value, the ESO will raise the formal recorded environmental and social notes and the deduction history to MOB in order to take a legal action. Considering that bidding document include environmental penalty in the BOQ, the ESMP and deduction procedures in annexes and referred to in particular conditions.

<u>The following form will be used for the environmental/ social note:</u>

Environmental and Social Note No ( )	
Municipality	Date
Project Name	
Site Location	
Contractor	
The Environmental Note	
Municipality Supervisor /Engineer	
Local Technical Consultant	
Contractor Representative on time of note	
Submitted to Contractor Representative	
Copy Submitted to MOB on	
Hour	
Date	

Procedures for National Competitive Bids and Shopping Bidding Documents:

As mentioned above, environmental and social notes might contain one or more environmental penalty applicable for deduction.

- For social notes: stop and alert the contractor to remedy the action;
- For environmental notes: refer to the ESMP for the note to verify how many notes illustrated in the note;
- Deduction rate starts with 0.1% of contract value; and
- Deduction rate increase by 0.05% of the contract amount after each fifth note.

For National Competitive Bids:

ESMP Compliance Penalty for National Completive Bids

ESMF Compliance Penalty		
No.	**Environmental and Social Note**	**Penalty**

1	1	Stop and alert
2	2+3+4+5+6	Stop and deduct 0.1% of the contract amount for each mitigation measure in the environmental note. Minimum amount of deduction is 150 Euro
3	7+8+10+11+12	Stop and deduct 0.15% of the contract amount for each mitigation measure in the environmental note Minimum amount of deduction is 225 Euro
3+1	Next five notes	Each 5 notes + deduction would be: N= percentage of deduction of (N-1) + (0.5* percentage of deduction of (N-1)) For example: Stop /Deduct 0.1%+0.05(0.1%) of the contract amount for each mitigation measure in the environmental note. Minimum amount of deduction is 300 Euro
5	Note +1	If penalty rate approach 5% of contract cost it is recommended to stop work and send official request to MOB of the proposed action according to bidding documents and procurement manual

Deduction is to be calculated by the relevant BSA/BWA Engineer (ESO) and to be reviewed by the supervisor engineer where he is to consider the environmental Note (N), and the deduction for N.

Deduction for N= [percentage of deduction of (N-1) + (0.5* percentage of deduction of (N-1)]* contract Amount.

If Penalties Rate approach 5% of Contract cost its recommended to stop work, and send official request to MOB of the proposed action according to bidding documents and procurement manual.

Municipality can decide if a mitigation measure has a significant impact and might require setting its noncompliance penalty rate based on its significance.

For Shopping Bidding Documents:

- For social notes: stop and alert the contractor to remedy the action;
- For environmental notes: refer to the ESMP for the note to verify how many notes illustrated in the note;
- Deduction rate starts with 0.1% of contract value; and
- Deduction rate increase by 0.05% of the contract amount after each fifth note.

ESMP Compliance Penalty for Shopping Bidding Documents

ESMF Compliance Penalty		
No.	**Environmental and Social Note**	**Penalty**
1	1	Stop and alert
2	2+3+4+5+6	Stop and deduct 0.1% of the contract amount for each mitigation measure in the environmental note. Minimum amount of deduction is 40 Euro
3	7+8+10+11+12	Stop and deduct 0.15% of the contract amount for each mitigation measure in the environmental note Minimum amount of deduction is 60 Euro
3+1	Next five notes	Each 5 notes + deduction would be: N= percentage of deduction of (N-1) + (0.5* percentage of deduction of (N-1))

		For example: Stop /Deduct 0.1%+0.05(0.1%) of the contract amount for each mitigation measure in the environmental note. Minimum amount of deduction is 80 Euro
5	Note +1	If penalty rate approach 3% of contract cost it is recommended to stop work and send official request to MOB of the proposed action according to bidding documents and procurement manual

Deduction is to be calculated by the BWA/BSA (ESO) and to be reviewed by the Supervisor Engineer where he is to consider the environmental Note (N), and the deduction for N.

Deduction for N= [percentage of deduction of (N-1) + (0.5* percentage of deduction of (N-1)]* contract Amount.

If Penalties Rate approach 3% of Contract cost its recommended to stop work, and send official request to MOB of the proposed action according to bidding documents and procurement manual.

BWA/BSA (ESO) can decide if a mitigation measure has a significant impact and might require setting its noncompliance penalty rate based on its significance.

Annex VI: Pesticides Use and Management

Chemical Methods for Controlling Urban Vectors

Cockroaches – Commonly used pesticide products for cockroaches and uses

Insecticides carrying a CAUTION label, in formulations that reduce potential for exposure.

Active ingredient	Example Products	WHO Classification	Uses
Disodium octaborate tetrahydrate	Ant Cafe® RTU 73766-2	Class 3	Pre-manufactured enclosed bait station that can be placed in inaccessible areas.
Boric acid	Drax® Roach Assault PGF 9444-193	Class 3	Solution, paste or gel that can be applied as drops in accessible areas. Gel can be applied in small amounts to cracks, crevices and other areas where bait stations cannot be used.
Hydramethylnon	Maxforce® Professional Insect Control Roach Killer Bait Gel 432-1254	Class 2	
Indoxacarb	Advion® Cockroach Gel Bait 352-652	Class 2	

Class 1A = Extremely Hazardous, Class 1B = Highly Hazardous; H = Moderately Hazardous; Class 3 = Slightly Hazardous; U = Unlikely to present acute hazard in normal use; FM = Fumigant, not classified, O = obsolete as pesticide, not classified.

Insecticides carrying a CAUTION label, in formulations with a greater potential for exposure

Active ingredient	Example Products	WHO Classification	Uses
Fipronil	Maxforce® Professional Insect Control Roach Bait Station 432-1257	Class 2	Volatile active ingredient in pre-manufactured enclosed bait station. Use alternative non-volatile products.
Boric acid	Borid® 9444-133	Class 3	Dust formulation. To reduce exposure hazard, use only in voids that will be sealed after use. Wipe up over-application.
Diatomaceous earth	Eaton's KIO System 56-67	U	
Disodium octaborate tetrahydrate	67 Boracide® 64405-7	Class 3	
Limestone	NIC 325 Pro Organic®	U	
Boric acid	ECO 2000-GR® 1677-191 Niban® FG 64405-2	Class 3	Granular formulations. To reduce exposure hazard, use only in voids that will
Xanthine	Ecologix® Cockroach Bait	U	

	1001-13		be sealed after use.
Oxypurinol orthoboric acid	Intice™ Ant Granules 73079-2	Class 3	
Boric acid	PT 240 Permadust® 499-384	Class 3	Pressurized aerosol. Mint oil formulations must be applied directly to insects, no residual activity.
Mint oil	Earthcare® Naturals Ant & Roach Killer	U	

Class 1A = Extremely Hazardous, Class 1B = Highly Hazardous; H = Moderately Hazardous; Class 3 = Slightly Hazardous; U = Unlikely to present acute hazard in normal use; FM = Fumigant, not classified, O = obsolete as pesticide, not classified.

Insecticides carrying a CAUTION label, in formulations with greater potential for toxicity and/or exposure

Active ingredient	**Example Products**	**WHO Classification**	**Uses**
Bifenthrin	Talstar® 279-3225	Class 2	Liquids sprayed or otherwise applied to exposed interior and/or exterior surfaces. Spray applications can contaminate an area and make baiting ineffective until the residue degrades. To reduce exposure hazard and avoid contamination, use alternative formulations and/or limit applications to non-volatile active ingredients applied to non-human contact surfaces in inaccessible areas.
Chlorfenapyr	Phantom® 241-392	Class 2	
Cyfluthrin	***Tempo® SC Ultra 11556-124***	***Class 1B (cannot be financed by BWSIP)***	
Cypermethrin	Demon® EC 100-1004	Class 2	
Deltamethrin	Suspend® SC 432-763	Class 2	
Lambda Cyhalothrin	Demand® CS 100-1066	Class 2	
Disodium Octaborate Tetrahydrate	Mop Up® 9444-132	Class 3	Liquid, mop-applied to exposed interior surfaces, e.g., floors, will leave dust residual. To reduce exposure hazard and avoid contamination, use alternative formulations

Class 1A = Extremely Hazardous, Class 1B = Highly Hazardous; H = Moderately Hazardous; Class 3 = Slightly Hazardous; U = Unlikely to present acute hazard in normal use; FM = Fumigant, not classified, O = obsolete as pesticide, not classified.

Rats and Mice – Commonly used pesticide products for rodents and mice

(As all of the below are WHO Classified 1A and 1B, they cannot be financed by BWSIP)

Active ingredient	**WHO Classification**	**Example Products**
Brodifacoum 0.005(waxblocks)	Class 1A	Brobait, Nofar
Bromadilone 0.005 (bait)	Class 1A	Acilone, Garden top fresh
Bromadilone 0.25 (L)	Class 1A	Bromac-c
Bromadilone 0.1 (TP)	Class 1A	Bromalone
Coumatetraryl 0.75 (TP)	Class 1B	Racumin, Ratryl
Flocoumafen 0.005 (wax block bait)	Class 1A	Storm, Murdex

Class 1A = Extremely Hazardous, Class 1B = Highly Hazardous; H = Moderately Hazardous; Class 3 = Slightly Hazardous; U = Unlikely to present acute hazard in normal use; FM = Fumigant, not classified, O = obsolete as pesticide, not classified.

As all of the commonly used rodenticides in Jordan and WHO classified 1A and 1B and therefore cannot be financed by the World Bank, it is recommended that **calciferols (vitamins D)**, including cholecalciferol (vitamin D_3) and ergocalciferol (vitamin D_2), be considered as possible rodenticides. It is considered to be single-dose, cumulative (depending on concentration used; the common 0.075% bait concentration is lethal to most rodents after a single intake of larger portions of the bait) or sub-chronic (death occurring usually within days to one week after ingestion of the bait). Applied concentrations are 0.075% cholecalciferol and 0.1% ergocalciferol when used alone.

Annex VII: Sample Grievance Registration Form

The _____Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.
Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date		**Place of Registration**			
Contact Information/Personal Details					
Name		**Gender**	* Male * Female	**Age**	
Home Address					
Place					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where, and how) of your grievance below: If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of Official Registering Grievance)	
Mode of Communication: Note/Letter E-mail Verbal/Telephonic	
Reviewed by: (Names/Positions of Officials Reviewing Grievance)	
Action Taken:	
Whether Action Taken Disclosed:	Yes No
Means of Disclosure:	

Arabic form

يرحب المشروع بأية استفسارات، أو اقتراحات، أو ملاحظات، أو شكاوى تتعلق بتنفيذ المشروع. ننصح المراجعين بذكر الاسم ومعلومات الاتصال ليتسنى لنا التواصل معهم بهدف الايضاح أو الرد على القضية المطروحة. أما في حالة اختار ابقاء المعلومات الشخصية سرية، فيجب كتابة عبارة "سرّي" فوق الاسم مباشرة، مع جزيل الشكر.

التاريخ		مكان تسجيل الشكوى			
معلومات عامة/ التفاصيل الشخصية					
الاسم		الجنس	ذكر انثى	السن	
عنوان الاقامة					
المكان					
رقم الهاتف					
البريد الالكتروني					
الشكوى/ الاقتراح/ الملاحظة/ الاستفسار. يرجى تزويدنا بالمزيد من المعلومات (من، ماذا، أين، وكيف؟) الخاصة بالشكوى: ضع اشارة هنا، إن كانت التفاصيل على شكل رسالة أو مرفق □					
كيف ترغب بالحصول على الرد على هذه الشكوى/ الملاحظة أو التطورات المتعلقة بها؟					

للاستخدام الرسمي فقط

سجلت الشكوى/ الملاحظة بواسطة: (اسم الموظف المسؤول عن تسجيل الشكوى)	
طريقة الاتصال: ملاحظة/ رسالة بريد الكتروني مشافهة/ هاتفية	
تمت المراجعة بواسطة: (اسماء الاشخاص/ وظيفتهم الذين قاموا بمراجعة الشكوى)	
الاجراء المتخذ:	
هل تمت مكاشفة الاجراء المتخذ:	نعم لا
طرق المكاشفة	

Annex VIII: Public Consultation –Questionnaire template

Al-Habibiya SPS Rehabilitation Project

Public Consultation Questionnaire

Name:

Educational level:

Work place:

Email: Phone:

1. Are you impacted by noise when operating pumps, motors, and other parts of the SPS?

   Yes ☐ No ☐

2. Are you impacted by odors and fumes generating from the SPS?

   Yes ☐ No ☐

3. Do you have any health problems connected to emissions from the SPS?

   Yes ☐ No ☐

4. Do you expect the rehabilitation work will provide job opportunities in your neighborhood?

   Yes ☐ No ☐

5. Do you think installing fumes and odor scrubbers in the SPS will help reduce risk of harmful emissions?

   Yes ☐ No ☐

6. What do you expect as a result of accomplishing rehabilitation work?

7. Suggestions