



**ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK  
(ESMF)**

**Yemen Emergency Health and Nutrition Project**

**Water and Sanitation and Hygiene Investments**

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**PREPARED FOR UNICEF:**

**By:**

**Dr. Eng. Fadhl Ali Al-Nozaily - Environmental Expert**

# TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS .....	3
Summary.....	4
1. INTRODUCTION.....	6
1.1. PROJECT BACKGROUND .....	6
1.2. PROJECT DESCRIPTION .....	6
1.3. PROJECT LOCATION .....	7
1.4. PROJECT CYCLE AT UNICEF/ WHO: .....	8
1.5. INTRODUCTION TO AND OBJECTIVES OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF) .....	9
1.6. THE ESMF.....	9
1.7. THE INTERVENTION SCREENING PROCESS .....	10
1.8. THE WASH PROJECT INTERVENTION .....	10
2. LEGAL AND INSTITUTIONAL FRAMEWORK.....	12
2.1. Legal Framework: .....	12
2.2. World Bank Safeguard Requirements .....	14
3. Baseline Environmental and Socio Economic Conditions.....	15
3.1. Geographical location.....	15
3.2. Climate and meteorology .....	15
3.3. Biological Flora and Fauna.....	15
4. ENVIRONMENTAL AND SOCIAL IMPACTS.....	18
4.1. INTRODUCTION .....	18
4.2. PROJECT IMPACTS .....	18
4.2.1. Water and Sanitation System (WASH) INTERVENTION IN HEALTH FACILITES BY WHO/UNICEF .....	18
4.2.2. RAIN WATER HARVESTING.....	21
4.2.3. WATER SUPPLY NETWORKS IN URBAN AND RURAL AREAS/ turnkey projects .....	23
4.2.4. Urban and Rural SEWERAGE NETWORKS AND WWTPs.....	26
4.2.5. WASH Intervention in Schools, Household, communities’ gatherings/public market and parks/Internally displaced peoples (IDPs) .....	29
4.2.6. SOCIAL BIULDINGDS Rehabilitation .....	31
4.2.7. PUBLIC SAFETY CONSIDERATIONS .....	32
5. MITIGATION PROGRAM .....	34
5.1. INTRODUCTION .....	34
5.2. RECOMMENDATIONS & MITIGATIONS.....	35
5.2.1. WASH INTERVENTIONS IN HEALTH FACILITIES BY WHO/UNICEF.....	35
5.2.2. RAINWATER HARVESTING.....	38
5.2.3. WATER SUPPLY NETWORK IN URBAN AND RURAL AREAS/TURNKEY PROJECT .....	40
5.2.4. SEWERAGE NETWORK AND WWTP .....	43
5.2.5. WASH INTERVENTIONS IN SCHOOLS, HOUSEHOLE, HOUSEHOLE, GATHERING COMM., PUBLIC PARKS AND MARKETS, IDPs .....	47
5.3. Monitoring Plan.....	48
5.4. INSTITUTIONAL STRENGTHING AND CAPACITY BUILDING PLAN .....	48
6. YEHP MONITORING PLAN .....	50
6.1. MONITORING PROGRAM .....	50
6.1. Third Party Monitoring (TPM) .....	55
7. PUBLIC CONSULTATION AND DISCLOSURE REQUIREMENTS .....	56
7.1. Objectives of stakeholders consultation .....	56
7.2. Grievance Redress Mechanism.....	58
Appendix A: Chance Find Procedures .....	60
APPENDIX B: EA Screening Check lists .....	63
APPENDIX C: Inspection Checklist for Rehabilitation and Maintenance implementation Phase .....	67
APPENDIX D: TOR for Reporting of Intervention Field Monitoring .....	69
Project #X (XX - X/X – XX-X-XXXX) .....	69
APPENDIX E: TOR for Social Mobilization and Environmental Awareness Specialist .....	70
APPENDIX F: Sample Third Party Monitoring (TPM) Checklist for Environmental and Social Safeguards Aspects ..	73
Appendix G: TOR FOR THE WORK OF THE ENVIRONMENTAL AND SOCIAL SPECIALLIST .....	77
APPENDIX H 1 AND H 2: WHO AND UNICEF INTERVENTIONS.....	78
APPENDIX I: OUTCOME OF PUBLIC CONSULTATION.....	83

## ABBREVIATIONS AND ACRONYMS

AWD	: Acute Watery Diarrhea
DTC	: Diarrhea Treatment Center
EA	: Environmental Assessment
EHSG	: Environmental, Health and Safety Guidelines
EA	: Environment Assessment
ESMF	: Environmental and Social Management Framework
ESMP	: Environment and Social Management Plan
FGD	: Focal Group Discussion
GARWSP	: General Authority for Rural Water Supply Projects
GRS	: Grievance Redress Service
HF	: Health Facilities
IDPs	: Internally Displaced Persons
INGOs	: International Non-Governmental Organizations
IPC	: Infection Prevention Control
LCs	: Local Councils
LDCs	: Least Developing Countries
Mm <sup>3</sup>	: Million cubic meter
M&E	: Monitoring and Evaluation
MWE	: Ministry of Water and Environment
MoPHP	: Ministry of Public Health and Population
NOGs	: Non-governmental Organizations
NWSSIP	: National Water Sector Strategy and Investment Program
NWSA	: National Water and Sanitation Authority
OCHA	: The United Nations Office for the Coordination of Humanitarian Affairs
O&M	: Operation and Maintenance
OP/BP	: Operation Policy/Best Practice
ORC/ORTC	: Oral Rehydration Treatment Center
PAD	: Project Appraisal Document
PEC	: Public Electricity corporation
PMU	: Project Management Unit
R&M	: Rehabilitation and Maintenance
TOR	: Terms of Reference
TPM	: Third Party Monitoring
UNICEF	: United Nations International Children's Emergency Fund
WASH	: Water and Sanitation and Hygiene
WHO	: World Health Organization
WSLC	: Water and Sanitation Local Corporation
WWTP	: Waste Water Treatment Plant
YEHNP	: Yemen Emergency Health and Nutrition Project

## SUMMARY

Yemen the poorest region in the Middle East and the least developed country among international list (LDCs), is currently passing through difficult time as a result of lately war and clash conflict since 2015 up to day. Under this critical condition, the region is unfortunately, facing several health problems and has witnessed a rapid spread of chronic disease like Cholera that already killing many and resulted in hundred thousand of serious illnesses and still increasing. This complicated issue is associated with poor healthcare services, shortage of medicine supplies, and limited number of health facilities and vaccinations, lack of operation budget, as well as difficulties to deliver salaries of local staff.

Investment in water, sanitation, and hygiene services (WASH) typically generates a number of economic, environmental and social benefits. Access to clean drinking water and sanitation reduces health risks and frees-up time for education and other productive activities, as well as increases the productivity of the labor force. Usually, WASH intervention involves simple, appropriate, low cost technologies that do not pose any significant environmental or social consequences.

In response to Yemeni current and complicated situation, UNICEF organization in Yemen has been working hardly to save lives and actively involved with local agencies to improve health condition of local community, but with more attention to combat Cholera through implementation of WASH program.

UNICEF organization in Yemen intends to carry out WASH program with no adverse consequences on local environment as well as on social sides of the local community. Therefore, UNICEF has prepared & provided this Environmental & Social Management Framework (ESMF) as a mandatory guide to be followed when carrying out WASH program. By doing this, UNICEF ensures that all WASH investments will be environmentally and socially sound, and would not lead to any environmental & social negative effect at current time as well as on the future.

However, implementation of WASH interventions may create some minor and temporary negative environmental impacts, resulting mainly from the construction activities. But, these impacts are readily manageable by standard civil works mitigation measures such as restrictions on working hours, dust management through watering down, erosion and sediment control.

On the other hand, the overall social impact of WASH investment is expected to be strongly positive. These benefits include the provision of basic services in the form of clean water supply, with resulting improved health outcomes amongst the beneficiary population. The provision of safe drinking water to residences will also improve health condition of the community and reduces burden of fetching water which disproportionately falls on female members of households. Positive impacts of WASH intervention can be obvious through the improved quantity and quality of safe drinking water, reduction in water related diseases such as diarrhea, dysentery, cholera, typhoid and thereby minimizing the cost of healthcare in households, reduction in infant, child and maternal mortality and morbidity due to improved health and sanitation services, reduced distances to water points which will lead to gains in productive time for women and girls.

To avoid potential impacts, the technical significant recommendations and environmental and social mitigation measures discussed on this ESMF document has been prepared and should be implemented. The ESMF is supports sustainability, minimizes potential negative environmental & social impacts, and ensures that the project activities meet relevant national laws and World Bank safeguard policies (OP 4.01). The ESMF is developed to:

- Ensure that environmental and social management is integrated into the development cycle of individual subprojects.
- Serve as a practical tool to guide identification and mitigation of potential negative environmental and social impacts of proposed investments and serve as a platform for consultations with stakeholders and potential project beneficiaries.
- Propose high-level principles, rules, guidelines and procedures to screen, assess, manage and monitor the mitigation measures of environmental and social impacts of the project activities /subprojects

## 1. INTRODUCTION

### 1.1. PROJECT BACKGROUND

Yemen is in the grip of the fast- spreading Cholera outbreak of unprecedented scale. A second wave of Acute Watery Diarrhea (AWD)/ Cholera outbreak has hit the country since 27 April 2017. According to Yemen Cholera Response, Daily Epidemiological update of 11/8/2017, around 494,003 suspected cholera cases were recorded in 22 governorates with 298 affected districts, claiming almost 1966 lives. MoPHP declared a state of emergency, indicating that the health system is unable to contain this unprecedented health and environmental disaster. The UN Estimated an additional 3000 to 5000 new cholera cases every day and expects the number of cases to increase rapidly unless, a coordinated health and WASH response is in place.

The situation is further exacerbated by the poor access to basic services, high risk of famine and unprecedented rate of malnutrition. Every 10 minutes, a child dies of preventable cases in Yemen. The current upsurge of cholera cases is attributed to a number of risk factors including contaminated water sources in affected communities, disruption of public health, collapsing water and sanitation system (WASH) services and the inability to treat sewage, given the challenges to operate wastewater treatment plant (WWTP) and absence of systems to collect garbage. Less than 45% of all health facilities are full functional and more than 14 Million people require assistance to access safe drinking water and sanitation. The health condition of this vulnerable population, particularly malnourished children, is already compromised by the deteriorating situation, increasing their susceptibility to cholera infection and associated complications contributing to higher case fatality rate. Millions of people are now at greater risk of health as they face to the "triple threat" of conflict, famine and cholera, particularly in the 95 most affected districts.

### 1.2. PROJECT DESCRIPTION

The proposed intervention under WASH include the following:

#### **A. Activities to be carried out by WHO:**

The proposed activities are to be conducted by WHO with financial support from UNICEF. WHO intervention is strictly oriented to 64 Health Facilities distributed all over the country (APPENDIX H -1).

The intervention includes the following activities:

- a. Supply of sufficient treated (chlorinated) water by tankers to health facilities;
- b. Rehabilitation of number of water wells including water pump and pipes and chlorination;
- c. Conducting a pre-test of water quality at/ from source (wells) to determination the appropriated chlorine dosage, as well as after disinfection to ensure efficiency of residual chlorine;
- d. Establishment & Operation of Diarrhea Treatment Center (DTC) including cleaning and disinfection.
- e. Oral Rehydration Treatment Center (ORTC) establishment and operation (including cleaning and disinfection)

- f. Rehabilitation and upgrade of Indoor water and sanitation network including improvement of water storage capacity, as well as building of roof rainwater harvesting system;
- g. Holding advanced (specialized) training for health workers on the correct practices on WASH and Infection Prevention Control (IPC);
- h. Maintenance and rehabilitation of selective number of bathrooms as well as perform maintenance activities for hand washing public basins, latrines, showers, facilities and tiles;
- i. Fecal Sludge Management, including septic tank and cesspit R&M

**B. Activities to be carried by UNICEF:**

The proposed activities to be conducted by UNICEF include the following (APPENDIX -H -2):

- a. Improve access to safe drinking water and improve sanitation system at household's level, schools, health facilities, public markets, public parks and IDPS... etc. This activity includes roof rainwater harvesting and sanitation systems for public buildings, disinfect the water tanks for targeted buildings; rehabilitation and maintenance of public conveniences, supply hygiene kits for all interventions and Jerry cans (if needed).
- b. Chlorination of water sources (wells and springs – through filled tanks beside the sources, reservoirs, harvested roof rainwater), indoor piped network and private water trucks. This preparation of stock solution and dosing the proper dose based on water analysis and check the residual chlorine after retention time by the operator.
- c. Maintenance and rehabilitation of major and critical water networks and WWTP and turnkey water supply systems in rural area.
- d. Protection of urban public water resources (open/ deep well head stone/concrete wall rising for protection from pollution, cover and fencing)
- e. Build collaboration partnerships between private water tankers and public sector in order to ensure sustainable and secure access to safe water and improved sanitation services.
- f. Support & provide equipment for a number of WSLC laboratories at each water utility and WWTP.
- g. Support and preserve the operational capacity of the local water authorities in both urban and rural areas.
- h. Strengthen Institutions and building capacity of specialists & technicians of relative local authorities;
- i. Rising public awareness on WASH correct practices through production of media short messages, holding campaigns, and also through direct communication with local people, public staff, and targeted society (i.e. household, schools, health facilities, local community/ WUAs), to ensure effective behavioral and hygiene practices.

**1.3. PROJECT LOCATION**

These interventions are to be located in all Governorates. The PMU has focal points to coordinate activities with the local corporations (LCs). The local corporations are the autonomous utilities providing water and sanitation services in urban areas with its branches at rural levels/ small cities, with GARWSP and its local offices/branches at Governorate level.

1.4. PROJECT CYCLE AT UNICEF/ WHO:

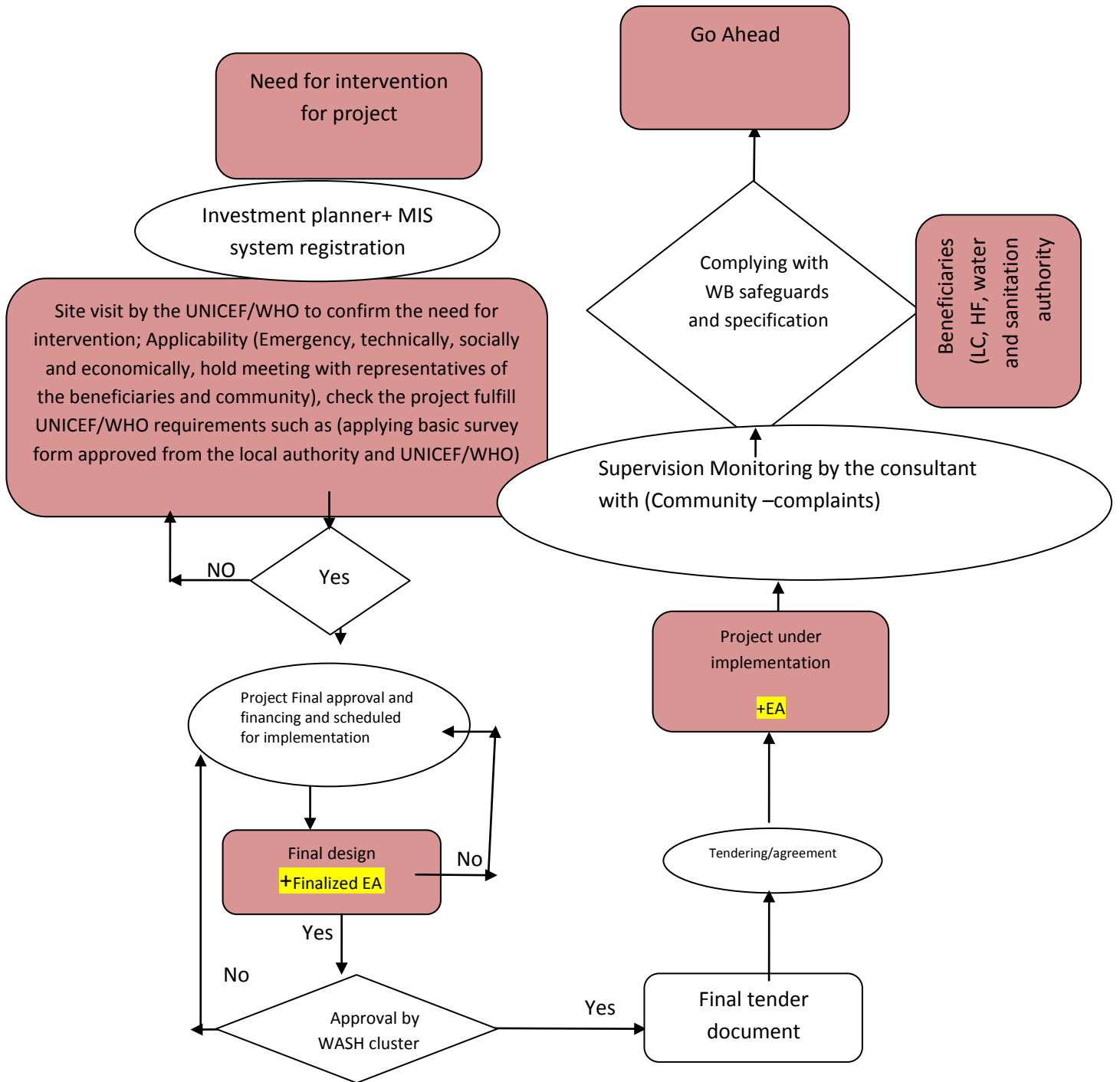


Fig. (1). YEHNP Project Cycle



### **1.5. INTRODUCTION TO AND OBJECTIVES OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF)**

This document presents an Environmental and Social Management Framework (ESMF) for the proposed response package as an additional financing to the existing Emergency Health and Nutrition Project (EHNP) to insure prompt processing of the development package. It will be implemented through UNICEF and WHO in coordination with the Urban Water PMU, Local Corporations (LCs) and local health and water authorities in both urban and rural areas, private suppliers, INGOs, NGOs through simple implementation and coordination mechanisms. However, the water and sanitation system (WASH) components for which this ESMF is mostly focused, will be implemented by UNICEF, with limited input expected from WHO.

Currently, a number of INGOs and NGOs are responding to immediate cholera needs through the provision of basic wash and health activities. However, these activities are not well coordinated in term of sustainability. Health and WASH clusters are leading the current response and trying to coordinate the different activities both are in the central and local levels. Yet with some difficulties, due to significant funding gaps.

The objectives of this ESMF is to provide guidance to implementers to ensure the EA process is carried out in compliance with the National legislation and the world banks safeguard policies. The ESMF sets out the principles, rules, guidelines and procedures to screen, assess, manage and monitor the mitigation measure of ESI of the project activities, subprojects and should provide guidance for development of interventions' checklists or simplified site specific ESMPs, and according to the potential impact significance of each proposed subproject.

The framework will establish clear directives and methodologies for the evaluation of subprojects to be financed, and ensure that the activities are environmentally and socially sound and sustainable and are in compliance with the World Bank safeguards policies. The ESMF is also in compliance with the Environmental and social laws and legislations of the Republic of Yemen, and the guidelines of the WHO and UNICEF as implementing agencies.

At present, details of the specific subprojects are not known yet. Therefore, the ESMF is the appropriate safeguard instrument to be prepared prior to project appraisal. The ESMF entails an Environmental and Social Screening process which allows subprojects to be classified according to their potential impacts and appropriate mitigation measures. The ESMF summarizes institutional arrangements for the implementation of mitigation measures, the monitoring arrangements, including monitoring indicators, capacity building needs as well as cost estimates.

### **1.6. THE ESMF**

The ESMF is presented in three main parts, namely, the environmental and social impacts (chapter 2), the mitigation program (chapter 3), and the monitoring plan (chapter 4). Each of these chapters is presented by sector as the nature of the impacts and mitigation measures vary according to the type of proposed works. The impacts and mitigation measures are also presented by stages of intervention implementation such as rehabilitation, maintenance, operation upon completion and commissioning. The ESMF also takes into account the experience from the World Bank projects. The cost of implementing the mitigation measures would be included in the contracts as such measures

would be part of the rehabilitation and maintenance. The cost of monitoring compliance with the ESMF would be included in the cost of the consultant contracts for study and construction supervision. An independent environmental consultant will be retained by the PMU for following up on specific environmental issues encountered during implementation and for independent reporting by the PMU to the UNICEF and the World Bank.

### **1.7. THE INTERVENTION SCREENING PROCESS**

The ESMF entails an Environmental and Social Screening process which allows subprojects to be classified according to their potential impacts and appropriate mitigation measures. In addition, the initial safeguards screening forms for all proposed civil works for subproject-level activities -see Appendix B- are catered to assess the application of the Bank Operational Safeguard Policies on physical cultural resources, and involuntary land acquisition and resettlement. The screening will be undertaken by the safeguards officer/UNICEF safeguards specialist. While the project is expected to only operate on public/state lands, the screening will assist in risk management, especially those related to the presence of squatters or other encumbrances on state lands. The screening form also caters for “chance finds” relating to the Physical and Cultural Resources Policy of the Bank. If there are “chance finds” which relate to Physical and Cultural Resources, specific procedures should be followed as mentioned in Appendix A.

This project seeks to contribute to addressing the emergency and development needs for approximately 24M people in Acute Watery Diarrhea (AWD)/Cholera affected districts /hotspots (So far 333 districts). The project is classified as Environmental category "B" in accordance with the World Bank OP/BP 4.01 on Environmental Assessment. The proposed project is likely to result in several positive environmental and socioeconomic impacts from the interventions for improving access to safe water and sanitation. These are small scale interventions which do not involve new construction and are anticipated to have no significant or irreversible environmental or social impacts.

However, potential negative impacts -if any- could be minor, site specific, and could be effectively mitigated by implementing the ESMF which is prepared, consulted on with the project's stakeholders, and implemented in compliance with OP 4.01.

### **1.8. THE WASH PROJECT INTERVENTION**

According to the United Nations Children Fund, and Yemen Emergency Health and Nutrient project, the proposed interventions by both WHO and UNICEF under WASH under the additional financing -2 (Cholera Response Project) is suggested to be grouped as follows (table 1):

Table (1). List of grouped interventions

no	INTERVENTIONS
A	<p>WHO intervention in <b>Health facilities</b> which includes:</p> <ul style="list-style-type: none"> <li>a1. Supply of enough and chlorinated water by tankers;</li> <li>a2. Rehabilitation of water wells including water pump and pipes and chlorination;</li> <li>a3. Water Quality Testing from water source (wells) and for determination of chlorine dosage and for residual chlorine;</li> <li>a4. Diarrhea Treatment Center (DTC) establishment and operation (including cleaning and disinfection)</li> <li>a5. ORTC establishment and operation (including cleaning and disinfection)</li> <li>a6. Indoor Water and sanitation network rehabilitation and upgrade including increasing water storage capacity, as well as implementing roof rainwater harvesting system;</li> <li>a7. Training health workers on proper WASH and IPC</li> <li>a8. Maintenance and rehabilitation of bathrooms including hand washing basins, latrines and showers and tiles;</li> <li>a9. Fecal Sludge Management, including septic tank and cesspit R&amp;M</li> </ul>
B	<p>UNICEF Intervention in the following sectors:</p> <ul style="list-style-type: none"> <li>b1. Rainwater harvesting</li> <li>b2. Water supply networks in rural areas</li> <li>b3. Sewerage network and WWTP</li> <li>b4. Schools</li> <li>b5. Households and water wells</li> <li>b6. Water and sanitation institutions</li> <li>b7. Public markets, Parks, Gathering community, IDPs</li> <li>b8. Partnership between private and public sectors</li> </ul>

It will also be considered that the capacity buildings will take place during the intervention in each sector.

## 2. LEGAL AND INSTITUTIONAL FRAMEWORK

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### 2.1. LEGAL FRAMEWORK:

The project is subject to the following Yemeni laws and regulations:

- ✓ National Water Sector Strategy and Investment Program (NWSSIP)
- ✓ Water Law No. 33 issued in 2002, and modified in 2006 after the creation of Ministry of Water and Environment (MWE). Its by-law was issued in 2011 by the Cabinet decree.
- ✓ Environment Protection Law nr. 26 of 1995 and its amendments

The Water Law No. 33 was issued in 2002, and modified in 2006 after the creation of Ministry of Water and Environment (MWE). Its by-law was issued in 2011 by the Cabinet decree. The law defines water resources as any water available in the republic's territory and its share of common waters jointly owned with neighboring countries. This is comprised of ground water, surface water, wastewater after purification, and saline water after desalination. The law's main objective is to regulate, develop, sustain and increase efficiencies in water utilization, protect from pollution, transport, and engage the beneficiaries of water installations in participatory management, investment, development, operation, maintenance and preservation at the various stages of development. Water is considered as a common property accessible to all.

Management of water resources is entrusted to the National Water Resources Authority (NWRA), which assess the resources, classify water basins and zones, and prepare the national water plan, which is considered as one of the components of national economic and social planning. Priorities of water use are: drinking and domestic use shall have absolute priority. Then in declining priority, watering livestock, public utilities, irrigation, industrial purposes, minimal level of environmental needs. For these uses water distribution and transport should be done according to hygiene means.

Existing and acquired water rights prior to the issuance of the law will be maintained, except in special cases when fair compensation will be ensured. Traditional water rights of rainwater harvesting and natural runoff flow in relation to irrigation shall be maintained. The same applies for the traditional rights on natural springs, streams, and creeks.

The Water Law and its by-law are a notable achievement in Yemeni legislation and provide important legislation for environmental management of UNICEF/WHO activities.

The environmental related polices and laws in Yemen is including inter alia: The Environment Protection Law (EPL) number 26 of 1995 forms the basis for the protection of the environment, issuance of permits, and Environmental Impact Assessments (EIA's). The provisions of this law are implemented through Executive Regulations (By-Law 148-2000), issued by a decree of the Council of Ministers to protect the environment, natural resources, society, and health. In addition, the law is designed to protect the national environment from activities practiced beyond national boundaries and to implement international commitments ratified by the Republic of Yemen in relation to environmental protection, control of pollution, conservation of natural resources, and the protection of such globally important environmental issues such as the ozone layer depletion and climate changes. The law equally stipulates the incorporation of environmental considerations in

economic development plans at all levels and stages of planning for all sectors. It also requires the preparation of EIAs for projects proposed by the public and private sectors. However, to date there is still no regulatory framework to support the implementation of the EPL and the provision of undertaking EIAs for projects is not strictly enforced. EIAs studies should be undertaken by an independent authority.

Equally important, environmental standards and specifications have been prepared by the former Environment Protection Council as annexes to the Executive Regulations, covering potable water quality, wastewater quality for agriculture, and ambient air quality, emissions, noise, biodiversity and protected areas. These include standard application forms intended for use by all relevant government bodies. Also, there are other policies, strategies and programs in Yemen to safeguard the Environment. The list of these policies, strategies and programs are:

- ✓ National Environmental Action Plan
- ✓ Environment & Sustainable Investment Program
- ✓ Biodiversity Strategy
- ✓ Environmental Impact Assessment Policy for the Republic of Yemen
- ✓ Reports on the State of Environment (by EPA)
- ✓ Evaluation of Future Development of the EIA System in Yemen

#### Cooperatives Societies and Unions Law (Law No. 39 of 1998}

Law 39 of 1998 concerning Cooperative Societies and Unions, which is the organizational and legal reference for all cooperatives and cooperative unions in the Republic of Yemen. This law is seen of relevance to the SAPEP since it addresses community mobilization in terms of collective actions that would lead to better community involvement in the design, implementation and operation and maintenance of the coping measures and the income generation activities.

Law no. 39 of 1998 grants a relevant Ministry and its departments and branches in the governorates the right to supervise and assure compliance with relevant laws, and provide advice and technical assistance to the cooperatives to plan their activities as well as to attend their General Assembly meetings. It defines five specific types of cooperatives. Any other type of cooperative, such as Agricultural Cooperative Union (ACU) and its branches in the country can be created according to the provision of Article 142, which states that it is lawful to establish other cooperative societies, according to provision of this Law, in other services. More specifically, Article 142 stipulates that a decree of establishment under appropriate line Ministry shall be developed and forwarded to the Ministry of Social Affairs and Labor for approval and issuance.

WUAs which were supported by water law are eligible under the law 39 of 1998. These associations have the privileges granted to it by law, as well as the support of the Water Law International and regional environmental legislation

The Yemeni Government has ratified multilateral environmental agreements on agro-biodiversity and natural resources, oceans and seas, hazardous materials and chemicals, atmosphere and air pollution, and health and workers' safety. The following list provides the multilateral agreements relevant to the project activities:

Yemen is party to a number of international environmental agreements, the most important of which are:

The Convention on Biodiversity (CBD) signed on 1/12/2005

- The Convention on the Conservation of Migratory Species (CMS); starting on the 1st of December, 2006; Yemen is party No.100.
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Signed at Washington, D.C., on 3 March 1973 and amended at Bonn, on 22 June 1979
- the United Nations Framework Convention on Climate Change (UNFCCC)
- Kyoto Protocol
- The United Nations Convention on Combating Desertification (UNCCD)
- Environmental Modification
- Hazardous Wastes
- World Cultural & Natural Heritage, Paris 1982
- Civil Responsibility for Damage from Oil Pollution, Paris 1979
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat 1971
- Law of the Sea
- Ozone Layer Protection. On December 19, 1994, the United Nations General Assembly proclaimed 16 September the International Day for the Preservation of the Ozone Layer, commemorating the date in 1987, on which the Montreal Protocol on Substances that deplete the Ozone Layer was signed
- Yemen has also signed Stockholm Convention on Persistent Organic Pollutants (Signed: 12/05/2001; Ratified: 01/09/2004), which is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife.

## **2.2. WORLD BANK SAFEGUARD REQUIREMENTS**

In addition to the Yemeni laws and regulation the ESMF and subsequent ESMPs should comply with the safeguards policies and procedures of the World Bank—specifically OP/BP 4.01 on Environmental Assessment which is the only triggered safeguards policy, while as the following policies are not triggered for this Project: (i) Physical Cultural Resources (OP4.11), (ii) Involuntary Resettlement (OP/BP 4.12) due to the fact that Investment in water, sanitation, and hygiene services (WASH) will only include rehabilitation and improvement of existing facilities and will not involve any involuntary resettlement impacts, and (iii) International Waterways (OP7.50).

Under the Bank’s safeguard requirements, the YEHNP has been assigned an EA Category “B” given that the nature of the proposed activities which will not have highly significant adverse environmental and social impacts. In addition, due to the nature of the YEHNP activities, the General and Industry guidelines on Environmental, Health and Safety Guidelines (EHSGs) in particular the General Guidelines and Sector Guidelines for Construction and Decommissioning should be used as appropriate<sup>1</sup>.

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<sup>1</sup> See ifc.org/ehsguidelines

### 3. BASELINE ENVIRONMENTAL AND SOCIO ECONOMIC CONDITIONS

#### 3.1. GEOGRAPHICAL LOCATION

The project will target all governorates in Yemen that are affected by cholera.



Map of Yemen

#### 3.2. CLIMATE AND METEOROLOGY

The climate of Yemen is characterized as semi-arid, where rainfall is generally limited but with significant variations depending on the elevations. Temperatures are generally high, particularly in the coastal regions. The highlands enjoy a temperate, rainy summer with an average high temperature of 21 °C (69.8 °F) and a cool, moderately dry winter with temperatures occasionally dipping below 0 °C (32.0 °F) at some places. Some areas of the western highlands receive about 1,000–1,500 mm (39.4–59.1 in) of rain each year.

#### 3.3. BIOLOGICAL FLORA AND FAUNA

Flora in Yemen: Yemen plants belong to the Sudanian and Somalian region. Some of which belong to the Arabian desert region or Sindi Desert, which extends to Egypt, Palestine and southern Iraq and southwestern Iran and Syria and called Holanigtse and little ones belong to the of the Mediterranean and Iranian regions. The African region plants exist in the western highlands and some plains of high elevations (Hajjah and Saddah) and the eastern mountains and desert plains, eastern and northern (Shabwa and Wadi Hadramout). The plants of Arabian Desert regions spread through Marib and Shabwa till Al-Maharah, while some of the Iranian region plants spread through the Hadhramout governorate and in Wadi Sharis in Hajjah governorate. According to the Ministry of Water and Environment (MoWE), about 2810 plant species were recorded in Yemen

Fauna in Yemen: The environments of Yemen as the project areas could be classified mountainous in Sana'a, Saada & Hajjah, coastal in Al-Hodeidah, Mukalla and Lahj, and desert in Shabwa and Sayoon,

Marib and Al-Jawf. The most common livestock in Yemen are goats and sheep. People raise also cows, camels and birds. There are also wild animals in some governorates including, but not limited to the following: hyena, lynx, Arabian leopard, wild dogs, mongoose, especially in protected areas, green turtles, caribou at the border areas with Hadramout. Moreover, there are different types of animals, but due to the limited studies on animal life in Yemen, which is originally limited as a result of the unknown scarce varieties and species of these animals. Also, the species of these animals vary depending on environments in which they live. Generally, the fauna comprises 71 recorded mammal species, 5 species of gazelle and more than 363 species of birds. The major threats to fauna are hunting and destruction of habitats due to deforestation and urbanization and killing of animals perceived as dangerous.

Normally (prior to the conflict), livelihoods in Yemen as the project area are based on a household mixed economy, including a broad range of sources of income. The balance of the mix and the quality and quantity of each type of activity, the asset base of the household, as well as the number of working members of the household are what determine the level of poverty. The range of activities include the following:

cultivation (on own land or sharecropped), irrigated, spate or rainfed, producing mostly for the household in the case of basic staples (sorghum, maize, wheat) and for cash (coffee, vegetables, fruit, qat). Due to the war, Internally Displaced Peoples (IDPs) were created all over Yemen which was estimated at around 3 Million, also international migration (legal or otherwise) to the Kingdom of Saudi Arabia (KSA), Djibouti, Jordan, Turkey, Sudan, Qatar, Somalia Land and Ethiopia. women's income generating activities in urban and mostly in rural areas, ranging from the sale of animals and/or their produced like processed milk (ghee, buttermilk), eggs and also income from handicrafts. It is reported that non-agricultural activities are acquiring an increasing share of household incomes. These activities range from large numbers of government employees, whether in the civil service (primarily education and health) or in a range of military jobs, to casual labor locally or beyond within Yemen and abroad. Immigration to neighboring countries, plays a major role in supporting households especially with the existing situation the government is not paying salaries to the government Yemen employees. At the same time, some of the private sector industries are attached by war which also cause release of the employees without job.

Gender aspects in relation to livelihoods: Women in Yemen do not have equality with men with respect to rights. By contrast when it comes to duties, they have more than their fair share. In rural areas, women are extremely active and certainly spend many more hours than men working in both crop production and livestock husbandry, let alone household domestic tasks which are their exclusive responsibility. While the benefits of crop production are shared reasonably evenly with respect to consumption within the home, when it comes to cash incomes, men have the upper hand as they are the ones who go to market and sell produce. They even usually sell the animals which are the personal property of women, and can thus keep the income if they wish to do so, even though that would be considered inappropriate behavior.

As of early 2017, the main sources of household income are regular salary from the public and private sector (40%), casual labor in both agriculture and non-agriculture (30%), petty trade and sale



of agriculture and fish products (20%) and the remaining (10%) is from other sources, such as remittances. The ongoing conflict has seriously affected an already deteriorating economic performance, and has disrupted livelihoods and income options in a number of ways. The airstrikes and ground fighting have damaged essential infrastructure for both public and private sectors including markets, roads, bridges, hospitals, schools, residential houses, power stations, agricultural farms, shops and water lines. As a result, most of the private businesses have been forced to shut down or reduce the workforce by more than half. The main reasons were physical damage to premises, loss of capital, mounting debt, lack of electricity and fuel, which has led to loss of livelihood options for more than 50% of the population.

Basic social services, including education, health, and water, are collapsing in several areas of the country and humanitarian needs are on the rise. The overall livelihood and socio-economic situation is not showing any signs of improvement and, combined with the reduction and suspension of government salaries, is most likely to have a substantial negative impact on the overall food security situation in the country. Moreover, the situation of sanitation and lack of providing enough and safe water for drinking and hygiene have contributed to cholera epidemic all over the country.

## 4. ENVIRONMENTAL AND SOCIAL IMPACTS

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### 4.1. INTRODUCTION

The YEHP interventions will be implemented in the 22 governorates of Yemen. This section therefore, addresses general environmental impacts per category of interventions. At the end of each category, the general environmental impacts for each intervention type, including the perceived risk of each impact, are listed in a summary table. Permanent impacts are expected to result from actions at the rehabilitation and maintenance operation phases, while temporary impacts will result from actions at the construction phase.

### 4.2. PROJECT IMPACTS

#### 4.2.1. Water and Sanitation System (WASH) INTERVENTION IN HEALTH FACILITIES BY WHO/UNICEF

The interventions in this sector are expected to have high positive health impacts on the communities they are going to serve. This intervention will provide the public health facilities and the staff and communities with essential WASH services, which are highly needed especially in the affected districts by cholera in the whole governorates (urban and rural areas). The components of the intervention are as follows:

Intervention components at health facilities

- a. Supply of enough and chlorinated water by tankers to health facilities;
  - b. Rehabilitation of water wells including water pump and pipes and chlorination;
  - c. Water Quality Testing from water source (wells) and for determination of chlorine dosage and for residual chlorine;
  - d. DTC establishment and operation (including cleaning and disinfection)
  - e. ORTC establishment and operation (including cleaning and disinfection)
  - f. Indoor Water and sanitation network rehabilitation and upgrade including increasing water storage capacity, as well as implementing roof rainwater harvesting system;
  - g. Training health workers on proper WASH and IPC
  - h. Maintenance and rehabilitation of bathrooms including hand washing basins, latrines and showers and tiles;
  - i. Fecal Sludge Management, including septic tank and cesspit R&M
- **Impact of access to drinking water:**
    - improper level of dose of chlorine,
    - unbalanced preparation of chlorine solution,
    - absence of measurement of the free chlorine,
    - measurement before reaching the retention time,
    - dirty/polluted water truck,
    - polluted water source,
    - truck movement noise,

- dust and gasses emission from exhaust inside the health facility,
- unsafe climbing the truck to dose the chlorine,
- polluting the source while sampling;
- methods of sampling and analysis might give wrong results.

- **Impact due to maintenance and rehabilitation**

- The trespassers enter the site
- difficulty to keep floors of health facilities clean with closets susceptible to damage

During maintenance and rehabilitation process, noise, vibration and surplus material solid and liquid waste may be resulted, a higher possibility of accidents for the rehabilitation and maintenance of health facilities.

Impact on Cesspit: The liquid medical waste, considered contaminated and a health hazard.

For all above activities, training of worker is important.

The impact of Rainwater harvesting from roofs and retaining walls is the absence of infrastructure, polluted catchment area, which will end up with polluted water

Maintenance of well including pump and pipes could also be a source of water for Health Facilities.

Piped systems deliver clean and safe water, but the pollution can occur at the Health Facility level due to wrong practices in storage and handling. If private tanks are placed in the yard or left open without any protection to exclude animals and children from getting close to the tank, this will create dirty and unhygienic conditions around it.

During rehabilitation of indoor water and sanitation network, dust, noise, surplus material and excavation, backfilling, compaction. Replacement of pipes, tiles, bathroom, toilets, washbasins, painting. Disinfection of DTC should be applied with care. ORTC should also be established far from DTC to protect patients from infection.

well pump and casing should be rehabilitated or maintained with care.

impact: Accidents or high risks when operating winches

Health and hygiene awareness is of crucial importance here and the UNICEF/ WHO team for social mobilization and environmental awareness should provide the required health and hygiene messages to the communities and train local NGOs to continue giving these messages. The TORs for this team can be found in APPENDIX D & E.

See APPENDIX B-1 for an Environmental and Social Impact Screening Checklist specific to Health facilities.

The potential impact for Health Facilities is listed in Table (2)

Table (2) potential impact of intervention in Health Facilities

potential impact area: Health Facilities	Impact identification method					Impact Analysis method				Design phase	Construction Phase	Operation Phase
	Checklist	Matrices	Networks overlays & GIS	Professional Experience.	Other	professional judgment	physical models experimentation	qualitative	other	+++ high positive impact ++ moderate positive impact + low positive impact 0 neutral impact - low negative impact -- moderate negative impact --- high negative impact		
<b>BIOLOGICAL</b>												
Flora and fauna				✓				✓		-	-	0
Endangered species				✓				✓		0	0	0
Sensitive habitats				✓				✓		0	0	0
Species of commercial importance				✓				✓		0	0	0
<b>COMMUNITY</b>												
Population	✓	✓						✓			0	---
Structure				✓				✓		0	0	0
Employment and Labor market	✓							✓		0	+	+
Distribution of income, goods and Services				✓				✓		0	+	+
Customs, aspirations and attitudes				✓				✓		0	+	++
Resettlement	✓							✓		0	0	0
<b>EDUCATION</b>												
More possibility of accidents	✓							✓		0	---	--
Women adult education				✓				✓		0	0	+++
Health awareness	✓							✓		0	0	+++
<b>HEALTH</b>												
The availability of health services	✓							✓		0	0	+++
Unhygienic toilet (latrine)	✓							✓		0	0	--
Collection, handling and disposal of medical waste	✓					✓				0	0	--
<b>LAND RESOURCES</b>												
Topography, soils, floods,				✓		✓				-	-	0
Soil contamination				✓		✓				-	-	-
<b>LAND USE</b>												
Disputes over the use of the				✓		✓				--	0	0
<b>Other Social impacts</b>												
Gender				✓							++	++
Community participation				✓							++	++
<b>AMBIENT AIR</b>												
Increased levels of noise,				✓		✓				0	--	0
<b>SAFETY</b>												
More possibility of accidents	✓							✓		0	---	--

#### 4.2.2. RAIN WATER HARVESTING

No negative environmental impacts are anticipated in using filtered rain water and chlorinating harvested rain water, as the size of the catchment area under these type of interventions is small in relation to the entire watershed area, and such small rainwater collection facilities would not encroach into the riparian rights of downstream water users. The provision of water for domestic or drinking purposes has high positive impacts on the general livelihood conditions of the communities especially of women and children, since they are mainly responsible for the fetching of water. The positive social impacts can be observed in the increased numbers of enrolment at schools, especially in the case of girls, and in the women's enrolment in literacy classes and other social or income generating activities.

The likely negative impacts would be in the lack of the community participation and contribution, improper use that would result in spillage at public collection points, pooling of wasted water that would promote vector breeding and the generation of increased quantities of wastewater in the absence of community environmental sanitation facilities. It is important to mention that the low coverage of environmental sanitation facilities, especially in rural areas, is a national problem in Yemen. Other small scale potential negative impacts include the increased dust generated during excavation and preparation of drainage beds and reservoirs. Also during rehabilitation and maintenance of the levels of noise and vibration will increase and there is a risk of damage to water supply pipes, paved roads, underground electricity cables, existing cesspits, and similar underground infrastructure. Also, the risk of accidents will rise.

Generally, the objective of the rainwater harvesting could well be for drinking, domestic/ household. For the case of drinking, domestic/ household, schools and health facilities purpose, the UNICEF/WHO has implemented a well-designed and approved sand filter system and chlorination system. The communities were trained on operation and maintenance of such mitigation measures. Additionally, a water sharing issue was addressed by suggesting a distribution timetable of water to the beneficiaries under supervision by the elected committee from beneficiaries and local council.

See Appendix B-2 for an Environmental and social Impact Screening Checklist specific to Rain Water harvesting interventions.

The potential impact of Rain water harvesting is listed in Table (3)

Table (3) The potential impact of Rain water harvesting

Potential ImpactArea: Rain water harvesting	Impact identification method						Impact Analysis Method				Design Phase	Construction Phase	Operation Phase
	checklist	Matrices	Networks	overlays & GIS	Professional Experience.	Other	professional judgment	physical models experimentation	case studies & qualitative comparisons	other	+++ high positive impact ++ moderate positive impact + low positive impact 0 neutral impact - low negative impact -- moderate negative impact --- high negative impact		
<b>BIOLOGICAL</b>													
Flora and fauna					√					√	-	-	-
Endangered species					√					√	0	0	0
Sensitive habitats					√					√	0	0	0
Species of commercial importance					√					√	0	0	0
<b>COMMUNITY</b>													
Population					√					√	0	0	+
Employment and Labor market	√									√	0	+++	+
Distribution of income, goods and Services					√					√	0	+	+
Customs, aspirations and attitudes					√					√	0	0	++
Resettlement	√									√	0	0	+
<b>HEALTH</b>													
The formation of vector breeding Sites					√				√		0	0	--
Dumping of solid waste or waste water in feeder canals or catchment area					√				√		0	0	---
Health problems due to insufficient treatment or accidental consumption					√				√		0	0	--
<b>LAND RESOURCES</b>													
Topography, soils, floods, earthquakes					√		√				0	0	+
<b>LAND USE</b>													
Disputes over the use of land for building site					√		√				--	0	0
<b>Other Social impacts</b>													
Gender					√							+	++
Community participation					√							++	++
<b>AMBIENT AIR</b>													
Increased levels of noise.					√		√				0	---	0
<b>SAFETY</b>													
More possibility of accidents	√								√		0	---	--
Possible adverse impacts on soil					√					√	0	0	-
<b>WATER &amp; WATER SUPPLY</b>													
<b>Groundwater</b>	√						√				0	0	+
Pollution of water sources	√								√		0	0	++

#### **4.2.3. WATER SUPPLY NETWORKS IN URBAN AND RURAL AREAS/ turnkey projects**

The rehabilitation and maintenance of water supply network has strong positive health and environmental impacts. These interventions are generally of small-size for which no major negative environmental impacts are anticipated, and minor negative impacts should be readily addressed through proper rehabilitation, operation and maintenance. Water supply interventions consist of improvements to rural and urban water distribution system.

The main negative impact of the water supply interventions would be the generation of increased quantities of wastewater in the absence of environmental sanitation facilities, which is a national problem in Yemen especially in rural and urban areas. During excavation and burial of pipes, increased dust might arise as will be the noise and vibration levels. Beside the increased risk of accidents, damage to existing water supply pipes, paved roads, underground electricity cables, existing cesspits, and similar underground infrastructure might result. Therefore, mitigation measures will be necessary for the rehabilitation and maintenance of such facilities.

In many of these intervention, protection around the water source is needed. The existing well and the pump engines should be enclosed in pump houses for protection and safety reasons.

In the operation manual, UNICEF/WHO engineers should include provisions for the pump operators to collect the used oil in barrels, instead of spilling it on the ground, polluting the well and adjacent properties. The changed oil could be sold as fuel for use in public traditional baths or in many other ways like applying it as a protective coat to wood or during asphaltting roads. During the previous years, some private sector companies were involved in the collection, refining and reuse of spent oil.

See Appendix B-3 for an Environmental and Social Impact Screening Checklist specific to Urban and Rural Water Supply interventions

The potential impact for water supply intervention is listed in Table (4)

Table (4a) The potential impact for Urban and Rural Water supply intervention/ turnkey

Potential Impact Area: Water Supply network	Impact identification method						Impact Analysis method				Design Phase	Construction Phase	Operation Phase
	checklist	Matrices	Networks	overlays & GIS	Professional Experience.	Other	professional judgment	physical models experimentation	case studies & qualitative comparisons	other	+++ high positive impact ++ moderate positive impact + low positive impact 0 neutral impact - low negative impact -- moderate negative impact --- high negative impact		
Increased dust during excavation and burial of pipes and at the water treatment works site.	√						√				0	---	0
<b>BIOLOGICAL</b>													
Flora and fauna					√				√		-	-	0
Endangered species					√				√		0	0	0
Sensitive habitats					√				√		0	0	0
Species of commercial importance					√				√		0	0	0
<b>COMMUNITY</b>													
Population					√				√		0	0	+
Structure					√				√		0	0	+
Employment and Labor market	√								√		0	+++	++
Distribution of income, goods and Services					√				√		0	+	+
Customs, aspirations and attitudes					√				√		0	0	++
<b>EDUCATION</b>													
Enrolment of children					√			√			0	0	+++
Women adult education					√			√			0	0	+++
Health awareness	√							√			0	0	+++
<b>HEALTH</b>													
The formation of vector breeding sites effluent ponds.					√			√			0	0	--



Table (4b) The potential impact for urban and rural water supply intervention (cont.)

Potential ImpactArea: Water Supply Network (continued)	Impact identification method					Impact Analysis Method				Design Phase	Construction Phase	Operation Phase
	checklist	Matrices	Networks	overlays & GIS	Professional Experience.	Other	professional judgment	physical models experimentation	case studies & qualitative comparisons	Other	+++ high positive impact ++ moderate positive impact + low positive impact 0 neutral impact - low negative impact -- moderate negative impact --- high negative impact	
<b>INFRASTRUCTURE SERVICES</b>												
Possible destruction of paved roads, cables, existing cesspits etc.	✓							✓		0	---	0
<b>LAND RESOURCES</b>												
					✓		✓			0	0	-
<b>LAND USE</b>												
Other Social impacts					✓		✓			-	0	--
Gender					✓						++	++
Community participation					✓						++	++
<b>AMBIENT AIR</b>												
Increased levels of odors, dust, noise and vibration					✓		✓			0	---	--
<b>SAFETY</b>												
More possibility of accidents	✓							✓		0	---	--
<b>TRAFFIC</b>												
Disruptions	✓							✓		0	--	0
Local access	✓							✓		0	--	0
<b>WATER</b>												
Groundwater	✓						✓			0	0	+
Disposal of waste and resource use	✓						✓			0	0	++
Wastewater generation					✓		✓			0	0	-
Wastewater tariffs			✓				✓			0	0	+
Pollution of water sources	✓							✓		0	0	++

#### **4.2.4. Urban and Rural SEWERAGE NETWORKS AND WWTPs**

The rehabilitation and maintenance of sewerage schemes has strong positive health and environmental impacts. These interventions are generally of small-size for which no major negative environmental impacts are anticipated, and minor negative impacts should be readily addressed through proper rehabilitation and maintenance. Sanitation interventions consist of improvements to urban and rural sanitary disposal systems including the WWTPs.

During excavation and burial of pipes, increased dust might arise as will be the noise and vibration levels. Beside the increase of accidents, damage to existing water supply pipes, paved roads, underground electricity cables, existing cesspits, and similar underground infrastructure. Therefore, mitigation measures will be necessary for the rehabilitation and maintenance of such facilities.

See Appendix B-4 for an Environmental and Social Impact Screening Checklist specific to urban and rural Sanitation interventions.

The potential impact for urban and rural sanitation intervention is listed in Table (5)

Table (5a) The potential impact for urban and rural sanitation intervention

Potential Impact Area: Sewerage and WWTP Interventions	Impact identification method					Impact Analysis method					Design Phase	Construction Phase	Operation Phase
	checklist	Matrices	Networks	overlays & GIS	Professional Experience.	Other	professional judgment	physical models experimentation	case studies & qualitative comparisons	other	+++ high positive impact ++ moderate positive impact + low positive impact 0 neutral impact - low negative impact -- moderate negative impact --- high negative impact		
Increased dust during excavation and burial of pipes and at the treatment works site.	√						√				0	---	0
<b>BIOLOGICAL</b>													
Flora and fauna					√				√	-	-	0	
Endangered species					√				√	0	0	0	
Sensitive habitats					√				√	0	0	0	
Species of commercial importance					√				√	0	0	0	
<b>COMMUNITY</b>													
Population					√				√	0	0	+	
Structure					√				√	0	0	+	
Employment and Labor market	√								√	0	+++	++	
Distribution of income, goods and Services					√				√	0	+	+	
Customs, aspirations and attitudes					√				√	0	0	++	
<b>EDUCATION</b>													
Enrolment of children					√				√	0	0	+++	
Women adult education					√				√	0	0	+++	
Health awareness	√								√	0	0	+++	
<b>HEALTH</b>													
The formation of vector breeding sites effluent ponds.					√				√	0	0	--	
Possibility of suffocation or explosions due to negligence while opening the septic tanks for cleaning and the release of flammable gases													
Wastewater disposal	√								√	0	0	--	
Health problems due to direct contact and handling of effluent.						√			√			0	
Removal and disposal of waste materials from pits	√						√			0	---	0	
Health problems due to insufficient treatment or improper effluent disposal from septic tanks to agricultural lands													
Collection, handling and disposal of waste	√						√			0	---	--	

Table (5b) The potential impact for urban and rural sanitation intervention (cont.)

Potential Impact Area: Sanitation and WWTP Interventions	Impact identification method						Impact Analysis Method					Design Phase	Construction Phase	Operation Phase
	checklist	Matrices	Networks	overlays & GIS	Professional Experience.	Other	professional judgment	physical models experimentation	case studies & qualitative comparisons	Other	+++ high positive impact ++ moderate positive impact + low positive impact 0 neutral impact - low negative impact -- moderate negative impact --- high negative impact			
<b>INFRASTRUCTURE SERVICES</b>														
Possible destruction of water supply pipes, paved roads, cables, existing cesspits etc.	✓							✓			0	---	0	
<b>LAND RESOURCES</b>														
Soil contamination					✓		✓				0	0	-	
<b>LAND USE</b>														
Disputes over the use of treated wastewater					✓		✓				-	0	--	
<b>Other Social impacts</b>														
Gender					✓							++	++	
Community participation					✓							++	++	
<b>AMBIENT AIR</b>														
Increased levels of odors, dust, noise and vibration					✓		✓				0	---	--	
<b>SAFETY</b>														
More possibility of accidents	✓							✓			0	---	--	
Possible adverse impacts on soil conditions as a result of lower treatment efficiency levels.					✓				✓		0	0		
<b>TRAFFIC</b>														
Disruptions	✓							✓			0	--	0	
Local access	✓							✓			0	--	0	
<b>WATER</b>														
Groundwater	✓						✓				0	0	+	
Disposal of waste and resource use	✓						✓				0	0	++	
Wastewater generation					✓		✓				0	0	-	
Wastewater tariffs			✓				✓				0	0	+	
Designed locations of points of disposal of effluent, sludge drying beds or other sludge treatment causing pollution of water resources.	✓							✓			0	0	++	
Insufficient treatment capacity for the designed treatment works.	✓							✓			0	0	--	
Pollution of water sources	✓							✓			0	0	++	

**4.2.5. WASH Intervention in Schools, Household, communities' gatherings/public market and parks/Internally displaced peoples (IDPs)**

The UNICEF intervention will be rehabilitation and maintenance to the existing facilities. During the implementation, maintenance of indoor water and sanitation and hygiene will take place to provide safe (chlorinated) and enough drinking water. septic tanks and cesspits and indoor sanitation will be applied for the needed cases where schools, communities' gathering, public market and parks and IDPs have no means of treatment or no public network or even no toilets

In cases when secondary schools have chemistry laboratories, the solution that will be applied under UNICEF interventions is to build a small open evaporation chamber for the disposal of liquid chemical waste from the laboratories. The separation of the liquid hazardous waste at the laboratories is done manually by means of a small container to be transported by the workers to the evaporation chamber.

**Increasing water volume in schools:**

The potential impact: in case there is a need for increasing the water volume in schools, community's gathering, additional water tanks would be installed while maintaining the old one both underground / ground or elevated or on roof. Implementation of roof rainwater harvesting system should be considered. The negative impact that could occur from these interventions are mainly damage to the indoor water pipes resulting in leakage of the water network which may also cause settlement of the soil underneath the floor and maybe some nearby buildings resulting in structural damage.

The positive impact of such interventions, which is implemented at some Houses in old cities, is that the pavement slope was utilized to harvest the storm water and utilized to irrigate the gardens inside these old towns.

**Indoor water and sanitation rehabilitation:**

The potential impact: This might cause interruption of the daily life of the households.

See Appendix B-5 for an Environmental and Social Impact Screening Checklist specific to School interventions

The potential impact for WASH intervention in schools, Household, gathering communities/public market and parks/IDPs is listed in Table (6)

Table (6) The potential impact for WASH intervention in schools, Household, Gathering communities/public market and parks/IDPs

The potential impact for WASH intervention in schools, Household, Gathering communities/public market and parks/IDPs	Impact identification method						Impact Analysis method				Design Phase	Construction Phase	Operation Phase
	checklist	Matrices	networks	overlays & GIS	Professional Experience.	Other	professional judgment	physical models experimentation case studies &	qualitative comparisons	other	+++ high positive impact ++ moderate positive impact + low positive impact 0 neutral impact - low negative impact -- moderate negative impact --- high negative impact		
<b>INFRASTRUCTURE SERVICES</b>													
Possible destruction of water supply pipes, paved roads, cables, existing cesspits etc.	Possible				√		√				--	0	0
<b>LAND RESOURCES</b>	LAN				√				√	0	0	0	
Soil contamination					√				√	0	0	0	
<b>LAND USE</b>					√				√	0	0	0	
Other Social impacts													
Gender					√							++	++
Community participation					√							++	++
<b>COMMUNITY</b>													
Population					√				√	0	0	+	
Structure					√				√	0	0	+	
Employment and Labor market	√								√	0	++	+	
Distribution of income, goods and Services					√				√	0	+	+	
Customs, aspirations and attitudes					√				√	0	0	+++	
<b>HEALTH</b>													
Increased awareness levels	√						√			0	0	+++	
Unhygienic toilet (latrine) Conditions	√								√	0	0	--	
Waste disposal	√								√	0	0	-	
<b>AMBIENT AIR</b>													
Increased levels of odors, dust, noise and vibration					√		√			0	--	0	
<b>SAFETY</b>													
More possibility of accidents	√								√	0	---	--	

**4.2.6. SOCIAL BUILDINGS Rehabilitation**

In order to encourage social participation, in this respect, vocational training is implemented in coordination with the WHO/ UNICEF/MoHP/ international/national NGOs who equip, operate and maintain the facilities.

The potential impact for private and public partnership in WASH intervention is listed in Table (8)

Table (7). The potential impact for private and public partnership in WASH intervention

Potential Impact Category: Social Buildings	Impact identification method						Impact Analysis method					Design Phase	Construction Phase	Operation Phase
	checklist	Matrices	networks	overlays & GIS	Professional Experience.	Other	professional judgment	physical models experimentation	case studies & qualitative comparisons	other	+++ high positive impact ++ moderate positive impact + low positive impact 0 neutral impact - low negative impact -- moderate negative impact --- high negative impact			
<b>LAND USE</b>														
Disputes over the use of land for the building site					√		√					--	0	0
Endangered species					√					√		0	0	0
Sensitive habitats					√					√		0	0	0
Species of commercial importance					√					√		0	0	0
Other Social impacts														
Gender					√								++	++
Community participation					√								++	++
<b>COMMUNITY</b>														
Population					√					√		0	0	+
Structure					√					√		0	0	+
Employment and Labor market	√									√		0	++	+
Distribution of income, goods and Services					√					√		0	+	+
Customs, aspirations and attitudes					√					√		0	0	+++
<b>HEALTH</b>														
Increased awareness levels	√						√					0	0	+++
Unhygienic toilet (latrine) Conditions	√									√		0	0	--
Waste disposal	√									√		0	0	-
<b>AMBIENT AIR</b>														
Increased levels of dust, noise and Vibration					√		√					0	---	0
<b>SAFETY</b>														
More possibility of accidents	√									√		0	---	--

#### 4.2.7. PUBLIC SAFETY CONSIDERATIONS

During the implementation of the project (rehabilitation / maintenance) of all interventions, there may be an increased risk of accidents involving local populations, especially children and trespassers. These may result from one or a combination of the following:

- Unauthorized access to a rehabilitation and maintenance site.
- An absence of control over general public access to implementation sites,
- Conflict with construction vehicles and equipment,
- Poor site safety,
- Inadequate site management.

By its nature, all implementation activities generate elevated levels of accident risk. However, three factors suggest that the impacts from these interventions may be further increased:

- It is evident that a number of implementation sites lack proper management and
- offsite activities, such as implementation traffic, are as poorly controlled.
- The nature of the urban development is such that access routes for vendors (and vehicles) traffic is generally be poor; often comprising relatively narrow streets and lanes with no pedestrian facilities, vertical and horizontal curves with blind access etc.

Women and Children. Recognizing the immense need for services benefiting women and children, the UNICEF/WHO considers this target group as the most important to respond to. Moreover, development and poverty alleviation cannot be achieved without taking into consideration the welfare of women and children. To meet this strategy, schools, viable water interventions and health facilities are given the highest priority, as women and children are the main beneficiaries.

UNICEF/WHO will raise awareness of environmental and hygiene within the interventions spots including schools, health facilities, IDPs, beneficiaries.....etc and the community as part of the awareness tasks, the awareness program should include the following aspects:

1. Water supply, Rainwater harvesting. The complexity of water scarcity in Yemen has led to the increased involvement in this intervention. Activities undertaken by UNICEF/WHO are contributions to water supply schemes and rain water harvesting ponds rehabilitation and maintenance disinfection
2. Sanitation. The intervention of UNICEF/WHO is limited to Only REHABILITATION, MAINTENANCE, DISINFECTION AND upgrading of existing facilities in urban AND rural areas can improve the environmental conditions. Sewerage systems are implemented in urban areas as an extension only whereby it is connected to the existing wastewater treatment. However, in rural areas, still a training and commitment of operation and maintenance might lead to not complying with the WB Operational policies. However, due to the need, the intervention is still including rehabilitation of some existing WWTP.
3. Community participation and beneficiary engagement. Many intervention designs require active inputs for operation and maintenance (O&M) after being handed-over to the community. Ongoing O&M is needed especially for drinking water, rain-water harvesting, sewerage, and health facilities and schools. Community participation and beneficiary engagement is critical from the earlier stages of the project cycle till the end and continue during the O&M for the sustainability of project benefits.
4. The community participation mechanism will be strengthened to ensure that beneficiaries are actively engaged in the intervention and operation and maintenance.
5. Labor-influx Related Impacts: Even though the project (WASH) is not expected to have major impacts related to labor-influx given the type of activities, there is a potential of negative impacts and issues related to community relations including potential exacerbation of conflict, crime, SGBV. The mitigation measures to prevent such impacts would include the application of Code of Conduct,



sensitization & awareness campaigns and monitoring the relations through GRM as part of the E&S monitoring plans.

6. Other factors. As in most developing countries, Yemen suffers from severe adverse environmental circumstances. Several factors such as high poverty levels, high population densities, lack of basic services like sewerage, migration and displacement due to war, depletion of water sources etc. have exacerbated the situation.

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## 5. MITIGATION PROGRAM

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### 5.1. INTRODUCTION

The government of the Republic of Yemen is committed through the components of this project, to improve the quality of life of the urban and rural populations saving them from the effect of war specifically cholera endemic and epidemic. The UNICEF/WHO will achieve this development objective through Rehabilitation and maintenance of infrastructure schemes that include: rehabilitation and upgrading of health facilities, water and sanitation networks, and waste water treatment plants; disinfection (chlorination of water and/or ozonation of treated wastewater), community water schemes, and rainwater harvesting.

This project is Environmental Category "B" in accordance with World Bank Operational Policy 4.01 "Environmental Assessment" and the YEHNP will retain this category and will exclude: (i) intervention that would require involuntary taking of land, resettlement of people (encroachers/squatters) in the ROW or public land, in accordance with World Bank safeguard policy OP 4.12; and (ii) any subproject that would involve transboundary aquifers or other international waterways in accordance with World Bank safeguard policy OP/BP 7.50. Furthermore, the YEHNP would not support any intervention that might cause damage to archaeological and/or historical and/or religious sites. Interventions that might trigger safeguard policies applicable to such impacts would be excluded. However, the project is classified as category "B" due to its potential environmental impacts associated with the rehabilitation, maintenance, upgrading and hygiene of the urban and rural infrastructure interventions in addition to turnkey water projects in some cases.

Due to the nature of the project that maintains the individuality of interventions, which are implemented in different environmental conditions, chapter 2 includes the assessment of the potential impacts for each intervention separately, and accordingly, chapter 3 recommends the necessary mitigation measures taking into account local environmental conditions and resources.

The YEHNP will therefore undergo a screening process to define the environmentally and socially sensitive interventions and produce intervention specific checklist/ ESMPs for those interventions that might have negative environmental and social impacts. **This will continue to take place through contracting short-term local environmental and social specialists or a local consulting firm to carry out individual intervention environmental and social analyses and produce the specific checklist/ ESMPs as required.**

An indicative TOR for this work is in Appendix B:

## **5.2. RECOMMENDATIONS & MITIGATIONS**

### **5.2.1. WASH INTERVENTIONS IN HEALTH FACILITIES BY WHO/UNICEF**

A general recommendation for the implemented intervention in the health facility is that with built-in masonry workbenches finished with tiles would provide an easy-to-clean work surface for the staff of the health facility. Additional built-in concrete shelves, closets or cupboards could also be very practical for providing storage space for drugs, syringes, etc. Concrete benches can accommodate patients in the waiting area. This built-in furniture provides an easy-to-clean heavy-duty alternative for the low quality and often un-hygienic furniture. An additional advantage of built in furniture is, that it is difficult to remove.

The YEHNP engineers should advise the staff of the health facilities with the appropriate practices for the safe disposal of medical waste using the existing Medical Waste Management Plan (MWMP) which has been prepared for the YEHNP parent project. The YEHNP engineers should provide the staff of the health facilities with supporting documents, leaflets or posters on the safe handling and disposal of medical and hazardous liquid waste provided in the MWMP.

The UNICEF/WHO of YEHNP should conduct a training, on a national level, for the staff of health facilities and TOT for local community on the safe WASH implementation activities through organization of training workshops on the national or regional levels.

In the case of joint implementation of WASH interventions, YEHNP engineers should hold meetings with all the concerned or implementing beneficiaries to clarify that all parties should carry out the recommended mitigations. It is important to identify the responsibilities of the different parties for improving the general environmental conditions around the implemented and future health facilities. (Table 7) provides wash intervention ESMP in Health facilities.

Table (7a). WASH Interventions Environmental and Social Management Plan in Health Facilities

item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and Cost	Monitoring Responsibility
Rehabilitation and maintenance Phase				
ITEM	POTENTIAL IMPACT	MITIGATION MEASURES	RESPONSIBILITY OF IMPLEMENTATION & COST	MONITORING RESPONSIBILITY
AMBIENT AIR	- increased levels of dust, - noise and, - vibration	- Nearby residents must be informed - Avoid work during night hours. - Spray water to suppress dust.	Implementing contractors	Environmental specialist
SAFETY	Work accidents are likely to increase	- Construction site must be provided with protection measures (barriers, fence) - warning signs, and authorized persons are only allowed to access working area - Provide proper support for excavations, to protect against collapse. - Provide workers with personal protective equipment. - allocate an alternative route far from the site for pedestrian. - provide light and fence and warning signs	- Implementing contractors - UNICEF/WHO supervision engineer	Environmental specialist
WATER NETWORK: WELL & INDOOR PUMP		-apply safety during the operation of the winch during R&M of the pump and protection pipes of the well; -fence the working site form workers, staff and patients and	- Implementing contractors - UNICEF/WHO supervision engineer	UNICEF/WHO
SANITATION NETWORK (indoor)	Disruption of work in the HF partially, the overlap between the maintenance and operation of the HF, the emission of odors from sewage resulting from replacement or maintenance of sewerage network, toilets, septic tank and cesspit, noise, dust, waste from work, accident to workers and patients.	--isolate the work site from workers, patients and visitors, limit the work in one area in series, spray the site with water during dust, work during the day when noise is an issue, get rid of oils and grease, taking care and caution while disposing out liquid waste applying occupational safety; use masks, gloves, safety shoes; helmet; over all	- Implementing contractors - UNICEF/WHO supervision engineer	Environmental specialist; Third Party Monitoring

Table (7b). WASH Interventions Environmental and Social Management Plan in Health Facilities (CONT.)

item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and Cost	Monitoring Responsibility
Operation Phase				
water network; well and pump (indoor)	Lack of energy source to operate the pump, non-compliance of the worker to commit duty continuously, inability to operate the pump, the need to change oil, throwing oil at the site	Ensuring the provision of alternative energy, Obligation the operator to be on duty by applying shifts, training the operator on the pump operation and maintenance, consumable oil, grease and diesel and spare parts on the stock in accordance with maintenance schedule, disposal of oil at the appropriate location	beneficiaries, local community, local council, contractor during the liability period under supervision of UNICEF/WHO engineers	Environmental specialist; Third Party Monitoring
Water chlorination	Not fulfilling the standard solution, Lack of knowledge of good mixing and retention time; Inability to operate the injector or measuring residual chlorine concentration, the worker may be affected by chlorine leakage in the area; flashing the chlorine on its body and face and eyes	Train and make sure of applying standard concentration during mixing of chlorine; correct measurements of residual chlorine and retention time; Proper operation of dosing pump; keeping it away from others; allocating safe and close area for storing chlorine; use special clothing (overall, mask, glass, gloves, helmet and safety shoes) during mixing and operating dosing pump; make shower ready for any accident from chlorine flashing on the operator	beneficiaries, local community, local council, contractor during the liability period under supervision of UNICEF/WHO engineers	Environmental specialist; Third Party Monitoring
Sanitation network (indoor)	non-applying Periodic maintenance of the septic tank; non-applying of flushing and cleaning of internal network, entry of suspended solids and garbage into the network; entry of hazardous medical waste; odors from inspection chambers and latrines, odors from desludging septic tank; cesspit over flow	periodic cleaning and flushing of the network every six months at least to avoid clogging, installing ventilating pipes at the inspection chamber with height above the roof by two meter, reuse of sludge generated at form septic tank as organic fertilizer or as soil conditioning the use of sludge should be applied after enough drying and away from the reach of people and for crops that are not eaten raw and vacuuming of the cesspit before flooding	beneficiaries, local community, local council, contractor during the liability period under supervision of UNICEF/WHO engineers	Environmental specialist; Third Party Monitoring

Table (7C) WASH Interventions Environmental and Social Management Plan in Health Facilities (CONT.)

item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and Cost	Monitoring Responsibility
Hygiene	The negligence or lack of knowledge by workers in personal hygiene and hygiene within the health facility; the absence of sorting, collection and disposal of hazardous medical waste, the absence of autoclave or incinerator or non-operation or lack of energy	Awareness of employees, patients and the community on the importance of personal hygiene and cleanliness of the surrounding environment; training on the sorting, collection and safe disposal of hazardous medical waste liquid and solid, training cleaning crew and providing tools for safety and hygiene	local council; HF and UNICEF/WHO	Environmental specialist; Third Party Monitoring
Health	Infection from outpatients; Crowding by accompany; Need for sufficient medicine Need to clean Lack of adequate specialized staff Lack of lab equipment and chemicals to operate; lack of enough energy source to operate the equipment and the health facility.	Applying of safety standards to avoid infection; isolating patients with infectious diseases; preventing the accompany to stay with the patient; providing the necessary medicines; continuous cleaning using proper detergents; providing the necessary equipment, chemicals and specialized medical staff, and providing alternative energy continuously as well as safe drinking chlorinated water	local council; HF and UNICEF/WHO	Environmental specialist; Third Party Monitoring

### 5.2.2. RAINWATER HARVESTING

In these kinds of interventions, the rainwater is the main water source to supply health facilities, schools, and households, community gathering and IDPs. The impact of such intervention is that the defined catchment area and the rooftop of the buildings should be protected as it is considered the main route of the rainwater. Sustaining the sanitary conditions around collection points for the case of the reservoir is considered an important hygiene issue. Mitigation measure to such intervention could well be paving the collection point surfaces, fencing to protect from animals and children and proper drainage of the spilled water to the nearest tree bed or agricultural land or animals drinking pit. Moreover, the collection point and the roof should be well maintained and clean. A collection tank should be supplied with small lifting pump should be used. For the pump, power could be supplied by solar radiation. The water from this source should filtered by sand filter and chlorinated due to susceptible epidemic cholera.

Health and hygiene awareness is of crucial importance here and the YEHP through UNICEF/WHO team for social mobilization and environmental awareness should provide the required health and hygiene messages to the communities and train local NGOs to continue giving these messages. The TORs for this team can be found in APPENDIX D & E. The team should prepare training manuals and education material for awareness messages for the different types of interventions

A continuous water quality analysis should be applied to make sure that the chlorine dosage is enough to disinfect the water to be suitable for drinking. The quality of the water can highly influence the decision

on the type and size of the intake and the washing outlet as well as the management of the water use and frequency of cleaning the tank (table 8).

Table (8A) Rainwater Harvesting Environmental and Social Management Plan

Item	Potential	Mitigation	Implementation Responsibility and cost	Monitoring
Implementation/ Rehabilitation and Maintenance Phase				
Air	Increased dust during excavation and preparing of drainage bed.	Inform nearby houses. Protect excavation works with proper shielding scaffolds.	Implementing contractors Local authorities, the	YEHNP Environmental specialist
Noise	Increased levels of noise and vibration	Inform nearby houses. Avoid work during night hours.	Implementing contractors	YEHNP Environmental specialist
Archaeological find	Damaging important and/or precious archaeological finds	Include in contracts provisions for chance find. Training will take place for crew/supervisors, to spot potential archaeological finds. In the event of a potential find, liaise with the archaeological department at MoC or a local university for quick assessment and action.	UNICEF/WHO supervisors	UNICEF; MoC
Safety	More possibility of Accidents	Protect construction site from trespassers. Provide proper support for trench sides to avoid collapsing. Improve the readiness of health facilities in the region to deal with emergency cases. Provide workers with protective clothing.	Implementing contractors Local authorities	YEHNP Environmental specialist
Operation Phase				
Health	Dumping of solid waste and wastewater in the catchment area	Emphasize the dangers of this attitude during the awareness sessions for the beneficiaries.	UNICEF/WHO awareness team. Local NGOs	YEHNP Environmental specialist

Table (8B) Rainwater Harvesting Environmental and Social Management Plan (CONT.)

Item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and cost	Monitoring Responsibility
Health	Vector breeding sites and susceptible pollution originated from sanitation	Closed conduit outlets Hygienic conditions around public collection points by paving at least 1 m <sup>2</sup> apron concrete slab under the water taps with proper drainage and fencing. Discuss the extent of local malaria problem with local health-care officials to emphasize on the importance of implementing their preventive and curative plans for vector control and malaria roll back. Cholera preventive measures by means of chlorination of harvested rain water. Alternative measure is to cover the reservoir as water source or avoid malaria-infested areas. Nevertheless, the collection tank in the buildings should always be covered and placed on or underground to be treated and left up by pump to the roof tank ready for use.	YHNEP engineers	YEHNP Environmental specialist
Capacity building	The possibility of failure due to low capacity in O&M, administrative or financial management of the project.	Support training for local authority, local NGOs and members of the community on O&M of the system. Support training on the administrative and financial management of the project.	YEHNP to contract specialized local consulting firms.	Environmental Specialist Local NGOs

**5.2.3. WATER SUPPLY NETWORK IN URBAN AND RURAL AREAS/TURKEY PROJECT**

Protection around the water source of wells or springs should take place. The well head and the pump engine should be enclosed in a pump house, for protection and safety reasons. YEHNP engineers should advise the pump operators to collect the used oil in barrels instead of spilling it causing a source of pollution to the well. The changed oil could be sold as fuel in public traditional baths or in many other ways like applying it as a protective coat to wood. Some new companies have emerged in such business of buying oil and refining it for sale, and to the extent it is feasible, arrangements with such companies should be included in the intervention design for the proper operation and maintenance of the new works.

Most of the time, piped systems deliver clean and safe water, but the pollution can occur at the household level due to wrong practices in storage and handling. If private tanks are placed in the yard without any protection to exclude animals and children from getting close to the tank, this will create dirty and unhygienic conditions around it. Ideally the water should be supplied to the private tank by a fixed connection and not by a loose plastic hose, with all kinds of dirt around it.

Health and hygiene awareness is of crucial importance here and the YEHNP team for social mobilization and environmental awareness should provide the required health and hygiene messages to the communities and train local NGOs to continue giving these messages. The TORs for this team can be found in APPENDIX D & E. The team should prepare training manuals and education material for awareness messages for the different types of interventions



The YEHP form of contract (bill of quantities) should include a separate component of all the mitigating measures as obligations on the implementing contractor.

**Schools, health facilities, communal gathering, public market, public parks** wherever possible, its latrine with facilities for hand washing should be properly rehabilitated and maintained with a good standard. This will be a key demonstration strategy in the health & hygiene campaign.

Household should receive water from the different networks (public/ private/community) should be protected from any pollution in addition to injecting chlorine to water in the network.

**Health and Hygiene Education.** A health and hygiene education campaign should be staged in project villages that will seek to i) impart knowledge and increase awareness of the need to improve hygiene practices, ii) promote good practice of collecting storing and using water, iii) improve hygienic practices for safe excreta disposal, and iv) promoting environmental improvements through solid and liquid wastes management and disposal.

**Water Quality Monitoring.** YEHP should coordinate with local LCs or GARWSP branches to analyze and follow up water quality monitoring. Water quality testing should occur at regular intervals thereafter.

**Water Quality Monitoring Parameters:** The basic water quality monitoring parameters for drinking water include: Physical, chemical and microbiological (Table 9).

Table (9A). WATER SUPPLY NETWORK ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and cost	Monitoring Responsibility
Rehabilitation and maintenance Phase				
pollution of network	water network passes through cesspit or sewerage manhole cause suction of pollution from pit or the MH.	Network water quality testing. Soil/site inspection to the pollution point followed by rehabilitation and preceded by continuous chlorination	YEHP	UNICEF/WHO Environmental specialist
Air	Increased dust during excavation and burial of pipes.	Inform nearby houses. Protect excavation works with proper shielding scaffolds. Spraying water during excavation might reduce the dust. Workers wear protective masks	Implementing contractors Local authorities, the community	UNICEF/WHO Environmental specialist
Health	Removal and disposal of waste material from (existing) manhole /pits. Collection, handling and disposal of solid waste.	Take health and safety measures when demolishing existing manhole; cesspits and on the disposal of sludge and polluted excavated soil. Dispose all polluted waste and soil to a safe location.	Implementing contractors	UNICEF/WHO Environmental specialist

Table (9B). WATER SUPPLY NETWORK ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (CONT.)

Item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and cost	Monitoring Responsibility
Infra-structure services	Possible destruction of water supply pipes, paved roads, cables, existing cesspits, etc.	during laying of water pipes, avoid causing damages. Take health and safety measures when demolishing existing cesspits and on the disposal of sludge and polluted excavated soil. Dispose all polluted waste and soil to a safe location. Repair pavement on the completion of the Works	Implementing contractors	UNICEF/WHO Environmental specialist
Noise	Increased levels of noise and vibration	Inform nearby buildings. Avoid work during night hours. Provide workers with Protection	Implementing contractors	UNICEF/WHO Environmental specialist
Safety	More possibility of Accidents	Protect work zones with portable scaffold sheets. Provide proper support for trench sides to protect against them collapse. Improve the readiness of health facilities in the region to deal with emergency cases. Provide workers with protective clothing.	Implementing contractors Local authorities	UNICEF/WHO Environmental specialist
Traffic	Disruptions of water supply and local access	Inform the affected buildings in advance and keep disruptions as short as possible.	Implementing contractors	UNICEF/WHO Environmental specialist
Archaeological find	Damaging important and/or precious archaeological finds	Contracts to include provisions for chance find. Training will take place for crew/supervisors, to spot potential archaeological finds. In the event of a potential find, liaise with the archaeological department at MoC or a local university for quick assessment and action.	UNICEF/WHO TEAM	UNICEF/WHO representatives MoC
Safety	More possibility of accidents	Protect construction site from trespassers. Improve the readiness of health facilities in the region to deal with emergency cases. Provide workers with protective clothing.	Implementing contractors Local authorities	UNICEF/WHO Environmental specialist

Table (9C). WATER SUPPLY NETWORK ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (CONT.)

Item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and cost	Monitoring Responsibility
Operation Phase				
Health	The possible splashing of chlorine on the operator; improper concentration of chlorine solution; unpredicted concentration of residual chlorine; less retention time is applied	wear protection clothes such as (eye google, mask, gloves, overall, safety shoes); install shower emergency; proper storage of chlorine stock solution; training of operator for proper chlorination procedure; develop awareness among the local community and staff	Local Authorities Local NGOs The community WSLCs	Environmental Specialist Local NGOs WSLCs
CONSULTATION AND TRAINING COMPONENTS				
Capacity building	The possibility of failure due to low capacity in O&M, administrative or financial management of the project.	Support training for local authority, local NGOs and members of the community on O&M of the system. Support training on the administrative and financial management of the project.	YEHP to contract specialized local consulting firms.	Environmental and social Specialist Local NGOs
Land resources	Possible adverse impacts on soil conditions as a result of lower efficiency levels of the treatment plant.	Test the characteristics of sewage and the treated effluent. Consider options for upgrading the performance of the treatment facility. Provide training for local NGOs and members of the community on O&M of the system. Discuss the use of the effluent for irrigating non-edible crops (e.g., gardening nurseries, palm trees, cotton, etc.)	Local authorities LCs NWASA Land owners, NGOs, local communities	Environmental Specialist EPA Local NGOs
Land use	Disputes over the use of treated effluent for irrigation.	Discuss effluent use, potential crops and disposal of effluent and sludge with land owners downstream of the treatment plant	Local authorities LIPWP-AF design engineers	Environmental Specialist EPA Local NGOs
Water	Ground water Pollution from Pit latrines	Ground water quality testing at source development and regular intervals.	NWASA GARWSP	Environmental Specialist EPA Local NGOs

**5.2.4. SEWERAGE NETWORK AND WWTP**

Sewerage interventions have high positive health and environmental impacts. Negative impacts are limited to the application of safety measures during the rehabilitation and maintenance phase for both the pedestrians and the laborers and to the insufficient treatment of wastewater with unsafe disposal of treated effluents and sludge. **The form of contract (bill of quantities) should include a separate component of all the mitigating measures as obligations on the implementing contractor.**

The sanitation component should have two main parts:

- i) A sanitation promotion campaign, and
- ii) Physical support to the rehabilitation of existing public convenience of communal gathering, IDPs, public market and public parks. This should be reinforced by health and hygiene education.

**Sanitation promotion campaign.** Social Mobilization Teams (SMT) should work with NGOs and local communities, and WSLCs in urban and rural areas and water/wastewater user associations and individuals to promote on-site latrine construction and maintenance, as well as the development of environmental action plans. These plans would include identifying environmental problems and mobilizing local resources to address them, digging waste pits if required. In support of the promotion campaign, demonstration latrines could be constructed at strategic locations, schools and health facilities. Latrine builder training courses can be organized and the graduates given certificates of attendance. Also, when soil conditions permit it, the use of household soak-away for sludge (wastewater) disposal should be demonstrated and promoted.

**Schools, health facilities and public markets, public parks, communal gathering and IDPs.** Wherever possible they should be provided with a good standard of sanitation i.e. a pour flush latrine with facilities for hand washing. This will be a key demonstration strategy in the health & hygiene campaign.

**Health and Hygiene Education.** A health and hygiene education campaign should be staged in intervention sites that will seek to i) impart knowledge and increase awareness of the need to improve hygiene practices, ii) promote good practice of collecting storing and using water, iii) improve hygienic practices for safe excreta disposal, and iv) promoting environmental improvements through solid and liquid wastes management and disposal.

**Protection of Ground Water Sources.** An important issue that should be taken into account is the possible pollution of ground water sources. A number of research studies have confirmed that pathogens and other pollutants do not travel far from a pit latrine or septic tank in homogeneous soils, particularly as the volumes of water involved are very low. However, the risk of pollution relates to the nature of the soil and the depth of the ground water table and each site should be assessed to ensure that there is no water pollution potential. Current good practice adopted in many countries is that latrines or septic tanks should not be located within 50 meters of a water well or borehole.

**Wastewater effluent Quality Monitoring.** YEHNP should coordinate with Water and Sanitation Local Corporations (WSLCs), General Association for Rural Water and Sanitation Projects (GARWSP) National Water and Sanitation Authority (NWSA) branches to conduct wastewater effluent and sludge quality monitoring (Table 10).

Table (10A) SANITATION ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and cost	Monitoring Responsibility
Construction Phase				
Air	Increased dust during excavation and burial of pipes.	Inform nearby houses. Protect excavation works with proper shielding scaffolds. Spraying water during excavation might reduce the dust. Workers wear protective masks	Implementing contractors Local authorities, the community	YEHP Environmental specialist
Health	Removal and disposal of waste material From (existing) pits Collection, handling and disposal of solid waste.	Take health and safety measures when Demolishing existing cesspits and on the disposal of sludge and polluted excavated soil. Dispose all polluted waste and soil to a safe location.	Implementing contractors	YEHP Environmental specialist
Infra-structure services	Possible destruction of water supply pipes, Paved roads, cables, and existing cesspits.	Avoid causing damages. Take health and safety Measures when demolishing existing cesspits and on the disposal of sludge and polluted excavated soil. Dispose all polluted waste and soil to a safe location. Repair pavement on the completion of the Works	Implementing contractors	YEHP Environmental specialist
Noise	Increased levels of noise and vibration	Inform nearby houses. Avoid work during night hours. Provide workers with Protection	Implementing contractors	YEHP Environmental specialist
Safety	More possibility of Accidents	Protect work zones with portable scaffold sheets. Provide proper support for trench sides to protect against their collapse. Improve the readiness of health facilities in the region to deal with Emergency cases. Provide workers with protective clothing.	Implementing contractors Local authorities with	YEHP Environmental specialist
Traffic	Disruptions of water supply and local access	Inform the affected houses in advance and keep disruptions as Short as possible.	Implementing contractors	YEHP Environmental specialist
Water	Pit latrines can pollute the underlying Aquifer.	Ground water quality testing at source Development and regular intervals. Soil/site inspection before latrine construction. Latrines to be more Than 50 m from wells.	YEHP	Initially PMU Local Government in future.

Table (10B) SANITATION ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (CONT.)

Item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and cost	Monitoring Responsibility
Archaeological find	Damaging important and/or precious archaeological finds	Contracts to include provisions for chance find. Training will take place for crew/supervisors, to spot potential archaeological finds. In the event of a potential find, liaise with the archaeological department at MoC or a local university for quick assessment and action.	YEHP supervisors	YEHP. MoC
Safety	More possibility of accidents	Protect construction site from trespassers. Improve the readiness of health facilities in the region to deal with emergency cases. Provide workers with protective clothing.	Implementing contractors Local authorities	YEHP Environmental specialist
Operation Phase				
Health	The possible formation of vector breeding stagnant effluent from WWTP.	Ensure proper utilization or disposal of effluent and sludge. Take necessary actions for fighting vectors (spraying with insecticides, reclamation of stagnant pools, using nets on windows and beds, etc.)	Local Authorities Local NGOs WSLCs The community	Environmental Specialist Local NGOs
	Health problems due improper effluent disposal	Ensure safe final disposal of effluent from treatment plants or reuse with extreme precaution to avoid direct contact with humans or animals. Provide training for selected members of the community on health and hygiene education	Local Authorities Local NGOs WSLCs The community	Environmental Specialist Local NGOs
Land resources	Possible adverse impacts on soil Conditions as a result of lower efficiency levels of the treatment plant.	Test the characteristics of sewage and the Treated effluent. Consider options for upgrading the performance of the treatment facility. Provide training for local NGOs and members of the community on O&M of the system. Discuss the use of the effluent for irrigating Non-edible crops (e.g., gardening nurseries, palm trees, cotton, etc.)	Local Authorities Local NGOs WSLCs The community	Environmental Specialist Local NGOs
Land use	Disputes over the use Of treated effluent for irrigation.	Discuss effluent use, potential crops and disposal of effluent and sludge with land owners downstream of the treatment plant	Local authorities YEHP design engineers	Environmental Specialist Local NGOs
Water	Ground water Pollution from Pit latrines/ effluent of WWTP	Ground water quality Testing at source development and regular intervals.	WSLCs	Environmental Specialist Local NGOs

Table (10C) SANITATION ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (CONT.)

Item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and cost	Monitoring Responsibility
<b>CONSULTATION AND TRAINING COMPONENTS</b>				
Capacity building	The possibility of failure due to low capacity in O&M, administrative or financial management of the project.	Support training for local authority, local NGOs and members of the community on O&M of the system. Support training on the administrative and financial management of the project.	YEHNP to contract specialized local consulting firms.	Environmental and social Specialist Local NGOs

**5.2.5. WASH INTERVENTIONS IN SCHOOLS, HOUSEHOLE, GATHERING COMM., PUBLIC PARKS AND MARKETS, IDPs**

In addition to the mitigation measures listed in table (11) below, YEHNP can arrange with the school management to encourage the students to keep the toilets clean, through holding competitions between classes and offering "Good Conduct" marks or prizes as incentives for the winning class or students. Science and social studies classes can be utilized to convey health and hygiene education messages and the children can be active advocates carrying those messages to their homes. The health unit staff and local NGOs can be also approached to play an active role in spreading health messages on safe sanitation and improvement in general health conditions in the community.

Public convenience at public parks and markets and community gathering /IDPs should be clean and with proper hygiene kits. Awareness should be conducted in the field of WASH. Beneficiaries should have such course in WASH.

Table (11). WASH INTERVENTIONS IN SCHOOLS, HOUSEHOLE, GATHERING COMM., PUBLIC PARKS AND MARKETS, IDPs ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Item	Potential Negative Impact	Mitigation Measure	Implementation Responsibility and cost	Monitoring Responsibility
<b>Rehabilitation and Maintenance Phase</b>				
Noise	Increased levels of noise and vibration	Inform nearby houses. Avoid work during night hours.	Implementing contractors	YEHNP Environmental specialist
Safety	More possibility of accidents	Protect construction site from trespassers. Provide proper support for trench sides to protect against their collapse. Improve the readiness of health facilities in the region to deal with emergency cases. Provide workers with protective clothing.	Implementing contractors Local authorities	YEHNP Environmental specialist
<b>OPERATION PHASE</b>				
awareness program	improper use of toilets	conduct awareness program in WASH for the beneficiaries is highly needed	LOCAL COMMUNITY	WASH SPECIALIST

### 5.3. MONITORING PLAN

The PMU, as assisted by the YEHNP Project team and local concerned Ministry staff, is required to supervise the provisions of the ESMP during Rehabilitation and Maintenance and operational phases of the intervention. The safeguards consultant hired by the YEHNP PMU, will be in charge of monitoring and evaluating safeguard compliance of the entirety of the subprojects, as guided by the ESMF. The individual intervention ESMP monitoring reports will provide information about key environmental and social impacts of the project, effectiveness of mitigation measures, and any outstanding issues to be remedied. The PMU will include a section on safeguards compliance in each progress report which will be submitted to the World Bank, with input from local government and other concerned Ministries as needed.

Key objectives of the monitoring plan include:

- Enabling the local government and the World Bank to evaluate the success of mitigation as part of project supervision.
- Allowing corrective actions to be taken whenever needed.

The plan contains objectives of monitoring, and specific targets to achieve, as well as main elements of monitoring, e.g. parameters to be monitored, full description of methods and equipment to be used for monitoring, sampling locations, frequency of measurements, threshold limits (per national and international standards), corrective action procedures, personnel responsible for monitoring, reporting and communication procedures. See Appendix C for an example of an Inspection Checklist for the Rehabilitation and Maintenance Phase of a Intervention and see Appendix D for Terms of Reference for Reporting of Intervention Field Monitoring.

Monitoring and procedures are set out in a way that:

- Early detection of conditions that necessitate particular mitigation measures is ensured
- Information on the progress and results of mitigation is furnished prior to applying monitoring plan,

### 5.4. INSTITUTIONAL STRENGTHING AND CAPACITY BUILDING PLAN

**Costs and Responsibilities:** The cost for these environmental and social mitigation and monitoring measures shall be included in the intervention costs. YEHNP staff would be responsible for the initial implementation of the mitigation initiative, i.e. testing and monitoring during construction.

The main mitigation costs to be borne by YEHNP, other than the ones already included in the project setup and in contract conditions, are in the field of capacity building and education for YEHNP staff, contractors, NGOs and beneficiaries. Other costs could be for the production of training manuals and awareness materials. A cost estimate for these activities recommended by this ESMP is given in Table below.



Capacity building courses	Cost (USD)
2-day training on EA for YEHNP staff and consultants	2000/training
2-day training on EA for YEHNP contractors	2000/training
2-day training workshops on environmental and social awareness for NGOs and interventions beneficiaries where needed (per diems and transport).	62500/year
Production of environmental and social awareness materials (brochures, posters, fliers, etc.)	5000
Environmental and social awareness campaigns carried out by local NGOs	5000
Training on water sampling and testing carried out by a specialized institution.	3000
international workshops for the YEHNP key staff	20,000
Training onsite on chlorination dosing and measuring the residual chlorine	25,000
sampling and analysis of water form physical, chemical and microbiological	\$ 200/ sample
sampling and analysis wastewater from inlet and effluent of WWTP for physical, chemical, biological and microbiological	\$300/ sample

## 6. YEHP MONITORING PLAN

### 6.1. MONITORING PROGRAM

Table (12A). YEHP MONITORING PLAN

Phase	When	What	Who	How
Rehabilitation and Maintenance works	During preparations of bill of quantities for the project components	<ul style="list-style-type: none"> <li>Mitigating measures included in the set of interventions.</li> <li>Mitigating measures cost included in the bill of quantities of the intervention.</li> <li>PMU awareness activities are carried out if recommended by YEHP</li> </ul>	Environmental Specialist; Social Specialist YEHP engineers; PMU unit	Review of sub- project component and bills of quantities. Review of awareness program materials before the start of the activities and reviewing the reports and indicators after conducting the program.
	weekly	Health and safety measures.: <ul style="list-style-type: none"> <li>protective clothes site protection</li> <li>disposal of hazardous materials</li> <li>readiness of health facilities for emergencies</li> <li>normal working hours (not more normal working hrs (not more than 8 hours /day)</li> </ul>	Environmental Specialist; Local NGOs; Local Authorities; YEHP engineers	Site inspection checklists and photos
	weekly	Noise and dust levels ear protection and dust masks for workers <ul style="list-style-type: none"> <li>no work at night time</li> <li>spray water</li> </ul>		Site inspection checklists and photos
	weekly	Traffic diversion and work progress in stretches		Site inspection checklists and photos.

Table (12B). YEHNP MONITORING PLAN (CONT.)

Sector	When	What	Who	How
<b>Operation phase (CONT.)</b>				
Health facilities	Continuous (at the start of operation)	<p>Performance of conducted activities:</p> <p>Implemented by WHO:</p> <p>((a)- Availability of enough and safe water;</p> <p>(b)-DTC and ORC, cleaned and disinfected</p> <p>(c)-Plumbing (water and sanitation) facilities indoor and outdoor of HF are working properly</p> <p>(d)- capacity building on WASH/IPC is implemented</p> <p>Implemented by UNICEF:</p> <p>(a)- storage tank is clean; chlorinated/safe water from different available sources (wells and rainwater harvested roof, reservoir, springs), with continuous water quality analysis (EC, pH, FC, V.C)</p> <p>(b)- Rehabilitated water wells, public water and wastewater networks (connected to HF);</p> <p>(c)- Plumbing (water and sanitation) facilities indoor and outdoor of HF are working properly (for other than the WHO targeted facilities)</p> <p>(d)- Hygiene kits are provided for All HF</p> <p>(e) implemented roof rainwater harvesting with needed facilities for All HF</p> <p>(f) conducted awareness program (for other than the WHO targeted facilities</p>	<p>Environmental Specialist</p> <p>Local Authorities, Local NGOs, The community YEHNP</p>	<p>Visual inspection Interviews with staff and community members</p> <p>- residual chlorine test and chlorine stock solution prep. and storing</p> <p>Analyze water resource; check internal water and sanitation plumbing facilities, hygiene kit, roof rainwater harvesting is operated and utilized; water wells are operating properly; capacity building is conducted</p>

Table (12C). YEHP MONITORING PLAN (CONT.)

Sector	When	What	Who	How
<b>Operation phase (CONT.)</b>				
<b>Schools</b>	at the start of operation	(a)- chlorinated/safe water from different available sources (wells and rainwater harvested roof, reservoir, springs) with continuous water quality analysis (EC, pH, FC, V.C); (b)- Rehabilitated public water and wastewater networks (connected to schools); (c)- Plumbing (water and sanitation) facilities indoor and outdoor of schools are working properly; (d)- Provided hygiene kits for schools; (e) roof rainwater harvesting with needed facilities for schools (f) conducted awareness program (g) Provide chlorine for cleaning of the storage tank	Environmental Specialist Local Authorities Local NGOs The community	Visual inspection; Laboratory/field tests results; WHO and Yemeni standards for drinking water Residual chlorine test and chlorine stock solution prep. and storing Analyze water resource; check, internal water and sanitation plumbing network and facilities (toilets and hand wash basin, septic tank, cesspit), check hygiene kit
<b>Households and WATER WELLS</b>	at the start of operation	- Provide chlorine for cleaning of the storage tank; - At wells For vendor disinfectors, provide chlorine, prepare chlorine stock solution, Gloves, mask and overall ( for safety of workers); Capacity building programs. Training of members from community or local NGOs/ WUAs on health & hygiene awareness on Chlorination and residual chlorine test; analyzing water of the well every 6 month (chemical microbiological) - Hygiene kit distribution;	Environmental Specialist Local Authorities Local NGOs The community YEHP	Monitoring checklists: Visual inspection at houses and wells - Samples collected from water source -. Checks on courseware qualities for capacity building programs (Administrative, financial and O&M) - Interviews with awareness teams For water, monitoring water rights dosing of chlorine; stock solution and preparation, residual chlorine test at different spots;

Table (12D). YEHP MONITORING PLAN (CONT.)

Sector	When	What	Who	How
<b>Operation phase (CONT.)</b>				
<b>Water and sanitation institutions (LCs, NWSA, GARWSSP)</b>	at the start of operation	Rehabilitation of Water and wastewater network and wells with its facilities; - Participate in providing energy source - providing lab equipment and chemicals - Provide safety precautions for operators - implementing turnkey water projects - Ozonation/ chlorination of WWTP Efficiency of treatment plant. Effluent quality tests for: • BOD/COD; pH; Conductivity; Fecal Coliforms; Vibrio cholera - Monitoring of WWTP effluent quality for reuse and types of irrigated crops. -applying restricted irrigation - Capacity building programs. Training of members of Community or local NGOs/ WUAs Awareness on health & hygiene - Chlorination and residual chlorine test	Local Authorities Local NGOs The community YEHP	Visual inspection at the scheme routes and at manholes. - Samples collected from outlet of treatment works. - Focus groups with communities to evaluate the effectiveness of health and hygiene awareness campaigns - Checks on courseware qualities for capacity building programs (Administrative, financial and O&M) - Interviews with awareness teams For water, monitoring water rights dosing of chlorine; stock solution and preparation, residual chlorine test at different spots; lab equipment readiness and available chemical and reagents; frequent analysis of water source quality
<b>Public markets, and parks, Gathering community/ IDPs</b>	at the start of operation	Providing enough and safe water; Rehabilitation and maintenance of water and sanitation plumbing network inside public convenience and public markets as well in the gathering communities and IDPs; water and wastewater connection network; hygiene kit (including chlorine for wells, disinfection material I facilities; detergents for all	Environmental and social/ institutional Specialist Local Authorities Local NGOs The community YEHP	Monitoring checklists Visual inspection at public markets; public parks /IDPs, gathering communities - Samples collected from water source -. Checks on courseware qualities for capacity building programs (Administrative, financial and O&M) - Interviews with awareness teams For water, monitoring water rights dosing of chlorine; stock solution and preparation, residual chlorine test at different spots; lab equipment readiness and available chemical and reagents; frequent analysis of water source quality

Table (12E). YEHNP MONITORING PLAN (CONT.)

Sector	When	What	Who	How
<b>Operation phase (CONT.)</b>				
Partnership between public and private sector	at the start of operation	<p>Commercial operation of:</p> <ul style="list-style-type: none"> <li>- water well for providing --water and disinfection of water trucks.</li> <li>- public convenience</li> <li>- cesspit evacuation truck with agreed disposal point</li> <li>- Release contract of LCs assets to private sector such as WWTP, water wells,</li> <li>- providing energy source,</li> <li>- Renting partial assets to be used by private sector</li> <li>- collection of bills</li> </ul>	<p>Environmental and social/ institutional Specialist Local Authorities Local NGOs The community YEHNP</p>	<p>Monitoring checklists: Visual inspection at different point of action for different activities - Samples collected from water source -. Checks on courseware qualities for capacity building programs (Administrative, financial and O&amp;M) - Interviews with awareness teams and beneficiary satisfaction for water, monitoring water rights; evaluation of equipment related all activities of water source and quality and WWTP operation; lab equipment readiness and available chemical and reagents.</p>

### 6.1. THIRD PARTY MONITORING (TPM)

Below is the general description of the monitoring agent services as follows:

“To verify that the physical implementation of projects is in accordance with signed contracts and in accordance to the agreed social and environmental guidelines; (b) verification that the completed project is serving the community as envisioned (i.e. water, safe sanitation, disinfection, hygiene kits, rehabilitation and maintenance of water and wastewater networks, WWTP, water and wastewater quality analysis (WASH) is being delivered to project beneficiaries and is of reasonable quality.”

To carry out the above services, the Monitoring Agent will: (a) prepare monthly, mid-term, and final implementation reports: and (b) carry out physical verification with digital photographs of ongoing works and goods supplied, alerting the Bank to deficiencies in implementation and following up on the correction of these deficiencies. This will be done for a selected subset of each of the World Bank projects, i.e. a selected number of YEHNP subprojects.

Specific to YEHNP, the TPM will report on (1) quality and progress of works vis-à-vis the plan and contract document (2) abidance by the contractor regarding disposal of unwanted materials, if any, to the designated dump sites (3) strict adherence of the contractor with regard to workers, passerby, etc safety procedures on the construction sites and, (4) any other *specific* issues that the TPM team wants to highlight.

**Specific checklist to collect environmental and social safeguards information:** Based on each specific contract, TPM should provide comments on any safeguards issues included in that particular contract. In case there are issues not mentioned in each of the specific contract and the TPM team found that there are important and relevant issues not mentioned in the contract, the TPM team may provide its comments and/ or recommendations, if any, in the report for that particular site. A sample of a typical Third Party Monitoring (TPM) Checklist for Environmental Safeguards Aspects is attached in Appendix F.

## **7. PUBLIC CONSULTATION AND DISCLOSURE REQUIREMENTS**

### **7.1. OBJECTIVES OF STAKEHOLDERS CONSULTATION**

Stakeholder consultations should be carried out as part of the Environment and Social Management Framework (ESMF) development process. The purpose of the consultations sessions is to present the overall project design; explain its broader benefits at the national level; and begin to outline some of the anticipated adverse environmental and social impacts expected to result from subproject activities, and to enable the stakeholders to understand the WASH and its activities, as well as to ensure that their concerns and issues are considered during all phases of the project, including at the planning phase.

For this ESMF, the consultant carried out 6 focused group discussions/meetings with key stakeholders and PMUs from line ministries and government officials at their places during the period 15-30 Aug 2017. UNICEF provided the required information and assistance needed to successfully complete the consultation. The Summary of the public consultation is as follows: Please refer to annex I for minutes of meetings, lists of participants and photos.

Public meeting and consultation is an integral part of any project, but essential when preparing an ESMF. Within this framework, consultation was conducted to gather information, comment, and feedback from beneficiaries and public agencies responsible to take part & participate in implementation of WASH project. Another important issue is to introduce the grievance mechanism to make sure that the beneficiaries voice can be reached to implementing agency(ies). Managers as well as technicians from different local authorities were consulted about current challenges, available capacities, intervention requirement, and for hearing their expectation about WASH intervention. In addition, the ESMF also included direct meeting with beneficiaries such as well owners, houses local residents, tankers owners who might affect/ be affected by WASH intervention activities. The main comments, feedback, concerns received to be included in the design of (WASH) and to stop cholera outbreak were as follows:

### **7.2. RESULTS OF THE ESMF CONSULTATIONS**

- UNICEF as an implementing agency has its own mechanisms and procedure in projects monitoring. It applies Third Party Monitoring through specific companies such as Prodigy, KPMG and Moore Stephens, beside its field offices which closely monitoring implementation on the ground. In applying their internal monitoring, they have their own system to contract the companies and apply their tools. As far as grievance is concern, UNICEF is applying their roles which was adapted and agreed upon with the WB. WHO during this WASH project is delegating to Water Supply and Sanitation Local Corporations (WSLCSs) the provision of water supply to the Health Facilities (HFs) through its water networks. Other concerns were to maintain the toilet to be suitable for the patients and disabled as well as separating entrances for men and women. Provide evaporation containers for hazardous chemical waste from labs to prevent polluting soil and groundwater. Rehabilitation of the wells based the exact diagnosis of the fault by Yemeni hydrogeologist experts. Recruiting Yemeni experts instead of importing foreigners' experts. Applying DTC as an isolation spot for the patients with cholera with applying ORTCs as safety measure to prevent infection and providing safety protective clothes for the HFs staff.



- WSLC as the main governmental operator and important partner in this WASH program. WSLC is badly in need to fuel (Diesel) for water supply pumps and generators, laboratory analysis and wastewater treatment. Therefore, UNICEF is supporting SWSLC through the Public Electricity Corporation (PEC). However, due to losses, PEC is not able to supply enough electricity as agreed upon. Therefore, there is a deficiency in supplying enough water and operating the WWTP continuously. A mitigation measures could be to supply WSLCs with fuel instead, in order to ensure consistent supply of water to all users. WSLCs require adequate supply of chlorine, provision & installation of control valves and rehabilitation of some part of water network is a prerequisite to ensure secure splitting of the network into zones to facilitate rationing supplying of water and improve health condition of beneficiaries. Technical training is needed for at least 15 technicians on water chlorination and disinfection procedures and pumping stations maintenance. Another 8 staff, can be trained on this M&E. The issue of the non-payment of salaries to the employees of the WSLCs was one of the main concerns for the employees. This implies allocation of some incentives to the employees to stimulate them to continue and follow-up diligently in the performance of their work. We could benefit from them as consultants, but with symbolic costs to stimulate them to do their work in studies on the requirements of network maintenance and the work of the WSLCs in general as has been done for their colleagues in the WWTP. Fear of being hit by rockets by conflict during the rehabilitation of wells or WWTP calls for a permit from the OCHA. The SWSLC needs suction equipment for cesspits overflow. Overflow of cesspit may be one of the causes of Cholera outbreak which necessitates provision of suction equipment. Asbestos pipes in sewerage network are corroded even when they are cleaned they get deteriorated. so, it needs to be replaced. To mitigate the impact of this process and avoid stopping the sewage network from performance, bypassing wastewater flow far from that part could be applied. Concrete Manholes are also eroded and need to be maintained by covering or replacing with plastic material as resistant material to corrosion caused by hydrogen sulfide gas in wastewater. Water Labs play an important role as warning step through analysis to identify and spot any pollution of the drinking water in the water network and therefore provision of needed chemicals and glassware; rehabilitation of the lab (such as ventilation hood, plumbing inside the labs (water and wastewater network) with providing a separate network for safe disposal of disposed chemicals as hazardous waste. Privacy of women having a separate toilet, clothes changing room, etc.; Provision of personal protective equipment PPE, safety installations, and safety manual for the lab; Training in safety procedures as well as on modern equipment. With regard to WWTPs, it is important to maintain all parts. The importance of the rehabilitation of WWTP is to improve the performance to achieve safe effluent with low BOD and FC. Introducing ozone unit to replace chlorine might be a good solution to avoid formation of carcinogenic compounds when using chlorination. However, this will need high investment cost as well as training to operate such a new unit in the WWTP. Therefore, it is not advised to close chlorination unit rather to repair it and keep it as a backup disinfection process. In Sana'a WWTPs maintenance requires consideration of the high skilled experienced technicians in the maintaining high technical equipment such as installation of aeration fans in place. The impact of this work is mitigated through the training and using the safety clothes and equipment. Nevertheless, although, the maintenance of the WWTP will not lead to full upgrading of the WWTP –as it is overloaded- it will help operating the WWTP so that the pollution of effluent is alleviated and the bioprocess and bacterial kept alive. WWTP Labs play an important role in analysis of influent and effluent of wastewater. It is in need to be maintained in addition to supply with chemicals that are needed on a continuous basis. In addition, electricity is an important factor in the continued operation of analytical equipment such as refrigerators, ovens, incubators and the BOD device, which is considered to give true results. Professional safety tools are needed in a continuous basis for the laboratory operation in both sampling and analysis. Wells owners are also considered one of the main sources of drinking water for the

non-networked areas. Applying WASH program is considered mainly by supply of chlorine at each well from where vendors are supply the people with water and for underground tanks at houses. UNICEF analyzed the water in each well and accordingly determined the needed chlorine dose, and contracted the owner of the well to receive the chlorine, prepare stock solution, and add it to the vendors, fill in a log book of the wells and limit the amount of chlorine that is poured in each vendor. The owner of the well have to convince the consumers about the importance of adding chlorine to water based on the volume of the vendor that was predetermined based on Well Water analysis by UNICEF. Chlorine exists in different forms, powder, solution or tablets. It is added by trained person under the supervision of the UNICEF supervisor. Chlorine vapor of the powder is annoying the people so the chlorine solution should be prepared outside the room or at ventilated room. The residual chlorine concentration is expected to reach 0.5-1 mg /L. Interestingly, the doses of chlorine ranges 50 to 300 ml per cubic meter. Moreover, to reduce the impact of the fear of increased concentration of the residual chlorine if happened is that it should be measured on site by providing the operator with the needed chlorine test kit equipment after passing the reaction time to make sure that the threshold concentration was not exceeded. As for chlorine, it is stored in a safe place away from people. The chlorine stock solution is stored in a distinctive container. The amount to be added should be applied with a specific measurement tools. Vendors Owners are also playing a role in informing and convincing the house owner in accepting to use the chlorinated as safe from pollution. Most of citizens appreciate and benefited from the disinfection of under/ground tanks, which remained years without disinfection and are a source of pollution. On contrary, they were worried at first because the taste of chlorine was clear, but when reduced the dose they do not taste the chlorine. The owners of tankers reported that at least 20% of people refused to accept adding chlorine. However, some of this refused chlorination are the small water treatment plant located in the streets as it would affect the treatment units such as Reverse Osmosis (RO) units, while some other people thought chlorine would harm the kidneys. Some people object to apply the chlorine and consider it dangerous, but awareness is important.

Initially, the summary of the draft ESMF was introduced to all stakeholders before carrying out the consultation to inform them about the WASH proposed activities. Furthermore the inputs provided during the consultation process, for example in relation of design of toilets for people with disabilities and gender aspects, will be considered in all phases of the project.

This ESMF will be translated into Arabic and both Arabic and English versions will be disclosed in-country as well as through the Bank's external website. Additionally, the Arabic version of the ESMF will be disclosed and be made available in locations accessible to stakeholders and PAPs. During implementation phase, future ESMPs and checklists shall also be disclosed and be made available in location accessible to PAPs.

### **7.3. GRIEVANCE REDRESS MECHANISM**

UNICEF shall establish an adequate grievance redress mechanism (GRM) both at the central level and at the project level to ensure beneficiaries may communicate their concerns due to subproject activities. The established UNICEF GRM shall provide multiple access points (telephone, complaints box, website, email, postal address) so that beneficiaries will know whom to contact with regard to their concerns. The WASH manager at UNICEF will have the overall responsibility to address concerns brought to the attention of the focal point regarding any environmental and/or social impacts due to subproject activities. Complaints received by the implementing agency shall be

recorded and documented in the subproject file and the subproject progress report including the number and type of complaints and the results of their resolution. Accordingly, UNICEF Office in Sana'a shall establish a Handling Complaints Unit and be equipped with a dedicate 1-2 officers responsible for ensuring that complaints and questions are being registered, tracked investigates and promptly resolved. The unit shall coordinate with the local field staff and local government officials to ensure prompt follow up action to response to complaints.

As such the ESMF has developed a grievance management process to serve as a guide during project implementation.

If any persons have any complaints, concerns or suggestions with the intervention design and implementation, he or she can lodge an oral or written grievance through mail, email, or phone text message to the following agencies: a) the local council at district level; b) UNICEF office. In case an oral complaint is made, it shall be written on paper by the receiving unit. Since this is an emergency project, the issue should be resolved within three days.

Activating the GRM mechanism, UNICEF will conduct the kick off workshop at which all beneficiaries and partners will be invited and informed for the assigned person(s) with telephone number in order to receive any GRM or questions regarding this WASH project.

## APPENDIX A: CHANCE FIND PROCEDURES

Contracts for civil works involving excavations should normally incorporate procedures for dealing with situations in which buried physical cultural resources (PCR) are unexpectedly encountered. The final form of these procedures will depend upon the local regulatory environment, including any chance find procedures already incorporated in legislation dealing with antiquities or archaeology. For JESSRP, chance finds procedures contain the following elements:

### 1. PCR Definition

In some cases, the chance finds procedure is confined to archaeological finds; more commonly it covers all types of PCR. In the absence of any other definition from the local cultural authorities, the following definition could be used: “movable or immovable objects, sites, structures or groups of structures having archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance”.

### 2. Ownership

The identity of the owner of the artifacts found should be ascertained if at all possible. Depending on the circumstances, the owner could typically be, for example, the state, the government, a religious institution, the land owner, or could be left for later determination by the concerned authorities.

### 3. Recognition

As noted above, in PCR-sensitive areas, recognition and confirmation of the specific PCR may require the contractor to be accompanied by a specialist. A clause on chance finds should be included in every contractor’s specifications.

### 4. Procedure upon Discovery

#### Suspension of Work

If a PCR comes to light during the execution of the works, the contractor shall stop the works. Depending on the magnitude of the PCR, the contractor should check with MOMA for advice on whether *all works* should be stopped, or only the works immediately involved in the discovery, or, in some cases where large buried structures may be expected, all works may be stopped within a specified distance (for example, 50m) of the discovery. MOMA’s decision should be informed by a qualified archaeologist.

After stopping work, the contractor must immediately report the discovery to the Resident Engineer. The contractor may not be entitled to claim compensation for work suspension during this period. The Resident Engineer may be entitled to suspend work and to request from the contractor some excavations at the contractor’s expense if he thinks that a discovery was made and not reported.

#### Demarcation of the Discovery Site

With the approval of the Resident Engineer, the contractor is then required to temporarily demarcate, and limit access to the site.

#### Non-Suspension of Work

The procedure may empower the Resident Engineer to decide whether the PCR can be removed and for the work to continue, for example in cases where the find is one coin.

#### Chance Find Report

The contractor should then, at the request of the Resident Engineer, and within a specified time period, make a *Chance Find Report*, recording:

- Date and time of discovery;
- Location of the discovery;
- Description of the PCR;
- Estimated weight and dimensions of the PCR;
- Temporary protection implemented.

The *Chance Find Report* should be submitted to the Resident Engineer, and other concerned parties as agreed with the cultural authority, and in accordance with national legislation. The Resident Engineer, or other party as agreed, is required to inform the cultural authority accordingly.

#### Arrival and Actions of Cultural Authority

The cultural authority undertakes to ensure that a representative will arrive at the discovery site within an agreed time such as 24 hours, and determine the action to be taken. Such actions may include, but not be limited to:

- Removal of PCR deemed to be of significance;
- Execution of further excavation within a specified distance of the discovery point;
- Extension or reduction of the area demarcated by the contractor.

These actions should be taken within a specified period, for example, 7 days. The contractor may or may not be entitled to claim compensation for work suspension during this period. If the cultural authority fails to arrive within the stipulated period (for example, 24 hours), the Resident Engineer may have the authority to extend the period by a further stipulated time. If the cultural authority fails to arrive after the extension period, the Resident Engineer may have the authority to instruct the contractor to remove the PCR or undertake other mitigating measures and resume work. Such additional works can be charged to the contract. However, the contractor may not be entitled to claim compensation for work suspension during this period.

#### Further Suspension of Work

During this 7-day period, the Cultural authority may be entitled to request the temporary suspension of the work at or in the vicinity of the discovery site for an additional period of up to, for example, 30days.The contractor may, or may not be, entitled to claim compensation for work suspension during this period. However, the contractor will be entitled to establish an agreement with the cultural authority for additional services or resources during this further period under a separate contract with the cultural authority.

## APPENDIX B: SCREENING CHECKLISTS

### B1- Screening Checklist for WASH Intervention in Health Facility by WHO/UNICEF

**NOTE:** Any subproject that triggers Physical Cultural Resources OP 4.11, Involuntary Resettlement OP 4.12 and/or International Waterways shall be excluded.

**Project Name:** .....

**Project ID:**.....

AspectF1s of EA	Checklist questions Will the new health unit?	Yes,	No	Additional data needed
Sources of Impact	1. Be an extension of an existing one	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2. Raise land ownership problems and potential impacts to the use Of land (including encroachers in ROW or public land)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3. Be run by sufficiently qualified personnel; have qualified WASH personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Receptors of Impact	4. Affect water sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5. Affect sites of historical or cultural importance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	6. Affect agricultural land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	7. Affect the life of surrounding human settlements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	8. Affect the life of plants or animals of special importance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Impacts	9. be a source of hazardous solid, liquid or gaseous waste (e.g. infected syringes or bandages, expired medicines, chemicals, gases, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	10. During construction, present a significant pollution hazard to workers and local communities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	11. Once operational, present a significant pollution risk to potable water supplies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	12. Not disturb the social structure of the surroundings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	13. be likely to require mitigating measures that result in the project being financially or socially unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mitigating measures	14. Require safety instructions with regards to the disposal of hazardous waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	15. Have its own water resource	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments	<del>I recommend that the subproject will have no significant adverse environmental impacts.</del>			<input type="checkbox"/>
	<b>I recommend that the subproject may have significant adverse environmental impacts and requires further analysis</b>			<input type="checkbox"/>
	<b>All the required mitigating measures have been included within the design and contract conditions for the construction and Operation phases.</b>			<input type="checkbox"/>
	Name and signature of YEHNP engineer	date		
	Name and signature of environmental specialist	date		

**B2- Screening Checklist for WASH Intervention in Urban and Rural Water and Sanitation Projects**

**NOTE:** Any subproject that triggers Physical Cultural Resources OP 4.11, Involuntary Resettlement OP 4.12 and/or International Waterways shall be excluded.

Project Name ... ..

Project ID .....

Aspects of EA	Checklist questions Will the project:	Yes,	No	Additional data needed
Sources of Impact	1. Be an extension of an existing one (water supply, sewerage network/ WWTP)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2. Raise land ownership problems and potential impacts to the use Of land (including encroachers in ROW or public land)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3. Require the acquisition or conversion of significant areas of land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4. Result in significant quantities of eroded material, effluent or solid wastes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Receptors of Impact	5. Involve siting sanitation treatment facilities close to human settlements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	6. effluent or solid wastes or sludge or raw wastewater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	7. Affect water sources (including transboundary aquifers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	8. Cause the spread of diseases due to lack of sanitation services, the	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Creation of stagnant water pools, pollution caused by the delivery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Impacts	9. Cause a noticeable permanent or seasonal reduction in the volume of ground or surface water supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	10. Present a significant pollution risk through liquid, solid or gaseous wastes to humans, sources of water extraction, conservation worthy aquatic ecosystems and species, or commercial fish stocks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	13. Create water rights	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	14. be likely to require mitigating measures that result in the project being financially or socially unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mitigating measures	<b>. CAUSE DISEASE IF EFFLUENT USED DOWN STREAM</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments	<b>I recommend that the subproject will have no significant adverse environmental impacts.</b>	<input type="checkbox"/>		
	<b>I recommend that the subproject may have significant adverse environmental impacts and requires further analysis.</b>	<input type="checkbox"/>		
	<b>All the required mitigating measures have been included within the design and the contract conditions for the construction and operation phase.</b>	<input type="checkbox"/>		
	Name and signature of YEHNP engineer	date		
	Name and signature of environmental specialist	date		



**B3- Screening Checklist for WASH Intervention in Rainwater Harvesting Projects**

**NOTE:** Any subproject that triggers Physical Cultural Resources OP 4.11, Involuntary Resettlement OP 4.12 and/or International Waterways shall be excluded.

**Project Name** ... ..

**Project ID** .....

Aspects of EA	Checklist questions Will the project:	Yes,	No	Additional data needed
Sources of Impact	1. Be an extension of an existing one	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2. Raise land ownership problems and potential impacts to the use Of land (including encroachers in ROW or public land)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3. Require the acquisition or conversion of significant areas of land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4. Result in significant quantities of eroded material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Receptors of Impact	5. Affect water sources (including transboundary aquifers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	6. Cause the spread of diseases due to pollution of the catchment area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	7. Cause a noticeable permanent or seasonal reduction in the volume ground or surface water supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	8. Present a significant health risk through the use of water for drinking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	10. Present a significant health risk due to vector breeding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	11. Be likely to require mitigating measures that result in the project being financially or socially unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Impacts	12. Be likely to require mitigating measures that result in the project being financially or socially unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	14.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mitigating measures	15.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>I recommend that the subproject will have no significant adverse environmental impacts.</b>	<input type="checkbox"/>		
Comments	<b>I recommend that the subproject may have significant adverse environmental impacts and requires further analysis.</b>	<input type="checkbox"/>		
	<b>All the required mitigating measures have been included within the design and the contract conditions for the construction and operation phase.</b>	<input type="checkbox"/>		
	Name and signature of YEHP engineer	Date		
	Name and signature of environmental specialist	Date		

**B4- Screening Checklist for WASH Intervention in Schools/Households/IDPs/Public Parks**

**NOTE:** Any subproject that triggers Physical Cultural Resources OP 4.11, Involuntary Resettlement OP 4.12 and/or International Waterways shall be excluded.

**Project Name**.....

**Project ID** .....

Aspects of EA	Checklist questions	Yes,	No	Additional data needed
Sources of Impact	1. be an extension of an existing one	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2. raise land ownership problems and potential impacts to the use Of land (including encroachers in ROW or public land).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3. be close to a main road (attach copy of map of location)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4. be close to a flood passage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Receptors of Impact	5. improve the health and education conditions for the students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	6. enhance the female enrollment in the school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	7. affect water sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	8. affect the life of surrounding human settlements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Impacts	9. require the building of toilets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	10. be the source of unpleasant odors, disease transmission due to the improper use or disposal of wastewater from toilets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	11. during implementation, present a significant pollution hazard to workers and local communities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mitigating measures	12. once operational, present a significant pollution risk to potable water supplies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	13. not disturb the social structure of the surroundings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	14. be likely to require mitigating measures that result in the project being financially or socially unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments	<b>I recommend that the subproject will have no significant adverse environmental impacts.</b>	<input type="checkbox"/>		
	<b>I recommend that the subproject may have significant adverse environmental impacts and requires further analysis.</b>	<input type="checkbox"/>		
	<b>All the required mitigating measures have been included within the design and the contract conditions for the construction and operation phase.</b>	<input type="checkbox"/>		

Name and signature of YEHP engineer date

Name and signature of environmental specialist date

## **APPENDIX C: INSPECTION CHECKLIST FOR REHABILITATION AND MAINTENANCE IMPLEMENTATION PHASE**

### 1. General

- Are required regulations generally being met and maintained?
- Are construction personnel, equipment and materials operating only within the defined work area?
- Are garbage and other wastes regularly collected from the work area and disposed of properly?
- Are tankers/vendors using the approved access routes to the proposed alignment?
- Are all necessary utilities approvals, diversion plans and traffic management plans in place?

### 2. Access Roads

- Are access roads properly located?
- Are access points to public rights of way appropriately controlled?
- Does run off from access roads show evidence of hydrocarbon spillage?
- Is run off from access roads causing stagnant water ponds elsewhere?

### 3. Camps

- Are camps located correctly?
- Are camps secure?
- Are all fuel stores etc. placed on appropriately sized hard stands?
- Are fuelling and maintenance of equipment conducted at defined sites?
- Are proper records being kept of the volume of waste being generated?
- Are HAZOPS procedures in place and is staff aware of procedures?
- Is equipment washing procedures being observed?

### 4. Spoil Heaps, Aggregates etc.

- Are spoil heaps of an appropriate size?
- Are materials separated correctly?
- Is there evidence of excessive wind blowing off material?
- Is there evidence of turbid waters running off heaps?

### 5. Trench Works

- Are trench sides properly buttressed?
- Are access points to trenches appropriate?
- Are men in trenches properly equipped and protected?
- Is excavated material placed in discrete piles?
- Have any objects of cultural heritage or historical value been encountered during excavation and have the chance find procedures included in the contract been properly and timely followed?

#### 6. Backfill

#### 7. Processing Sites

- Are sites correctly located to minimize adverse atmospheric and noise pollution effects?
- Are sites secure?
- Are all fuel stores etc. placed on appropriately sized hard stands?
- Are fuelling and maintenance of equipment conducted at defined sites?
- Are HAZOPS procedures in place and is staff aware of procedures?
- Are washing equipment procedures being observed?
- Are materials stored appropriately, (e.g. chlorine)?

#### 8. Clean-up

- Is the final clean up appropriately timed?
- Has all man-made debris been removed?
- Have all trenches been restored to as close as practicable to original configurations?
- Has access to all areas been restored?

## **APPENDIX D: TOR FOR REPORTING OF INTERVENTION FIELD MONITORING**

### **PROJECT #X (XX - X/X – XX-X-XXXX)**

Intervention Title Here

The site of this project was visited

1. Existing situation:
2. Available cadre:
3. Common diseases:
4. Currently available water resources:
5. Existing sanitation conditions:
6. The content of this project:
7. Served area:
8. Technical Recommendations to guide Intervention Implementation:
9. Screening form results:
10. Expected Impact from the project and the management plan and monitoring:
11. Overall Recommendations, Actions to be Taken, and Parties Responsible for taking each Action:

Commitment from the Ministry:

12. Follow-up Actions to taken by UNICEF:

## **APPENDIX E: TOR FOR SOCIAL MOBILIZATION AND ENVIRONMENTAL AWARENESS SPECIALIST**

### Background:

One of the main objectives of the WASH Project is to improve access to basic infrastructure services, environmental conditions and sustainability of development projects. To achieve this, the UNICEF has embedded in its procedures social mobilization and environmental awareness.

Social Mobilization is an important step in achieving sustainable development especially when resources are scarce.

It has been proved that development projects can fail drastically if communities are not involved in the decision process; it is the corner stone for the success of implementation and sustainability of projects.

In this respect communities, can play an important role in sustaining the project both operationally and environmentally. They can mobilize resources for operation and maintenance, and if environmental awareness is raised in a proper manner, they can maintain sound environmental conditions.

In the case of small development projects where local communities are the direct beneficiaries the need for their involvement is even more critical.

Thus, community involvement is one of the development objectives of the World Bank and international donors.

### Objective:

- Social Mobilization to ensure that communities are fully aware of the environmental consequences of implementing the specific project in addition to operation & maintenance aspects.
- Ensure that implemented projects improve the environmental conditions of the communities and are sustainable.
- Improve environmental awareness among all stakeholders, especially local communities.

### Responsibilities:

The specialist's responsibilities will be two-fold:

#### 1. Social Mobilization:

##### 1.1 Establishing procedures and Data base

Establishing and improving procedures/methodologies and a database for ensuring in-depth Social Mobilization and contribution in the WASH Project so as to achieve sustainability.

The procedures should include:

Supervising the establishment of beneficiary committees and election of their members before commencing implementation.

Responsibilities will include but not be limited to:

- o Ensure sustainability of completed projects, operationally and environmentally,
- o Collect or make available contributions,
- o Be present during site handing over,
- o Coordinate with concerned agencies if special designs are needed e.g. water, sanitation etc.,
- o Be familiar and consent to designs,
- o Follow-up with concerned agencies for operation, and
- o Ensure operation and maintenance of completed facilities.

Local Councils should be part of the committee and act as facilitator.

Coordination with each community, to ensure that it is well represented and involved in all phases of the project cycle as follows:

- o In identifying and prioritizing needs. All interventions selected, should satisfy the needs and priorities expressed by the communities.
- o In preparation and designing, contribute to the design to the most possible extent.

Communities should be fully aware of the detailed design through discussions. This is of particular importance in water and sanitation projects.

- o Implementation by involving the community in site selection, handing over of site, and informal supervision.
- o Operation and Maintenance. The most important role of the communities is in ensuring the sustainability of the interventions. This should be achieved through the elected committee, by coordination with the relevant agencies and / or operating and maintaining themselves.
- o The beneficiary committee should be fully trained in all aspects of O & M, with emphasis on the financial, technical and environmental aspects.

Monitoring their performance during and after implementation for a period of not less than one year after Final Handing over of the Projects.

## 2. Environmental Awareness:

### 2.1 Screen environmentally sensitive projects

- o Ensure that sanitation measures have been taken before implementing a water supply project.
- o Standardize mitigation to the most possible extent (due to the repetitive nature of projects) to be included in designs
- o Ensure screening checklists are done. For projects that need further analysis, coordinate and provide necessary information to environmental consultant to undertake EA's.
- o Ensure all mitigation measures are taken into account during the relevant phases.
- o Monitor the ESMP and follow- up UNICEF responsibilities if any.
- o Monitor environmental conditions of completed projects especially water and sanitation and suggest any actions that may be required to improve conditions.

### 2.2 Training Program / Awareness for Local Communities:

- o Prepare an Environmental Awareness training program and training manuals for UNICEF projects (in particular WASH). The awareness should include informing the communities of all environmental factors affecting them due to project implementation.
- o Direct supervision of team (which will include female trainers) to train communities on all aspects of environmental issues.
- o Prepare and supervise training program for operation and maintenance of water and sanitation projects implemented by the UNICEF including financial and technical aspects.
- o Prepare environmental awareness materials containing messages appropriate for different types of projects.
- o Conduct training for local communities and NGOs using specially prepared training manuals and materials to carry out environmental campaigns.
- o Monitor the environmental campaigns carried out by local NGOs by following the performance of previously prepared indicators.

## 3. Reporting:

- o All of the above procedures will be reported in an appropriate reporting format per project.
- o Quarterly progress reports will be submitted
- o All activities on site will be in coordination with the sub-area managers.



## APPENDIX F: SAMPLE THIRD PARTY MONITORING (TPM) CHECKLIST FOR ENVIRONMENTAL AND SOCIAL SAFEGUARDS ASPECTS

### Environment

#### Institutional Arrangements and Documentation

1. Has the project been identified to have negative environmental impacts? Yes \_\_\_\_\_ No \_\_\_\_\_

If "Yes", does the contractor include an environmental specialist / site engineer? Yes \_\_\_\_\_ No \_\_\_\_\_

2. Does the contractor have a copy of the Environmental and Social Management Plan (ESMP), ESMP?

Yes \_\_\_\_\_ No \_\_\_\_\_

If "Yes", is environmental compliance being monitored and reported in consultant reports?

Yes \_\_\_\_\_ No \_\_\_\_\_

3. Is the project causing negative environmental impact or nuisance? (e.g. to flora, fauna or relating to noise, dust, waste, etc.)

Comment:

If "Yes", are mitigation measures as recommended in the ESMP being implemented?

Yes \_\_\_\_\_ No \_\_\_\_\_

4. Does Project Management Unit (PMU) include environmental staff or consultant? Yes \_\_\_\_\_ No \_\_\_\_\_

If "Yes", is the above individual trained on ESMP and World Bank safeguard policies?

Yes \_\_\_\_\_ No \_\_\_\_\_

5. Does the PMU include a Monitoring and Evaluation (M&E) specialist? Yes \_\_\_\_\_ No \_\_\_\_\_

6. Is information relating to environmental compliance included (separate annex or paragraphs) in Project Progress Reports? Yes \_\_\_\_\_ No \_\_\_\_\_

#### Disposal, Contamination and Erosion

7. Does the project require large amounts of raw material and construction material to be transported (e.g. from a quarry)? Yes \_\_\_\_\_ No \_\_\_\_\_

8. Does the contractor have written permission from relevant authorities for selection of quarry site?

Yes \_\_\_\_\_ No \_\_\_\_\_

9. Is the project obtaining sand or gravel from river bed or alternative source other than identified quarry?

Yes\_\_\_\_\_ No\_\_\_\_\_

10. Does the project require cutting down of trees or other vegetation? Yes\_\_\_\_\_ No \_\_\_\_\_

11. Is the project causing degradation to natural areas? Yes\_\_\_\_\_ No \_\_\_\_\_

12. Is the project generating large amounts of residual wastes (solid/liquid waste)? Yes\_\_\_\_\_ No \_\_\_\_\_

13. Is the project causing soil or water contamination? (e.g. from oil, grease, fuel, equipment)

Yes\_\_\_\_\_ No\_\_\_\_\_

15. Is the project generating hazardous waste substances? Yes\_\_\_\_\_ No \_\_\_\_\_

If "Yes", are these being disposed in pre-identified and approved sites? Yes\_\_\_\_\_ No \_\_\_\_\_

16. Is the project causing any cumulative negative environmental impacts or unanticipated negative environmental impacts beyond the footprint of the project? Yes\_\_\_\_\_ No\_\_\_\_\_

Comment:

Community, Health and Safety

17. Are there any community concerns/complaints relating to negative environmental impacts?

If "Yes", are they being addressed? Yes\_\_\_\_\_ No \_\_\_\_\_

18. Are on site workers equipped with PPE? Yes\_\_\_\_\_ No\_\_\_\_\_

19. Does the contractor have adequate medical emergency supplies (first aid kit) on site?

Yes\_\_\_\_\_ No \_\_\_\_\_

20. Is the project is causing sanitation related environmental issues (also stagnant water)?

Yes\_\_\_\_\_ No \_\_\_\_\_

If "Yes", are mitigation measures being applied? Yes\_\_\_\_\_ No \_\_\_\_\_

21. Is there any potential exacerbation of conflict, crime, SGBV issues related to community relations?

If "Yes", are they being addressed? Yes\_\_\_\_\_ NO\_\_\_\_\_

22. Are there measures to prevent conflict and other related community issues such as Code of Conduct, sensitization and awareness campaigns and monitoring the relations through GRM?

If “Yes”, please specify the measures taken

Social safeguards

Sample Screening Form for Social Safeguards Monitoring

A. Social & Safeguards Indicators

1. Was land required for the project construction? Yes<sup>2</sup>: \_\_ No: \_\_\_\_\_
2. If the answer to above is “Yes”, specify the number of land/assets acquired for the project activities (in local unit of measurement) and where it was acquired from and if it was required voluntarily or involuntarily:

Source	Amount	Voluntary	Involuntary
a. Government			
b. Common/Community land			
c. Private			

3(a) Compensation for the Project Affected People (PAP):

- Has any compensation been paid to the affected families, for the loss of structure and other productive income, e.g. fruit trees, ag. land? Yes or No
- If yes, how was compensation paid?
  - (i) in cash: \_\_\_\_\_, (ii) in kind (e.g. land for land): \_\_\_\_\_
- The amount of compensation paid per unit: (i)Land: \_\_\_\_\_/ (ii) tree: \_\_\_\_\_/unit; and (iii) structure/wall: \_\_\_\_\_/room/meter run
- The source of compensation (in percentage): (i)Government: \_\_\_\_\_, (ii) community compensation: \_\_\_\_\_, (iii) private donation: \_\_\_\_\_

Comments:

3. Were the PAPs and beneficiaries/community satisfied with the approach of acquiring land/assets (including the amount of compensation)? Yes \_\_\_\_\_ No \_\_\_\_\_

<sup>2</sup> If the subproject includes involuntary taking of land, please report immediately to UNICEF and the Bank

4. If not, why? \_\_\_\_\_
5. Is there documentation available regarding the land acquisition (size, location and ownership)? Yes: \_\_\_\_\_ No: \_\_\_\_\_
6. If yes, please specify where it is located and attach a copy to the report.
7. Were consultations held with the community during the planning and implementation phase of this project? Yes \_\_\_\_\_ No \_\_\_\_\_
8. If yes, are documentation of consultation available?
9. Were community women involved in the project related consultations?

Yes: \_\_\_\_\_ No: \_\_\_\_\_

10. If Yes – are documentation of consultations available?

Yes \_\_\_\_\_ No: \_\_\_\_\_

11. Were females consulted regarding the planning and implementation of the project? Yes: \_\_\_\_\_ No: \_\_\_\_\_ Comments \_\_\_\_\_

12. What concerns regarding the project were raised by women?

Comments: \_\_\_\_\_

13. Is there any documentation of the main concerns raised by women voiced?

Yes \_\_\_\_\_ No \_\_\_\_\_

14. Where is, the documentation located? \_\_\_\_\_

#### Grievance redress mechanism

1. Is a grievance handling system to address local conflict regarding the project?

Yes: \_\_\_\_\_ No: \_\_\_\_\_

If Yes, please answer below questions:

- a. Most frequent type of grievance: \_\_\_\_\_
- b. Where are, grievances registered and who handles them? \_\_\_\_\_

## **APPENDIX G: TOR FOR THE WORK OF THE ENVIRONMENTAL AND SOCIAL SPECIALIST**

The Environmental and Social Specialist is required to carry out the following activities:

1. To conduct desk reviews for the documents of the proposed YEHNP interventions, and to carry out environmental and social analyses, intervention specific limited Environmental and Social Assessments and specific Environmental and Social Management Plans (ESMPs) for the environmentally sensitive sites according to policy of the World Bank and the Yemen Environmental and Social Impact Assessment Policy Document.
2. To conduct office discussions with the concerned engineers of the YEHNP.
3. To establish contact with the local and national EPA officials responsible for EA oversight as well as other relevant local and national authorities in the concerned governmental or non-governmental sectors and to develop joint activities when required.
4. To conduct field visits for selected number of interventions accompanied by staff members or Regional Officers of the YEHNP, to assess the existing environmental conditions on site and the potential environmental and social impacts associated with the proposed interventions.
5. To provide the results of the Environmental and Social Impact Analysis in the form of an EA and intervention specific ESMP, to be submitted to the decision makers.
6. To conduct training workshops for the YEHNP staff and engineers on EA and on the EA tools developed for the project.
7. To identify the interventions that need community mobilization and awareness programs and prepare such awareness programs for implementation before, during and upon completion of the interventions.
8. To be engaged in the supervision, monitoring and evaluation of the YEHNP sub- projects.

## **APPENDIX H 1 AND H 2: WHO AND UNICEF INTERVENTIONS**

- List of Proposed Governorate and DHs

World Health Organisation / UNICEF  
Emergency Health and Nutrition Project (EHNP)  
List of Governorate and District Hospitals

23-May-17

21 Governorate Hospitals

43 District Hospitals

Governorate	Districts	Name of Hospital	Type
<b>Al-Hodeidah</b>	<b>26</b>		
1		Al-Thawra Hospital	Governorate Hospital
2	Hais	Hais District Hospital	District Hospital
3	Al-Zaydah	Al-Zaydah District Hospital	Inter-District Hospital (Al-Zaydah, Al Qanawis & Al Munirah)
4	Bajil	Bajil District Hospital	Inter-District Hospital (Bajil, Buraa, Al-Marawiah & Al-Hajjajlah)
<b>Hajjah</b>	<b>31</b>		
1		Al-Jumhuri Hospital	Governorate Hospital
2	AL-Mahabishah	Al-Mahabishah District Hospital	District Hospital
3	Khayran Al-Muhharraq	Khayran Al-Muhharraq District Hospital	District Hospital
4	Qafil Shammar	Qafil Shammar District Hospital	District Hospital
<b>Al-Mahweet</b>	<b>9</b>		
1		Al-Jumhuri Hospital	Governorate Hospital
2	Bani Saad	Bani Saad District Hospital	District Hospital
<b>Raimah</b>	<b>6</b>		
1		Al-Thulaya Hospital	Governorate Hospital
2	Bilad Al Ta'am	Al-Mithaq District Hospital	District Hospital
<b>Ibb</b>	<b>20</b>		
1		Al-Thawra Hospital	Governorate Hospital
2	Yarim	Yarim District Hospital	Inter-District Hospital (Yarim, Al-Nadera, Al Radama, Al Qafer, Al Saddah, Mohamasheen)
3	Al-Udayn	Al-Udayn District Hospital	Inter-District Hospital (Hazm Al-Odain, Far Al-Odain, Mothaikhra, Reef Ibb, Dhe Sofal & Mohamasheen)
4	Ba'adan	Ba'adan District Hospital	District Hospital
<b>Taiz</b>	<b>23</b>		
1		Al-Jumhuri hospital	Governorate Hospital
2	Maqbanah	Al-Barh District Hospital	District Hospital
3	Shara'ab Al Salam	Al-Faqeed Bani Awn District Hospital	District Hospital
4	Al-Maafer	Al-Nashama Hospital	District Hospital
5	Al-Ronah	Abdul Galil Hospital	District Hospital
<b>Saadah</b>	<b>15</b>		
1		Al-Jumhuri Hospital	Governorate Hospital
2	Kitaf	Kitaf District Hospital	District Hospital

- Emergency Health and Nutrition Project (EHNP)

<b>Sana'a Governorate</b>		<b>18</b>	
1		Matna 26th Sept Governorate Hospital	Governorate Hospital
2	Sanhan	Sayan District Hospital	District Hospital
3	Seefan	Seefan District Hospital	District Hospital
<b>Amman</b>		<b>20</b>	
1		Amman General Governorate Hospital	Governorate Hospital
2	Thula	Thula District Hospital	District Hospital
3	Al-Souda	Al-Souda District Hospital	District Hospital
<b>Dhamar</b>		<b>12</b>	
1		Dhamar General Hospital	Governorate Hospital
2	Jabal Al-Sharg	Jabal Al-Sharg District Hospital	District Hospital
3	Ubamah	Ubamah District Hospital	District Hospital
<b>Sanaa City Municipality</b>		<b>10</b>	
1		Al-Jumhour Hospital	Governorate Hospital
2	Moeen	22 May Hospital - Moeen District	District Hospital
<b>Al-Baldhah</b>		<b>20</b>	
1		Al-Thawra Hospital - Baldhah City	Governorate Hospital
2	Reda's	Redas Hospital - Redas	Inter - District Hospital Al Qunakhyah - Ash Sharyah - Ar nyakhyah -Ar nyakhyah - Al Amsh
3	Mokahra	Mokahra Hospital	District Hospital
<b>Al-Jawf</b>		<b>12</b>	
1	Al-Hazm	Al-Jawf Hospital	Governorate Hospital
2	Barat Al-Anan	Barat Al-Anan Rural Hospital	District Hospital
<b>Aden</b>		<b>8</b>	
1	Al-Sheikh Othman	Al-Sadeka Hospital	Governorate Hospital
2	Der Seed	Der Seed Hospital	District Hospital
3	Al-Bonafah	Salah Al-Deen Hospital	District Hospital
<b>Lahj</b>		<b>15</b>	
1	Al-Hota	Ibn Khaldoun	Governorate Hospital
2	Radhan	Radhan	District Hospital
3	Tor Al-Baha	Tor Al Baha	District Hospital
<b>Al-Dhalea</b>		<b>9</b>	
1	Al-Dhalea	Al-Naser Hospital	Governorate Hospital
2	Al-Shoab	Al-Shoab Hospital	District Hospital
3	Qatabah	Al-Salem Hospital	District Hospital
<b>Abyan</b>		<b>11</b>	
1	Khanfar	Al-Rad Hospital	Governorate Hospital
2	Zongubar	Zongubar Hospital	District Hospital
3	Rosod	Rosod Hospital	District Hospital
<b>Hadramout Al-Saheal</b>		<b>12</b>	
1	Al-Mukalla	Ibn Sina Hospital	Governorate Hospital
2	Hager	Hager Hospital	District Hospital
3	Al-Baida Al-Sharkia	Al-Baida Hospital	District Hospital



Hadramout Al-Wadi		16	
1	Sayoon	Sayoon Hospital	Governorate Hospital
2	Tarim	Tarim Hospital	District Hospital
3	Al-Katin	Al-Katin Hospital	District Hospital

Mareb		14	
1	Al-Gobah	26th September Hospital	District Hospital

Al-Mahara		9	
1	Al-Kaidah	Al-Kaidah Hospital	Governorate Hospital
2	Al-Kashn	Al-Kashn Hospital	District Hospital

Shabwah		17	
1	Ataq	Ataq Hospital	Governorate Hospital
2	Maifa'a	Azzan Hospital	District Hospital
3	Baihan	AL-Dofifah Baihan Hospital	District Hospital

Socotra		2	
1	Qalansia	Qalansia Hospital	District Hospital

Proposed Activities to be conducted by WHO

WASH Activity	Quantity, Proposed Additional WSS Activities	Budget, Proposed Additional WSS Activities
Temporary Water Trucking to health facilities	65 HF for 6 months	
Rehabilitation of water wells including water pump and pipes	15	
Water Chlorination	HF for 6 months	
Water Quality Testing	0	
DTC establishment and running costs (inc. cleaning and disinfection)	50 DTCs (IPC scale-up)	
ORC establishment and running costs (inc. cleaning and disinfection)	400 ORCs (IPC scale-up)	
Water network rehabilitation and upgrade	32	
Increase water storage capacity	TBA	
Training health workers on proper WASH and IPC	TBA	
<b>Water Sub-Total</b>		
maintenance and rehabilitation of bathrooms including hand washing basins, latrines and showers	50	
Feecal Sludge Management	50	
Rehabilitation of sewage networks inside the health facilities	50	
<b>Sanitation Sub-Total</b>		

## APPENDIX H-2. UNICEF INTERVENTION SUB-PROJECTS

- **Classification of Projects for UNICEF Intervention in water and Sanitation and Hygiene in rural and urban areas**

- **Access to safe drinking water:**

- Chlorination of drinking water tank (at mosques, public parks, households, schools, health facilities, public markets, communal gathering places including IDPs
- Chlorination at public or private or community water supply (piped) network.
- Chlorination of private water trucks
- Chlorination of springs and rain water harvesting (retaining walls, roofs, reservoirs)

- **Access to safe wastewater treatment and reuse**

- Ozonation of effluent WWTP

- **Maintenance and rehabilitation and support of water sanitation facilities**

- Maintenance and rehabilitation of WWTP, water and wastewater network
- Maintenance and rehabilitation of water, sanitation: at school, Health facilities, public markets, communal gathering including IDPs
- Maintenance and Rehabilitation and support of water and sanitation laboratories at each water utility and WWTP.

- **Hygiene kit providing and distribution**

- Distribution of consumable hygiene kits and jery Cans for households; school, Health facilities, public markets, communal gathering including IDPs

- **Institutional strengthening and capacity building;**

- Awareness of the local authorities; -
- Support and preserve the operational capacity of the local water authorities in both urban and rural areas.;
- Protection of urban public water resources;
- Staff training of Water (and treated wastewater) User Associations (WUAs);
- Mass communication and awareness campaigns at the house hold, facility, community, and national levels for effective behavioral and hygiene practices.











- **Partnerships between private and public:**



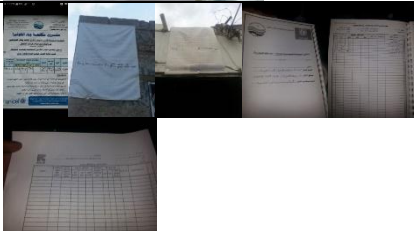
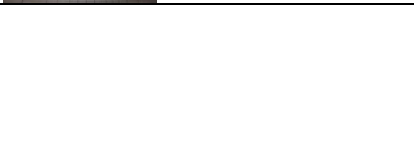
- Commercial operation of public convenience; cesspit trucks evacuation /disposal in an agreed disposal point.

**APPENDIX I: OUTCOME OF PUBLIC CONSULTATION**

Public meeting and consultation is an integral part of any project, but essential when preparing the ESMF. Within this framework, consultation was conducted to gather information, comment, and feedback of the most beneficiaries and public agencies responsible to take part & participate in implementation of WASH program. Managers as well as technicians from different local authorities were consulted for current challenges, available capacities, intervention requirement, and for hearing their expectation about WASH intervention program. In addition, the ESMF also included direct meeting with beneficiaries such as well owners, houses local residents, tankers owners who might affect/ be affected by WASH intervention activities.

Within this framework, the following institutions and personnel were interviewed during the period 15-31 August 2017:

BENEFICIARY/ ORGANIZATION	POSITION OF INTERVIEWEE	NAME OF INTERVIEWEE	sample photo
1. UNICEF	Wash specialist	Ms. Ahlam Al-Mutawakil and Dr. Nisar syed	
2. WHO	Environmental Health Officer	Eng. Abdul Malik Mofadal	
3. Sana'a Water & Sanitation Local Corporation (SWSLC)	Water supply distribution officer	Mr. Mohammed AL-Haifi	
	Director of sewer network project	Eng. Amin Al-Mawry	
	Water Lab specialist	Ms. Mona Mohamed Nagi	 
	Acting director at WWTP	Eng. Abdulwahab Salah	 
	Head O&M at WWTP	Eng. Farooq Al-Qadasi	 
	Head Lab of WWTP	Chem. Hasan Al-Doais	

BENEFICIARY/ ORGANIZATION	POSITION OF INTERVIEWEE	NAME OF INTERVIEWEE	sample photo
4. Deep wells owners (UNICEF supervisor Sharaf Al-Sakaf	Owner: Al-Khawi at Maeen dist.	Abdulwase Al-Sabri	
	Owner: Al-Radae at Maeen dist.	Ali Al-Radae	
5. Vendor Owner	Vendor owner	Yehya Yehya Aiedh Hoomi	
	Vendor owner	Nazem Al-Qadasi	
6. House Owners	House Owners	Husain Al-Somaei	
		Aref Al-Doosh	
		Mohamed Al-Basihiri	
		Mohamed Al-Ansi	
		Abdallah Hajeb	
		Morshed Ezzadin	

1. At UNICEF- Wash specialist:

During the meeting, Ms Ahlam and Dr. Nisar Syed stated the following: UNICEF has many mechanisms in projects monitoring, UNICEF have Third Party Monitoring companies (Prodigy, KPMG and Moore Stephens) beside the field offices closely monitoring. UNICEF have contracts with the companies and tools to be used during internal monitoring. It is mainly depending on the project documents. Moreover, regarding to the procedure of applying in case of Grievance, when the project starts, UNICEF will organize a kickoff workshop with the partners and beneficiaries at which they will announce the responsible(s) workforce who will receive the application for grievance and their telephone number(s).

2. At WHO- Environmental Health Officer

Discussion took place on the mitigation measures to be considered when implementing the WASH. WHO is supporting LCs such as Hodiedah and Hajjah, while Sana'a and Al-Mahweet are not operating by means of delegating the provision of water through its networks to the Health Facilities (HFs). Other concern is mitigation inside the HFs are the toilet separation for men and women, as well as for special needs such as rails and ramps. Separation of hazardous chemical waste from labs

far from the cesspit or sewerage network, to an evaporation container. Rehabilitation of the wells at the HFs are an important issue where the exact diagnosis of the fault is identified by Yemeni hydrogeologist experts. One of the concerns is to recruit Yemeni experts instead of importing foreigners' expert. Other concern of Diarrhea Treatment Centre (DTC) where it is considered as an isolation spot for the patients with cholera and applying Oral Rehydration Treatment Center (ORTC) and use safety protective clothes by the staff at HFs is a good means to avoid getting sick from the patients and safely treat the patients to prevent transferring the disease from patients to others and from patients to themselves.

### 3. At SWSLC:

#### 3.1. At SWSLC -Officer water distribution system:

According to the interviewee, the most comments and currently urgent requirements can be the following;

- SWSLC lacks fuel (Diesel) to operate water supply pumps and generators. UNICEF has already and still supporting SWSLC on this issue, but through the Public Electricity Corporation (PEC). In general, electricity is not really supplied as agreed upon to supply water to all connected houses. Instead, the interviewee prefers UNICEF to directly supply SWSLC with fuel requirement in order to ensure consistent supply of water to all users.
- SWSLC is in need of technical training on water chlorination and disinfection procedures. 15 technicians, who represent SWSLC branches and pumping stations, are in need for this training
- There is also a need of training in monitoring and evaluation. 8 staff, can be trained on this M&E;
- At current, SWSLC requires adequate supply of chlorine,
- Moreover, provision & installation of control valves and rehabilitation of some part of water network is a prerequisite to ensure secure splitting the network into zones to facilitate rationing supplying of water and improve health condition of beneficiaries.

#### 3.2. At SWSLC- Director sewerage network:

Eng. Amin Al-Mawri focused in his discussion on the non-payment of salaries to the employees of the SWSLC and therefore the importance of financial support to the employees to stimulate them to continue and follow-up diligently in the performance of their work. We could benefit from them as consultants, but with symbolic costs to stimulate them to do their work in studies on the requirements of network maintenance and the work of the SWSLC in general as has been done for their colleagues in the WWTP. Fear of being hit by rockets by conflict during the rehabilitation of wells calls for a permit from the OCHA. The network needs a crane and heavy equipment to play its role, especially in the case of maintenance of the plant, which used the winch and heavy equipment owned by the SWSLC. The SWSLC needs suction equipment for cesspits overflow. The available equipment currently available is half for suction and the other half is for pumping which can be used in the case of rain flood suction or sewage cesspit overflow. One case happened is that the cesspit overflow was sucked and drained to the rainfall channel (Wadi Sailah), which causes the spread of odors and pollution of sewage that necessitated washing the channel, according to Engineer Amin Mawri, some parts of the asbestos pipes sewerage network are corroded even when they are cleaned they get deteriorated so, it needs to be replaced. To mitigate the impact of this process and avoid stopping the sewage network from performance, bypassing wastewater flow far from that part could be applied. Concrete Manholes are also eroded and need to be maintained. Replacement of such manholes could

be by plastic material as it is resistant corrosion caused by hydrogen sulfide gas in wastewater.

### 3.3. At SWSLC—specialist water Lab:

The most discussed points are:

- There is a shortage in chemicals for analysis, additives, filter papers, as well as analysis glassware;
- Some ventilation (lab ventilation hood), need maintenance;
- Filtration glass unit (three) with needed filter paper for FC coliform test;
- The lab needs rehabilitation specifically the wastewater network which requires separation of the exist network;
- Building an improved discharge facility (storage) and special network for safe disposal of lab used chemicals (hazardous waste);
- Provision of personal protective equipment PPE, safety installations, and safety manual for the lab;
- Training in safety procedures as well as on modern equipment;
- Privacy of women is not considered in the lab (toilet, clothes changing room);

### 3.4. AT WWTP- Acting Director

With regard to other units such as sedimentation tanks and thickeners, it is expected that the scouring racks at the bottom will need to be maintain and remove the deposited materials inside them which are less difficult than the aeration tanks, but these racks are expected to be more effected by these deposited materials because they are adhering to them. The importance of the rehabilitation of WWTP is to improve the performance which may reach up to 200 mgBOD/l of the effluent. Moreover, the idea of introducing ozone unit is to disinfect the effluent as the chlorination could not be applied with effluent with high BOD. However, this will need high investment cost as well as training to operate such a new unit in the WWTP. At the same time, it is not intended to close chlorination unit rather to keep it as a backup disinfection process. Therefore, chlorine chamber is to be rehabilitated.

### 3.5. At WWTP-Head O&M

The plant is currently being maintained by removing the accumulated sediments in the aeration tanks, which covered almost half the depth of the tanks. In addition, the fans of aerators are replaced, which will increase the efficiency of the WWTP in its current state. This stage requires consideration of the searching for experienced technicians in the installation of fans in place due to the large and the existence of the bottom hindering stand fans underneath the aerators. The impact of this work is mitigated through the training and using the safety clothes and equipment. The maintenance of the WWTP will not lead to upgrading the WWTP as the upgrading project is stopped due to the stop of funding. So, this rehabilitation will help operating the WWTP so that the pollution of effluent is alleviated and the bioprocess and bacterial kept alive as it is overloaded.

### 3.6. At WWTP-Head LAB

As for the laboratory, there are devices needed to be maintained in addition to chemicals that are needed on a continuous basis. In addition, electricity is an important factor in the continued operation of analytical equipment such as refrigerators, ovens, incubators and the BOD device, which is considered to give true results. Professional

safety tools are needed in a continuous basis for the laboratory operation in both sampling and analysis.

4. At WELLS- Owners, operators and UNICEF monitoring supervisors

Chlorination of elevated tank of the well, the vendors and the underground tanks at houses.

UNICEF contracted the owner of the well to receive the chlorine, prepare stock solution, and add it to the vendors, fill in a log book of the wells and limit the amount of chlorine that is poured in each vendor. The owner of the well said that most of the consumers are responsive but some refuse to get chlorine in the water. The well owner is trying to make people aware and add chlorine according to the volume of the vendor based on the predetermined need amount base on the well water analysis according to UNICEF. Chlorine exists in different forms, powder, solution or tablets. It is added by trained person under the supervision of the UNICEF supervisor. Chlorine vapor is annoying the people so it is mixed outside the room where the place is ventilated.

Monitoring forms are filled by the operators and hand it over to the UNICEF supervisors to calculate the amount of chlorine use. The residual chlorine concentration is expected to reach 0.5-1 mg /L. Interestingly, the doses of chlorine ranges 50 to 300 ml per cubic meter. The impact of the chlorine solution preparation is the irritating smell of chlorine to the eyes and nose and the mitigation could well be that applying the mixing in the ventilated space outside the room or in a ventilated room. Moreover, to reduce the impact of the fear of increased concentration of the residual chlorine is that it should be measured on site by providing the operator with the needed chlorine test kit equipment for analysis check after passing the reaction time to make sure that the threshold concentration was not exceeded with continuous chlorine supply. As for chlorine, it is stored in a safe place away from people. The chlorine required for use during the dosing is mixed with a distinctive container with a specific measurement.

5. At Vendors- Owners

Citizens have benefited from the disinfection of under/ground tanks, which remained years without disinfection and are a source of pollution. On contrary, they were worried at first because the taste of chlorine was clear, but when reduced the dose they do not taste the chlorine. The owners of tankers (vendors): Yehya Yehya Hoomi reported that at least 20% of people refused to add chlorine, half of them consumed in treatment plant because it would affect the treatment units such as Reverse Osmosis (RO) units, while the other half thought chlorine would affect the kidneys.

6. At House- Owners

Some people object to apply the chlorine and consider it dangerous, but awareness of its use is important until it reaches tasting then starts to be considered as dangerous.

