UNITED NATIONS OFFICE FOR PROJECT SERVICES

REPUBLIC OF YEMEN
INTEGRATED URBAN SERVICES EMERGENCY PROJECT
Additional Financing (P178270)

Environmental and Social Management Framework (ESMF)

Final

29 November 2021

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Abbreviations

AWD	Acute Watery Diarrhea
CERC	Contingent Emergency Response Component
CSO	Civil Society Organization
DFID	Department for International Development ·
DLAs	District Local Authorities
DNA	Damage and Needs Assessment
ECRP	Yemen Emergency Crisis Response Project
EHS	Environmental, Health and Safety
EHNP	Emergency Health and Nutrition Project
EPL	Environmental Protection Law (26/1995)
ESF	Environmental and Social Framework of the World Bank
ESHS	Environment, Social (including labor), Health, and Safety
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standard
FMFA	Financial Management Framework Agreement
FCV	Fragility, Conflict and Violence
GBV	Gender Based Violence
GDP	Gross Development Product
GHS	General Health and Safety guidelines
GIIP	Good International Industry Practice
GIS	Geographic Information System
GIZ	Gesellschaft für Internationale Zusammenarbeit
GM	Grievance Mechanism
GRM	Grievance Redress Mechanism
GOAM	General Organization for Antiquities and Museums
HSSE	Health, Safety, Social and Environment
ICRC	International Committee of the Red Cross
IDA	International Development Association
IDP	Internally Displace Person
LC	Local Corporation
LED	Light Emitting Diode
LMP	Labor Management Procedures
LTI	Lost Time Injury
MoPIC	Ministry of Planning and International Cooperation
MoWE	Ministry of Water and Environment
NGO	Non-Governmental Organization
NWSSIP	National Water Sector Strategy and Investment Program
PAP	Project Affected People
PMU	Project Management Unit
PWP	Public Works Project
PV	Photovoltaic
RCA	Root Cause Analysis
RoY	Republic of Yemen
SCAP	Safeguards Corrective Action Plan
SEA	Sexual Exploitation and Abuse
SH	Sexual Harassment
SEP	Stakeholder Engagement Plan
SMP	Security Management Plan
TCC	Technical Coordination Committee

TPM	Third Party Monitoring
UNDP	United Nations Development Program
UNICEF	United Nations Children's Emergency Fund
UNOPS	United Nations Office for Project Services
UW-PMU	Urban Water Project Management Unit
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WSLC	Water and Sanitation Local Corporations
WSS	Water Supply and Sanitation
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant
YIUSEP II	Second Yemen Integrated Urban Services Emergency Project

Glossary of Terms Used in the ESMF

Chance find procedure. A chance find is archaeological material encountered unexpectedly during project construction or operation. A chance find procedure is a project-specific procedure which will be followed if previously unknown cultural heritage is encountered during project activities. The chance finds procedure will set out how chance finds associated with the project will be managed. The procedure will include a requirement to notify relevant authorities of found objects or sites by cultural heritage experts; to fence off the area of finds or sites to avoid further disturbance; to conduct an assessment of found objects or sites by cultural heritage experts; to identify and implement actions consistent with national law; and to train project personnel and project workers on chance find procedures.

Child labor consists of work by children that is economically exploitative or likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.

Compliance compares how well a process meet the requirements placed on the process.

Disposal. Final placement or destruction of wastes, polluted soils, and toxic or hazardous materials. Disposal may be accomplished through approved secure landfills, surface impoundments, or incineration.

Effluent. Wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall; generally, refers to wastes discharged into surface waters.

Environmental, Health, and Safety Guidelines (EHSGs) are technical reference documents with general and industry-specific statements of Good International Industry Practice. The EHSGs contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable cost. For complete reference, consult the World Bank Group Environmental, Health, and Safety Guidelines, http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/our+approach/risk+management/ehsguidelines.

Environment and Social Impact Assessment (ESIA) identifies and assesses the potential environmental risks impacts of a proposed project, evaluate alternatives, and design appropriate mitigation, management, and monitoring measures.

Environmental and Social Management Plan (ESMP) details: (a) the measures to be taken during the implementation and operation of a project to eliminate or offset adverse environmental impacts, or to reduce them to acceptable levels; and (b) the actions needed to implement these measures.

Environmental and Social Management Framework (ESMF) is an instrument that examines the risks and impacts when a project consists of a program and/or series of subprojects, and the risks and impacts cannot be determined until the program or subproject details have been identified.

Good International Industry Practice (GIIP) is defined as the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally or regionally. The outcome of such exercise should be that the project employs the most appropriate technologies in the project-specific circumstances.

Grievance. An issue, concern, problem, or claim (perceived or actual) that an individual or community group wants a project implementor or contractor to address and resolve.

Grievance Mechanism (GM) is a locally based, formalized way to accept, assess, and resolve community feedback or complaints from individuals or communities who believe they are adversely affected by the Project.

Hazardous wastes. By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Substances classified as hazardous

wastes possess at least one of four characteristics—ignitability, corrosivity, reactivity, or toxicity—or appear on special lists.

Lost Time Injury (LTI) is the incapacity to work for at least one full workday beyond the day on which the accident or illness occurred**.**

Lost workdays are the number of workdays (consecutive or not) beyond the date of injury or onset of illness that the employee was away from work or limited to restricted work activity because of an occupational injury or illness.

Mitigation. Measures taken to reduce adverse impacts on the environment.

Monitoring. Periodic or continuous surveillance or testing to determine the level of compliance with statutory requirements or pollutant levels in various media or in humans, animals, and other living things.

Occupational Health and Safety deals with all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards (WHO).

Sludge. A semisolid residue from any of a number of air or water treatment processes. Sludge can be a hazardous waste.

Solid wastes. Nonliquid, nonsoluble materials, ranging from municipal garbage to industrial wastes, that contain complex, and sometimes hazardous, substances. Solid wastes include sewage sludge, agricultural refuse, demolition wastes, and mining residues. Technically, solid wastes also refer to liquids and gases in containers.

Stakeholder. Persons or groups who are directly or indirectly affected by a project as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively. They may include locally affected communities or individuals and their formal or informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, the academic community, or other businesses.

Stakeholder Engagement is a broad, inclusive, and continuous process between a project proponent and those potentially affected by the project that usually spans the project's life. It includes consultations, information disclosure and dissemination, and participation.

Wastewater Treatment Plant. A facility containing a series of tanks, screens, filters, and other processes by which pollutants are removed from water.

Executive summary

This Environmental and Social Management Framework (ESMF) was prepared by UNOPS for the second Yemen Integrated Urban Services Emergency Project (YIUSEP II); the parent project. This ESMF has also been updated to include the additional financing YIUSEP-AF (P178270) of US$100 million to the parent project, whose number of target cities will increase from 11 to 15 within the same governorates targeted in YIUSEP II as the result of the additional financing.

The World Bank is financing the YIUSEP II to support Yemen's reconstruction and recovery, under the provisions of World Bank OP 10.00, paragraph 12, *Projects in Situations of Urgent Need of Assistance or Capacity Constraints*. The Project aims to restore access to critical urban services in selected cities within the Republic of Yemen in four target sectors: (i) tertiary municipal services and solid waste management; (ii) urban water and sanitation; (iii) urban roads; and (iv) electricity for critical services.

The ESMF was prepared to meet the requirements of the World Bank's Environmental and Social Framework (ESF), most particularly the Environmental and Social Standard on the Assessment and Management of Environmental and Social Risks, including the World Bank Group Environment, Health and Safety (EHS) Guidelines. It also meets the UNOPS Environmental, Health and Safety (EHS) procedures and practices and complies with Yemeni environmental and social laws and regulations.

The use of a Framework is appropriate and necessary, given that the Project consists of a large number of subprojects in many different localities, and that the specific location and activities of each subproject will only be determined during implementation.

UNOPS has in parallel prepared a Labor Management Procedure (LMP) to meet the requirements of ESS2, a GBV/SEA/SH Plan and a Security Management Plan (SMP) to meet the requirements of ESS4, a Resettlement Framework to meet the requirements of ESS5, and a Stakeholder Engagement Plan (SEP) to meet the requirements of ESS10. All of these documents have been updated to include the additional financing to the parent project.

The United Nations Office for Project Services (UNOPS) is responsible for overall project implementation, in cooperation with three local Implementing Partners: the Public Works Project (PWP), the Road Maintenance Fund Implementation Unit (RMF-IU), and the Urban Water Project Management Unit (UW-PMU). UNOPS has recruited an Environmental and Social Safeguards Officer (ESSO) based in Sana'a, to oversee Project safeguards, as well as Gender Mainstreaming Officer, a Health and Safety Officer, and a part-time international expert to support the ESSO in the implementation of the ESMF. Each implementing partners will deploy and ESSO and a Health and Safety Officer. Additional personnel may be recruited to by UNOPS and its implementing partners to effectively manage the additional financing to the parent project because of the increase in the numbers of subprojects in each target city under YIUSEP-II-AF

The Project will only rebuild, restore, or rehabilitate existing infrastructure. There will be no expansion of existing facilities nor the creation of new ones, and rehabilitated facilities will be handed back to the competent authorities. The Project will not provide technical assistance to develop Operations and Maintenance (O&M) plans for the reconstructed or rehabilitated facilities. Thus, issues such as the siting of the facilities, and many of their operational impacts will be beyond the scope of the Project.

The bulk of the ESHS risks and impacts is directly associated with the construction and rehabilitation activities of the contractors who will rebuild, rehabilitate, and restore the targeted facilities. Although the risk profile might differ between specific activities, the overall risk profiles of construction activities are analogous for the four target sectors.

The ESMF details specific mitigation measures for each of the four target sectors.

The ESSOs will screen all subproject proposals prepared by UNOPS and its Implementing Partners to: (i) determine the environmental and social issues that might be triggered by the subproject, (ii) identify the relevant Environmental and Social Standards (ESS); (iii) determine the appropriate Environmental and Social risk rating for the subproject, and; (iv) specify the type of environmental and social

assessment required, including specific instruments/plans.

UNOPS will prepare proportionate ESMPs for subprojects not requiring a full ESIA and ESMP, according to the following table of content:

(i) Summary Sheet
(ii) Subproject Description
(iii) Environmental and Social Baseline
(iv) Consultations
(v) Mitigation Instruments

Subprojects that cause significant environmental and social impacts will require a full ESIA and ESMP, and might also require a Resettlement Plan. Guidance for resettlement planning is detailed in the Project's Resettlement Framework.

UNOPS and its Implementing Partners will apply the World Bank's requirements for **consultation and disclosure,** as detailed in the updated Project Stakeholder Engagement Plan. Consultations will be initiated as soon as subprojects screening has been completed and consultation records will be kept in the Project Office. Consultations will take into consideration the sociocultural context of Yemen, as well as the ongoing COVID-19 epidemic.

UNOPS and its Implementing Partners will incorporate **environmental and social requirements for contractors** in tender documentation and contract documents, so that potential bidders are aware of environmental and social performance requirements expected from them and are able to reflect that in their bids. The cost to contractors of meeting the ESHS requirements will be included in their respective contracts. UNOPS and its Implementing Partners will enforce compliance by contractors with these requirements.

The requirements include 10 sections:

(i) Contractor Environmental and Social Management Plan (C-ESMP)
(ii) ESHS Training
(iii) Construction Site Management
(iv) Occupational Health and Safety (OHS)
(v) Road safety and Traffic Safety
(vi) Chance Find Procedures
(vii) Emergency Preparedness and Response
(viii) Stakeholder Engagement
(ix) Code of Conduct

UNOPS will **monitor and report** on implementation of the ESMF, with inputs from implementation partners and the TPM agent. The UNOPS ESSO will ensure that safeguards monitoring is included in the Project's quarterly reports to the World Bank.

The Project has establish a **Grievance Mechanism (GM)**, as detailed in the Project Stakeholder Engagement Plan that has been used for environmental, resettlement and social issues. The ESSO in UNOPS and the Implementing Partners will handle Project activity-related complaints.

UNOPS is fully covering, as part of the fee that it will charge the Bank, the cost of the ESSO, the Gender Mainstreaming Office, the health and Safety Officer, as well as any associated operational costs and the cost of additional personnel needed as a result of the new additional financing to the parent project.

The Implementing Partners are covering the cost of their respective ESSOs and Health and Safety Officers as part of their respective Project Cooperative Agreement (PCA) with UNOPS. These staff might not work full time on YIUSEP II activities, as each Implementing Partners has partnered with several projects.

The cost of due diligence for specific subprojects (preparation of the screening form, consultations, GM, preparation of ESMPs, and monitoring) are included in the costs/budget for each subproject.

Chapter 1.
Introduction and Background

1.1 Introduction

1. This Environmental and Social Management Framework (ESMF) was prepared by UNOPS to meet the requirements of the World Bank's Environmental and Social Framework (ESF), as well as national environmental laws and regulations, for the second Yemen Integrated Urban Services Emergency Project (YIUSEP II; P175791). This ESMF has also been updated to include the additional financing IUSEP-AF (P178270) of $100 million to the parent project. The use of an ESMF is appropriate and necessary, given that the Project consists of a large number of subprojects in many different localities, and that the specific locations and activities of each subproject will only be determined during implementation.

2. The Project ESMF will guide UNOPS and its Implementing Partners, to ensure that all subprojects meet the requirements of the ESF, including the preparation of subproject specific Environmental and Social Management instruments in accordance with the ESF. For this purpose, the ESMF details how UNOPS will screen each subproject to assess its environmental and social risks and impacts, identify the necessary mitigation measures, and monitor ESMP implementation, most particularly the environmental and social performance of Project contractors.

3. UNOPS has in parallel prepared a Labor Management Procedure (LMP) to meet the requirements of ESS2, a GBV/SEA/SH Plan and a Security Management Plan (SMP) to meet the requirements of ESS4, a Resettlement Framework to meet the requirements of ESS5, and a Stakeholder Engagement Plan, to meet the requirements of ESS10. All of these document have been updated to include the additional financing to the parent project.

1.2 Background[1]

4. After five years of escalating conflict, the Republic of Yemen (RoY) continues to face an unprecedented humanitarian, social and economic crisis. In May 2015, the United Nations (UN) placed Yemen at level 3 of humanitarian distress, the highest categorization of countries in conflict. Since then, Yemen has been described as the worst humanitarian crisis in the world[2], with 24 million Yemenis requiring humanitarian assistance and 3.65 million internally displaced. More than 20 million people are food insecure, of which 10 million are suffering from extreme hunger. As per the UNDP estimates (2019), there have been 102,000 combat deaths and 131,000 indirect deaths due to lack of food, health services and infrastructure, and many more injuries. The country is also facing the worst cholera epidemic in modern history. The economy has been badly affected by the prolonged conflict, depriving millions of their livelihoods and jobs and driving poverty levels to over 80 percent. In 2018, Gross Domestic Product (GDP) was estimated at US$23 billion, and although official statistics are no longer available, evidence suggests that GDP has contracted by about 40 percent cumulatively since 2015[3].

5. Yemen's cities have been very badly impacted by the conflict, with widespread destruction of urban infrastructure. In January 2020, damage in the 16 cities covered by the World Bank's Yemen Dynamic Needs Assessment (DNA) was estimated between US$6.9 and US$8.5 billion.[4] The housing sector has experienced the most damage, with costs ranging between US$5.1 and US$6.2 billion,

[1] The Background section is borrowed from the Project Appraisal Document

[2] UN Secretary-General António Guterres in remarks to donor conference in Geneva on April 3, 2018

[3] World Bank Yemen Republic Overview, April 2018

[4] Yemen Dynamic Needs Assessment: Phase 3 (2020 Update) (English). Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/490981607970828629/Yemen-Dynamic-Needs-Assessment-Phase-3-2020-Update.

followed by the health (US$605–740 million) and power (US$541–662 million) sectors. Estimated damage to WASH, transport, and education infrastructure is also immense, estimated to be in the hundreds of millions. Amongst the 16 DNA cities, Sana'a has suffered the greatest damage, followed by Taiz, with damages estimated at US$2.4–3.0 billion and US$1.4–1.7 billion respectively. Aden and Hodeidah have also been severely affected by the conflict.

6. The damage to Yemen's public institutions is causing widespread disruptions in basic urban services across the country. Agencies responsible for basic service delivery are disintegrating due to a lack of resources and arrears of civil servant salary payments for more than three years. Since the start of the conflict, waste collection services have been interrupted, urban roads have been wrecked, water, sanitation, and drainage infrastructure has been extensively damaged, and critical facilities have been left without electricity. Consequently, two-thirds of the population lack access to safe water and sanitation, and healthcare services are failing to meet the country's immense needs.

7. In addition, the country is affected by regular flash floods and heavy rainfall events that have compounded the severity of the situation in urban areas. From mid-April to August 2020, Sana'a, Hodeidah, Abyan, Marib, Amran, Sa'ada, Al Jawf, Ibb, Hajjah, Hadramout, and Al Dhale'e were badly flooded due to heavy rainfall. According to media reports, 172 people died, and many were injured[5]. In addition, an estimated 300,000 people in Yemen were reported to have lost their homes, crops, livestock and personal belongings.[6] Alongside drought and increased water stress, rainfall intensity and associated flooding, is projected to increase with climate change. There are high concentrations of risk and vulnerability in urban areas, particularly coastal cities, due to exposure to sea level rise and storm surge, flash floods, and epidemiological hazards enhanced by the flash floods and depletion of water resources for household consumption. Due to the ongoing multiple crises Yemen has very limited capacity to deal with the future impacts of a changing climate. The level of economic vulnerability to climate change is extremely high, as over 80% of the population are reliant on humanitarian assistance. Furthermore, the cumulative impact of conflict and climate change is exacerbating the health risks for vulnerable communities.[7]

8. The COVID-19 risk to Yemen is very high compared to other countries as the conflict has taken a heavy toll on the country's capacity to respond to crises. Lockdowns, quarantines and the closure of airports have been implemented sporadically, with unknown effect on containing the spread of COVID-19. According to the WHO's COVID-19 Dashboard, as of 23 November 2020, there were 2,073 confirmed cases and 605 COVID-19 related deaths in Yemen, suggesting a fatality rate as high as 30%[8]. While there is very little data available to quantify the problem, there is a general consensus among development agencies on the ground that the figures are underreported. COVID-19 is a threat multiplier as the Yemeni people are among the world's most malnourished, and evidence shows that malnourished individuals are at much higher risk of contracting, becoming seriously ill and dying from COVID-19[9]. COVID-19 is also devastating for Yemen's struggling economy and is compounding the impacts of recent urban flooding and a declining global oil price, which is the only significant export of the country.

9. Women are disproportionately affected by the hardships in Yemen due to pre-existing inequalities related to patriarchal systems and norms. Gender disparities are extreme[10] and economic opportunities are extremely limited, with a labor force participation rate of only 6.2%, compared to 65.4% for men (ILO, 2015).

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[5] More than 260 houses were damaged, including some in Sana'a's historic Old City which is a UNESCO World Heritage site.

[6] UNHCR, August 2020, https://www.unhcr.org/en-us/news/briefing/2020/8/5f3e7faf4/300000-people-lose-homes-incomes-food-supplies-belongings-due-catastrophic.html.

[7] http://www.emro.who.int/pandemic-epidemic-diseases/cholera/outbreak-update-cholera-in-yemen-12-january-2020.html

[8] https://covid19.who.int/region/emro/country/ye

[9] See 2020 Global Nutrition Report https://globalnutritionreport.org/reports/2020-global-nutrition-report/2020-global-nutrition-report-context-covid-19/

[10] The country ranks last globally in the World Economic Forum's Global Gender Gap Index (153rd place). Yemeni women are also largely absent from political life, and have very low literacy rates at only 35%, compared with 73% of men, which further limits their opportunities to be beneficially and professionally employed, impacting their earning potential.

The conflict and recent flooding have extensively damaged water and sanitation infrastructure, with a particularly heavy burden on women, who spend three to six hours fetching water in parts of Yemen. Children (girls especially) have reportedly missed school to help their mothers[11]. The World Health Organization (2017) have also found that of acute watery diarrhea (AWD) and cholera cases deaths, 49% were women, and 34% were children under five[12]. Because Yemeni women are also largely absent from political life, and have very low literacy rates at only 35%, compared with 73% of men[13], their ability to influence resource allocation and decision-making is extremely limited.

1.3 Rationale

10. In line with ESS1, the Project uses an Environmental and Social Management Framework instead of an Environmental and Social Impact Assessment (ESIA) and an Environmental and Social Management Plan (ESMP) because the exact nature and location of subprojects and their impacts are not fully known. With the additional financing to the parent project, the subprojects will be selected after November 2021, once the Project team can carry out stakeholder consultations for investment selection.

11. As indicated in ESS1:

> *The ESMF sets out the principles, rules, guidelines and procedures to assess the environmental and social risks and impacts. It contains measures and plans to reduce, mitigate and/or offset adverse risks and impacts, provisions for estimating and budgeting the costs of such measures, and information on the agency or agencies responsible for addressing project risks and impacts, including on its capacity to manage environmental and social risks and impacts. It includes adequate information on the area in which subprojects are expected to be sited, including any potential environmental and social vulnerabilities of the area; and on the potential impacts that may occur and mitigation measures that might be expected to be used.*

1.4 Lessons learned

12. The Project builds on the Yemen Integrated Urban Services Emergency Project (YIUSEP I; P164190) and the ongoing phase two of YIUSEP (P175791) that is implemented by UNOPS and includes similar components.

- YIUSEP I implemented 154 subprojects: PWP (81); RMF-IU (25); UW-PMU (26), and UNOPS implemented 22 electricity sector subprojects.
- UNOPS and its Implementing Partners prepared ESMPs for all subprojects (Level 2), and jointly supervised their implantation by contractors.
- None of the subprojects required the preparation of an ESIA (Levels 3 and 4).
- UNOPS and its Implementing Partners conducted environmental, social, and OHS inspections usually on a weekly basis during subproject implementation. Noncompliance was addressed and corrected immediately by the contractor's team/safety officers.
- Contractor non compliances included: (i) workers not wearing appropriate PPE: (ii) workers not fully aware of the worker's GRM; (iii) waste and debris not collected immediately and transported to the assigned landfill; (iv) one child labor case with a PWP contractor that was immediately addressed.
    - A flagman was slightly injured and treated on the site when he jumped over a footpath to avoid an oncoming car during the maintenance of a solar street light pole in Sana'a City in February 2019. UNOPS immediately conducted an incident review and identified lessons learned; the contractor was warned, and corrective measures taken, including defining safe distance requirements for safety cones, barriers and safety lights.

[11] 2019 World Bank-UNOPS qualitative study.

[12] They most likely have higher "occupational exposure" through greater amount of household work.

[13] This also limits their opportunities to be beneficially and professionally employed, impacting their earning potential. World Economic Forum, 2020, Global Gender Gap Report 2020

  - One worker and a relative died in a sewer at a PWP sanitation rehabilitation site in March 2019. UNOPS conducted Root Cause Analysis (RCA), and prepared and implemented a Safeguards Corrective Acton Plan (SCAP), including more explicit contractor requirements for work in sewers. PWP terminated the contract. Compensation was paid by the contractor, not by the project.
  - RMF-IU road maintenance in Dhamar City resulted in a death of one person. UNOPS conducted an RAC, and prepared an implemented a SCAP. A warning was issued to the contractor. Compensation was paid by the contractor, not by the project.

- These SCAPS were implemented to the satisfaction of the World Bank, and both UNOPS and the local partners were able to learn from these incidents and enhance their safeguards practices.
- Complaints received by the GRM included requests to: (i) repair or provide regular maintenance to installed generators or solar systems; (ii) immediately remove waste and debris from working sites; (iii) clean road maintenance and paving sites to ensure proper rainwater drainage; (iv) avoid making noise or generating dust; (v) avoid compromising other services such as electricity, telecommunication, or sanitation. when excavating and securing sites; (vi) maintain access; (vii) to shorten the duration of works affecting streets
- Many of complaints concerned procurement or labor issues, such as delayed payments to contractors, disputes on remaining due payment between contractors, subcontractors, suppliers of construction materials, contractor's engineers and workers and terms of payments.
- Most complaints were resolved immediately with the contractors to the satisfaction of the complainants, except for financial disputes between contractors and other parties where UNOPS was not a party. UNOPS advised contractors to solve these complaints amicably. If the complainant was not satisfied, they had the option to go for second level of legal process.

- To respond to the crisis in Yemen's urban areas, in November 2017 the World Bank approved the US$150 million Yemen Integrated Urban Services Emergency Project (YIUSEP) to restore access to critical urban services of selected cities. Under YIUSEP, the Bank and UNOPS team were able to deliver or exceed all results despite the challenging situation. This included support for 3 million beneficiaries, 1.5 million person-days of work, restoration of 240 kilometers of roads, 1.2 million people gaining access to WASH services. Despite the success of YIUSEP, Yemen's unmet urban infrastructure and service delivery needs remain immense due to the extent of damage to infrastructure and institutions caused by the ongoing conflict.

- Repeated requests for additional support from local partners led to YIUSEP II, a new US$ 50 million IDA operation, which was approved in June 2021 to continue restoring critical urban services impacted by the conflict and recent flooding (Component 1) for an expected 1.5 million people, whilst strengthening the capacity of selected national and local institutions to provide continuity, resilience to shocks and sustainability of urban service delivery (Component 2). The capacity-building component was strengthened in YIUSEP II to help restore the capacity and functions of local institutions with the aim of enhancing the sustainability of the restored services. YIUSEP II also expanded WASH services in response to the COVID-19 pandemic, and focused heavily on the restoration of urban infrastructure damaged by flooding which has compounded the severity of the emergency in urban areas. The hardships faced in Yemen's cities due to the devastating combination of conflict, climate impacts, health and economic stresses, has led to constant demands for additional assistance, resulting in this proposed AF.

Chapter 2.
Project Description[14]

Project Development Objective (PDO)

13. The PDO remains the same: *To restore access to critical urban services and strengthen resilience to shocks in selected cities within the Republic of Yemen.*

B. Revision of the Results Framework

14. No major changes are proposed for the PDO level indicators. Only the end targets will be updated to account for an increase in the number of activities.

15. Intermediate results indicators (IRIs) will not change significantly. One new IRI will be added, to expand the gender component: "Value of tender slots allocated for Women Owned Businesses (WOB) only" (US$1 million target). In addition, the gender indicator "Participating contractors and consulting firms must have a minimum of 5% of staff who are women" will be modified to increase the minimum requirement from 5 to 10%.

C. Project Description

16. The AF is effectively a scale up of the same activities supported by the parent project, with a greater focus on building the selected cities' resilience to climate change. The geographical scope of the AF remains the same as YIUSEP II. The proposed AF will continue to finance the same activities as YIUSEP II - restoration of critical urban services impacted by the conflict and recent flooding (Component 1), whilst strengthening the capacity of local institutions to provide continuity, resilience to shocks, and sustainability of urban service delivery (Component 2). Water and sanitation will remain a key priority. The project will also maintain a CERC (Component 3) to support the response to an eligible disaster if one arises. The number of beneficiaries will increase from 1 million to 3 million as a result of the AF (to be updated).

D. Project Components

17. **Expansion of Component 1: Service Restoration (US$90 million, New total: US$ 130 million).** Following the same design as the parent project, the AF will finance the scale up of the preparation and implementation of infrastructure investments. A tentative first year investment pipeline has already been prepared, based on the same technical and sustainability criteria of YIUSEP II[15]. New city level knowledge of climate risks is also helping to shape subproject selection and investment locations. Furthermore, as per the parent project, the final list of sub-projects will be informed by a bottom-up citizen engagement process with equal male and female representation.

[14] This Chapter is based on the Project description in the Project Appraisal Document (PAD) dated 10 April 2021 that was shared by the World Bank. It is not the final version.

[15] i) the ability to address the unmet needs in targeted cities; (ii) the impact on COVID-19 response; (iii) the potential to build resilience to urban flooding; (iv) feasibility (considering access to goods and supplies, conflict, capacities) and the potential for integration with other activities; (v) potential for local job creation; and (vi) potential positive impact on highly stressed communities.

(a) *Sub-Component 1.1: Tertiary Municipal Services and Solid Waste Management.* The AF will follow the parent project and finance the same type of activities while expanding to additional cities. Activities will focus on labor-intensive sub-projects which proactively reduce environmental health risks and mitigate flooding in urban areas in response to increasing occurrences of flash floods and heavy rainfall related to climate change. These are small-scale works which include rehabilitation of existing drainage channels and neighborhood sanitation infrastructure, as well as solid waste management initiatives to improve the cleanliness of the city and remove potential blockages in drainage channels. Spatially targeted investments in neighborhoods that contribute to climate change adaptation and mitigation and protect dense population and cultural heritage assets, are also included under this sub-component. This includes rehabilitation of local parks and green spaces to better manage stormwater runoff, store flood water upstream, and help reduce the urban heat island effect. Local runoff management through stone paving of neighborhood streets and flood channel improvement are also included.

(b) *Sub-Component 1.2: Urban Water and Sanitation* aims to restore access to clean water and sanitation service delivery at the city level and supports the response to the COVID-19 pandemic, and mitigating the health risks due to extreme weather: (i) replacement of critical assets such as pumps, generators, water treatments units, related facilities and spare parts; (ii) rehabilitation of water and sanitation networks, water tanks, existing wells, and wastewater treatment plants; and (iii) service delivery maintenance support at the city level. Solar energy will also be used to operate key water facilities, providing safe and clear water, with lower emissions. The WASH investments will significantly improve the quality of women and girls' lives[16], and are proposed as a focal point for the ABA in the cities to ensure continuity and sustainability of services.

(c) *Sub-Component 1.3: Urban Roads* will continue to improve access and mobility within the target cities through the rehabilitation and repair of selected intra-urban roads, selected major entrances and main streets in these cities[17]. Expanding the flood capacity enhancement of roads which support drainage functions in old town areas are also proposed under this AF. All rehabilitation works will consider the climate risks that the roads are exposed to and will adopt better resilience principles.

(d) *Subcomponent 1.4: Energy for Critical Services.* This sub-component, just as its parent will restore electricity supply to hospitals, clinics, and other medical facilities. It will be closely coordinated with relevant UN agencies, local partners, and Sub-component 1.2 (which restores electricity for critical water and wastewater assets). To contribute to climate change mitigation, renewable and clean power generation will be encouraged as far as possible.

18. **Expansion of Component 2 (US$10 million, New total: US$ 20 million).** This sub-component will continue to support the same elements as the parent project. Nevertheless, the AF is expected to have a greater focus on capacity building activities.

a. *Sub-Component 2.1 Project Implementation and Management Support*. Since the PIU is already in place in country, no major revisions are expected to this subcomponent, with the exception of the required scale up of staff related to project management, procurement, FM and safeguards supervision.

[16] They most likely have higher "occupational exposure" through greater amount of household work. Damaged water and sanitation infrastructure has had a particularly heavy burden on women, who spend three to six hours a day fetching water in some parts of Yemen, with children (especially girls) reportedly missing school to help their mothers. The World Health Organization (2017) have also found that of acute watery diarrhea (AWD) and cholera cases deaths, 49% were women, and 34% were children under five

[17] This includes spot and pothole repairs, crack sealing, patch works, asphalt resurfacing, road safety improvement works and intersection rehabilitation.

b. *Sub-Component 2.2: Enhanced Capacity Building*. The proposed AF will build and broaden the scope of the capacity building elements of the parent project. In addition, this AF will provide training, capacity building and technical support to the national and local institutions responsible for urban planning, spatial planning and municipal planning. This is to meet the request from the Yemeni local partners to help with spatial planning for Yemeni cities, to support adaptation to climate change, investigate low carbon development opportunities for local economic development, avoid city expansion into dangerous and high-risk locations, and help deliver safe and affordable serviced land to support population increases.

c. *Sub-Component 2.3: Third Party Monitoring***.** The same approach to TPM will be maintained. It is proposed to expand the scope of the existing TPM agent for the parent project to account for the increase in activities.

19. **The Contingent Emergency Response Component (CERC) (component 3) (US$0, New total US$ 0)** will also remain as part of the project design to allow for emergency response when an eligible disaster arises as per the parent project.

E. Extension of the closing date

20. The project closing date and the grant closing date will be extended by one year to December 31, 2024.

F. Implementation Arrangements

21. **Project implementation arrangements will not change.** The proposed project is an emergency operation processed under OP 2.30 and IPF Policy and Directive paragraph 12 'Situations of Urgent Need or Capacity Constraints'. The proposed project will be implemented by UNOPS, which will act as the non-sovereign recipient of IDA funds and alternative implementation agency on an exceptional basis under the Financial Management Framework Agreement (FMFA) between the World Bank and UN agencies. The financial management arrangements will be governed by the FMFA, which provides for the use of the UN's Financial Regulations. UNOPS will follow its own procurement procedures as Alternative Procurement Arrangements (APA) allowed by the World Bank's Procurement Framework Policy Section III.F.

22. **Local Partners.** UNOPS will work with the same partners[18] as with the parent through project cooperation agreements.

23. **Theory of Change.** Since there are no significant changes to the project design or strategic approach, the Theory of Change of the proposed AF will remain the same as that of the parent.

2.1 Project Beneficiaries

13. The Project was initially expected to reach approximately 1.0 million beneficiaries. With the additional financing to the parent project, the project is now expected to reach 3 million beneficiaries who include the residents and IDPs of cities where infrastructure investments are being implemented, where urban services are restored, and where the capacity of local institutions is being restored. The cities included in the project represent more than 60% of the urban pre-crisis population, and more than 20% of the total country pre-crisis population.

[18] Public Works Project (PWP), Road Maintenance Fund Implementation Unit (RMF-IU), Cleaning Funds, and Urban Water Project Management Unit (UW-PMU).

14. Of the above beneficiaries with access to urban services and assets restored, a subset of approximately 900,000 beneficiaries will be identified who are benefitting from enhanced resilience through interventions in the WASH, transport, and energy sectors in the same cities. The beneficiaries will include new beneficiaries of new interventions in the previous targeted 11 cities in addition to the beneficiaries of interventions of the new added 4 cities, where the population of the 15 targeted cities is approximately reaching 10 million inhabitants.

Chapter 3.
Institutional and Implementation Arrangements

15. The Project is an emergency operation processed under OP 2.30 and OP 10.00 paragraph 12. It uses UNOPS as the recipient of IDA funds and alternative implementation agency on an exceptional basis under the Financial Management Framework Agreement (FMFA) between the World Bank and UN agencies. The financial management arrangements will be governed by the FMFA, which provides for the use of the UN's Financial Regulations. UNOPS will follow its own procurement procedures as Alternative Procurement Arrangements allowed by the World Bank's Procurement Framework Policy Section III.F.

16. The project was designed to complement existing WBG emergency operations in Yemen, and to become an integral part of the World Bank emergency response for Yemen. The project also complements the Yemen Emergency Crisis Response Project (ECRP: P159053) that focuses on improving livelihoods, infrastructure, and services primarily in rural areas. Moreover, the project will coordinate closely with the proposed Yemen EHNP Fourth Additional Financing (P175532), by complementing the infrastructure-heavy approach of the EHNP in the water and sanitation sector with targeted small- and medium-scale investments that aim to restore WWTPs at the city level.

17. The Project is designed to work directly with independent local institutions, such as PWP, RMF-IU, UW-PMU, as implementers for the benefit of local communities and local service providers such as Local Water and Sanitation Corporations. Line Ministries (Central Government) in Sana'a or in Aden will not play a direct role in the design or the implementation of project activities.

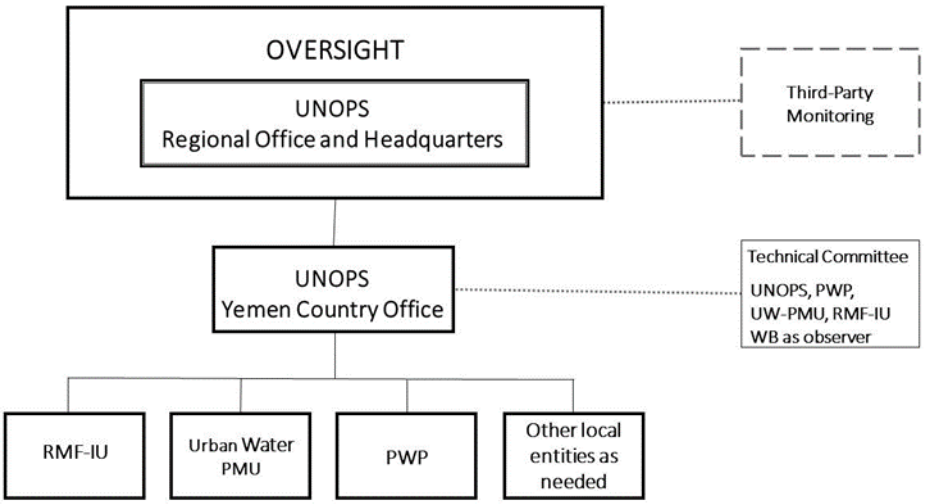
3.1 UNOPS

18. The project will be implemented by UNOPS through direct implementation as well as project cooperation agreements between UNOPS and three local Implementing Partners: (i) the Public Works Project (PWP); (ii) the Road Maintenance Fund Implementation Unit (RMF-IU) (RMF-IU), and; (iii) Urban Water Project Management Unit (UW-PMU). UNOPS will: (a) take responsibility for project implementation; (b) monitor the project targets and results in coordination with the local partners; (c) handle relevant procurement, financial management, and disbursement management including the preparation of withdrawal applications under the project; and (d) ensure that all reporting requirements for IDA are met per the Project Financing Agreement. Figure 2 below describes the project governance and management structure to be put in place under the project.

19. The Bank is currently exploring partnership modalities to implement Subcomponent 2.2. This subcomponent will be implemented by an experienced partner active in the field and with presence on the ground. This modality could involve subcontracting by UNOPS or direct engagement as a recipient of IDA funding. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)[19] is being considered as the strongest candidate to implement such activities because of: i) their track record in delivering effective capacity building programs in Yemen, in particular in the WASH sector which will be prioritized under this operation to help address the flood and COVID-19 emergencies; and ii) their presence in Yemen and ability to travel and reach cities in the North and South of the country.

[19] This is an direct quote from the PAD. Because of the uncertainty regarding its role, the ESMF could not assess GIZ's environmental and social risk management capacity in Yemen.

Figure 1. Project Governance and Management Structure



20. The UNOPS office in Sana'a hosts a project management and implementation support team consisting of international and national staff: project manager, procurement specialists, finance specialists, an Environmental and Social Safeguards Officer (ESSO), a Gender Mainstreaming Officer, a Health and Safety Officer, a logistics officer, and an administrative officer. Additional personnel may be recruited to by UNOPS and its implementing partners to effectively manage the additional financing to the parent project. This office has already successfully implemented the YIUSEP and has a significant presence in Yemen. UNOPS has a regional office and hub in Amman, Jordan, that provides support and advice as needed. The hub also hosts a Regional Oversight and Management Advisor that oversees the operations in the region and provides management advice to the Regional Director. The Regional Office is also supported by the UNOPS headquarters based in Copenhagen, Denmark, which provides global corporate oversight and program support.

3.1.1 TPM

21. UNOPS has already recruited a Third-Party Monitoring (TPM) agent (composed of international audit firm and an experienced technical firm) to undertake independent results verification of subprojects funded under the project, on the basis of ToRs developed by UNOPS and approved by the World Bank. With the additional financing to the parent project, UNOPS will need to amend the TPM contract to account for the increased number of subprojects in target cities. The TPM will report to the WB and to UNOPS on the Project's technical achievements and the environmental and social performance of the Project.

3.1.2 ESMF Implementation

22. UNOPS is responsible for the overall implementation of the ESMF. More specifically UNOPS will ensure that:

- site specific ESIAs and ESMPs are prepared in a timely manner, as needed.
- tender documents and construction contracts include effective and enforceable contractual clauses to manage environmental and social risks
- no activities start before the required environmental and social risk management measures are in place
- the environmental and social performance of contractors at all times meets the Project's environmental and social requirements.

23. The ESSO will be supported by a part-time international expert, who will assist in the management, monitoring and reporting of environmental and social risk management aspects

throughout project implementation.

24. In addition, the Implementing Partners (PWP, RMF-IU, UW-PMU) will each designate an ESSO and a Health and Safety Officer, who will monitor and control the on-site environmental and social performance at subproject level.

3.2 Implementing Partners

25. While retaining overall responsibility for implementation, fiduciary and safeguards aspects of the Project, UNOPS will work with local partners for the implementation of Project activities. These local partners have been created through World Bank and other international donor interventions, have years of experience in implementing IDA investments, and have a strong implementation record under YIUSEP. During the crisis, they have continued to support the implementation of donor-funded projects, leveraging their sector-specific knowledge, relationships with local entities, and on-the-ground experience. They have a good track record of successfully implementing safeguards requirements, in compliance with World Bank policies. Despite the conflict, these project management units have improved their safeguards capacities through YIUSEP and several capacity building and training programs. Given that they have not yet implemented projects under the ESF, UNOPS will ensure appropriate training, as indicated in Section 9.5 of this ESMF.

3.2.1 Public Works Project (PWP)

26. The World Bank and other regional, bilateral, and international development agencies have funded and supported PWP since its inception in 1996. Between 1996 and 2015, PWP implemented 5,149 projects in about 11,200 villages and 1,300 urban neighborhoods, totaling an estimated US$648 million. PWP has played a significant role in improving poor communities' access to education, water, sanitation, roads, and irrigation, among other services. Bank experience with PWP has shown that the organization has a good reputation for fiduciary due diligence, effective delivery of results and political neutrality. PWP, currently, is playing an important implementation role for implementing the Tertiary Municipal Services subcomponent of the YIUSEP. Its performance has been very satisfactory. PWP is headquartered in Sana'a with nine regional offices and a current core staff of 53.

3.2.2 Road Maintenance Fund Implementation Unit (RMF-IU)

27. The RMF-IU established as a special implementation unit responsible for most aspects of foreign-funded maintenance projects, in particular the fiduciary and safeguards as well as regular monitoring and reporting. Over the years, the RMF-IU has gained considerable experience in procurement and contract management. Created in 2005, it had implemented several road maintenance and road rehabilitation contracts with funding from the road maintenance budget as well as from various donors, including the World Bank. For these contracts, the unit had managed all procurement activities for goods, works and consulting services. It had accumulated extensive experience in preparing bids, requests for proposals from consultants, and tender documents. Currently, the RMF-IU is involved in implementing the Urban Roads subcomponent of the YIUSEP. It is headquartered in Sana'a with a small office in Aden. Prior to the crisis, it maintained four regional offices in Taiz, Ibb, Lahj and Al Hodeidah.

3.2.3 Urban Water Project Management Unit (UW-PMU)

28. The UW-PMU has implemented several water supply and sanitation projects in Yemen. It was established in 2002 as a financially and administratively independent PMU to manage all activities related to the implementation of the World Bank Urban Water Supply and Sanitation Adaptable Program Loan (P057602). During the implementation of this project, the UW-PMU attracted funds from various donors. It had implemented projects including 1,000 km of water supply networks, 250 km of sewer lines, reservoirs with a total capacity of 40,000 m^3, three wastewater treatment plants, drilling and construction of 65 production and investigation boreholes and several emergency rehabilitations works. The UW-PMU is the local Implementing Partner for the Urban Water and Sanitation subcomponent of the YIUSEP. It is based Sana'a and Aden cities and has close working relationships with LCs.

3.3 Other National Stakeholders

3.3.1 Local Water and Sanitation Corporations (LCs)

29. Local Water and Sanitation Corporations (LCs) are decentralized, corporatized and commercialized utilities established under Cabinet Decree 237 of 199, which serve the main cities and secondary towns in a given governorate. By law, LCs' Boards are responsible for all aspects of service development and provision in their area, including design and construction of water supply systems and their subsequent ownership, operation and monitoring, as well as tariff setting.

30. Prior to the escalation of the conflict, 23 LCs and 10 annexed autonomous utilities (AUs) had been established, and their service areas covered about 50 percent of the country's urban population, with the rest covered by private tankers. LCs provide services to large cities whereas AUs are utilities in secondary towns of the same governorate.

31. UNOPS will ensure that implementation activities under subcomponent 1.2 shall be in full cooperation and collaboration with respective LCs. For this purpose, the concerned LCs will sign partnership agreement with UNOPS

3.3.2 Local Councils

32. Local councils are the administrative body which have been elected by the local community for each governorate/ directorate. They cooperate with governmental offices in implementing, operating and supervision of projects. They approach donors for financing the demanded projects and facilitate handing over the different important infrastructure services projects to the related ministry office.

3.3.3 Local Cleaning Funds

33. Local Cleaning Funds are independent local entities for each governorate that have operational and maintenance procedures for the collection, separation, transport of solid waste, and for the management of landfills. They fall under local authorities (sub-national authorities) and were created a result of decentralization efforts following the Yemeni Local Authority Law of 2000. They are entitled to and usually receive certain local revenues for their operation.

34. Local Cleaning Funds are expected to have clear policies and procedures, but their capacity to implement these policies and procedures varies greatly between governorates and depends on the level of local funding they receive. They perform best in large cities such as Sana'a and Aden.

3.3.4 Civil Society Organizations (CSOs)

35. There are over 12,000 registered CSOs in Yemen, but only a few hundred CSOs have the capacity and resources to fulfill their mandates. As a consequence, UNOPS will be selective in engaging CSOs with the Project activities.

36. Nonetheless, under subcomponent 2.2 of the Project and starting with the second year of implementation, the Project will expand to include additional activities that will be based on community priorities identified through citizen engagement mechanisms and the community validation of investment options. UNOPS will implement these activities by engaging Civil Society Organizations or other relevant technical experts, as needed.

3.4 The World Bank

37. The World Bank will closely coordinate with UNOPS for the implementation and overall oversight of the of site-specific environmental and social risk management instruments, e.g., ESMPs and RAPs to ensure that their scope and quality are satisfactory to the Bank.

38. The World Bank will also monitor the implementation of the different prepared instruments through regular supervision missions (which will include an environmental and/or social specialist) during which document reviews, and site visits and spot-checks by TPM will be conducted as needed.

3.5 Project Technical Coordination Committee (TCC)

39. To facilitate the investment planning process and ensure cross-sectoral coordination, UNOPS will chair a TC composed of representatives from the local partners (PWP, RMF-IU and UW-PMU). Other members will be engaged during the project, if needed. The World Bank will join the TC as an observer. The TC will play an advisory role and will meet quarterly and on an as needed basis. Its main tasks will include a) conducting a periodic review of project implementation progress and providing recommendations for improvement, as necessary; b) reviewing proposed sub-projects for the yearly investment plans and recommending a shortlist; and c) strategically communicating the project and its investments to other donors and stakeholders.

Chapter 4.
Legal and Regulatory Framework

40. This ESMF is prepared to:

(i) meet the requirements of the World Bank's Environment and Social Standards (ESS), including the World Bank Group Environment, Health and Safety (EHS) Guidelines, and other guidelines and guidance
(ii) comply with national environmental and social laws and regulations.

4.1 World Bank Requirements

4.1.1 World Bank Environmental and Social Framework

41. The World Bank Environmental and Social Framework (ESF) sets out the World Bank's Commitment to sustainable development. It includes a set of ten Environmental and Social Standards that establish the mandatory requirements that the Borrower and the projects must meet through the project life cycle:

- **Environmental and Social Standard 1.** Assessment and Management of Environmental and Social Risks and Impacts
- **Environmental and Social Standard 2.** Labor and Working Conditions
- **Environmental and Social Standard 3.** Resource Efficiency and Pollution Prevention and Management
- **Environmental and Social Standard 4.** Community Health and Safety
- **Environmental and Social Standard 5.** Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- **Environmental and Social Standard 6.** Biodiversity Conservation and Sustainable Management of Living Natural Resources
- **Environmental and Social Standard 7.** Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities
- **Environmental and Social Standard 8.** Cultural Heritage
- **Environmental and Social Standard 9.** Financial Intermediaries
- **Environmental and Social Standard 10.** Stakeholder Engagement and Information Disclosure.

42. All of the above standards are relevant to the Project, except for ESS7 and ESS9. The standards establish objectives and requirements to avoid, minimize, reduce and mitigate environmental and social risks and impacts, and to compensate for or offset any residual impacts. In the context of YIUSEP II, UNOPS shall address the Project's environmental and social risks as part of the environmental and social assessment process, in accordance with ESS1. ESS2–10 set out the obligations of UNOPS in identifying and addressing environmental and social risks and impacts that may require particular attention.

4.1.2 Environment, Health and Safety Guidelines

43. The ESF also requires all projects to apply the relevant requirements of the World Bank Group Environmental, Health and Safety Guidelines (EHSGs)[20]. These are technical reference documents, with general and industry specific examples of Good International Industry Practice (GIIP). They define acceptable pollution prevention and abatement measures and emission levels in World Bank financed

[20] A complete list of industry-sector guidelines can be found at: www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines.

projects.

44. The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them.

45. The application of the Guidelines to existing facilities may involve the establishment of site-specific targets with an appropriate timetable for achieving them. The environmental assessment process may recommend alternative (higher or lower) levels or measures, which, if acceptable to the World Bank, become project - or site-specific requirements.

46. If less stringent levels or measures than those provided in the EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent.

47. In the context of YIUSEP II, UNOPS will use the General EHS Guidelines[21], the Water and Sanitation EHS Guidelines[22], and the Waste Management Facilities EHS Guidelines. The General Guidelines cover environmental, occupational health and safety, and community health and safety related risks. Section 1.6 of the General Guidelines covers Waste Management

4.1.3 Environmental and Social Risk Classification

48. The World Bank classifies all projects into one of four classifications: High Risk, Substantial Risk, Moderate Risk or Low Risk. This classification takes into account relevant issues, such as the type, location, sensitivity, and scale of the project; the nature and magnitude of the potential environmental and social risks and impacts; and the capacity and commitment of the Borrower (including any other entity responsible for the implementation of the project) to manage the environmental and social risks and impacts in a manner consistent with the ESSs. Other areas of risk may also be relevant to the delivery of environmental and social mitigation measures and outcomes, depending on the specific project and the context in which it is being developed. These could include legal and institutional considerations; the nature of the mitigation and technology being proposed; governance structures and legislation; and considerations relating to stability, conflict or security.

49. The World Bank has classified the environmental and social risks of YIUSEP II as 'substantial' as the project will involve physical interventions to be implemented in urban cities, including restoration/rehabilitation of some services such as the replacement of water and sanitation pipes, rehabilitation of urban roads, removal of solid waste and rubble from clogged drains, and the rehabilitation of municipal drainage channels. Although no significant risks and adverse environmental impacts are anticipated; potential minor adverse impacts are expected from works related to earthworks, dust and air emissions, debris, and other solid waste generation and management, social inconveniences and community health and safety due to traffic increase, blocked streets, noise, dust, as well as workers health and safety It will review the risk classification on a regular basis during implementation, and will change the classification where necessary, to ensure that it continues to be appropriate. Any change to the classification will be disclosed on the World Bank's website.

4.1.4 Environmental and Social Management Framework

50. The ESMF examines the risks and impacts when a project consists of series of subprojects, and their risks and impacts cannot be determined until the subproject details have been identified during

[21] https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES)

[22] (https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES

implementation. The ESMF:

- sets out the principles, rules, guidelines, and procedures to assess the environmental and social risks and impacts of subprojects
- contains measures and plans to reduce, mitigate and/or offset adverse risks and impacts, provisions for estimating and budgeting the costs of such measures, and information on the agency or agencies responsible for addressing project risks and impacts, including on its capacity to manage environmental and social risks and impacts
- includes adequate information on the area in which subprojects are expected to be sited, including any potential environmental and social vulnerabilities of the area; and on the potential impacts that may occur and mitigation measures that might be expected to be used.

51. In the context of YIUSEP II and given the conflict circumstances, the World Bank will review and approve all instruments prepared under the ESMF.

4.1.5 Labor Management Procedures

52. Under ESS2 on Labor and Working Conditions, UNOPS is required to develop labor management procedures (LMP) for YIUSEP II. The LMP was prepared and updated as a standalone document according to the established template.

53. The purpose of the LMP is to facilitate planning and implementation of the project. The LMP identifies the main labor requirements and risks associated with the Project, and help UNOPS determine the resources necessary to address Project labor issues. The LMP is a living document, which is initiated early in Project preparation, and is reviewed and updated throughout the development and implementation of the project.

54. A concise and up to date LMP will enable different project-related parties, for example, staff of the project implementing unit, contractors and sub-contractors and project workers, to have a clear understanding of what is required on a specific labor issue. The level of detail contained in the LMP will depend on the type of project and information available. Where relevant information is not available, this should be noted and the LMP should be updated as soon as possible.

55. Primary supply workers would be engaged by UNOPS to supply parts and equipment on an on-going basis, as well as construction materials. Procurement documents will include provisions requiring contractors and their suppliers to meet labor requirements set out in ESS2, as relevant to the range of activities they are implementing. These procurement documents are subject to World Bank review

56. In preparing and updating the LMP, Borrowers refer to the requirements of national law and ESS2 and the Guidance Note to ESS2 (GN).

4.1.6 Stakeholder Engagement Plan

57. In the context of YIUSEP II and its additional financing, UNOPS, in consultation with the World Bank, have developed, updated, and will implement a Stakeholder Engagement Plan (SEP) proportionate to the nature and scale of the project and its potential risks and impacts. The SEP must:

- Describe the timing and methods of engagement with stakeholders throughout the life cycle of the project, distinguishing between project-affected parties and other interested parties.
- Describe the range and timing of information to be communicated to project-affected parties and other interested parties, as well as the type of information to be sought from them.
- Take into account the main characteristics and interests of the stakeholders, and the different levels of engagement and consultation that will be appropriate for different stakeholders.
- Set out how communication with stakeholders will be handled throughout project preparation and implementation.
- Describe the measures that will be used to remove obstacles to participation, and how the views of differently affected groups will be captured. Where applicable, the SEP will include differentiated measures to allow the effective participation of those identified as disadvantaged or vulnerable. Dedicated approaches and an increased level of resources may be needed for

communication with such differently affected groups so that they can obtain the information they need regarding the issues that will potentially affect them.

58. When the stakeholder engagement with local individuals and communities depends substantially on community representatives, UNOPS will make reasonable efforts to verify that such persons do, in fact, represent the views of such individuals and communities, and that they are facilitating the communication process in an appropriate manner.

59. The SEP for YIUSEP II is a standalone document that is disclosed separately.

4.1.7 Grievance Mechanism

60. ESS10 requires that UNOPS propose and implement a grievance mechanism to receive and facilitate resolution of concerns and grievances of project-affected parties related to the environmental and social performance of the project in a timely manner.

61. The grievance mechanism required by ESS10 must *be proportionate to the potential risks and impacts of the project and will be accessible and inclusive. Where feasible and suitable for the project, the grievance mechanism will utilize existing formal or informal grievance mechanisms, supplemented as needed with project-specific arrangements.*

- *The grievance mechanism is expected to address concerns promptly and effectively, in a transparent manner that is culturally appropriate and readily accessible to all project-affected parties, at no cost and without retribution. The mechanism, process or procedure will not prevent access to judicial or administrative remedies. The Borrower will inform the project-affected parties about the grievance process in the course of its community engagement activities, and will make publicly available a record documenting the responses to all grievances received*
- *Handling of grievances will be done in a culturally appropriate manner and be discreet, objective, sensitive and responsive to the needs and concerns of the project-affected parties. The mechanism will also allow for anonymous complaints to be raised and addressed.*

4.1.8 Environmental and Social Commitment Plan

62. In the context of YIUSEP II and its additional financing, UNOPS developed, updated and will implement an Environmental and Social Commitment Plan (ESCP), which sets out the measures and actions required for the project to achieve compliance with the ESSs. The ESCP forms part of the legal agreement.

63. The ESCP took into account the findings of the environmental and social assessment, the World Bank's environmental and social due diligence, and the results of consultations with stakeholders. It is an accurate summary of the material measures and actions required to avoid, minimize, reduce or otherwise mitigate the potential environmental and social risks and impacts of the project. A completion date for each action is specified in the ESCP.

64. UNOPS will diligently implement the measures and actions identified in the ESCP in accordance with the timeframes specified, and will review the status of implementation of the ESCP as part of its monitoring and reporting.

65. UNOPS will notify the World Bank promptly of any proposed changes to the scope, design, implementation or operation of the project that are likely to cause an adverse change in the environmental or social risks or impacts of the project. The updated ESCP will be disclosed.

4.1.9 Information Disclosure

66. The World Bank requires that all documents provided to it by UNOPS meet the requirements of the World Bank Policy on Access to Information.

67. The World Bank will require UNOPS to provide sufficient information about the potential risks and impacts of the project for UNOPS' consultations with its stakeholders. Such information will be disclosed in a timely manner, in an accessible place, and in a form and language understandable to

project-affected parties and other interested parties as set out in ESS10, so they can provide meaningful input into project design and mitigation measures.

The World Bank will disclose documentation relating to the environmental and social risks and impacts of YIUSEP II with its additional financing prior to project appraisal. This documentation will reflect the environmental and social assessment of the project, and be provided in draft or final form (if available). The documentation will address, in an adequate manner, the key risks and impacts of the project, and will provide sufficient detail to inform stakeholder engagement and World Bank decision making. Final or updated documentation will be disclosed when available.

68. UNOPS will ensure to have on project sites visible signboards in place that indicate the nature of the project, its beginning and ending date as well as the parties to contact for information or complaints.

4.1.10 Contingent Emergency Response Components (CERC)[23]

69. The World Bank requires all activities financed through the CERC to meet ESF requirements, keeping in mind that this requirement only applies once the CERC is triggered. CERC activities will rely as much as possible on the Project's environmental and social instruments.

70. If the CERC is activated, the World Bank will advise UNOPS on the following elements:

- Confirming which activities can proceed on the basis of the provisions of the CERC-ESMF, with no additional environmental or social assessment, and which ones require assessment (and at what level) prior to being initiated.
- Rapidly assessing the environmental and social baseline of the planned CERC activities and locations based on readily available information.
- Determining the sequencing and implementation plan for:
    - Mobilizing technical assistance and funding to prepare any additional safeguard instruments, e.g., Environmental and Social Management Plan, Resettlement Action Plan, etc.
    - Preparing the safeguards instruments and carrying out their Bank review, revisions, clearance, and approval.
    - Consultations and disclosure.
    - Establishing roles and responsibilities for safeguards implementation, and monitoring.
    - Estimating the costs for safeguards preparation and implementation.

71. In the event that CERC activities exceed the scope of the original PDO and thus this ESMF, UNOPS might be called on to prepare a supplemental CERC-ESMF as part of an eventual Project restructuring. The CERC-ESMF would include a screening process for the potential activities, the institutional arrangements for environmental and social due diligence and monitoring, any needed capacity-building measures, and generic guidance on emergency small-scale civil works. It would also indicate which kinds of emergency response actions can proceed with no additional environmental or social assessment, and which ones would require assessment (and at what level) prior to being initiated. It may also identify trade-offs, where required short-term responses could create longer-term risks that need to be managed.

72. Given the uncertainties and rapid changes inherent in emergency situations and responses, the CERC-ESMF would be built around a flexible, "adaptive management" approach, i.e., with emphasis on monitoring of key outcomes and mechanisms to feed information rapidly and effectively into decision- making and management.

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[23] This section is based on Paragraphs 17 of the World Bank Guidance on Contingent Emergency Response Components (CERC) (16 October 2017)

[30] https://unemg.org/wp-content/uploads/2019/07/FINAL_Model_Approach_ES-Standards-1.pdf

[31] The 6 UNOPS Environmental Management Guidelines are:
GEM 01 Generic Register of Environmental Impacts https://docs.google.com/document/d/1qYIPFNsi6ghZloYv1aaSA5gBSQ5KCWPRqAm-LOSNLuU/edit
GEM 02 Waste Management and Hazardous Substances https://docs.google.com/document/d/1qYIPFNsi6ghZloYv1aaSA5gBSQ5KCWPRqAm-LOSNLuU/edit

73. UNOPS will use the same institutional framework and the same screening process and criteria for the CERC as for the other Project components.

4.2 UNOPS Requirements

74. UNOPS is in the process of developing a comprehensive set of environmental and social safeguards guidelines that will be applicable to all of the Projects it implements. These safeguards guidelines will be based on the Model Approach to Environmental and Social Standards for UN Programming[24]. The Model Approach represents a key step in moving towards a common approach among UN entities for addressing environmental and social standards for UN programming.

75. UNOPS has already adopted a policy on Health & Safety and Social & Environmental (HSSE) Management, and developed General Environmental Management (GEM) Guidelines[25], General Health and Safety (GHS) Guidelines[26], and accompanying templates. It has also set up an HSSE Unit based in Copenhagen.

76. When applied to contractors, the GEM and GHS can provide clear and comprehensive instructions to contractors, particularly regarding work safety issues. The templates accompanying the guidelines are practical and can easily be operationalized. Overall, the guidelines are more than equivalent with the EHS Guidelines where they overlap.

77. The available UNOPS guidelines do not yet cover certain critical issues, such as Labor Management, Sexual Exploitation and Sexual Harassment (SE/SH), Community Health and Safety, and Stakeholder Engagement and Disclosure. They are also not yet publicly available. In addition, although the UNOPS guidelines are referenced in the bidding document for the contracts that UNOPS manages, they are generally not included as technical clauses of contracts. As a consequence, UNOPS will default for the purpose of this Project to a set of Environment, Social (including labor), health, and safety requirements derived from World Bank requirements and guidelines (see Annex 5) that UNOPS will include as technical clauses in the contracts they prepare for this Project. The option is available for UNOPS to use some of their procedures at the operational level, where they go beyond Bank requirements.

4.3 National Requirements and Policies

78. The Republic of Yemen (RoY) has drafted policies, developed sectoral legislation and

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[24] https://unemg.org/wp-content/uploads/2019/07/FINAL_Model_Approach_ES-Standards-1.pdf

[25] The 6 UNOPS Environmental Management Guidelines are:

GEM 01	Generic Register of Environmental Impacts
GEM 02	Waste Management and Hazardous Substances
GEM 03	Protection of Water
GEM 04	Wastewater
GEM 05	Borrow Pit Management
GEM 06	Preservation of Historical, Archeological and Cultural Remains

[26] The 14 UNOPS Health and Safety Guidelines are:

GHS 01	General Site Rules
GHS 02	Lifting
GHS 03	Electrics
GHS 04	Excavation
GHS 05	Fire Safety
GHS 06	Noise
GHS 07	Scaffold
GHS 08	Underground Services
GHS 09	Working at Heights
GHS 10	Significant Accident or Incident Response
GHS 11	Confined Space
GHS 12	Site Establishment
GHS 13	Welfare Facilities
GHS 14	Construction Camp

implementation procedures, established institutions responsible for environmental management, and joined international conventions. The ongoing conflict has considerably weakened the capacity of the assigned institutions to implement policies and existing laws. As a consequence, the use of Yemen's environmental and social management framework is not considered for the project. Particularly for ESMF and ESMPs approval.

4.3.1 National Environmental Action Plan

79. The foundational document for environmental management in Yemen is the National Environmental Action Plan (NEAP) that the ROY prepared in 1995, with the support of the UNDP and the World Bank. The NEAP defines priority actions regarding key environmental issues such as water resources, land resources, natural habitats, and waste management.

4.3.2 Environmental Protection Law

80. The Environmental Protection Law (Law 26/1995; EPL), was enacted in 1995 in the wake of the NEAP. It constitutes the framework environmental legislation for Yemen, including provisions for environmental protection, the issuance of permits, and the requirement to prepare Environmental Impact Assessments (EIAs). The provisions of the law are implemented through By-Law 148/000.

81. The law is also designed to: (i) incorporate environmental considerations in economic development plans at all levels and stages of planning, (ii) protect the national environment from activities practiced beyond national boundaries, and; (iii) implement international commitments ratified by the RoY in relation to environmental protection, pollution control, the conservation of natural resources, and global environmental issues such as the depletion of the ozone layer depletion and climate change.

Environmental Protection Authority[27]

82. The EPL established an Environmental Protection Council (EPC)and granted it power to take all measures necessary to protect and improve the quality of environment and to prevent pollution of the environment. Decree 101/2005 established the Public Environmental Protection Authority (EPA) to replace the EPC and lays down its objectives, tasks and management. The functions assigned to the EPA include:

- preparing and executing appropriate policies/strategies/plans to protect the environment
- conducting environmental surveys
- assessing areas/resources/species to be protected through necessary measures conserving the ecosystem including flora and fauna, wild and marine life as per existing laws and monitoring their application
- developing legislative proposals for environment protection in coordination with other agencies involved
- developing a National Emergency Plan to combat natural disaster and environmental pollution in consultation with the agencies concerned implementing environmental protection law and other relevant laws/regulations
- reviewing EIA studies for public /private sector projects for giving clearance and monitoring their execution
- coordinating relevant programs/activities with national, regional and international agencies and organizations
- recommending necessary laws, regulations and systems to protect the environment, in accordance with regional and international agreements on environmental protection.
- collecting data, assessing and evaluating the status of the environment, and setting up suitable monitoring systems

[27] The information regarding the Environmental Protection Authority is purely indicative, as the EPA will not play any role during Project implementation.

- laying down appropriate standards for protecting the environment from pollution and formulating policy guidelines to combat industrial pollution and protect animal, plant and marine ecology

Environmental Impact Assessments

83. The EPL requires the preparation of EIAs for projects proposed by the public and private sectors. The proponent is responsible to undertake the EIA, but the report may be prepared by the proponent or the competent authority or both. Line ministries and Government bodies commission EIA studies at the request of funding agencies and seek the advice of the EPA.

84. The EPA is responsible for implementing screening procedures, assisting in scoping, evaluation and approval of the Environmental Impact Statement (EIS). However, 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, particularly for project that are not internationally funded.

85. Given the current context, modifications to the EIA procedures are not expected during the project. Current procedures will be taken into account, but there is no expectation at this point that the EPA will review the Project's safeguard instruments.

National Environmental Standards and Specifications

86. The former Environment Protection Council (EPC) issued environmental standards and specifications 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.

87. The EPC has released draft standards for wastewater quality and air quality but a comprehensive set of standards is not yet available. In their place international standards, primarily those of the World Health Organization (WHO) are used.

88. Decree 148/2000 sets permissible limits for pollutants for use by all government bodies (see Annex 2).

4.3.3 Water Law[28]

89. The Water Law (Law 33/2002, updated by Law 41/2006)) regulates water supply and sanitation. The structure of water sector institutions consists of two national-level ministries (MoWE and MAI) and an intermediate-level water authority (NWRA). According to the amended water law and its by-law, the MoWE/NWRA are jointly responsible for organizing and developing water resources. The MAI is responsible for formulating policies and legislation that regulate the use of the irrigation water in line with the national water policies and plans and under the umbrella of the National Water Sector Strategy and the Investment Program (NWSSIP). The MoWE is the lead ministry for the oversight of water resources and water service provision, including in rural areas. The MoWE also supervises local water companies/corporations (public utilities) and all water suppliers (including private) to the domestic and industrial sectors.

90. Each water supply and sanitation Local Corporation has a Decree issued at the date of its establishment that stipulates the provisions and rules to govern and manage the LC, as well as the functions, tasks and responsibilities of interrelated public bodies. Thus, each of the five cities targeted by the Project (Sana'a, Aden, Taiz, Ibb, and Mukalla) has its own decree. Each LC provides water supply and sanitation service to all customer groups in a specified area.

Water Supply

91. Under Article 54 or the updated Water Law, MoWE has *"the authority to protect the water*

[28] Based on the National Water Sector Strategy and Investment Program (original NWSSIP, 2004), and Dire Straits: The Crisis Surrounding Poverty, Conflict, and Water in the Republic of Yemen (World Bank, 2017)

resources from contamination, preserve its standard quality, and prohibit activities that lead to its contamination or deterioration of its standards and combat cases of emergency contamination in cooperation with the relevant and competent authorities."

92. The Water Law also *"provides a legal basis for controlling groundwater abstractions. It includes measures like licensing and registration requirements for wells and rigs, and more strict control regimes in water stressed catchments. The Water Law also supports decentralization in the form of encouraging the formation of basin committees and requires working closely with Local Councils in implementation of water management measures*." The government has worked to put in place a system of water rights, and to enforce contracts involving voluntary transfers of such rights between consenting parties. The NWRA (through its branch offices) is authorized to implement water laws and regulation and to allocate surface and groundwater resources to the most compelling needs.

Wastewater

93. The Water Law specifies that treated wastewater shall not be disposed of or allowed to be used except after coordination with the MoWE and the relevant authorities, and after consultation and coordination with its users and those who are affected by its use. Article

94. Article 54 of the Water Law indicates that the concerned competent agencies shall, in coordination with the MoWE, issue licenses for; (i) the disposal of waste, sludge, waste water, oils and specify locations and methods of their disposal and construction of their facilities; (ii) reuse of treated water sewerage effluents according to the approved standards and specifications, and; (iv) construction of sewerage networks and desalination plants according to the relevant laws

95. The NWSSIP Update defines acceptable sanitation systems, taking into account that Yemeni topography, and the low flow of waste water can make centralized sewage treatment systems uneconomic.

4.3.4 Resettlement

96. The law most directly relevant to Project resettlement issues is the Public Eminent Domain Law (Law 1/1995), most particularly Articles 12-16 on temporary acquisition, and Articles 21-27 defining provisions for land acquisition. The Yemeni laws and regulatory framework are presented extensively in the Resettlement Framework (RF), which outlines the key issues and procedures for involuntary land acquisition under this Law.

4.3.5 Labor

97. The Labor Law (Law 5/1995) requires employers to address Occupational Health and Safety issues, including ventilation and lighting of workspaces; protection from emissions (gas, dust, etc.) hazards; protection from machine accidents and hazards; provision of gender-specific toilet facilities; provision of safe drinking water for workers; basic firefighting equipment and emergency exits; provision of appropriate personal protection equipment; fair compensation; access to periodic medical examinations; availability of first aid.

98. The Labor Law regulates the rights and wages of workers, their protection, occupational health and safety. In addition, the Social Insurance Law regulates retirement compensation.

Gender

99. The Labor Law states that women are equal to man in all aspects without any discrimination, and that equality should be maintained between women and men workers in recruitment, promotion, wages, training, social insurance. It also regulates work time for pregnant women.

100. Yemen also ratified the Convention on Elimination of all Forms of Discriminations Against Women (CEDAW) in 1984, and prepared a National Strategy for Women Development in 1997, which was updated in 2015. Implementation of CEDAW is delegated to relevant ministries and authorities (Decree 55/2009). Based on amendments proposed by the Women National Committee, 24 laws were amended to ensure building gender balance in accordance with the convention.

ILO Fundamental Conventions

101. Yemen has ratified ILOs eight "fundamental" Conventions, covering subjects that are considered to be fundamental principles and rights at work:

1. Freedom of Association and Protection of the Right to Organize Convention, 1948 (No. 87)
2. Right to Organize and Collective Bargaining Convention, 1949 (No. 98)
3. Forced Labour Convention, 1930 (No. 29) (and its 2014 Protocol)
4. Abolition of Forced Labour Convention, 1957 (No. 105)
5. Minimum Age Convention, 1973 (No. 138)
6. Worst Forms of Child Labour Convention, 1999 (No. 182)
7. Equal Remuneration Convention, 1951 (No. 100)
8. Discrimination (Employment and Occupation) Convention, 1958 (No. 111).

102. Law 7/2001 ratified ILO Convention Number 138 on Minimum Age for Admission to Employment. ILO Convention 182 on the Worst Forms of Child Labor refers to child labor as work that is mentally, physically, socially or morally dangerous and harmful to children; and interferes with their schooling by depriving them of the opportunity to attend school, by obliging them to leave school prematurely; or by requiring them to attempt to combine school attendance with excessively long and heavy work. Nonetheless, drawing a line between "acceptable" forms of work by children and child labor can prove difficult, as it depends on the child's age, the types of work performed, the conditions under which it is performed and national.

4.3.6 International Conventions

103. The RoY is party to a number of international environmental agreements, the most important of which are:

- World Heritage Convention (UNESCO)
- International Convention on Civil Liability for Oil Pollution Damage (CLC)
- The Convention on Biodiversity (CBD)
- The Convention on the Conservation of Migratory Species (CMS)
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- The United Nations Framework Convention on Climate Change (UNFCCC)
- Kyoto Protocol (Yemen is not yet a party to the Paris Climate Agreement)
- The United Nations Convention on Combating Desertification (UNCCD)
- The Environmental Modification Convention (ENMOD)
- The Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and Their Disposal
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat
- Law of the Sea
- The Montreal Protocol on Substances that Deplete the Ozone Layer
- Stockholm Convention on Persistent Organic Pollutants

104. In general, national agencies are not currently in a position to handle the technical complexities and reporting requirements of international agreements. Project activities are not expected to be in breach of any international agreement to which the RoY is a party.

4.4 Comparison between World Bank Requirements and Yemeni Requirements

105. The following table compares World Bank environmental and social requirements with Yemeni Requirements, identifies gaps and suggests recommended actions.

106. Given that the cumulative maximum power rating of the fossil fuel power generation facilities that might be rehabilitated might exceed 3MWh, UNOPS will ensure that the small combustion facilities emissions guidelines[29] are followed, as indicated in Table 7, if the installations operates more than 500 hours

[29] General EHS Guidelines, Small Combustion Facilities Emissions Guidelines

per year, and if their annual capacity utilization exceeds 30 percent.

Table 1. Small Combustion Facilities Emissions Guidelines (3MWth – 50MWth) – (in mg/Nm3 or as indicated)

Combustion Technology / Fuel/ Engine	Particulate Matter (PM)	Sulfur Dioxide (SO2)	Nitrogen Oxides (NOx)	Dry Gas, Excess O2 Content (%)
Gas	N/A	N/A	200 (Spark Ignition) 400 (Dual Fuel) 1,600 (Compression Ignition)	15
Liquid	50 or up to 100 if justified by project specific considerations (e.g., Economic feasibility of using lower ash content fuel, or adding secondary treatment to meet 50, and available environmental capacity of the site)	1.5 percent Sulfur or up to 3.0 percent Sulfur if justified by project specific considerations (e.g., Economic feasibility of using lower S content fuel, or adding secondary treatment to meet levels of using 1.5 percent Sulfur, and available environmental capacity of the site)	If bore size diameter [mm] < 400: 1460 (or up to 1,600 if justified to maintain high energy efficiency.) If bore size diameter [mm] > or = 400: 1,850	15
Turbine				
Natural Gas =3MWth to < 15MWth	N/A	N/A	42 ppm (Electric generation) 100 ppm (Mechanical drive)	15
Natural Gas =15MWth to < 50MWth	N/A	N/A	25 ppm	15
Fuels other than Natural Gas =3MWth to < 15MWth	N/A	0.5 percent Sulfur, or lower percent Sulfur (e.g., 0.2 percent Sulfur) if commercially available without significant excess fuel cost	96 ppm (Electric generation) 150 ppm (Mechanical drive)	15
Fuels other than Natural Gas =15MWth to < 50MWth	N/A	0.5% S or lower % S (0.2% S) if commercially available without significant excess fuel cost	74 ppm	15
Boiler				
Gas	N/A	N/A	320	3
Liquid	50 or up to 150 if justified by environmental assessment	2000	460	3
Solid	50 or up to 150 if justified by environmental assessment	2000	650	6

Notes: -N/A/ - no emissions guideline; Higher performance levels than these in the Table should be applicable to facilities located in urban / industrial areas with degraded airsheds or close to ecologically sensitive areas where more stringent emissions controls may be needed.; MWth is heat input on HHV basis; Solid fuels include biomass; Nm^3 is at one atmosphere pressure, 0□C.; MWth category is to apply to the entire facility consisting of multiple units that are reasonably considered to be emitted from a common stack except for NOx and PM limits for turbines and boilers. Guidelines values apply to facilities operating more than 500 hours per year with an annual capacity utilization factor of more than 30 percent.
Lower emission values may apply if the proposed facility is located in an ecologically sensitive airshed, or an airshed with poor air quality.

Table 2. Comparison of World Bank and Yemeni Environmental and Social Requirements relevant to the Project

World Bank Requirements	*Yemeni Requirements*	*Recommended Action*
ESS1. Environmental Assessment		
Identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs.	The Environment Protection (EPL, 26/1995) requires the preparation of an EIA during the preparation of all projects and the inclusion of mitigation measures in the project's capital and recurrent costs (Cabinet Decree 89/1993). The EIA should describe: (i) proposed project activities, design of activity, the surrounding environment that may be affected, including a land use map of the adjacent areas, the requirement and types and source of energy, raw material and infrastructure services and roads emergency plan and safety, waste disposal etc.; (ii) and (iii) alternatives using less polluted inputs, as well as consideration of the 'no-project' alternative (EPL Article 37 Para (b)). The EIA guidelines require that ESIAs consider the social acceptability or refusal of the local communities to the proposed project, with evidence and record of public consultations and, if it is accepted, should include baseline data, indicators and monitoring plan. It also includes requirements for monitoring, capacity building, verification of monitoring results and findings (EPL Article 60).	National requirements and ESF objectives are aligned, an complement each other. UNOPS will apply both the ESF and national requirements
To adopt a mitigation hierarchy approach to anticipate and avoid risks and impacts; Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels; Once risks and impacts have been minimized or reduced, mitigate; Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.	Yemeni law has no equivalent to the mitigation hierarchy. National law gives priority to the principle of environmental protection and pollution prevention, and not only to the mitigation or compensation of impacts. All new projects must carry out EIAs to prevent adverse impact and must obtain an environmental permit. No project or new structure that could harm, pollute or deteriorate the environment and natural resources is allowed and all new projects should use best available practices for clean production and apply environment protection/pollution prevention measures.	UNOPS will apply the ESF requirements

World Bank Requirements	*Yemeni Requirements*	*Recommended Action*
To adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities resulting from the project.	Included in the EPL (26/1995)	National requirements and ESF objectives are aligned, an complement each other. UNOPS will apply both ESF and national requirements
To utilize national environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate.	The Environmental Protection Council must inform the proposed projects proponents of the screening results within three months from submission of the project proposal and determines the appropriate EA instrument and required studies required to assess potential risks and impacts. The EIA guideline provides the possibility of using regional and international assessment procedures and norms when applicable. If the project is rejected, the rejection note should indicate the basis for the rejection, as well as the relevant sections of the regulatory framework. The EIA guideline also provides the possibility for project proponents to contest any rejection and to appeal to the special court, within a period of 60 days. The court is required to make a final judgment within six months (Chapter 1 Article 3, EPL 26/1995 - By-law 148/2000).	UNOPS will take into account national laws and regulations when applying the ESF requirements
To promote improved environmental and social performance, in ways which recognize and enhance Borrower capacity.	Include in the Environmental Protection Law No. 26/1995.	UNOPS will take into account national laws and regulations when applying the ESF requirements
ESS2. Labor and Working Conditions		
No equivalent in ESS2	To provide every employee with written particulars of employment Included in Yemen Labour Law Number 5/1995, Articles Number 27, 28, 29, 30, 31, 32, 33, 34	Contractors will be required to comply with national legislation when recruiting workers.

World Bank Requirements	Yemeni Requirements	Recommended Action
To promote safety and health at work.	Included in Yemen Labor Law Number 5/1995, Articles 113, 114, 115, 116, 117 and 118, Chapter 9 of the Labor Law (5/1995), Law Number 25/1997 and Law Number 25/2003 address Occupational Health and Safety and work environment in Articles 113 to 118. Chapter 10 covers worker's insurance. Employers are required to provide necessary occupational safety and health conditions, including: ventilation and lighting of workspaces; protection from emissions (gas, dust, etc.) hazards; protection from machine accidents and hazards; provision of gender-specific toilet facilities; provision of safe drinking water for workers; basic firefighting equipment and emergency exits; provision of appropriate personal protection equipment; fair compensation; access to periodic medical examinations; availability of first aid. The competent authority shall ensure the availability of the appropriate work environment and conditions for occupational safety and health. The Ministry of Labor is charged with advising employers in the field of occupational health and safety; organize and implement accident prevention training programs; exchange of technical information; identify and evaluate the means of accident prevention measures; etc. The Minister may establish sub-committees for occupational health and safety in the governorates and in the sectors and industries, which include the relevant bodies. The composition decision shall determine the functions of these committees, their terms of reference and the rules governing their work. Where employers fail to implement labor protection and labor safety regulations, they could receive a one week stop order from the Minister, until the reasons for the breach are explained. The Minister must refer the matter to the competent arbitration committee if the partial suspension is extended or if a total suspension is requested. If the risk is still not removed by the employer, the workers who have stopped working are entitled to full wages.	Each contractor will be required to have an OHS Officer and First Aider. Contractors required to keep logs of incidents and should be reported and investigated regularly. Contractors will do daily toolkit talk, and UNOPS will conduct weekly induction talks to workers and contractors.
To promote the fair treatment, non-discrimination and equal opportunity of project workers.	Included in Yemen Labor Law Number/1995, Articles 5, 42, and 67.	Contractors will be required to comply with national legislation when recruiting workers.

World Bank Requirements	Yemeni Requirements	Recommended Action
To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate.	Included in Yemen Labor Law Number (5/1995), Articles 5, 15, 42, 43, 44, 45, 46, 47a, 47b and 89; the Law for the Organization of Workers' Unions (35/2002); the Law for Social Insurance (26/1991). The Labor Law regulates the rights and wages of workers, their protection, occupational health and safety. In addition, the Social Insurance Law regulates retirement compensation. **Gender** Yemen ratified the Convention on the Elimination of all Forms of Discriminations Against Women (CEDAW) in 1984, and prepared a National Strategy for Women Development in 1997, which was updated in 2015. Implementation of CEDAW is delegated to relevant ministries and authorities (Decree 55/2009). Based on amendments proposed by the Women National Committee, 24 laws were amended to ensure building gender balance in accordance with the convention. The Labor Law (Law 5/1995) states that women are equal to man in all aspects without any discrimination, and that equality should be maintained between women and men workers in recruitment, promotion, wages, training, social insurance. It also regulates work time for pregnant women.	National legislation will be applied. However, the World Bank standards will be enforced where there are gaps. The higher standard between the national legislation and World Bank standards will always prevail in case of uncertainty in applicable requirements.

World Bank Requirements	Yemeni Requirements	Recommended Action
To prevent the use of all forms of forced labor and child labor.	**Forced Labor** Included in Yemen Labor Law Number 5/1995, Articles 55 **Child Labor** Included in Yemen Labor Law Number 5 /1995, Article 49 Yemen has also ratified ILO Convention Number 138 on Minimum Age for Admission to Employment (Law 7/2001). The Convention establishes a minimum age for admission to employment. Yemen has also ratified the ILO Convention 182 on the Worst Forms of Child Labor. It refers to child labor as work that is mentally, physically, socially or morally dangerous and harmful to children; and interferes with their schooling by depriving them of the opportunity to attend school, by obliging them to leave school prematurely; or by requiring them to attempt to combine school attendance with excessively long and heavy work. Drawing a line between "acceptable" forms of work by children and child labor can prove difficult, as it depends on the child's age, the types of work performed, the conditions under which it is performed.	**Forced Labor** Contractors will be required to comply with national legislation and as precautionary measure to conduct an induction and random inspection will be done on a regular basis to ensure compliance **Child Labor** Contractor will be prohibited to employ anyone under the age of 18 years. Monitoring will be done through the National ID system that every employee is required to produce on employment. If a contractor is found to have engaged under age children in the project: - a formal case will be reported and the contract will be terminated.
To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law.	Included in Yemen Labor Law (5/1995) Articles 151 and 152, and the Law for the Organization of Workers' Unions (35/2002)	Contractors must inform workers of their right to organize according to the law.
To provide project workers with accessible means to raise workplace concerns.	Included in Yemen Labor Law (5/1995) Articles 129, 130, 132 and 136.	Contractors will be required to comply with national legislation in this regard. Contractors will be required to have a grievance procedure and inform workers of the same during induction. UNOPS and TPM will require contractors to log worker's grievances in monthly reports
ESS3. Resource Efficiency and Pollution Prevention and Management		
To promote the sustainable use of resources, including energy, water and raw materials.	Included in the EPL, the Water Law (33/2002), the Law for Mines and Quarries (24/2002), the Electricity Law (1/2009), and the Renewable Energy Strategy.	National requirements and ESF objectives are aligned, an complement each other.

World Bank Requirements	Yemeni Requirements	Recommended Action
To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.	National law gives priority to the principle of environmental protection and pollution prevention, and not only to the mitigation or compensation of impacts. All new projects must carry out EIAs to prevent adverse impact and must obtain an environmental permit. No project or new structure that could harm, pollute or deteriorate the environment and natural resources is allowed and all new projects should use best available practices for clean production and apply environment protection/pollution prevention measures. Yemeni Law encourages related sectors and projects to provide institutional capacity and training for projects to enhance their capacity and knowledge in handling environmental issues. It also encourages research and development in all environmental aspects (EPL, Article 90).	UNOPS will apply both ESF and National requirements to the Project
To avoid or minimize project-related emissions of short and long-lived climate pollutants	Included in the EPL (26/1995), and is a Yemeni commitment under the Climate Change Convention.	Both World Bank ESF objectives and National requirements will apply to the Project
To avoid or minimize generation of hazardous and non-hazardous waste.	Included in the EPL (26/1995), the Pesticide Law (25/1999), the Public Cleaning Law (39/1999), and the Law Establishing Cleaning Funds (20/1999)	Both World Bank ESF objectives and National requirements will apply to the Project
To minimize and manage the risks and impacts associated with pesticide use	Included in the Pesticide Law (25/1999), and the EPL (26/1995)	Both World Bank ESF objectives and National requirements will apply to the Project
ESS4. Community Health and Safety		
To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and nonroutine circumstances.	Yemeni Law does not specifically address community health and safety	UNOPS will follow ESF requirements
To promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure, including dams.	No equivalent in Yemeni law. However, IPCC National Contribution commitments and other various national laws (EPL Chapter 2 Article 5 and 7) address global environmental concerns, such as the ozone layer and climate change	UNOPS will follow ESF requirements
To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials.	No equivalent in Yemeni law	UNOPS will follow ESF requirements

World Bank Requirements	Yemeni Requirements	Recommended Action
To have in place effective measures to address emergency events	Included in Yemen Labour Law Number 5 for 1995, Articles 119, 121	National requirements and ESF objectives are aligned, and no significant gaps are noted. Both World Bank ESF objectives and National requirements will apply to the Project.
To ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	No equivalent in Yemeni Law	UNOPS will follow ESF requirements
ESS5. Land Acquisition, Restrictions on Land Use and Involuntary Resettlement		
To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives	Included in Yemeni laws, e.g., urban planning law	Both ESF and national requirements will be applied
To avoid forced eviction	Included in the Yemeni Constitution, and Civil Law.	Both ESF and national requirements will be applied
To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: (a) providing timely compensation for loss of assets at replacement cost and (b) assisting displaced persons in their efforts to improve, or at least restore, their livelihoods and living standards, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher	Public Eminent Domain Law addresses involuntary land taking resulting in relocation or loss of shelter and loss of assets or livelihood and fair and timely compensation. There is no measure for livelihood restoration in Yemeni law.	UNOPS will follow ESF requirements
To improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure.	Payment is made for disturbance, loss of accommodation, loss of profit and transport allowances. Compensation is on monetary basis only. Yemeni law does not recognize any vulnerable groups, but it does recognize squatters.	UNOPS will follow ESF requirements

World Bank Requirements	Yemeni Requirements	Recommended Action
To conceive and execute resettlement activities as sustainable development programs, providing sufficient investment resources to enable displaced persons to benefit directly from the project, as the nature of the project may warrant.	The Civil Law and Local Administration Law requires the prompt and fair payment of compensation on monetary basis to replace the lost land within a distance not more than 20 km from the project site. The governments in Sana'a and Aden provide adequate housing, access to service facilities, and security of tenure, to improve living conditions of poor and vulnerable persons who are physically displaced.	UNOPS will follow ESF requirements
To ensure that resettlement activities are planned and implemented with appropriate disclosure of information, meaningful consultation, and the informed participation of those affected.	In Yemeni law, PAPs must be informed about resettlement decisions through the compensation committees that negotiate with them and gather information about asset inventory, number of family members, etc. PAPs are to be informed about their rights, consulted on, provided FULL, FAIR and PROMPT compensation based on market value of the Property for lost assets attributable directly to the project. PAPs can dispute the amount to the Land Tribunal through the district commissioner to choose alternatives PAPs can first seek satisfaction through local customary practices for resolving conflicts. They can then initiate legal proceedings in accordance with national law.	UNOPS will follow ESF requirements
ESS6. Biodiversity Conservation and Sustainable Management of Living Natural Resources		
To protect and conserve biodiversity and habitats.	Included in the Environmental Protection Law No. 26/1995 and Yemen is a party in the Conservation of Biodiversity Convention.	No major gap between national, international requirements and ESF objectives. Both will be applied.
To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity.	Included in the Environmental Protection Law No. 26/1995 and Yemen is a party in the Conservation of Biodiversity Convention.	No major gap between national, international requirements and ESF objectives. Both will be applied.
To promote the sustainable management of living natural resources.	Included in the Environmental Protection Law No. 26/1995 and Yemen is a party in the Conservation of Biodiversity Convention.	No major gap between national, international requirements and ESF objectives. Both will be applied.
To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.	Included in the Environmental Protection Law No. 26/1995 and Yemen is a party in the Conservation of Biodiversity Convention.	No major gap between national, international requirements and ESF objectives. Both will be applied.

World Bank Requirements	Yemeni Requirements	Recommended Action
ESS7. Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities		
Not Relevant		
ESS8. Cultural Heritage		
To protect cultural heritage from the adverse impacts of project activities and support its preservation.	EPL (26/1995, Chapter 3 Article 37) requires the establishment of a national list of all sites with important cultural heritage or environmental sensitivity such as wetland sites, coral reefs, protected areas and national parks. During projects planning in urban and rural areas, projects should plan for the protection of cultural heritage. If there is an indication of existence of any cultural heritage, the relevant authority must be consulted before commencement of project works. Project works should be located no closer than 500 m from the nearest known cultural heritage (Presidential Decree 21/1994, Parliament Decree 14/1994 and Law 8/1997 Amending the Antiquities Law 21/1994, Article 12). In the event of a chance find of above ground or underground cultural heritage, government authorities must be consulted and the site must be guarded safely until the related governmental authority experts came, investigate and have a hold on it, in return the finder is entitled to suitable reward regardless of the value and age of the cultural heritage. The General Organization for Antiquities and Museums (GOAM) has the mandate to stop any works that could damage antiquities and cultural heritage areas and to preserve cultural field work and excavation findings (Presidential Decree 21/1994, Parliament Decree 14/1994 and Law 8/1997 Amending article 9 of the Antiquities Law 21/1994). UNESCO, the Doha Office of GOAM and Oxford University agreed to jointly launch the Yemeni Heritage Management Platform Database in 2017	The Yemeni requirements are more specific. UNOPS will ensure that any cultural heritage encountered during the work will be reported to the GOAM and the Yemeni Heritage Management Platform Database National requirements and ESF objectives are aligned, and no significant gaps are noted. Both World Bank ESF objectives and National requirements will apply to the Project.
To address cultural heritage as an integral aspect of sustainable development	To conduct field-based surveys by specialists and describe the proposed site for project including map, borders and neighborhoods with design of infrastructures, facilities and services and all inputs and outputs (EPL and EIA Guideline).	National requirements and ESF objectives are aligned and complementary. UNOPS will apply both ESF and national requirements

World Bank Requirements	*Yemeni Requirements*	*Recommended Action*
To promote meaningful consultation with stakeholders regarding cultural heritage.	No comparable requirement under Yemeni law	UNOPS will apply ESF requirements
To promote the equitable sharing of benefits from the use of cultural heritage.	No comparable requirement under Yemeni law	UNOPS will apply ESF requirements
ESS9. Financial Intermediaries		
Not Relevant		
ESS10. Stakeholder Engagement and Information Disclosure		
To establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties.	Article 35 of the Yemeni Constitution declares that Environment protection is the responsibility of the state and the community and that it is a duty for every citizen. Community and NGO participation are considered an essential part of consultation while planning proposed projects, and is a continuous process before, during and after project implementation (EPA EIA Guideline). Furthermore, NGOs and individuals can directly sue any person or entity who causes harm to the environment and natural resources or participate in its deterioration and pollution (EPL Article 4, para 4 and Article 82).	UNOPS will follow ESF requirements
To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance.	Included in the Local Administration Law	UNOPS will follow ESF requirements
To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them.	Included in the Local Administration Law	UNOPS will follow ESF requirements
To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format.	ESIAs should include a reference list and a non-technical summary for public use and disclosure in a form and language understandable to general public (EPA EIA guideline).	National requirements and ESF objectives are aligned, and no significant gaps are noted. Both World Bank ESF objectives and National requirements will apply to the Project.

World Bank Requirements	Yemeni Requirements	Recommended Action
To provide project-affected parties with accessible and inclusive means to raise issues and grievances, and allow Borrowers to respond to and manage such grievances	Article 51 of the Constitution allows for recourse to the courts. The Public Eminent Domain Law and the Local Administration Law provide for the right of grievance before the Estimation Committee/courts. To address grievances, PAPs can first seek satisfaction through local customary practices for resolving conflict. They can then initiate legal proceedings in accordance with provincial national law.	National requirements and ESF objectives are aligned, and no significant gaps are noted. Both World Bank ESF objectives and National requirements will apply to the Project.

Chapter 5.
Environmental and Social Baseline

5.1 Tertiary Municipal Services[30] and Solid Waste Management

107. Basic municipal urban services have significantly deteriorated due to the ongoing conflict. Neighborhood roads, local sanitation networks, and public spaces, which were damaged during the conflict, remain unrepaired. Given the low capacity and lack of resources at the municipal level, rehabilitation of the urban environment remains limited in most cities. YIUSEP has funded basic public works in 8 cities, including the collection of over a million cubic meters of accumulated waste and repair of local sanitation networks. Despite these efforts, untreated sewage water overflow in streets and garbage accumulation blocking drains remains common in most cities, contributing to the cholera crisis and the spread of other communicable diseases. The lack of provision of basic municipal services is a critical challenge in most cities and will continue to be addressed under the proposed project.

108. Urban flooding is a major issue in Yemen's cities because of a combination of climate change and the ongoing conflict, which has destroyed municipal drainage infrastructure and has left local authorities with very limited capacity to repair or maintain infrastructure. Urban flooding also creates major pressure on the healthcare system, as it provides a perfect vector for waterborne diseases, and can prevent the population from reaching medical care due to roads being submerged under water. Recent flooding has also likely contributed to the spread of COVID-19 in Yemen, as it has forced thousands of people to flee from their homes as well as internally displaced persons (IDPs) to move from settlements. YIUSEP has helped address urban flooding through investments in stormwater flood protection, including box culverts, stormwater pumps and suctioning of stagnant floods water from urban areas in Aden. Amran city, whose urban infrastructure has been continuously damaged during monsoonal rains in recent years, benefited significantly from stormwater investments under YIUSEP, averting loss of life and assets. Since climate change is projected to increase rainfall variability, intensity and flooding in Yemen, building resilience to urban flooding is a priority of the proposed project and will contribute to important public health and economic benefits.

109. As YIUSEP II interventions will be in urban areas only, there will be no expected impacts on biodiversity, flora or fauna etc,

5.2 Urban Water and Sanitation

110. Even before the ongoing conflict, Yemen suffered from acute water scarcity. The urban water crisis has been exacerbated during the last three decades due to rapid population growth and excessive withdrawal of the limited fossil groundwater for irrigation use. This is a consequence of many factors including government policy that encourages farmers to shift from traditional rain-fed to irrigated agriculture, mismanagement of scarce water resources. Before the conflict started, the public water supply covered approximately half of the urban population. The other half of the population was supplied water through unstructured private sector interventions, at a high cost, and with poor water quality.

111. The systemic water and sanitation crisis in Yemen has been exacerbated by the ongoing conflict, internal displacement, COVID-19 pandemic, and natural disasters. According to UNICEF, as of October 2020, about 18 million people lack adequate access to clean water and sanitation in Yemen. Only about one third of the population is connected to piped water. The

[30] Tertiary refers to neighborhood-level municipal services, for example, neighborhood streets, sanitation, drainage, parks, etc.

armed conflict has seriously affected infrastructure and led to an almost complete stoppage of water service delivery. In addition, according to the 2020 Update of the Yemen DNA, an estimated 38 % of water and sanitation facilities in major cities are currently damaged and have lost functionality. An assessment conducted in 2016[31] also demonstrated how the inability to pay basic salaries of Water and Sanitation Local Corporations' (WSLCs)[32] staff has further limited the operation of water facilities and services. Although the WSLCs, their branch offices, and associated utilities have maintained a skeleton staff, they continue to face significant challenges, including financial sustainability, infrastructure replacement or repair, customer demands and work force remuneration. Thus, a significant portion of the urban population is relying on unregulated private water tankers. Due to the lack of functioning water and sanitation services, many cities in Yemen, including Aden and Sana'a, are currently confronted with a significant cholera outbreak.

112. Urban Water and Sanitation aims to restore access to clean water and sanitation service delivery at the city level and supports the response to the COVID-19 pandemic and mitigating the health risks due to extreme weather. This includes replacement of critical assets such as pumps, generators, water treatments units, related facilities and spare parts. Rehabilitation of water and sanitation networks, water tanks, existing wells, and wastewater treatment plants are also included under sub-component 1.2, along with service delivery maintenance support at the city level. The parts replacement including energy efficient equipment with real time process control and technologies used will prioritize energy efficiency to fight climate change, reduce CO2/GHG emissions and reduce water losses as far as possible. Solar energy (PV panels) will also be used to operate key water facilities, providing safe and clear water, with lower emissions. The WASH investments will significantly improve the quality of women and girls' lives, and are proposed as a focal point for the ABA in the cities to ensure continuity and sustainability of services. In this vein, all rehabilitation measures will follow build back better resilience principles to maximize their climate change adaptation potential.

5.3 Urban Roads and Transport

113. Yemen's road sector has gone through a significant transformation in the past three decades, albeit challenges remain. The road network grew from only about 5,000 km in 1990 to about 16,000 km in 2015, a 220 % increase over 25 years. These changes have had a major impact on the population and the economy, promoting internal and external trade, connecting a growing share of the population to public services and markets, and ensuring that food imports reach remote areas. In addition, several private road construction and maintenance companies as well as engineering firms have emerged. The main challenges to the road sector include underfunding, insufficient maintenance, poor planning and budgeting, and low civil service salaries.

114. Urban roads in major cities in Yemen, such as Sana'a, Aden, Ibb, Taiz, Al Hodeidah, Saadah and Amran, have been severely damaged. Major road links and bridges have also been destroyed. According to the 2020 Update of the Yemen DNA, more than half of intra-urban roads have been damaged in Sa'ada and Taiz. The damage to urban roads has rendered large segments of the road network inaccessible for people and vehicles with negative impacts on trade, mobility and access to localized services (e.g., markets, health facilities and schools). The recent floods have caused additional extensive damages to urban roads infrastructure, and several locations along key lifeline road corridors were severely damaged. While the storm's impact was felt across the country, Amran, Ma'rib, the Capital Sana'a, Hodeidah, Ad Dali', and Aden have been the worst hit. The proposed project with its additional financing will help restore road access to critical infrastructure and vulnerable communities.

[31] Conducted by Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ).

[32] In the water and sanitation sector in Yemen, the Local Corporations are the utility providers operating in various urban centers.

115. Yemen fares low on road safety performance:

Data from 2013 indicates mortality caused by road traffic injury (per 100,000 people) is 21.5 , about 70% road traffic injuries are people less than 30 years old . Although no recent reliable data is available, the situation is expected to worsen since the conflict broke in 2015 as road condition deteriorated, governance compromised (weak enforcement of traffic rules and vehicles safety inspections), vehicle conditions degraded mirroring the overall economic situations and a dysfunctional post trauma management system.

5.4 Energy

116. Even before the conflict, Yemen had one of the lowest per capita levels of electricity consumption and the lowest electricity access in the Middle East and North Africa (MENA) region, with estimates of access from either on-grid or off-grid sources ranging between 52 % and 72 % in 2014. The national electricity authorities, such as local Public Electricity Corporations, lacked the resources, infrastructure and capacity to supply adequate electricity to meet the country's power needs and requirements for maintaining economic growth.

117. The conflict in Yemen has significantly worsened the already low electricity access level with severe impacts on urban public services as well as commercial and industrial activities, which rely heavily on a functioning power supply system. Fuel is scarce and many electricity generation facilities have been damaged and destroyed. The national grid has disintegrated into several subnational systems because transmission links were destroyed, damaged, or ceased operations due to the conflict. Consequently, public electricity supply has been completely shut down in large areas of the country, including major cities such as Sana'a, Al Hodeidah and Taiz. Only an estimated ten % of the population has access to reliable electricity. A recent phone survey commissioned by the World Bank found that, as of end-2019, around 12 % of the population relied solely on public electricity[33]. Light emissions visible from satellite imagery indicate that electricity consumption has decreased by about 75%. The impact on facilities dependent on reliable electricity has been devastating. Hospitals, schools, water pumping stations, water treatment stations, industry and commercial facilities have all had to cut back operations or find alternative power sources.

118. Yemen's healthcare system is struggling to deal with the COVID pandemic because many of the country's hospitals and clinics have been damaged or destroyed by the conflict, and those remaining face frequent shortages of electricity. Under the YIUSEP, 60,000-megawatt hour as energy generation supported through the project will be achieved in which solar photovoltaic (PV)-based electricity supply systems have been installed in 208 health, education, and water wells facilities in the project target cities to help overcome the shortage of electricity. Where urgent intervention was required rental generators and rental power were also made available for general hospitals, schools, and municipal water wells. In addition to the rooftop solar PV, the rental power, and electrical generators have also been provided to 97 health, schools, and WASH facilities. With the additional financing to the parent project, the interventions under this subcomponent also include solar PV-based energy-efficient light-emitting diode (LED) streetlights, indoor LED bulbs and solar water heaters. The provision of clean energy through the project is also helping avoid CO_2 emissions. To support the fight against COVID-19 this proposed project will prioritize provision of off-grid energy supply to the country's critical medical infrastructure.

5.5 Climate

119. Yemen is a largely arid sub-tropical country with rainfall characterized by seasonally intense and short-lived heavy storms that often lead to flash floods with implications for soil

[33] World Bank Group. Yemen Dynamic Needs Assessment: Phase 3 2020

erosion and degradation of agricultural terraces. Heavy rainfall is frequently followed by long dry periods. Although high year-to-year variability makes it difficult to detect a trend in precipitation, summer precipitation totals appear to have declined across the Yemen Highlands since the 1950s, although local data for Yemen are lacking, and there are inconsistencies between data sets.

120. Climate-related hazards in Yemen include extreme temperatures, floods, landslides, sea level rise, sea water intrusion and drought. Most of these risks exacerbate the country's water scarcity, pose serious threats to development and food security, and their intensity and frequency are likely to increase due to climate change.

5.6 Climate change-related cross-sector challenges [34,35,36]

121. Climate change poses a significant threat to Yemen's development across many sectors. Challenges include: (a) Short-burst, intense rainfall which often leads to flash floods, which can result in significant damage and high losses in urban areas due to their concentrated physical assets and population. Rainfall intensity, and therefore flooding, is projected to increase with climate change; (b) Greater rainfall variability could result in prolonged drought periods. Yemen's water crisis ranks among the worst in the world, and water stress is observed to be increasing, with groundwater reserves likely to be mostly depleted in two to three decades regardless of climate change; (c) A vast majority of the urban poor is vulnerable to rockslide and landslide risk as they typically live on marginal and environmentally sensitive land; and (d) A rise in sea levels would result in increased coastal flooding and possible damage to infrastructure and groundwater quality and supply. In response to these threats, improved urban infrastructure, water and waste management are key priorities. The project will help mitigate the potential impacts of these threats in relevant activities.

5.7 Physical Regions

The physiographic characteristics of Yemen are very diverse and consist of high, steep mountains, escarpments, deserts, costal plains and hundreds of Wadis running between the mountains and through the costal plains. The majority of the population concentrates in the Wadis and Highland Plateaus, performing agricultural activities irrigating from the spates flow in the Wadis in the rainy seasons, and from base flow and groundwater. In addition, there are a number of islands scattered within the Red Sea and the Arabian Sea.

The physical regions in Yemen are described employing the same categories utilized in the Land Degradation Project in Yemen and widely utilized by public agencies including RAP CMO [37]. According to these studies, Yemen is classified into 5 physical regions and 16 sub regions as illustrated in the following table (see also ***Figure 5.1***).

Table 3. Physical Regions of Yemen

Physical Regions	Sub-regions
Mountain Massif	1. Highland Plains
	2. Western Slopes
	3. Eastern Slopes
	4. Southern Slopes
Eastern Plateau	5. Northern Plateau Zone

Physical Regions	Sub-regions
Desert Regions	9. Ramlat As Sabatayn
	10. Rub Al Khali
Coastal Plains	11. Tihama Plains
	12. Tuban-Abyan Plains
	13. Ahwar-Maifa'ah Plains

[34] World Bank Group. Climate Change Country Brief: Yemen. Retrieved from http://globalpractices.worldbank.org/climate/Pages/CountryBriefs/Yemen.aspx

[35] World Bank Group. Climate Change Knowledge Portal: Yemen Dashboard. Retrieved from http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&ThisRegion=Asia&ThisCCode=YEM

[36] World Bank Group. (2011, April). Climate Risk and Adaptation Country Profile: Yemen.

[37] *See the Environmental Report for Phase 1*

	6. Southern Plateau Zone		14. Eastern Coastal Plains
	7. Wadi Hadhramout	Yemen Islands	15. Socotra
	8. Al Ghaydah Basin		16. Kamaran and other Islands

The Mountain Massif

The Mountain Massif forms a complex that separates the Highland Plains from the eastern deserts of the Arabian shield and from the Tihama plains in the west. It is a volcanic region with elevations between 1000-3600 m above sea level parallel to the Red Sea Coast, characterized by mountainous terraces and temperate climate with monsoon rains. It includes parts of the Governorates of Sana'a, Dhamar, Taiz, Ibb, Hajjah and areas of Dale'a and Mukairas. Mean temperatures in this region range from 14-32 degrees centigrade while relative humidity ranges from 60-65%. Rainfall ranges from 100-1000 mm except in Ibb and Taiz area where the mean annual rainfall may range from 600-1000 mm.

Four sub-regions are identified within the Mountain Massifs:

- *The Highland Plains*: The sub-region extends from the southern limits of Taiz region through the central mountains to the North of Sa'dah. On turn, this sub-region can be classified into three parts: Northern, Central and Southern Highland Plains. It comprises a series of plains at elevation varying from 2,200 to 2,600 m asl. Rims surrounding the plateaus may rise up to 2,600-2,800 m asl. Within the plains, isolated volcanic peaks and typical mesa/butte structures are present. Extensive gravel fans are common.
- *The Western Slopes*: Which constitute the steep slopes of the foothills beyond the Tihama plain up to the crest of the western escarpment. They comprise a complex topography with extreme variations in relief over short distances. Lower slopes may be as low as few hundred meters and high points over 3,000 m including the highest peak in Yemen and in the Arabian Peninsula (Shouaib Mountain 3,666 m).
- *The Eastern Slopes*: The Eastern slopes lie between 3,000 m and 1,000 m but comprise a much more gentle topography. Changes in relief are generally far less extreme and the exacerbating effects of water-based erosion are relatively muted.
- *The Southern Slopes:* They extend from the Red Sea in the west to the borders of Oman in the east. They consist of groups of mountains, wadis and drains into the Arabian Sea.

The Eastern Plateau

The Eastern Plateau covers half of the country and borders the Arabian Shield along its northern and eastern margins. The area is characterized by an extensive thick sediment layer with slight almost uniform (1° dip) at the surface. It includes the Hadramout-Mahrah uplands and areas from Mareb, Aljouf, and Shabwah. The climate in this area is generally hot and dry in summer and cool in winter. Temperature ranges from 19-40 degrees centigrade and Relative Humidity ranges from 40-60%.;while rainfall ranges from 60-100mm Elevations range from 1,200 to 1,800 m asl a the main water divides to sea level in the southern plateau zone and to 900 m to the north (towards the Rub Al Khali desert). The principal sub-regions are:

- *The Northern Plateau Zone*: towards the Rub Al Khali, the Plateau becomes wider and then it slopes gradually towards the desert. Its maximum elevation is 1,000 m.
- *The Southern Plateau Zone*;
- *The Wadi Hadramout Plateau*: The elevation ranges from 600m in the Wadi to 1600m

in high watershed areas. The plateau slopes gently towards the north where it becomes heavily covered by alluvial sediments:

- *The Al Ghaydah Basin*.
- The relief in the Eastern Plateau is generally moderate to gentle though there are some localised areas of extreme relief associated with structural features (typically reflected in ravines or much broader features) that pose challenges to road construction.

The Desert Regions

This includes parts of the northern areas of the country extending to Al-Rub-al-Khali (The Empty Quarter). The climate in these regions is generally dry. Rainfall ranges from 5-10 mm and temperature ranges from 40-45 degrees centigrade in summer and may drop to 20 degrees centigrade in winter. The desert regions include:

- *The Ramlat As Sabatayn Desert*: it is a sand desert lying between Mountain Massif and the Eastern Plateau and has a maximum extent (E-W) of 350 km. Except on the extreme southern fringes, this area is almost devoid of vegetation and moisture.
- *The Rub Al Khali Desert* lies between the northern part of the Mountain Massif and the northern part of the Eastern Plateau. This is an extremely dry and inhospitable area that supports little economic activity.

Within the scarce desert vegetation are included some needle plants such as Aruq Al-Kuthaib, Zeiza, Mawared etc. Some seasonal wadis constitute the habitat for animal grazing and rearing for nomadic settlements. Few road projects are likely to be developed in the desert regions.

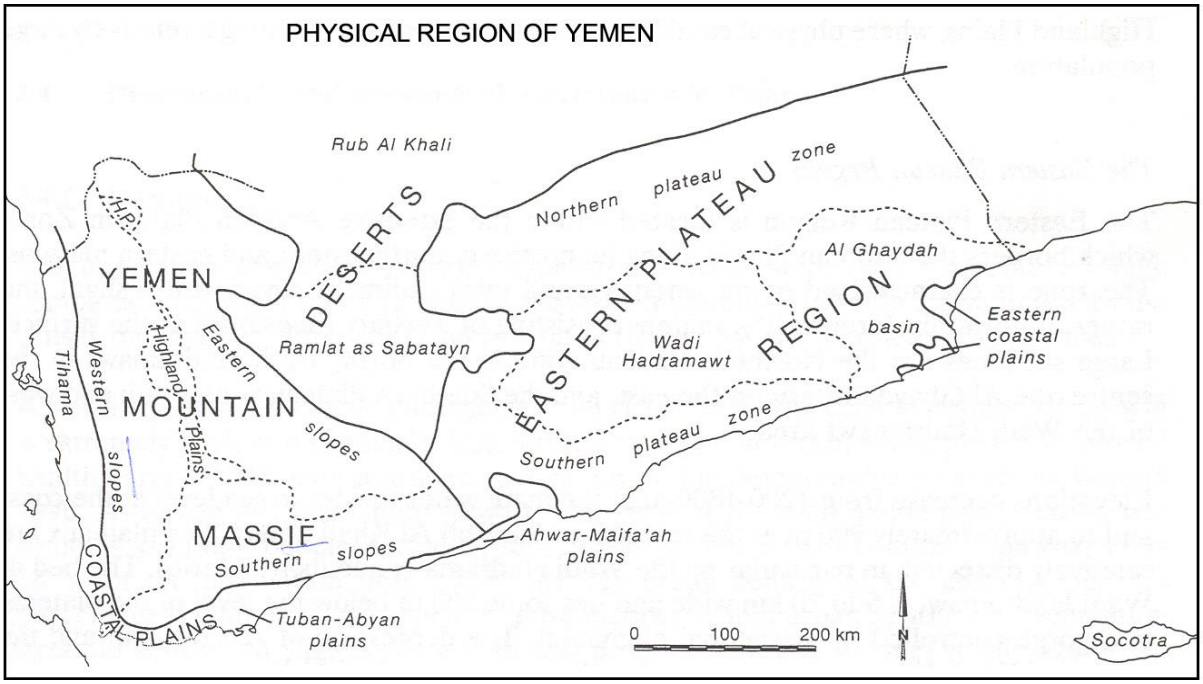
The Coastal Plains

This covers almost 16% of the land and stretches inland to about 65 Km. It covers the area of Tihama plain along the Red Sea to the Gulf of Aden and some stretches along the Arabian Sea to the boundaries of the Sultanate of Oman on the East. Rainfall in this area ranges from 70-100 mm and the mean temperature ranges from 25-35 degrees centigrade, while relative humidity ranges from 65-80%.

In broad terms, the Coastal Plains belong to the Western Arabian Rift System, which separates the Arabian from the African plates. They have been down faulted by as much as 2,000 metres and this has resulted in the accumulation of thick sequences of tertiary and quaternary sediments. Elevations are low, usually less than 300 metres and the surface is typically characterized by Aeolian and alluvial sediments, the latter often in the form of large outwash fans. Four areas can be found in the Coastal Plains:

- *The Tihama Plain:* The Tihama plain extends along the Red Sea up to the foot of the central mountains in the east with an elevation ranging from the sea level up to 250 m along the foothills;
- *The Tuban-Abyan Plains*: They extend from East to West starting by the Gulf of Aden and ending by the Arabian Sea below the southern slopes sub-region of the Mountain Massif. The elevation ranges from sea level up to 300m towards the inland.
- *The Ahwar Maifa'ah Plains* extend along the Arabian Sea coast from the southern slopes sub-region towards the southern plateau zone.
- *The Eastern Coastal Plains* are located near the Oman border just below the Al Ghaydah basin.

FIGURE 5.1 PHYSICAL REGION OF YEMEN



The movement of dunes is one of the primary environmental issues related to road development in the Coastal plains.

The Yemeni Islands

There are more than 112 small islands, which form part of the Republic of Yemen. Most of them are situated in the Red Sea and Arabian Sea and have their own distinctive climatic, environmental, geographical and natural characteristics. The most populated and famous are the Socotran Archipelago and Kamaran islands.

- Socotra is the biggest island and is famous for being the home of the dragon tree and span wood, some unique trees with significant medical and economic values;
- Kamaran is considered the major inhabited island with some wild animals;
- Mayoon Island has a strategic importance due to its location at the strait of Bab al Manadab.
- A number of other small islands are close to Socotra of which Abdul-Kori Island and al-Akhalween islands (Samha and Darsa) are the major ones.

5.8 Geography

Yemen is located in Southwest Asia, at the southern tip of the Arabian Peninsula, between Oman and Saudi Arabia. It is situated at the entrance to the Bab-el-Mandeb Strait, which links the Red Sea to the Indian Ocean (via the Gulf of Aden) and is one of the most active and strategic shipping lanes in the world. Yemen has an area of 527,970 square kilometres (203,850 sq mi), including the islands of Perim at the southern end of the Red Sea and Socotra at the entrance to the Gulf of Aden. Yemen's land boundaries total 1,746 kilometres (1,085 mi). Yemen borders Saudi Arabia to the north (1,458 km or 906 mi) and Oman to the northeast (288 km or 179 mi).[1] Through the Socotra island, Yemen also shares borders with the Guardafui Channel and the Somali Sea

5.9 HYDROLOGY, WATER RESOURCES

General Information

Yemen lies within the northern stretches of the tropical climatic zone and its border with the sub-tropical climatic zone. The extreme differences in elevation are largely responsible for the great variations in temperature and climate over the different regions of the country. Mean annual temperatures range from less than 15°C in the highland region to 30°C in the coastal plains region. Recorded temperatures may rise to 40°C during summer in the coastal plains region and to over 40 °C in the desert plateau region. However, the winter temperature may fall below freezing in the highlands. Relative humidity may range between the extremely dry 4% in Sana'a to the very high figures of 90-100% with intermediate figures between 16 and 60%.

The country can be broadly divided into three climatic zones:

- Arid tropical climate: This climate covers the coastal plains region and lower mountain slopes in the west and south, and is characterized by high temperatures and low precipitation ranging from 0 to 400 mm.
- Arid sub-tropical climate: This is a transitional climate between the tropical climate of the coastal plains region and the temperature climate of the highland region. Mean monthly temperature varies form 16°C to 28°C. Precipitation ranges from less than 100 mm to 600 mm. It covers the lower and upper mountain slopes and the eastern plateau region.
- Temperate climate: This covers the mountains ranging in altitude from 1,800 to 3,700 m asl. Mean monthly temperature in this climate ranges from 10°C to 18°C. Precipitation varies from 200 mm to more than 1,200 mm.

Rainfall

Rainfall is the basic water resource, and there are marked differences in the amount of rain received in various parts of the country. Rainfall varies from less than 50 mm in the coastal plains region and desert plateau region, to more than 1,200 mm in the western mountainous highland region. The highest and most consistent rainfall occurs in the southern highlands near Ibb/Taiz area. Rainfall is highly erratic in time, quantity, and location. It occurs in two periods, the first from March through May, and the second from July until September, which is the heaviest rainy season. Normally, there is little or no rain from November to February but there are exceptions in certain regions and years. In general, annual rainfall increases with distance from the Red Sea, reaching 150 mm in the Coastal Tihama Plain (Western coastal plain of the coastal plains region), and up to 300-400 mm on the foothills of the mountains. Again, the rainfall increases from south to north and in the western mountainous highlands. Then it decreases in the central highlands towards the capital, Sana'a where it averages to about 200 mm in the northern highlands, then, gradually increases from Sana'a towards Sa'dah.

The spatial pattern of annual rainfall varies from year to year due to the unavailability of long term records with the exception of few stations along the country. Most of which are located in the mountain massif region, Southern and Western Costal plains and in the Wadi Hadhramout area.

Socotra and the sparsely populated mainland of Al Mahra have only one metrological station each and there are no monitoring stations in the vast desert areas. Hence it is not yet possible to produce a reasonable isohyetal map fro the country. Nevertheless, Figure 4.1 was compiled to show the spatial pattern of average annual rainfall for the period of 1985 -1991.

Rainfall General Features

Rainfall in Yemen is generated by three meteorological phenomena:

- The Mediterranean Effect: In the winter months, (especially in December and January) the influx of polar air that follows the passage of a depression may trigger light rainfall. However, such events are infrequent occurring on average every 3-5 winter seasons.
- The Red Sea Convergence Zone (RSCZ): The RSCZ is caused by the rapid heating up of land surfaces (relative to sea warming) that gives rise to the generation of onshore winds that are then affected by the convection effects of the Western Slopes. As a consequence humid air masses are lifted and carried eastward to give rise to heavy, but short and highly localised, rainstorms. The RSCZ is at its most influential from March to May, and to less notable effect in the autumn.
- Monsoonal Inter-Tropical Convergence Zone (ITCZ): The Monsoonal ITCZ influences Yemen from July to September when warm dry air from the Arabian (and African) land masses to the North mixes with moist southerlies from the Indian Ocean The rain producing effects of the ITCZ are most keenly felt on the Western and Southern Escarpments where the triggering orographic effects are most significant. The Eastern Escarpment receives relatively little in the way of rain from the influence of the ITCZ, though as the ITCZ moves north (before retreating south again) areas as far east and north as the Sana'a plain may receive.

Rainfall Distribution

The average annual rainfall ranges from less than 50 mm in the coastal areas and the deserts to 200-400 mm on the slopes of the highlands and more than 1 200 mm on the western slopes of the mountains. This demonstrates a clear pattern to the rainfall distribution and in particular the relationship between annual rainfall, relief and exposure to the RSCZ and the ITCZ.

Orographic effects also influence rainfall patterns strongly at the sub regional and local levels with very marked rain shadow effects evident over short distances. Similarly, individual rainfall events are typically convective in nature and quite limited in spatial extent. Even when large storm systems develop in the summer during periods of intensive air mass convergence, very significant variations in rainfall will occur over relatively short distances.

The rainfall data associated with agro-climatic zones are provided in ***Figure 4.3*** overleaf (Source. AREA- Dhamar).

Total Annual Rainfall

Variations in annual rainfall are significant but there are few stations with sufficient records available to provide for detailed assessment. Data for Aden suggest that:

- There is no significant long term trend identifiable;
- There are no well defined cycles of wet and dry year;
- Periods of high relative rainfall appear to have a greater variation relative to the mean than low rainfall periods.

Information from a wider data set (Riyan, Sana'a Shoub and Sana'a Airport, Taiz Town and

Taiz Old Airport) seems to confirm the intuitive argument that annual rainfall variation is less in the wetter areas but nonetheless remains very significant.

Annual rainfall throughout the country are given in the table below:

Table 4. Quantity of monthly rainfall (millimetre) in main meteorology stations

Month	Stations									
	Ibb	Al-Hodeidah	Sa'ada	Marib	Socotra	Sayoun	Al-Rayan	Taiz	Aden	Sana'a
Jan	0.0	1.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0
Feb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Apr	117.4	0.0	42.1	0.0	0.0	0.0	0.0	138.8	0.0	0.0
May	117.0	0.0	29.7	0.5	0.0	0.0	0.5	58.2	0.0	3.2
Jun	123.5	0.0	0.0	0.0	0.0	0.0	0.0	103.3	0.0	0.0
Jul	182.9	0.0	1.6	0.0	0.0	0.0	0.0	112.2	0.0	4.5
Aug	244.3	83.6	4.0	6.4	0.0	2.1	0.0	143.3	1.2	48.7
Sep	125.9	55.2	1.9	2.5	0.0	0.5	0.0	149.2	0.7	0.1
Oct	53.9	16.5	0.0	0.0	26.0	14.5	5.0	134.0	2.4	0.0
Nov	41.7	0.0	6.0	18.4	7.1	0.0	11.6	21.3	1.8	7.4
Dec	0.0	0.0	1.0	0.0	98.0	0.0	1.0	0.5	0.0	0.0
Total	**1,006.6**	**156.3**	**86.3**	**27.8**	**134.6**	**17.1**	**18.1**	**860.8**	**6.1**	**63.9**

Rainfall Types and Intensity

Precipitation in Yemen generally occurs as rain though hail and mist are not uncommon. Snow may be observed in exceptional circumstances on the high peaks.

Rainfall tends to occur as a single storm event per day. Rain events are short, rarely extending beyond a few hours. Data on rainfall intensity is not well documented but TSHWC (Technical Secretariat of the High Water Council) take the view that variations in the duration and intensity of an event in different areas are not great. Their hypothesis is that annual rainfall totals are a function of the number of rain events rather than the duration and intensity of each event.

Water Resources

General Information

Yemen's renewable fresh water is a finite and constant resource. Its availability per capita falls with as population grows and Yemen's population is growing fast. The availability per capita decreased from 1,098 m^3 in 1955, to 460 m^3 in 1990, to 137 m^3 in 2002, and is expected to

further decrease over time[38]. The key concerns regarding water availability identified in the NEAP include, inter alia:

- Depletion of water resources due to over extraction of groundwater;
- Lack of water allocation and conservation systems;
- Inadequate water supply systems.

Although complete data on the nation and magnitude of the water crisis are not available, the basic trends constitute reason enough for concern. In Yemen's agriculture, water is of crucial importance. In most areas the rainfall is insufficient for rain fed agriculture. Only mountainous areas receive significant rainfall, which provides the water for agricultural areas, either through spate flows or indirectly through pumping from groundwater. Along wadis and in the lowlands, farming depends on surface water diversion and to a limited extent on conjunctive of surface and groundwater. Historically, farmers have built terraces, spate breakers, small dams, etc. to harness runoff water and increase groundwater recharge to a great extent. However, these facilities have deteriorated due to population migration to the cities and the Gulf countries and due to inadequate maintenance.

Surface water resources in Yemen have been estimated at 2,000 million m^3/year, but this quantity corresponds to the runoff from major catchments and does not include the runoff produced within the smaller catchments.

Renewable groundwater resources have been estimated at 1.5 million m^3/year, a large part probably coming from infiltration in the river beds. A major groundwater aquifer was recently discovered in the eastern part of the country with an estimated storage of 10 km^3. This aquifer is still under study and it is not known whether the groundwater is rechargeable or whether it is all fossil water.

73.5% of the Yemeni population lives in rural areas (Population Projections) within and in close proximity of wadis where water may be available. Irrigated agriculture provides most of the rural income. Irrigated agriculture covers an area of about 444,000 hectares. Agriculture as a whole accounts for about 20% of total GDP (about 85% of the value of crop production corresponding to some US$ 600 million worth) and over 90% of water use. Irrigation efficiency is about 30 - 40% in the country.

Qat cultivation in Yemen has significantly expanded over the past two decades currently consuming 5.5% of arable land and accounts for approx. 20% of the total water use. The rapid expansion in the planting of qat trees is one of the major problems facing the agriculture sector. Official statistics about the scale and the trends of qat production are unavailable. However, several reports and studies indicate that the area used for qat production has nearly tripled over the past 20 years. Recent data shows that the total area planted in qat is estimated at approximately 80,000 ha. In the past, qat was grown on the hillsides and in a wide range of soil conditions, but recently qat is being planted in the irrigated valleys. The trend will seriously affect the availability of water in the future

In most areas, groundwater is being over exploited far beyond the safe levels of annual recharge. At an estimated 90% of water utilization by agriculture, most cities are running critically short of potable water supplies and if unchecked, the capital city Sana'a is due to run out of water from its traditional aquifers within the next 20 years. The water crisis is particularly acute in the western highland part of the country, where groundwater is the main source of water, aquifers are depleting some 1-4 meters per year, and water quality is degrading

[38] *Population Action International: Population and Future of Renewable Water Supplies-Washington, 1993 and update 1995. Also based on information available from "Groundwater and Soil Conservation Project (GSCP).*

by wastewater discharge. It is also reported that parts of the coastal aquifers suffer from seawater intrusion. The balance of water resources in Yemen is tabulated here below:

Table 5. Water Balance in Yemen

Supply Side Indicators		Demand Side Indicators	
Rain water quantities	2.0 BCM	Demand for all sectors	2.9 BCM
Rain off from drainage	1.5	Pumping ground water	2.5 BCM
Renewable quantities	2.0 BCM	*For irrigation :*	
Non – conventional	n.a	Qat trees	800 BCM
		Population demand	Tripled by 2015
		Tube well	More than 45,000

The total dam capacity is estimated at 0.18 km^3. In general, the dams are built for irrigation and domestic purposes, but at the same time they contribute to groundwater recharge. There are also many flood control dams, which are not intended to store water, but to divert the spate floods immediately to the adjacent irrigation network (spate irrigation).

Irrigation Systems

In most areas of Yemen rainfall reliability is a critical concern. This is reflected in the fact that little or no truly rain fed agriculture is practiced. In virtually all cases some form of rainfall supplementation occurs, be it tube-wells or hand dug wells systems or flood water harvesting. In 2001, the total cultivated area was 1,199,104 with different irrigation systems (Source: CSO-2001 Statistical Yearbook) as shown in the following table.

Table 6. Cultivated Land in Yemen by Type of Irrigation

Type of Irrigation	Area (ha)	%
Rainwater Harvesting	611,543	51.00
Floodwater Harvesting	143,892	12.00
Ground Water Irrigation:		
Spring Irrigation	35,974	3.00
Well Irrigation (Tube well)	407,695	34.00
Total Cultivated	**1,199,104**	**100.00**

Three main types of water collection are utilized for irrigation:

- Rain water harvesting: This is based on collecting and retaining (mainly through contour benching terracing) overland flow in zones where soils permit agriculture. The receiving zone is always smaller than the zone from which overland flow is produced, thus a multiplier effect is produced which permits agricultural production in low precipitation zones. The numerous mountain terraces, collect and retain rain and overland flow in a similar way in areas where natural slopes may be excessive, 12% or greater. The further implications for retention and soil stability and erosion have long been recognised and adequately countered by terrace systems. However, recent trends in agriculture have seen some fall off in the maintenance of terrace systems with potential serious long-term adverse impacts.
- Floodwater harvesting (or spate irrigation): Traditionally, farmers in the vicinity of wadis rely heavily on simple earth built diversion systems and irrigation networks. With small spates, these temporary embankments can be effective; with large spates, they are often swept away. In order to give better control of the spate flows, a series of public sector investments, involving the construction of permanent diversion weirs

and canal distribution structures, have been made in the main wadis since the early 1970s. Most of these systems, however, have experienced maintenance and water distribution problems because scheme designs have often conflicted with traditional water rights.

- Ground water irrigation: This comprises an area of about 444,000 ha, all irrigated from groundwater, of which about 408,000 ha from tube wells and 36,000 ha from spring water. In general, new, deeper tube wells replace those that have gone out of production because of declining water tables.

Overall irrigation efficiency is low, between 35 and 45%, depending on field levelling and the water conveyance system used. Sprinkler irrigation and micro-irrigation are found on a limited number of farms and in pilot projects, using water from tubewells and springs. Almost all irrigation is surface irrigation. Efficiency improvements, to say 60%, could be achieved by lining canals and installing pipe distribution for surface irrigation, and to over 80% by adopting sprinkler irrigation and micro-irrigation techniques.

According to the Constitution, flowing and underground water are defined as “res communis”. However, a landowner has “precedence” for water taken from a well on his land. In spring-irrigated areas water can be attached to land in the form of 'turns', which give rights to divert the canal into the field for a fixed period of time. The “turn” can however be detached from the land and sold or rented separately. This landowner “precedence” has permitted the private development of deep tube-well extraction, which is “in some ways in conflict with Islamic principles. Islamic and customary law has no precedent for dealing with a new technology that allows landowners to extract (and sell) an unlimited quantity of water from deep aquifers, and modern law has not yet regulated it either.

The distribution of the above data among the Governorates is shown in Table 5.5 below.

The significance of water harvesting to the economy of Yemen and to virtually all rural communities is such that they must be a primary consideration in road design programmes. In this context and given the difficulties associated with estimation of wadi flows it may be argued that placing the emphasis in design at the micro catchment level is probably the most sensible use of resources as failings at this level are more likely to generate severe adverse local impacts.

Table 7. Cultivated Land in Yemen by Type of Irrigation

Governorate (Muhafazat)		Cultivated Land by Type of Irrigation (ha)				
N	Name	Rain Water Harvesting	Flood Water Harvesting (Spate)	Groundwater irrigation		Total Cultivated (ha)
				Spring Irrigation	Well Irrigation (ha)	
1	Al-Beida	13,622	3,205	801	9,082	26,710
2	Al-Dhaleh	n/a	n/a	n/a	n/a	n/a
3	Al-Mahweet	14,738	3,468	867	9,826	28,899
4	Amran	n/a	n/a	n/a	n/a	n/a
5	Dhamar	49,678	11,689	2,922	33,119	97,408
6	Ibb	43,810	10,308	2,577	29,207	85,902
7	Sana'a	115,343	27,140	6,785	76,895	226,163
8	Sana'a City	n/a	n/a	n/a	n/a	n/a
9	Hajjah	31,355	7,378	1,844	20,903	61,480
10	Sa'adah	29,170	6,863	1,716	19,446	57,195
11	Taiz	35,661	8,391	2,098	23,774	69,924
12	Abyan	16,033	3,772	943	10,688	31,436
13	Aden	1,406	331	83	938	2,758
14	Al-Hodeidah	160,613	37,791	9,448	107,076	314,928
15	Laheg	11,144	2,622	656	7,429	21,851
16	Al-Jawf	24,903	5,860	1,465	16,602	48,830
17	Al-Mahrah	541	127	32	360	1,060
18	Hadramout	12,238	2,879	720	8,159	23,996
19	Mareb	46,363	10,909	2,727	30,908	90,907
20	Shabwah	4,925	1,159	290	3,283	9,657
Total		**611,543**	**143,892**	**35,974**	**407,695**	**1,199,104**

Water Quality

Water quality is deteriorating in Yemen. Shallow aquifers, especially in urban areas, are becoming polluted and coastal aquifers are subject to saline intrusion. The capacity to plan and implement appropriate responses to water resources problems is undermined by insufficient data. Data on water quality and saltwater intrusion are particularly weak. There are no national water quality standards, although WHO guidelines are generally applied to urban water supply monitoring and FAO standards for water used in agriculture.

Ground-water contamination is pervasive and poses a serious health threat for those dependent on water from private tankers and neighbourhood wells in urban areas. Water resources are contaminated primarily by industrial and residential waste, seepage of wastewater, low pressure, back siphonage, and cross connections. Consequently, many wells, especially those drawing water from shallow aquifers, are contaminated with viruses and bacteria, leaving large segments of the population vulnerable to waterborne diseases. In the poor neighbourhoods, inadequate environmental conditions have lead to outbreaks of diseas such as cholera, baxterial dysentery, infectious hepatitis, salmonellosis and typhoid. It is estimated that about 70% of infant mortality is due to waterborne diseases (Source : NEAP-1996).

Surface water is fully exploited and essentially distributed in the upstream parts of watersheds,

and only limited flows reach the sea. The immediate impacts include: decline in water quality from diminished dilution of pollutants, seasonal or continuous shortfall in supply of downstream users and increases in salinity in estuaries and other coastal areas.

The quality standards applicable for irrigation water (FAO) and for drinking water (WHO) are listed here below:

Table 8. Water Quality Standards for Agriculture (FAO)

Parameters	FAO Standard
Na mg/l	<300
K mg/l	0-2
Mg mg/l	0-50
Ca mg/l	0-200
Cl mg/l	<400
HCO_3 mg/l	<150
SO_4 mg/l	0-200
NO_3 mg/l	0-50
EC us/cm	1500

Table 9. Drinking Water Quality Standards (WHO)

Parameters	WHO Standards
EC us/cm	1500
pH	6.5-8.3
P mg/l	04-05
NO_3 mg/l	0-50
Total Coliform MPN/100/ml	0
Faecal Coliform MPN/100 ml	0

Health

Despite the reasonable improvement in health conditions in Yemen over the last two decades, the health sector is still facing three large challenges: i) a persistent high fertility rate (7.7 child per women), ii) high population growth rate (3.7%), and iii) a chronic shortage of health services. These challenges are reflected in the alarming health indicators. Recent data indicate that infant mortality rate (IMR) is 75.3 (CSO- Statistical yearbook 2001) per live birth, which are among the highest in the world. The leading causes for IMR are diarrheaol diseases, malnutrition and parasitic diseases. These diseases can be directly attributed to poverty, low personal hygiene, and lack of sanitation and safe water supplies.

The health sector is facing many pressing issues. Difficulties in rural populations, lack of financing, organizational and management problems and inadequate training of healthcare personnel are among the most serious challenges. Only 55% of the population has access to medical facilities, while public health services in many of the rural areas are almost non-existent. According to official statistics for 2001, there were only 121 hospitals (with an average, 79 health centers with beds and 432 without beds and 1540 primary health care unit .The total patient-beds were estimated at 10,690 nationwide with significant disparity between

urban and rural areas.The situation of health services in 2001 is illustrated in the following table:

Table 10. Number of health services

Governorate (Muhafazat)		Health Facilities							
		Pharmacies & Drugstores	Maternity Centres	Primary Health Care Units	Health Centres without beds	Health Centres with beds		Hospitals	
N	Name					N.	Beds	N.	Beds
1	Al-Beida	28	1	56	17	1	20	7	285
2	Al-Dhaleh	91	6	75	7	7		4	220
3	Al-Mahweet	28	4	75	5			4	370
4	Amran	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
5	Dhamar	180	123	114	35			2	186
6	Ibb	211	48	123	62	1	6	10	498
7	Sana'a	73	20	128	20			10	100
8	Sana'a City	415	48		85			6	1.582
9	Hajjah	147	6	137	5	10	100	4	200
10	Sa'adah	72	22	16	13			7	105
11	Taiz	462	7	110	75	8	130	6	1,250
12	Abyan	8	30	101	10	10	65	7	553
13	Aden	179		5	7	1	7	4	1,330
14	Al-Hodeidah	124	43	118	43			2	720
15	Laheg	61	2	118	17	2	12	15	846
16	Al-Jawf	14		47	4	10	132	2	105
17	Al-Mahrah	49	4	43	4			5	264
18	Hadramout	41	23	119	4	8	142	18	703
19	Mareb	22	4	69	19	11		2	125
20	Shabwah		4	86		10	174	6	360
	Total	**2,205**	**395**	**1,540**	**432**	**79**	**788**	**121**	**9,802**

The Government has made it a priority to make health services more effective and accessible to the most needed segments of the population. In order to do this, preference will be given to preventive health care concentrating on immunization programs, family planning, nutrition and health and health education and access to safe water drinking water.

The incidence of disease registered in 2001 at Governorate level is shown in the table overleaf.

Communicable Diseases

Sexually-transmitted diseases (STDs), such as HIV/AIDS, are the communicable diseases of most concern because of labor mobility. Recognizing that no single measure is likely to be effective in the long term, the Contractor shall implement a combination of behavioral and environmental modifications to mitigate communicable diseases:

- Conduct Information, Education and Consultation Communication (IEC) campaigns, at least every other month, addressed to all construction site staff (including all the Contractor's employees, all subcontractors of any tier, consultants' employees working on the site, and truck drivers and crew making

deliveries to the site for Works and Services executed under the Contract, concerning the risks, dangers and impact, and appropriate avoidance behavior of communicable diseases.

- Provide for active screening, diagnosis, counselling and referral of workers to a dedicated national STD and HIV/AIDS program, (unless otherwise agreed) for all Site staff and labor.
- Provide male or female condoms to all Site staff and workers, as appropriate.
- Provide treatment through standard case management in on-site or community health care facilities.
- Ensure ready access to medical treatment, confidentiality and appropriate care, particularly with respect to migrant workers.
- Promote collaboration with local authorities to enhance access of workers families and the community to public health services and ensure the immunization of workers against common and locally prevalent diseases.
- Provide basic education on the conditions that allow the spread of other diseases such as COVID-19, Lassa Fever, Cholera and Ebola. The training should cover sanitary hygiene education.
- Prevent illness in immediate local communities by:
    - Implementing an information strategy to reinforce person-to-person counselling addressing systemic factors that can influence individual behavior as well as promoting individual protection, and protecting others from infection, by encouraging condom use
    - Training health workers in disease treatment
    - Conducting immunization programs for workers in local communities to improve health and guard against infection
    - Providing health services
    - Contracting an HIV service provider to be available on-site

COVID-19[39]

In the context of the COVID-19 pandemic, Contractors shall develop and implement measures to prevent or minimize an outbreak of COVID-19, and develop procedures indicating what should be done if a worker gets sick. The Contractor shall:

- Assess the characteristics of the workforce, including those with underlying health issues or who may be otherwise at risk
- Confirm that workers are fit for work, including temperature testing and refusing entry to sick workers
- Consider ways to minimize entry/exit to site or the workplace, and limit contact between workers and the community/general public
- Train workers on hygiene and other preventative measures, and implement a communication strategy for regular updates on COVID-19 related issues and the status of affected workers
- Treat workers who are or should be self-isolating and/or are displaying symptoms
- Assess risks to continuity of supplies of medicine, water, fuel, food and PPE, taking into account international, national and local supply chains
- Reduce, store and dispose of medical waste
- Adjust work practices to reduce the number of workers and increase social distancing
- Expand health facilities on-site compared to usual levels, develop relationships with local health care facilities and organize for the treatment of sick workers

[39] Based on the World Bank COVID-19 LMP Template, April 16, 2020

- Build worker accommodations further apart, or have one worker accommodation in a more isolated area, which may be easily converted to quarantine and treatment facilities, if needed
- Establish a procedure to follow if a worker becomes sick (following WHO guidelines)
- Implement a communication strategy with the community, community leaders and local government in relation to COVID-19 issues on the site.

Vector-Borne Diseases

Reducing the impact of vector-borne disease on the long-term health of workers is best accomplished by implementing diverse interventions aimed at eliminating the factors that lead to disease. The Contractor, in close collaboration with community health authorities, shall implement an integrated control strategy for mosquito and other arthropod-borne diseases that includes the following measures:

- Prevent of larval and adult propagation through sanitary improvements and elimination of breeding habitats close to human settlements
- Eliminate unusable impounded water
- Increase water velocity in natural and artificial channels
- Consider the application of residual insecticide to dormitory walls
- Implement integrated vector control programs
- Promote the use of repellents, clothing, netting, and other barriers to prevent insect bites
- Use chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease reservoirs
- Monitor and treat circulating and migrating populations to prevent disease reservoir spread
- Collaborate and exchange in-kind services with other control programs in the project area to maximize beneficial effects
- Educate project personnel and area residents on risks, prevention, and available treatment
- Monitor communities during high-risk seasons to detect and treat cases
- Distribute appropriate education materials
- Follow safety guidelines for the storage, transport, and distribution of pesticides to minimize the potential for misuse, spills, and accidental human exposure

5.10 BIOLOGICAL RESOURCES

Introduction

Yemen is very rich in flora and has a wide range of natural vegetation types, a mixture of species from East Africa, the Sahara-Arabia, and the Mediterranean. The vegetation coverage ranges from 9 to 43% and is dominated by grasses and dwarf shrubs, mainly the herbaceous *Andropogon spp* Precise data on the status and number of rare and endangered plants in Yemen are not available, however, some 8 species (7 from the island of Soqotra are listed in the IUCN Red Book), plus some 19 additional species are considered endangered at the national level. Medicinal flora is not well documented in Yemen and research on the subject is limited,

however, medicinal and aromatic plants are of great interest to rural Yemenis

Yemen Fauna has a population of 71 recorded land mammal species including bats five species of gazelle have been recorded, four of which are believed to be almost extinct in the country Other species are ibex, oryx, baboon, red fox, wolf, hyena and jackal Amongst the most notable is the Arabian Leopard, which is considered endangered or already extinct and the cheetah, which has not been seen in the wild since 1963.

Yemen is very rich in bird life and more than 350 species have been recorded The presence of a wide variety of habitats and strategic positioning at the transition of three geographic regions make the country an ideal stopover in the flight paths of migrant birds, notably birds of prey and waders.

The major threats to flora are cultivation and poor agricultural practices, wood cutting for timber firewood and charcoal, over grazing, soil salination, wind erosion and expansion of villages and cities. The major threats to fauna are over hunting, killing of animals perceived as dangerous such as snakes, and destruction of habitats through deforestation and urbanization.

Terrestrial Biodiversity

Habitats and Floristics

The geographical position of Yemen and the diverse topographical features, which resulted in different ecosystem types, have given the country a great diversity of natural environments and a high level of biodiversity. Yemen is very rich in its flora and has a wide range of natural vegetation types. The vegetation of Yemen is a mixture of the East African Highlands, Sahara-Arabian regions, the Mediterranean regions and has its own endemic flora. The main natural habitats and vegetation areas[40] in Yemen can be summarized as follows.

1) Coastal Plains: Seven vegetation types have been recognized in the coastal plains:

a) *Avicennia marina association:* Avicennia marina forms mangrove swamps and occurs along the Red Sea coastal fringe, mainly north of the Wadi Siham outlet. Isolated swamps are also seen north at Yakhtol (southern Tihama) and around Bir Ali (west of al Mukalla). These mangroves serve to protect the coast from marine erosion, are valuable nursery area for fisheries and have many uses for man. Mangroves of Yemen are threatened by over-exploitation in Yemen. Occasionally other plants such as *Aeluropes lagopoides*, *Suaeda* spp. and others can occur in this association.

b) *Suaeda fruticosa* shrubland: This habitat is found along flat areas on the coast, often on mud flats known locally as Sabakha and covers an area from shore line to about 5 km inland. *Suaeda fruticosa* and *Aeluropus lagopoides* are the most common species in this habitat. The following vegetation types have been found:

- *Halopyrum mucronatum-Suaeda fruticosa* type is a dwarf shrubland and grassland
- *Aeluropus lagopoides- Suaeda fruticosa* type is a grassland
- *Suaeda fruticosa-Odyssea mucronata* type is a dwarf shrubland

[40] *After Scholte, P.T., Al Khulaidi, A.A. & Kessler, J.J. (1991); Al Khulaidi, A.A (1996); Al Khulaidi, A.A. & El-Ghouri, M. (1996).*

c) Sandy plains covered by shrubland: Sandy plains cover most of the coastal area and may reach up to 5-20 km to 20-40 km inland. The vegetatin cover ranges between 6% to 27%. Many sandy hummocks covered by vegetation are found in numerous locations. Many vegetation types composed of shrubland, dwarf shrubland and grassland dominated by *Panicum torgidum, Suaeda fruticosa and Odyssea mucronata* are found in this habitat.

d) Sand dunes area: This unit is a degraded form of the previous unit. The vegetation cover is very low (less than 5%). A sparse grassland dominated by *Odyssea mucronata* and *Panicum turgidum* with Association of *Dipterygium glaucum,* occasionally *Leptedenia pyrotechnica, Acacia tortitis, Cassi sinna and Cassia italica* can be seen.

e) Gravelly plain areas: These plains are slightly undulating and intersected by wide and shallow wadis or depressions and numerous drainage lines where the dense vegetation is found. Most of these plains are concentrated in southern Tihama (south Wadi Zabid). Many vegetation types dominated by *Lasiurus scindicus, Sarcostemma* sp., *Acacia hamulosa, Panicum turgidum* and *Commiphora myrrh* and a number of associated species comprise the woodland, shrubland and grassland in this area. The vegetation cover ranges between 12 to 35%. Winds have removed the fine materials, resulting in extensive gravel plains. This habitat is the only part of coastal plains where some natural woody vegetation remains, and is an important source of fuelwood, forage for animals and bees, and a wood supply for construction.

f) *Acacia ehrenbergiana* woodland: This woodland is common in many parts of coastal plains such as wadis, depressions and alluvial fans. Associated species are *Ziziphus spina-christi, Panicum turgidum, Acacia tortilis* and others. A pure dense stand of *Acacia ehrenbergiana* can be seen in many sites. Most or this entire habitat is protected by owners who use it as a grazing reserve and for supplies of timber, fuelwood and forage for animals and bees. *Acacia ehrenbergiana* woodlands probably covered most of the gravelly plains of northern Tihama plain in the past, but due to human activities such as cultivation, cutting of fuelwood, grazing of domestic livestock and charcoal-making, these woodlands have all but disappeared.

g) *Ziziphus spina-christi - Dobera glabra* cultivated lands: These lands are located on plains near the Tihama foothills where scattered trees of *Dodera glabra* and *Ziziphus spina-christi* may be found. On fallow lands of this unit *Dactyloctenium scindicum,* may sometimes occur in dense cover. Cultivated fields provide the main source of forage for livestock, e.g. (sorghum stover and crop residues), but fallow lands (weeds) and harvested fields are also valuable grazing areas. The trees also provide shade and good forage for domestic animals. In general the vegetation of this area is characterized by the herbaceous species, which are valuable forage for livestock such as *Dactyloctenium scindicum, Eleusine floccifolia, Echinochloa colonum, Cynodon dactylon, Eragrostes ciliaris, Cyperus rubicundus and C. rotundus.*
A woodland dominated by *Salvadora persica - Tamarix aphylla* is found along wadis. The thickets of *Salvadora and Tamarix* are important sources for firewood, forage for camels and are used as landmarks, fence and hedges and to protect fields adjacent to the wadis from flood erosion.

2) Low altitude mountains

The habitat is very rich in vegetation and important for grazing and firewood collecting. The tree and shrub cover are rich and form an important source of animal forage during dry seasons. For example trees like *Ziziphus spina-christi* and *Dobera glabra* and *Acacia tortilis* are regularly lopped to provide high quality fodder for livestock. Also there is a potential for developing the collection and marketing of *Commiphora* resin. In the past, Yemen was famous

for myrrh produced from *Commiphora myrrha* and Balm of Gilled from *C. gileadensis*. Undisturbed reverie forest (e.g. Jabal Buraa) is among the richest habitats in Yemen, with many plants including a number of endemics which have a limited distribution on the Arabian peninsula..

The Huof area is very rich in vegetation and composed of forest dominated by *Anogeissus dhofarica, Dodonaea angustifolia* and *Jatropha dhofarica*. The area is rich in species which are endemic to Huf and Dhufar region. Among the important endemic plant species are: *Maytenus dhofarensis*, *Euphorbia smithii*, *Jatropha dhofarica, Anogeissus dhofarica and Commiphora foliacea*.

A shrubland dominated by *Anisotes trisulcus, Cassia italica, Acacia mellifera and Anisotes trisulcus* are found on dry slopes and foothills with and number of associated species. A forest and woodland dominated by *Trichilia emetica, Commiphora spp. Anogeissus dhofarica, Jatropha dhofarica and Euphorbia coneata* are found on rocky slopes, valleys and wadis such as Jabal Buraa, and Huf al Mahara with many associated species..

3) Medium altitude mountains

These mountains are very rich in vegetation and are one of the major habitats where succulent species are most conspicuous, such as the area around Taiz and east of Hammam Ali. A large part of the medium altitude mountains are covered by woodland and shrubland of *Acacia* spp. especially *Acacia mellifera.* Most of the valley bottoms are heavily cultivated, and almost all trees in these valleys are privately owned. The *Juniperus procera* forest in Jabal Eraf is very rich in vegetation and is considered to be the most important vegetation site known in Yemen. It has the highest number of endemic species after Socotra Island.

A woodland dominated by *Acacia asak, Euphorbia coneata, Cadia purpurea* and *Acacia mellifera* are found on the mountain slopes and hills. Forested areas dominated by *Juniperus procera* are found on moderately steep slopes of Jabal Eraf (al Maqatirah, Taiz) and Jabal Thogan (al Qabbaitah, Taiz), between 1350-1450m. There are many associated species, some of which have not yet been identified and could be new or endemic to Yemen or to the Arabian Peninsula.

A shrubland dominated by *Acalypha fruticosa, Euphorbia cactus, Euphorbia inarticulata, Euphorbia parciramulosa* is found on the slopes of mountains around Taiz, east of Madinat Ashsharq, near Hammam Ali and south Hajjah along with numerous associated species. Most valley bottoms of medium altitude mountains (between 1000-1400 m) are heavily cultivated. Here traditional agroforestry systems are practiced agricultural terraced fields. Trees grow around the edges and inside the fields to provide shade, forage and wood sources. The main trees are *Ficus vasta, F. sycomorus, F. palmata, F. cordata ssp. salicifolia, Trichilia emetica, Tamarindus indica,* with associated of *Acanthus arboreus, Carissa edulis, Jasiminum grandiflorum* and others. Woodlands dominated by *Acacia etbaica* are found on plains, plateaus and at the base of mountains on moderately steep mountain slopes (between 1400-1800m).

4) High altitude mountains

Trees are very few at higher elevations and most of them are privately owned. Most high altitude mountain slopes are either terraced or appear bare from a distance. Dense perennial grasses grow in many areas in this habitat. The main source of fodder in cultivated areas is sorghum stover and forage crops like *Medicago sativa* (Alfa alfa). The *Acacia origena* woodland areas provide fuel wood and fodder for livestock in the dry season. The region has valuable and high quality of forage for livestock. A grassland or dwarf shrubland dominated

by *Acanthus arboreus, Barleria proxima, Scabiosa columbaria* and *Pennisetum setacem* occur on the steep montane slopes and hills between 1900-2200m, such as east and south east Wadi Mauna (between Maaber and Madinat Ashsharq) and south east Hajjah, Jabal Saber (south Taiz) and Sumara. Woodlands dominated by *Acacia origena* are found near or on cultivated fields of wadis, plains and plateaus or slopes (e.g. Ibb, NE Atturba, Jabal Saber, and Jabal Sumara).

5) Highland plains

Grasses and dwarf shrubs dominate the vegetation of highland plains. The vegetation cover ranges between 9% and 43%. The plains have almost no trees, except on lower slopes and wadis, but these trees are mainly found as scattered or as small groups not more than 5% cover and mainly *Acacia origena.* The dwarf shrub cover is very low (< 10%) in general. Herbaceous cover is relatively high (about 50%) and is dominated by *Andropogon* spp., *Eragrostes pappos, Tetrapogon villosum, Cenchrus ciliaris,* and on fallow lands *Cynodon dactylon, Eragrostes papposa, Arisdida adscensionis* are common. Open woodlands dominated by *Acacia etbaica* are found on plains below 1500 m (e.g. Qa al Qaeda). Woodlands dominated by *Acacia origena* are found on mountain slopes and terraces (between 1,950 – 2,250 m).

6) Eastern and northeast mountains

The vegetation cover and forage production of most of areas between 1800-2600 m (east highland plains) is low, probably due to low rainfall and high degree of rock cover. Also this habitat is less cultivated than the montane plains. The characteristic species are *Lavandula pubescens* and *Euphorbia balsamifera,* both species a sign of over grazing. The high altitude regions >1800 m where the grass C*hrysopogon plumulosus* is dominant are the most important grazing areas. Shrub cover is also low, probably the result of intensive collecting of woody species for firewood. The herbaceous cover is high and is dominated by *Andropogon crossotos, Chrysopogon plumulosus* and *Teterapogon villosum.* The high cover of *Euphorbia* spp. is also probably the result of wood cutting or may be due to poor environmental conditions. Trees in the region are privately owned by villages or individuals and occur in rocky areas in the northern and southern highland plains and wadis. Shrubland and dwarf shrubland cover most of the region and are dominated by *Lavandula pubescens, Helichrysum somaliense, Chrysopogon plumulosus, Kleinia odora* and *Psiadia arabica.* Open grasslands dominated by *Andrpogon crossotos* occur on plains, hills and mountains around Rada at elevations up to 2600 m. An open woodland dominated by *Acacia nilotica, Cadia purpurea, Acacia oerfota* and *Commiphora myrrha* occurs on plains, mountains, wadis and hills adjacent to the desert and in the northeastern and southern part of al Baydha governorate, or in depressions at elevations between 1800 to 2000 m. Large trees such as Brreonadia salicina, Trichilia emetica, Tamarix indica, Ficus spp. and Ziziphus spina-christi characterize the Wadis.

7) Eastern desert

Most of the region consists of an aeolian sand dune plain in which fragments of tuffic basalt and scattered volcanic cones occur. Under these conditions the only plants which can survive are those which are able to absorb the water that has infiltrated deep into the soil, such as *Panicum turgidum* which is the dominant species of this habitat (the same case at the coastal plains). Locally this plant forms pure stands of grassland. On saline soil near wadis the main species are halophytes such as *Desmostachya bipinnata, Suaeda aegyptiaca, Salsola imbricata and Tamarix aphylla.* The deposition of the alluvial materials adjacent to the wadi provides favorable conditions for sparse shrubs dominated by *Aerva javanica* and *Rhazia stricta*. This condition can be observed along the edges of wadis, but the vegetation gradually decreases as one moves from these edges to the gravely or sandy plains. In deep drainage lines that dissect the mountains or on wadis, a sparse woodland can be found, the dominant species here being

Acacia tortilis, Chrysopogon plumulosus and Aerva javanica. Acacia tortilis provides excellent firewood and the leaves and pods are an important source of fodder for domestic animals during the dry season. Perennial grasses like *Pennisetum sp., Panicum turgidum* and a dwarf shrub species are an important fodder for livestock in the rainy season. Undisturbed *Acacia tortilis* woodlands can still be found in different wadi beds.

Orchard-like *Ziziphus spina-christi* growth represents is a valuable method of cultivating fodder and provides high quality animal forage in the dry season, it also providing building materials, firewood, forage sites for bees; the fruits are eaten which are sold in local markets. The vegetation cover is very low in the region, and only few trees can be found in most parts. This could be a natural phenomenon.

A grassland-woodland association dominated by *Acacia tortilis, Panicum turgidum* and *Aerva javanica* occurs on wadis, drainage lines, along the edges of the wadi and sand dunes. A sparse shrub-woodland dominated by *Suaeda aegyptiaca* and *Salsola imbricata* occurs on undulating to almost flat, slightly saline soil areas (northern west Marib).

8) Socotra Island

Socotra Island lies at about 3625 km off the northeast corner of Africa (between latitude. 12° 19' to 12° 42', and longitude 53° 20' to 54° 30'), which is part of Hadhramot governorate. It can be divided into three main topographical zones: (1) coastal plains, (2) a limestone plateau, and (3) mountains; the elevation ranges from sea level to 1519m. The coastal plains and low inland mountains are covered by open shrubland dominated by the *Croton socotranus, Cissus subaphylla, Jatropha unicostata, Pulicaria stephanocarpa, Dendrosicypos socotrana,* and *Adenium obesum* subsp. *sokotranum.* Some 828 plant species have been recorded so far from the island, and of these about 270 are endemic. The following vegetation associations can be found in the island:

Limonium axillare - Atriplex griffithii
Croton socotranus - Cissus subaphylla
Aizon canatiensis - Salsola sp.
Salvadora persica - Cissus subaphylla
Indigofera nephrocarpoides - Panicum rigidum

At low and middle elevations (500-600m) we find a shrubland or woodland dominated by the following species: *Dracaena cinnabari, Buxus hildebrandtii, Croton socotranus, Heliotropium nigricans, Corchorus erodiodes, Trichocalyx obovatus, Rhus thyrsiflora.* At middle elevations on the plateau (about 650m) a dwarf shrubland dominated by *Aloe perry,* and *Corchorus erodiodes* can be found.

At higher elevations a woodland dominated by *Dracaena cinnabari, Buxus hildebrandtii, Croton* sp. and *Rhus* sp. can be found. In the valleys a thicket trees and shrubs are found, with the characteristic species being *Tamarix* sp., *Ormocarpum caeruleleum, Mussoenda capsulifera, Jasminum grandiflorum, Porana obtusa* and others. Many plants are used for the purposes of dyeing such as *Gaillonia tinctoria, Indigofera,* and *Roccella tinctoria.* Among important and valuable species are the Dragon's Blood Tree *Dracaena cinnabari*, which is found on the high altitude plateau and mountain grasslands (gum-resin exudes in tears from the stem of the Dragon's Blood Tree). Other gum-resin producing trees are *Boswellia* spp. and *Aloe perry.*

Wetlands

Yemen's wetlands can be divided into natural and man-managed systems. The first category

includes four subdivisions:

- Marshes and lagoons, around Aden, which form a suitable refuge for several species of birds.
- Mangrove sites in the Tihama "west coast of Yemen" and Bir Ali mangrove site on the southern coast.
- Valleys and permanent streams all over the country which support all kinds of freshwater biodiversity, including microorganisms, various invertebrates, fish, amphibians, birds, and many plant species.
- The swamps of Taiz, the only known site in Yemen for the globally threatened Bald Ibis *Geronticus eremic*.

The man-managed systems, on the other hand include the lake of Marib Dam, which is the largest freshwater body within the Arabian Peninsula. This lake can play an important role in the conservation of large numbers of freshwater species.

Vegetation

The flora of Yemen is very rich and heterogeneous. Species diversity is a result of considerable climatic changes in former periods, which enabled different species to survive in the different ecological habitats. Over 3000 plant species are possibly found in the mainland, and about 10% of them are endemic. One checklist[41] comprised 467 plant species belonging to 244 genera from 71 families. Socotra Island is unique in its flora and like many oceanic islands, has a high level of endemism. The latest study reported that Socotra contains approximately 850 plant species, 254 (about 30%) of which are endemic. Out of the eighteen plant genera endemic to the Arabian Peninsula, ten genera are restricted to the Socotra archipelago[42].

The majority of endemic taxa in Yemen are associated with mountainous areas, which provide a rich variety of ecological niches and offer a degree of environmental stability during periods of climatic changes. Endemism is generally very high among the succulent plants. The largest numbers of endemic species are found within the Asclepediaceae taking into account the Stapeliad genera (*Carraluma*, *Duvalia*, *Huernia*, and *Rhytidocaulon*). Euphorbiaceae and Aloeceae also have high percentage of endemism as they include the succulent *Euphorbia* and *Aloe* species respectively. Socotra Island contains about 30% of endemic species.

Precise data on the status and number of rare and endangered plants are not available. Some eight species (seven of these from Socotra) are included in the IUCN Red Data Book as being endangered or rare, and an additional 19 species are considered to be endangered or rare at the national level in Yemen.

The medicinal flora in Yemen is not yet well documented, as research on this subject is still limited. However, medicinal and aromatic plants are of great interest and use to Yemenis. There are accumulated experiences in using these plants as traditional remedies to cure an endless list of diseases in different areas of the country while others are used as cosmetics, condiments, coloring matters and flavoring agents. A list of 224 medicinal and aromatic plants species along with their scientific names, families, vernacular names, distribution, active

[41] *Compiled by S. Gabali & A. Gifri, (1990).*

[42] *A. Miller, (1999).*

substances, medicinal part and medicinal use has been complied[43]. A similar study concentrated on the use of medicinal plants endemic to Yemen[44].

Other uses include 19 species of common trees and shrubs used for fuel wood, seven species used as timber for construction, another 19 species for dune stabilization and a great number of plants (weeds, trees, shrubs, grasses and some succulents) are used by grazing ungulates.

Terrestrial Fauna

Yemen has a rich and diverse terrestrial fauna is primarily due to two factors:

- The wide range of habitats in the country that vary from the highest mountains, to the plains, dry sand-deserts, marshes, coastal habitats and volcanic ocean islands;
- The country's position at the juncture of three major biogeographic regions, the Palaearctic, Afrotropical and Oriental regions.

Mammals

Yemen has a population of 71 recorded land mammal species represented by eight orders including the bats (See Table 4.17). About one third of the mammals are relatively large-sized species some of which are rare in other parts of Arabia. Five species of gazelle have been recorded in Yemen[45] the most common being the "Idmi" or Arabian Mountain Gazelle (*Gazella gazella*) which is typically found in Acacia and Savanna-like habitats, but close to barren rocky hills with wadis and depressions that support a scarce vegetation of mainly *Acacia tortoils, Leptadenia pyrotechnica* and *Panicum turgidum.* The remaining four species are rare, and are believed to be almost extinct in the country[46]. The Rhim or the Goitered Gazelle (*Gazella subguturosa*) is the typical desert gazelle being larger and stouter than the other four species. It is possible that Rhim may still occur in the most remote areas close to the hot desert area of Al-Rub Al-Kahli near the border with Oman. The Dorcas Gazelle (G*azella saudiya*), the smaller and lighter species with relatively longer horns, formerly inhabited the plains of the interior but has not been reported in recent times, and is believed to be almost certainly extinct in the country. The Queen of Sheba's Gazelle (*Gazella arabica bilkisi*) is known only from Yemen. Four specimens collected in the past few years were represented to be held in a private collection in the State of Qatar[47]. Two specimens from Ma'bar were currently held in the Field Museum of Natural History, Chicago[48].

Table 11. Preliminary record of orders, families, genera, and species of mammals

Order	Family	Genus	Species
Insectivora	2	3	6
Primates	1	1	1
Carnivora	6	11	16
Hyracoidea	1	1	1
Lagomorpha	1	1	1

[43] *Al-Dubaie and Al Khulaidi (1995).*
[44] *Al-Dubaie (1993)*
[45] *Al-Jumaily (1998).*
[46] *Groves (1997).*
[47] *Stauart & Stauart (1997)*
[48] *Greth et al (1993).*

Artiodactyla	1	4	8
Rodentia	4	9	15
Chiroptera	8	18	23
Total	24	28	71

The Ibex (*Capra ibex nubiana*) still occurs in the eastern part of Yemen, inhabiting the difficult rocky slopes in mountainous areas which have served to protect the animals from hunters in vehicles. The Arabian Oryx (*Oryx leucoryx*) is almost certainly extinct in the wild, and there is no evidence that it exists within the accessible terrain in the deserts of northeastern part of Yemen. The Baboon (*Papio hamadryas*) is still found in hilly terrain, preferring rocky slopes usually in the vicinity of permanent water. There has been a serious decline in the Baboon population with the occupation of nearly all water sources and fertile wadis by man.

The Arabian Red Fox (*Vulpes vulpes arabicus*) and the Striped Hyaena (*Hyaena hyaena)* are probably the most abundant mammals in Yemen and inhabit adequately vegetated areas throughout different parts of the country. Although the Striped Hyaena is primarily known as a scavenger feeding on carcasses of dead animals, people in many parts of the country have complained about Hyaenas attacking their domestic animals and raiding watermelon crops in the field. Two other species of foxes found in Yemen are Sand Fox (*Vulpus ruppelli*) a paler and smaller species with larger ears that inhabits the desert, and Blanford's Fox (*Vulpes cana*), similar to the Sand Fox in general appearance but inhabits rocky slopes. Its occurrence in Yemen is not certain. The Arabian Wolf (*Canis lupus arabus*) is found in many areas, especially in the eastern part of the country. The Jakal (*Canis aureus*) is a wolf-like animal and can be found near human settlements.

The Family Felidae has the largest number of members and is represented by 5 genera and 6 species, all of which are considered endangered or extinct. Among the most notable are the Arabian Leopard (*Panthera pardus nimr*), a very rare, if not an extinct mammal in Yemen, which was known to inhabit the rocky slopes of mountainous and hilly terrain. Recent reports indicate that a leopard was captured near the area of Wadeah, and was sent to the United Arab Emirates for a captive breeding program[49]. The Cheetah (*Acinonyx jubatus*) has not been observed in the wild in many years. Ducker saw the last individual in March 1963 in Wadi Mitan. However, there is some evidence that cheetah may still survive in remote areas of the southern part of the country. A stuffed skin of cheeta was seen hanging on a building in Ataq in 1985, and was said to have been killed in the area.

Table 12. Extinct and endangered mammals of Yemen

ENDANGERED		**EXTINCT (in the wild)**	
Scientific name	**English name**	**Scientific name**	**English name**
Gazella gazelle	Arabian Mountain Gazelle	*Gazella arabica bilkis*	Queen of Sheba's Gazelle
Gazella subgutturosa	Goitered Gazelle	*Oryx leocoryx*	Arabian Oryx
Gazella saudiya	Dorcas Gazelle	*Acinonyx jubatus*	Cheetah
Capra ibex nubiana	Ibex	-	-
Canis lupus arabs	Arabian Wolf	-	-
Canis aureus	Jakal	-	-
Panthera pardus nimr	Arabian Leopard	-	-

[49] *Nabil A. Obadi, personal communication March 1999*

Birds

Yemen has a very rich bird fauna with more than 363 species thus far recorded representing 18 orders, 61 families and 177 genera. The main reasons for this richness are:

- Presence of a wide array of habitats (mountains, Tihama plains, wetlands and marshes, coastal areas, Gulf of Aden and Red Sea, and agricultural landscapes of many varieties) largely the result of the broad range of elevations and climate;
- Geographic isolation by the sea and deserts, resulting in 13 endemic or near-endemic species;
- Yemen's position at the transition zone of three bio-geographic regions: Afro-tropical, Oriental and Palaearctic, resulting in a mixture of species from all three; and
- The country's strategic position at the foot of the Arabian Peninsula, thus acting as an important stop-over in the path of flyways for migrant birds, notably birds of prey and waders.

From the 363 bird species recorded in Yemen, seven groups are of particular importance:

a) Globally Threatened Species:

- Bald Ibis (*Geronticus eremita)*: Yemen is probably a vital wintering area for a small population of this species and may possibly even be their breeding ground. The retention of grazing marshes, especially in the Taiz area is critically important.
- White-eyed Gull (*Larus leucophthalmus)*: Occurs throughout the year on the coast and may well breed on Yemen's off-shore islands.

The main threats are oil pollution and destruction of nesting colonies through man's activities. Other important species are shown in Table 5.11 below.

Table 13. Globally threatened birds found in Yemen

Species	English Common Name	Endemic in Yemen	Restricted Distribution Including Yemen
Aquila clanga	Greater Spotted Eagle		
Aquila heliaca	Imperial Eagle		
Aythya nyroca	Ferruginous Duck		
Crex crex	Comerake		
Emberiza socotra	Socotra Bunting	*	
Falco naumanni	Lesser Kestrel		
Geronticus eremic	Northern Bald Ibis		
Larus leucophthalmus	White-eyed Gull		*
Onychognathus futer	Socotra Starling	*	
Parisoma buryi	Yemen Warbler	*	
Turdus menachesis	Yemen Thrush	*	

b) Species Endemic to Southwest Arabia

Yemen holds significant, and in most cases the major populations of 13 species unique to southwest Arabia. For a small country to be so richly endowed with endemic birds adds greatly to its international significance. With the exception of the Arabian Golden Sparrow (*Passer*

euchlorus), all endemic species occur in the highlands.
The Arabian Accentor (*Prunella fagani*) is known only from the highlands of Yemen mainland. The demise of the terracing systems could adversely affect several of the endemics, as the resultant soil erosion will cause loss of trees.
Acacias in the highlands, even isolated trees or clumps, are important for the Arabian Woodpecker (*Dendrocopos dorae*), Yemen Thrush (*Turdus menachensis*), Yemen Warbler (*Parisoma buryi*), Arabian Serin, (*Serinus rothschildi*), Golden-winged Grosbeak (*Rhynchostruthus socotranus*), and Yemen Linnet (*Carduelis yemenensis*). The distribution of endemic and semi endemic birds in mainland Yemen, Socotra, and two neighboring areas is shown in Table Below

Table 14. Endemic and semi endemic bird species in Yemen

Species	Endemic to Yemen		Semi Endemic		
	Mainland	Socotra	Yemen	Asir	Dhofar
Alectoris melanocephala (Red-legged Partridge)			*	*	*
Alectoris philbyi (Philby's Rock Partridge)			*	*	
Apus berliozi berliozi		*			
Carduelis yemenensis (Yemen Linnet)			*	*	
Cisticola haesitata		*			
Dendrocopos dorae (Arabian woodpecker)			*	*	
Emberiza socotrane (Soqotra Bunting)		*			
Estrilda rufibarba (Arabian Waxbill)			*	*	
Incana incana		*			
Nectarinia balfouri (Balfour Sunbird)		*			
Oenanthe lugens boscaweni (Mourning Wheatear)				*	*
Oenanthe lugens lugentoides (Mourning Wheatear)			*	*	
Onychognathus frater		*			
Otus senegalensis pamela (Senegal Scops Owl)			*	*	*
Otus senegalensis socotranus		*			
Parisoma buryi (Yemen Warbler)			*	*	
Passer euchlorus (Golden Sparrow)			*	*	
Passer insularis (Socotra Sparrow)		*			
Prunella fagani (Arabian Accentor)	*				
Rhynchostruthus socotranus percivali			*	*	*
Rhynchoxtruthus s. socotranus (Golden-winged Grosbeak)		*			
Serinus menachensis (Yemen Serin)			*	*	
Serinus rothschildi (Olive-rumped Serin)			*	*	
Turdus menachensis (Yemen Thrush)			*	*	
Zosterops socotrana (Soqotra White-eye)		*			

c) Seabirds
The biological richness of the Red Sea and offshore islands of Yemen combine to make an ideal feeding and breeding area for seabirds, notably Red-billed Tropicbird (*Phaethon aethereus*), Masked Booby (*Sula dactylatra*), Brown Booby (*Sula leucogaster*), Sooty Gull (*Larus hemprichii*) and possibly White-cheeked Tern (*Sterna repressa*). The globally threatened White-eyed Gull (*Larus leucophthalmus*) may also breed there. All these species plus many others feed in the relatively shallow inshore waters along the coast of Yemen. Oil pollution, disturbance from military activities, port developments and planned tourist facilities may all have an adverse effect on the seabirds. The lack of recent information on the status of these birds in Yemen makes specific recommendations impossible. However, priority should

be given to an ornithological survey of the offshore islands.

d) Waterbirds

Freshwater habitats are rare in Yemen. Concentrations of ducks and grebes occur in just two areas (both recently created sewage lagoons) but rarely exceed 1000 birds. These, together with the new dam at Ma'rib, may result in a notable increase in the numbers of waterbirds in winter; they have already led to some species breeding for the first time in Yemen.

For wading birds, coastal areas are important, particularly where wadis reach the sea. While comprehensive counts have not been undertaken it would appear that the biologically rich mudflats are particularly important for the following species: Carb Plover (*Dromas ardeola*), Greater Sand Plover (*Charadrius leschenaultii*), Lesser Sand Plover (*Charadrius mongolus*), Sanderling (*Calidris alba*), Little Stint (*Calidris minuta*), Curlew Sandpiper (*Calidris ferruginea*), Bar-tailed Godwit (*Limosa lapponica*), Grey Plover (*Pluvialis squatarola*), and Redshank (*Tringa totanus*). Storks, herons and egrets also occur on passage in small to moderate numbers but no important concentrations have been discovered. White Storks (*Ciconia ciconia*) winter in small numbers at freshwater sites and breeding species include Abdim's Stork (*Ciconia abdimii*) (on Tihama rooftops), Reef Heron (*Egretta gularis*) (coast), Cattle Egret (*Bubulcus ibis*) (trees on Tihama and foothills), Green-backed Heron (*Butorides striatus*) (mangroves), and Pink-backed Pelican (*Pelicanus rufescens*) (mangroves); though none have been censused. Despite the close proximity of many breeding colonies to villages and human activities, there is no evidence of interference or persecution. The highest conservation priority concerning waterbirds is of course the Bald Ibis, mentioned under 'Globally Threatened Species'.

e) Raptors

Raptors frequently suffer more than other species in terms of both indirect (e.g. pesticide pollution) and direct persecution. However neither is common in Yemen. As a consequence there appears to be a healthy raptor population with some 17 resident species and a further 15 occurring regularly on passage or in winter. The limited information suggests that the country is in the path of an important flyway, at least in autumn, for migrant Steppe Eagles (*Aquila rapax*), Buzzards (*Botu* spp.) and Black Kites (*Milvus migrans*) passing from their Palearctic breeding grounds to their main wintering area in East Africa. Clearly there is an international responsibility to ensure that these birds are unmolested.

f) Migrant and Wintering birds

Over 220 species have been recorded on migration in Yemen; mention has been made already of the waders, white storks and raptors. A number of passerines or near-passerines also occur on migration and/or in winter in what appear to be significant numbers. These are Golden Oriole (*Oriolus oriolus*), Bee-eaters (*Merops* spp.), Short-toed Lark (*Calandrella brachydactyla*), Swift (*Apus* spp.), Swallow (*Hirundo rustica*), Tawny Pipit (*Anthus campestris*), Yellow Wagtail (*Motacilla flava*), White Wagtail (*Motacilla alba*), White throated Robin (*Irania gutturalis*), Black Redstart (*Phoenicurus ochrurus*), Redstart (*Phoenicurus phoenicurus*), Stonechat (*Saxicola torquata)*, Isabelline Wheater (*Oenanthe isabellina*), Pied Wheater (*Oenanthe pleschanka*) , Olivacous Warbler (*Hypolais pallida*), Menetries' Warbler (*Sylvia mystacea*), Desert Lesser Whitethroat (*Sylvia curruca minuta*), Chiffchaff (*Phylloscopus collybita*), Isabelline Shrike (*Lanius isabellinus*), and Great Gray Shrike (*Lanius excubitor*).

g) The Arabian Bustard (Ardeotis arabus)

Within the Arabian Peninsula, Yemen is probably now the only country with a self-sustaining population of Arabian Bustards. This may in fact be partly supplemented by migrants crossing the Red Sea. The species may be threatened from hunting on the Tihama, the only place where this bird occurs in the country.

Reptiles and Amphibians

The herpetological fauna of Yemen is less studied than the mammals and birds, nevertheless new species continue to be discovered and described. Presently the recorded reptiles and amphibians of Yemen include 117 species. Eight are amphibians belonging to four genera, three families, and one order, while the remaining 109 species are reptiles belonging to 54 genera, 18 families and two orders.

The reptiles of Yemen include 71 species of lizards, 28 snakes and three amphibians, all belonging to the Order Squamata, which comprises the largest reptilian group. Turtles (Order Testudinata) are represented in Yemen by six species, one terrestrial species (*Geochelon sulcata*), one freshwater species (*Pelomadora subrufa*) and four species of marine turtles[50].

Table 15. Preliminary records of orders, families, genera and species of the classes of reptiles and amphibians in Yemen

Class	Order	Suborder	Family	genus	species
Amphibia	*Anura*	____	3	4	8
Reptilia	*Squamata*	*Lacertilia*	6	22	71
Reptilia	*Squamata*	*Amphisbaenia*	1	3	3
Reptilia	*Squamata*	*Ophidia*	7	22	28
Reptilia	*Testudinata*	____	4	7	7

The 71 species of lizards recorded in Yemen belong to 22 genera and six families (Table 16), and the 28 snake species are shown in Table 17

Table 16. Number of lizard species and their families, recorded in Yemen.

Family	Number of genera	Number of species
Agamidae	3	11
Chamaeleonidae	1	5
Geckonidae	7	34
Lacertidae	5	9
Scincidae	5	10
Varanidae	1	2
TOTAL	22	71

Table 17. Number of snake species, and their families in Yemen.

Family	Number of genera	Number of species
Boidae	1	2
Colubridae	12	15
Elapidae	2	2
Hydrophiidae	1	1
Leptotyphlopidae	2	3
Typhlopidae	1	1

Viperidae	3	4
TOTAL	22	28

Invertebrates

Five classes, 38 orders, 313 families, 1833 genera and 3372 species represent the terrestrial Arthropods in Yemen. Unfortunately all these species are listed in the literature only and by no means can serve for identification purposes. Almost all studies on Arthropods have been made by expatriates, and it seems that specimens were taken abroad for identification and never returned back, neither were duplicates left in any institute in the country.
Presently Yemen has no recorded specimens in its collections.

Table 18. Preliminary records of classes, orders, families, genera and species of terrestrial arthropods in Yemen

Class	Order	Family	Genus	Species
1-Arachnida	8	52	134	252
2-Malacostraca	1	5	7	11
3-Diplopoda	2	2	2	5
4-Chilopoda	2	4	6	12
5-Hexapoda	25	250	1,684	3,092
TOTAL	38	313	1,833	3,372

The Class Arachnida (scorpions and spiders) is second after the insects in the number of species that have been recorded in Yemen. It is represented in Yemen by eight orders, 52 families, 134 genera and 252 species (see Table 19)

Table 19. Preliminary record of orders, families, genera and species of the Class Arachnida

Order	Family	Genus	Species
Scorpiones	3	8	19
Amblypygi	1	1	1
Uropygi	1	1	2
Araneae	31	85	160
Opiliones	2	2	3
Acari	8	25	49
Pseudoscorpiones	3	6	7
Solifugae	3	6	11
TOTAL	52	134	252

The remaining invertebrates recorded from Yemen are shown in the following table.

Table 20. Invertebrates other than Archnida recorded from Yemen

Class	Order	No. of families	No. of genera	No. of species
Malacostraca	Isopoda	5	7	11
Diplopoda	Polydesmida	1	1	3
"	Spirostreptida	1	1	2
Chilopoda	Scolopendromorpha	2	4	4

"	Geophilomorpha	2	2	3
Hexapoda	25 orders	250	1,684	3,092
TOTAL	30	261	1,699	3,115

Sustainable Use of Terrestrial Biodiversity

Several plant species are known to be used for different purposes in Yemen. These include:

- Grazing plants: There is a long list of plants including grasses and weeds, used for grazing by livestock.
- Aromatic and medicinal plants: There is a long list of plant species used in folk medicine as remedy for different disorders. Among the most commonly used plants are *Cassia senna*, (leaves used as laxative); *Ziziphus spina-christie*, (antiseptic); *Lowsonia inermis* (antiseptic and cosmetic); *Mentha longifolia* (for abdominal disorders); *Withania somnifera* and *Solanum incanum* (dental analgesic); and *Anisotes trisulcus* (for kidney stone.
- Wood for fuel, timber and sand stabilization: A number of plant species are used as fuel in rural areas in Yemen. The most common ones include *Accacia* spp., *Acalypha fruticosa, Cadia purpurea, Ficus* spp., *Rumex nervosus, Tamarix* spp., and other plant species. Plants used as timber for construction include *Acacia* spp., *Cordia africana*, *Ficus* spp., *Terminida brownii, Trichlia emetica,* and *Ziziphus spina-christi*. Moreover, a few trees and shrubs are used for sand stabilization in windy areas.
- Certain birds, such as *Alectoris* spp., Guinea fowl, pigeons, doves, and bustards are hunted for food, and some game animals are also killed for human consumption.

Threats and Constraints

Threats to the Vegetation : The country's vegetation is being drastically reduced by rapid degradation of the environment, a direct result of desertification and droughts, among the oldest global environmental phenomena. These phenomena have increased drastically in Yemen and threaten about 90% of the land and can be attributed to the following:

a) Cultivation and poor agricultural practices;
b) Wood cutting for firewood, timber and charcoal;
c) Over grazing;
d) Soil Salination;
e) Wind erosion and Sand dune encroachment; and
f) Construction expansion in cities and villages.

Threats to Terrestrial Fauna: Threats to terrestrial fauna in Yemen are common to many countries in the regions and are mainly:

a) Destruction, degradation and loss of habitats;
b) Over-hunting and proliferation of firearms; and
c) Road construction opening up avenues into the hinterland.

Threats to Freshwater Biodiversity: Threats to freshwater biodiversity in ranking order of importance include:

a) Overuse and depletion of water;
b) Degradation of wetland ecosystems;
c) Improper application of pesticides;
d) Use of chemical fertilizers;
e) Contamination of ecosystems with sewage; and
f) Contamination by industrial waste.

Coastal Biodiversity

Coastal Habitats

Sandy coasts: Sandy shores are predominant along the Red Sea coast of Yemen. Also in some sites along the south coast, sandy coasts offer a very important nesting sites for turtles such as Green turtles (*Chelonia mydas*) and Hawksbill turtle (*Eretmochelys imbricata*) Perim Island, Zugar, the Hanish Archipelago in the Red Sea, Socotra, Sharma and Jethmun beaches in the south of Yemen are reported as important turtle nesting areas.

Rocky coasts: Rocky shores are mainly found along the southern coasts of Yemen (for example: Aden and little Aden, east of Mukkalla). Limestone cliffs are found near sharma bay, at Ras Sharwayn and at Ras Fartak. The ecology and composition of fauna and flora with the rocky shores habitats of Yemen are not well known.

Mangrove swamps: Along the Red Sea coast, mangrove swamps are found mainly north of Al-Urj. Obviously, mangroves have been observed associated with khawrs and sabkhahs. Mangroves swamps are considered as a highly productive natural system and act as nursery and feeding grounds for some important fishery resources, including marine shrimp (K. Hariri, 1998). Mangroves are characteristically found in the intertidal zone and growing along the brackish and seawater shores. They are distributed in the tropics and their latitudinal limits are dominated by low air temperature and sometimes-extreme salinities.

Palm groves: On the Red Sea coast, most of the wadi discharge directly into the sea at several places in Tihama plain, such as Al-Khawkhah. We can found fresh water by digging a few centimeters near the shore, hence we can found palm near the sea water like dom palm (*Hyphaena thebaica*) and date palm (*Phoenix dactylifera*).

Coastal Species

Mangroves: Mangroves are important biological features of Yemeni coast, providing the basis for many important marine food chains. The leaves after decomposition result in detritus and bacteria, which provide food for meiofauna, mollusks and crustaceans, including some commercial species of shrimps. They also provide nesting sites for shore and sea birds. They form one of the several recognized critical marine habitats in Yemen.

Two species of mangroves were recorded from the Yemen Red Sea coastal area; *Avicenna marina* (Black Mangrove), and *Rhizophora mucronata* (Red Mangrove). The total area of *A. marina* in Yemen Red Sea form 12% of the coastal strip with 100-200m wide and up to 5m high. The majority of mangrove stands occur to the north of Al-Urj; whereas the large stands occur around the Oreste point of the Yemen/Saudi border and Al-Luhayah/Bahr Ibn Abbas area. *R. mucronata* was recorded from a small island of one hectar area in Khor Kathib near Al-Hudydah.

The conditions along the Gulf of Aden coast are not suitable for mangroves growing. Because the upwelling phenomena which bring the deeper cold water to the surface, which is rich with nutrients cause more turbidity and because the competition with macroalgae, only one instance of a small (less than 1 ha) monospecific thicket was recorded. This is situated 4 km north of Khor Showran near Bir-Ali. There is a crater lake fringed with mangrove. The species is *A. marina.* This species is also recorded from Socotra Archipelago.

Fresh water vegetation: Fresh water vegetation includes those plants, which have a relatively low salinity tolerance and require an almost continuous supply of fresh water. Al-Khawkhah, Yakhtul, Al-Urj and Wadi Al-Mulk (North of Al-Mukha) are suitable areas for growing this type of vegetation in the Red Sea coast and Ahwar, Al-Hiswa in the Gulf of Aden, also in Socotra because the fresh water source is close to the surface (ex. 10cm deep in Al-Khawkhah).

There are four species recorded from the Yemen coastal area of the Red Sea and Gulf of Aden, These are:

- *Phoenix dactylifera* (Date Palm) covers most of the area between Al-Hudydah and Yakhtul in the Red Sea region and Ahwar in the Gulf of Aden.
- *Hypaene thebaica* (Dom Palm) recorded from Al-Urj and Al-Jabanah north of Al-Hudydah.
- Palm like trees *Pandanus odoratissimus* recorded only in Al-Mujaylis and al-Fassah in the Red Sea coast.
- *Salvadora persica* trees (A'arak) dominate between Al-Mukha and Dhubab, also between Ras Qawa'a and Khor Umirah. Many local people use the roots of this tree as toothbrushes.

Halophytes: Halophytic vegetation usually occurs where a fresh ground water supply is limited or absent and where saline intrusion is rare. Five species of halophytes were recorded from the Red Sea coastal area of Yemen, and 16 species were recorded from Socotra Archipelago coastal area. This type of flora has the ability of limiting beach erosion and allows other less tolerant species to germinate Halophytic vegetation supports a variety of fauna such as insects and birds. They also provide nesting places for several sea birds. Moreover, they form grazing ground for goats and camels.

Birds: The Arabian Peninsula is an important "land bridge" between Africa, Asia and Europe for approximately three billion birds, which annually migrates along north-south or east-west routes. A number of these birds can be observed along the coast of Yemen. About 82 species of sea and shore birds were recorded from the coastal area of Yemen along the Red Sea; in which 14 species were endemic to the region. Fifteen species were also recorded from the southern coastal region of Yemen. In Socotra Archipelago a total of 70 species were known to be found, however the following species were endemic to the region:

1- *Phalacrocorax nigrogularis*
2- *Onychognathus frater*
3- *Passer insularis*
4- *Fringillaria socotrana*
5- *Cyaromitra balfouri*
6- *Incana incana*
7- *Cisticola haesitata*

Marine Turtles: Marine turtles spend the whole of their life in the sea, except when they come briefly ashore to lay their eggs on the sandy beaches. In general, nesting sites for turtles usually located on restricted beaches of ideal conditions. The suitable supra-littoral zone for nesting must not be prone to the flooding during high tide. Thus, these sites are considered critical to the survival of marine turtles. Nearly, all species of marine turtles are regarded as endangered animals world wide by the IUCN. Four species of turtles were recorded from the Yemeni waters. These species are:

1- *Chelonia mydas* (Green turtle)
2- *Eretmochelys imbricata* (Hawksbill turtle)
3- *Caretta caretta* (Loggerhead turtle)
4- *Dermochelys coriacea* (Leatherbacks turtle)

Caretta caretta was recorded from Socotra Archipelago only. In particular, Ras Sharma beach

is considered as the most important nesting area for the Green Turtle in the entire Arabian Region, including the Red Sea and Gulf of Aden. Approximately nesting 1,000 turtles were recorded in this area.

Threats

The following are considered the major threats to the coastal environment of Yemen:

- Uncontrolled use of coastal zone
- Destruction of coastal habitats and ecosystems
- Spatial conflicts among various users
- Unplanned coastal reclamation
- Liquid and solid waste pollution from sewage, industrial plants, ports facilities
- Agro-chemicals flushed by floods
- Cutting of mangroves for wood and use of mangroves for feeding camels

Protected Areas (Declared and Proposed)

In Yemen there are 36 important ecological sensitive areas 2 of which have been declared Protected Area s (Autma and Socotra), 4 were under declaration as at October 2003 and 30 proposed for declaration. The list of these areas is provided hereafter to together with their characteristics and location (Governorates and Physical Regions).

Table 21. List of Ecological sensitive Areas in Yemen
(Source: EPA)*

Status	No	Location	Characteristics	Governorate	Physical Region
Declared	1	Socotra	Protected Area	Hadhramout	Yemeni Islands
	2	Automa	Protected Area	Dhamar	Mountain Massif
Under Declaration	3	Belhaf – Berum – Bir Ali	Marine Protected Area+Birds	Hadhramout + Shabwa	Eastern Plateau
	4	Ras Sharma-Jathmun and nearby areas	Green Turtles Protected Area	Hadhramout	Eastern Plateau
	5	Hawf	Forest – Wild Animal	Al Mahra	Coastal Plains
	6	Jabal Bura'a	Protected Area-Forest	Al-Hudaidah	Coastal Plains
Proposed for Declaration	7	Jabal – Eraf	Forests (Juniper)	Lahj	Coastal Plains
	8	Tarim	Wild Animal Protected Area	Hadhramout	Eastern Plateau
	9	Qishen	Wetland	Al Mahra	Coastal Plains
	10	Myfa'a	Wild Gazelle	Shabwa	Coastal Plains
	11	Al-Luhaya	Marine Protected Area +Birds	Al Hodeidah	Coastal Plains
	12	Kamaran Island	Mangrove + Coral River	Al Hodeidah	Coastal Plains
	13	Al-Zubair, Zuqar Island, Hunaish Archipelago	Coral River + Biomarine	Al Hodeidah	Yemeni Islands
	14	Aljah – Gulaifigah	Wetland	Al Hodeidah	Coastal Plains
	15	Al-Fas'ah	Wetland	Al Hodeidah	Coastal Plains
	16	Al-Takrir		Al Hodeidah	Coastal Plains
	17	Qataba	Mangrove Protected Area	Al Hodeidah	Coastal Plains
	18	Al-Wahija	Mangrove + Wetland	Al Hodeidah	Coastal Plains
	19	Bahr Ibn Abas	Mangrove + Wetland	Al Hodeidah	Coastal Plains
	20	Yakhtul	Herbs Marine + Mangrove	Al Hodeidah	Coastal Plains
	21	Tihama	Bustard Bird	Al Hodeidah	Coastal Plains
	22	Bany Jabr, Bany Suham	Wild Animals + Plants	Sana'a	Mountain Massif
	23	Jabal Al-Lawz	Bidiversity (Ibex)	Sana'a	Mountain Massif
	24	Kussma	Natural Park	Sana'a	Mountain Massif
	25	Raimah	Forests	Sana'a	Mountain Massif
	26	Al-Arem	Biodiversity	Sana'a	Mountain Massif

	27	Al-Ghourira	Wetland	Taiz	Mountain Massif
	28	Bab Al-Mandab	Wetland + Birds	Taiz	Coastal Plains
	29	Birds Lake (Aden Coastal Wetlands)	Birds	Aden	Coastal Plains
	30	Khour Umairah	Mangrove + Wetland	Aden	Coastal Plains
	31	Meedy	Mangrove	Haja	Coastal Plains
	32	Chain of Al-Kore Mountains	Wild Animal (Leopard)	Abian	Coastal plains
	33	Al-Rivadi	Natural Park	Al-Mahwit	Mountain Massif
	34	Al-Dhababia Valley	Wild Anima (Gazells)	Al-Baidha	Mountain Massif
	35	Ketfah	Biodiversity	Sa'ada	Mountain Massif
	36	Wadia'A	Arabic Leopard	Amran	Mountain Massif

The Protected Areas already declared include:

- **Socotra**, Socotra Island lies at about 3625 km off the northeast corner of Africa (between latitude. 12º 19' to 12º 42', and longitude 53º 20' to 54º 30'), which is part of Hadramout governorate. Some 828 plant species have been recorded so far from the island, and of these about 270 are endemic. The following vegetation associations can be found in the island:
    - *Limonium axillare - Atriplex griffithii*
    - *Croton socotranus - Cissus subaphylla*
    - *Aizon canatiensis - Salsola* sp.
    - *Salvadora persica - Cissus subaphylla*
    - *Indigofera nephrocarpoides - Panicum rigidum.*

- **Otma** is located in the highlands where variety of flora and funa exist. The following edemic bird species live in Otma, just to name a few:
    - Arabian Red-legged Parirdge *Electoris Melanocephala*
    - Yemen Warbbler *Parisomaburui*
    - Arabian Woodpecker *Dendrocopos Dorae*

The 4 areas proposed include (see ***Figure 5.5*** overleaf for location)

- **Belhaf, Berum and Bir Ali**: it is a coastal shore line area which extends for 75 km in the boarders of Shabwa and Hdhramout. In particular Bir Ali includessSeveral sites of conservation importance such as:
    - Karif Shoran, a unique habitat, consisting of a volcanic crater lagoon with mangrove vegetation, which is the only site on the southern coast.
    - The three islands of Baraqa, Sikha and Hallaniyah lying less than 10 km off Bir Ali on the Gulf of Aden coast, all important sites for breeding of the endemic Socotra Cormorant *(Phalacrocorax nigrogularis*) and Sooty Gull (*Larus hemprichii*).

- **Ras Sharma, Jathmum and nearby Areas:** A coastal line shore areas in Hadhramout having a total length of 50km.

- **Hawf:** This site is located in the southeast part of Yemen in Al-Mahara Governorate at the border of Oman. The area faces the Arabian Sea, has a coastline of some 18km and a relief of 1,800m in its limestone mountains. With its 20,000 has extension wawf is considered the largest forest in Yemen. The area has rich vegetation and of forests dominated by *Anogeissus dhofarica, Dodonaea angustifolia* and *Jatropha dhofarica*. The site is rich in species endemic to the Huf and Dhufar regions. Among the important endemic plant species are: *Maytenus dhofarensis, Euphorbia smithit, Jatropha*

dhofarica, Anogeissus dhofarica, Commiphora faliacea. The major floristic communities of Huf include:

1) Anogeissus dhofarica-Jatropha dhofarica community
2) Dodonaea angustifolia community
3) Acacia etbaica community
4) Maytenus dhofarensis - Dodonaea angustifolia
5) Allophylus rubifolia - Dodonaea angustifolia

The area is important for grazing; there are traditional rules by which the local people protect the vegetation, including controls on cutting of green wood.

- **Jabal Bura'a**: The site is located in the Tihama foothills about 20 km southeast of Bagel. The altitudinal range falls between 400-2000 m. Jabal Buraa is 4,100 ha large and is considered to hold some of the richest habitats in the entire Arabian Peninsula. The main vegetation communities are:
  1. *Antsotes trisulcus* community
  2. *Maytenus sp.*
  3. *Acalypha fruticosa* community
  4. *Abrus bottae* community
  5. *Acacia asak* community
  6. *Commiphora kataf* community
  7. *Combretum molle* community

There are other 30 sensitive areas which vary in locations throughout all physical regions of Yemen. The variety in locations provides variety of species in term of wildlife, birds, plants, mangrove, forests and wetland with rich biodiversity in each site. Some sites are of particular importance for avifauna conservation and consideration needs to be given to afford better protection for the birds in these areas. These include:

Al-Luhayah: This is an area of some 30,000 ha located on the Red Sea coast that stretches for about 90 km from Midi near the Saudi border to Al-Luhayah. The site contains a well-developed mangrove fringe, extensive sand bars and mudflats, several seagrass beds and some coastal vegetation. The area is very important for migratory waterfowl and provides good habitat for at least three globally threatened animal species including the Green Turtle (Chelonia mydas), Dugong (Dugon dugon) and White eyed Gull (Larus leucophthalmus).

- **Bird lakes-Aden Coastal Wetlands (lagoon, marshes and beach):** The wetlands surrounding Aden city consist of:
  a. marshland covering an area of 50 ha which receives the run-off of the swage treatment plant located nearby;
  b. an artificial lagoon of the swage treatment plant;
  c. four large lagoons on the west side of the Aden peninsula;
  d. large intertidal flats; and
  e. sandy beaches and rocky cliffs.

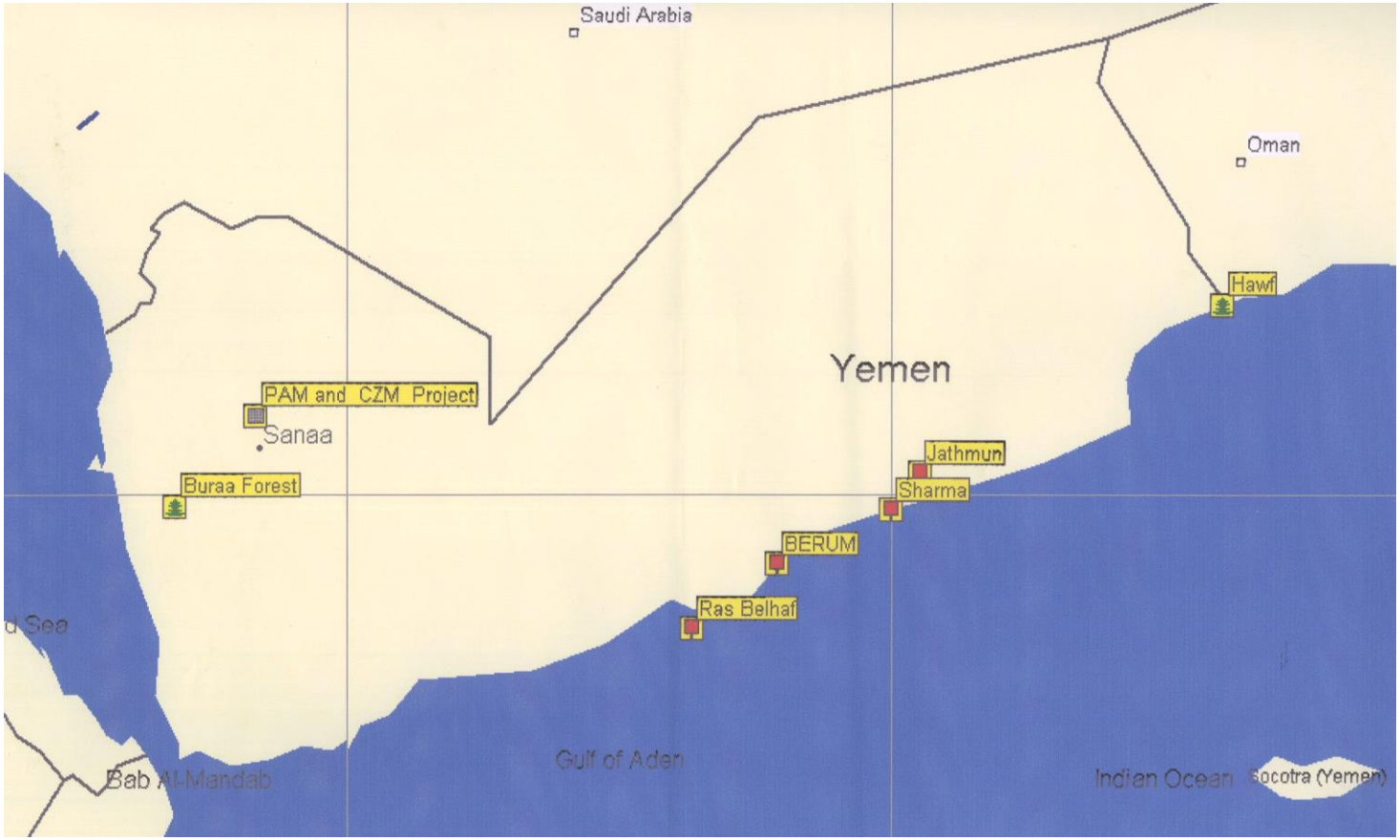
The Aden Coastal Wetlands are considered to be one of the most important sites for migratory birds and regularly host over 10,000 waterfowl including three globally threatened and 12 regionally important species populations (Table 4.28). The site meets the conditions of the International Ramsar site and Bonn Conventions. Among the most significant species found in the area are Lesser Flamingo (*Phoenicopterus minor*) with 9200 birds counted on the last census (in 1996), the largest concentration any where in the Middle East. Other important species include Great Spotted Eagle (*Aquila clanga*), Imperial Eagle (*Aquila heliaca*), and Crab Plover (*Dromas ardeola*).

Table 22. Globally threatened and regionally important bird species populations found in Aden wetlands

Globally threatened		Regionally important species populations	
Scientific name	**English name**	**Scientific name**	**English name**
Aquila clanga	Great Spotted Eagle	*Phoenicopterus minor*	Lesser Flamingo
Aquila heliacal	Imperial Eagle	*Phoenicopterus ruber roses*	Larger Flamingo
Larus leucophthalmus	White-headed Gull	*Dromas ardeola*	Crab Plover
-	-	*Larus hemprichii*	Sooty Gull
-	-	*Platalea leucorodia*	Spoonbill
-	-	*Tringa tetanus*	Redshank
-	-	*Egretta gularis*	Reef heron
-	-	*Sterna caspia*	Caspian tern
-	-	*Sterna nilotica*	Gull-billed tern
-	-	*Sterna bergii*	Swift tern
-	-	*Limicola falcinellus*	Broad-billed sandpiper
-	-	*Himantopus himantopus*	Black-winged stilt

Jabal Iraf: A rocky plateau 1450-1680 m high with a good Acacia-Juniper woodland forms about 30% cover. This site is located on a plateau along the border of the Taiz and Lahj governorates (al Maqatera region). This is the largest remaining area of Juniper forest in Yemen. The vegetation is composed of forest dominated by *Juniperus procera* and *Pstadia arabica* and represents the Mediterranean region in Yemen.

FIGURE 5.2 LOCATION OF PROTECTED AREAS



Among the endemics in the area are: *Blepharispermum yemenense, Centaurea yemense, Crotalaria squamigera, Jatropha variegata*. There is a very rich herb and grass layer covering 50% of the area. Among the most significant endemic animal species recorded in the area are:

- The Arabian Wood Pecker (*Dendrocopus dorae*)
- The Arabian Waxbill (*Estrilda rufibarba)*
- The Golden-winged Grosbeak (*Rhynchostruthus sacotranus*)
- The Arabian Serin (*Serinus rothschildi*)
- The Baboon (Papio hamadryas)
- The Cat snake *(Telescopus dhara)*
- The Arabian toad *(Bufo arabicus)*
- The Dwarf day gecko *(Pristurus flavipunctatus)*

Khor Umairah: The site is characterized by a semi-enclosed lagoon isolated from the shore by a permanent sand spit running from the east consisting of fine mud and sand with rocks in the central part of the lagoon. There is also a coarse sand and gravel desert coastal plain in the surrounding area. The sheltered conditions in the lagoon reduce wave energy and limit the re-suspension of sediments. Additionally the sea grass beds downstream of Khor Umairah may be considerably important to the detritus food chain and sea turtle populations.

The construction of new roads creates new habitat edges, alters hydrological dynamics, and disrupts natural processes and habitats. Road maintenance and traffic contaminate the surrounding environment with a variety of pollutants and noise. In addition, infrastructure and traffic impose dispersal barriers to most terrestrial animals, and vehicle traffic causes the death of many animals.

Agricultural Biodiversity

Agriculture is an important sector of the Yemeni economy. It contributes to about 18% of the GDP, accounts for about 2% of exports and employs about 70% of the total labor force. Diverse vegetation types and crop species and varieties exist within and between environmental zones. This variation makes Yemen one of the most important sources of agricultural biodiversity in the Arabian Peninsula. Agriculture is the main source of food and income for the majority of the population of the country.

Crop Diversity

Differences in environmental conditions among the agro-ecological zones of Yemen make it possible to grow a wide range of tropical, subtropical and temperate crops. The main crops are cereals, vegetables, fruits, legumes and cash crops including sesame, cotton, tobacco, qat, and coffee**.**

The country's crop diversity is comprised of cultivated crop species and varieties grown for different uses of the community. These have evolved through natural selection and selective breeding by traditional agricultural practices over long periods of time in the different environmental conditions of the country. Crop relatives and wild species also have been used for different purposes. The resultant varieties and races of crops may form homogeneous varieties or heterogeneous populations. The number of land races of each crop species is dependent on the distribution of the crop across the environment. Crop diversity is the basis for successful agriculture and the sustainable use of the country's scarce water and soil resources.

Cereals: Cereals remain the principal crops in the country and occupy 55% of the cultivated land. The grains of these crops constitute the basic food source for the majority of the population and main source of forage for draft animals. Cereal crops include sorghum, millet, maize, wheat, and barley.

Vegetable crops: are grown in the most fertile soils of most agro-ecological zones of the country. The total area devoted to vegetable crops is about 67,000 ha out of which 50% is cultivated with potato and tomato crops. There are more than 20 species of vegetables, which are grown mainly under irrigation system. The areas under vegetable cultivation are gradually being increased due the expansion of irrigated lands. Ground water depletion is the main negative result of this expansion. Only few introduced varieties are currently in cultivation.

Fruits: The production of fruits covers an area of about 95,000 ha. The production of fruits was part of traditional agricultural practices from early historical times as evidenced by the development of water conservation technologies such as construction of dams and terrace systems. Wide variations of deciduous, tropical and subtropical fruit crops are grown in Yemen. Every agro-ecological zone has a specialized fruit crop production; deciduous fruits are grown in the highlands and tropical and subtropical fruits are grown in the lowlands of Tihama, and in the eastern and southern plains and plateaus.

Deciduous fruits such as peaches, apples, figs, pears, and almond are sometime grown around houses or wells and along the irrigation channels. In general, farmers own few trees, which receive little attention and keep the fruits for family and neighbors. There are only a few orchards that are planted with introduced varieties.

Yemen is particularly well known for its traditional production of grapes and pomegranates. Grapes are the most important fruit crop grown in the country and Yemen has been producing high quality grapes for centuries. Grapes are cultivated in areas ranging in altitude of 1350-2000 m and are concentrated in Sana'a and Sadah governorates.

Some 40 date palm varieties have been identified in Yemen, and most are grown mainly in the Tihama lowlands and Wadi Hadramout. Date palm plantations are concentrated on the banks of five major wadis dissecting the Tihama plain from the mountain foothills to the Red Sea, which include Russian, Zabid, Remaa, Surdod, and Mour wadis. Date palm plantations are under flood irrigation systems. Because of the shallow root systems of date palms, some plantations have even been established on the coastal areas of the Red Sea. Either naturally growing or planted, date palms depend on shallow ground water derived from rainfall in the mountains. In recent years, disturbance of the delicate balance between the fresh rainwater and salt water near the coast has been catastrophic for the palm trees in the coastal areas. The over pumping of ground water and construction of small dams have prevented the mountain rain water from reaching palm trees close to the sea coast, which has resulted in gradual death of these trees.

Pulses (Legume Crops): Legume crop species are grown at different agro-ecological zones and are considered to be important sources of protein. About 53,000 ha is devoted to legume crops annually which produces about 75% of the country's needs. The most important legumes cultivated under rainfed conditions include *vigna*, lentils, dry peas, and fenugreek. Beans and broad beans are grown under supplemental irrigation

Cash Crops: Coffee is cultivated in wide range of ecological zones and is best grown at altitudes between 1000-1800 m. Coffee is grown under irrigation from springs, wells, and

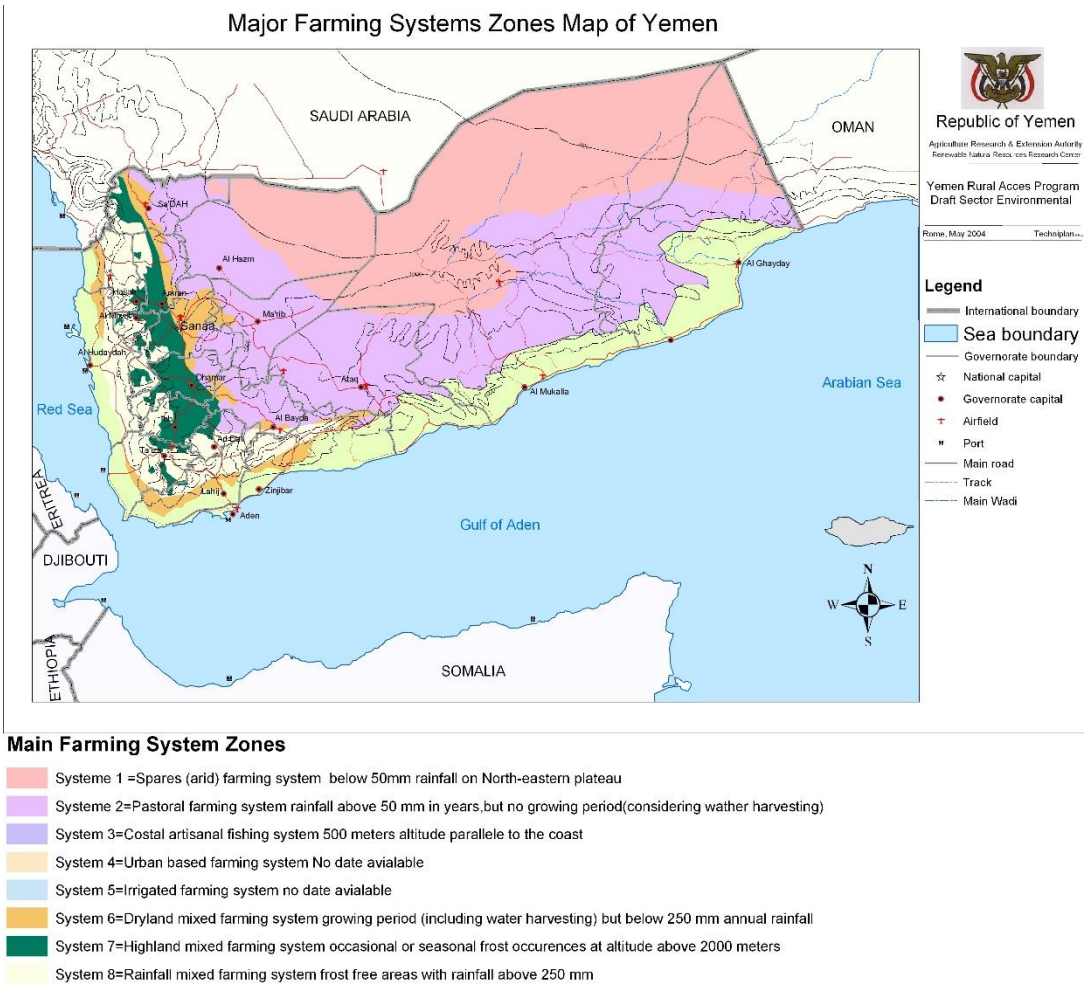
wadi-based water. Different varieties of *Coffee arabica* are distinguished by differences to drought tolerance, shape of the plants, and color, size, shape, and taste of coffee fruits. The local names of coffee varieties in most cases refer to the cultivation areas or shapes of coffee trees and fruits. Qat, a high cash crop used as stimulant by most men and some women in the country, is one of Yemen's major crops and is cultivated on 91,418 ha or 5.5% of the total arable land in the country. In general qat is best grown under irrigation in areas above 1500 m. Qat cultivation seems to be increasing with the expansion of irrigated land at the expense of other crops. Since the most favorable environment for qat cultivation is similar to that of coffee and grapes, these crops are the most likely to suffer from qat expansion.

The distribution of the above data among the Governorates is shown in the table on next page.

Table 23. Area and production of crops in Yemen by Governorates

Governorate (Muhafazat)		1. Cereals		2. Vegetables		3. Fruits		4. Pulses		5. Cash Crops		6. Fodder		Total Area Cultivated (ha)	Total Production (M.T.)
N.	Name	Area (ha)	Production (M.T.)	Area (ha)	Production (M.T.)	Area (ha)	Production (M.T.)	Area (ha)	Production (M.T.)	Area (ha)	Production (M.T.)	Area (ha)	Production (M.T.)		
1	Al-Beida	12,896	12,444	3,428	49,836	407	2,425	402	508	7,417	22,624	2,160	19,275	26,710	107,112
2	Al-Dhaleh														0
3	Al-Mahweet	14,074	11,266	328	2,675	427	1,849	1,965	1,323	6,337	3,569	5,768	64,634	28,899	85,316
4	Amran														0
5	Dhamar	69,755	94,268	5,820	76,262	1,006	7,764	5,953	4,360	9,132	4,139	5,742	47,649	97,408	234,442
6	Ibb	50,912	74,187	6,784	87,028	863	6,325	5,386	6,948	18,500	20,799	3,457	29,713	85,902	225,000
7	Sana'a	119,352	110,566	9,595	129,997	23,025	145,786	9,381	9,198	50,351	27,337	14,459	219,907	226,163	642,791
8	Sana'a City														0
9	Hajjah	27,554	23,554	1,061	9,955	4,472	50,584	794	528	21,058	22,523	6,541	67,061	61,480	174,205
10	Sa'adah	25,716	27,785	1,267	14,365	8,246	64,629	1,302	2,436	19,124	11,091	1,540	11,532	57,195	131,838
11	Taiz	54,170	54,969	4,204	50,446	1,483	22,253	3,462	3,369	4,649	2,661	1,956	23,810	69,924	157,508
12	Abyan	3,528	3,504	2,608	19,120	1,666	19,156	1,446	1,748	14,073	9,923	8,115	121,263	31,436	174,714
13	Aden	340	295	224	2,284	0	0	0	0	21	31	2,173	26,316	2,758	28,926
14	Al-Hodeidah	169,971	137,660	22,073	265,192	30,481	203,136	18,438	26,313	39,643	36,978	34,322	434,300	314,928	1,103,579
15	Laheg	5,155	3,782	2,152	15,798	815	3,655	159	115	6,545	5,995	7,025	114,856	21,851	144,201
16	Al-Jawf	29,075	51,447	2,805	28,273	2,550	19,414	1,777	4,368	2,217	2,118	10,406	113,376	48,830	218,996
17	Al-Mahrah	366	372	173	1,674	22	132	0	0	55	81	444	5,486	1,060	7,745
18	Hadramout	9,450	12,559	1,848	15,321	8,021	16,445	364	250	892	1,418	3,421	59,036	23,996	105,029
19	Mareb	62,946	78,117	1,402	16,159	11,353	137,052	1,625	2,368	6,856	5,522	6,725	64,385	90,907	303,603
20	Shabwah	2,611	3,366	1,604	18,348	410	2,815	225	201	1,425	1,082	3,382	45,107	9,657	70,919
	Total	**657,871**	**700,141**	**67,376**	**802,733**	**95,247**	**703,420**	**52,679**	**64,033**	**208,295**	**177,891**	**117,636**	**1,467,706**	**1,199,104**	**3,915,924**

FIGURE 5.3 MAJOR FARMING SYSTEMS ZONES MAP OF YEMEN



Main Farming System Zones

- Systeme 1 =Spares (arid) farming system below 50mm rainfall on North-eastern plateau
- Systeme 2=Pastoral farming system rainfall above 50 mm in years,but no growing period(considering wather harvesting)
- System 3=Costal artisanal fishing system 500 meters altitude parallele to the coast
- System 4=Urban based farming system No date avialable
- System 5=Irrigated farming system no date avialable
- System 6=Dryland mixed farming system growing period (including water harvesting) but below 250 mm annual rainfall
- System 7=Highland mixed farming system occasional or seasonal frost occurences at altitude above 2000 meters
- System 8=Rainfall mixed farming system frost free areas with rainfall above 250 mm

Livestock Diversity

The indigenous livestock of Yemen are cattle, sheep, goats, camels, donkeys and horses in addition to poultry and rabbits. The breed sizes, structure of herds or flocks, and the sustainability or reproductivity of the endemic livestock are unknown. The published Agricultural Statistics of Yemen is concerned only with cattle, sheep, goats and camels. An approximate estimate of their total population in the country is provided below.

Table 24. Livestock population and diversity in Yemen

Animal Production	Heads	%	Number of species
Camels	198,34	1.79	2
Cattle	1,400,593	12.64	2
Goats	4,452,540	40.18	6
Sheeps	5,028,968	45.39	9
Total Heads	**11,080,535**	**100.00**	

Based on previous livestock reviews, there were 0.587 million donkeys, 6.15 million indigenous Baladi chicken with an annual growth rate of 2.48% and 1000 horses in all governorates of Yemen.

The distribution of the above data among Governorates is shown in the table here below:

Table 25. Livestock population and diversity in Yemen by Governorate

Governorate (Muhafazat)		Camels (Heads)	Cattle (Heads)	Goats (Heads)	Sheeps (Heads)	Total Heads
N.	Name					
1	Al-Beida	3,915	33,194	172,759	366,746	576,614
2	Al-Dhaleh	n/a	n/a	n/a	n/a	n/a
3	Al-Mahweet	856	42,189	31,415	40,547	115,007
4	Amran	n/a	n/a	n/a	n/a	n/a
5	Dhamar	5,516	148,346	139,134	377,848	670,844
6	Ibb	4,444	230,471	207,390	355,611	797,916
7	Sana'a	5,900	223,276	517,540	1,046,972	1,793,688
8	Sana'a City	n/a	n/a	n/a	n/a	n/a
9	Hajjah	7,348	113,275	203,645	233,868	558,136
10	Sa'adah	1,149	63,276	88,346	190,328	343,099
11	Taiz	5,816	171,816	219,217	142,974	539,823
12	Abyan	13,760	16,087	450,741	405,508	886,096
13	Aden	1,904	3,879	108,199	48,423	162,405
14	Al-Hodeidah	17,733	205,103	320,898	366,116	909,850
15	Laheg	10,725	73,646	411,287	323,358	819,016
16	Al-Jawf	12,298	7,461	175,878	199,411	395,048
17	Al-Mahrah	37,119	1,208	258,336	99,556	396,219
18	Hadramout	47,256	47,988	606,908	273,337	975,489
19	Mareb	8,648	17,115	228,315	269,969	524,047
20	Shabwah	14,047	2,263	312,532	288,396	617,238
	Total	**198,434**	**1,400,593**	**4,452,540**	**5,028,968**	**11,080,535**

Forestry and Rangeland Diversity

Studies and research in forestry, rangelands and desertification are still very limited in Yemen. Local funds allocated for forestry resource development represents less than 1% of the budget of the Ministry of Agriculture & Irrigation. Rangelands, forests and other woodland areas comprise about 38% of the land area. The land is grazed by about 5 million sheep, 4.5 million goats and 1.4 million cattle (2001 data, see table 4.31 above). The remaining land, almost 57% of the total land area, is mostly desert with limited use potential.

Studies carried out in 1991-92 using aerial and satellite photography showed that the area of shrublands and forests was about 2.4 million ha of which 400,000 ha are located beside agricultural lands, illustrating the remaining traditional agroforestry that existed centuries ago. When the aerial photos of Jabal Bura'a woodland (Hodeidah Governorate) taken in 1973 were compared with those taken in 1987, it appeared that 60% of this woodland area was degraded. The natural woody vegetation had degenerated into low scattered shrubs or open woodland, the result of over-cutting for long periods of time, expansion of stock grazing and clearance for crop production or road construction purposes.

The available information reveals that almost 60% of the population still uses firewood. Assuming that individual consumption is about 0.5 cubic meter/person, an estimate of about 4.7 million cubic meters of firewood will be cut annually. This means that the rate at which forest trees are being cut exceeds forest regeneration, which indicates that it might be impossible to protect the remaining forest trees through issuing legislation and political procedures alone, unless alternative energy sources are available with convenient prices. The official statistics show that the country's import of wood in 1994 was estimated as 780 million Yemeni Rials. Some reports show that the area of rangeland may reach 16 million ha, characterized by weak biological balance, scarcity of species and poor forage value. The excessive grazing of livestock now estimated at about 11 million (2001 data) head continues to degrade plant cover.

Women and Agricultural Biodiversity Conservation

There are about 9.4 million women in the country. Women play a crucial role in the rural economy of the country and contribute over 70% of the agricultural labour force in several different capacities. For example, women a) are the primary collectors of fodder and firewood which account for 50% of the energy consumption in rural areas; b) have their own livestock, and tend grazing animals; c) work in the honey production industry and have their own beehives; d) help in maintaining native cultivars of vegetables and field crops; e) are involved in breeding and pruning grapes in traditional ways; and f) select plants to be used as medicines or cosmetics for their families. They never differentiate between endemic or rare plants, as they are not aware of these issues. Women in rural areas should be a major focal group in any biodiversity awareness program as they live and work closely agriculture and nature in the day to day work in providing for their families. The actual situation of poverty problems in rural areas compels women to care for and provide food for their families using cheap sources of naturally available energy. In many respects, providing food for rural communities goes side by side with biodiversity conservation.

Threats to Agricultural Biodiversity

The impact of various agricultural projects and their activities on the sustainable use of natural resources is clearly reflected in several problems now faced by the country. For example, the most important problems in agriculture are:

- Limited and generally overexploited and inefficiently used physical resources base, largely due to the policies favoring ground-water-irrigated agriculture;
- Neglect of the traditional methods in farming in research and extension activities; and
- Introduction and promotion of technologies unsuited to the farmers' needs and resources.

As a result, the production, productivity and incomes are low in agriculture. Provision of highly subsidized crop seeds leads to the negligence of the traditional systems of seed security and seed treatments, which result in the spread of plant disease (smut and rust) and decreased yields. Major threats include:

- Introduction of homogenous, high yielding crop varieties which replace the heterogeneous low-yielding local crop varieties has resulted in genetic erosion and narrowing the genetic variability of the crops;

- Changes in human consumption habits and diet preference in recent years due to the availability of heavily subsidized commodities such as wheat and wheat products, have resulted in the deterioration of local varieties of sorghum and millet which are under constant threat caused by the introduction of improved varieties;

- Over grazing and over exploitation of the vegetative cover have resulted in degradation of terraced land and a loss of crop biodiversity,

- The rapid expansion of irrigated lands have caused deterioration of rainfed farming systems including the loss of drought resistant crop varieties;

- Periodic drought in the absence of genetic reservation systems has resulted in the loss of valuable genetic resources;

- The rapidly increasing urbanization process at the expense of agricultural land may also further threaten agricultural biodiversity;

- The use pesticides and the negligence of traditional methods of pest control are threatening the beneficial insects which are part of the biodiversity of this country;

- Immigration has led to a deterioration of indigenous knowledge and the loss of biodiversity.

- The lack of clear agriculture policies regulating the usage of natural resources and promoting the sustainable use of these resources.

Chapter 6.
Potential Environmental and Social Risks and Mitigation

122. This chapter identifies the potential Environmental, Social (including labor), Health, and Safety (ESHS) risks and impacts associated with Project activities, and the matching mitigation measures. Project activities will have strong positive environmental, social, and health impacts by reestablishing urban services. Health and environmental impacts are generally of small size and should cause only minor negative environmental harm that can be readily addressed through proper design, construction, and operation and maintenance.

123. The Project will not finance activities that involve permanent land acquisition causing physical or economic displacement. Moreover, local contractors are expected to conduct all works using workers that already reside in the cities where the works are conducted. Subprojects should trigger minimal labor influx, and contractors are not expected to build or operate residential labor camps to host such workers.

124. The selection of activities will be based on the priority needs to be identified by UNOPS, in consultation with the LCs, relevant DLAs, and local communities. The Project will only rebuild, restore, or rehabilitate existing infrastructure. There will be no expansion of existing facilities nor the creation of new ones, and rehabilitated facilities will be handed back to the competent authorities. The Project will not provide technical assistance to develop Operations and Maintenance (O&M) plans for the reconstructed or rehabilitated facilities. Thus, issues such as the siting of the facilities, and many of their operational impacts will be beyond the scope of the Project.

125. Nonetheless, the overall environmental and social risk rating of the Project is high due the social risks and the security risks. Component 1 involves reconstruction and rehabilitation works that will involve excavation and earthworks. These activities might cause risk and impacts on workers, communities, as well as the environment, if sufficient mitigation measures do not accompany their implementation.

6.1 Selection, design and siting risks

126. A first tier of risks concerns the selection, design, and siting of subprojects. These risks include inherent security risks, the risk that that the targeted infrastructure might carry social or environmental legacy issues, the risk that contract awards might disadvantage certain groups, and the risk that the rehabilitated services do equally provide services, particularly to vulnerable groups or persons. These risks would be addressed by avoiding insecure areas, identifying legacy issues during the screening process, inclusive contracting, and ensuring equal access to subproject benefits. No legacy issues are anticipated, and none were encountered during YIUSEP1. For instance, no rehabilitation of water supply systems should be initiated if there is no assurance that the corresponding sanitation infrastructure will be able to cope with the improvement.

6.2 Contractor Related Risks and Impacts

127. The second tier of risks is directly associated with the construction and rehabilitation activities of the contractors who will rebuild, rehabilitate, and restore the targeted facilities. These risks represent the ***bulk of the ESHS risks and impacts risks and impacts of Project activities***. Although the risk profile might differ between specific activities, the overall risk profiles of construction activities are analogous for the four subcomponents of Component 1: (i) Tertiary Municipal Services and Solid Waste Management; (ii) Urban Water and Sanitation; (iii) Urban Roads; and (iv) Electricity for Critical Services. These risks and the relevant ESSs are detailed in the following table.

Table 26 . ESHS risks and impacts associated with the activities of YIUSEP II Contractors

Construction Site Management	
Vegetation	
• Construction activities can unnecessarily destroy, scar, or deface the natural surroundings in the vicinity of the construction site	ESS6
Damage to Existing Installations	
• Existing installations, such as buildings, structures, works, pipes, cables, sewers, or other services may be damaged	ESS4
• Owners, tenants or occupiers of properties may be disturbed or inconvenienced by the construction works	ESS4
Waste from Construction Activities	
• Construction debris and spoils might contaminate soils and groundwater	ESS3
• Transport of waste might litter roads	ESS3
• Solid waste and debris might be disposed improperly	ESS3
Air Pollution	
• Air pollution due to emissions from dust, construction vehicles and equipment	ESS3
• Dust generation during excavation, backfilling, compaction, or transportation of construction materials can affect the wellbeing of neighboring communities	ESS4
Hazardous and Toxic Waste	
• The production of liquid wastes can lead to soil or groundwater pollution	ESS3
• Hazardous, or potentially hazardous, wastes from construction debris or the use of chemicals can spill into the environment	ESS3
Area Signage	
• The absence of appropriate signage and precautionary measures can lead to accidents	ESS2, ESS4
Borrow Pits and Quarries	
• Quarry operations will produce noise and dust that will impact on nearby inhabitant	ESS4
• Quarries used by primary suppliers could lead to the significant conversion or degradation of natural or critical habitats	ESS6
• Improperly sited quarries can pollute the ground and surface water	ESS3
• Unfenced borrow pits and quarries are a hazard to people and livestock	ESS4
• Blasting operation can damage property.	ESS4
• Borrow pits and quarries can deface the landscape	ESS3, ESS4
Location of Worker Camps	
• Poorly located camps can be prejudicial to local communities, and cause conflicts	ESS4, ESS5
Decommissioning of Camps, Worksites and Plant	
• Construction sites might include contaminated patches, waste, and abandoned equipment that are a health hazard to neighboring communities	ESS3, ESS4
Health and Safety	
Severe Weather and Facility Shutdown	
• Workers can be injured or become ill if required to work in severe weather	ESS2
Lavatories and Showers	
• Inadequate lavatories and showers can lead to worker illness or disease	ESS2
Potable Water Supply	
• Inadequate supply of potable water on site can lead to worker illness and disease	ESS2
Clean Eating Area	
• The absence of a clean eating area can lead to worker illness and disease	ESS2
Personal Protective Equipment (PPE)	

• The lack of appropriate PPE, and of training in its use, can lead to injuries	ESS2
Noise	
• High noise levels can permanently affect the hearing of workers • Increased levels of noise and vibration due to heavy vehicles and construction equipment, which are a nuisance to the community around the site	ESS2
Working in Sewers	
• Working in sewers can lead to suffocation and even death, if the necessary precautions are not taken	ESS2
Associated Facility	
• Ensure that for every water supply system there is a working sanitation system in place.	ESS3
Communicable Diseases	
• Construction site can facilitate the spread of communicable diseases	ESS2, ESS4
COVID-19	
• Construction sites can increase the spread of COVID-19	ESS2, ESS4
Vector-Borne Diseases	
• Poorly managed construction site can favor vector borne diseases, particularly if pools of stagnant water are not avoided	ESS2, ESS4
Road safety and Traffic Safety	
• Project related traffic can cause accidents	ESS2, ESS4
Cultural Heritage	
• Project activities might unearth unknown cultural heritage (chance finds) • Project activities might indirectly affect existing cultural heritage, for example by cracking masonry	ESS8 ESS8
Emergency Preparedness and Response	
• Lack of preparation can seriously increase the negative impact of an emergency	ESS4
Stakeholder Engagement	
• The lack of engagement with neighboring communities affected by Project activities might cause tensions, and result in complaints	ESS10
Labour Force Management	
Labour Influx	
• Labor influx to work on Project activities can have major negative impacts on local communities	ESS2, ESS4
Labor Conditions	
• Contractors might not provide workers with the terms and conditions they are entitled to under Yemeni Labor Legislation, most particularly Decree 5/1995, and applicable International Labour Organization conventions on workplace conditions.	ESS2
Insurance	
• Contractors might not compensate workers and their families for workplace injuries or deaths	ESS2
Grievance Mechanism for Workers	
• Contractors might not act on worker grievances	ESS2
Protection from Sexual Exploitation and Abuse	
• Workers might sexually abuse of exploit women or children	ESS2, ESS4
Protection from Child Labor	
• Contractors might unknowingly employ workers under the age of 18.	ESS2
Code of Conduct	
• The behavior of workers can be prejudicial to neighboring communities, and to fellow workers	ESS2

128. These construction-related risks will be mitigated by requiring that contractors meet a detailed set

of Environmental, Social, Health, and Safety (ESHS) requirements[51] that match the risks and impacts listed in the above table, as detailed in Annex 5. The Requirements are largely based on the General EHS Guidelines, and other World Bank Guidelines. UNOPS and its Implementing Partners will include the Project's ESHS requirements in all bidding documents and contracts for works. UNOPS will also prepare safety manuals or handbooks for contractors as required.

6.3 Sector Specific Risks and Impacts

129. The third tier of risks are sector specific and not related to contractor led activities. some are potential risk and impacts associated with the operation of the facilities once they are rehabilitated.

6.3.1 Solid Waste Management

130. Solid waste management is the riskiest type of activity that the Project might finance. Non-contractor related risks include landfill Management and solid waste collection. Landfills are managed by the local Cleaning Fund in each city. UNOPS, PWP and the concerned Local Cleaning Fund will ensure that waste management activities are implemented in accordance with the requirements spelled out in the EHS Guidelines for Waste Management Facilities.

131. UNOPS prepared and submitted to the World Bank landfill assessments for Aden, Sana'a, Lahj, Amran, Sa'adah, Mukalla, Dhamar, and Hodeida, during YIUSEP 1 implementation. Similar assessments will also be prepared for any other landfill before the Project becomes involved.

132. The following table details some of the non-contractor related risks and impacts that UNOPS and PWP might need to address, as well as matching mitigation measures, if the Project was to finance a landfill subproject. These sector specific risks and impacts are additional to the generic contractor related risks and impacts described in the Table below:

133. Make reference to subsection 6.2 for all OHS issues.

Table 27. Potential impacts and matching mitigation measures for existing landfill support subprojects

Potential impact	Mitigation measures	Reference
The formation of breeding sites for disease vectors	• Cover solid waste with soil; • Take necessary actions to fight vectors • Ensure proper utilization or disposal of separated solid waste for reuse.	• ESS2, ESS4
The spread of diseases because of improper disposal of medical waste	• Dispose of medical waste separately from other waste • Agreement with health authorities to better implement of their healthcare waste management systems within facilities	• ESS2, ESS4
The risk of disproportional impacts on vulnerable groups dependent on waste picking such as the Al Mahamasheen[52]	• Assess waste pickers (numbers, types, and roles, such as collection, sorting, or recycling) • Plan the role of waste pickers and provide necessary training • Provide appropriate PPE • Ensure that vulnerable groups are included • Give special consideration to the most vulnerable groups	• ESS4

[51] Some of the ESHS requirements might not become relevant during Project implementation, for example the requirements for the management of worker camps or labor influx

[52] Based on the landfill assessments prepared during YIUSEP 1, no physical or economic displacement of waste pickers is anticipated because the proposed interventions mainly focus on the provision of waste collection and disposal equipment.

The risk that waste collection workers, pickers and members of neighboring communities might get ill because of pollution or catch a disease	• Train waste collection workers, pickers and selected members of the community on health and hygiene • Conduct cleaning and awareness campaigns and provide waste pickers with safety and hygienic materials as well as the labor	• ESS2, ESS3, • ESS4
The risk of child labor, particularly waste picking	Prevent child labor.	
Groundwater and watershed pollution as a result of poor leachate treatment	• Test the characteristics of leachate and the treated effluent • Test groundwater quality at source development at regular intervals. • Upgrade the performance of the leachate 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, such as garden nurseries, palm trees, or cotton	• ESS3
The use of effluent from unsegregated waste with high concentrations of heavy metals, such as mercury, or PCBs	• Regular monitoring of effluents • Segregation of chemical pollutants at urban wastewater facilitates • Establish effluent standards combined with incentives or enforcement	• ESS3
Disputes over the use of treated concentrate for irrigation	• Discuss effluent use, potential crops and disposal of treated concentrate with land owners downstream of the landfill	• ESS3
Poor operation and management of the landfill might aggravate underlying environmental issue	• Support training of 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	• ESS3
Complaints by adjacent residents/beneficiaries	• Provide appropriate mitigation measures to remedy complaints • Instigate public awareness and communication campaigns	• ESS10

134. The following is a list of additional environmental mitigation measures[53] that UNOPS and PWP will consider when implementing existing landfill support subprojects:

Long Term Remedial Measures

- Avoid the co-disposal of waste water from septic tanks into the landfill body, to minimize the leachate generated and groundwater contamination
- Responsible authorities should provide the basic facilities needed for sorting and source separation of waste
- Increase the knowledge and awareness among residents about the importance of waste sorting and source separation and its beneficial effect on social, economic and environmental aspects
- Declare and organize scavenger work through merging it formally in the system. Scavenging can be an effective way for managing waste, because the volume reduction it generates lowers the cost of formal waste management systems as it reduces the quantity of waste for collection
- Encourage the private sector to invest in all forms of waste recycling and management projects

[53] Adapted from: Mohammad Aljaradin,1 and Kenneth M. Persson. 2012. Environmental Impact of Municipal Solid Waste Landfills in Semi-Arid Climates, Case Study - Jordan. The Open Waste Management Journal 5: 28-39.

- Reducing the quantity of the biodegradable waste that is landfilled which is considered with encouraging landfill methane recovery the major strategies for reducing the methane emissions, by implementing special standards starting with industries, companies and big waste generators

Short Term Remedial Measures

- Ensure that daily covers are practiced. Leachate problem could be minimized by limiting the water getting into the landfill through surface water diversion to ensure that no water can enter the landfill and also to ensure a low water table within the landfill by frequent pumping that should be coupled with the daily soil cover. A low-permeability cover affects the water content of the landfill.
- Improve access roads
- Build the basic infrastructure, fencing and weighbridge.
- Stop open burning inside landfills.
- Establish surface drainage system for limiting the infiltration of the water through the landfill cover
- Raise the awareness and competences of the employees
- Ensure that no disposal of hazardous and medical waste takes place; it is important that only municipal waste is disposed in landfill, and no industrial or hazardous waste. Waste should be sorted and sites should be carefully selected to especially avoid negative impacts on groundwater resources.

6.3.2 Urban Water and Sanitation

135. UNOPS will ensure that UW-PMU and the Local Cleaning Funds implement urban water and sanitation subprojects in accordance with the EHS Guideline for Water and Sanitation. The following table details the main non-contractor related risks and impacts that UW-PMU might need to address, as well as matching mitigation measures, if the Project was to finance an urban water and sanitation subprojects. The sector specific risks and impacts are additional to the generic contractor related risks and impacts described in Table

Table 28. Potential impacts and matching mitigation measures for urban water and sanitation subprojects

Potential Impact	Mitigation Measure
Improved water supply can increase the quantities of wastewater	UNOPS will ensure that the water supply subprojects are accompanied by sanitation subprojects, if the increased wastewater exceeds current capacity
Uncontrolled discharging of water sanitation will lead to transmission of diseases such as cholera, diarrhea, dysentery, hepatitis A, typhoid and polio and exacerbates stunting. Poor sanitation reduces human well-being, social and economic development due to impacts such as anxiety, risk of sexual assault, and lost educational opportunities	Ensure that for every water supply system there is a working sanitation system in place.
Improvements in the sewerage system could, in the absence of sufficient treatment, increase the discharge of untreated or inadequately treated wastewater (domestic, municipal and industrial), contaminate ground, surface and coastal waters, or increase the incidence of cholera and dysentery	UNOPS will ensure that subprojects that result in an increase in collected wastewater are accompanied by measures to handle the increase UNOPS will ensure that its sanitation subprojects provide for the safe final disposal of effluents from treatment ponds or reuse with extreme precaution to avoid direct contact with humans or animals. As necessary, UNOPS and its Implementing Partners will provide training to selected members of the community on health and hygiene issues
The rehabilitation of wastewater treatment plants will produce fecal sludge that must be properly managed and disposed of	UNOPS will ensure that any subproject resulting in increased fecal sludge includes measures to properly dispose of the sludge
Stagnant effluent ponds might be breeding sites for disease vectors	UNOPS will take necessary actions to fight disease vectors for any stagnant effluent pool resulting from one of its subprojects, including the use of insecticides, and providing nets for windows and beds
Temporary stagnant ponds might be breeding sites for disease vectors.	UNOPS will take necessary actions to pump and suction any overflow nearest manholes or chambers to fight disease vectors for any stagnant pool resulting from one of its subprojects, including the use of insecticides.
Temporary loss of income and disruption of economic activities/ businesses because of Project activities.	UNOPS will take all appropriate measures to compensate affected parties, as per the Project Resettlement Framework
Untreated or inadequately treated wastewater might be reused for agriculture, particularly by the poorer segments of the population.	UNOPS will only go forward with the subproject if the risk can be addressed as recommended by the World Health Organization's (WHO)[54].
Because of limited availability, increased water supply to cities might affect existing agricultural use	UNOPS will not go forward with a water supply subproject if it creates a water conflict.
Demand side management and efficient allocation of water by the LCs might be necessary to conserve scarce water resources, but could lead to higher prices for poorer segments of the population. Furthermore, cost recovery for sanitation and wastewater treatment services may adversely impact the poorer segments of the society	UNOPS will ensure that any Technical Assistance regarding tariffs for water supply (production distribution and maintenance) or sanitation (including sewer networks, wastewater treatment, and maintenance) promotes measures that do not adversely impact the poorer or vulnerable segments of the population.

[54] Health guidelines for the use of wastewater in agriculture and aquaculture (WHO Technical Report Series, No. 778, 1989).

Rehabilitated wastewater treatment plants might negatively impact neighboring communities that have expanded over the years, for example by increasing unpleasant odors or reducing property values	• Depending on the scope of the issues, UNOPS will explore whether it can implement sufficient mitigation measures to address the concerns of these neighboring communities. • UNOPS will not go forward with the subproject if it cannot implement sufficient mitigation measures. • UNOPS will Instigate public awareness and communication campaigns
OHS and health & safety risk are potential impact of proposed interventions.	Appropriate and well-defined health and safety measures and OHS requirements will be strictly applied.

Water Distribution

136. UNOPS will ensure that UW-PMU apply the following measures during the rehabilitation of water distribution systems that is supported by the Project.

- Maintain adequate pressure to protect water quality in the system
- Implement a leak detection and repair program (including records of past leaks and unaccounted-for water to identify potential problem areas)
- Consider replacing mains with a history of leak
- Prevent, minimize, and control impacts from flushing of mains

Waste Water Treatment

137. UNOPS will ensure that UW-PMU apply the following measures during the rehabilitation of waste water treatment plants that is supported by the Project.

- Minimize bypass of the treatment system by using separate stormwater and wastewater systems, if possible, and providing capacity sufficient to treat peak flows;
- Implement an industrial source control program which includes monitoring and effective regulatory enforcement
- Consider discharge of treated wastewater to natural or constructed wetlands, which can buffer the impact f from discharge on the aquatic environment, unless the wetland itself would be degraded by the discharge
- Treat grey water, if collected separately from sewage, to remove organic pollutants and reduce the levels of suspended solids, pathogenic organisms and other problematic substances to acceptable levels based on applicable national and local regulations
- Grey water lines and point of use stations should be clearly marked to prevent accidental use for potable water quality applications
- Based on an assessment of risks to human health and the environment, consider re-use of treated effluent, especially in areas with limited raw water supplies. Treated wastewater quality for land application or other uses should be consistent with the relevant public health-based guidance from the World Health Organization (WHO) and applicable national requirements.
- Select appropriate sludge treatment technologies, considering, for example, the quantity and sources of sludge; available resources for capital expenditures, training, operations and maintenance; availability of skilled operators, maintenance personnel, etc.; and the desired disposal methods or end uses of the treated solids.
- Consider land application or other beneficial re-use of wastewater treatment plant residuals, but only based on an assessment of risks to human health and the environment. The Quality of residuals for land application should be consistent with the relevant public health-based guidance from the World Health Organization (WHO)[55] and applicable national requirements

[55] WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater (2006).

- Process, dispose of and re-use wastewater treatment plant residuals in a manner consistent with applicable national requirements or, in their absence, internationally accepted guidance and standards
- Cover emission points (e.g., aeration basins, clarifiers, sludge thickeners, tanks, and channels), and vent emissions to control systems (e.g., compost beds, bio-filters, chemical scrubbers, etc.) as needed to reduce odors and otherwise meet applicable national requirements and internationally accepted guidelines
- Where necessary, consider alternate aeration technologies or process configurations to reduce volatilization.

Sanitation

138. UNOPS will ensure that UW-PMU apply the following measures during the rehabilitation of sewers:

- If grey water is managed separate from sewage, implement grey water source control measures to avoid use and discharge of problematic substances, such as oil and grease, large particles or chemicals.
- Investigate upstream sources of pollutants causing treatment plant upsets or interference;
- Consider the installation of separate sewer systems for domestic wastewater and stormwater runoff in the overall planning and design of new sewerage systems;
- When on-site sanitation systems where excreta are mixed with water predominate, consider use of small-diameter sewerage system to collect water effluent from septic systems or interceptor tanks;
- Limit the sewer depth where possible (e.g., by avoiding routes under streets with heavy traffic). For shallower sewers, small inspection chambers can be used in lieu of manholes;
- Use appropriate locally available materials for sewer construction. Spun concrete pipes can be appropriate in some circumstances but can suffer corrosion from hydrogen sulfide if there are blockages and/or insufficient slope;
- Ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope in gravity mains to prevent buildup of solids and hydrogen sulfide generation;
- Design manhole covers to withstand anticipated loads and ensure that the covers can be readily replace if broken to minimize entry of garbage and silt into the system;
- Equip pumping stations with a backup power supply, such as a diesel generator, to ensure uninterrupted operation during power outages, and conduct regular maintenance to minimize service interruptions. Consider redundant pump capacity in critical areas;
- Conduct repairs prioritized based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g., pump station failures, sewer line ruptures, or sewer line blockages);
- Review previous sewer maintenance records to help identify "hot spots" or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed;
- When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by covering or blocking storm drain inlets or by containing and diverting the sewage away from open channels and other storm drain facilities (using sandbags, inflatable dams, etc.). Remove the sewage using vacuum equipment or use other measures to divert it back to the sanitary sewer system.

6.3.3 Urban Roads

139. The following table details the potential impacts and risks that UNOPS and RMF-IU might need to address, as well as matching mitigation measures, if the Project was to finance urban road maintenance subprojects. Similar to YIUSEP, YIUSEP II will only support the routine maintenance of road, i.e., works are usually non-structural in nature and are meant to extend the life of the pavement.

These include fixing the cobbles of stone roads, patching pot holes, surface patching with surface dressing or thin asphalt, crack sealing and filling, re-graveling of shoulders, cleaning of drains and culverts; installing traffic signs and signals; replacing damaged signs and road markings, controlling roadside brush and vegetation, cleaning roadside, and repairing sidewalks.

140. The sector specific risks and impacts are additional to the generic contractor related risks and impacts described in Table 2.

Table 29. Potential Impacts and matching mitigation measures for urban roads subprojects (Standard routine maintenance work)

Potential Impact	Mitigation Measure
Filling or blockage of culverts, drainage ditches and canals as a result of maintenance	• Side slope roads to prevent the accumulation of water on the road surface • Periodically clean and maintain ditches and culverts
Temporary loss of income and disruption of economic activities/ businesses because of Project activities.	UNOPS and its Implementing partners will take all appropriate measures to avoid the disruption of economic activities, and will compensate affected parties, as per the Project Resettlement Framework
Road accidents due to absence of traffic safety signage Temporary loss of access; traffic disruptions; OHS; community health and safety etc.	Ensure that roads are equipped with the proper road traffic safety signage Prepare a traffic plan for each sub-project according to the site specific ESMPs. Prepare CESMP including all OHS requirement, community health and safety standards and guidelines

6.3.4 Electricity for Critical Services

141. The following table details the potential impacts and risks that UNOPS might need to address, as well as matching mitigation measures, if the Project was to finance electricity related subprojects.

142. YIUSEP II will not be involved in transmission or distribution, or in any way interface with the assets owned by the Local Public Utility Corporations (PECs). UNOPS does not have the authority to affect such assets, or the authorization from the PECs.

143. As was done during YIUSEP, all activities and equipment will be off grid, mainly within the premises of existing health or educational facilities, and will consist of the repair of existing generators or the installation of mainly rooftop photovoltaic panels. The connection of off-grid facilities supported by the Project to neighboring businesses was envisaged at one hospital during YIUSEP, but was abandoned because of the liabilities that would ensue vis-à-vis the PEC.

144. The sector specific risks and impacts are additional to the generic contractor related risks and impacts described in Table 2.

Table 30. Potential impacts and matching mitigation measures for Electricity for Critical Services subprojects

Potential Impact	Mitigation Measure
Electric shock can cause death or injury to the public	• Build security fences around facilities • Put in place warning signs • Carefully design using appropriate technologies to minimize hazards
Impacts of hazardous wastes resulting from the disposal of batteries and panels used in solar PV systems	• Ensure proper recycling and disposal paths exist for batteries • Contract with appropriate experienced recycling contractor for disposal of solar PV panels

Emission due to fossil fuel	• Ensure that generators are well-maintained and meet the Small Combustion Facilities Emissions Guidelines
Impact of illegal connection that could affect economy of formal electricity supply and the safety of workers and users	Ensure that all rules , regulation to prevent this illegal connection are in place

Given that the cumulative maximum power rating of the fossil fuel power generation facilities that might be rehabilitated might exceed 3MWth, UNOPS will ensure that the small combustion facilities emissions guidelines[56] are followed, as indicated in Table 7, if the installations operates more than 500 hours per year, and if their annual capacity utilization exceeds 30 percent.

[56] General EHS Guidelines, Small Combustion Facilities Emissions Guidelines

Flood Management

Current best practice for flood management is to treat flooding in a risk management context, in which the flood itself is a natural hazard and risk results from the exposure of the community to the hazard and its ability to deal with the occurrence of the hazard. The consequences of a flood depend on both its magnitude, how exposed the community is to the flood, and how vulnerable the community is in terms of people, property, infrastructure and environmental impacts.
Hence, in order to reduce the flood risk, the following must be adopted:
Reduce the community's exposure to flooding.
Increase the community's ability to cope with the flood and its aftermath.

1- Reduce the community's exposure to flooding

The community' exposure to flooding can be reduced by following measures:

- Levees (dykes); o Enlargement of channels and culverts;
- Diversion (bypass) channels.

2- Increase the community's resilience to flooding

Approaches under this category are all non-structural in nature and include:

- Flood Mapping;
- Education/awareness campaigns;
  - Raising community awareness of flooding issues;
  - How to understand and make use of flood warning information;
- Flood forecasting and warning;
  - Meaningful, timely, preparation of flood forecasts and the dissemination of flood warning information; and
- Disaster Management Planning and Emergency Services Response.

a) Flood mapping is a fundamental requirement in raising community resilience as it provides both the data required by the responsible agencies for good planning and is also a very useful tool to enable the community to understand the flood risk. Use of animations of the development and recession of the flood wave has also been found to be very useful in this regard.
b) Flood forecasting and warning hydraulic models for flood mapping may also be used for real time flood forecasting with a combination of rainfall and upstream river level data. In small catchments where flood warning "lead" times are short, forecasts are generally based on rainfall data alone, but in larger river systems, more accurate forecasts can be developed incorporating upstream water levels. The aim of flood forecasting is to provide information to the public in respect of the estimated severity of the imminent flood (in terms of flood height) together with the time at which flooding is expected to start (and its likely duration). This information empowers the community to act to remove themselves, their pets, vehicles and, if necessary, housing commodities, to higher ground. The longer the warning or "lead" time, the greater amount of damage can usually be avoided. This information may be made available to the community via a range of techniques, the most recent of which is by the use of SMS messaging. Other methods include television and radio broadcasting or the use of sirens. In addition to receiving the warning in a timely manner, it is essential that the communities are able to interpret the warning as it relates to their own circumstances (i.e. location and elevation level). The official warnings usually refer to specific locations, so some means of interpretation is required.

Chapter 7.
Procedures to Address Environmental and Social Issues

145. This section sets out in detail the procedures to be followed in addressing the environmental and social risks and impacts of subprojects

7.1 Exclusion List

146. The first step in addressing a subproject's environmental and social risks and impacts is for the ESSO to exclude as **ineligible for UNOPS support all** subprojects that include any of the following attributes:

- Production or activities involving harmful or exploitative forms of forced labor/harmful child labor;
- Production or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements;
- Production or trade in weapons and munitions;
- Gambling, casinos and equivalent enterprises;
- Trade in wildlife or wildlife products regulated under CITES;
- Production or trade in radioactive materials;
- Production or trade in or use of un-bonded asbestos fibers;
- Production or trade in wood or other forestry products from unmanaged forests;
- Production or trade in products containing PCBs;
- Production, trade, storage, or transport of significant volumes of hazardous chemicals, or commercial scale usage of hazardous chemicals;
- Production or trade in pharmaceuticals subject to international phase outs or bans;
- Production or trade in pesticides / herbicides subject to international phase outs or bans
- Production or trade in ozone depleting substances subject to international phase out;
- Production or activities that impinge on the lands owned, or claimed under adjudication, by indigenous peoples, without full documented consent of such people.
- Power plants,
- Large-scale transport infrastructure such as highways, expressways, urban metro-systems, railways, and ports,
- Investments in extractive industries; commercial logging,
- Dams, or projects involving allocation or conveyance of water, including inter-basin water transfers or activities resulting in significant changes to water quality or availability,
- Activities that would significantly convert natural habitats or significantly alter potentially important biodiversity and/or cultural resource areas, and
- Activities that would require the relocation of residential households and/or significant involuntary land acquisition,
- Activities in disputed areas.

7.2 Screening

147. Within one week of receiving a draft subproject proposal from UNOPS' technical staff or UNOPS' Implementing Partners, the ESSO will prepare, sign, and pass on to the Project Manager, a subproject specific screening form (Template in Annex 1), indicating:

(i) The proposed environmental and social risk rating (High, Substantial, Moderate or Low), with

justifications

(ii) The proposed environmental and social risk management instruments to be prepared.

7.3 Environmental and Social Risk Management Instruments

Subprojects requiring a full ESIA and ESMP

148. The ESSO will determine if the subproject requires a full Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP). When this is the case, the ESSO, in collaboration with the ESSO of the concerned Implementing Partner, will prepare draft ToRs for the ESIA and ESMP as per the templates in Annex 3 and 4. He will then pass on the ToRs to the Program Manager who will submit them to the World Bank for review and clearance.

149. UNOPS will competitively select consultants to prepare full ESIAs and ESMPs for subprojects that require them. The ESSO will supervise their preparation and interact with the consultants. On completion of the instruments, the Program Manager will submit the draft ESIAs and ESMPs to the World Bank for their review, clearance and disclosure.

Subprojects only requiring an ESMP

150. Proportionate ESMPs for subprojects not requiring a full ESIA and ESMP will be prepared either by the UNOPS ESSO, for subprojects directly implemented by UNOPS, or by the ESSO of each Implementing Partner, for the subprojects they will implement. A subproject's ESMPs must be prior reviewed and cleared by the World Bank before a subproject can be implemented. The UNOPS ESSO will review and ensure the quality of all ESMPs before they are sent to the Bank by the Project Manager.

151. The proportionate ESMPs will be prepared according to the following table of content:

Summary Sheet

Subproject Name	
Subproject Location	
Implementing Partner	
Risk level (low, moderate, substantial or high)	
Date of the field visit	
Consultation Summary	
Observations/Comments	
Signature of responsible ESSO	
Date	

Subproject Description

- Nature and scope of activities, particularly construction and rehabilitation works. Include all the technical details that are relevant to understand the environmental and social risks and impacts of the subproject
- Location, including a map. If the subproject includes multiple locations, then the particulars of each location must be provided.

Environmental and Social Baseline

- Provide all the necessary information required to understand the environmental and social risks and impacts of the subproject.

- Provide enough pictures to illustrate environmental and social issues, with appropriate legends.

Consultations

- Document all consultations with stakeholders likely to be affected by the subproject (date, location, list of participants, topics discussed, conclusions). The consultations must include the persons that might be negatively affected, and not only beneficiaries or interested and concerned parties.
- Join photos of the consultations
- Detail the grievance mechanism procedures specific to the subproject

Mitigation Instruments

- Refer to the Environment, Social (including labor), Health, and Safety requirements (Annex 5) and attach them to the ESMP
- Highlight the ESHS requirements to which subproject contractors must pay the greatest attention. If necessary, the ESMP will ensure that the ESHS requirements are proportional to the subproject's nature, scope, the specific environmental and social risks, and the number of workers involved. For example, UNOPS might need to specify for small contracts the type of PPE, or the contents of First Aid Boxes.
- If necessary, indicate additional requirements that will be applicable to the subproject contractor.
- Indicate the mitigation measures that UNOPS and its Implementing Partners will be implementing to address the environmental and social risks and impacts not associated with contractors (see section 6.2 of this ESMF), including legacy issues, and technical assistance.
- Provide a subproject specific monitoring plan that indicates what parameters will be monitored, how they will be monitored, who will monitor them, and how frequently they will be monitored.
- Detail any training provided by UNOPS to the contractors and their workers.

Budget

- Provide a budget for the mitigation measures to be implemented by UNOPS and its implementing partners. The cost to contractors of meeting the ESHS requirements will be included in their respective contracts.

7.4 Incorporating ESHS requirements in contracts[57]

152. UNOPS or its Implementing Partner will ensure that:

- Requests for Proposals reference the ESHS requirements in Annex 5
- Bidders submit a preliminary environmental and social plan as part of their bids, describing the principles and methodology they will use to address environmental, social, health and safety issues under the contract, and will include all costs associated with managing environmental and social issues in their bids.
- The quality of the preliminary environmental and social plan, the bidders' past environmental and social performance, and their ability to manage environmental and social issues will be considered in the selection of contractors.
- The selected contractors will prepare a Contractor Environmental and Social Management Plan (C-ESMP), detailing how the ESHS requirements will be implemented, including personnel
- It approves the C-ESMP before the start of activities

[57] UNOPS will also require all contractors to meet its GHS guidelines, although they might not be explicitly mentioned in contract conditions.

- C-ESMPs will serve as the benchmark for monitoring and evaluating the contractor's environmental and social performance

7.5 Consultation and Disclosure Requirements

153. Despite the emergency situation and the current COVID-19 pandemic, UNOPS consulted with public authorities and the Implementing Partners (PWP, RMF-IU, and Urban PMU), to ensure that YIUSEP II with its additional financing responds to the needs identified during the implementation of YIUSEP I. Further detail regarding consultations during Project preparation are found in the Project updated Stakeholder Engagement Plan (SEP)

154. UNOPS and its implanting partners would keep stakeholders informed as the project develops, including reporting on project environmental and social performance, and implementation of the stakeholder engagement plan and grievance mechanism through information disclosure through the UNOPS web site and public meetings.

155. UNOPS will ensure to place of project-related information and printed materials in dedicated/designated locations that also provide visitors and readers with an opportunity to leave their comments in a feedback register

156. For each subproject, the ESSO of the concerned Implementing Partners will engage with affected communities, including host communities, through the process of stakeholder engagement described in the Project updated Stakeholder Engagement Plan (SEP). UNOPS and its Implementing Partner will initiate consultations with individuals and communities that might be affected by the subproject, as soon as subproject screening has been completed. The purpose of the consultations will be to: (i) inform them about the activities to be undertaken, their timetable and possible impacts, and; (ii) document and address their concerns. Consultation summaries should be included in safeguard instruments, including who was consulted, where and when, what concerns were expressed, and how these concerns were addressed. The records of consultations are kept in the Project Office.

Public consultation workshops with stakeholders were held in June 2021 for the parent project and for the newly added cities (Ibb, Yarim, Sayoun, and Al Shahar) as the result of the additional financing to the parent project between 9 June and 11 November 2021 to ensure effective stakeholder participation relevant to targeted urban cities. Various stakeholder representatives were invited and 974 participants; of whom 339 females (38%), attended the consultation workshops; including:

- The MoWE Minister, Vice Minister, and Deputy Ministers;
- The MoHP Minister and Deputy Ministers;
- Water and Sanitation Local Corporations (WSLCs) representatives;
- Public Project Works -PMU and its local branches teams.
- Road Maintenance Fund -PIU, and its local branches teams
- The Urban Water PMU and its local teams;
- The MoPIC Deputy Minister and General Directors of local offices;
- The SCMCHA General Secretary, Deputies, and General Directors of local offices;
- The MoE Vice Minister and Deputy Ministers
- The MoLA Deputy Minister;
- Governors and their Deputies;
- Local council members and local district General Directors;
- Representatives of local authority, civil society, and women associations; and
- Local IDPs and beneficiaries.

All consultation workshops were designed and held to encourage stakeholder feedback and to support active and inclusive engagement with project-affected parties in a documented way free of external interferences in which:

- Arabic language was used with more emphasis on verbal and visual methods.
- Large public and easily accessible venues were used with a gender-sensitive setting with sufficient

security requirements.

- Transportation allowances were provided to participants from remote locations.
- Participants were maintained a proper social distance and given masks and hand sanitizers as COVID-19 preventive measures.
- A number of UNOPS qualified female and male staff were presenting and facilitating the consultation.
- Project information was distributed to all participants in a form of hardcopies (Booklets) of the PAD, ESMF, RF, SEP, LMP, and GBV Prevention and Response Plan
- Leaflets containing the Project GM information were also distributed to all participants.
- Evaluation surveys were used during the sessions to get participants' feedback, suggestions and remarks as well, with attendees' contact details, organization and title.

157. UNOPS is keen to ensure interactive participation during the consultation sessions. Therefore, participants were given enough time to raise their concerns. UNOPS has also consulted its local implementing partners; namely, the Public Works Project (PWP), Road Maintenance Fund –IU (RMF-IU), and the Urban Water and Sanitation Project Management Unit (UW PMU) on the proposed investment plan for YIUSEP II AF and the need to amend the UNOPS Partnership Cooperation Agreements (PCAs). The below table shows list of participants and date of consultations for the AF.

Table 31 Participants number, place and date of consultations for the AF

Date	Session	City	Venue	Number of Attendees
Wednesday - June 09, 2021	Session 1	Sana'a	Bustan Hotel - Sana'a	220
Thursday - June 10, 2021	Session 2	Sana'a	Bustan Hotel - Sana'a	
Tuesday - June 15, 2021	Session 1	Aden	Coral Hotel - Aden	199
Wednesday - June 16, 2021	Session 2	Aden	Coral Hotel - Aden	
Thursday - June 17, 2021	Session 1	Abyan	Coral Hotel - Aden	89
Monday - June 21, 2021	Session 1	Lahj	Coral Hotel - Aden	74
Wednesday - June 23, 2021	Session 1	Al Dale	Coral Hotel - Aden	62
Thursday - June 24, 2021	Session 1	Taiz City	Coral Hotel - Aden	52
Thursday - August 12, 2021	Session 1	Taiz Alhawban	Grand Ibb Hotel - Ibb	70
Thursday - August 12, 2021	Session 1	Taiz Alhawban	Grand Ibb Hotel - Ibb	68
Tuesday - November 9, 2021	Session 1	Ibb & Yarim	Grand Address Hotel, Sana'a	67
Wednesday - November 10, 2021	Session 1	Mukalla ,Sayounn , Al-Shahir	Ramada Hotel - Mukalla	73
Total				974

158. **Main Consultation Outcomes:**

- The YIUSEP II AF (P178270) proposed funding and interventions for WASH and roads were not sufficient to meet the local increasing priority needs (i.e. the WASH infrastructure of Sana'a Old City and road conditions in Yarim).
- Project-affected parties needed additional gender-sensitive engagements and consultations to enhance their awareness of the project's institutional arrangements, needs selection and prioritization and the importance of the project GM and its confidentiality.
- Stakeholders appreciated the prior disclosure and dissemination of relevant project information and

requested more consultations that support active and inclusive engagement with project-affected parties. UNOPS implementing partners (PWP, RMF-IU and UW-PMU) reaffirmed their understanding of the ESF objectives and their plans to have adequate resources to implement them (for example by recruiting a full-time Gender Officer). However, they also expressed concerns regarding: the complexity of these instruments, particularly the requirements for GBV/PSEA awareness raising stipulated in the SEA/SH Prevention and Response Action Plan, the Security management Plan (SMP), and the Labor Management Procedures (LMP). The "long list" of requirements and the "need to build implementing partners' capacity" to comply with these requirements.

- The main outcomes of the CSOs' consultations were:
- The CSOs have a good understanding and experience in adopting and implementing safeguard plans and engagements.
- The CSOs' capacity to comply and deliver environmental and social requirements, including consultation, is subject to donors' (or main partners') enforced policies and guidelines, and on the extent of capacity support provided by donors.
- They hoped that UNOPS could implement the project SEP as planned because the increasingly challenging situation in Yemen (i.e., ground fighting, limited access, and the pandemic) could hinder its smooth implementation.
- They recommended that UNOPS organize SEP consultations based on the WASH sector and CSO specialization, to ensure relevant productive discussion and feedback during SEP consultations. UNOPS has taken this recommendation into consideration.
- All CSOs expressed their "huge interest" to participate in capacity training and stakeholder consultations that mutually benefit them and local communities under YIUSEP II-AF. UNOPS indicated that it would notify these CSO (and others) regarding any upcoming ESF training opportunities, as well as stakeholder consultations in the different target areas.

159. Feedback forms were distributed to 903 participants to capture the views and suggestions from persons who may have refrained from expressing their views or concerns in public.

160. The main outcomes suggested that they were generally in favor of the project with:

- 97.5% of the participants were satisfied with the participatory approach in the project and,
- 2.5% of the participants were not satisfied and recommended the inclusion of per diems to enhance stakeholder participation and it was agreed to pay different transportation rates according to the distance where participants are coming from.

161. The consultation process considers the sociocultural context of Yemen. Consultations takes the form of focus groups discussions (FGD) with elders/community leaders, or interviews. Separate consultations are done for women in order to ensure that any special concerns and needs are taken into account during the preparation of the safeguard instruments. In light of the fragility, conflict, and violence (FCV) context, the ESSO of the concerned Implementing Partners ensures that PAPs are not exposed to risks as part of their participation in subproject consultations, for example by avoiding large meetings, and not disclosing personal information/photos.

7.6 Grievance Mechanism

162. UNOPS will apply the Project Grievance Mechanism[58] detailed in Section 5 of the Project Stakeholder Engagement Plan, to all subprojects. Each ESMP will include a subproject specific Grievance Mechanism, with procedures relevant to its specific context.

[58] The Project Grievance Mechanism described in the Project Stakeholder Engagement Plan (SEP) is distinct from the Workers Grievance Mechanisms described in the Project Labor Management Procedures (LMP)

163. Subproject related grievances can be brought up by affected people in case of: (i) non-fulfillment of contracts or agreements; (ii) compensation entitlements; (iii) types and levels of compensation; (iv) disputes related to destruction of assets or livelihoods; or (v) disturbances caused by construction activities, such as noise, vibration, dust or smell. Anonymous complaints will be admissible.

164. The UNOPS Program Manager based in the Sana'a Office will have the overall responsibility to address Project activity-related complaints and inquiries from Project affected communities or individuals regarding any environmental or social impacts due to subproject activities. The UNOPS ESSO in its Sana'a Office will handle Project activity-related complaints, who will be assisted by UNOPS' City Engineers in the target cities. The ESSO in each of the Implementing Partners will handle complaints related to their activities. UNOPS will coordinate with the local Implementing Partners and will set a unified timeframe for reporting grievances. UNOPS and the Implementing Partners will present and explain the mechanism to all subproject affected persons subproject preparation.

165. UNOPS is providing multiple access points to the ESSO for beneficiaries to voice their concerns. These access points will be advertised at subproject level, and include: complaint box at Project activity sites, at UNOPS' offices in Sana'a, Aden and Mukalla, by directly contacting Project affiliated staff, and by mail, telephone, email, and UNOPS 'website:

Address	Haddah Street, former European Union Office Building, Sana'a
Hotline	8000-190
Email	gm-yemen@unops.org
Website	www.unops.org

7.7 Implementation of Subproject Mitigation Measures

166. UNOPS and the Implementing Partners are responsible for implementing the necessary mitigation measures that are beyond the control of contractors. In addition, subprojects should regularly consult with project affected persons and communities throughout subproject implementation, as indicated in the Project's Stakeholder Engagement Plan.

Chapter 8.
Monitoring and Reporting

167. The UNOPS ESSO will monitor the overall implementation of the ESMF[59] by UNOPS and its Implementing Partners, most particularly the:

(i) timely preparation of environmental and social screening forms for all subprojects (list of subprojects by risk category by date)
(ii) timely preparation and clearance of subproject ESIAs and ESMPs, as needed (list of instruments with dates)
(iii) management of prior review requirements of the World Bank (non-objection requests with dates)
(iv) preparation and monitoring of ESMP implementation, including monitoring of mitigation measures and monitoring of contractors environmental and social performance (indicators)
(v) training of Project staff, of Implementing Partners, and contractors (list of persons, dates and places)

168. The ESSO will prepare:

(i) bi-annual reports summarizing monitoring results, to be included in the Project's bi-annual Reports to the World Bank
(ii) reports that aggregate and analyze monitoring results ahead of regular "reverse" World Bank implementation support missions with UNOPS
(iii) an annual evaluation of all environmental and social monitoring results, which will be submitted to the World Bank as part of overall project implementation reporting

169. Environmental and social risk management aspects are also part of the scope of the Third-Party Monitoring (TPM) services contracted by UNOPS. As per their Terms of Reference, the:

"Specific Requirements for Safeguards Compliance Verification include two phases of subprojects' implementation:

- *Phase 1 includes compliance check with the environmental and social safeguards requirements per Project documents (PAD; ESMP; RAP; other) in regard to the subprojects preparation/design and existence of these requirements in the bid and contract documents or other related implementation arrangements;*
- *Phase 2 includes verification of conformity with safeguards' requirements during implementation of subprojects; and compliance check with all environmental and social safeguards requirements per the Project documents (PAD; ESMP; RAP; other)."*

8.1 Subproject Environmental and Social Database

170. The ESSO will establish, maintain, and update a database of all subprojects that will be shared with the Implementing Partners. The database will include for each subproject:

(i) type of subproject, name of subproject, Implementing Partner
(ii) environmental and social risk level
(iii) timeline (clearance of screening form, clearance of ToRs, clearance of safeguard instruments)
(iv) supervision reports by ESSOs during implementation
(v) contractor reports
(vi) noncompliance by contractors

[59] In addition to the subproject ESMP, the ESSO will monitor any Resettlement Plan as well as the status of resolution of grievances/complaints. The ESSO will also evaluate that the livelihoods of PAPs were restored as per the Resettlement Plan.

(vii) cross references to the Grievance Redress Mechanism's log of complaints.

8.2 Monitoring of ESMPs

171. The ESSOs within UNOPS and the Implementing Partners will conduct onsite visits to large water and sanitation subprojects at least once a week, or more often as needed, to monitor the implementation of their ESMPs. Smaller subprojects will be monitored every two weeks, or more often as needed.

172. The following table provides an indicative monitoring plan in the event of a large water and sanitation subproject, to be included in subproject ESMPs.

Table 32 . Monitoring plan

What	How	Who	When
• Proper operation of the network.	• Monitoring checklists • Visual inspection at the scheme routes and at manholes.	• MoWE • Local water and sanitation corporations • TPMs, UWS & PWP	Semi-annually (for one year after handing over
Efficiency of treatment ponds. Effluent quality tests for: • BOD • PH • Conductivity • Fecal Coliforms	Samples collected from inlet and outlet of treatment works Monitoring checklists	• MoWE • Local water and sanitation corporations • TPMs, UWS & PWP • EPA and its branches	Quarterly - annually (for one year after the start of operation)
Health and safety of workers	HSE inspection report	• UNOPS -HSE Specialist / TPMs, UWS & PWP	Weekly
Capacity building programs. Training of members of community or local NGOs on health & hygiene awareness	• 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	• Capacity building Specialist UNOPS/ • TPM, • UWS & PWP	Regularly according to implementation milestones.
• Complaint handling	• Checking logs	• GRM Focal Point UNOPS & TPM.	Monthly

8.3 Monitoring of Contractors

173. As part of their regular activities, the ESSOs will monitor and document (including pictures) the environmental and social performance of contractors for each subproject throughout the contract period. This will involve both spot check visits to work locations, and reviews of records kept by the contractor and of reports submitted by the contractor. The frequency of site visits should be commensurate with the magnitude of activities and their associated environmental and social impacts. Overall, each construction site should be visited at least once during subproject implementation.

174. For any incident or accident that causes or has the potential to cause material or significant environmental and/or social harm, the site supervisor/designated officer shall notify the responsible party's senior management and the Project Manager as soon as possible, and no later than 24 hours. UNOPS or its Implementing Partner will visit sites where a serious accident is recorded within one working day of the accident or incident, and report any significant accident or incident to the World Bank within 48 hours.

175. UNOPS and its Implementing Partners will document in the database each visit and interaction with a contractor, including identification of contractor noncompliance, the significance of the non-compliance, and guidance provided on actions to be taken. The ESSOs within UNOPS and Implementing Partners will follow up as needed to ensure timely resolution of issues of noncompliance with environmental and social clauses. This may include additional visits to the contractor's site or offices, further communications with contractor personnel, issuance of notices of deficiency or warnings to the contractor, and other actions as needed.

176. At any stage of construction or other work, if the contractor has not taken appropriate action to achieve compliance with the environmental and social clauses after repeated notices of violation and warnings of noncompliance, and significant environmental or social impacts are occurring or imminent, UNOPS should order the contractor to stop work until environmental and social performance is brought under control and up to acceptable standards.

8.4 Completion Reports

177. Upon subproject completion, the ESSOs will prepare a subproject completion report that flags any unresolved environmental or social issue, with recommended remedial action. This report will be shared with the Program Manager who will decide the way forward. For subprojects with significant environmental or social impacts, the completion report might recommend periodic routine inspections/monitoring during operation of the facility by dedicated environmental and social specialists.

Chapter 9.
Capacity

178. This chapter reviews the capacity and skills available within UNOPS and its Implementing Partners to implement and monitor the ESMF, and proposes measures to enhance this capacity.

9.1 UNOPS

179. UNOPS' Environmental and Social Standards Officer (ESSO) based in the UNOPS Sana'a Office will oversee the management of environmental and social risks for the Project. The ESSO will:

- Review and clear environmental and social screening forms for all subprojects that are prepared by the Implementing Partners
- Prepare ToRs for all full ESIAs and ESMPs that might be required
- Provide the draft ToRs for full ESIAs and ESMPs to the World Bank for their prior review
- Supervise the preparation of ESIAs and ESMPs by the consultants selected by UNOPS
- Provide draft full ESIAs and ESMPs to the World Bank for review and clearance
- Monitor subproject compliance with their ESMP, including field visits and spot checks
- Work closely with UNOPS engineers and procurement officers to incorporate environmental and social requirements into subproject design, appraisal and resource mobilization
- Closely coordinate with ESSOs in the Implementing Partners.
- Compile quarterly, biannual and annual reports on environmental and social risk management performance of the Project that will be incorporated into the Project reports
- Provide assistance and deliver capacity building trainings to UNOPS staff, Implementing Partners, and contractors
- Organize and oversee the preparation, production and distribution of training manuals and awareness materials

180. UNOPS will also deploy a Gender Mainstreaming Officer and a Health and Safety Officer based in its Sana's office.

181. UNOPS will also recruit a part time international expert to be available - on a needs basis - to oversee the overall implementation, monitoring, and reporting of environmental and social risk management aspects. With the additional financing to the parent project, UNOPS may recruit additional personnel as needed.

9.2 Public Work Project (PWP)

182. PWP currently employs an environmental expert and a social expert who cover environmental and social issues in PWP' s current portfolio of projects. These two experts will jointly serve as the ESSO for the subprojects implemented by PWP, including the preparation of environmental and social screening forms, the preparation of proportionate ESMPs for subprojects that do not require a full ESIA and ESMP, and the monitoring of contractor compliance with subproject ESMP requirements. As necessary, PWP will recruit additional staff or employ local consultants.

9.3 RMF-IU

183. RMF-IU currently employs two environmental and social experts, who will jointly serve as its ESSO. The Project will provide them with on-the-job training and guidance to raise their capacity. The ESSO will prepare the environmental and social screening forms for all subprojects, and monitor on-site contractor compliance with subproject ESMP requirements and any Resettlement Plans.

9.4 UW-PMU

184. The environmental and social officer in UW-PMU will serve as its ESSO for the Project. The ESSO will prepare the environmental and social screening forms for all subprojects implemented by UWS, and monitor on-site contractor compliance with subproject ESMP requirements, including the Environmental and Social Requirements for contractors.

9.5 Capacity Development

185. UNOPS will ensure that the ESSO, the Gender Mainstreaming Officer, and the Health and Safety Officer within UNOPS, as well as the ESSOs and Health and Safety Officers of the Implementing Partners receive training on the ESF and its implementation.

186. The UNOPS ESSO, jointly with the ESSOs in the Implementing Partners, will organize training for the persons involved in Project implementation, including:

- A launch workshop to operationalize the ESMF and agree on roles and responsibilities moving forward
- A workshop with UNOPS engineers and technical staff to explain the ESMF and its implementation.
- Environmental and social risk management training and capacity enhancement for the Implementing Partners, participating contractors, and Local Councils.
- Toolbox talks for contractors to explain the ESMF and the ESHS requirements, including the grievance mechanism for workers, sexual exploitation and abuse (SEA)/sexual harassment (SH) and the associated grievance management, and worker OHS, including:
  - On-site risk identification and mitigation
  - Use of PPEs
  - Emergency Prevention and Preparedness
- Sessions to sensitize the local councils to the ESMF and its implementation
- Training of UNOPS staff and Implementing Partners on land acquisition and resettlement management

187. The UNOPS HSSE Unit might be involved in the capacity building activities.

188. UNOPS will also finance the production of training manuals and awareness materials as needed.

Table 33 . Indicative costs of capacity building activities

Capacity Building Measures	Unit Cost (USD)	Costs (USD)
15 X 2-day training on ESMF for Implementing Partners and their consultants	2000/session	30,000
15 X 1-day consultation with local councils and key stakeholders	1000/session	15,000
140 X 1-day training on ESMP and contractual clauses for contractors	1000/session	140,000
Production of environmental and social awareness materials (brochures, posters, fliers)	15000	15,000
	TOTAL	**200,000**

9.6 Budget

- UNOPS is fully covering, as part of the fee that it will charge the Bank, the cost of the ESSO, the Gender Mainstreaming Officer, and the Health and Safety Officer, as well as any associated operational costs and the cost of additional personnel needed as the result of the new additional financing to the parent project.
- The Implementing Partners are covering the cost of their respective ESSOs and Health and Safety Officers as part of their respective Project Cooperative Agreement (PCA) with UNOPS.

These ESSOs might not work full time on YIUSEP II activities, as each Implementing Partners has partnered with several projects.

- The cost of due diligence for specific subprojects (preparation of the screening form, consultations, GM, preparation of ESMPs and Resettlement Plans, and monitoring) are included in the costs/budget for each subproject. These costs are scalable to the level and scope of the potential risks and impacts, and might include the costs of consultants recruited by UNOPS or an Implementing Partner to assist on specific tasks. Specifics will be required for the two larger solid waste management activities that were prepared under YIUSEP but will be implemented under YIUSEP II, given that they will require full ESIAs and ESMPs.

Annex 1.

Template for Subproject Screening

Screening Form for Potential Environmental and Social Issues

UNOPS will use this form to screen for the potential environmental and social risks and impacts of a proposed subproject. The form will allow UNOPS to: (i) identify the relevant Environmental and Social Standards (ESS); (ii) establishment an appropriate Environmental and Social risk for the subproject, and; (iii) specify the type of environmental and social assessment required, including specific instruments/plans.

The Screening Form is not a substitute for subproject-specific environmental and social assessments or specific mitigation plans.

Subproject name	
Subproject location	
Implementing Partner	
Estimated Investment	
Was the site visited beforehand	
Estimated Start/Completion Date	
Observations/Comments	
Signature of UNOPS ESSO	
Signature of Program Manager	

Question	**Answer**		**ESS relevance**	**Due diligence/ Actions**
	Yes	no		
Does the subproject involve civil works including new construction, expansion, upgrading or rehabilitation of existing infrastructure?			ESS1	ESIA/ESMP, SEP
Does the subproject involve land acquisition and/or restrictions on land use?			ESS5	Resettlement Plan, SEP
Is the subproject associated with any external waste management facilities such as a sanitary landfill, incinerator, or wastewater treatment plant?			ESS3	ESIA/ESMP, SEP
Does the subproject have an adequate system in place (capacity, processes and management) to address waste?			ESS1, ESS3	ESMP
Does the subproject involve the recruitment of workers including direct, contracted, primary supply, and/or community workers?			ESS2	LMP, SEP

Does the subproject have appropriate OHS procedures in place, and an adequate supply of PPE (where necessary)?			ESS2	LMP
Does the subproject have a GM in place, to which all workers have access, designed to respond quickly and effectively?			ESS10	SEP
Does the subproject involve use of security or military personnel during construction and/or operation of healthcare facilities and related activities?			ESS4	ESIA/ESMP, SEP
Is the subproject located within or in the vicinity of any ecologically sensitive areas?			ESS6	ESIA/ESMP, SEP
Is the subproject located within or in the vicinity of any known cultural heritage sites?			ESS8	ESIA/ESMP, SEP
Does the project area present considerable Gender-Based Violence (GBV) and Sexual Exploitation and Abuse (SEA) risk?			ESS1	ESIA/ESMP, SEP

Conclusions of the screening:

1. **Indicate the proposed environmental and social risk ratings[60] (High, Substantial, Moderate or Low), and provide justifications.**

2. **Indicate the proposed environmental and social risk management instruments that must be prepared.**

[60] **High Risk** subprojects are likely to generate a wide range of significant adverse risks and impacts on human populations or the environment, because of the complex nature of the Project, their large to very large scale, or the sensitivity of the subproject locations. Impacts are likely to be long term, permanent, irreversible, and impossible to avoid entirely due to the nature of the Project

Medium Risk subprojects are likely to generate some significant adverse risks and impacts on human populations or the environment, because of their large to medium scale. They are not located in a highly sensitive area. Impacts are likely to be mostly temporary, predictable and reversible.

Moderate Risk subprojects have adverse risks and impacts on human populations and/or the environment that are not likely to be significant, because the subproject is not complex or large, do not involve activities that have a high potential for harming people or the environment, and are located away from environmentally or socially sensitive areas.

Low Risk subprojects have potential adverse risks to and impacts on human populations or the environment that are likely to be minimal or negligible. These subprojects do not require further ES assessment following the initial screening.

UNOPS

Annex 2.

Yemeni Environmental Quality Standards

Table 34 Permissible limits for key air pollutants

Pollutant	Time Period	Value
Carbon Monoxide and Dioxide gas (CO/CO_2)	8 hours	10 micrograms\m^3
Nitrogen oxide (NO_x)	24 hours	150 micrograms\m^3
Sulphur oxide (SO_X)	24 hours	250 micrograms\m^3
Ozone (O_3)	8 hours	120 micrograms\m^3
Particulate Matter (PM)	24 hours	70 micrograms\m^3
Lead (Pb)	Annually	1 micrograms\m^3

The Yemeni standards for air quality do not specify sources of industrial emissions; they are also less strict than those in the World Bank Group EHS Guidelines.

Table 35 Maximum noise level allowed in different environments (Decibel Unit dB)

Environment	Time		
	7h00-18h00	18h00-23h00	23h00-07h00
Rural housing and entertainment places	45	40	25
Suburban housing areas	50	45	40
Urban housing areas	55	50	45
Housing areas in city centers	60	55	50
Industrial and commercial areas	70	70	70

Table 36 Physical Characteristics of drinking water

Characteristic	Unit	Optimal limit	Maximum limit
Taste		Acceptable to consumers	
Odor		Acceptable to consumers	
Color	Platinum Cobalt	5	25
Turbidity (NTU)	Turbidity Unit	1	5
Temperature	Degree Celsius	-	25
pH (Potential of hydrogen)		6.5-8.5	5.5- 9
Electrical Conductivity EC	Micro mohs/cm	450-1000	2500

Table 37 Inorganic substances in drinking water

Substance	Symbol	Optimal limit (mg/L)	Maximum limit (mg/L)
Total Dissolved Salts	TDS	650	1500
Bicarbonate	HCO_3	150	500
Chloride	Cl^-	200	600
Sulphate	SO_4	200	600
Fluoride	F^-	0.5	1.5

Calcium	Ca	75	200
Magnesium	Mg	30	30-150
Barium	Ba	0.1	0.15
Sodium	Na	200	400
Potassium	K	0-12	12
Nitrate	NO_3	10	50
Iron	Fe	0.3	1
Manganese	Mn	0.1	0.5
Copper	Cu	0 1	1.5
Zinc	Zn	5	15
Total Hardness (as Calcium Carbonate)	TH	100	500
Aluminum	Al	0.2	0.3
Nickle	Ni	0.05	0.1
Boron	B	0.50	1
Silica	SiO_2		40

Total residual chlorine concentration in treated water reaching the consumers should be between 0.2 to 0.5 ppm. It might be increased in the event of an epidemic to the level determined by the related authorities and international organizations.

Table 38 . Maximum limits for organic pollutants in drinking water

Substance	Maximum limit (mg/L)
Aldrin	0.0002
Lindane	0.004
Methoxine	0.01
Toxaphene.	0.002
2,4 Dichlorophenoxy acetic acid	0.1
Propionic acid	0.01
Malathion	0.19
Parathion	0.035
Permethrin	0.01
Dimethoate	0.002
Diazinon	0.002

Table 39 . Maximum limits for toxic substances in drinking water

Substance	Unit	Maximum limit
Lead (Pb)	mg/L	0.05
Selenium (Se)	//	0.01
Arsenic (As)	//	0.01
Chromium (Cr)	//	0.05
Cyanide (CN)	//	0.01
Cadmium (Cd)	//	0.005
Mercury (Hg)	//	0.001
Antimony (Sb)	//	0.005
Barium (Ba)	//	0.5-1.0
Silver (Ag)	//	0.01-0.1

Halogenated methane group (TTHM) includes: Chloroform, Bromoform, Bromodichloromethane and Dibromochloromethane	µg/L	150

The amount of radioactive materials in water should not exceed the limits mentioned below:

The microbiological pollutants in treated public water supplied through the distribution network or any other distribution means must be free of Total Coliform and Colon Bacillus form as mentioned below:

Table 40 . Bacterial Pollutants

Bacteria	Unit	Maximum limit
Total coliforms	CFU/100 ml	Zero
Fecal coliform	CFU/100 ml	Zero

Microbiological pollutants in untreated public water conveyed into the distribution network

- 98% of the annually tested samples must be free of total coliforms.
- The fecal coliform must not exceed three in any one isolated sample and not successive samples.
- Water not supplied through the distribution network such as: wells, springs, rain water reservoirs the Fecal coliform that found in a 100 ml water sample must not exceed 10-15 coliform.

Biological Pollutants

The drinking water must be free from the following:

- Protozoa harmful to health.
- Parasitic worms (Helminths) that can involve human as a host during its life cycle and transfer infection to human.
- Parasites including fungi that affect health or produces toxic materials that affect human health.

Waste Water

Physical Standard physical requirements:

- Maximum temperature should not exceed 45 C^o
- Should not contain substances susceptible to freezing, settling or become viscous in temperature ranging from 0-40 C^o
- Should not contain solid or liquid hazardous and explosive materials

Table 41 . Maximum levels of chemical substances in industrial and commercial waste water discharged in the public sewerage network

Compound/Substance	Symbol	Unit	Maximum limit
Chemical Oxygen Demand	COD	mg/L	2100
Biochemical Oxygen Demand	BOD	mg/L	800
Power of Hydrogen	pH	---	5.5-9.5
Maximum Temperature Degree	C^o	C	45
Total Suspended Solids	TSS	mg/L	1100
Total Dissolved Solids	TDS		2000
Oil and Grease	---		100
Phenolic Compounds	---		10
Sulphate	SO_4		1000

Phosphorus	P		50
Cyanide	CN		5
Sulphur	S		1
Hydrogen Sophie	H_2S		10
Iron	Fe		50
Chloride	Cl		600
Fluoride	F		8
Arsenic	As		5
Tin	Sn		10
Barium	Ba		5
Boron	B		5
Cadmium	Cd		1
Chromium (VI)	Cr		5
Copper	Cu		5
Lead	Pb		0.6
Mercury	Hg		0.01
Nickel	Ni		5
Selenium	Se		0.1
Silver	Ag		1
Manganese	Mn		10
Beryllium	Be		5
Zinc	Zn		15
Cobalt	Co		0.05
Lithium	Li		5
Vanadium	V		0.1
Aluminum	Al		5

Wastes that must be handled with control set up by the administration under the competent authority of which wastes lie:

Clinical wastes generated from medical care in hospitals, clinics and medical centers.

1. Wastes generated from pharmaceutical preparations and products.
2. Wastes generated from medicaments and drugs.
3. Wastes generated from production of biological insecticides, preparation of medicaments from plants and shrubs and its usage.
4. Wastes generated from wood chemical protective materials and their preparation and utilization.
5. Wastes generated from organic solvent materials and their preparation and usage.
6. Wastes generated from thermal processing and printing processes which contains cyanide.
7. Wastes from unusable mineral oil.
8. Wastes from oil/water and mixes of hydrocarbons etc.
9. Wastes from substances and compounds containing alkaline phenol with multitude bonds (PCBs) and/or phenyls of multiple chlorine bonds.
10. Wastes from tar sediments resulting from refining and distillation and any thermal processing analysis.
11. Wastes from production of links, paints, coloring materials, lacquers, varnishes and their preparation and usage.
12. Wastes left from the production of resins, gingival, plastics, furs, sticking materials and their preparation and usage.
13. Wastes from chemical materials generated from research and development activities or from any uncategorized/ or new educational activities the effects of which on human beings and the environment are not known.

14. Wastes of explosive nature not subjected to any other legislation.
15. Wastes left from production of chemical, processing and photographic materials and their usage and preparation and usage.
16. Wastes from surface treatment of plastics and metals.
17. Residues resulting out of disposing of industrial wastes.

Hazardous wastes for which transportation and handling is prohibited except with a permission from the Competent Authority include:

- Wastes that include the following materials in their composition:
    1. Carbonic metal.
    2. Barium and barium compounds.
    3. Chrome hexa equivalence compounds.
    4. Copper compounds.
    5. Zinc compounds.
    6. Arsenate, arsenic compounds.
    7. Selenium, selenium compounds.
    8. Cadmium, cadmium compounds.
    9. Antimony, antimony compounds.
    10. Tellurium, tellurium compounds.
    11. Mercury, mercury compound.
    12. Thallium, thallium compounds.
    13. Lead, lead compounds.
    14. Fluorine inorganic compounds except calcium fluoride.
    15. Cyanide inorganic compounds.
    16. Acid solutions or acids in solid state.
    17. Alkaline solutions or alkalines in solid state.
    18. Rock silk (Asbestos) (fiber dust)
    19. Phosphorous organic compounds.
    20. Cyanide organic compounds.
    21. Phenol, phenol organic compounds including chlorophenol.
    22. Organic compounds of Ether/air.
    23. Halogenic organic solvents.
    24. organic solvents expect halogenic solvents.
    25. Any similar substance to bi-benzene of multiple chlorine bonds.
    26. Any substance similar to dioxin-pho-bi-benzene of chloride bonds.
    27. Most organic halogen compounds
- Pesticides and home insecticides.
- Petroleum substances.
- Substances from which ionic radiations are emitted.
- Inflammable and explosive substances.

Annex 3.

Indicative Outline of Subproject ESIA

Where an environmental and social impact assessment (ESIA) must be prepared as part of the environmental and social assessment of a subproject, it will include the following:

Executive Summary

- Concisely discusses significant findings and recommended actions.

Legal and Institutional Framework

- Analyzes the legal and institutional framework for the project, within which the environmental and social assessment is carried out, taking into account in an appropriate manner all issues relevant to the project, including: (a) the country's applicable policy framework, national laws and regulations, and institutional capabilities (including implementation) relating to environment and social issues; variations in country conditions and project context; country environmental or social studies; national environmental or social action plans; and obligations of the country directly applicable to the project under relevant international treaties and agreements; (b) applicable requirements under the ESSs; and (c) the EHSGs, and other relevant GIIP.
- Compares the Borrower's existing environmental and social framework and the ESSs and identifies the gaps between them.
- Identifies and assesses the environmental and social requirements of any co-financiers.

Subproject Description

- Concisely describes the proposed subproject and its geographic, environmental, social, and temporal context, including any offsite investments that may be required (e.g., dedicated pipelines, access roads, power supply, water supply, housing, and raw material and product storage facilities), as well as the project's primary suppliers.
- Through consideration of the details of the project, indicates the need for any plan to meet the requirements of ESS1 through 10.
- Includes a map of sufficient detail, showing the project site and the area that may be affected by the project's direct, indirect, and cumulative impacts.

Baseline Data

- Sets out in detail the baseline data that is relevant to decisions about project location, design, operation, or mitigation measures. This should include a discussion of the accuracy, reliability, and sources of the data as well as information about dates surrounding project identification, planning and implementation.
- Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions.
- Based on current information, assesses the scope of the area to be studied and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences.
- Takes into account current and proposed development activities within the project area but not directly connected to the project.

Environmental and Social Risks and Impacts

- Takes into account all relevant environmental and social risks and impacts of the project. This will include the environmental and social risks and impacts specifically identified in ESS2–8, and any other environmental and social risks and impacts arising as a consequence of the specific nature and context of the project, including the risks and impacts identified in ESS1, paragraph 28.

Mitigation Measures

- Identifies mitigation measures and significant residual negative impacts that cannot be mitigated and, to the extent possible, assesses the acceptability of those residual negative impacts.
- Identifies differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable.
- Assesses the feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of proposed mitigation measures, and their suitability under local conditions; and the institutional, training, and monitoring requirements for the proposed mitigation measures.
- Specifies issues that do not require further attention, providing the basis for this determination.

Analysis of Alternatives

- Systematically compares feasible alternatives to the proposed project site, technology, design, and operation—including the "without project" situation—in terms of their potential environmental and social impacts.
- Assesses the alternatives' feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of alternative mitigation measures, and their suitability under local conditions; and the institutional, training, and monitoring requirements for the alternative mitigation measures.
- For each of the alternatives, quantifies the environmental and social impacts to the extent possible, and attaches economic values where feasible.

Design Measures

- Sets out the basis for selecting the particular project design proposed and specifies the applicable EHSGs or if the EHSGs are determined to be inapplicable, justifies recommended emission levels and approaches to pollution prevention and abatement that are consistent with GIIP.

Key Measures and Actions for the Environmental and Social Commitment Plan (ESCP)

- Summarizes key measures and actions and the timeframe required for the project to meet the requirements of the ESSs. This will be used in developing the Environmental and Social Commitment Plan (ESCP).

Appendices

- List of the individuals or organizations that prepared or contributed to the environmental and social assessment.
- References—setting out the written materials both published and unpublished, that have been used.
- Record of meetings, consultations and surveys with stakeholders, including those with affected people and other interested parties. The record specifies the means of such stakeholder engagement that were used to obtain the views of affected people and other interested parties.
- Tables presenting the relevant data referred to or summarized in the main text.
- List of associated reports or plans.

UNOPS

Annex 4.

Indicative Outline of an ESMP

An ESMP consists of the set of mitigation, monitoring, and institutional measures to be taken during implementation and operation of a subproject to eliminate adverse environmental and social risks and impacts, offset them, or reduce them to acceptable levels. The ESMP also includes the measures and actions needed to implement these measures. UNOPS will (a) identify the set of responses to potentially adverse impacts; (b) determine requirements for ensuring that those responses are made effectively and in a timely manner; and (c) describe the means for meeting those requirements.

The content of the ESMP will include the following:

Mitigation

- The ESMP identifies measures and actions in accordance with the mitigation hierarchy that reduce potentially adverse environmental and social impacts to acceptable levels.
- The plan will include compensatory measures, if applicable. Specifically, the ESMP:
  - (i) identifies and summarizes all anticipated adverse environmental and social impacts (including those involving indigenous people or involuntary resettlement);
  - (ii) describes - with technical details – each mitigation measure, including the type of impact to which it relates and the conditions under which it is required (e.g., continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate;
  - (iii) estimates any potential environmental and social impacts of these measures;
  - (iv) takes into account, and is consistent with, other mitigation plans required for the project (e.g., for involuntary resettlement, indigenous peoples, or cultural heritage).

Monitoring

- The ESMP identifies monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed in the environmental and social assessment and the mitigation measures described in the ESMP. Specifically, the monitoring section of the ESMP provides (a) a specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions; and (b) monitoring and reporting procedures to (i) ensure early detection of conditions that necessitate particular mitigation measures, and (ii) furnish information on the progress and results of mitigation.

Capacity Development and Training

- To support timely and effective implementation of environmental and social project components and mitigation measures, the ESMP draws on the environmental and social assessment of the existence, role, and capability of responsible parties on site or at the agency and ministry level.
- Specifically, the ESMP provides a specific description of institutional arrangements, identifying which party is responsible for carrying out the mitigation and monitoring measures (e.g., for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training).
- To strengthen environmental and social management capability in the agencies responsible for implementation, the ESMP recommends the establishment or expansion of the parties responsible, the training of staff and any additional measures that may be necessary to support implementation of mitigation measures and any other recommendations of the environmental and social assessment.

Implementation Schedule and Cost Estimates

- For all three aspects (mitigation, monitoring, and capacity development), the ESMP provides (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) the capital and recurrent cost estimates and sources of funds for implementing the ESMP. These figures are also integrated into the total project cost tables.

Integration of ESMP with Project

- The Borrower's decision to proceed with a project, and the Bank's decision to support it, are predicated in part on the expectation that the ESMP (either stand alone or as incorporated into the ESCP) will be executed effectively. Consequently, each of the measures and actions to be implemented will be clearly specified, including the individual mitigation and monitoring measures and actions and the institutional responsibilities relating to each, and the costs of so doing will be integrated into the project's overall planning, design, budget, and implementation.

Annex 5.

Environmental and Social Requirements for Contractors

Contractors shall meet the following Environmental, Health, Safety and Social (including labor) requirements – thereafter called ESHS requirements[61].

The ESHS requirements include 10 sections

1. Contractor Environmental and Social Management Plan (C-ESMP)
2. ESHS Training
3. Construction Site Management
4. Occupational Health and Safety (OHS)
5. Road safety and Traffic Safety
6. Chance Find Procedures
7. Emergency Preparedness and Response
8. Stakeholder Engagement
9. Labor force management, including the Code of Conduct
10. Contractor Environmental and Social Reporting

Contractor Environmental and Social Management Plan (C-ESMP)

The Contractor shall:

- Prepare and submit to UNOPS for approval a Contractor Environmental and Social l and Social Management Plan (C-ESMP).
- Include in the C-ESMP a detailed explanation of how the contractor's performance will meet the ESHS requirements
- Ensure that sufficient funds are budgeted to meet the ESHS requirements, and that sufficient capacity is in place to oversee, monitor and report on C-ESMP performance.
- Put in place controls and procedures to manage their ESHS performance.
- Get prior written approval from UNOPS Engineers before starting construction or rehabilitation activities.

ESHS Training

The Contractor shall

- Determine ESHS training needs in collaboration with UNOPS
- Maintain records of all ESHS training, orientation, and induction.
- Ensure, through appropriate contract specifications and monitoring that service providers, as well as contracted and subcontracted labor, are trained adequately before assignments begin.
- Demonstrate that its employees are competent to carry out their activities and duties safely. For this purpose, the Contractor shall issue a Competence Certificate for every person working on site (relative to trade and aspect of work assignment) that specifies which tasks can be undertaken by which key personnel.

[61] The ESHS requirements build on the General EHS Guidelines of the World Bank Group, but also take into account other World Bank guidelines, and good practice notes

Orientation Training

The Contractor shall:

- Provide ESHS orientation training to all employees, including management, supervisors, and workers, as well as to subcontractors, so that they are apprised of the basic site rules of work at/on the site and of personal protection and preventing injury to fellow employees.
- Training should consist of basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. Any site-specific hazard or color coding in use should be thoroughly reviewed as part of orientation training.

Visitor Orientation

The Contractor shall:

- Establish an orientation program for visitors, including vendors, that could access areas where hazardous conditions or substances may be present.
- Visitors shall not enter hazard areas unescorted.
- Ensure that visitors shall always be accompanied by an authorized member of the contractor, or a representative of UNOPS or of its Implementing Partners, who has successfully fulfilled the ESHS orientation training, and who is familiar with the project site construction hazards, layout, and restricted working areas.

New Task Employee and Contractor Training

The Contractor shall:

- Ensure that all workers and subcontractors, prior to commencement of new assignments, have received adequate training and information enabling them to understand work hazards and to protect their health from hazardous ambient factors that may be present. The training should adequately cover the step-by-step process that is needed for Project activities to be undertaken safely, with minimum harm to the environment, including:
  - Knowledge of materials, equipment, and tools
  - Known hazards in the operations and how they are controlled
  - Potential risks to health
  - Precautions to prevent exposure
  - Hygiene requirements
  - Wearing and use of protective equipment and clothing
  - Appropriate response to operation extremes, incidents and accidents

Construction Site Management

Vegetation

The Contractor shall:

- Prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the construction site
- Protect all trees and vegetation from damage by construction operations and equipment, except where clearing is required for permanent works, approved construction roads, or excavation operations
- Revegetate damaged areas on completion of the Works, and for areas that cannot be revegetated, scarifying the work area to a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion
- Use, as much as possible, local species for replanting and species that are not listed as a noxious weed

- Repair, replant, reseed or otherwise correct, as directed by UNOPS or its representative, and at the Contractor's own expense, all unnecessary destruction, scarring, damage, or defacing of the landscape resulting from the Contractors operations
- Transport labor and equipment in a manner to avoid as much as possible damage to grazing land, crops, and property

Protection of the Existing Installations

The Contractor shall:

- Safeguard all existing buildings, structures, works, pipes, cables, sewers, or other services or installations from harm, disturbance or deterioration during construction activities
- Coordinate with local authorities to identify existing infrastructure that might not be visible
- Repair any damage caused by the Contractor's activities, in coordination with concerned authorities.
- Take all reasonable precautions to prevent or reduce any disturbance or inconvenience to the owners, tenants or occupiers of properties to the construction activities, and more generally to the public
- Maintain safe access to public and private properties that might be affected by construction activities. If necessary, provide acceptable alternative means of passage or access to the satisfaction of the persons affected.
- Avoid working during night hours

Waste from Construction Activities

The Contractor shall:

- Collect and properly manage all solid wastes resulting from the construction activities, including construction debris and spoils, to prevent the contamination of soil and groundwater
- Remove unneeded excavation material from construction sites as soon as possible
- Agree with relevant municipalities about construction waste disposal
- Carefully select waste disposal sites, to be approved by UNOPS or its Implementing Partner
- Minimize littering of roads by ensuring that vehicles are licensed and loaded in such a manner as to prevent falling off or spilling of construction materials, and by sheeting the sides and tops of all vehicles carrying mud, sand, other materials or debris
- Transfer construction waste to assigned places in the selected waste disposal sites with documented confirmation.
- Properly dispose of solid waste and debris at designated permitted sites waste disposal sites allocated by the local authorities, and obtain a receipt of waste from the authorized landfill authority.

Air Quality

The most common pollutant involved in fugitive emissions is dust or particulate matter (PM) that is released during the transport and open storage of solid materials, and from exposed soil surfaces, including unpaved roads. Accordingly, the Contractor shall:

- Use dust control methods, such as covers, water suppression, or increased moisture content for open materials storage piles, or controls, including air extraction and treatment through a baghouse or cyclone for material handling sources, such as conveyors and bins;
- Use water suppression for control of loose materials on paved or unpaved road surfaces. Oil and oil by-products are not a recommended method to control road dust.
- Use wheel washes at quarries, ready-mix plants, construction sites, and other facilities to prevent track-out of mud, dust and dirt on to public road.
- Regularly clean road surfaces within the construction sites to remove accumulated fine material, and regularly clean transportation vehicles.

- Cover open bodied trucks handling sand, gravel or earth.
- Minimize smoke from diesel engines by regular and proper maintenance, in particular by ensuring that the engine, injection system and air cleaners are in good condition.

Hazardous and Toxic Materials

Toxic and deleterious wastes resulting from the Contractor's activities require special attention in order to forestall their introduction into the natural environment which could result in harm to people, aquatic life or natural growth of the area. Accordingly, the Contractor shall:

- Train workers regarding the handling of hazardous materials
- Label using easily understandable symbols, and provide material safety data sheets, for chemical substances and mixtures according to the Globally Harmonized System (GHS) of classification and labelling of chemicals.
- Store hazardous materials as per the statutory provisions of the Manufactures, Storage and Import of Hazardous Chemicals Rules (1989), under the Environment (Protection) Act, 1986.
- Provide adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids,
- Use impervious surfaces for refueling areas and other fluid transfer areas
- Train workers on the correct transfer and handling of fuels and chemicals and the response to spills
- Provide portable spill containment and cleanup equipment on site and training in the equipment deployment
- Deposit or discharge toxic liquids, chemicals, fuels, lubricants and bitumen into containers for salvage or subsequent removal to off-site locations.
- Treat hazardous waste separately from other waste
- Avoid the storage or handling of toxic liquid adjacent to or draining into drainage facilities.
- Keep absorbent materials or compounds on Site in sufficient quantities corresponding to the extent of possible spills.
- Locate landfill pits for the disposal of solid waste at least 100 m from water courses, and fencing them off from local populations.
- Ensure adequate primary treatment of sanitation effluents and installing septic tanks away from village watering points.

Area Signage

The Contractor shall:

- Appropriately mark hazardous areas.
- Install warning signs
- Ensure that signage is in accordance with international standards and is well known to, and easily understood by workers, visitors and the general public as appropriate.
- Demarcate work sites with safety tape, fencing or barricades, as appropriate, to prevent unauthorized access to the construction sites
- Safeguard public safety by covering holes and by installing guardrails along temporary pathways.

Borrow Pits and Quarries[62]

Materials required for site fill, backfill or the construction of permanent works that are not available from the surface will be obtained from borrow areas and quarries that the Contractor will identify,

[62] Contractors should consider doing borrow pits on a a willing-buyer willing-seller (renter) basis to avoid involuntary land acquisition.

subject to approval by the UNOPS or its Implementing Partners.

The Contractor shall adhere to the following standards when siting, developing, operating, and reinstating borrow pits and quarries:

- Obtain all necessary permits for borrow pits and quarry operations.
- Locate quarry sites as far away from settlements as possible. Quarry operations will produce noise and dust that will impact on nearby inhabitants even if controls are imposed.
- Fence and secure quarry sites. Steep quarry faces are a hazard to people and livestock.
- Locate borrow pits and quarries at least 100 m from watercourses or human habitations.
- Conduct a pre-blasting inspection/survey, in consultation with residents/property owners, prior to operating a quarry, to document the existing condition of buildings and identify any sensitive structures, building components or contents. The site conditions and the inspection information should be used to design the blasting operation to avoid any effects to property.
- Locate, to the extent possible, borrow pits on land that is not used for cultivation and is not wooded.
- Avoid areas of local historical or cultural interest and locate pits more than 25 m of grave sites.
- Hide, to the extent possible, pits from the road. Quarries and borrow pits should be designed to minimize visible scarring of the landscape.
- Develop a borrow pits and quarry management plan, including a plan to reinstate borrow pits and quarry sites as closely as possible to their original state

Location of Worker Camps

The Contractor shall:

- Consult and negotiate with local stakeholders before proposing a location for its camps.
- Submit the proposed locations to UNOPS or its Implementing Partner for approval, including a justification for their location, as well proposed measures to mitigate the environmental and social risks and impacts around the camp and to enhance social benefits.

Decommissioning of Camps, Worksites and Plant

The Contractor shall:

- Clear construction sites of any equipment or waste and ensuring that the sites are free from contamination.
- Dispose of or recycle any equipment or waste in an appropriate and environmentally sound manner.
- Hand construction sites over to the original owners, taking into account his/her wishes and national legislation.

Health and Safety

Contractors will collaborate with other contractors in applying health and safety requirements, when workers from more than one contractor are working together in one location, without prejudice to the responsibility of each party for the health and safety of its own workers.

Severe Weather and Facility Shutdown

The Contractor shall:

- Design and build workplace structures to withstand the expected elements for the region and designate an area designated for safe refuge, if appropriate.
- Develop Standard Operating Procedures (SOPs) for project or process shut-down, including an evacuation plan.

Lavatories and Showers

The Contractor shall:

- Provide adequate lavatory facilities (toilets and washing areas) for the number of people expected to work at the construction sites, and make allowances for segregated facilities, or for indicating whether the toilet facility is "In Use" or "Vacant".
- Provide toilet facilities with adequate supplies of hot and cold running water, soap, and hand drying devices.
- Where workers may be exposed to substances poisonous by ingestion and skin contamination may occur, provide facilities for showering and changing into and out of street and work clothes.

Potable Water Supply

The Contractor shall:

- Provide adequate supplies of potable drinking water from a fountain with an upward jet or with a sanitary means of collecting the water for the purposes of drinking
- Ensure that water supplied to areas of food preparation or for the purpose of personal hygiene (washing or bathing) meets drinking water quality standards

Clean Eating Area

The Contractor shall:

- Where there is potential for exposure to substances poisonous by ingestion, make suitable arrangements to provide clean eating areas where workers are not exposed to hazardous or noxious substances

Personal Protective Equipment (PPE)

The Contractor shall:

- Identify and provide at no cost appropriate PPE to workers, the workers of subcontractors, as well as to visitors, which gives adequate protection without incurring unnecessary inconvenience to the individual
- Ensure that the use of PPE is compulsory.
- Provide sufficient training in the use, storage and maintenance of PPE to its workers and workers of its subcontractors.
- Properly maintain PPE, including cleaning when dirty and replacement when damaged or worn out;
- Determine requirements for standard and/or task-specific PPE based on of Job specific Safety Analysis (JSA);
- Consider the use of PPE as a last resort when it comes to hazard control and prevention, and always refer to the hierarchy of hazard controls when planning a safety process.

Noise

The Contractor shall institute appropriate measures to reduce the exposure of workers to construction noise, including but not limited to:

- Avoid exposure to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).
- Enforce the use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110 dB(A).

- Provide hearing protective devices capable of reducing sound levels at the ear to at most 85 dB(A).
- Reduce the "allowed" exposure period or duration by 50 percent for every 3 dB(A) increase in in excess of 85 dB(A).
- Perform periodic medical hearing checks on workers exposed to high noise levels.
- Rotate staff to limit individual exposure to high levels.
- Install practical acoustical attenuation on construction equipment, such as mufflers.
    - Use silenced air compressors and power generators
    - Keep all machinery in good condition
    - Install exhaust silencing equipment on bulldozers, compactors, crane, dump trucks, excavators, graders, loaders, scrapers and shovels.
- Post signs in all area where the sound pressure level exceeds 85 dB(A).
- Shut down equipment when not directly in use
- Provide advance notice to occupants if an activity involving high level impact noise is in close proximity to buildings.

Working in Sewers

The Contractor shall:

- Ensure that a safety supervisor/officer is onsite at all times.
- Supervise and control all access to sewers, and maintain logbook of all workers working in sewers, including worker's names, start time and finish time,
- Control access to each sewer that is worked on, to ensure that only workers with a specific written permission and Permit to Work (PTW) in confined spaces can enter
- Ensure that: (i) all workers in a sewer are in continuous communication with an above ground safety watcher at the top of the manhole and a safety supervisor; (ii) a trained first aid responder is always available on site, with ready access to a first aid kit and oxygen; (iii) the above ground crew has the means to rescue workers in the sewer in the event of an emergency and to transport affected workers ; (iv) the nearest well-equipped health facility has been identified, and the time required to reach it has been assessed.
- Rotate all workers in a sewer after one shift
- Properly ventilate sewers and confirm that each sewer is free from any toxic and harmful gases, or any other risks, before allowing access to it.
- Ensure that all workers entering a sewer are properly trained regarding the risks of working in a sewer and the required safety measures
- Ensure that all workers entering a sewer or other confined spaces wear appropriate PPE, including: (i) for above ground work: full face respiratory cartridge, disposable coverall/overall, safety footwear with disposable boat cover.) for upper ground work; (ii) for underground work; a Self-Contained Breathing Apparatus, eye protection (safety goggles), hard hat/helmet, gloves, disposable overalls and boot cover, full body harness, and lifeline.
- Provide proper access and egress to sewers through sanitation manholes.
- Limit work in sewers to daytime only. Work in sewers at night is proscribed.
- Never allow a worker to be in a sewer by himself.
- Provide suitable lighting inside the sewers during work hours.
- Vaccinate all workers working in sewers against the diseases that might infect them because of working in sewers

First Aid and Accidents

The Contractor shall:

- Ensure that qualified first-aid by qualified personnel is always available. Appropriately equipped first-aid stations should be easily accessible throughout the place of work.

- Provide workers with rescue and first-aid duties with dedicated training so as not to inadvertently aggravate exposures and health hazards to themselves or their co- workers. Training would include the risks of becoming infected with blood–borne pathogens through contact with bodily fluids and tissue.
- Provide eye-wash stations and/or emergency showers close to all workstations where immediate flushing with water is the recommended first-aid response.
- Provide dedicated and appropriately equipped first-aid room(s) where the scale of work or the type of activity being carried out so requires.
- Equip first aid stations and rooms with gloves, gowns, and masks for protection against direct contact with blood and other body fluids.
- Make widely available written emergency procedures for dealing with cases of trauma or serious illness, including procedures for transferring patient care to an appropriate medical facility.
- Immediately report all accidental occurrences with serious accident potential such as major equipment failures, contact with high-voltage lines, exposure to hazardous materials, slides, or cave-ins to UNOPS.
- Immediately investigate any serious or fatal injury or disease caused by the progress of work by the Contractor, and submit a comprehensive report to UNOPS.

Communicable Diseases

Sexually-transmitted diseases (STDs), such as HIV/AIDS, are the communicable diseases of most concern because of labor mobility. Recognizing that no single measure is likely to be effective in the long term, the Contractor shall implement a combination of behavioral and environmental modifications to mitigate communicable diseases:

- Conduct Information, Education and Consultation Communication (IEC) campaigns, at least every other month, addressed to all construction site staff (including all the Contractor's employees, all subcontractors of any tier, consultants' employees working on the site, and truck drivers and crew making deliveries to the site for Works and Services executed under the Contract, concerning the risks, dangers and impact, and appropriate avoidance behavior of communicable diseases.
- Ensure ready access to medical treatment, confidentiality and appropriate care, particularly with respect to migrant workers.
- Promote collaboration with local authorities to enhance access of workers families and the community to public health services and ensure the immunization of workers against common and locally prevalent diseases.
- Provide basic education on the conditions that allow the spread of other diseases such as COVID-19, Lassa Fever, Cholera and Ebola. The training should cover sanitary hygiene education.
- Prevent illness in immediate local communities by:
  - Training health workers in disease treatment
  - Conducting immunization programs for workers in local communities to improve health and guard against infection
  - Providing health services.

COVID-19[63]

In the context of the COVID-19 pandemic, Contractors shall develop and implement measures to prevent or minimize an outbreak of COVID-19, and develop procedures indicating what should be done if a worker gets sick. The Contractor shall:

[63] Based on the World Bank COVID-19 LMP Template, April 16, 2020

- Assess the characteristics of the workforce, including those with underlying health issues or who may be otherwise at risk
- Confirm that workers are fit for work, including temperature testing and refusing entry to sick workers
- Consider ways to minimize entry/exit to site or the workplace, and limit contact between workers and the community/general public
- Train workers on hygiene and other preventative measures, and implement a communication strategy for regular updates on COVID-19 related issues and the status of affected workers
- Treat workers who are or should be self-isolating and/or are displaying symptoms
- Assess risks to continuity of supplies of medicine, water, fuel, food and PPE, taking into account international, national and local supply chains
- Reduce, store and dispose of medical waste
- Adjust work practices to reduce the number of workers and increase social distancing
- Expand health facilities on-site compared to usual levels, develop relationships with local health care facilities and organize for the treatment of sick workers
- Build worker accommodations further apart, or have one worker accommodation in a more isolated area, which may be easily converted to quarantine and treatment facilities, if needed
- Establish a procedure to follow if a worker becomes sick (following WHO guidelines)
- Implement a communication strategy with the community, community leaders and local government in relation to COVID-19 issues on the site.

Vector-Borne Diseases

Reducing the impact of vector-borne disease on the long-term health of workers is best accomplished by implementing diverse interventions aimed at eliminating the factors that lead to disease. The Contractor, in close collaboration with community health authorities, shall implement an integrated control strategy for mosquito and other arthropod-borne diseases that includes the following measures:

- Prevent of larval and adult propagation through sanitary improvements and elimination of breeding habitats close to human settlements
- Eliminate unusable impounded water
- Increase water velocity in natural and artificial channels
- Consider the application of residual insecticide to dormitory walls
- Implement integrated vector control programs
- Promote the use of repellents, clothing, netting, and other barriers to prevent insect bites
- Use chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease reservoirs
- Monitor and treat circulating and migrating populations to prevent disease reservoir spread
- Collaborate and exchange in-kind services with other control programs in the project area to maximize beneficial effects
- Educate project personnel and area residents on risks, prevention, and available treatment
- Monitor communities during high-risk seasons to detect and treat cases
- Distribute appropriate education materials
- Follow safety guidelines for the storage, transport, and distribution of pesticides to minimize the potential for misuse, spills, and accidental human exposure

Road safety and Traffic Safety

The Contractor shall ensure traffic safety by all project personnel during displacement to and from the workplace, and during the operation of project equipment on private or public roads. The Contractor shall adopt best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public, including:

- Emphasize safety aspects among drivers
- Improve driving skills and requiring licensing of drivers
- Institute defensive driving training for all drivers prior to starting their job
- Adopt limits for trip duration and arranging driver rosters to avoid overtiredness
- Avoid dangerous routes and times of day to reduce the risk of accidents
- Use speed control devices (governors) on trucks, and remote monitoring of driver actions
- Require that drivers and co-passengers wear seatbelts, and duly sanction defaulters.
- Regularly maintain vehicles and use manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.

Where the project may contribute to significant changes in traffic along existing roads the Contractor shall:

- Commence activities that affect public motorways and highways, only after all traffic safety measures necessitated by the activities are fully operational.
- Arrange diversions for providing alternative routes for transport and/or pedestrians
- Minimize pedestrian interaction with construction vehicles, particularly at crossing points to schools, markets, and any animal crossing points of significance, through appropriate signage, engineered footpaths or traffic slowing devices.
- Organize meaningful road accident awareness events at all roadside schools and communities within 150 meters of the road centerline, covering safe road crossing, road accident hazards from weather conditions and vehicle roadworthiness, overloading and driver alertness, dangers posed by parked and broken-down vehicles, etc.
- Collaborate with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present.
- Collaborate with local communities on education about traffic and pedestrian safety (e.g., school education campaigns).
- Coordinate with emergency responders to ensure that appropriate first aid is provided to all affected persons in the event of accidents.
- Use locally sourced materials, whenever possible, to minimize transport distances, and locate associated facilities such as worker camps close to project sites.
- Employ safe traffic control measures, including road signs, traffic cones, removable barriers, and flag persons to warn of dangerous conditions.

Cultural Heritage[64]

The Contractor shall:

- Develop and adopt a Chance Find Procedure that outlines the actions to be taken if previously unknown cultural heritage is encountered, including:
  - determine whether cultural heritage is expected to be found, either during construction or operations
  - train construction crews and supervisors to spot potential archaeological finds
  - keep records and ensure expert verification
  - provide chain of custody instructions for movable finds
  - notify the Department of Archaeology at the Ministry of Culture or a local university, for quick assessment and action
  - define clear criteria for potential temporary work stoppages required for rapid disposition of issues related to the finds.
- Avoid indirect damage to existing cultural heritage, such as affecting masonry through vibration

[64] Particular care must be taken when opening or operating quarries

Emergencies

The Contractor shall:

- Establish and maintain an emergency preparedness and response system, in collaboration with appropriate and relevant third parties including to cover: (i) the contingencies that could affect personnel and facilities of the project to be financed; (ii) the need to protect the health and safety of project workers; (iii) the need to protect the health and safety of the Affected Communities. The emergency preparedness and response system shall include:
    - Identification of the emergency scenarios
    - Specific emergency response procedures
    - Training of emergency response teams
    - Emergency contacts and communication systems/protocols (including communication with Affected Communities when necessary)
    - Procedures for interaction with government authorities (emergency, health, environmental authorities)
    - Permanently stationed emergency equipment and facilities (e.g., first aid stations, firefighting equipment, spill response equipment, personal protection equipment for the emergency response teams)
    - Protocols for the use of emergency equipment and facilities
    - Clear identification of evacuation routes and muster points
    - Emergency drills and their periodicity based on assigned emergency levels or tiers
    - Decontamination procedures and means to proceed with urgent remedial measures to contain, limit and reduce pollution within the physical boundaries of the project property and assets to the extent possible.

Stakeholder Engagement

As part of the overall Project Stakeholder Engagement[65], the Contractor will undertake a process of stakeholder engagement with representative persons and communities directly affected by the activities it undertakes, including, if necessary, the public disclosure of its C-ESMP. The Contractor shall also maintain throughout the Project good relations with local communities and will give these communities prior notice of plans and schedules as they might affect local people.

The stakeholder engagement process will also be applicable in the event of land acquisition associated with changes in the footprint of activities.

Labour Force Management

Labour Influx

The Contractor shall:

- Establish worker camps when accommodation supply is insufficient for workers, including subcontractors and associated support staff
- Locate worker camps away from environmentally sensitive areas
- Build additional/separate roads to project and workers' camp sites
- Organize the commute from camp to project to reduce traffic

[65] The overall process of stakeholder engagement is described in the Project Stakeholder Engagement Plan (SEP)

- Ensure workers' camp and associated facilities are connected to a septic tank or other wastewater systems that are appropriate and of sufficient capacity for the number of workers and local conditions
- Avoid contamination of fresh water sources
- Provide opportunities for workers to regularly return to their families
- Provide opportunities for workers to take advantage of entertainment opportunities away from rural host communities
- Ensure that children and minors are not employed directly or indirectly on the project and keep registration and proof of age for all employees on-site.
- Pay adequate salaries for workers to reduce incentive for theft
- Pay salaries into workers' bank accounts rather than in cash
- Get an appropriate mix of locally and non- locally procured goods to allow local project benefits while reducing risk of crowding out of and price hikes for local consumers
- Create supervised leisure areas in workers' camp;
- Establish substance abuse prevention and management programs
- Hire workers through recruitment offices, and avoid hiring "at the gate" to discourage spontaneous influx of job seekers
- Identify authorized water supply source and prohibit use from other community sources;
- Separate service providers for community and workers' camp/construction site;
- Put in place measures to reduce water and electricity consumption;
- Employ locals to the extent possible;
- Develop and adopt a Gender Action Plan to promote the transfer of construction skills to local women, to facilitate their employment at the Project site, including training and recruitment targets.

Labor Conditions

The Contractor shall:

- Implement the measures and commitments defined in the Project Labor Management Procedures.
- Provide all workers with terms and conditions that comply with Yemeni Labor Legislation, most particularly Decree 5/1995) and applicable International Labour Organization conventions on workplace conditions.
- Put in place workplace processes for project workers to report work situations that they believe are not safe or healthy, and to remove themselves from a work situation which they have reasonable justification to believe presents an imminent and serious danger to their life or health. Project workers who remove themselves from such situations will not be required to return to work until necessary remedial action to correct the situation has been taken. Project workers will not be retaliated against or otherwise subject to reprisal or negative action for such reporting or removal.
- Avoid all forms of forced or compulsory labor, i.e., all work or service which is exacted from any person under the threat of a penalty and for which the person has not offered himself or herself voluntarily.

Insurance

The Contractor shall:

- Protect the health of workers involved in onsite activities, as indicated in Chapter X of Yemen's Labor Code
- Compensate any employee for death or injury

Grievance Mechanism for Workers

The Contractor shall put in place a Grievance Mechanism for its workers and the workers of its subcontractors that is proportionate to its workforce. The GM for workers shall be distinct from the Project level Grievance Mechanism described in the Project Stakeholder Engagement Plan (SEP) for affected individuals and communities, and shall adhere to the following principles:

- *Provision of information.* All workers should be informed about the grievance mechanism at the time they are hired, and details about how it operates should be easily available, for example, included in worker documentation or on notice boards.
- *Transparency of the process.* Workers must know to whom they can turn in the event of a grievance and the support and sources of advice that are available to them. All line and senior managers must be familiar with their organization's grievance procedure.
- *Keeping it up to date.* The process should be regularly reviewed and kept up to date, for example, by referencing any new statutory guidelines, changes in contracts or representation.
- *Confidentiality.* The process should ensure that a complaint is dealt with confidentially. While procedures may specify that complaints should first be made to the workers' line manager, there should also be the option of raising a grievance first with an alternative manager, for example, a human resource (personnel) manager.
- *Non-retribution.* Procedures should guarantee that any worker raising a complaint will not be subject to any reprisal.
- *Reasonable timescales.* Procedures should allow for time to investigate grievances fully, but should aim for swift resolutions. The longer a grievance is allowed to continue, the harder it can be for both sides to get back to normal afterwards. Time limits should be set for each stage of the process, for example, a maximum time between a grievance being raised and the setting up of a meeting to investigate it.
- *Right of appeal.* A worker should have the right to appeal to the World Bank or national courts if he or she is not happy with the initial finding.
- *Right to be accompanied.* In any meetings or hearings, the worker should have the right to be accompanied by a colleague, friend or union representative.
- *Keeping records.* Written records should be kept at all stages. The initial complaint should be in writing if possible, along with the response, notes of any meetings and the findings and the reasons for the findings. Any records on SEA shall be registered separately and under the strictest confidentiality.
- *Relationship with collective agreements.* Grievance procedures should be consistent with any collective agreements.
- *Relationship with regulation.* Grievance processes should be compliant with the national employment code.

Protection from Sexual Exploitation and Abuse[66]

The Contractor shall:

- Provide repeated training and awareness raising to the workforce about refraining from unacceptable conduct toward local community members, specifically women
- Inform workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted
- Prohibit its employees from exchanging any money, goods, services, or other things of value, for sexual favors or activities, or from engaging in any sexual activities that are exploitive or degrading to any person.

[66] UNOPS has prepared a Sexual Abuse and Exploitation (SEA) and Sexual Harassment (SH) Prevention and Response Plan for the Project

- Develop a system to capture gender-based violence, sexual exploitation and workplace sexual harassment related complaints/issues.
- Adopt a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence.

Protection from Child Labor

The Contractor shall:

- Verify that workers are older than 18 when hiring
- Exclude all people under the age of 18.
- Review and retain copies of verifiable documentation concerning the age of workers

Code of Conduct

The Contractor shall ensure that all employees, including those of subcontractors, are informed about and sign the following Code of Conduct:

CODE OF CONDUCT FOR CONTRACTOR'S PERSONNEL

We the Contractor [enter name of Contractor] have signed a contract with UNOPS for [enter description of the activities]. These activities will be carried out at [enter the Site and other locations where the activities will be carried out]. Our contract requires us to implement measures to address environmental and social risks related to the activities, including the risks of sexual exploitation and assault and gender-based violence.

This Code of Conduct is part of our measures to deal with environmental and social risks related to the activities. It applies to all our staff, including laborers and other employees in all the places where the activities are being carried out. It also applies to the personnel of every subcontractor and any other personnel assisting us in the execution of the activities. All such persons are referred to as "Contractor's Personnel" and are subject to this Code of Conduct.

This Code of Conduct identifies the behavior that we require from all Contractor's Personnel.

Our workplace is an environment where unsafe, offensive, abusive or violent behavior will not be tolerated and where all people should feel comfortable raising issues or concerns without fear of retaliation.

Required Conduct

Contractor's Personnel shall:

1. carry out his/her duties competently and diligently;
2. comply with this Code of Conduct and all applicable laws, regulations and other requirements, including requirements to protect the health, safety and well-being of other Contractor's Personnel and any other person;
3. maintain a safe working environment including by:
4. ensuring that workplaces, machinery, equipment and processes under each person's control are safe and without risk to health;
5. wearing required personal protective equipment;
6. using appropriate measures relating to chemical, physical and biological substances and agents; and
7. following applicable emergency operating procedures.
8. report work situations that he/she believes are not safe or healthy and remove himself/herself from a work situation which he/she reasonably believes presents an imminent and serious danger to his/her life or health;
9. treat other people with respect, and not discriminate against specific groups such as women, people with disabilities, migrant workers or children;
10. not engage in any form of sexual harassment including unwelcome sexual advances,

requests for sexual favors, and other unwanted verbal or physical conduct of a sexual nature with other Contractor's or Employer's Personnel;

11. not engage in Sexual Exploitation, which means any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another. In Bank financed projects, sexual exploitation occurs when access to or benefit from Bank financed Goods, Works, Consulting or Non-consulting services is used to extract sexual gain;
12. not engage in Sexual Assault, which means sexual activity with another person who does not consent. It is a violation of bodily integrity and sexual autonomy and is broader than narrower conceptions of "rape", especially because (a) it may be committed by other means than force or violence, and (b) it does not necessarily entail penetration.
13. not engage in any form of sexual activity with individuals under the age of 18, except in case of pre-existing marriage;
14. complete relevant training courses that will be provided related to the environmental and social aspects of the Contract, including on health and safety matters, and Sexual Exploitation and Assault (SEA);
15. report violations of this Code of Conduct; and
16. Not retaliate against any person who reports violations of this Code of Conduct, whether to us or the Employer, or who makes use of the Grievance mechanism for Contractor's Personnel or the project's Grievance Mechanism.

Raising Concerns

If any person observes behavior that he/she believes may represent a violation of this Code of Conduct, or that otherwise concerns him/her, he/she should raise the issue promptly. This can be done in either of the following ways:

1. Posting notice that indicate the Individuals designated to follow-up in these issues by the Contractor [enter name of Contact)
2. In writing at this address [ ]
3. By telephone at [ ]
4. In person at [ ]
5. Calling [ ] to reach the Contractor's hotline and leave a message (if available)

The person's identity will be kept confidential, unless reporting of allegations is mandated by the country law. Anonymous complaints or allegations may also be submitted and will be given all due and appropriate consideration. We take seriously all reports of possible misconduct and will investigate and take appropriate action. We will provide warm referrals to service providers that may help support the person who experienced the alleged incident, as appropriate.

There will be no retaliation against any person who raises a concern in good faith about any behavior prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

Consequences of Violating the Code of Conduct

Any violation of this Code of Conduct by Contractor's Personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.

For Contractor's Personnel

I have received a copy of this Code of Conduct written in a language that I comprehend. I understand that if I have any questions about this Code of Conduct, I can contact [enter name of Contractor's contact person with relevant experience in handling gender-based violence] requesting an explanation.

Name of Contractor's Personnel: [insert name]
Signature: _____
Date: (day month year): _____
Countersignature of authorized representative of the Contractor:
Signature: _____
Date: (day month year): _____

A copy of the code shall be displayed in a location easily accessible to the community and project affected people. It shall be provided in languages comprehensible to the local community, Contractor's personnel (including sub-contractors and day workers), and affected persons.]

Contractor Environmental and Social Reporting

The Contractor shall report major work-related incidents, accidents or loss of life to UNOPS or the relevant Implementing Partner **within 24 hours** of their occurrence.

The Contractor shall monitor, keep records and report on the following environmental and social issues:

- *Safety:* hours worked, lost time injury (LTI), lost workdays, recordable incidents and corresponding Root Cause Analysis (lost time incidents, medical treatment cases), first aid cases, high potential near misses, and remedial and preventive activities required (for example, revised job safety analysis, new or different equipment, skills training, and so forth).
- *Environmental incidents and near misses:* environmental incidents and high potential near misses and how they have been addressed, what is outstanding, and lessons learned.
- *Major works:* those undertaken and completed, progress against project schedule, and key work fronts (work areas).
- *ESHS requirements:* noncompliance incidents with permits and national law (legal noncompliance), project commitments, or other ESHS requirements.
- *ESHS inspections and audits:* by the Contractor, UNOPS and its Implementing Partners, or others—to include date, inspector or auditor name, sites visited and records reviewed, major findings, and actions taken.
- *Workers:* list of workers at each site, confirmation of ESHS training, indication of origin (expatriate, local, nonlocal nationals), gender, age with evidence that no child labor is involved, and skill level (unskilled, skilled, supervisory, professional, management).
- *Training on ESHS issues:* including dates, number of trainees, and topics.
- *Footprint management:* details of any work outside boundaries or major off-site impacts caused by ongoing construction—to include date, location, impacts, and actions taken.
- *External stakeholder engagement:* highlights, including formal and informal meetings, and information disclosure and dissemination—to include a breakdown of women and men consulted and themes coming from various stakeholder groups, including vulnerable groups (e.g., disabled, elderly, children, etc.).
- *Details of any security risks:* details of risks the Contractor may be exposed to while performing its work—the threats may come from third parties external to the project.
- *Worker grievances:* details including occurrence date, grievance, and date submitted; actions taken and dates; resolution (if any) and date; and follow-up yet to be taken—grievances listed should include those received since the preceding report and those that were unresolved at the time of that report.
- *External stakeholder grievances:* grievance and date submitted, action(s) taken and date(s), resolution (if any) and date, and follow-up yet to be taken—grievances listed should include those received since the preceding report and those that were unresolved at the time of that report. Grievance data should be gender-disaggregated.
- *Major changes to Contractors environmental and social practices*.
- *Deficiency and performance management:* actions taken in response to previous notices of deficiency or observations regarding ESHS performance and/or plans for actions to be taken should continue to be reported to UNOPS until it determines the issue is resolved satisfactorily.

Annex 6.

Grievance Complaint, and Suggestion Form

نموذج لآلية التظلمات والشكاوى

استمارة توثيق ومتابعة شكاوى المستفيدين من المشروع الطارئ للخدمات الحضرية المتكاملة المرحلة الثانية

"Documenting and Monitoring Complaints Form of Beneficiaries of Yemen Integrated Urban Services Emergency Project AF" YIUSEP II

الاسم الثلاثي للمستفيد: Beneficiary Name			
رقم البطاقة الشخصية: ID No.		**رقم الهاتف للمتابعة** Tel No. for follow up	
العنوان الدائم: Permanent Address			
اسم النشاط المنفذ (مركز/وحدة) Name of activity under implementation			
مكان تنفيذ النشاط: Place of activity under implementation	**القرية:** Village	**المديرية:** District	**المحافظة:** Governorate

نوع الشكوى Complaint Type	إدارية Administrative	فنية Technical	مالية Financial	أخرى Other

موضوع الشكوى:
Complaint Subject

الوضع الحالي: Current Situation			
أسباب المشكلة: Reason of the problem			
التاريخ: Date		**توقيع صاحب الشكوى:** Complainant Signature	

- الجهة التي يجب أن يقدم لها الشكوى:.. UNOPS/Sana'a – Tel: 01 504914/915 - SMS:739888388 Tool Free 8000190 Email: GRM.yemen@unops.org .....
The entity which the complaint should be forwarded to:
-الرأي في جدية الشكوى:.....
Opinion on the seriousness of the complaint
-الجهة المحول لها الشكوى :.....
The complaint transferred to
- المدة الزمنية اللازمة للبت في الشكوى:.....
Time required for response
-مدى رضى المستفيد عن الاستجابة لحل شكواه:.....
Satisfaction of beneficiary in responding to his/her complaint

الإجراءات المتخذة : Action taken			
ما ترتب عليها من نتائج: The results of the action taken		**التاريخ:** Date	

اسم مستلم الشكوى ووظيفته: .....
Name of person received the complaint and his/her position

التاريخ Date : **.....** **توقيع الموظف المختص/** Signature