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UNOPS

UNITED NATIONS OFFICE FOR PROJECT SERVICES

(UNOPS)

Yemen Emergency Human Capital Project

(YEHCP)

COMPONENT 2

Improving Access to Water Supply and Sanitation (WSS) and Strengthening Local Systems

Supply and Installation of Solar PV System to 9 Water Wells in

Sana'a, Ibb, Shabwah, Hadramout, Taiz and Al Byda Governorates

Environmental and Social Management Plan (ESMP)

23 July, 2022

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Abbreviations

EU	European Union's (EU) mandatory conformity
DC	Direct Current
DCJB	DC Junction Box
EHS	Environmental, Health and Safety
ESF	Environmental and Social Framework of the World Bank
ESHS	Environment, Social (including labor), Health, and Safety
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
GHS	General Health and Safety guidelines
GIIP	Good International Industry Practice
GM	Grievance Mechanism
GRM	Grievance Redress Mechanism
GSM	Global System for Mobile Communication
HSSE	Health, Safety, Social and Environment
IDA	International Development Association
IDP	Internally Displace Person
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LMP	Labor Management Procedures
MCB	Miniature Circuit Breakers
MCCB	Molded Case Circuit Breaker
MPPT	Maximum Power Point Tracking

PAP	Project Affected People
PV	Photovoltaic
PVC	Permanent virtual circuit
RF	Resettlement Framework
ROY	Republic of Yemen
SEA	Sexual Exploitation and Abuse
SH	Sexual Harassment
SEP	Stakeholder Engagement Plan
SMP	Security Management Plan
SPD	Surge Protector Device
TPM	Third Party Monitoring
TUV	Technischer Überwachungsverein (Association for Technical Inspection)
UL	Underwriters' Laboratories
UNOPS	United Nations Office for Project Services
UV	Ultraviolet
XLPE	Cross linked polyethylene cable.
YIUSEP II	Second Yemen Integrated Urban Services Emergency Project
YEHCP	Yemen Emergency Human Capital Project

Summary Sheet

Sub-Project Name	Supply and Installation of Solar PV System to 9 Water Wells in Sana'a, Ibb, Shabwah, Hadramout, Taiz and Al-Bayda'a Governorates.
Sub-Project Location	Sana'a, IBB, Shabwah, Hadramout, Taiz and Al-Bayda'a Governorates.
Implementing Partner	Directly implemented by UNOPS through Local Contractors
Risk level	Moderate
Estimated Total Investment	750,000 USD ESMP Cost (2,300 USD)
Date of the field visit	April 2022
Date of consultation	April 2022
Observations/Comments:	Indicated below.
Signature of ESSO:	
Date:	

Executive Summary

Water supply projects, particularly in this sub-project governorates, are among the most essential humanitarian and development projects. Due to the high population density in the region, scarcely of water, and remote water resources, supplying water to the cities is costly. The bulk of individuals who benefit from water projects in these regions are poor, low-income people and IDPs. The provision of water supply services in Yemen in general has been hampered by the ongoing conflict and the fuel blockage crisis. Local Water and Sanitation Corporations (LWSCs) have been encouraged to use advanced alternative energy sources for pumping water from boreholes and water pumping stations.

UNOPS is promoting the use of alternative energy technology to ensure continuity of water and sanitation services to the population of Yemen and strengthen the local systems. The intervention of UNOPS in this Sub-project aiming at improving access to safe drinking water at an adequate cost to alleviate the suffering of the poor communities in these areas.

This Environmental and Social Management Plan (ESMP) was prepared based on UNOPS Environmental and Social Management Framework (ESMF) of the Yemen Emergency Human Capital Project (YEHCP), to address the potential environmental and social impacts, which may be triggered during the implementation of the Solar Systems sub-projects Supply for Wells and Pumping Stations that will be implemented by UNOPS.

The selection of activities was based on the priority needs and criteria identified by UNOPS in consultation with District Local Authorities DLAs, Local Communities and the governorates (

Sana'a, IBB, Shabwah, Hadramout, Taiz and Al-bayda'a) Local Corporation WSLC. The supply and installation work contracts will maximize the use of manual labor to support local employment.

This ESMP defines the potential impacts due to the supply and installation activities and their proposed mitigation measures that would be the direct responsibility of contractor to implement, under the supervision of UNOPS. Arrangement with Water and Sanitation Local Corporations for the required supply, installation and completion of the Solar Systems was considered by UNOPS.

Proposed activities: The proposed activities will include Supply, Installation and completion of the Solar Systems for Wells and Pumping Stations, the implementation of the solar systems will help providing safe drinking water to the beneficiaries to cover their needs at lowest cost, reducing the maintenance and operation cost of water supply systems, improving public health and reducing environmental pollution from diesel generators.

Main activities to be implemented shall include but not limited to the following:

- Site preparation and leveling
- Excavation for Foundations and other structural concrete;
- Compaction and Backfilling;
- Dismantling all the existing equipment inside the boreholes (pump, motor, riser pipes, cables, etc.)
- Supply and installation of submersible solar pumps, riser pipes and accessories.
- Repair and maintenance for the existing control room
- Installation of PV module support structures
- Electrical system supply and Installation, including:
    - PV modules
    - Inverters/controllers
    - DC combiners, disconnects, fuses, and wiring
    - AC breakers and disconnects
    - Enclosures, conduit, and wiring
    - Generators.

1. Introduction

This Environmental and Social Management Plan (ESMP) was prepared based on UNOPS updated Environmental and Social Management Framework (ESMF) of the Yemen Emergency Human Capital Project (YEHCP), to address the potential environmental and social impacts, which may be triggered during the implementation of the sub-project to meet the requirements of the World Bank's Environmental and Social Framework (ESF), as well as national environmental laws and regulations, for the Yemen Emergency Human Capital Project (YEHCP-Component 2).

This sub-project ESMP was built based on principles and objectives spelt out in the updated ESMF prepared for the additional Financing of the YEHCP.

Specific to YEHCP-Component 2, UNOPS has in parallel prepared a Labor Management Procedure (LMP) to meet the requirements of ESS2, and a GBV/SEA/SH Plan and a Security Management Plan (SMP) to meet the requirements of ESS4, and a Resettlement Framework (RF) to meet the requirements of ESS5, as well as a Stakeholder Engagement Plan (SEP) which is prepared jointly by UNOPS, WHO, and UNICEF, to meet the requirements of ESS10. All the above-mentioned documents have been updated to be part of the additional financing to the parent project.

Updated YEHCP ESMF link:
https://documents1.worldbank.org/curated/en/099535005302223184/pdf/P17657004944f30b0b3c005bafa0859d1b.pdfUpdated YEHCP SEP Link:
http://documents.worldbank.org/curated/en/740571632338239349/pdf/Stakeholder-Engagement-Plan-SEP-Yemen-Emergency-Human-Capital-Project-P176570.pdf

Background

Violent conflict, now in its seventh year, has crippled Yemen's economy and created an unprecedented humanitarian crisis. Yemen has been embroiled in conflict, inflicting considerable physical damage to infrastructure, ravaging its economy, weakening institutions, and protracting what has already been the world's worst humanitarian crisis in a long time. According to the United Nations Development Program (UNDP)'s estimates, there were 102,000 direct combat deaths and 131,000 indirect deaths due to lack of food, health services and infrastructure, and many more injuries between 2015 and 2019[1]. Diverse factors including tribal, regional, and sectarian divisions, long-standing grievances, elite capture of limited resources and rampant corruption have been the major causes of fragility drivers operating across Yemen. While conflict has been a key factor in the gradual breakdown of national structures essentially crippling service delivery, particularly in life-critical sectors such as health, violence alone cannot account for the magnitude of suffering with other factors like fragmentation, poor coordination, limited transparency, and weak governance further complicating the picture on the ground.[2]

Yemen, a country located in a dry and semi-arid region, is already facing a severe water crisis in which several major cities are running out of water. Mostly due to high population growth, misguided agricultural development, traditional irrigation practices and type of cropping patterns, a lack of law enforcement to regulate water use, and vulnerability to climate change, the crisis may soon reach catastrophic levels. Yemen's acute water scarcity poses a serious threat to the country's stability and security. While the past six years of conflict cannot be attributed solely to water shortage, it is an important contributor. Studies reveal that water scarcity acts as a security threat multiplier in regions characterized by a growing population, social and political tensions, as well as ineffective and unaccountable state institutions – such as in Yemen. The recent impacts of climate change and armed conflict on the country's dwindling water resources create a new urgency to address this old problem.

The country has suffered extensive damage to its human capital which will require time and steady resources to undo. A large swathe of the population is food insecure, and over two million children

[1] Moyer J, et al. 2019, Assessing the Impact of Conflict on Human Development in Yemen, UNDP. *https://www.undp.org/content/dam/yemen/General/Docs/ImpactOfWarOnDevelopmentInYemen.pdf* (accessed 11/23/20)

[2] AlKarim T, et al. BMJ Global Health 2021; 6:e004740. doi:10.1136/bmjgh-2020-004740

require treatment for acute malnutrition,[3] causing irreparable damage to human capital. About 4.5 million children have been born in Yemen since the escalation of violence in March 2015. An estimated 4.3 million people have fled their homes since the start of the conflict, of which over 3 million remain internally displaced with the numbers rising. The conflict has further limited already fewer opportunities open to women to access economic activities with their mobility and participation in the public domain further curtailed, while a climate of intensified gender-based violence, increased rates of child marriage, and reduced educational opportunities remain pervasive. At the same time, the operating environment for aid delivery is highly constrained, further complicating operational conditions for international agencies on the ground.

With over 24 million people food insecure, including a staggering 16.2 million people in Integrated Food Security Phase Classification (IPC) Phase 3+ requiring urgent emergency assistance, food insecurity in Yemen is deep-rooted. Hunger, food insecurity and malnutrition are among the most pressing and overwhelming challenges faced by the country at present, at a scale that is not being fully met by national authorities and the international development and humanitarian communities. The high dependence on food imports, for most households combined with high food prices and significantly reduced income earning has resulted in low food access.

Socio-economic conditions deteriorated further in 2020, leading to a significant worsening of poverty. Distortions created by the fragmentation of institutional capacity and the divergent policy decisions between the areas of control have further compounded the economic and humanitarian crisis.

Project Description (YEHCP)

The World Bank is financing the Yemen Emergency Human Capital Project (YEHCP- P176570), under the provisions of World Bank OP 10.00, paragraph 12, *Projects in Situations of Urgent Need of Assistance or Capacity Constraints*. The Project will be implemented by the United Nations Office for Project Services (UNOPS), the World Health Organization (WHO), and the United Nations Children's Fund (UNICEF) in which UNOPS will implement Component 2 of the project, in partnership with local Implementing Partners.

The overall objective of YEHCP is to provide essential health, nutrition, water, and sanitation services to the population of Yemen.

Project Components (1 and 2)

The Project has four components as follows:

- **Component 1. Improving Access to Healthcare, Nutrition, and Public Health Services:** 1.1: Improving Access to the Minimum Service Package (MSP) at Primary Health Care Level (implemented by UNICEF); 1.2: Preventing Chronic Malnutrition and Treating Acute Malnutrition at the Community and Primary Level (implemented by UNICEF); 1.3: Supporting Health and Nutrition Services at the First Level Referral Centers (implemented by WHO); 1.4: Sustaining the National Health System Preparedness and Public Health Programs (implemented by WHO)
- **Component 2. Improving Access to Water Supply and Sanitation (WSS) and Strengthening Local Systems:** 2.1: Restoring Access and Improving Quality to WSS Services

[3] Integrated Food Security Phase Classification 2020/2021 analysis for acute malnutrition

in Selected Urban and Rural Areas (implemented by UNOPS); 2.2: Emergency Support for WASH Interventions in Response to COVID-19 Pandemic and Flash floods (implemented by UNOPS); 2.3: Enhanced Capacity Building of Water and Sanitation Institutions at the Local Level (implemented by UNOPS).

- **Component 3: Project Support, Management, Evaluation and Administration, (implemented by UNICEF, WHO, and UNOPS):** This component will support administration and monitoring and evaluation (M&E) activities to ensure smooth and satisfactory project implementation. The component will finance: (i) general management support for WHO, UNICEF and UNOPS; (ii) hiring of Third-Party Monitoring (TPM) agents, with terms of reference satisfactory to the World Bank, that will complement the existing TPM arrangements for the implementing agencies; and (iii) technical assistance.
- **Component 4: Contingent Emergency Response Component (CERC). (implemented by UNICEF, WHO, and UNOPS) :** The zero-dollar CERC is in place to provide expedited response in case of emergency. There is a probability that an epidemic or outbreak of public health importance or other emergencies may occur during the life of the project, causing major adverse economic and/or social impacts. If this component is triggered, an Emergency Response Operational Manual will be prepared jointly and agreed upon with the World Bank to be used and the ESMF and RF will be updated to reflect the newly added activities.

The current sub-project falls under component 2 of the YEHCP which will be implemented by UNOPS. A brief description of component 2 is described below.

Component 2: Improving Access to Water Supply and Sanitation (WSS) and Strengthening Local Systems (implemented by UNOPS)

This component aims to support the provision of WSS services for the population of Yemen through rehabilitation of medium to large WSS infrastructure, response to COVID-19 and flash floods and strengthening the capacity building of the local water and sanitation institutions at a decentralized level. The project will help preserve and strengthen the WSS system through supporting, inter alia, procurement and contract management, low carbon and climate resilient infrastructure, technical design, asset management, O&M of WSS facilities for medium to long term, information management, safeguard and leadership capacities of local water and sanitation institutions, etc.

Sub-component 2.1: Restoring Access and Improving Quality to WSS Services in Selected Urban and Rural Areas (implemented by UNOPS)

This sub-component aims to restore access and improve quality to WSS services at a decentralized level. It will be implemented by UNOPS in partnership with autonomous national and local water and sanitation institutions e.g., Urban Water – Project Management Unit (UWS-PMU), PWP, respective WSLCs in selected priority urban and peri-urban areas (that have WWTPs) and local branches of the GARWSP in selected rural areas based on clear and transparent selection criteria. Given the strong linkage between the level of water and sanitation services and environmental and health issues, this sub-component will focus on restoring access to improved water and sanitation services, with particular emphasis on priority sanitation needs, by investing in related urgent areas (i.e., rehabilitation and scaling up of medium to large scale facilities including rehabilitation of water and sanitation infrastructure, main water and sewerage pipelines and networks, water treatment plants, WWTPs, water wells, pumping and booster stations, related civil works of building and structures, etc.) to improve service provision. The sub-component will help monitor the quality of water and sanitation services through rehabilitation of public laboratories for water and wastewater quality testing and enhancing and strengthening the operational capacities of the WSLCs and their branches,

AUs, branches of NWSA and GARWSP in the target areas in the delivery of safe water and sanitation services (e.g., installing small decentralized WWTPs on a pilot basis, purchase and use electrical generators; purchase, installation and storage of O&M materials such as; spare parts, measuring devices, manholes, sewage maintenance vehicles, machines, tools, laboratory equipment and consumable supplies. In addition, this subcomponent will support the operation of main water and wastewater facilities by providing electrical materials (e.g., submersible motor and control panel, transformers, etc.) and alternative sustainable energy solutions, in particular, solar panels to provide a clean, cost effective, and reliable energy source for disadvantaged areas.

Sub-component 2.2: Emergency Support for WASH Interventions in Response to COVID-19 Pandemic and Flash Floods (implemented by UNOPS)

This sub-component aims to respond to COVID-19 Pandemic and the impact of flash floods at decentralized level and will be implemented by UNOPS in partnership with the autonomous national and local institutions (UWS-PMU, PWP), respective WSLCs and their branches to improve their readiness and capacities to respond to COVID-19's possible impact and other infectious diseases (e.g., cholera).

This sub-component will focus on selected priority urban, peri-urban and rural areas at decentralized level including IDP camps, health centers, schools and local markets, through addressing basic needs of:

- WASH requirements and supplies
- Providing personal protective equipment (PPE) and WASH non-food items (NFIs) for water and sanitation staff.
- Water trucking to key health facilities
- IDP camps, provide fuel to key WSLCs (if needed),
- Spare parts, equipment and necessary supplies for the benefit of the priority areas for water and wastewater systems (where it is not included under sub-component 2.1).

It will also carry out wastewater evacuation through:

- Water sucking (evacuation) trucks,
- Building or repairing bathrooms in public areas to encourage appropriate hand washing and behavior changes on hygiene in close coordination with UNICEF,
- Constructing and operating of water distribution points and water tanks, water pumps to help the vulnerable communities better adapt to the climate change shocks and risk from natural disasters such as droughts (by increasing water availability) and floods (improved water pumping and wastewater treatment).

Rehabilitation of selected HFs and schools will be conducted based on clear and transparent criteria including access to a sustainable water source, community organization to take over and oversee the functionality once rehabilitation has been completed, ensuring integration of rehabilitation interventions including WASH, Health, etc. based on detailed need assessment, etc. WASH rehabilitation may include rehabilitation of water and sanitation systems within facilities' premises, connection of water and sanitation system of the facilities to the nearest public networks, cleaning of toilet tiles and walls, provision of water tank, water pipes/pumps/taps, hand washing basin,

installation of solar system, etc. Water Trucking to Key HFs and Fuel supply to key WSLCs will be provided as transition emergency interventions and will be built on the results achieved from the exit strategies implemented under YEHNP toward having more sustainable interventions. Water quality will be addressed at water sources, distribution points, tanker trucks, and HH levels through testing water quality for public and private providers. The capacity of WSLCs will be strengthened through rehabilitation of laboratories, provision of key equipment and enhancing the capacity of the local staff on water quality monitoring, analyzing, and reporting. As part of community participation, active Water User Associations (WUAs) and /or District Local Authorities (DLAs) especially those having women on the management committee will be involved in the identification of priorities, implementation of activities and O&M of projects whenever possible to ensure ownership of the rehabilitated system, and sustainability of service delivery and investments. Furthermore, this sub-component will consider a combination of sewerage network and non-network solutions whenever possible to ensure maximizing the impact and would, among others, adopt the prioritization tools developed under the Bank's City-Wide Inclusive Sanitation (CWIS).

Subcomponent 2.3: Enhanced Capacity Building of Water and Sanitation Institutions at the Local Level (implemented by UNOPS)

This sub-component aims to strengthen the resiliency of key local WSS institutions at a decentralized level. Because the capacity building for the local institutions in urban areas will be covered under the second phase of the Yemen Integrated Urban Services Emergency Project (YIUSEP-II) implemented by UNOPS[4], this sub-component will mainly target strengthening the capacity of local institutions in selected peri-urban, rural areas and WSLCs in urban areas and their branches in peri-urban areas that are not covered under YIUSEP-II. This includes training on technical and non-project-related aspects (including planning around when it is most convenient for women to join) to support the local institutions to assume their service delivery mandate more effectively beyond the boundaries of the project. The support may include provision of per diem to key staff if needed based on clear Terms of Reference (ToR) with associated deliverables and clear timelines. Support will build medium and long-term capacity at the local level and will cover topics including procurement and contract management, social and environmental standards, low carbon and climate resilient infrastructure, technical design, asset management, grievance redress and gender-sensitive citizen engagement, building WSLCs capacity on gender parity in recruitment, the advantages of gender diversity in the workplace, etc., and other critical needs which may be identified.

2. Sub-Projects/Component Description

Yemen has high solar insolation, providing an ideal conditions for the generation of Solar Power in Yemen. Power is the lifeline of any development of the nation. At present, the power requirement is being met by two main sources. Generators of private sectors, public or main network. While Public or Main Networks have their inherent limitations due to the crisis's context, private sector power

[4] With the objective of complementarity and integration of WASH interventions and making best use of funds, the capacity building plan has been prepared under the new urban project (YIUSEP-II) based on detailed consultation with UNOPS and Local Partners. The plan includes cross-sectoral training for water, transport, energy sectors, etc. as well as specific training activities for local institutions of each sector at a decentralized level.

(Generators) is often confronted by the challenge associated with the availability of fuel. Currently, private or public sectors power generators/stations do not meet the minimum part of the power demand especially in the sectors of services providers for communities, i.e., healthcare, water supply, etc., and cannot meet the increasing demand forever. In addition to the requirement of huge funds and the availability issues, the implementation of more such projects using conventional means of power generation will also involve issues of growing environmental concern, with depletion of fossil fuels.

Considering the good potential of solar power and the essential need of drinking water in Sana'a city and the other cities in IBB, Shabwah, Hadramout, Taiz and Al-Bayda'a governorates, UNOPS is planning to set up solar systems for their Water and Sanitation Local Corporation (WSLC) to help them provide drinking water from the boreholes using solar system in the ground of water wells locations.

The intervention will take around two months to implement the sub-project activities.

The works generally includes supply, installation, operation and testing of (09) solar PV water-pumping systems for drinking water wells in Sana'a, IBB, Shabwah, Hadramout, Taiz and Al-Bayda'a Governorates as indicated in the table below:

Table #1: The list of the Nine well sub-projects grouping

LOT	Well ID	Well Name/Location	Type	PV Capacity
				KWp
LOT#1	SAN-A	Water **Well ID: SAN-A** in Hayran rural area - AL-HAYMA District-Sana'a Governorate	Water Well	60KW
LOT#2	SAN-B	Water **Well ID: SAN-B** in Osbah & Jawhar rural area - Bani Matar District-Sana'a Governorate	Water Well	60KW
LOT#3	SAN-C	Water **Well ID: SAN-C** Beer Al-Masjid rural area- Jahanah District-Sana'a Governorate	Water Well	17KW
LOT#4	SAN-D	Water **Well ID: SAN-D** - Maeen District-Sana'a City	Water Well	112 KW
LOT#5	IBB-A	Water **Well ID: IBB-A** Hawrah rural are - Al Makhader District- IBB Governorate	Water Well	43KW
LOT#6	SHA-A	Water **Well ID: SHA-A** - Al-Jif Bin Atef rural area - Gardan District Shabwah Governorate	Water Well	51KW

LOT#7	HAD-A	Water **Well ID: HAD-A** Aynat rural area - Tarim District- Hadramout Governorate	Water Well	34KW
LOT#8	Taiz-C	Water **Well ID: TAZ-C**- Al-Mahrabah rural area - Al-Moaset District Taiz Governorate.	Water Well	34Kw
LOT#9	BAY-A	Water **Well ID: BAY-A**- Ber Beet Al Arami rural area - Alarsh District Al-Bayda'a Governorate.	Water Well	112 KW

Location

The nine (09) targeted water wells are located in both urban areas and rural areas of Sana'a, Ibb, Shabwah, Hadramout, Taiz and Al- Bayda'a Governorates with the coordinates indicated in the following table:

TABLE #2: LOCATION OF THE TARGETED WATER WELL

LOT	Well ID and Location	Location Coordinates		City	District
		N	E		
LOT#1	Water **Well ID: SAN-A** in Hayran rural area - AL-HAYMA District-Sana'a Governorate	15.268392	43.800540	Sana'a	Al-hayma
LOT#2	Water **Well ID: SAN-B** in Osbah & Jawhar rural area - Bani Matar District-Sana'a Governorate	15.1355718	43.9886409	Sana'a	Bani Matar
LOT#3	Water **Well ID: SAN-C** Beer Al-Masjid rural area - Jahanah District-Sana'a Governorate	15.099730	44.492159	Sana'a	Jahanah
LOT#4	Water **Well ID: SAN-D** - Maeen District-Sana'a City-Urban Area	15°23'19.32"	44°10'16.81"E	Sana'a	Maeen
LOT#5	Water **Well ID: IBB-A** Hawrah rural are - Al Makhader District- IBB Governorate	14.19009	44.19879	Ibb	Al Makhader
LOT#6	Water **Well ID: SHA-A** - Al-Jif Bin Atef rural area - Gardan District Shabwah Governorate	14.900233	47.076286	Shabwah	Gardan
LOT#7	Water **Well ID: HAD-A** Aynat rural area - Tarim District- Hadramout Governorate	16.042148	49.138256	Hadramout	Tarim

LOT#8	Water **Well ID: TAZ-C**- Al-Mahrabah rural area - Al-Moaset District Taiz Governorate.	13.33305	44.14821	Taiz	Al-Moaset
LOT#9	Water **Well ID: BAY-A**- Ber beet Al Arami rural area - Alarsh District Al-bayda'a Governorate.	14.410933	44.76465	bayda'a	Alarsh

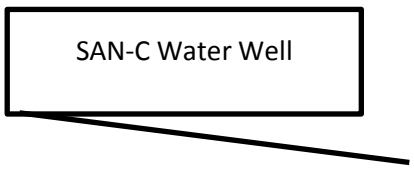
1. **Figure 1:Map shows location of SANA'A Water Well -Sana'a Governorate- Al-hayma District**

The solar power systems sub-project is located in Sana'a Governorate - Al-hayma District and the implemented PV systems will serve the neighborhoods in Al-Hayma and the adjacent villages

2. **Figure 2: Map shows location of SAN-B Water Well in Sana'a Governorate - Bani Matar District.**

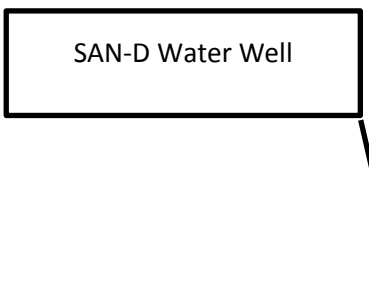
The solar power systems sub-project is located in Sana'a Governorate – Bani Matar District and the implemented PV systems will serve the neighborhoods in Bani Matar and the adjacent areas.

3. **Figure 3: Map shows location of SAN-C Water Well - Sana'a Governorate - Jahanah District.**



The solar power systems sub-project is located in Sana'a Governorate - Jahanah District and the implemented PV systems will serve the neighborhoods in Jahanah and the adjacent areas.

4. **Figure 4: Map shows location of SAN-D Water Well - Sana'a City -** Maeen District



The solar power systems sub-project is located in Sana'a Governorate - Maeen District and the implemented PV systems will serve the neighborhoods in Maeen areas.

5. **Figure 5 : Map shows location of IBB-A Water Well - IBB Governorate - Al Makhader District.**

The solar power systems sub-project is located in IBB Governorate - - Al Makhader District and the implemented PV systems will serve the neighborhoods in - Al Makhader and the adjacent areas.

6. **Figure 6: Map shows location of SHABWAH-A Water Well - Shabwah Governorate - Gardan District.**

The solar power systems sub-project is located in Shabwah Governorate - Gardan District and the implemented PV systems will serve the neighborhoods in - Gardan and the adjacent areas.

7. **Figure 7: Map shows location of HAD-A Water Well Hadramout Governorate- Tarim District.**

The solar power systems sub-project is located in Hadramout Governorate - Tarim District and the implemented PV systems will serve the neighborhoods in - Tarim and the adjacent areas.

8. **Figure 8: Map shows location of TAZ-C Water Well Taiz Governorate- Al-Moaset District.**

The solar power systems sub-project is located in Taiz Governorate - Al-Moaset District and the implemented PV systems will serve the neighborhoods in - Al-Moaset and the adjacent areas.

9. **Figure 9: Map shows location of BAY-A Water Well Al-Bayda'a Governorate- Alarsh District.**

The solar power systems sub-project is located in Al-Bayda'a Governorate - Alarsh District and the implemented PV systems will serve the neighborhoods in - Alarsh and the adjacent areas.

Planned activities

The general scope of work: procure, supply, install, testing, training, commissioning and handing over of the complete Solar PV Water Pumping System that will be installed in the lands which are belongs to the wells(Government lands). As required in the specifications but not limited to the following items: -

- Suitable amount of solar PV modules with its mounting structures and arrangements to enhance the availability of solar radiation to achieve the max output power to run Submersible AC pump adequate to lift desired quantity of water via appropriate controller (solar pump inverter) and all accessories
- Solar water pumping systems shall be installed as per the specifications provided in the tender technical specifications and the manufacturer's recommendations according to approved catalogs and manuals.
- The good quality material and applying the latest available technologies with high quality.

Detailed Scope:

- The work to be implemented shall consist of furnishing system, tools, equipment, materials, supplies, and manufactured articles, and furnishing all labour, transportation, and services, including fuel, power, water, and essential communications, and performing all work or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The WORK shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the WORK in good faith shall be provided by the contractor as though originally so indicated, at no increase in cost to the employer.
- The contractor is also required to make sure that all required materials, equipment's, subsystem is included in his offer to deliver a completed and functional system., includes but not limited the following components:
    - Solar PV modules consisting of required number of Crystalline PV modules;
    - Fixed Mounting structures suitable for number of PV panels;
    - PV combiner box;
    - Solar pump inverter (built in MPPT controller) with external AC connection.
    - Submersible AC pump set (Motor & Pump) with suitable Cables and Accessories;
    - System Cables (DC & AC);
    - Raiser Pipes and Joints including flushing and cleaning.
    - PVC pipe for cable holding.
    - Earthing, short-circuit, surge and lightning protections for the whole system including existing equipment earthing if required.
    - Mechanical Water Flow Meter and valves.
    - Chain Link Fences with two leaflet gates to protect the system.
- Installation of PV system & Water Pumping System components shall be done in accordance with manufacturer operation manuals adequate to lift the desired quantity of water; bidders will be required to submit stamped operation and manuals prior to commencement of works.

- Excavation will for Foundations and for the other concrete which will be less than 50cm depth.

- Compaction and Backfilling;

- Dismantling all the existing equipment inside the boreholes (pump, motor, riser pipes, cables, etc.)

- Supply and installation of submersible solar pumps, riser pipes and accessories.

- Repair and maintenance for the existing control room

- Installation of PV module support structures

- Electrical system supply and Installation, including:

- PV modules
- Inverters/controllers
- DC combiners, disconnects, fuses, and wiring
- AC breakers and disconnects
- Enclosures, conduit, and wiring
- Generators

- The contractor shall carry out any operational costs to finish the installation at the location.
- The Contractor shall generate a site plan, which indicates the structural and electrical works that is required for the successful completion of the Project and has to be approved by UNOPS
- Dismantling the old existing equipment that will be replaced with a new installations covered in this scope such as pumping unit including pumps, motors, cables, riser pipes, flow meters complete with all accessories and deliver to well management or general Authority for rural water supply projects; all required costs for dismantle shall be bared by the contractor.

The contractor shall clear, from all areas planned for the work, materials, debris, etc., prior to the commencing of work and the construction waste will be disposed safely to the designated landfill.
Table #3: The PV Solar System details.

#	Well Name/Location	Type	PV Capacity	Number of panels	Installation Place
			KWp		

1	Water **Well ID: SAN-A** in Hayran rural area - AL-HAYMA District- Sana'a Governorate	Water Well	60KW	112	Ground(Public Land)
2	Water **Well ID: SAN-B** in Osbah & Jawhar rural area - Bani Matar District-Sana'a Governorate	Water Well	60KW	112	Ground (Public Land)
3	Water **Well ID: SAN-C** Beer Al-Masjid rural area - Jahanah District-Sana'a Governorate	Water Well	17,KW	32	Ground (Public Land)
4	Water **Well ID: SAN-D** Maeen District-Sana'a City	Water Well	112KW	208	Ground (Public Land)
5	Water **Well ID: IBB-A** Hawrah rural are - Al Makhader District- IBB Governorate	Water Well	43KW	80	Ground (Public Land)
6	Water **Well ID: SHA-A** - Al-Jif Bin Atef rural area - Gardan District Shabwah Governorate	Water Well	51KW	96	Ground (Public Land)
7	Water **Well ID: HAD-A** Aynat rural area - Tarim District- Hadramout Governorate	Water Well	34KW	64	Ground (Public Land)
8	Water **Well ID: TAZ-C**- Al-Mahrabah rural area - Al-Moaset District Taiz Governorate.	Water Well	34KW	64	Ground (Public Land)
9	Water Well **ID: BAY-A**- Ber beet Al Arami rural area - Alarsh District Al-Bayda'a Governorate.	Water Well	112KW	208	Ground (Public Land)

Fire Prevention measures during design stage:

- Selecting proper size of cabling compatible with international standards to avoid overloading/overheating of the cables.
- Include appropriate size of circuit breakers between the solar system components to prevent electrical surge.

Fire Prevention measures of the solar system specifications:

- Ensure high quality cables standard outdoor and indoor are applied.
- Ensure high quality circuit breakers are provided.

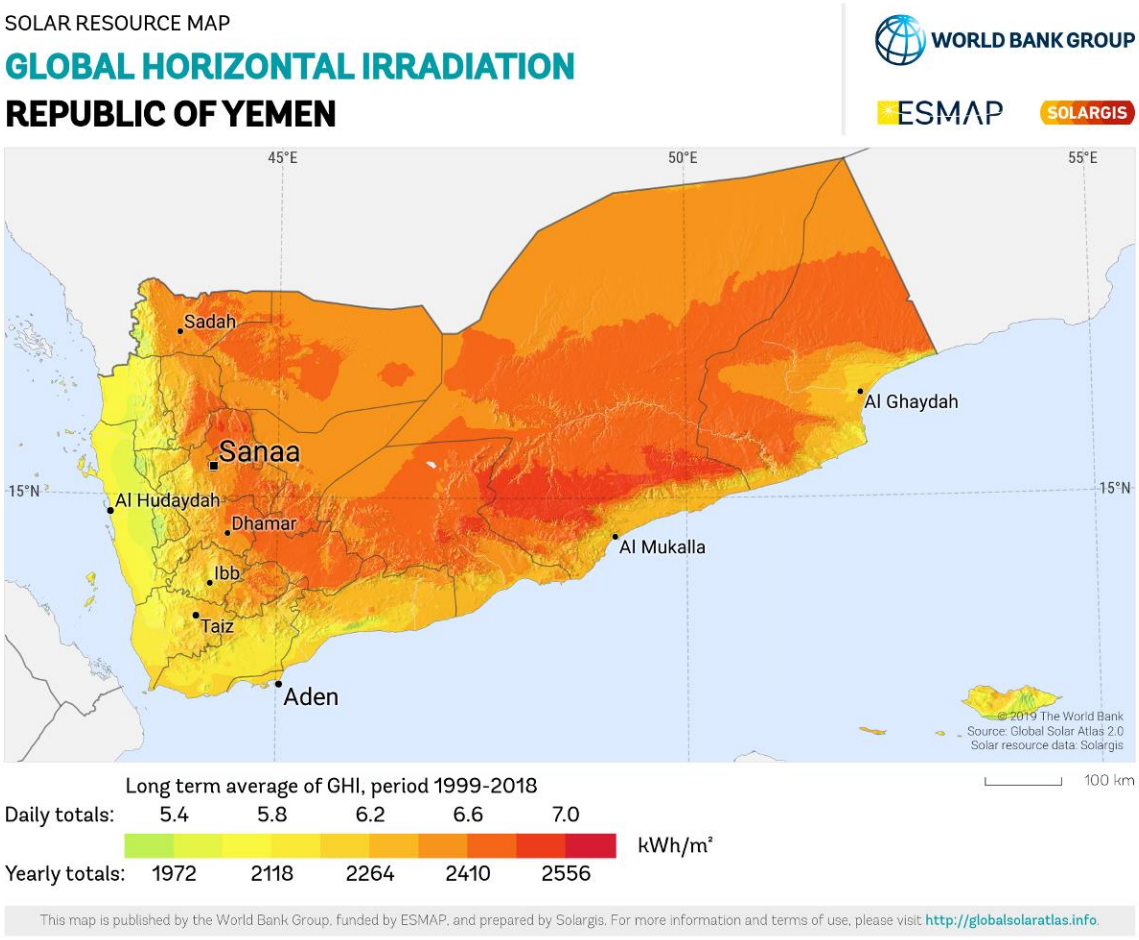
Fire Prevention measures during implementation and operations stage:

- Detection and fire alarm system
- CO2 fire-extinguishers
- Powder fire-extinguishers
- Emergency Response plan
- Solar System Monitoring Unit to detect any problems and shut down the solar system and record the system faults log.

- Provide Fire Safety training and drills for the wells operation staff and technicians.

3. Environmental and Social Baseline

Figure 10: Solar Resource Map



Sana'a Governorate

Sana'a is the capital of the Republic of Yemen and the historic capital of the Yemen Arab Republic (YAR). Government ministries and other institutions as well as foreign diplomatic missions are based

in the city. It is also an important cultural and economic center. The city is divided into 10 administrative districts.

Climate and Weather

In Sanaa, the summers are warm, arid, and mostly cloudy and the winters are cool, dry, and mostly clear. Over the course of the year, the temperature typically varies from *5°C* to *29°C* and is rarely below *2°C* or above *30°C*.

The warm season lasts for 3.4 months, from May 23 to September 4, with an average daily high temperature above 27°C. The hottest month of the year in Sanaa is June, with an average high of 29°C and low of 16°C.

The cool season lasts for 3.4 months, from October 24 to February 6, with an average daily high temperature below 24°C. The coldest month of the year in Sanaa is December, with an average low of 6°C and high of 22°C.

Rainfall

The 31-day rainfall total in Sanaa does not vary throughout the year, remaining within 2 millimeters of 3 millimeters.

Humidity

The perceived humidity level in Sanaa, as measured by the percentage of time when the humidity comfort level is humid, does not vary significantly throughout the year, remaining nearly constant at 0%.

Wind

The average hourly wind speed in Sanaa experiences seasonal variation over the course of the year.

The windier part of the year lasts for 5.0 months, from May 22 to October 22, with average wind speeds of more than 2.6 meters per second. The windiest month of the year in Sanaa is July, with an average hourly wind speed of 3.2 meters per second.

The calmer time of year lasts for 7.0 months, from October 22 to May 22. The calmest month of the year in Sanaa is December, with an average hourly wind speed of 2.0 meters per second.

Solar Energy

The average daily shortwave solar energy experiences some seasonal variation over the course of the year.

The brighter period of the year lasts for 1.6 months, from May 8 to June 26, with an average daily incident shortwave energy per square meter above 7.2 kWh. The brightest month of the year in Sanaa is June, with an average of 7.4 kWh.

The darker period of the year lasts for 2.1 months, from November 20 to January 23, with an average daily incident shortwave energy per square meter below 6.3 kWh. The darkest month of the year in Sanaa is December, with an average of 6.0 kWh.

Air Quality and Noise

Data on air quality in Yemen generally, and in the subproject area in particular, is extremely scarce. No air quality monitoring data for the project area was found. In fact, air pollution in Yemen is caused by a variety of factors, including emissions from vehicles. The main source of air pollution, particularly in Sana'a City is emissions from vehicles and economic activities, such workshops, factories, etc. Another source of air pollution is potholes and pavement deterioration particularly. When vehicles pass in the deteriorated sections, dust is emitted. The main source of noise is also vehicles. The traffic volumes vary based on the road tracks.

Socioeconomic aspects:
Population

The capital governorate historically had the highest share of local revenue in its local authority budget, reflecting its importance as an industrial and commercial center in the national economy. Seventy-two percent of its 2014 budget was funded from central grants and subsidies, and 28% from local revenues. The main sources of local revenue came from citywide shared revenues and taxes, notably sales tax, zakat, income tax, and profit tax. The city also derived income from assets and sales of goods and services. Following the establishment of the General Zakat Authority by the de facto authorities, the city of Sana'a stands to lose zakat, previously an important source of income.

In 2014, the poverty rate in Sana'a city was 13.4%. More recent estimates suggest the rate has spiked to almost 80% as the suspension of government salaries has hit the public sector workforce in the capital, and rampant inflation and the general implosion of the economy have taken their toll.

Access to basic services

There are nearly 2.4 million people (approximately 80% of the population) in need of assistance in Sana'a city. Forty-three percent of them are in dire need.

Health services are available in public hospitals and health facilities, which rely on support from donor organizations and fees charged for services. Even with donor support, services are at a bare minimum and do not meet the needs of the population. Large numbers of IDPs who have fled to Sana'a from other governorates have placed additional strain on health services and other infrastructure.

As of 2017, 70% of households in Sana'a city had access to potable water. Water services in the city have been damaged by airstrikes and have been only partially restored. The sewage system does not cover all districts.

Ibb

The governorate of Ibb is located 193 kilometers south of Sana'a, in the central part of the Republic of Yemen. The governorate is also known as the "green province" for its verdant mountains and agriculture. The governorate is divided into 20 administrative districts. The city of Ibb is the capital of the governorate. Ibb was the center of several ancient and medieval states. Dhafar, the capital city of the Himyarites, and Jiblah, capital of Al-Sulayhi state, are located in the governorate.

Districts of Ibb: Al Qafr, Yarim, Ar Radmah, An Nadirah, Ash Sha'ir, As Saddah, Al Makhadir, Hubaysh, Hazm Al Udayn, Far Al Udayn, Al Udayn, Jiblah, Ba'dan, As Sabrah, As Sayyani, Dhi As Sufal, Mudhaykhirah, Al Mashannah, Al Dhihar, Ibb.

Climate and Weather

In Ibb, the summers are short, warm, and overcast; the winters are short, cool, and mostly clear; and it is dry year round. Over the course of the year, the temperature typically varies from 8°C to 28°C and is rarely below 6°C or above 30°C.

The warm season lasts for 2.1 months, from May 12 to July 16, with an average daily high temperature above 27°C. The hottest month of the year in Ibb is June, with an average high of 28°C and low of 16°C.

The cool season lasts for 2.7 months, from November 21 to February 12, with an average daily high temperature below 23°C. The coldest month of the year in Ibb is January, with an average low of 9°C and high of 21°C.

Rainfall

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered around each day of the year. Ibb experiences *some* seasonal variation in monthly rainfall.

The *rainy* period of the year lasts for *6.4 months*, from *March 29* to *October 11*, with a sliding 31-day rainfall of at least *13 millimeters*. The month with the most rain in Ibb is *August*, with an average rainfall of *39 millimeters*.

The *rainless* period of the year lasts for *5.6 months*, from *October 11* to *March 29*. The month with the least rain in Ibb is *December*, with an average rainfall of *4 millimeters*.

Humidity

The perceived humidity level in Ibb, as measured by the percentage of time in which the humidity comfort level is *humid* does not vary changes over the course of the year, staying within *2%* throughout the year.

Wind

The average hourly wind speed in Ibb experiences *significant* seasonal variation over the course of the year.

The *windier* part of the year lasts for *1.8 months*, from *June 25* to *August 17*, with average wind speeds of more than *2.6 meters per second*. The *windiest* month of the year in Ibb is *July*, with an average hourly wind speed of *3.2 meters per second*.

The *calmer* time of year lasts for *10 months*, from *August 17* to *June 25*. The *calmest* month of the year in Ibb is *September*, with an average hourly wind speed of *2.0 meters per second*.

Solar Energy

The average daily shortwave solar energy experiences *some* seasonal variation over the course of the year.

The *brighter* period of the year lasts for *2.9 months*, from *February 18* to *May 16*, with an average daily incident shortwave energy per square meter above *6.8 kWh*. The *brightest* month of the year in Ibb is *March*, with an average of *7.1 kWh*.

The *darker* period of the year lasts for *1.4 months*, from *July 10* to *August 24*, with an average daily incident shortwave energy per square meter below *5.8 kWh*. The *darkest* month of the year in Ibb is *July*, with an average of *5.6 kWh*

Air Quality and Noise

Data on air quality in Yemen generally, and in the subproject area in particular, is extremely scarce. No air quality monitoring data for the project area was found. In fact, air pollution in Yemen is caused by a variety of factors, including emissions from vehicles. The main source of air pollution, particularly in Ibb, is emissions from vehicles and economic activities, such workshops, factories, etc. Another source of air pollution is potholes and pavement deterioration particularly. When vehicles pass in the deteriorated sections, dust is emitted. The main source of noise is also vehicles. The traffic volumes vary based on the road tracks.

Socioeconomic aspects:
Population

Ibb Governorate population is about 2,837,000 estimated in 2017 according to Yemen Central Statistical Organization projections. They are distributed administratively into 20 districts, and Ibb city is the capital of the governorate economic activities.

Agriculture is the largest employer in the governorate and a cornerstone of its economy. Ibb produces 5.6% of the total agricultural production of the Republic of Yemen, making it the fourth-largest agricultural producer after Al-Hodeidah, Sana'a, and Marib. Cereals and vegetables are the most important crops. The governorate is also home to minerals used in manufacturing cement, basalt quarries and zeolite.1

According to the local authority's 2014 budget, 95% of Ibb's total revenue came from central subsidies, while local revenues accounted for 5%. The most significant local revenues were local shared revenues, especially zakat, taxes (on goods, services, income, and profit), the sale of goods and services, and fines and penalties.2 Local revenues have decreased due to the war.

According to the 2014 Household Budget Survey, the poverty rate in Ibb was 56.6%. With the economic decline and military confrontations of the past years, this rate has likely increased significantly.

Access to basic services

According to OCHA, there are nearly two million people in need of assistance in Ibb, or about 70% of the population. Twenty percent of them are in dire need.

Public hospitals and health centers provide health services in the governorate. However, available services are insufficient to meet basic needs. The local authority pays for a small fraction of the cost of healthcare. In addition, hospitals levy small service fees to cover part of the cost. Donors cover the largest portion of the cost of health services. In particular, they cover the cost of fuel needed to operate generators at the hospitals and health centers, and they provide medical equipment and emergency supplies. Donors also cover the costs of medicine as well as vaccination campaigns. There are also a number of private hospitals and health centers providing services to those with the financial means to pay for them.5

Education has been disrupted in Ibb, where the war damaged 33 schools6 and teacher salaries are not being paid. The local authorities are not providing operational funding for schools. Parents and parents' councils have sought to collect contributions and raise funds in some of the schools. UNICEF began paying a stipend for teachers in 2019 at a rate of $50 per teacher. This has helped restore education to a minimum level. Despite this initiative, many students who have the financial means to do so have enrolled in private schools.

As of 2016 and 2017 statistics 77% of households in Ibb had access to potable water. Ibb is experiencing water scarcity, and the local water corporation is facing major challenges in meeting demand, given the influx of approximately 150,000 IDPs in the governorate. To address the problem, donors are helping to drill new water wells. The sewage system in the city is working, but covers only some neighborhoods.

Shabwah Governorate

Climate and Weather

The Governorate of Shabwah is located in the southeastern part of the Republic of Yemen, along the Arabian Sea coast between Abyan and Hadhramout. It is 474 kilometers southeast of the capital city of Sana'a. The governorate is divided into 17 administrative districts with the city of Ataq as its capital.

Districts of Shabwah: Dhar, Al-Talh, Jardan, Arma, Usaylan, Ain, Bayhan, Merkhah Al Ulya, Merkhah As Sufla, Nisab, Hatib, Al-Sa'eed, Ataq, Habban, Ar Rawdah, Mayfa'a, Rudum.

In Ataq, the summers are long, sweltering, arid, and mostly cloudy and the winters are short, comfortable, dry, and mostly clear. Over the course of the year, the temperature typically varies from *12°C* to *36°C* and is rarely below *8°C* or above *38°C*

The hot season lasts for 4.4 months, from May 9 to September 23, with an average daily high temperature above 34°C. The hottest month of the year in Ataq is June, with an average high of 36°C and low of 22°C.

The cool season lasts for 2.7 months, from November 23 to February 13, with an average daily high temperature below 29°C. The coldest month of the year in Ataq is January, with an average low of 12°C and high of 27°C.

Rainfall

The sliding 31-day quantity of rainfall in Ataq does not vary significantly over the course of the year, staying within *1 millimeter* of *2 millimeters* throughout.

Humidity

The perceived humidity level in Ataq, as measured by the percentage of time in which the humidity comfort level is humid , does not vary significantly over the course of the year, staying within 4%.

Wind

The average hourly wind speed in Ataq experiences seasonal variation over the course of the year.

The *windier* part of the year lasts for *3.6 months*, from *February 6* to *May 26*, with average wind speeds of more than *3.8 meters per second*. The *windiest* month of the year in Ataq is *March*, with an average hourly wind speed of *4.5 meters per second*.

The *calmer* time of year lasts for *8.3 months*, from *May 26* to *February 6*. The *calmest* month of the year in Ataq is *October*, with an average hourly wind speed of *3.1 meters per second*.

Solar Energy

The average daily shortwave solar energy experiences *some* seasonal variation over the course of the year.

The *brighter* period of the year lasts for *2.6 months*, from *March 6* to *May 26*, with an average daily incident shortwave energy per square meter above *7.3 kWh*. The *brightest* month of the year in Ataq is *April*, with an average of *7.6 kWh*.

The *darker* period of the year lasts for *2.1 months*, from *November 20* to *January 23*, with an average daily incident shortwave energy per square meter below *6.3 kWh*. The *darkest* month of the year in Ataq is *December*, with an average of *6.0 kWh*.

Air Quality and Noise

Data on air quality in Yemen generally, and in the subproject area in particular, is extremely scarce. No air quality monitoring data for the project area was found. In fact, air pollution in Yemen is caused by a variety of factors, including emissions from vehicles. The main source of air pollution, particularly in Shabwah is emissions from vehicles and the economic activities, such workshops, factories, etc. Another source of air pollution is potholes and pavement deterioration particularly. When vehicles pass in the deteriorated sections, dust emitted. The main source of noise is also vehicles. The traffic volumes vary based on the road tracks.

Socioeconomic aspects:

Population

Agriculture, beekeeping, fishing, and fish canning are the most important economic activities in the governorate. Shabwah produces about 2% of the total crops of Yemen, notably fruits and vegetables. The governorate is home to several of Yemen's active oil fields and commercial oil exploitation takes place in the governorate, as does refining in Safer and Bayhan, and oil export from the governorate's Bir Ali terminal. Production is below pre-war levels as some oil companies have suspended production, but it continues. The governorate is a domestic tourist destination thanks to its picturesque coastline.

Grants and central subsidies constituted 98% of Shabwah's total general revenue, while local revenues accounted for only 2%. Local sources of revenue included local shared revenues, leasing government land, selling goods and services, and levying fines and penalties, these revenues were negatively affected by the war, causing major economic challenges for the governorate. Unlike other oil-producing governorates, Shabwah has not been able to reach a revenue sharing agreement with the central government.

According to the 2014 Household Budget Survey, the poverty rate in Shabwah was 42%. By 2018, the poverty rate in the governorate may have surpassed 80%.

Access to basic services

There are approximately 600,000 people in need of assistance in Shabwah, equivalent to 95% of the population. Forty percent of those in need are in dire need.

Health services in Shabwah are provided through public hospitals and health centers, which receive limited central government and local authority support, as well as support from international donors. However, the services provided do not meet the needs of the population due to lack of medical staff, meagre financial allocations, and lack of equipment.

With regard to education, 43 schools have been damaged by the war in Shabwah, but teachers are being paid regularly. Education in Shabwah has been relatively stable.

As for drinking water, 57% of households in Shabwah had access to potable water in 2016 and 2017. The water authority provides water services in the city of Ataq. Sanitation services are lacking in the city and residents rely on traditional methods like cesspits.

Shabwah Governorate's population was about 632,000 in 2017 according to Yemen Central Statistical Organization projections based on the 2004 census. They are distributed administratively into 17 districts, and Ateq city is the capital of the governorate.

Hadhramout Governorate

The Governorate of Hadhramout is located in the southeastern part of the Republic of Yemen, 794 kilometers east of the capital of Sana'a, between Al-Mahra to the east and Al-Jawf, Marib, and Shabwah to the west. The governorate is divided administratively into 28 districts, with the city of Mukalla as its capital. Hadhramout is the largest governorate of Yemen by area. It borders the Kingdom of Saudi Arabia in the north.

Districts of Hadhramout: Rumah, Thamud, Qaf, Zamakh wa Manwakh, Hagr As Sai'ar, Al Abr, Al Qatn, Shibam, Sah, Sayun, Tarim,As Sawm, Ar Raydah Wa Qusayar, Ad Dis, Ash Shihr, Ghayl Bin Yamin, Ghayl Ba Wazir, Daw'an, Wadi Al Ayn, Rakhyah, Amd, Adh Dhlia'ah, Yabuth, Hajr, Brom Mayfa, Al Mukalla, Al Mukalla City, Huraidhah.

The Hadhramaut Valley is a large region in southern Yemen spanning approximately 90,000 square kilometres (35,000 square miles). It consists of a narrow, arid coastal plain bounded by the steep escarpment of a broad plateau averaging around 1,400 m (0.87 mi) of altitude, with a sparse network of deeply sunk wadis (seasonal watercourses). Although the southern edge of Hadhramaut borders the Arabian Sea, Tarim is located around 180 km (110 mi) inland from the coast and 35 kilometres (22 miles) north-east of Seiyun. The region is characterized by rocky plateaus that reach elevations of around 900 m (3,000 ft), and are separated by numerous valleys.

Climate and Weather

In Tarim, the summers are long, sweltering, arid, and partly cloudy and the winters are short, comfortable, dry, and mostly clear. Over the course of the year, the temperature typically varies from *12 °C* to *42°C* and is rarely below *8 °C* or above *43 °C*.

The hot season lasts for 4.0 months, from May 14 to September 16, with an average daily high temperature above 103°F. The hottest month of the year in Tarim is July, with an average high of 107°F and low of 81°F.

The cool season lasts for 2.8 months, from November 16 to February 9, with an average daily high temperature below 89°F. The coldest month of the year in Tarim is January, with an average low of 54°F and high of 85°F.

Rainfall

Tarim's sliding 31-day rainfall does not vary significantly throughout the year, remaining within 1 millimeter of 2 millimeter.

Humidity

The perceived humidity level in Tarim, as measured by the percentage of time in which the humidity comfort level is humid does not vary significantly over the course of the year, staying within *3%*.

Wind

The average hourly wind speed in Tarim experiences mild seasonal variation over the course of the year.

The windier part of the year lasts for 3.4 months, from February 11 to May 23, with average wind speeds of more than 8.5 miles per hour. The windiest month of the year in Tarim is March, with an average hourly wind speed of 9.4 miles per hour.

The calmer time of year lasts for 8.6 months, from May 23 to February 11. The calmest month of the year in Tarim is September, with an average hourly wind speed of 7.6 miles per hour.

Solar Energy

The average daily incident shortwave solar energy experiences some seasonal variation over the course of the year.

The brighter period of the year lasts for 2.6 months, from March 19 to June 6, with an average daily incident shortwave energy per square meter above 7.4 kWh. The brightest month of the year in Tarim is May, with an average of 7.7 kWh.

The darker period of the year lasts for 2.3 months, from November 17 to January 26, with an average daily incident shortwave energy per square meter below 6.2 kWh. The darkest month of the year in Tarim is December, with an average of 5.8 kWh.

Air Quality and Noise

Data on air quality in Yemen generally, and in the subproject area in particular, is extremely scarce. No air quality monitoring data for the project area was found. In fact, air pollution in Yemen is caused by a variety of factors, including emissions from vehicles. The main source of air pollution, particularly in Hadhramout is emissions from vehicles and the economic activities like workshops, factories, etc. Another source of air pollution is potholes and pavement deterioration particularly. When vehicles pass in the deteriorated sections, dust is emitted. The main source of noise is also vehicles. The traffic volumes vary based on the road tracks and the quality of the road.

Socioeconomic aspects:
Population

Most of the economically active population in Hadhramout is engaged in agriculture, fishing, or livestock rearing. The governorate produces around 5% of Yemen's total agricultural production, notably dates, cereals, and cash crops. Hadhramout's coast includes rich fisheries in the Arabian Sea.

Alongside Marib and Shabwah, the governorate is home to the main oil-producing region of Yemen. Other mineral resources, such as gold, are present, but not currently exploited in large quantities. Hadhramout has many cultural landmarks, but tourism is very limited.1 The Al-Wadiyah border crossing with Saudi Arabia generates significant customs revenue. However, Marib currently controls the border crossing.

According to Hadhramout's 2014 budget, grants and central subsidies constituted 89% of the total revenue for the governorate, while local revenues accounted for 11%. The most significant sources of local revenue were local shared revenues, taxes, and income from the sale of goods and services.

Despite the disruption of central government subsidies in various governorates, the local authority in Hadhramout has kept its local revenues, being far from military confrontations. This has enabled the government to continue regular payment of salaries and to cover the operational costs of the governorate. In addition, the governorate covers the investment budget for services and infrastructure maintenance from oil income, which the governorate currently receives according to a 20% - 80% formula. The residents of Hadhramout had previously called for a share of oil income. The "all-inclusive Hadhramout Conference", held on 26 April 2017, for example, called for increasing the governorate's share to 20% for reinvestment in the governorate. Hadhramout has also received support from its large diaspora, which has been instrumental for the governorate to continue service provision.

According to the 2014 Household Budget Survey, the poverty rate in Hadhramout was 60% of the total population. This number has likely increased since. Despite the absence of open conflict in the governorate, rapid inflation has eroded purchasing power among the population.

Access to basic services

There are nearly 900,000 people in need of assistance in Hadhramout (approximately 65% of the population), 38% of whom are in dire need.

In the health sector, hospitals and health centers are working regularly to provide services to the population. They are supported by the local authority and by donors. This support has allowed the maintenance of service provision levels as well as expansion and construction of new health facilities and equipment. Despite functioning health facilities, the services provided are insufficient to meet the demands of the population, especially with the influx of people displaced from Al-Mahra and Shabwah.

Schools in the governorate have not been affected by the conflict. Teachers' salaries are being paid regularly and education has continued without disruptions. As for drinking water, 94% of households in Hadhramout had access to potable water in 2017.

Population

Hadhramout Governorate's population is about 1,424,036 in 2017 according to Yemen Central Statistical Organization projections based on the 2004 census. They are distributed administratively into 28 districts, and Al Mukla city is the capital of the governorate.

Taiz

The Governorate of Taiz is located in the central and southwestern part of Yemen, 256 kilometers south of the capital city Sana'a along the Red Sea coast overlooking the Bab Al-Mandab. The governorate is the most populous in Yemen and divided into 23 administrative districts, with the city of Taiz as the capital.

Districts of Taiz: Mawiyah, Shara'b As Salam, Shara'b Ar Rawnah, Maqbanah, Al Mukha, Dhubab, Mawza, Jabal Habashy, Mashra'a Wa Hadnan, Sabir, Al Mawadim, Al Misrakh, Dimnat Khadir, As Silw, Ash Shamayatayn, Al Wazi'iyah,Hayfan, Al-Mudhaffar, Al Qahirah, Salh, At Ta'iziyah, Al Ma'afer, Al Mawasit, Sama

Climate and Weather

The hot season lasts for 2.5 months, from May 3 to July 21, with an average daily high temperature above 29°c. The hottest month of the year in Taiz is June, with an average high of 31°c and low of 20°c.

The cool season lasts for 2.4 months, from December 2 to February 13, with an average daily high temperature below 25°c. The coldest month of the year in Taiz is January, with an average low of 13°c and high of 23°c.

Rainfall

Taiz experiences some seasonal variation in monthly rainfall.

The rainy period of the year lasts for 6.2 months, from March 30 to October 4, with a sliding 31-day rainfall of at least 13mm. The month with the most rain in Taiz is August, with an average rainfall of 36mm.

The rainless period of the year lasts for 5.8 months, from October 4 to March 30. The month with the least rain in Taiz is December, with an average rainfall of 5mm.

Humidity

Taiz experiences some seasonal variation in the perceived humidity.

The humid period of the year lasts for 5.2 months, from May 11 to October 18, during which time the comfort level is humid at least 9% of the time. The month with the most humid days in Taiz is August, with 8.0 days that are humid.

The month with the least humid days in Taiz is January, with 0.8 days that are humid.

Wind

The average hourly wind speed in Taiz experiences seasonal variation over the course of the year.

The windier part of the year lasts for 1.9 months, from June 27 to August 24, with average wind speeds of more than 11.7 Km per hour. The windiest month of the year in Taiz is July, with an average hourly wind speed of 14.6 Km per hour.

The calm wind time of year lasts for 10 months, from August 24 to June 27. The calmest month of the year in Taiz is September, with an average hourly wind speed of 8.9 Km per hour.

Solar Energy

The average daily shortwave solar energy experiences some seasonal variation over the course of the year.

The brighter period of the year lasts for 2.4 months, from February 21 to May 1, with an average daily incident shortwave energy per square meter above 6.7 kWh. The brightest month of the year in Taiz is March, with an average of 7.1 kWh.

The darker period of the year lasts for 2.0 months, from July 4 to September 5, with an average daily incident shortwave energy per square meter below 5.6 kWh. The darkest month of the year in Taiz is July, with an average of 5.3 kWh.

Air Quality and Noise

Air pollution in Yemen is caused by a variety of factors, including emissions from transportation. The main source of air pollution. However, particularly in cities such as Taiz, the source of emission is mainly from vehicles.

The pollutant concentrations are estimated to be several times higher than set standards for air quality as well as the noise level.

Socio-economic

Population

Rapid urbanization of Taiz city began in the early 1970s as a result of growing inflow of workers' remittances, stagnation of agriculture, growth of governmental services as well as the growth in incomes. After the 1980s, Taiz continued to grow rapidly with a year-on-year growth of approximately 3 and 9 percent between 1994 and 2005, until it reached more than 466,000 inhabitants in 2004. However, several rounds of conflict in Taiz have led to massive population outflows from Taiz city to rural areas; Humanitarian Needs Overview (HNO) data suggests that the city lost about 43 percent of its pre-conflict population due to these conflicts. In 2019, HNO data estimated the city's total population at 372,845, a drop of more than 280,000 inhabitants. On the other hand, there has been an inflow of IDPs into Taiz city; the International Organization for Migration (IOM)/ Displacement Tracking Matrix (DTM) reports a presence of almost 50,300 IDPs in Taiz city

Al-Baydha Governorate

The Governorate of Al-Baydha is located in central Yemen and is 267 kilometers south of Sana'a. The governorate has 20 districts. The city of Al-Baydha is the governorate capital. The governorate has special significance for its location in the center of Yemen. It shares borders with eight other Yemeni governorates: Marib, Shabwah, Lahj, Al-Dhalea, Ibb, Dhamar, Abyan and Sana'a.

Districts of Al-Baydha: Na'man, Nati', Maswarah, As Sawma'ah, Az Zahir, Dhi Na'im, At Taffah, Mukayras, Al Bayda City, Al Bayda, As Sawadiyah, Radman Al Awad, Rada', Al Quraishyah, Wald Rabi', Al A'rsh, Sabah, Ar Ryashyyah, Ash Sharyah, Al Malagim.

Climate and Weather

In Al Bayḍā', the summers are warm, arid, and overcast and the winters are cool, dry, and mostly clear. Over the course of the year, the temperature typically varies from *7°C* to *29°C* and is rarely below *4°C* or above *31°C*.

The warm season lasts for 3.6 months, from May 18 to September 5, with an average daily high temperature above 27°C. The hottest month of the year in Al Bayḍā' is June, with an average high of 29°C and low of 16°C.

The cool season lasts for 3.2 months, from November 17 to February 22, with an average daily high temperature below 22°C. The coldest month of the year in Al Bayḍā' is January, with an average low of 7°C and high of 21°C.

Rainfall

The 31-day quantity of rainfall in Al Bayḍā' does not vary throughout the course of the year, staying within *3 millimeters* of *4 millimeters*.

Humidity

The perceived humidity level in Al Bayḍā', as measured by the percentage of time in which the humidity comfort level is Humid does not vary significantly over the course of the year, staying within *1%* throughout the year.

Wind

The average hourly wind speed in Al Bayḍā' experiences *mild* seasonal variation over the course of the year.

The *windier* part of the year lasts for *4.6 months*, from *December 31* to *May 18*, with average wind speeds of more than *3.1 meters per second*. The *windiest* month of the year in Al Bayḍā' is *March*, with an average hourly wind speed of *3.5 meters per second*.

The *calmer* time of year lasts for *7.4 months*, from *May 18* to *December 31*. The *calmest* month of the year in Al Bayḍā' is *September*, with an average hourly wind speed of *2.8 meters per second*.

Solar Energy

The average daily shortwave solar energy experiences some seasonal variation over the course of the year.

The brighter period of the year lasts for 3.0 months, from February 23 to May 24, with an average daily incident shortwave energy per square meter above 7.0 kWh. The brightest month of the year in Al Bayḍā' is April, with an average of 7.3 kWh.

The darker period of the year lasts for 1.5 months, from July 5 to August 21, with an average daily incident shortwave energy per square meter below 5.9 kWh. The darkest month of the year in Al Bayḍā' is July, with an average of 5.7 kWh.

Economy

Agriculture is the main economic activity in the governorate. Al-Baydha produces about 2.6% of the total agricultural output of Yemen. The most important products are vegetables and cash crops. Al-Baydha governorate produces handicrafts, such as agricultural tools, textiles, wool and silver. The governorate is home to a number of minerals in commercial quantities (Titanium, glass sand, and silica) that are not commercially mined. There are a number of historic landmarks and tourist attractions.

According to the 2014 Local Authority Budget, governorate revenues derived largely from grants and central subsidies (93%), with local revenues accounting for the remainder (7%). The most significant local revenues derive from shared local resources and taxes, specifically revenue from zakat and taxes on qat, goods and services, income, profits, and capital gains. The governorate also derives revenue from ownership, sales of goods and services, and from penalties and fines. As elsewhere, these revenues were adversely impacted by the war.

According to the 2014 Household Budget Survey, the poverty rate in Al-Baydha was 39.2%. With the economic downturn the governorate has faced due to the war, it is likely that the current rate is far higher.

Access to basic services

With regard to the humanitarian situation, there are nearly 500,000 people, or approximately 65% of the population, in need of assistance in Al-Baydha. Twenty percent of them are in dire need.

As for drinking water, in 2016/17, the majority (59%) of households in Al-Baydha did not have ready access to potable water. With regard to sanitation, a sewage system exists only for some neighborhoods of Al-Baydha City and in Rada'a. Moreover, the system is subject to breakdown and local authorities must carry out the repairs with very limited resources.

Population

Al-Baydha Governorate's population is 760,000 in 2017 according to Yemen Central Statistical Organization projections based on the 2004 census. They are distributed administratively into 20 districts, and Al Al-Baydha City is the capital of the governorate.

Targeted Water Wells Beneficiaries

#	Water Well Name	Number of Beneficiaries(Based on the water well water user association records)
		Total

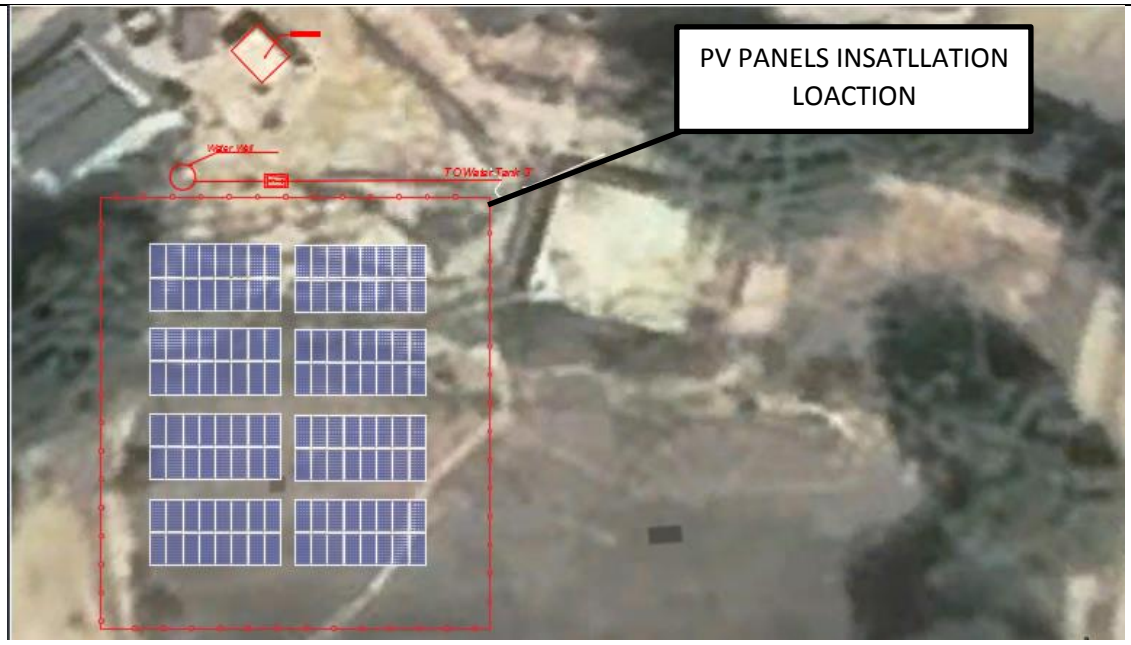
1	Water **Well ID: SAN-A** - Sana'a Governorate.	1755
2	Water **Well ID: SAN-B** - Sana'a Governorate.	1,900
3	Water **Well ID: SAN-C** - Sana'a Governorate.	1,350
4	Water **Well ID: SAN-D** - Sana'a City.	5,000
5	Water **Well ID: IBB-A** IBB City	1,755
6	Water **Well ID: SHA-A** - Shabwah Governorate.	2,295
7	Water **Well ID: HAD-A** - Hadramout Governorate.	5,805
8	Water **Well ID: TAZ-C**- Taiz Governorate.	1,800
9	Water **Well ID: BAY-A**- Al-bayda'a Governorate.	2,030

Layouts, drawings and photos from field visits for inspecting existing situations of the targeted water wells:

1- Water Well ID: SAN-A - Sana'a Governorate

Water well

Proposed Location for solar panels installation

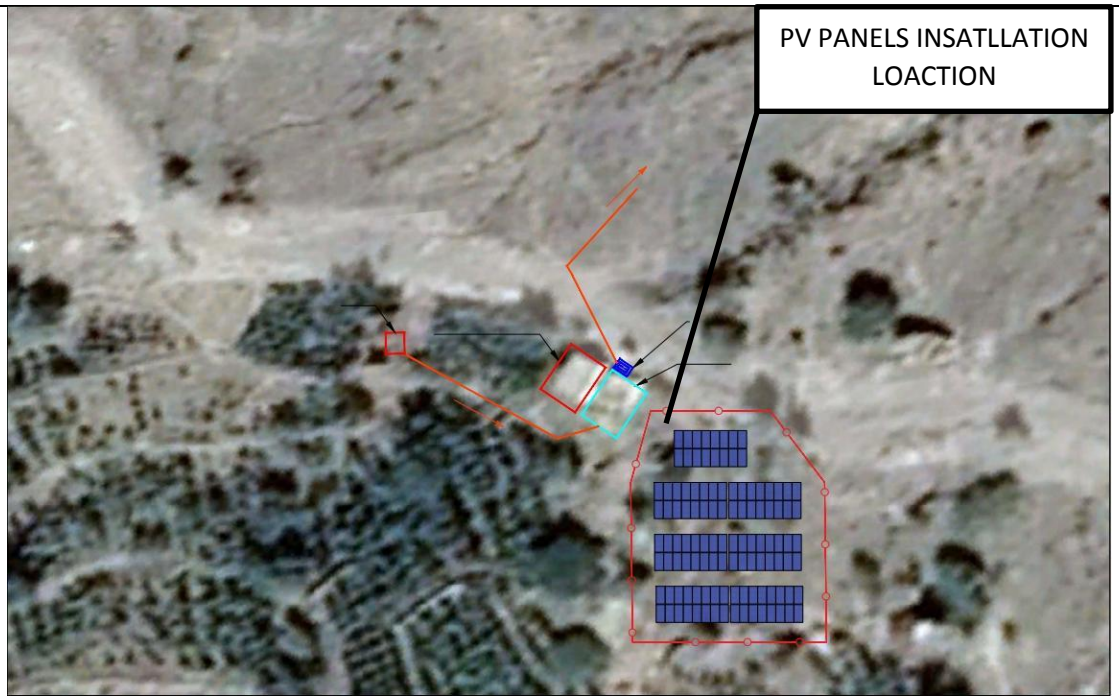


Ground PV Panels installation location

2- Water Well ID: SAN-B - Sana'a Governorate.

Water well

Proposed Location for solar panels installation

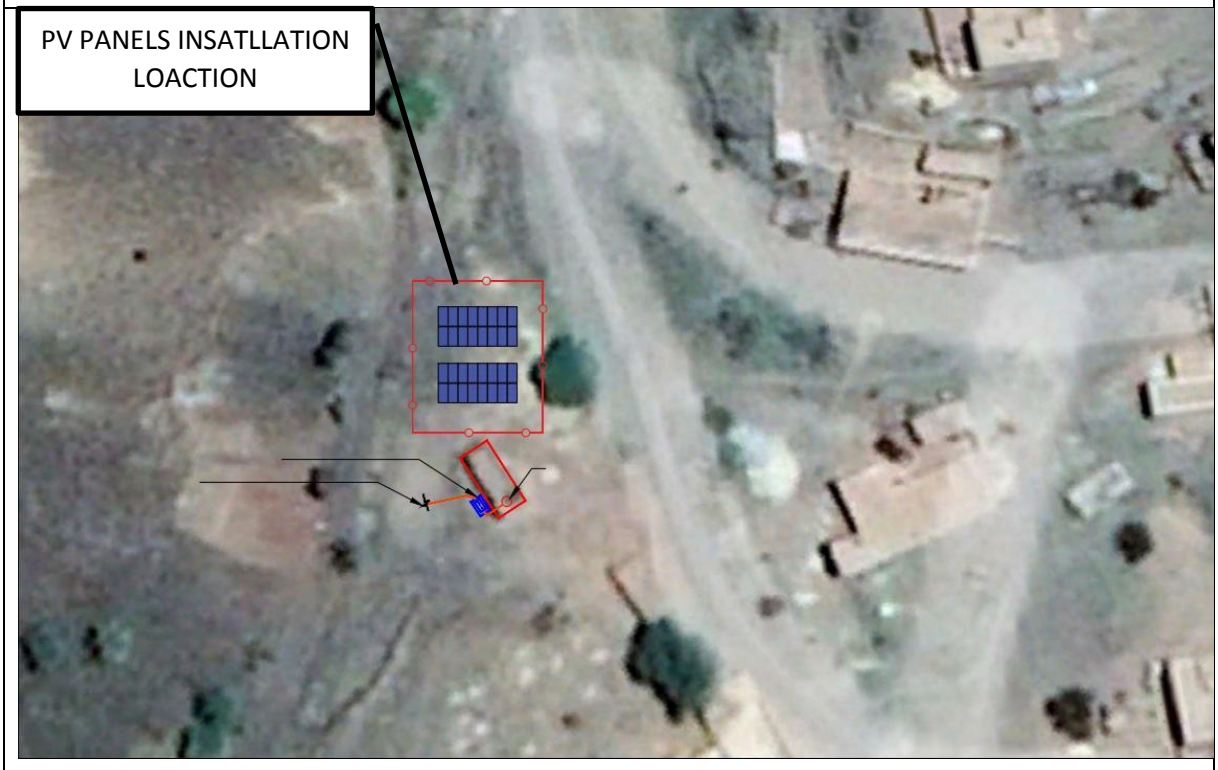


Ground PV Panels installation location

3- Water Well ID: SAN-C Sana'a Governorate

Water Well

Proposed Location for solar panels installation



Ground PV Panels installation location

4- Water Well ID: SAN-D Sana'a City.

Water well
Proposed Location for solar panels installation

Ground PV Panels installation location

5- Water Well ID: IBB-A IBB Governorate.

Water Well

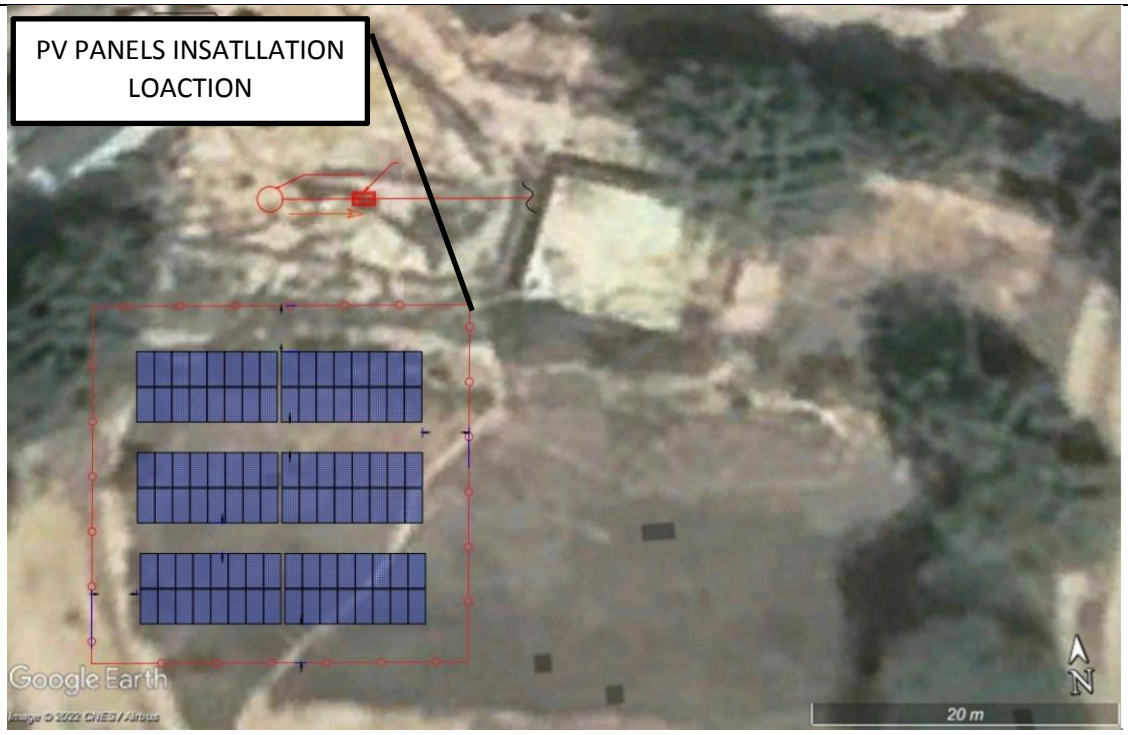
Proposed Location for solar panels installation

Ground PV Panels installation location

6- Water Well ID: SHA-A - Shabwah Governorate.

Water well

Proposed Location for solar panels installation

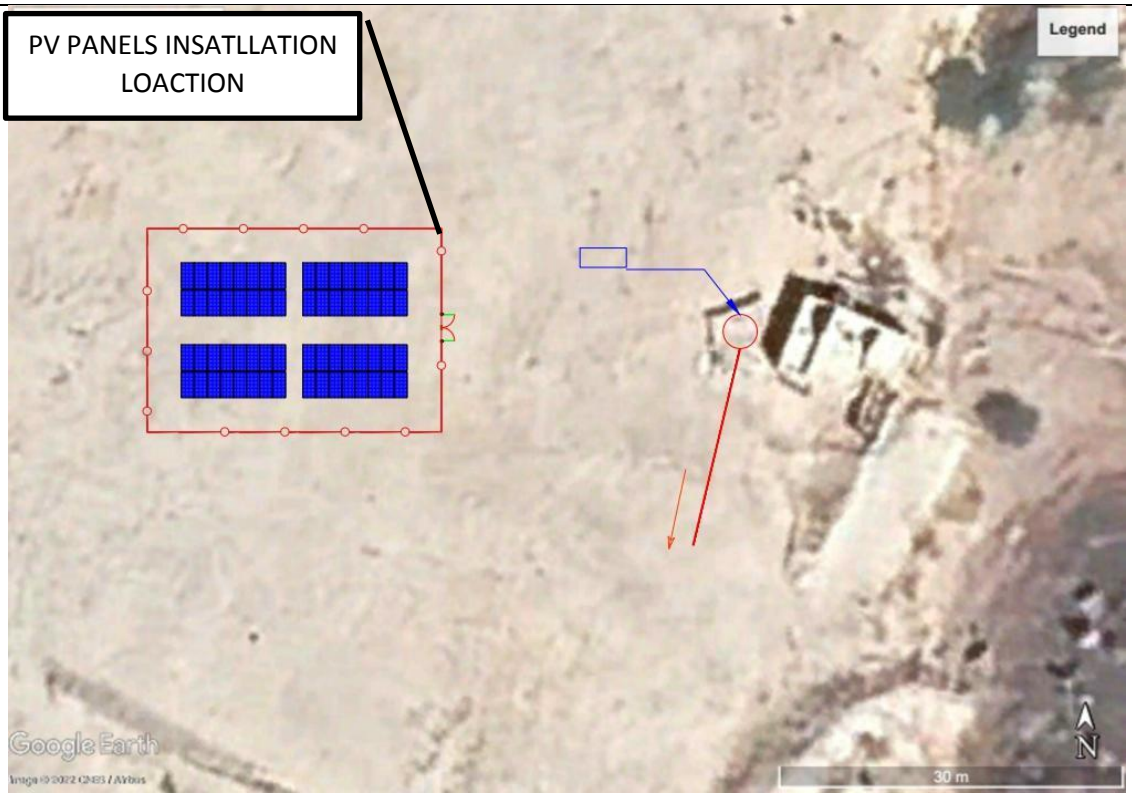


Rooftop PV Panels installation location

7- Water Well ID: HAD-A - Hadramout Governorate.

Water Well

Proposed Location for solar panels installation

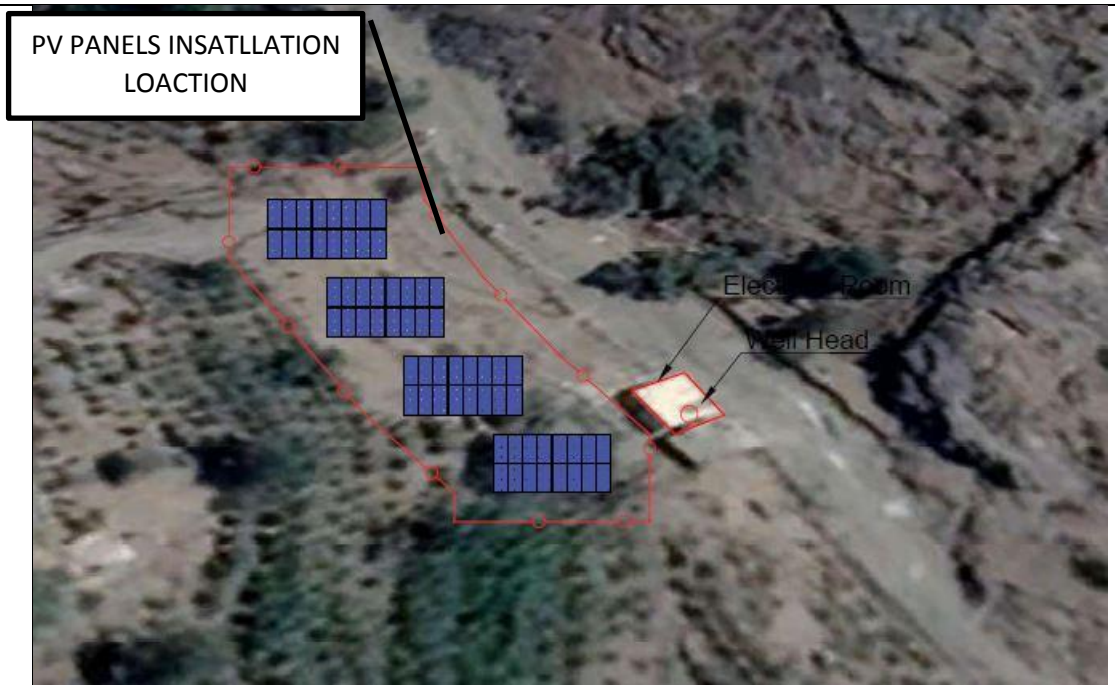


Ground PV Panels installation location

8- Water Well ID: TAZ-C - Taiz Governorate.

Water Well

Proposed Location for solar panels installation

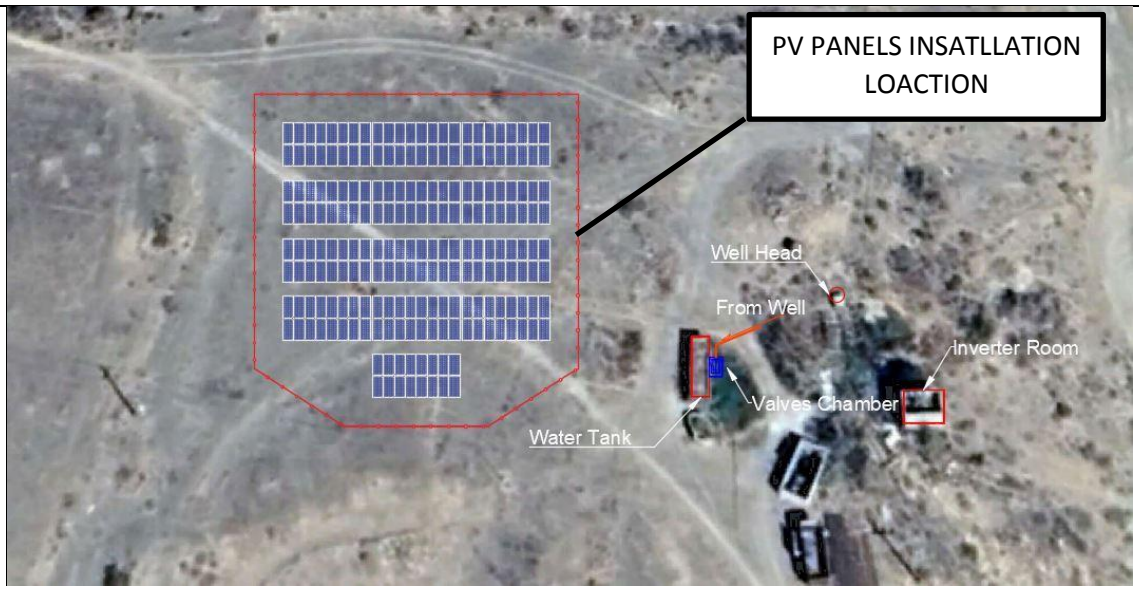


Ground PV Panels installation location

9- Water Well ID: BAY-A - Al-bayda'a Governorate.

Water Well

Proposed Location for solar panels installation



Ground PV Panels installation location

4. Consultation

Consultations were conducted by the social facilitators in different governorates with a total of 183 persons out of which 97 males and 86 females as follows:

Targeted Wells	Consulted Females	Consulted Males	Total Consulted People
Water **Well ID: SAN-A** - Sana'a Governorate.	10	10	20
Water **Well ID: SAN-B** - Sana'a Governorate.	10	10	20
Water **Well ID: SAN-C** - Sana'aGovernorate.	10	10	20
Water **Well ID: SAN-D** - Sana'a City.	9	11	20
Water **Well ID: IBB-A** Ibb Governorate.	9	11	20
Water **Well ID: SHA-A** - Shabwah Governorate.	15	12	27
Water **Well ID: HAD-A** - Hadramout Governorate.	6	10	16
Water **Well ID:TAZ-C** - Taiz Governorate.	9	11	20
Water **Well ID: BAY-A**- Al-bayda'a Governorate.	8	12	20

Topics of the consultations are to:

- Inform beneficiaries about the activities to be undertaken and the sub-project timetable;
- Document and address local beneficiaries concerns, expectations and feedback;
- Ensure participation of sub-project beneficiaries both females and males with awareness on their rights to participate and give feedback including GM contacts, anonymous complaints and escalation of grievances if not satisfied with the resolution and action taken;
- Discuss the positive impacts that the sub-projects will have and the sub-project potential negative impacts and proposed mitigation measures to avoid possible impacts.
- Raise awareness on the protective measures from Covid-19 Pandemic.
- Provide awareness to the consulted persons both males and females, on their rights to participate in all sub-project implementation phases, give their feedback and raise their concerns.

Consultation Findings and Feedback

Interviews were conducted by the Female Social Facilitators. The consultation process takes the form of semi-structured discussions and interviews with the beneficiaries of water wells both males and females, and feedback was updated and collected by questionnaires. The interview started by a brief

explanation of the nature and objective of the sub-projects and potential impacts with proposed mitigation measures.

The interviewed people both males and females have emphasized the importance of continuous supply of drinking water and reducing the cost and appreciate the support of supplying and installing solar systems in the water wells to ensure sustainable and clean source of energy to be supplied for drinking water supply. All mitigation measures were discussed in detail with the consulted persons.

5. Environmental and Social Impact Assessment

Applicability:

YEHCP ESMF applies because this sub-project may trigger some HSSE impacts such as Occupational Health and Safety OHS impact.

Eligibility:

These sub-projects are eligible for support because they do not have any of the attributes in the following exclusion list:

Exclusion List

#	Question	Answer	
		Yes	No
1	Production or activities involving harmful or exploitative forms of forced labor/harmful child labor; For direct and contracted workers		X
2	Production or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements;		X
3	Production or trade in weapons and munitions;		X
4	Gambling, casinos and equivalent enterprises;		X
5	Trade in wildlife or wildlife products regulated under CITES;		X
6	Production or trade in radioactive materials;		X
7	Production or trade in or use of un-bonded asbestos fibers;		X
8	Production or trade in wood or other forestry products from unmanaged forests;		X
9	Production or trade in products containing PCBs;		X
10	Production, trade, storage, or transport of significant volumes of hazardous chemicals, or commercial scale usage of hazardous chemicals;		X

11	Production or trade in pharmaceuticals subject to international phase outs or bans;		X
12	Production or trade in pesticides / herbicides subject to international phase outs or bans		X
13	Production or trade in ozone depleting substances subject to international phase out;		X
14	Production or activities that impinge on the lands owned, or claimed under adjudication, by indigenous peoples, without full documented consent of such people.		X
15	Landfills and waste transfer stations,		X
16	Power plants,		X
17	Large-scale transport infrastructure such as highways, expressways, urban metro-systems, railways, and ports,		X
18	Investments in extractive industries; commercial logging,		X
19	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,		X
20	Activities that would convert natural habitats or significantly alter potentially important biodiversity and/or cultural resource areas,		X
21	Activities that would require the relocation of residential households and/or significant involuntary land acquisition,		X
22	Activities in disputed areas.		X

6. Environmental and Social Screening

Environmental and social screening was conducted using the YEHCP ESMF screening form. The solar system is environmental-friendly, and PV Panels and equipment will be installed within the same areas of water wells and do not cause disturbance to the community, and the environmental and social impacts will be mostly positive.

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?	X		ESS1	ESMP, SEP
Does the subproject involve land acquisition and/or restrictions on land use?		X		SEP
Is the subproject associated with any external waste management facilities such as a sanitary landfill, incinerator, or wastewater treatment plant?		X		ESMP, SEP
Does the sub-project use additional technically feasible water conservation measures?	X		ESS1, ESS3	ESMP
Does the sub-project consider additional strategies to adopt measures that avoid or minimize negative effects of emissions?	X			
Does the subproject have an adequate system in place (capacity, processes and management) to address waste?	X			
Does the subproject involve the recruitment of workers including direct, contracted, primary supply, and/or community workers?	X		ESS2	LMP, SEP
Does the subproject have appropriate OHS procedures in place, and an adequate supply of PPE (where necessary)?	X		ESS2, ESS4	LMP
Does the sub-project have a GM in place, to which all workers have access, designed to respond quickly and effectively?	X		ESS10, ESS2	SEP

Does the subproject involve use of security or military personnel during construction and/or operation of healthcare facilities and related activities?		X		
Does the sub-project establish and implement appropriate quality management systems to anticipate and minimize risks and impacts that services may have on community health and safety.	X		ESS4	ESMP, SEP
Does the sub-project apply the concept of universal access where technically and financially feasible?	X			
Is the subproject located within or in the vicinity of any ecologically sensitive areas?		X		ESMP, SEP
Is the subproject located within or in the vicinity of any known cultural heritage sites?		X		ESMP, SEP
Does the project area present potential Gender-Based Violence (GBV) and Sexual Exploitation and Abuse (SEA) or Sexual Harassment (SH) risk?	X		ESS1/ESS4	ESMP, SEP/GBV Action Plan

7. Risk Level and Mitigation Instruments

The sub-project assigned risk is moderate, because the subprojects interventions are medium scale, and do not involve activities that have a high potential environmental and social impacts, and the solar systems are environmental-friendly. Actions required to minimize risk to OHS of workers due to poor construction practices, inadequate site management or faulty design and equipment. Therefore, UNOPS will include environmental and social requirements for contractor including all OHS requirements, as well as Health and Safety prevention measures from COVID-19 in the contract and tender documents.

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) including the WBG Environmental Health and Safety guidelines, as well as national environmental laws and regulations.

Environmental Risk and Impacts:

- Solid waste produced by work accumulated and pollutes the environment including E-waste.
- Environmental pressures on workers (heat strokes, dust storms)
- Soil and ground water contamination from fuel leaks
- Fuel Spillage
- Vegetation removal.

Social Risk and Impacts:

- Lack of worker's awareness and knowledge on social safeguard issues on gender, SEA and GBV.
- Child Labor
- Low aesthetic value
- Access of public into working site.
- Public Exposure to high risk activities (Lifting, Excavation,)

OHS Risk and Impacts:

- Lifting Operations Impacts:
- Failure of lifting equipment;
- Falling loads; and
- Workers being crushed by a moving Load or lifting equipment which all might result in fatalities or injuries.
- Electricity Shock Impacts:
    - Thermal burns
    - Muscle, nerve and tissues damage due to electrical shock
    - Fall from height due to sudden electric shock
    -

- Manual Handling Impacts:

Manual Handling Injuries that includes

- Fractures
- Damage to muscles, ligaments and tendons
- Spinal disc injuries
- Trapped nerves
- Abrasions and cuts
- Burns
- Hernias

- Excavation Impacts:

- Dust generated by excavation activities
- Waste generated from the excavation
- Falling in excavated zones

- Hazardous Substances and Wastes Impacts:

- Injuries or fatalities that result from:
- Electric shock
- Fire
- Flash burns

- Infection by Covid-19 Impacts:

- Transmission of corona virus between site workers
- Site workers lives could be at risk(illness / Death)

Operation and maintenance

- Operation and Maintenance (cleaning PV Panels using water)

UNOPS will ensure that:

- The generic environmental and social requirements for contractors including all OHS requirements that are relevant to the project activities will be applied to contractors, as well as OHS requirements as indicated in the site ESMP and included in the tender documents and contract to fully avoid or mitigate environmental, social, occupational health and safety impacts that might arise from this activity.
- The supply and installation of PV solar system equipment will be compliant to environmental, health and safety standards and specifications including electricity safety, weather resistance, and UL standards.
- Safe installation of solar system and solid fixation of PV mounting structures in safe place on the ground of the Wells.
- The Wells administration, guard and/or technician will receive proper training on the safe operation and maintenance of the solar PV system.
- The operation and maintenance training will be conducted by the contractor to the Wells administration. Additional training (ESCP, LMP, and SEP) will be conducted by UNOPS for both contractors and the Wells administration.

UNOPS will also require that contractor:

- Inspect existing facility and apply all safety measures to reduce the risk of any injury to the workers during installation or the users during operation, subject to written approval by the UNOPS engineer provided before implementation of work.
- Conduct risk assessment for solar system installation, evaluate the risk, and put the appropriate safety measures in place and submit it for review and approval.
- Fully implement permit to work system, method of statement and job safety analysis to ensure all tasks are well prepared and follow all necessary safety mitigation and prevention measures.
- Provide safety training to all workers including lifting operations, electrical safety and permit to work before commencing any work
- Provide the required safety and health PPE and hygienic materials to workers to protect workers and ensure their safety and prevent them from Covid-19 infection.
- Provide fully insulated PPE, isolated installation tools, instruments and equipment.
- Provide appropriate training on the use, serviceability and integrity of the necessary PPE.
- Prepare emergency response plan including contact numbers, evacuation plan and provide necessary first aid equipment in site and transportation and contracted nearest hospital in case of any emergency.
- Health and safety training should be provided to workers to avoid electrocutions and potential electrical hazards and wearing proper PPEs.
- The contractors must also comply with the project LMP, including the establishment and maintenance of a grievance redress mechanism for workers.

- Follow the slip prevention measures in the same elevation by:
    - Use of slip resistant footwear and locating electrical cords, cables and ropes in common areas and marked corridors to prevent risk of slips and fall associated with uncontrolled use of electrical cords and cables on the ground.
    - Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labeling covers for openings in floors, roofs, or walking surfaces.

UNOPS has already taken the following steps in GBV/SEA/SH:

- In the stakeholder consultation meetings UNOPS has presented the project GBV SEA/SH action plan and during the meetings we focused on female's participants and ensure to explain about the GM mechanism and highlighted how it is transparent, secure and confidential to use any of the GM access point
- UNOPS has developed visibility materials to promote awareness for PSEA/SH prevention in local language (Arabic) the materials and messages used adapted to be suitable for Yemen context and sensitivity of the subject.
- GM focal point received specialized training about SEA/SH cases and the way to deal with it using Victim centered approach
- UNOPS is developing SOP and protocol for GM in how to deal with SEA/SH cases.
- UNOPS has conducted refresh sessions for Project Personnel in GBV/SEA/SH and trained retainer's sites engineers as well
- UNOPS has prepared risk assessment tools for GBV and will require contractors to fill a checklist on GBV/SEA/SH and to prepare code of conduct for their workers/staff.
- AS part of YEHCP GBV SEA/SH action plan UNOPS will roll out SEA/SH prevention and response plans for contractors , where the contractors need to prepare the action plan as part of the tender documents , UNOPS is supporting the contractors to enhance capacity in this area

looking to the fact that almost they have zero knowledge and capacity , for that UNOPS developed contractors action plan template where it covers the most priority areas and UNOPS conducted induction session for contractors about this requirement and presented to contractors on how to prepare their own GBV SEA/SH prevention and response plans (GBV Action Plans) using the developed template , other in depth training sessions will follow and will continue during project life span

- AS part of YEHCP GBV SEA/SH action plan UNOPS will roll out SEA/SH prevention and response plans for contractors, where the contractors need to prepare the action plan as part of the tender documents.

- UNOPS is supporting the contractors to enhance capacity in the area of SEA/SH prevention, for that UNOPS developed contractors action plan template

- UNOPS conducted induction session for contractors about this requirement how to prepare their own GBV /SEA/SH prevention and response plans (GBV Action Plans) using the developed template.

- Also training sessions on this area will follow and will continue during project life span

- UNOPS will train contractors' PSEA/SH focal points
- UNOPS will require contractors to employ at least 5% female staff to encourage gender mainstreaming.

Labor Management:

The estimated/planned number of workers for solar installation is 8 skilled and 4 unskilled workers in each well which the contractor is responsible for.

Child Labor and Forced Labor:

- Ensure all workers are more than 18 Years old, and no child, forced, involuntary or unpaid labor will be used in any work. UNOPS will ban all forms of forced labor under the project as it has been stated in the LMP and ESMF.
- UNOPS will include specific language in the bidding documents to alert the industry to the issue of forced labor and requires that bids are accompanied by declarations from suppliers. Bids will include applicable procurement documents indicating that solar panels/components constitue the "core functions of a project" as defined in the World Bank's Environmental and Social Framework): (i) applicable provisions in the invitation for bids, instructions to bidders and qualification requirements; (ii) a Forced Labor Performance Declaration; (iii) a Forced Labor Declaration; and (iv) a strengthened contract clause on Forced Labor.
- All procurements that apply to the declaration will be subject to Bank prior review and Bank no objection. The new requirements apply to both international and national competitive procurement and any direct selection/direct contracting within the scope of application. The requirements apply to new procurement advertised or direct contracting awarded on or after January 1, 2022.
- The contractor shall protect the workers from any risk that may be encountered during the

implementation including exposure to COVID-19.

- The contractor shall maintain occupational health and safety system in the site to protect workers from hazards and risks and provide adequate health and safety training, required PPE, first aid box, and toilets and potable drinking water.
- UNOPS will ensure in the tender documents that contractors must provide valid insurance policy covering worker's insurance during sub-project implementation and maintenance period.

Community health and safety

1. indicated in Annex 3 that to COVID, risk during installation of the panels.
2.
3. Access of public into working site.

These impacts on the community health and safety can be mitigated through:

1. Install barriers, danger warning signs and restriction signs showing the potential danger to the public, indicating that access is limited to authorize persons only. And establish barriers around the working site, equipment area and excavation area.

GRM:

UNOPS has established Grievance Redress Mechanism (GRM) with the following contact channels: UNOPS/Sana'a –Tool Free Number 8000190 -Tel: 01 504914/915 - SMS:739888388 Email: GRM.yemen@unops.org for Yemen Integrated Urban Service Emergency Project (YEHCP) with a new Toll Free Phone Number 8000190 to enable beneficiaries to communicate their concerns regarding the project activities. More specifically, the GRM details the procedures that communities and individuals, who believe they are adversely affected by the project or a specific sub-project, can use to submit their complaints, as well as the procedures used by UNOPS and its local partners to systematically register, track, investigate and promptly resolve complaints.

Accordingly, hard copies of the translated forms of GRM (attached in Annex 1) was provided to the interviewed people and they have been informed about the GRM contact information that will also be posted at the sub-project site signboard to ensure any grievance can be addressed in an amicable manner. Resolving complaints at community level is always encouraged to address the problem that a person may have during implementation and/or operational phase.

Anonymous complaints can be provided for both staff and local community and GRM can be used as a channel for any kind of complaints including GBV/SH and will handle such complaints and also for positive feedback or suggestions.

Grievance Mechanism for Workers

The Contractor shall put in place a Grievance Mechanism for workers and the workers of its subcontractors that is proportionate to its workforce. The GRM shall be distinct from the Project level Grievance Mechanism 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 .For more details refer to the YEHCP-LMP .
- *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 will follow a separate process where cases 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.

Gender – based Violence (GBV)/Sexual Exploitation and Abuse (SEA)/Sexual Harassment (SH):

The contractor and workers should sign the Code of Conduct and ensure workers respect and adhere to the Code of Conduct (CoC) to respect the local community cultures, and adhere to the social safeguard issues on Gender, SEA/SH and GBV. Raise awareness on GM system and how it can be used to report any GBV cases. For more details refer to the YEHCP GBV/PSEA/SH action plan.

Training of workers: UNOPS and Contactor should provide the workers with required training and daily toolbox talk in the OHS, GBV, SEA and GRM.

Contactor should provide the work site with GM system for all workers including providing complaints box and complaint means.

Information Dissemination and Disclosure

The survivor-centered approach is based on a set of principles and skills designed to guide professionals, regardless of their role, in their engagement with survivors (predominantly women and girls but also men and boys) who have experienced sexual or other forms of violence. The survivor-centered approach aims to create a supportive environment in which the survivor's interests are respected and prioritized, and in which the survivor is treated with dignity and respect. The approach helps to promote the survivor's recovery and ability to identify and express needs and wishes, as well as to reinforce the survivor's capacity to make decisions about possible interventions.

There will be Gender-sensitive communication channels. And in disclosure it will take into consideration women´s safety when designing and dealing with information.

The World Bank will disclose documentation relating to the environmental and social risks and impacts of YEHCP 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.

COVID 19

UNOPS will require contractor to implement extra measures during COVID 19 Pandemic, including the following prevention measures to protect workers and will depend on emphasizing basic infection prevention measures and all contractors/suppliers should implement good hygiene and infection control practices, including but not limited to:

- Promote frequent and thorough hand washing, including by providing workers, customers, and worksite visitors with a place to wash their hands. If soap and running water are not immediately available, provide alcohol-based hand rubs containing value of alcohol recommended by WHO.
- Encourage workers to stay home if they are sick.
- Encourage respiratory etiquette, including covering coughs and sneezes.
- Provide customers and the public with tissues and trash receptacles.
- Employers should explore whether they can establish policies and practices, such as flexible worksites (e.g., telecommuting) and flexible work hours (e.g., staggered shifts), to increase the physical distance among employees and between employees and others if state and local health authorities recommend the use of social distancing strategies.
- Discourage workers from using other workers' phones, desks, offices, or other work tools and equipment, when possible.
- Maintain regular housekeeping practices, including routine cleaning and disinfecting of surfaces, equipment, and other elements of the work environment. When choosing cleaning chemicals, employers should follow the manufacturer's instructions for use of all cleaning and disinfection products (e.g., concentration, application method and contact time, PPE).
- Workers should wear masks, gloves and goggles at all times on the site.

HSSE Impacts Analysis Plan and Mitigation Measures

Potential Impact Factor	Mitigation Measure	Implementation Responsibility[5]	Estimated cost for each subproject (USD)
Occupational Health and Safety			
Lifting Operations Impacts: Failure of lifting equipment; Falling loads; and Workers being crushed by a moving Load or lifting equipment which all might result in fatalities or injuries.	Close the lifting area with fence to prevent access to the lifting area during lifting work. Install warning signs for lifting activities Prevent accessibility to non-workers at lifting zones or any construction zone Ensure safe distance from lifting sites Carry out lifting work by well trained, qualified, and certified lifting team and with proper communication means and flagman. Provide workers with all necessary Personal Protective Equipment (PPE) and safety materials. Use well-maintained equipment for lifting that is appropriate for the weight; well checked and tested by a third party. Secure loads when lifting and use strong and reliable fixation materials to make sure that the load is well tightened and no solid parts fall from the load during lifting.	Contractor and UNOPS	300$

[5] The contractor is responsible of applying all UNOPS HSSE guidelines, SOPs and OHS requirements.

The UNOPS is responsible of supervising the contractor implementation of HSSE guidelines and OHS requirements.

	Protect the units against staining, discoloration and other damage until they are installed in their final location. Lifting device capacity shall be 1.65 times the maximum calculated static load at that point. An ultimate load shall be ≥ 4 times the maximum static load.		
Electricity Shock Impacts: Thermal burns Muscle, nerve and tissues damage due to electrical shock Fall from height due to sudden electric shock Fatalities or injuries	Inspect existing water well sites and apply all safety measures to prevent the risk of any injury to the workers by electricity shock during installation or the users during operation and apply Hot Work Permit and Electricity Isolation Certificate subject to written approval by the UNOPS engineer provided before implementation of work. Carefully design using appropriate technologies to minimize hazards. Build security fences around electricity areas. Contractor electricians should be well trained and provided with appropriate insolated PPE and work tools and should be aware of electricity shocks and avoidance techniques. Avoid working during rainy times Install danger signage in the electrical hazard areas and apply all safety measures to prevent exposures. Ensure skilled and trained workers are hired for each job.	Contractor and UNOPS	NA

	Conduct regular awareness sessions and daily Toolbox Talks on OHS requirements before commencing any work. Periodic inspection to ensure that mitigation measures are implemented and stop any unsafe act or unsafe situation. Emergency response plan to be in place with details and contact of the nearest hospital or medical center, responsibilities are understood for all works, first aid boxes are available and a list of trained first aiders is posted and known by all workers with available transportation. Immediately report all accidental occurrences with serious accident potential such as major equipment failures, contact with high-voltage lines, and exposure to hazardous materials, slides, or cave-ins to UNOPS Contractors 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 Project Company, Independent Engineer, UNOPS and its implementing partners, or others—to include date, inspector or auditor name, sites visited, and records reviewed, major findings, and actions taken. - Maintaining a record of injuries and accidents specifying cause and location - Provide a list of trained workers, who will be checked for their training skills. Measures will be implemented onsite and followed by regular monitoring visits. - Ensuring the contractor is taking care of the safety of workers while working in the site and give all necessary vaccines to workers to prevent any infection with epidemic and pandemic diseases.		
Manual Handling Impacts: Manual Handling Injuries that include Fractures	Provide required information and training on manual handling to the site workers. Apply safe handling techniques.	Contractor and UNOPS	NA

Damage to muscles, ligaments and tendons Spinal disc injuries Trapped nerves Abrasions and cuts Burns Hernias	Remove space constraints, ensure good housekeeping and provide improved layouts Keep manual handling to one level, improve floor conditions and improve the environmental conditions. The floor must be clean from any obstacles and well protected. Ensure use of appropriate PPE and safety materials. Addressing potential use of handling aids with matching safety measures.		
Excavation Impacts: Dust generated by excavation activities Waste generated from the excavation	Excavation will be less than 50cm depth. Excavation area to be appropriately secured using barricades, fences and precaution tapes. Reflective Safety signs to be placed. Continuously remove the waste and transfer it to the approved disposal site by the local district authorities Excavation activities will be away from water well, people access way and out of their working/ attendance hours.		NA
Infection by Covid-19 Impacts: Transmission of corona virus between site workers Site workers lives could be at risk (illness / Death)	UNOPS will ensure that contractors will provide health, safety and hygiene awareness and materials to staff, workers and visitors and provide proper training on health and hygiene issues. Contractor to maintain routine cleaning and disinfecting of surfaces, equipment, and other elements of the work environment. When choosing cleaning chemicals, employers should	Contractor and UNOPS	800$

	follow the manufacturer's instructions for use of all cleaning and disinfection products (e.g., concentration, application method and contact time, PPE). Workers should wear masks, gloves and goggles at all times on the sites.		
Hazardous materials (i.e fuel) and wastes (i.e empty containers)	Ensure all hazardous materials and wastes are handled stored and disposed according to their Material Safety Data Sheets (MSDSs). Ensure fuel is stored in insulated areas from the ground, well ventilated and inaccessible to the public. Ensure only trained employees handle hazardous materials and ensure that workers are wearing PPEs. Ensure the presence of spill prevention kits.	Contractor and UNOPS	N.A
Environmental pressures on workers (heat strokes, dust storms)	Not working during high temperatures and start the work early in the morning and working in calm weather conditions. raise awareness on the importance of drinking enough water Provide proper PPEs against heat and dust Do not allow working during bad weather, rain, dust storms Provide adequate and suitable breaks and supply workers with drinking/potable water	Contractor and UNOPS	NA
Environmental Impacts			

Solid waste produced by work accumulated and pollutes the environment.	Ensure that work wastes are properly stored and regularly collected and transported to authorized disposal site and arrange for safe path of last destination of E-waste. Ensure waste areas are properly fenced and insulated.	Contractor and UNOPS	500$
Soil and groundwater contamination from chemicals (i.e fuel)	Ensure no wastes or excavated materials are stored inappropriately to prevent contamination of ground water and water sources during installation of subversive pumps and excavation Provide secondary containment for all chemical contained vessel or rumps. Presence of suitable spill prevention kits Proper storage of hazardous substances and away from soil and water resources.	UNOPS and contractor	NA
Vegetation removal	Protect the existing trees during the project design and implementation by keeping suitable distance between the installation area and the trees.	UNOPS and contractor	NA
Social Impact			
Lack of workers awareness and knowledge on social safeguard issues on gender, SEA and GBV.	Contractor and workers to sign the code of conduct, and ensure workers respect and adhere to the code of conduct. Conduct regular awareness sessions on site in GBV prevention.	Contractor and UNOPS	$200

	GM system is in place to handle any issue on Gender SEA and GBV. GM system for all workers including providing complaints box and complaint means. Overall Sub-project GRM system in place to handle all the issues, complaints and positive feedback.		
Child Labor	All workers should be more than 18 years old. Verifying age of workers by checking IDs and official documents. Ensure a worker log is available, and all workers are registered.	Contractor and UNOPS	NA
Access of public into working site. Impacts: Public Exposure to high-risk activities (Lifting, Excavation,)	Install barriers, danger warning signs and restriction signs to only authorized persons and signs showing the potential danger to the public. (Please see suggested language in above comments). And establish barriers around the working site, equipment area and excavation area. Do not allow public to access working sites in all cases Avoid construction work during academic seasons Ensure proper storage of materials and fencing the storage area to prevent accessibility.	Contractor and UNOPS	500$
Operational/ Maintenance Phase.			
Operation and Maintenance (cleaning of PV Panels using water)	Ensure water is used efficiently while cleaning the panels in order to avoid wasting water.	Wells Administration.	NA

	The solar panel cleaning will be wiper cleaning and water saving practice by using Rubber Blade water sprayers with very little amount of water.		

Environmental and Social Monitoring Plan

Impacts	Measurements (incl. methods & equipment)	Frequency	Implementation responsibility
	Community Health and Safety		
Public safety during the construction work.	**Method:** - Visual observation and photographic documentation of safety measures. - Visual observation for installing warning signs, barricading of working areas with safety tapes and fencing/barricades to prevent unauthorized access of public and pedestrians to the working areas. **Indicators** - Number of recorded injuries and types of injuries and accidents	Daily basis during rehabilitation work and weekly during site inspection visits, On any complaint	Contractor and UNOPS
The risk of employing children and forced labor for work activities.	**Method:** - Site inspection, checking and documentation of contractor employee records **Indicators:** o Number of recorded employees below the age of 18	Weekly during site inspection and regularly by TPM	Contractor, UNOPS and TPM
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.).	Monthly	Contractor and UNOPS

External stakeholder grievances	Number of grievances 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.	Continuous Monthly	Contractor, UNOPS and TPM
Complaints Handling	**Method:** Complaints register will be kept on site and this will feed into the GRM. Details of complaints received will be incorporated into the audits as part of the monitoring process **Indicators:** Number of Reported Grievances	Weekly	Contractor and UNOPS
GBV and SEA issues	**Indicators** - Number of reported and registered cases of the SEA/SH through project GM. - Number of reported cases of contractors' noncompliance to PSEA/SH obligation on work sites.	Weekly	Contractor, UNOPS and TPM
	General Environmental Impacts		
Dust generation during work implementation.	**Method:** Visual observation and photographic documentation of equipment induced dust clouds during maintenance/ rehabilitation activities Indicator: visible dust emissions	Daily	Contractor and UNOPS

Increased level of noise	**Method:** Site supervision/inspection and documentation to ensure compliance with the noise mitigation measures **Indicator** Percentage of workers complying with PPE procedures Percentage of trained workers in hearing conservation	Weekly during site inspection.	Contractor and UNOPS
Production, proper disposal and disposal of work's debris and waste materials.	**Method:** Inspection and photographic documentation **Indicators:** Records of presence of waste stored in open areas or near drainage areas and increase in waste pollution	Daily and weekly during rehabilitation works and site inspection	Contractor and UNOPS
Soil and groundwater contamination	**Method:** Inspection and photographic documentation and water testing **Indicators:** **Change in soil color and presence of visible fuel leaks** **Water Contaminants above national and WHO health and safety limits.**	Daily for soil contamination and weekly for water testing	Contractor and UNOPS
Vegetation	**Method:** Inspection and photographic documentation	Weekly	Contractor and UNOPS

	Indicators: Presence of dead vegetation and trees Decrease in vegetation land cover in the area		
Operation and Maintenance (cleaning using water)	Visual inspection to ensure that water saving practice is implemented efficiently in cleaning PV Panels.	Weekly (After Installation)	Wells Administration
Occupational Health and Safety			
Lifting Operations	Visual inspection to ensure that all lifting activities in the work site are executed safely and as per the standard lifting safety rules. Visual inspection that safety distance from lifting sites is adhered to Indicators: Number of injured workers from lifting activities	Daily	Contractor and UNOPS
Electricity Operation	Visual inspection to Ensure that all electricity safety rules are implemented, followed and communicated. Ensure that only skilled workers are authorized to perform any electrical operations through qualification inspections. Indicators: Number of injured workers from electrical shocks Number of workers not wearing suitable PPEs.	Daily	Contractor and UNOPS
Manual Handling	Visual inspection to ensure that all manual handling activities are performed according to the OSH manual handling safety rules and instructions. Record any noncompliance	Daily	Contractor and UNOPS

	Ensure that the implementation of the safety techniques to control the manual handling risk is monitored continuously. Indicators: Number of injured workers and number of workers not wearing proper PPEs.		
Excavation	Visual inspection to ensure that all excavation activities are executed safely and all safety rules are implemented. Record any noncompliance. Indicators: Number of workers wearing masks Number of workers falling into excavated areas	Daily	Contractor and UNOPS

Infection by Covid-19	**Method:** - Visual inspection to ensure that health, safety and hygiene awareness are followed and communicated. - Visual inspection to ensure that all health, safety and hygiene materials are provided. **Indicator:** - Number of sick workers - Number of workers adhering to wearing PPEs through visual Inspection	Daily	Contractor and UNOPS
Work related accidents and injuries.	**Method:** - Inspection and photographic documentation - Maintaining a record of injuries and accidents in project reports specifying cause and location - Contractors are required to provide a list of trained workers, who will be checked for their training skills and age and the measures will be implemented onsite and followed by regular monitoring visits. - Inspection and photographic documentation **Indicator:** The record of injuries and accidents in project reports specifying cause and location.	Daily	Contractor, UNOPS and TPM
Poor onsite housekeeping, toilet and water supply, leading to illness and disease.	**Method:** Site inspection - Indicator: o Presence of clean water o Presence of pests o Reports on illness and diseases	Weekly during site inspection and regularly by TPM	UNOPS and TPM

Safety	**Indicator:** Hours worked, 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.	Continuous	Contractor and UNOPS
Environmental incidents and near misses	**Method: :** Environmental incidents and high potential near misses and how they have been addressed, what is outstanding, and lessons learned. **Indicator:** Number and types of recorded environmental misses	Continuous	Contractor and UNOPS
Major works:	**Indicator:** Work undertaken and completed, progress against project schedule, and key work fronts (work areas).	Continuous	Contractor and UNOPS
E&S and OHS requirements:	**Indicator:** Register non-compliance incidents with permits and national law (legal noncompliance), project commitments, or other E&S requirements.	Continuous	Contractor and UNOPS
E&S/OHS inspections and audits:	**Indicator:** By contractor, engineer, or others, including authorities to include date, inspector or auditor name, sites visited, and records reviewed, major findings, and actions taken.	Continuous	Contractor and UNOPS

Workers:	**Indicator** Number of workers, 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).	Continuous	Contractor and UNOPS
Training on E&S issues	**Method:** Including dates, number of trainees, and topics. **Indicator:** Training records and number of training sessions on E&S issues and attendances	Weekly	Contractor and UNOPS
Footprint management:	Details of any work outside boundaries or major off-site impacts caused by ongoing work—to include date, location, impact, and actions taken.	Monthly	Contractor and UNOPS
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	When occurred	Contractor and UNOPS
Worker grievances:	**Indicator:** Number or grievances, details including occurrence date, grievance type, 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.	Weekly	Contractor, UNOPS and TPM
Major changes to contractor's environmental and social practices.	**Indicator:** Records of Major changes to contractor's environmental and social practices.	Weekly	Contractor, UNOPS and TPM

Deficiency and performance management	**Indicator:** Actions taken in response to previous notices of deficiency or observations regarding E&S performance and/or plans for actions to be taken—these should continue to be reported until UNOPS determines the issue is resolved satisfactorily	Weekly	Contractor, UNOPS and TPM
Operation and Maintenance (Staff Health and Safety and community health and safety)	Ensure same monitoring measures are implemented during operation and maintenance	Continuous daily	UNOPS, Contractor and Wells Administration.
Operation and Maintenance (training to water well staff)	Training on how to handle solar panels, clean them, proper PPEs and safety measures etc.	Prior to handing the project to the Wells administration.	UNOPS, Contractor and Wells Administration.
All costs will be r the responsibility of each party including the contractor and will be included in the contract BoQ.			

Annex 1: Design Requirements and Guidelines:

Technical Specifications.

PART A (PV and Electrical)

1. PV Modules:

- The capacity of the solar modules should be **at least** 40 % greater than AC motor pump.
- Module capacity should not be less than 540 W @STC.
- Type of cell: Poly or Mono Crystalline.
- The PV manufacturer should be approved as tier-1.
- Module efficiency: should not be less than 19.0%
- The PV modules junction box not less than IP67
- Module Voltage: Not less than 1000 VDC;
- Operating temperature: -40°C to 85°C
- Temperature Characteristics: P max: -0.38% /C° or less
- VOC: -0.30% /C° or less;
- Nominal operating cell temperature (NOCT) : 45 ±2°C.;
- Weather proof DC rated MC4 connector. Fully Secured, not allowing for any loose connections.
- High transmittance tempered glass: Minimum thickness of 4.0 mm;
- Must conform to IEC 61215, 61730, 61701, and UL 1703.TUV, UL certificates or equivalent;
- Certificates and Data sheet of PV module that contains the P-V & I-V Curves, all electrical and mechanical Data, Dimensions, Module area should provide by bidder;
- Performance warranty: Nominal power output 90% for 10 years, 80% for 25 years;
- Product warranty shall be at least 12 years.

2. Solar Pumping Inverter Controller

The solar pumping drive is required, the drive should have a long lifetime, low maintenance cost, inbuild MPPT + VFD (Variable Frequency drive). The drive rating should be 1.25 X AC pump rating and it shall follow below features:

- Three phase output, voltage range 380-420 V;
- Efficiency: Not less than 95%;
- Output Frequency: 50H±3%;
- Enclosure class should be not less than IP55.
- Maximum input voltage Voc): not less than 770 VDC;
- The system should be designed to run near its MPPT range;
- Operating temperature: up to 45 °C;
- Such device should have built in data loggers
- The device shall allow hybrid operation with external power source, where solar power should be configured as the primary power source;
- soft start, V/F stable speed control during solar radiation changes, adjustable auto/ manual start in early morning, auto wakeup after adjustable hibernation time in cloudy days, o inputs for pressure switch and water level sensor to protect the pump against dry running and tank full water or closed pipeline (high pressure)
- Display: LCD Screen display with Cover + LED status indicator

- Protection: Over-Voltage, pump Over-Current, pump Over-Load, Over-Temperature, pump Phase Loss, pump Short-Circuit, ground fault, solar low power, DC Input Anti-reverse, AC output unbalance (3Phase);
- Display content: PV status (Current, Voltage, Power, Energy), AC input voltage, AC output voltage, Load, Running Status, RPM, and Frequency.
- Product warranty should be at least 2 years.

3. PV Combiner Box

The PV combiner box shall be used to combine the multiple DC input to one output, and it shall comply with the following specifications as minimum.

- Enclosure materials: Coated metal with lockable door.
- Enclosure protection: IP65.
- Number of input circuit: total number of strings in addition to 2 spare inputs.
- DC fuse rating for each string:1000V, 15 A.
- DC output circuit: In accordance with the maximum current X 1.25, 1000 VDC breaker;
- Built in surge protection device;
- Anti-backflow diodes.
- Operational Environment Temperature: -30 °C ~+70 °C;
- Product warranty shall be at least 2 years.

4. System Cables:

Cables should be sized in accordance with IEC 60364-5-52 standard, bidders should submit cable sizing, and voltage drop calculations taking into account that the maximum voltage drop should be no more than 3% for each side (AC and DC);

4.1 3phase, AC Submersible Pump Cable

- Voltage rating:450/750VAC, Type of Conductor: copper, flexible, finely multi stranded, Insulation: black poly chloroprene, HO7RN -F or equivalent material

4.2 DC Cable (From array to Combiner Box)

- Made of double insulation material and jacket, TUV certified, 1000VDC, Sheath colours: black, red, Type of Conductor: tinned copper, flexible, finely multi stranded

4.3 DC Cable (From Combiner Box to inverter)

- Made of double insulation material and jacket, TUV certified, 1000VDC, Sheath colours: black, red, type of Conductor: tinned copper, flexible, finely multi stranded

4.4 Water level Cable with Sensor

- Submersible cable, 1 ×1.5 mm2 mm, double sheath.
- Dry running electrodes

5. Cable Laying

- All above ground cables shall be installed in perforated galvanized cable tray with cover. Cable tray shall be supported with concrete blocks in appropriate intervals or on the mountings structure.
- Under-ground cables shall be installed in cable trench 60 cm depth with PVC Sch#40 pipes as per drawings.
- 50% spare for future expansion.

6. Earthing and Lightning Systems

6.1 AC and DC Earthing

- All PV modules shall be grounded in accordance to the manufacturer instruction
- Each array structure of the PV modules should be grounded properly.

- All metal casing/shielding of the system and its components should be thoroughly grounded.
- Earthing System shall be comply with IEC/BS EN 62305-3.
- Earthing installation in accordance with the IEE Wirin1g regulations BS 7671.
- Earthing clamps shall be used.
- Grounding and lightening protection equipment shall include SPD, earth pits and rods
- Grounding resistance should be not more than 5 ohm.

6.2 Lightning System

- Lighting arrester should be provided.
- Lightning arrester shall be installed with height to protect all PV arrays.
- Lightning System shall be comply with IEC/BS EN 62305-3.
- Minimum height of lightning arrester is 1.5 m.
- System resistance should be not more than 1 ohm.

7. Moulded Case Circuit Breaker (MCCB)

- 400V, 3P & 25KA
- NEMA 3R enclosure and powder-coated steel construction
- Lockable front door, wall mounted type, Direct handles, Locking devices, Auxiliary contacts and Protective plates.
- 3 ways at least, shock and vibration proof contacts.
- Conform to BS EN 60947-3 and UL 1008 Listed.

PART B (Mechanical)

8. Submersible Pump and Motor:

8.1 Pump

- Submersible pump Mixed flow multi -stage separate type, AC 3PH motor type, the motor pump Sets should be used for the solar PV, Starting compatible with AC VFD operation, bidders shall indicate manufacture, country of origin and model. It shall follow below features as minimum:
- Pump Efficiency at Duty Point: Not less than 70%
- Clearance (well dia-pump max dia with cable) = not less than 40 mm;
- Casing (Pump Bowl), Impeller , Wear Rings, Pump delivery and Housing , Check valve (None Return Valve) , Inlet strainer should be comply with: (AISI 304 or equivalent) or higher specification materials.
- Shaft and coupling, Shaft sleeve, Bearing bush, Guide bearing, Screw, stud, nut, washer.. etc should be comply with: (AISI 304 or equivalent) or higher specification materials.
- allowable sand: minimum 100 gr/m3.
- Coupling: according to NEMA.

8.2 Motor

- The motors shall be Rewindable, insulation rating is compatible with AC VFD operation
- Rated Voltage:380/400VAC
- Insulation Material and Class, PE2+PA
- Ambient water temp: minimum 40 C°
- IP: not less than 68
- Motor Efficiency: Not less than 80%
- Motor Speed:1850rpm – 2850rpm
- Cooling sleeve suitable for well internal diameter
- Shaft, Motor Sleeve, Motor Housing, Diaphragm cover, bolts, Nuts, Studs, screws Washers etc. should be comply with: (AISI 304 or equivalent) or higher specification materials.
- Shaft Seal (Mechanical Seal) Tungsten carbide/ceramic- Diaphragm Nitrile Rubber Radial Bearing (Guide Bearing) Graphite or superior Axial Bearing (Thrust Bearing) Graphite/ S.S Pads superior, Rubber Parts NBR or equivalent
- Product warranty should be at least 2 years.

9. Well Raiser

9.1 GI Carbon Steel Raiser Pipes

- Materials: Hot dip galvanized Carbon Steel according to BS 1387 or equivalent
- Joint Type: Threaded or Flanged
- Thickness / Schedule: Heavy as per BS 1387 standard or equivalent.
- Single Piece Length: 6 m, or 3m.
- Pipes package shall include all required adaptors and accessories
- Pipes allowable working pressure not less than 80 bar

9.2 Vertical Raiser Non-return Valve (Check Valve).

- Nominal Diameter (DN): Shall be selected according to raiser line diameter.
- Nominal Pressure (PN): Shall be more than TDH of the system.
- Body Material**: Stainless steel 304** or higher grade
- Connection Type: According to the raiser pipes.
- Standard: BS5153 or Equivalent
- Complete with all required accessories

10. Well Head Piping Equipment:

Piping equipment shall include any required fittings and materials for proper installation or existing system modification such as elbows, tees, sockets, flanges, piece of pipes, ..etc with high quality and high rating, piping equipment shall be installed inside valve chamber.

10.1 Mechanical Water Flow Meter

- Inline, Flanged, Magnetic type, Dray dial, turbine flow meter with all needed accessories such as threaded flanges, gaskets and bolts.
- Nominal Diameter (DN): Shall be selected according to output pumping line diameter.
- Nominal Pressure (PN): Shall be selected according to output pressure on the beginning of the pumping line.
- Body: Cast Iron
- Standard: EN14154, ISO4064
- Transient Flow Qt : Shall be less than 50% of Pump flow rate.

- Accuracy: ±2% of Nominal flow
- Maximum dial indication: 999999
- Measuring Units: cubic meter m3

10.2 Horizontal Pumping line Non-return Valve.

- Nominal Diameter (DN): Shall be selected according to pumping line diameter.
- Nominal Pressure (PN): Shall be selected according to output pressure on the beginning of the pumping line.
- Connection Type: Flanged.
- Type: Swing
- Standard: BS5153 or Equivalent
- Body Material: Cast Iron (Gg25)
- Spindle: Stainless steel
- Complete with flanges, gaskets, bolts and nuts

10.3 Gate Valve

- Nominal Diameter (DN): Shall be selected according to pumping line diameter.
- Nominal Pressure (PN): Shall be selected according to output pressure on the beginning of the pumping line.
- Connection Type: Flanged.
- Standard: BS BS6163 or Equivalent.
- Operator: Hand Wheel
- Resilient Seated.
- Body Material: Cast Iron(Gg25)
- Stem: Stainless Steel
- Complete with flanges, gaskets, bolts and nuts

10.4 Pressure Switch

- Hi pressure Low pressure function
- Regulating range: Shall be selected according to output pressure on the beginning of the pumping line
- NO/NC electric connection
- NPT thread connection to pipe
- Manual trip function
- IP44 to EN 60529 / IEC 60529
- Shall be equipped with isolation Stainless steel 1/2 inch Ball valve of the same pressure rating.

10.5 Analogue Pressure Gauge.

- Reading range: Shall be specified according to the pressure on the installation point.
- Process connection: NPT connection 1/2" or 1/4".
- Pressure gauge should be equipped with isolation Stainless steel 1/2 inch Ball valve of the same pressure rating.
- Casing: Stainless steel, 4 inch

10.6 Well Cap / Cover

- Material: made from A36 or equivalent CS plate
- Min. thickness: 18 mm for borehole wells caps

- Min. thickness: 3mm for wide opening well's covers
- Painted by Anti-corrosion Paint at least two coats (premier and finishing layer)
- Diameter: Shall be more than well diameter
- Fabricated with stiffeners and holes for pump and sensor cables
- Stiffeners shall be holed for lifting purposes

PART C (Safety and Security)

11. Solar Outdoor Lighting

- Minimum capacity 60 Wp lamp compact type (All in one) or separated module (battery shall be built-in with the lamp)
- Lamp luminous efficacy: not less than 100 Im/w.
- Working life time: not less than 30,000.
- The colour temperature range: 3000K – 5000K.
- The LED lamps outdoor deigned with IP 65 protection.
- Operating Temperature range: up to 60°C.
- Certification: All related certificates shall be provided such CE, RoHS.
- PV module and Battery capacities shall cover all energy consumption by lamp for 12 Hr at least.
- Provided with mounting support and all required accessories.
- Fence supports cannot be Water well for the installation of lighting
- Shall be distributed to light all area of PV modules and well-head room.
- Warranty: at least two years.

12. Fire Extinguishers

- A portable fire extinguisher shall be provided, 2 extinguishers for each Water well should be supplied near the solar inverter unit.
- Powder / CO2 extinguishers.
- Approved to EN1866.
- 5- 6 kg capacity.
- Made of high strength steel cylinders with a red epoxy polyester paint finish.
- Warranty: at least two years.

13. Smoke & Heat Detector

- Shall be located inside the control room;
- Include button for false alert;
- Battery life not less than three years;
- Warning sound delivers sounds of >85 Db.
- PVC pipe type: High quality heat rated PVC pipes and accesses

14. Danger Labels and Signage

- Awarded Bidders are entitled to provide outdoor, sun proof danger signage where necessary including but not limited to, solar inverter, and junction box(s).
- Size and test of the signage shall be finalized in consultation with UNOPS engineer.

Annex 2: GRM Complaint and Suggestion Form

Yemen Emergency Human Capital Project **YEHCP** **Sample of GRM** **Complaint and Suggestion Form**	أستمارة توثيق ومتابعة شكاوى المستفيدين من مشروع رأس المال البشري الطارئ	مشروع رأس المال البشري الطارئ نموذج لألية التظلمات والشكاوى

"Documenting and Monitoring Complaints Form of

Beneficiaries of Yemen Emergency Human Capital Project"

الاسم الثلاثي للمستفيد: Beneficiary Name			
رقم البطاقة الشخصية: ID No.		رقم الهاتف للمتابعة Tel Number 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 – Tool Free No 8000190 Tel: 01 504914/915 - SMS: 739888388 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			
ماترتب 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 **:**

Annex 3: Environmental and Social Requirements for Contractors

These requirements for contractors are generic and clauses applied as relevant to each sub-project.

Contractors shall meet the following Environmental, Health, Safety and Social (including labor) requirements – thereafter called ESHS requirements[6].

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. Code of Conduct
10. Contractor Environmental and Social Reporting

Contractor Environmental and Social Management Plan (C-ESMP)

- Prepare and submit to UNOPS for approval a Contractor Environmental 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

- 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 aspect of work assignment) that specifies which tasks can be undertaken by which key personnel.

Orientation Training

- 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.

[6]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

Visitor Orientation

- 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

- 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

- 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.
- Re-vegetate 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 or invasive species.
- 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

- 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

- Collect and properly store and manage all solid wastes and hazardous wastes resulting from the construction activities, including construction debris and spoils, to prevent the contamination of soil and groundwater. Hazardous E-waste should be managed stored and disposed according to widely accepted guidelines. In case chemicals are present they should be stored and disposed according to their Material Safety Data Sheets (MSDSs)
- Remove unneeded excavation material from construction sites as soon as possible.
- Agree with relevant municipalities about solid waste disposal during construction.
- 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 hazardous wastes 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 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 bag house 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 is 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

The Contractor shall take precautions relative to the conditions specified herein.

- Train workers regarding the handling of hazardous materials.
- 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

- 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.

Health and Safety

Severe Weather and Facility Shutdown

- 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

- 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

- 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

- 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 the hazardous or noxious substances.

Personal Protective Equipment (PPE)

- 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

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 conditions.

  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.

First Aid and Accidents

- 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, and 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

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 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.

  Training by 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

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 measures shall include:

- Assessing the characteristics of the workforce, including those with underlying health issues or who may be otherwise at risk.

- Confirming that workers are fit for work, including temperature testing and refusing entry to sick workers.
- Considering ways to minimize entry/exit to site or the workplace, and limiting contact between workers and the community/general public
- Training workers on hygiene and other preventative measures,and implementing a communication strategy for regular updates on COVID-19 related issues and the status of affected workers.
- Treating workers who are or should be self-isolating and/or are displaying symptoms
- Assessing risks to continuity of supplies of medicine, water, fuel, food and PPE, taking into account international, national and local supply chains
- Reducing, storing and disposing of medical waste
- Adjusting work practices, to reduce the number of workers and increase social distancing
- Expanding health facilities on-site compared to usual levels, developing relationships with local health care facilities and organize for the treatment of sick workers
- Building worker accommodations further apart, or having one worker accommodation in a more isolated area, which may be easily converted to quarantine and treatment facilities, if needed
- Establishing a procedure to follow if a worker becomes sick (following WHO guidelines)
- Implementing 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.

Emergencies

- 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 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

The Project Company will be required to 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 Project Company 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.

Labor Force Management

Labor Conditions

- Implement the measures and commitments defined in the Labor Management Procedures. A copy of the LMP can be found in the Project ESMF
- Provide all workers with terms and conditions that comply with Yemeni Labor Legislation, most particularly Decree 5/1995) and applicable International Labor Organization conventions on workplace conditions.

Insurance

- Provide insurance for call employees involved in onsite activities, as indicated by Yemen's Labor Law
- Compensate any employee for death or injury, except to the extent that liability arises from the

Grievance Mechanism for Workers

The Contractor shall put in place a Grievance Mechanism for workers and the workers of its subcontractors that is proportionate to its workforce. The GM shall be distinct from the Project level Grievance Mechanism 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

- 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 any sexual activities that are exploitive or degrading to any person.
- 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

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

Code of Conduct

Contractors 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 at the at 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 persons should feel comfortable raising issues or concerns without fear of retaliation.

Required Conduct

Contractor's Personnel shall:

carry out his/her duties competently and diligently.

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.

maintain a safe working environment including by:

ensuring that workplaces, machinery, equipment and processes under each person's control are safe and without risk to health.

wearing required personal protective equipment.

using appropriate measures relating to chemical, physical and biological substances and agents; and

following applicable emergency operating procedures.

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.

treat other people with respect, and not discriminate against specific groups such as women, people with disabilities, migrant workers or children.

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.

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.

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.

not engage in any form of sexual activity with individuals under the age of 18, except in case of pre-existing marriage.

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).

report violations of this Code of Conduct; and

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 [Project Grievance [Redress] 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. Contacting the Individual designated 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), Project Company's and Project Manager's Personnel, and affected persons.]

Contractor Environmental and Social Reporting

Contractors 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 Project Company, Independent Engineer, 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 Project Company 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 4 Consultation Questionnaires (Samples)

استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	ريشا صالح رشيد
اسم المنشأة	بئر حيران / الحية الداخلية / صنعاء
اسم الشخص	محمد رجيب عبدالله
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا أعرف
1	يقلل من الكلفة المادية (شراء الديزل).	✓		
2	يمكن من تقديم خدمات المياه بشكل افضل.	✓		
3	يوفر الاحتياجات اليومية اللازمة من المياه.	✓		
4	يلبي أولوية وأهمية اقتصادية واجتماعية.	✓		
5	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة نظيفة من التلوث بالديزل والانبعاثات.	✓		
6	يساهم في تحقيق الرضى للمواطنين بشكل عام.	✓		
7	يؤدي ترشيد استخدام المياه إلى ضمان استدامة الموارد.	✓		
8	المياه المتوفرة لديكم كافية للاحتياجات اليومية.	✓		
9	نقص المياه يتسبب لك بالمعاناة في عدة نواحي.	✓		
10	تتكبد النساء والأطفال مشقة جلب المياه من مسافات بعيدة	✓		
11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	رشا صالح ربيع
اسم المنشأة	بئر حيران / الحجة الداخلية / صنعاء
اسم الشخص	زين العابدين علي
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	أوافق	لا أوافق	لا أعرف
1	يقلل من الكلفة المادية (شراء الديزل).	✓		
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3	يوفر الاحتياجات اليومية اللازمة من المياه.	✓		
4	يلبي أولوية وأهمية اقتصادية واجتماعية.	✓		
5	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة نظيفة من التلوث بالديزل والانبعاثات.	✓		
6	يساهم في تحقيق الرضى للمواطنين بشكل عام.	✓		
7	يؤدي ترشيد استخدام المياه إلى ضمان استدامة الموارد.	✓		
8	المياه المتوفرة لديكم كافية للاحتياجات اليومية.	✓		
9	نقص المياه يتسبب لك بالمعاناة في عدة نواحي.	✓		
10	تتكبد النساء والأطفال مشقة جلب المياه من مسافات بعيدة	✓		
11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	رشا صالح ربيد
اسم المنشأة	بئر حيران / الجمعه الداخلية / صنعاء
اسم الشخص	آمال عادل عبده
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا اعرف
1	يقلل من الكلفة المادية (شراء الديزل).	✓		
2	يمكن من تقديم خدمات المياه بشكل افضل.	✓		
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5	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة نظيفة من التلوث بالديزل والانبعاثات.	✓		
6	يساهم في تحقيق الرضى للمواطنين بشكل عام.	✓		
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9	نقص المياه يتسبب لك بالمعاناة في عدة نواحي.	✓		
10	تتكبد النساء والأطفال مشقة جلب المياه من مسافات بعيدة	✓		
11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تشغيل الابار بالطاقة الشمسيه

تاريخ المقابلة:	
اسم الباحثة	ريشا صالح رشيد
اسم المنشأة	بئر حيران / الحيه الداخليه / جنوب
اسم الشخص	رموز عبدالله محمد
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا أعرف
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11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	رشا صالح ربيد
اسم المنشأة	بئر عسبة وجوهر / بني مطر / جذعاد
اسم الشخص	بكيل ناصر يحيى
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

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استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	ريشا هاني رشيد
اسم المنشأة	بئر عسبة وجوهر / ابي مطر / حوعاء
اسم الشخص	ناجي محمد أحمد
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

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استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	رشا صالح ربيد
اسم المنشأة	بئر عسبة وجوهر / بني مطر / صنعاء
اسم الشخص	ابتسام محي الله
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

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استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	ريشا صالح رشيد
اسم المنشأة	بئر عسبة وجوهر/ بني مطر/ جنزاد
اسم الشخص	سلوى أحمد علي
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

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استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	ريشا صالح رشيد
اسم المنشأة	بئر المسجد / جحانه / صنعاء
اسم الشخص	جميل صالح عبده
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا أعرف
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استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	رشا صالح ربيد
اسم المنشأة	بئر المسجد / جحانة / هرجاد
اسم الشخص	عبد القوي صالح عبده
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا اعرف
1	يقلل من الكلفة المادية (شراء الديزل).	✓		
2	يمكن من تقديم خدمات المياه بشكل افضل.	✓		
3	يوفر الاحتياجات اليومية اللازمة من المياه.	✓		
4	يلبي أولوية وأهمية اقتصادية واجتماعية.	✓		
5	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة نظيفة من التلوث بالديزل والانبعاثات.	✓		
6	يساهم في تحقيق الرضى للمواطنين بشكل عام.	✓		
7	يؤدي ترشيد استخدام المياه إلى ضمان استدامة الموارد.	✓		
8	المياه المتوفرة لديكم كافية للاحتياجات اليومية.	✓		
9	نقص المياه يتسبب لك بالمعاناة في عدة نواحي.	✓		
10	تتكبد النساء والأطفال مشقة جلب المياه من مسافات بعيدة	✓		
11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	رشا صالح ربيد
اسم المنشأة	بئر المسجد / جحانه / صنعاء
اسم الشخص	راوية مساعد التوعري
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا أعرف
1	يقلل من الكلفة المادية (شراء الديزل).	✓		
2	يمكن من تقديم خدمات المياه بشكل افضل.	✓		
3	يوفر الاحتياجات اليومية اللازمة من المياه.	✓		
4	يلبي أولوية وأهمية اقتصادية واجتماعية.	✓		
5	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة نظيفة من التلوث بالديزل والانبعاثات.	✓		
6	يساهم في تحقيق الرضى للمواطنين بشكل عام.	✓		
7	يؤدي ترشيد استخدام المياه إلى ضمان استدامة الموارد.	✓		
8	المياه المتوفرة لديكم كافية للاحتياجات اليومية.	✓		
9	نقص المياه يتسبب لك بالمعاناة في عدة نواحي.	✓		
10	تتكبد النساء والأطفال مشقة جلب المياه من مسافات بعيدة	✓		
11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	رشا صالح رشيد
اسم المنشأة	بئر المسجد / جحانه / جرعاء
اسم الشخص	كرعي محمد صالح
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا اعرف
1	يقلل من الكلفة المادية (شراء الديزل).	✓		
2	يمكن من تقديم خدمات المياه بشكل افضل.	✓		
3	يوفر الاحتياجات اليومية اللازمة من المياه.	✓		
4	يلبي أولوية وأهمية اقتصادية واجتماعية.	✓		
5	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة نظيفة من التلوث بالديزل والانبعاثات.	✓		
6	يساهم في تحقيق الرضى للمواطنين بشكل عام.	✓		
7	يودي ترشيد استخدام المياه إلى ضمان استدامة الموارد.	✓		
8	المياه المتوفرة لديكم كافية للاحتياجات اليومية.	✓		
9	نقص المياه يتسبب لك بالمعاناة في عدة نواحي.	✓		
10	تتكبد النساء والأطفال مشقة جلب المياه من مسافات بعيدة	✓		
11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	رشا صالح / بيد
اسم المنشأة	بئر جامعة صنعاء كلية الطب / صنعاء
اسم الشخص	يوسف الصوفي
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا أعرف
1	يقلل من الكلفة المادية (شراء الديزل).	✓		
2	يمكن من تقديم خدمات المياه بشكل افضل.	✓		
3	يوفر الاحتياجات اليومية اللازمة من المياه.	✓		
4	يلبي أولوية وأهمية اقتصادية واجتماعية.	✓		
5	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة نظيفة من التلوث بالديزل والانبعاثات.	✓		
6	يساهم في تحقيق الرضى للمواطنين بشكل عام.	✓		
7	يؤدي ترشيد استخدام المياه إلى ضمان استدامة الموارد.	✓		
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9	نقص المياه يتسبب لك بالمعاناة في عدة نواحي.	✓		
10	تتكبد النساء والأطفال مشقة جلب المياه من مسافات بعيدة	✓		
11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	ريشا صالح رشيد
اسم المنشأة	بئر جامعة صنعاء كلية الطب / صنعاء
اسم الشخص	بلال الفقيه
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا اعرف
1	يقلل من الكلفة المادية (شراء الديزل).	✓		
2	يمكن من تقديم خدمات المياه بشكل افضل.	✓		
3	يوفر الاحتياجات اليومية اللازمة من المياه.	✓		
4	يلبي اولوية وأهمية اقتصادية واجتماعية.	✓		
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6	يساهم في تحقيق الرضى للمواطنين بشكل عام.	✓		
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8	المياه المتوفرة لديكم كافية للاحتياجات اليومية.	✓		
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10	تتكبد النساء والأطفال مشقة جلب المياه من مسافات بعيدة	✓		
11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	ريشا صالح رشيد
اسم المنشأة	مبنى جامعة صنعاء كلية الطب / صنعاء
اسم الشخص	دعاء راجح
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا اعرف
1	يقلل من الكلفة المادية (شراء الديزل).	✓		
2	يمكن من تقديم خدمات المياه بشكل افضل.	✓		
3	يوفر الاحتياجات اليومية اللازمة من المياه.	✓		
4	يلبي أولوية وأهمية اقتصادية واجتماعية.	✓		
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6	يساهم في تحقيق الرضى للمواطنين بشكل عام.	✓		
7	يودي ترشيد استخدام المياه إلى ضمان استدامة الموارد.	✓		
8	المياه المتوفرة لديكم كافية للاحتياجات اليومية.	✓		
9	نقص المياه يتسبب لك بالمعاناة في عدة نواحي.	✓		
10	تتكبد النساء والأطفال مشقة جلب المياه من مسافات بعيدة	✓		
11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تشغيل الابار بالطاقة الشمسية

تاريخ المقابلة:	
اسم الباحثة	ريشا صالح رشيد
اسم المنشأة	بئر جامعة صنعاء كلية الطب / صنعاء
اسم الشخص	جيهان بدر
الفئة العمرية	ضع دائرة حول واحدة مما يلي : أقل (15) ، (18-25) ، (26-45) ، (46-65)

	فقرات الاستبيان	اوافق	لا اوافق	لا أعرف
1	يقلل من الكلفة المادية (شراء الديزل).	✓		
2	يمكن من تقديم خدمات المياه بشكل افضل.	✓		
3	يوفر الاحتياجات اليومية اللازمة من المياه.	✓		
4	يلبي أولوية وأهمية اقتصادية واجتماعية.	✓		
5	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة نظيفة من التلوث بالديزل والانبعاثات.	✓		
6	يساهم في تحقيق الرضى للمواطنين بشكل عام.	✓		
7	يؤدي ترشيد استخدام المياه إلى ضمان استدامة الموارد.	✓		
8	المياه المتوفرة لديكم كافية للاحتياجات اليومية.	✓		
9	نقص المياه يتسبب لك بالمعاناة في عدة نواحي.	✓		
10	تتكبد النساء والأطفال مشقة جلب المياه من مسافات بعيدة	✓		
11	لضمان فاعلية المنظومة لابد أن تهتم لجنة المستفيدين بالصيانة الدورية .	✓		

استبيان حول تزويد الآبار بالطاقة الشمسية

اسم الباحث	سمر محمد خالد ناجي النقيب
اسم البلد	شبوه
اسم الشخص	محسن راشد بن حسن
الفئة العمرية	ضع دائرة حول من مما يلي (١٨ – ٢٥) (٢٦ – ٤٥) (٤٦ – ٦٥) نعم لا متوسط

١	يقلل التكلفة المادية لشراء الديزل	نعم				
٢	يمكن من تقديم خدمة المياه بشكل أفضل	نعم				
٣	يوفر الاحتياجات اليومية اللازمة من المياه			نعم		
٤	يلبي أولوية وأهمية اقتصادية واجتماعية	نعم				
٥	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة ونظيفة من التلوث بالديزل والانبعاث	نعم				
٦	يساهم في تحقيق المرضى للمواطنين بشكل عام	نعم				
٧	يؤدي ترشيد استخدام المياه الى ضمان استخدام الموارد	نعم				
٨	المياه المتوفرة لديكم كافية للاحتياجات اليومية			نعم		
٩	نقص المياه يتسبب لك بالمعاناة في عده نواحي	نعم				
١٠	تنكيد النساء والأطفال مشقة جلب المياه من مسافات بعيده	نعم				
١١	لضمان فاعلية المنظومة لابد ان تهتم لجنة المستفيدين بالصيانة الدورية	نعم				

استبيان حول تزويد الآبار بالطاقة الشمسية

اسم الباحث	سمر محمد خالد ناجي النقيب
اسم البلد	شبوه
اسم الشخص	مبخوت كدش بن سريع
الفئة العمرية	ضع دائرة حول من مما يلي (١٨ – ٢٥) (٢٦ – ٤٥) (٤٦ – ٦٥)

		نعم	لا	متوسط			
١	يقلل التكلفة المادية لشراء الديزل	نعم					
٢	يمكن من تقديم خدمة المياه بشكل أفضل	نعم					
٣	يوفر الاحتياجات اليومية اللازمة من المياه			نعم			
٤	يلبي أولوية وأهمية اقتصادية واجتماعية	نعم					
٥	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة ونظيفة من التلوث بالديزل والانبعاث	نعم					
٦	يساهم في تحقيق المرضى للمواطنين بشكل عام	نعم					
٧	يؤدي ترشيد استخدام المياه الى ضمان استخدام الموارد	نعم					
٨	المياه المتوفرة لديكم كافية للاحتياجات اليومية			نعم			
٩	نقص المياه يتسبب لك بالمعانات في عده نواحي	نعم					
١٠	تنكيد النساء والأطفال مشقة جلب المياه من مسافات بعيده	نعم					
١١	لضمان فاعلية المنظومة لابد ان تهتم لجنة المستفيدين بالصيانة الدورية	نعم					

استبيان حول تزويد الآبار بالطاقة الشمسية

اسم الباحث	سمر محمد خالد ناجي النقيب
اسم البلد	شبوه
اسم الشخص	أم خميس الحر
الفئة العمرية	ضع دائرة حول من مما يلي (١٨ – ٢٥) (٢٦ – ٤٥) (٤٦ – ٦٥) نعم لا متوسط

١	يقلل التكلفة المادية لشراء الديزل	نعم				
٢	يمكن من تقديم خدمة المياه بشكل أفضل	نعم				
٣	يوفر الاحتياجات اليومية اللازمة من المياه			نعم		
٤	يلبي أولوية وأهمية اقتصادية واجتماعية	نعم				
٥	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة ونظيفة من التلوث بالديزل والانبعاث	نعم				
٦	يساهم في تحقيق المرضى للمواطنين بشكل عام	نعم				
٧	يؤدي ترشيد استخدام المياه الى ضمان استخدام الموارد	نعم				
٨	المياه المتوفرة لديكم كافية للاحتياجات اليومية			نعم		
٩	نقص المياه يتسبب لك بالمعانات في عده نواحي	نعم				
١٠	تنكيد النساء والأطفال مشقة جلب المياه من مسافات بعيده	نعم				
١١	لضمان فاعلية المنظومة لابد ان تهتم لجنة المستفيدين بالصيانة الدورية	نعم				

استبيان حول تزويد الآبار بالطاقة الشمسية

اسم الباحث	سمر محمد خالد ناجي النقيب
اسم البلد	شبوة
اسم الشخص	أم / مضلح بن عاطف
الفئة العمرية	ضع دائرة حول من مما يلي (١٨ – ٢٥) (٢٦ – ٤٥) (٤٦ – ٦٥) متوسط

١	يقلل التكلفة المادية لشراء الديزل	نعم				
٢	يمكن من تقديم خدمة المياه بشكل أفضل	نعم				
٣	يوفر الاحتياجات اليومية اللازمة من المياه			نعم		
٤	يلبي أولوية وأهمية اقتصادية واجتماعية	نعم				
٥	باستخدام الطاقة الشمسية لضخ المياه نحافظ على بيئة محيطة ونظيفة من التلوث بالديزل والانبعاث	نعم				
٦	يساهم في تحقيق المرضى للمواطنين بشكل عام	نعم				
٧	يؤدي ترشيد استخدام المياه الى ضمان استخدام الموارد	نعم				
٨	المياه المتوفرة لديكم كافية للاحتياجات اليومية			نعم		
٩	نقص المياه يتسبب لك بالمعانات في عده نواحي	نعم				
١٠	تنكيد النساء والأطفال مشقة جلب المياه من مسافات بعيده	نعم				
١١	لضمان فاعلية المنظومة لابد ان تهتم لجنة المستفيدين بالصيانة الدورية	نعم				