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Environmental and Social Impact Assessment

(Fecal Sludge Management Subproject for Semera-Logia Town)

[Final]

Second Urban Water Supply and Sanitation Project

May 2023
Addis Ababa

Financed By

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ACRONYMS

ABR	Anaerobic Baffled Reactor
BAU	Business as usual
BP	Bank Procedures
CBOs	Community Based Organizations
CoC	Code of Conduct
CSA	Central Statistical Authority
CR-WSP	Climate Change Resilience Water Safety Plan
EA	Environmental Assessment
EPC	Environmental Pollution Control
EPA	Environmental Protection Authority
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EHS	Environmental Health and Safety
FS	Fecal Sludge
FDRE	Federal Democratic Republic of Ethiopia
FOG	Fats, Oil, and Grease
FSM	Fecal Sludge Management
FSTP	Fecal Sludge Treatment Plant
GBV	Gender Based Violence/
GoE	Government of Ethiopia
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GHG	Greenhouse Gas
HASP	Health and Safety Plan
HNAP	Health National Adaptation Plan to climate change
HSDP	Health Sector Development Program
IFC	International Finance Corporation
MoWE	Ministry of Water and Energy
NGO	Non-Government Organization
OP	Operational Policy
PAP	Project Affected People
PCT	Public and Communal Toilet
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SA	Sexual Abuse
SEA	Social Environmental Assessment
SLWSSA	Semera-Logia Water Supply and Sanitation Agency
STDs	Sexually transmitted Diseases
ToR	Terms of Reference
TMP	Traffic Management Plan

VIP	Ventilated Improved Pit
WASH	Water Sanitation and Hygiene
WB	World Bank
WHO	World Health Organization
WIF	WaSH Implementation Framework
UWSSP-II	2nd Urban Water Supply and Sanitation Program
UWWM	Urban Waste Water Management

DEFINITION OF TERMS

Aerobic digestion: A process, which uses bacteria and oxygen to break down organic and biological waste.

Anaerobic digestion: A process, which uses bacteria to break down organic and biological waste in the absence of oxygen.

Basic sanitation: Use of an improved sanitation facility that is not shared with any other household.

Decomposition: refers to a controlled method to treat fecal sludge whereby its components are broken down by aerobic and/or anaerobic digestion processes. Decomposition in this context can be successfully practiced when fecal sludge is contained (typically underground) for at least two years in an environment where liquids drain and remaining fecal sludge becomes dry. The end product after the decomposition process is called humus, which can then be used as a soil conditioner. Decomposition is an appropriate Fecal Sludge Management (FSM) solution and contributes to safely managed sanitation.

An Impact: is the effect of any action that affects one or more elements of the natural, social or economic environment, either adversely or beneficially.

Containment/storage: Ways of collecting and storing (and in some cases treating in-situ) fecal sludge generated from a latrine.

Drying beds: A method of treating fecal sludge off-site whereby sludge is spread out over a contained space to dry.

Direct pit: A pit that is directly under a latrine pan, whereby excreta fall directly into the pit.

Dry pit latrine: A type of latrine that does not require water for flushing. Excreta typically falls directly into the pit.

Direct Impacts: Those impacts that are caused by the action and which generally occur at the same time and place as the action.

Displaced Household: All members of a subproject affected household residing under one roof and operating as a single economic unit, who are adversely affected by the project or any of its components; it may consist of a single nuclear family or an extended family.

Displaced Persons: In the context of involuntary resettlement, displaced persons are those who are physically displaced (i.e., have been subject to relocation, loss of residential land, or loss of shelter) or economically displaced (i.e., have been subject to loss of land, assets, access to assets, income sources, or means of livelihoods) as a result of (i) involuntary acquisition of land; or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas.

Compensation: Payment in cash or in kind of the replacement cost of the acquired assets.

Cumulative Impacts: Those impacts that result from the incremental impact of the proposed action added to the impacts of other past, present, and foreseeable future actions.

Economic Displacement: Loss of land, assets, access to assets, income sources, or means of livelihood because of: (i) involuntary acquisition of land; or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas.

Encroachers: People who occupy the land beyond what they legally own. They are usually not entitled to compensation but are sometimes provided with assistance if they are found vulnerable. Loss of built-up structures, trees, crops, and other assets could be compensated.

Entitlement: Range of measures applied to displaced persons to restore their economic and social base: compensation, income restoration, transfer assistance, income substitution, and relocation.

Environment: The physical factors of the surroundings of the human beings including land, water, atmosphere, climate, sound, odor, taste, the biological factors of animals and plants, and the social factor of aesthetics and including both the natural and built environment.

Environment and Social Impact Assessment: A systematic examination conducted to determine whether or not a project will have any adverse impacts on the environment.

Environmental Impact Study: means the study conducted to determine the possible environmental impacts of a proposed policy, project, or activity, and measures to mitigate any such impacts.

Environmental Monitoring: the continuous determination of the actual and potential effects of any activity or phenomenon whether short-term or long-term.

Fecal sludge: Contents of an on-site sanitation facility (such as a latrine pit) typically comprising of excreta, flush water, and anal cleansing materials.

Fecal sludge management: Methods and processes to manage fecal sludge.

Leach pit: Latrine pit that facilitates the draining of liquids into the surrounding soil.

Latrine: A sanitation system that captures fecal sludge and contains it. Through this containment, a barrier is established to prevent contact between humans and potentially disease-causing microbes in fecal sludge. Numerous types of latrine systems, technologies, and configurations exist.

Human health hazards: Hazards associated with fecal sludge that may be related to its microbial, chemical or physical properties. Microbial hazards refer to the health risks associated with exposure to potentially harmful microbes. Chemical hazards can include exposure to cleaning agents and physical hazards, to dangerous labor or machinery.

Indirect Impacts: Those impacts that induce changes in the natural environment, population, economic growth, and land use, as a result of actions not directly linked to the project in question.

Involuntary Resettlement: Land or asset loss, which negatively impacts livelihood. These losses have to be compensated for so that no person is worse off than they were before the loss of land and/or assets caused by the project.

Participation: A process through which stakeholders' influence and share control over development initiatives and decisions or resources that affect them.

Physical Displacement: Relocation, loss of residential land, or loss of shelter as a result of (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas.

Pollution: any direct and indirect alteration of the physical, thermal, chemical, biological, or radioactive properties of any part of the environment by discharging, emitting, or depositing wastes so as to affect any beneficial use adversely, to cause a condition that is hazardous or potentially hazardous to public health, safety or welfare, or to animals, plants or aquatic life, or to cause a contravention of any condition, limitation or restriction to a healthy environment.

Project: a set of planned activities to achieve objectives within a given area and time frame.

Project brief: a summary statement designed to achieve specific objectives within a given area and the likely environmental impacts and mitigation measures thereto.

Proponent/Developer: means a person, group of persons, or agency developing a new project or proposing to extend an existing project which is subject to an environmental impact assessment process.

Mitigation measures: Actions that reduce, avoid or offset the potential adverse environmental consequences of a project, and include engineering works, technological improvements, management

measures, and ways and means of ameliorating effects to the environment and losses suffered by individuals and/or communities, including compensation and resettlement.

Rehabilitation: Compensatory measures provided under the World Bank Operational Policy (OP) 4.12 on Involuntary Resettlement and other than the payment of replacement cost of acquired assets.

Replacement Cost: Compensation for acquired housing, land, and other assets that are calculated at full replacement costs based on the following elements: (i) fair market value; (ii) transaction costs; (iii) interest accrued, (iv)transitional and restoration costs; and (v) other applicable payment if any. Depreciation of structures and assets should not be taken into account.

Resettlement Impact: The nature and value of livelihood loss caused by the acquisition of land or assets

Safely managed sanitation: Refers to the use of an improved sanitation facility, which is not shared with any other household, and where excreta are either: (1) treated and disposed in-situ (in the place where it is kept); or (2) transported and treated off-site; or (3) transported through a sewer to a treatment facility. Safely managed sanitation aims to ensure that the potential health and environmental risks associated with fecal sludge are minimized throughout the entire sanitation service chain.

Septic pit: A pit that is fully sealed (often-using cement), connected to a latrine, and collects and stores fecal sludge. Given that pit is sealed, liquid cannot drain from the pit into the surrounding soil.

Scoping: is the early transparent process of interaction that identifies concerns, evaluates them, and organizes them by eliminating insignificant impacts and focusing on significant impacts for further assessment so that attention and therefore resources can be effectively and efficiently utilized.

Screening: Selection of actions or projects requiring Environmental and Social Impact Assessment (ESIA). Common methods for screening include project threshold, sensitive area criteria, positive and negative lists, and preliminary assessment/ IEE.

Significance: an expert evaluation/judgment of the magnitude of impact or the degree to which a proposed activity or project may (potentially) impact on the environment if implemented.

Significant effect: substantial, or potentially substantial, adverse changes in any of the physical factors of the surroundings of human beings including land, water, atmosphere, climate, sound, odor, taste, the biological factors of animals and plants, and the social factor of aesthetics and includes both the natural and built environment.

Significant Impact: Impact experienced by 200 people or more, involving: (i) physical displacement from housing; or (ii) loss of 10% or more of their productive assets or income-generating activities.

Stakeholders: those affected by the outcome of a project or can affect the outcome of a proposed either negatively or positively.

Squatters: People who unlawfully occupy land or a structure. If the occupation is well established before the dissemination of project details and the cut-off date and the occupying people are found vulnerable, they are eligible for compensation for the loss of any structure, trees, crops, and other assets that they will lose access to because of project implementation.

Treatment: A process that changes the physical, chemical and biological characteristics of fecal sludge so that it is converted into a product that is safer for end-use or disposal.

Vulnerable Groups: Households below the poverty line, women, children, elderly, people without legal title to assets (including land), and indigenous people.

Waste: is a by-product of day-to-day activities or anything, which is no longer useful to someone and is disposed of. It is an unwanted or undesired material or substance that is thrown away.

EXECUTIVE SUMMARY

INTRODUCTION

The imperative for improving the collection, treatment, and disposal of human excreta is gaining increasing attention in international development efforts. Exposures to microbial pathogens transmitted in human waste are associated with diarrhea, helminths infections, and other infectious diseases (Pruss-Ustun et al., 2008; Mara et al., 2010). In addition, there is increasing evidence for links between unsafe sanitation practices, environmental enteric dysfunction (Mbuya and Humphrey, 2016) and child growth faltering. Nevertheless, in 2015, estimates indicated that over 2.4 billion people still lacked access to safe sanitation facilities, and the World Health Organization (WHO) has calculated that inadequate sanitation alone results in 280,000 deaths every year (WHO, 2017). Poor sanitation also has social and economic consequences, and the returns on sanitation investments are estimated to be at least 5-fold (Hutton et al., 2008).

This report presents an Environmental and Social Impact Assessment (ESIA) for the upcoming Fecal Sludge Treatment plant subprojects (FSTP) in Semera-Logia town, Ethiopia, and discusses alternative options for the proposed technologies (FSTP technologies). The project is implemented in the two sub towns Semera and Logia, Semera is the capital of the Afar regional state. Logia is located 7 km from Semera town and is popular residential area of the Afar Region.

Semera-Logia town has no centralized solid and liquid waste management facilities. Consequently, it relies entirely on on-site sanitation. According to the study conducted by SEURECA Veolia JV Seureca East Africa Ltd & GENCON,[1] only 41% of the fecal waste is safely managed and that the greater portion or 59% is unsafely managed. According to the same study, 42.4% of households have improved toilet facilities (flush to septic tank, Ventilated Improved Pit (VIP), pit latrine) and about 18.2% of the households use an unimproved pit latrine while about 36.6% of the population who live in and around informal settlements in logia sub town and are mainly low - income households who practice open defecation. The Semera-Logia Water Supply and Sanitation Agency (SLWSSA) and currently some private companies' empty trash for the towns.

Semera-Logia Water Supply and Sanitation Agency (SLWSSA) is currently implementing the 2nd Urban Water Supply and Sanitation Project (UWSSP-II), which is financed by the World Bank through the support of the Ministry of Water and Energy. The primary objectives of the UWSSP-II are to construct an additional PCT and new FSTP in three phases (short-term, medium-term and long-term) in the urban center of the Semera-Logia. The project also includes the development of communal and public toilets in different parts of the Semera and Logia sub cities to improve the town's sanitation facilities in public areas (e.g., markets and Mosques), and residential areas with shortage of toilets (resettlement and slum areas). The implementation of PCT and the FSTP in the short-term (2021-2026) in the low-income communities will improve the poor sanitation of the town. The proposed additional works for PCT and FSTP are importantly needed to complement what has been achieved in the subproject implementation so far.

[1] Development of an Integrated Town-Wide Sanitation Plan, Feasibility Study and Detail Design of Wastewater Management System for Gambella, Semera-Logia and Asossa Towns Final Feasibility Study and Preliminary Design Report SEMERA-LOGIA

The additional and new PCT and FSTP subprojects will involve the improvement of town-wide sanitation facility and its management by doing the following: The proposed subproject activities include the construction of public and communal toilets and FSTP in different locations of Semera and Logia towns. A central fecal sludge treatment plant is proposed to be located about 4km from Semera on the way to Djibouti road at Ashboda, to serve the two sub-towns. The Fecal Sludge treatment plant will be implemented in phase I and will be expanded in phases II and III. Along with the construction of PCT and FSTP, several vacuum trucks are proposed to be purchased in each phase. The present ESIA study focuses on sanitation schemes laid down for Phase I-III (2021-2041), evaluating the necessary requirements for the technology adoption, site selection and construction and operation modalities.

Semera-Logia Water Supply and Sewerage Enterprise responsible for implementing the subprojects. Either some of the new infrastructure facilities were not well completed or the desired goals were not fully met. Hence, the proposed additional works (such as rehabilitation of the existing sanitation facilities and infrastructures) for PCT and the newly proposed FSTP are importantly needed to complement what has been envisioned to be achieved in the subproject's implementation plan.

ESIA is considered as a project management and decision-making tool for collecting and analyzing information on the environmental and social impacts of proposed sub projects. Therefore, this ESIA was conducted to provide information on the potential negative and positive environmental and social impacts of the planned sub project, which will help to run its operation in an environmentally and socially friendly way by implementing proper Environmental and Social Management Plan (ESMP). It also aims to make recommendations for the mitigation of the potential negative impacts and enhancement of the positive ones.

The infrastructure development will bring adverse impacts on the environment and social aspects that need efforts to minimize impacts and set mitigation measures to make the project environmentally benign and socially acceptable. Without proper planning and management, the project may result in severe economic, social and environmental impacts. Hence, this study aims to provide an insight of the possible environmental and social impacts that can occur due to the design, construction and operation of the proposed projects during different phases and the possible mitigation measures can be adopted. In connection with this, the Ministry of Water and Energy (MoWE) signed consultancy service contracts with Motion Consultancy and Training PLC., to undertake the ESIA Study for the FSTP Construction project for Semera-Loggia town.

The overall objective of the ESIA is to identify, predict and evaluate the potential impacts of the proposed project on the biophysical and socio-economic environment in terms of magnitude, spatial extent, duration and significance. The study is also aimed to provide recommendations for enhancing the beneficial aspects and mitigation measures for the adverse impacts as well as ESMP that would help implementation of the recommended enhancement and mitigation measures. The ESIA gives particular emphasis to the potential impacts on the quality of life of people living close to the proposed subprojects, the health and safety of those who will be involved in the construction and operation of the FSTP, and the surrounding natural and human environment. The scope of the ESIA study includes:

- Identification and analysis of the national and the World Bank environmental safeguard policies and regulations that will be triggered by the project activities;
- Describe the views and concerns of the public & stakeholders towards implementation of the project;
- Establish baseline features of biophysical, socio-economic and cultural attributes of the project area;
- Identify and evaluate the significant impacts (both beneficial and adverse) associated with project implementation and subsequent operation;
- Propose specific mitigation for inclusion in the project detail design and management plan to reduce or avoid significant adverse environmental and social impacts; and
- Prepare Environmental and Social Management and Monitoring Plans for the recommended measures that will minimize adverse impacts and enhance beneficial impacts during the planning, construction, operation as well as the decommissioning of the proposed sub project.

METHODOLOGY

The ESIA methodology adopted screening to determine the extent of the project and desktop data search and analysis for the baseline biophysical and social environmental parameters of the project area. In addition, the consultant worked with the project design group and was briefed and obtained design approaches to be used, which informed the requirements of the environmental reporting process and for which excerpts have been obtained on salient design information. The Consultant engaged on multi-faceted stakeholder's consultation process, social and environmental surveys using structured questionnaires duly analyzed and key informant interviews to institutions and lead agencies and public consultation meetings. Based on these findings and expert judgment, the consultant has compiled the projected social and environmental impacts (positive and negative) likely to emanate from proposed project activities. The ESMP and Monitoring Plans (MP) provided information on how negative effects and risks will be mitigated or avoided as well as who will be responsible for doing so.

The ESIA study, in this case, is aimed to contribute to the environmental and social safeguards of the proposed FSTP subproject in the project area. Environmental and social screening process and preparation of appropriate safeguard instruments for proposed investments. The key subproject activities were evaluated against the predesigned methods to assess its social and environmental impacts.

POLICIES, LEGISLATIONS AND INSTITUTIONAL FRAMEWORK

Relevant National Policies and Strategies

The Constitution of the federal democratic republic of Ethiopia (FDRE), adopted in 1995, provides the overriding principles and legal provisions for all legislative frameworks in the country. The concept of sustainable development and the environmental rights of the people are enshrined in the Constitution's Articles 43 and 44. These Articles, among others, state the right to development, the right to live in a clean and healthy environment, and the right to monetary or alternative means of compensation, including relocation with adequate state assistance for persons displaced or whose livelihoods adversely affected as a result of state programs. Article 35 provides a foundation for the recognition and protection of women's rights and guarantees women an equal right with men. The Environmental Policy of Ethiopia, issued in 1997, has the overall policy goal to improve and enhance the health and quality of life of all Ethiopians, to

promote sustainable social and economic development through sound management and use of natural, human-made and cultural resources and their environment as a whole. ESIA policies are included in the cross-sectoral environmental policies and they emphasize the early recognition of environmental issues in project planning, public participation, mitigation and environmental management, and capacity building at all levels of administration.

Other relevant policies issued by the Government of Ethiopia (GOE) include Water Resources, Wildlife, Population, Health, HIV/AIDS and Women Policies. Applicable strategies and programs include Climate Resilient Green Economy Strategy, Urban Wastewater Management Strategy, Health National Adaptation Plan to climate change (HNAP), the Second Urban Water Supply and Sanitation Program (2017 to 2022), Integrated Urban Sanitation and Hygiene Strategy, National Hygiene and Sanitation Strategy, and WASH Implementation Framework and Climate Change Resilience Water Safety Plan (CR-WSP) Strategic framework.

Environmental Framework Legislations

The GOE has issued several Proclamations and Regulations that are aimed to foster environmental protection and sustainable use of natural as well as man-made resources. Among these legislations are the Proclamation on Establishment of Environmental Protection Organs (EEPO), the Proclamation of EIA and the Proclamation on Environmental Pollution Control (EPC), all came into effect in 2002. The EEPO Proclamation lays down the institutional arrangements necessary to ensure environmentally sustainable management and development at Federal, Sectoral and Regional levels. It re-establishes the Federal Environmental Protection Authority (EPA), and empowers every sector ministry or agency and regional state to establish or designate a Sectoral Environmental Unit and Regional Environmental Agency respectively.

The EIA Proclamation makes an EIA mandatory for specified categories of activities undertaken either by the public or by private sectors and is the legal tool for environmental planning, management and monitoring. The EPC Proclamation is mainly based on the right of each citizen to have a healthy environment, as well as on the obligation to protect the environment of the Country and its primary objective is to provide the basis from which the relevant ambient environmental standards applicable to Ethiopia can be developed, and to make the violation of these standards a punishable act. Other most relevant laws and regulations include Water Resources Management Proclamation (Proclamation No. 192/2000); Solid Waste Management Proclamation (Proclamation No. 513/2007); Expropriation of Land Holdings, Payment of Compensation and Resettlement Proclamation (Proclamation No. 1161/2019); Public Health Proclamation (Proclamation No. 200/2000); Labor Proclamation (Proclamation No. 1156/2019); Regulation on Prevention of Industrial Pollution (Regulation No. 159/2008); and Regulation on Expropriation and Valuation, Compensation and Resettlement (Regulation No. 472/2020).

The World Bank's Safeguard Policies

Of the World Bank (WB) Safeguard Policies, OP/BP 4.01 Environmental Assessment (EA) is the most relevant. The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through the appropriate analysis of the projects‟ actions and their likely environmental impacts. The Bank undertakes environmental screening for each

proposed project to determine the appropriate extent and type of ESIA. The Bank also classifies a proposed project into one of three categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. A project designated as Category A requires a full environmental assessment followed by Independent Environmental Review; Category B projects require a lesser level of environmental investigations; Category C projects require no environmental analysis. The proposed subprojects fall under category B.

DESCRIPTION OF BASELINE CONDITIONS

Physical Environment

A semi-arid environment characterizes the climate of the study area. The temperature in Semera-Logia is to 45°C in the hottest season with the mean maximum temperature 36.2°C and with a minimum of 19.8°C. The rainy period extends from April to September with a slight decline in June. The maximum rainfall occurs in April and the minimum in January. The annual rainfall of Semera-Logia town varies from 200mm-400mm with a mean annual value of 205mm.

Biological Environment

An observation-based biodiversity assessment was made in the proposed subproject sites. The proposed FSTP site has not been identified as an area of significantly sensitive natural vegetation cover. There are no sensitive natural habitats and wildlife or any other forms of protected areas at or in the vicinity of the project sites. In general, the FSTP site is characterized as a bare land use type.

Socio-economic Environment

Semera-logia is the capital of the Afar Regional state of Ethiopia. It comprises two sub-towns located approximately 7 km apart and close to Ethiopia's border with Djibouti, and about 580 km from Addis Ababa. Semera-Logia town became the Capital of Afar Region in 2007. Semera is located at 11°47'32"N and 41°0'31"E while Logia is located at 11°43'19" N and 40° 58' 28" E.

According to the Central Statistical Authority (CSA) projections as of July 2022 the population of Semera is estimated to be 6,444 (3,303 male and 3135 female) while Logia has 34, 494 of which 18,549 are male and 15,945 females. Age-wise, 28.9% of the population of the town is less than 15 years old, 65.9% between 15 and 59 years and 5.2% are 60 years and above.

There are different institutions and infrastructures around the proposed subprojects. These include schools, taxi stations, police stations, residential house market areas, roads, electric utility lines and other institutions and facilities. None of the observed institutions and infrastructures is expected to be affected by the construction of FSTP.

DESCRIPTION OF THE PROPOSED SUBPROJECTS

According to the final feasibility, study and preliminary design report (May 2022), the town relies fully on onsite sanitation technologies with the majority of the population using different types of pit latrines as discussed above. In addition, there are no central fecal sludge and wastewater treatment facilities in both Semera and Logia.

Asossa, Gambella, Harar and Semera-Logia are among the twenty-two cities selected to participate in the UWSSP-II Project. The development objective of the project is to contribute to the improvement of the socio- economy for the residents of Semera and Logia by providing effective and efficient sanitation services. To achieve the goals delineated under the immediate horizon (urgent between 2021 and 2026) (Table 1) works, the following measures have been proposed:

- Construction of five communal and seven public toilets in the selected towns1 fecal sludge treatment plant at the outskirts of Semera located about 4km to Djibouti road (near to Semera industrial park).
- In the medium horizon, which runs between 2026 and 2031, the expansion works will be done.
- In the Long-term horizon, which is planed between 2031 and 2041, expansion and capacity building will be take place.

The objective of this assignment is to conduct an ESIA as part of construction and operational activities of the FSTP. The treatment plant will start its implementation in phase I and will continue in phases II and III. Along with the construction of PCT and FSTP, several vacuum trucks are proposed to be purchased in each phase. The present ESIA study focuses on sanitation schemes laid down for Phase I-III (2021-2041).

Table 1: Project Planning Horizons

Horizon Description	Planning Period
Initial Year-Short Term Plan	2021-2026
Future Year- Medium Term Plan	2026-2031
Ultimate Year- Long Term Plan	2031-2041

PCTs toilets

For construction of toilets, the engineering consultant compared different alternative design options. After analyzing the social, technical, and economic issues, a typical public toilet to be implemented on a plot has been prepared.

Fecal Sludge Treatment Plant

As per the Feasibility and Design report, the planned FSTP consists of the following main components:

Inlet Works: The inlet works comprise a tanker discharge bay; screens chamber; stainless steel bar screens; and a chute for delivering sludge at the bottom of the anaerobic pond.

Biological Treatment Units: Anaerobic Baffled Reactor (ABR) with a combination of facultative pond and maturation pond. The treatment process comprises inlet works (coarse screen). The collected waste from ABR will be treated in a series of facultative and maturation ponds. Where, the main function of maturation ponds is destruction of pathogens and other bacterial growth. The process also carryout polishing of the wastewater to achieve the standards for BOD and suspended solids. The collected sludge from the ABR will be treated in the sludge drying beds. The dried sludge will be stored on open ground.

Sludge *Drying Beds:* designed for the dewatering and stabilization of partially treated fecal sludge after accumulation in the ABR and anaerobic ponds. Further treatment of sludge is expected in the Drying Beds

due to the extensive exposure to UV resulting in considerable pathogen reduction. Continuous dewatering and drying of the sludge are also expected to result in more rapid sludge stabilization.

Site Works: include fencing, gate, guardhouse, and laboratory, access roads, office, car washing and parking, drainage platform.

SUBPROJECT ALTERNATIVES

During the feasibility study, alternative sites and alternative technologies were assessed, analyzed, compared and selected. In this section, summary of the proposed alternative sites and technologies are summarized from the feasibility report. With the parties, participating in the feasibility study and the subproject design consultants, this ESIA and detailed feasibility and design studies were executed simultaneously.

Three alternative FSTP technologies were reviewed and compared to select the best biological treatment technologies. These are ABR with Facultative Pond and Maturation Pond; Anaerobic Pond (AP) with Facultative Pond and Maturation Pond; ABR with Facultative Pond and Constructed Wetland; AP with Facultative and Constructed Wetland: ABR with Aerated Lagoon and Constructed Wetland; and AP with Aerated Lagoon and Constructed Wetland. These alternative technologies were evaluated and ranked based on technical feasibility, financial considerations, environmental impacts, social, and economic factors. According to the above evaluation criteria, the Anaerobic Baffled Reactor ABR with Facultative Pond and Maturation Pond is deemed the most advantageous technology to be adopted.

Following a multi-criteria analysis comparing the above fecal sludge treatment options against a number of technical, financial, environmental, social, and other criteria, the ABR system with Facultative and Maturation ponds (Alternative 3) was selected as the most advantageous and optimum system for the project area. Hence, recommended priority/immediate interventions (Short-term horizon) include the procurement of vacuum trucks, construction of communal and public toilets and one FSTP facility with ABR system.

In the alternative 'without project' analysis, it was found that the 'without project' option is not acceptable, and it is recommended that the envisaged project would be implemented in order to address the sanitation facility shortage in Semera-Logia.

PUBLIC AND STAKEHOLDER CONSULTATION

Consultation meetings were conducted with key stakeholders and project proponents with the main objective of presenting the proposed subproject and getting feedback from the stakeholders and local community on the project contents and its possible impacts. Stakeholder's consultations were carried out with different actors who have direct or indirect stake in the implementation of the proposed subproject. Accordingly, consultations were made with SLWSSE, Afar Regional State EPA, Bureau of Water and Energy, Agriculture office under the mayor, Bureau of Health, Land Administration with the Mayor office, etc. Also, grass-roots participation was done during the visit to the subproject sites over what shall be done where a wide cross-section of communities was consulted.

The findings of the consultations conducted with the above-mentioned actors reveal that all the stakeholders have interest in the implementation of the subprojects. The main issues/concerns raised by the stakeholders and recommendations provided include the following:

a) Dust pollution,
b) Project delay and lack of coordination
c) Misuse of existing public and communal sanitary facility and appropriate waste management

POTENTIAL IMPACTS AND MITIGATION MEASURES

The existing sanitation situation in the Semera-Logia town is very poor. PCT and FSTP construction projects are proposed to increase sanitation facilities. This mainly helps to improve the quality of the social and natural environment of the project area. The absence of well-organized sanitation facilities has caused deterioration of the social and natural environment with adverse consequences on human health, which is directly or indirectly associated with water, air and soil pollution resulting from improper fecal waste disposal. Though construction and operation of the proposed FSTP is a well-recognized solution to overcome the existing environmental pollution and associated health impacts, some impacts are expected to occur during the construction, operation and decommissioning phases of the project. In this ESIA, both positive and adverse environmental and social impacts are identified. Adverse impacts are characterized by type, magnitude, nature, spatial extent and duration of impact, and assessed for significance.

Impacts during Construction Phases

The main positive impact during the construction phases is job creation for skilled and unskilled workers, particularly for the jobless youth of the project area, and for national and international contractors and consultants. The proposed improvement strategies include giving local communities, women, and potential employees' access to business possibilities, job training, and capacity building. Potential adverse impacts include:

- Air pollution due to dust emission caused by vehicles/ traffic movements on unpaved access roads, land clearing, excavation and earthmoving activities, and transport of spoil materials to disposal sites; and gaseous emissions from vehicles and construction equipment.
- Noise pollution resulting from operation of construction vehicles and equipment.
- Soil compaction and soil erosion caused by project activities including site clearing, excavation in soil, and hauling of spoils to disposal sites, which would involve operation of heavy-duty Machinery and dump trucks.
- Pollution of water bodies due to inadequate handling and spillage of pollutants (like fuel, oils, greases, and paints), release of solid and liquid wastes from construction camps and workshops.
- Increased traffic accident risks to project construction workers, roadside communities, road users, and pedestrians due to increased traffic volume on the roads.
- Impacts on occupational health and safety resulting from construction activities, operation of project vehicles and equipment, storage and use of hazardous chemicals and explosives, dust and exhaust emissions, etc.
- Alteration of landscape due to construction of treatment plants and exploitation of construction materials from borrow and quarry sites and impacts on aesthetic quality of the sites,
- Increased rate of HIV/AIDS and other sexually transmitted infections due to arrival of construction workers and relations with local women including commercial sex workers.

The identified impacts are predicted to be moderate to high, short-term, reversible and direct adverse impacts. They can be minimized to acceptable levels by adopting appropriate mitigation measures including the following:

- Implement measures that will reduce dust emission including regular spraying of water on unpaved access roads, exposed earth and any stockpiles on site.
- Use updated technology or modern equipment in excavation works that will minimize dust generation from earthen materials and noise emissions and vibration.
- Regular inspections and maintenance of vehicles and equipment to reduce excessive exhaust emissions, and prevent fuel spills by filling fuel at only designated fuel stations.
- Impose speed limits for project vehicles to 30km/hour on unpaved access roads esp. in the vicinity of sensitive areas (residential and business areas, social services, religious places).
- Carry out noisy construction activities in the vicinity of sensitive areas during normal working hours only.
- Keep noise level near sensitive areas such as residential areas and camps below the WHO and Ethiopian maximum allowable noise level standards.
- Select the location of campsites in collaboration with local authorities to avoid environmentally or socially sensitive areas.
- Prevent environmental pollution by hazardous substances through proper storage and handling of those substances.
- Choose hours of less traffic volume on roads for mobilizing materials and construction machinery.
- Implement appropriate traffic management at and in the vicinity of the FSTP sites.
- Create awareness for drivers and equipment operators on health, safety and traffic accident prevention.
- Post proper and clearly visible signs, barricades, reflectors at appropriate locations so that road users are aware of the active construction works and take precautions while driving through or at nearby project operational areas.
- Reinstate the damaged sections of roads as soon as the construction works have been completed.
- Plant suitable trees and shrubs on the boundary of the FSTPs.
- Provide priority of job opportunities for the local people.
- Provide awareness education about HIV/AIDS, other STIs and preventive measures for project workers and local community, and avail protective materials.
- Implement other mitigation measures specified in this report.

Impacts during Operation Phase

Most of the beneficial impacts of the project will be harnessed during the operation phase of the FSTP. These include Improved living conditions of Semera-Logia residents through improved public health and sanitation facilities; Reduced cases of waterborne diseases such as cholera, typhoid, amoeba and diarrhea through provision of sanitation facilities due to improved hygiene; Improved quality of health from proper management of fecal matter that would otherwise be dumped haphazardly and drain into rivers where others may become in contact; and Increased agricultural products due to availability of manure. Potential adverse impacts during the operation phase include:

- Some offensive odor at and around the treatment plant sites mainly due to release of hydrogen sulphide resulting from anaerobic digestion.

- Pollution of ground water at treatment sites due to infiltration of wastewater through permeable soils
- Contamination of the soils at the temporary storage of sludge that may contain hazardous substances like heavy metals as well as in case of spillages and overflows of FSTP.
- Public health and safety risks related to spills, leakages or discharge of sewage or uncontrolled spreading of sludge. Also, exposure to hydrogen sulphide, which is a colorless and toxic gas, may pose health risks. In addition, operators of the treatment plants could be exposed to pathogenic microorganisms in wastewater and sludge that may cause risks of infection and disease. Other potential health and safety risks are related to accidents and malfunctioning of plants.

The identified adverse impacts of the operation phase are possible, reversible, of moderate to high significance, and long-term. They can be mitigated through:

- Adherence to national rules and regulations and appropriate contract specifications and guidelines;
- Maintaining appropriate buffer zones around the treatment plants and planting trees to prevent spread of nuisance odor and improve aesthetic view of the treatment sites;
- Fencing at least the treatment process areas to guard against vandalism and to protect the public from entering to the treatment sites;
- Proper handling of chemicals and other materials to be used in the treatment process and keeping good personal hygiene;
- Constructing FSTPs foundation and direct influence areas with concrete lining to avoid leakage of wastewater through permeable soils and weathered and fractured rocks into the groundwater system;
- Applying aeration, proper chemical dosing and oxidation or pH adjustment to reduce offensive odor;
- Covering tanks or installation of exhaust hoods;
- Operating equipment at optimum/design conditions;
- Adopting effective and efficient housekeeping procedures;
- Regular facility maintenance and monitoring operational practices including process control and treatment, continuous process of the operation; and
- Implement other mitigation measures specified in this report.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This section provides an ESMP that comprises a specific plan of action for the proposed mitigation measures to ensure implementation of the 'mitigation measures' to avoid or reduce adverse impacts and enhance positive impacts from the construction and operation of the proposed project components. ESMP is the key to ensure that the environmental and social quality of the project influence area does not deteriorate due to the implementation of the proposed development project covering all aspects of project implementation in its different phases. It is generally used as the basis for establishing the environmental and socio-economic behavior that the proposed project requires during its various stages including the decommissioning phase.

The ESMP for the proposed project consists of a set of feasible and cost-effective mitigation and institutional measures to be undertaken during the different phases of the project to eliminate or reduce to

acceptable levels the adverse environmental and social impacts identified. It is prepared in such a way that it serves as a document that sets forth those practices, which will be implemented to prevent, control, and mitigate significant negative environmental and social impacts arising as a consequence of the implementation of the proposed project. Hence, the ESMP is directed at mitigating, minimizing, or controlling negative impacts arising throughout the different phases of the project.

This ESMP defines the roles and responsibilities of various stakeholders for ensuring smooth and well-integrated implementation and monitoring of the project operations. It contains commitments that are binding on the proponent. It can be translated into project documentation and provide the basis for a legal contract that establishes responsibilities of the proponent. In turn, the proponent can use the ESMP to establish environmental and social performance standards and requirements for those carrying out the works or providing supplies. It can be also used to prepare an environmental and social management system for the operational phase of the project.

ENVIRONMENTAL AND SOCIAL MONITORING PLAN

Environmental and Social Monitoring is an important component of environmental management as it provides the basis for rational management decisions regarding impact control. Monitoring will provide the information necessary for feedback into the environmental management process including feedback about the actual environmental and social impacts of a project and will assist in identifying where additional mitigation effort or where alteration to the adopted management approach may be required. The environmental and social monitoring plan is developed to provide a basis for evaluating the efficiency of the proposed mitigation measures and for updating the actions and impacts of baseline data. It also gives information for adoption of additional mitigation measures if the proposed measures are found insufficient. Thus, it avails information for management decisions taking in the different phases of the project.

Monitoring should be performed during all stages of the project (construction, operation and decommissioning) to ensure that the impacts are not greater than predicted, and to verify the impact predictions. The monitoring program will indicate where changes to procedures or operations are required, to reduce impacts on the environment or local population.

Implementation arrangements and capacity building

SLWSSE has an established position for an Environmental Officer and positions for sociologists, which will provide oversight on the implementation of the environment components (ESIA) of the program. It is further planned that oversight on environmental issues will further be supplemented through the recruitment of additional environment expertise by the supervising consultant once the project commences. In the interim, this staffing arrangement is deemed adequate.

The responsibility for implementing the ESMP of the supplement ESIA during construction will be of the contractor, SLWSSE and the bureau of Health. During the operation and maintenance of the FSTP works, the responsibility will be mainly under the SLWSSE. Similarly, Afar region EPA has the sole responsibility in monitoring and regulating the overall social and environmental performance of the subproject activities.
The environmental sustainability of the FSTP is dependent on the capacity of institutions at all levels (i.e., staffing, training, and other necessary support services) to carry out the associated ESMP implementation

work. Thus, it is vital that SLWSSE allocate sufficient resources for training and capacity building. These efforts will not only benefit the enterprise but will also build local capacity to undertake other development initiatives.

Budget estimation

The estimated total budget for the ESMP, which is mainly for environmental monitoring programs and training required to implement the ESMP is about 10,197,000.00 Eth. Birr, as summarized in table 29. It should be noted that most of the recommended mitigation measures for identified impacts are assumed to be incorporated in the design when they require engineering interventions. In addition, as it is proposed on the feasibility study the treatment plant is to be implemented in Design Build and operate contract modality. Therefore, they will be taken care of by the specifications and bill of quantities as well as overall contractor's and consultant's fees.

CONCLUSION AND RECOMMENDATIONS

It is certain that implementation of the proposed subprojects will be a major solution to minimize the prevailing poor sanitation related environmental pollution affecting the social dynamics and its consequences in the project and downstream areas. The subprojects will serve as a very important intervention for the protection of the socio-economic and biophysical environment of the towns. The identified adverse environmental, social and health impacts related to the construction and operations of the proposed FSTP as compared to the subproject benefits have low to moderate significance and can be easily mitigated to acceptable levels by properly applying proposed mitigation measures.

Proper implementation of the proposed mitigation and enhancement measures for each stage of the project will avoid or minimize adverse impacts and enhance beneficial impacts. Hence, it is recommended that the enhancement and mitigation measures for the identified potential positive and negative impacts respectively are properly implemented. The benefits of implementing these measures by far outweigh the costs to be incurred. Furthermore, saving life supports environmental resources and ecosystems from further pollution and deterioration would be of paramount importance.

1. INTRODUCTION

Safe sanitation is indispensable for human health through preventing infectious diseases, promoting, and sustaining physical, mental as well as social well-being. It is also an important component in ensuring environmental well-being too. Sanitation is also a building block of development (WHO, 2017). Nowadays, Fecal Sludge Management (FSM) is a global concern including improved sanitary facilities (for example toilets and fecal sludge treatment plant), particularly in low-income countries which predominantly rely on on-site sanitation technologies. That is why, in poor and growing urban areas of those low-income countries like Ethiopia, fecal sludge management represents a growing challenge; generating significant negative public health and environmental risks.

Any fastest-growing cities in the world face poor or lack of management in the sanitation sector, which encourages them to take firm action to revamp sustainable development goals. Fecal Sludge Management (FSM) is a major thrust area in sanitation and has recently been adopted as one of the viable and affordable solutions to make cities clean and healthy. Fecal Sludge is a mixture of human excreta, which consists of water, organic and inorganic matter including nutrients, whereas FSM is a set of scientific practices that ensures safe collection, transportation, treatment, and disposal of onsite collected excreta without polluting the environment (Ronteltap et al 2004).

Waste management is a big challenge in Ethiopia and other secondary towns such as Asossa, Gambella, Harar, and Semera-Logia, especially within the urban areas. For example, Semera-Logia town's fecal sludge waste generated is disposed of in an open site. Fecal sludge and shortage of public and communal toilets also cause management problems if the management infrastructure is not adequate. Industrial effluent and diffuse release from agricultural activities are other forms of pollution to the environment. In the growing complexity of problems, precautionary measures such as ESIA of projects to ensure adequate waste management can work out to be more effective. To effectively manage environmental challenges, the Government of Ethiopia (GoE) with the financial support from the World Bank is planning to implement town wide fecal sludge management and the construction of public and communal toilets.

1.1 Background

Ethiopia faces various sanitation problems related to a low level of priority for sanitation, poverty, unavailability of well-equipped skilled human resources, unclear institutional framework, and responsibilities. As a result, only 4% of rural and 16% of urban households use improved toilet accommodations. About 56% of rural households rely on unimproved toilet facilities and more than 35% of toilet accommodations are shared in urban households, whereas only 2% of rural households share their toilet facilities with other households (CSA and ICF, 2017). One in three Ethiopian households has no toilet facility; defecate to bush/fields (39% in rural areas and 7% in urban areas) (CSA and ICF, 2017). Furthermore, according to the WHO (2014) estimates, diarrhea contributes to more than one in every ten child deaths in Ethiopia. The total population growth rate of Ethiopia is also 2.5% a year, with urban centers growing at a rate of 5.1% (Haddis et al., 2013). This situation triggers the construction of PCT and fecal sludge management facilities in selected four towns of Ethiopia, is critical. In the towns of Semera and Logia, as in many other areas of the country or any community, poor sanitation has long been seen as a barrier to socio- economic growth.

In Semera-Logia, the local administration is responsible for safe management of wastes generated from industries, businesses as well as households and need to organize private operators with suction trucks to empty septic tanks and latrines. Currently, only about 12.2% of the residents in Semera-Logia empty their pit latrines/septic tanks. These need a serious of awareness raising activities to improve the attitudes of users on willingness to pay. In Semera and Logia sub towns there is no modern FSM system and appropriate site for disposal of the fecal sludge, hence, pits and septic tanks emptied by the municipality and private operators is inappropriately dumped in the open field (without proper management system). As a result, the main focus will be on developing a disposal facility near Semera to provide hygienic treatment of the fecal sludge in a sustainable manner.

The construction and operation of the proposed subprojects will improve Semera-Logia's sanitary facility problems including its fecal sludge and therewith reduce the spread of diseases and pollution of ground and surface waters. It also increases hygienic conditions, which will bring both social and economic advantages to Semara-Logia town and its surrounding environment. Furthermore, the successful implementation of the FSTP will improve the link between the rural-urban communities.

1.1.1 Project Benefits

The project will enhance the proper management of fecal sludge in Semera-Logia town. In addition, the project will create some jobs during the construction and operation of the facility for local workers and the community.

During the field survey and site study, five categories of sanitation problems were observed, discussed with the local administration, and, identified for further analysis. The Semera-Logia sanitation facility problems are deep-rooted and accumulated for a long time. These problems are also studied during the feasibility study by SEURECA Veolia JV Seureca East Africa Ltd & GENCON consultant in December 2021. The key sanitation problems are briefly presented below.

Generally, the problems are varied from site to site. For example, the Logia problem is quite different from the Semera site, as the Logia sub town is older than the Semera sub town. These are the shortage of private, communal, and public toilets; lack of proper sewerage and fecal sludge management systems; and problems with emptying services. Whereas, mismanagement of solid waste is a serious problem in Logia areas, particularly following the main roads, main business areas (such as market area) and bus stations.

Unavailability of fecal sludge disposal site: This is a key challenge for Semera-Logia town to properly manage fecal sludge wastes. The problem is complex and needs an immediate response from all relevant stakeholders with the consultation of the local community. It is dumped in an open dumpsite. Currently, Semera-Logia has neither an operational fecal sludge treatment plant nor a dedicated sludge disposal site.

In order to address the above-mentioned sanitation problems of Semera-Logia town, feasibility study was conducted with a detailed design. The project under UWSSP-II is addressing these public challenges, to solve the ongoing wastewater treatment and sludge treatment challenges and related obstacles in the first phase (2021-2026). Therefore, the proposed project implementation sites have been evaluated against the environmental and social criteria for its eligibility and suitability for the proposed facility construction. The

assessment was aimed at the analysis of the potential project impacts on the social and natural environment during construction and operation and to establish the baseline for future monitoring.

1.1.2 The Rationale of the ESIA Study

The ESIA process helps an organization or developer identify critical environmental and social issues associated with a project, and ensure that positive impacts are optimized while negative impacts are mitigated or minimized. An effective ESIA process can improve local community understanding of a project, thereby increasing the sustainability of the project. It is most cost-effective to carry out an ESIA prior to site development, to identify and resolve issues at an early stage by appraising options for development, because of a large amount of capital funding involved in developing or altering a site. Environmental and social assessments are also useful for the operational phase to identify areas for improvement and thus avoid site closure as a result of non-compliance. Thus, the purpose of conducting this ESIA study was to facilitate an evaluation of potential impacts and its mitigation associated with the proposed works and in harmony with relevant stakeholders.

The environmental and social impact assessment proclamation No. 295 of 2002 provides direction for ESIA in the country bringing together stakeholders across different sectors. The proclamation through its EIA outlines the procedures to be followed in undertaking the ESIA study for a development project.

1.2 Objective the ESIA study

The main objectives of the ESIA study as stated in the Terms of Reference (ToR) is to assess, identify and mitigate the potential adverse and localized environmental and social impacts of Semera-Logia sanitation project. It is to ensure that the planned sanitation scheme is environmentally sustainable, socially acceptable and will not cause serious adverse environmental and social impacts.

The objective of the report is, therefore, to provide an environmental and social impact assessment in order to identify important environmental and socio-economic issues arising from the proposed works, especially during the construction and operation phases of the proposed FSTP, and to prepare a corresponding Environmental & Social Management Plan (ESMP). The overall objectives of the ESIA are to:

- Identify key environmental and social issues related to the proposed project, their impacts, and mitigation if negative.
- Generate baseline information of biophysical, socio-economic and cultural attributes of the project area.
- Compile an ESMP comprising environmental and social management measures as well as mechanisms for their implementation and its compliance monitoring in order to minimize the project's negative impacts and enhance the positive aspects.
- Anticipate, avoid, minimize or offset the adverse significant biophysical, social and relevant effects of the sub project activities.

  Enable information exchange, notification, and consultations between stakeholders

1.3 Scope of the ESIA

This ESIA was conducted in Semera-Logia town of Afar region on the FSTP component. The assessment referred to the rules and standards stipulated by the government of Ethiopia's ESIA (EIA) guidelines, directives, legislation, and World Bank's safeguards policies and legislations as deemed necessary.

In accordance with the ESIA ToR, the consulting team reviewed a series of relevant policies, legislation, and relevant documents including a feasibility study on the proposed project activities and its technologies, collected, verified and instituted environmental and social safeguards and compliances, grievance redress approaches and protocols in line with the ESIA. A conventional and contemporary collection, coding, and analysis of all generated data were employed during the analysis and evaluation of the ESIA.

The scope of this report is limited to outlining the overall activities in terms of how, what, when, and who of the ESIA study should be conducted of the assessment in the selected sub-project sites. During the ESIA assessment, analysis, and presentation the following major aspects of the intended project were carefully examined:

- Outline the national policies, legislation, and administrative framework within which the environmental management of the proposed works will be carried out;
- Describe and evaluate the present baseline data and the relevant environmental characteristics of the area proposed for the development of the work;
- Identify, analyze and assess potential environmental and social impacts that will result from the proposed works, based on the proposed design;
- Stakeholder analysis, responsibility description, and assignment.
- Propose cost-effective mitigation measures for minimizing or eliminating adverse social and environmental impacts of the proposed works, including recommendations on design changes if deemed necessary;
- Propose modalities and arrangements for collection of stakeholders' views ensuring participation of key public and community representatives;
- Prepare an environmental and social management plan for implementing the mitigation measures and recommend institutional administrative and management frameworks.
- Descriptions of the monitoring plan and developing monitoring strategy were specified,
- Estimation of cost for proposed mitigation measures formulated.

1.4 Team in charge of the ESIA Study

More than eight senior professionals with diverse background and having extensive relevant experience were involved in the process of the ESIA. They all hold second degree and Above (MSC, MA and PhD) and have more than 15 years of experience on environmental studies (ESIA, ESMP, RAP, and EA) in general and in their areas of expertise in particular. They also have ample capacity to organize community and stakeholder consultation and discourse, undertake qualitative and quantitative data collection, qualitative and quantitative data analysis. The appendix 7 presents the qualifications, experiences, and positions of the assigned staff.

2. APPROACH AND METHODOLOGY

2.1 Approach

The overall approach used to carry out the ESIA study is based on the Ethiopian ESIA Guideline. Relevant studies, policies and guidelines were reviewed. Primary data was collected through field observation and beneficiary consultation. A field survey on the FSTP subproject site was conducted and potential environmental impacts of the expected project activities were identified, assessed and documented. Consultations were also conducted with key stakeholders and local community representatives pertaining to socio-economic and environmental matters. Obtaining experts opinions and learning from previous experiences were also among other study approaches used.

2.2 Methodology

This ESIA study is based on the review of relevant previous studies, primary data collected through a comprehensive field survey in the project area, and consultations with project-affected communities, municipality, Kebele administrators, key stakeholders, and relevant experts. Secondary data was gathered from various offices at regional and municipality levels, and feasibility and design study. The thorough approaches used are briefly outlined here. This assessment's methodology adhered to the EIA proclamation of 295/2002, using the strategy of identifying, collecting, and analyzing information that comprised:

- Undertaking the activities initiated during the scoping phase including involvement of key stakeholders and collecting of the baseline information on both natural and built environments including socio-economic conditions surrounding the project area and the municipality at large;
- Analysis of data for identification, prediction, and evaluation of the impacts both beneficial and adverse ones from the proposed project development and operation. This was achieved through the use of checklists, simple matrices, and use of engineering judgment (feasibility study), standards, and guidelines;
- Identifying and proposing mitigation measures aimed at minimizing and where possible eliminating the potential negative impacts and enhancing positive ones using expert judgment;
- Preparing environmental and social management and monitoring plans for follow up and follow up during project operation;
- Presenting the information in the ESIA Report (the report).

The methodology took into account likely impacts on the physical and biological environment (e.g., on air quality, soil, groundwater quality, land use, and vegetation). Other methodologies used in this assessment include literature reviews, consultative meetings with respective offices including the Regional Office (EPA, Health, Agriculture, Water, Irrigation, and Energy, Land administration, Women and children affairs, etc.), district officials and village members and their respective leaders, and visual observations through familiarization visits in the project areas.

To this effect, the steps adopted to prepare this ESIA study cover the following:

- Deskwork studies and analyses,
- Fieldworks and
- Stakeholders' consultations

The necessary activities involved in undertaking the study are as follows:

1. Consulting key stakeholders to gather their concerns about proposed improvement works and in particular how the surrounding communities will be affected by the project;
2. Carry out additional information or data to supplement ESIA;
3. Establish environmental conditions about in the proposed sites for proposed works;
4. Assessing the status of ecological and social receptors;
5. Describing the project characteristics and affected environment due to project activities;
6. Assess and evaluate the potential environmental impacts resulting from the proposed sub-projects, especially within the zones of project influence;
7. Identify mitigation measures for serious impacts; and
8. Develop an Environmental and Social Management Plan detailing actions and responsibilities for the mitigation of impacts and for monitoring them.

2.2.1 Review of Relevant Documents, Policies and Guidelines

Policies, legislation, and guidelines pertinent to social safeguard and environmental protection were gathered and reviewed for assessing the relevant environmental and social safeguard policies, laws, and regulations related to environmental protection matters in general and the expected socio-environmental impacts of the proposed development in particular. In addition, available documents on the previous studies of the proposed project, baseline of the social and environmental conditions of the project influence area, and other relevant data were collated and reviewed in order to obtain important data/ information for the project description. The feasibility study and design of the proposed project activities were reviewed to understand the method of delivering the project. The list of the documents reviewed is provided in the list of references.

2.2.2 Screening

Prior to the ESIA exercise, the Town WSSA had conducted environmental and social screening. Accordingly, the sub project is put under category B and require a lesser level of environmental investigations.

2.2.3 Scoping

The consulting team conducted scoping for the subprojects through following key actions

- identifing key environmental and socio-economic issues;
- physical inspection of the site and surrounding areas;
- Identifing possible environmental and socio-economic impacts through public participation and and stakeholder consultation.
- Impact prediction and ratings,

Summary of scoping is presented in appendix 12

2.2.4 Field Surveys and Data Collection

Following an extensive review of existing documents related to the proposed project, field investigation and collection of detailed data on the social and natural environment were carried out at the project area. The aim of the survey was to collect socio-environmental baseline data for the project influence area and to identify sensitive environmental components that are likely would have a significant effect due to the implementation and operation of the envisaged sanitation projects. Data collection was carried out using a

checklist. The checklist was filled at the site and used to identify potential adverse socio-environmental impacts and to categorize and determine the level of ESIA to be conducted.

2.2.5 Public and Stakeholder Consultation

During the ESIA, field survey groups of community members, concerned authorities/officials, and experts (social and environmental experts) at region, municipality, and Kebele levels were contacted and consulted. Information related to the existing waste management system focuses on constraints, existing environmental and social features of the project influence area, potential environmental issues/impacts related to the proposed project components and activities, as well as the attitudes of the officials, local communities, and experts towards the planned scheme were assessed. This information and opinions have been considered in this socio-environmental impact analysis. The minutes of consultations made (in the Amharic language) with the Kebele administration and local communities residing at the proposed FSTP site is attached in appendixes.

The consultation process at the design stage is an initial consultation. More consultation is envisaged during the project's implementation and operation phases since the Government of Ethiopia and World Bank through the local administration encourages community discussions during the implementation of development projects.

The stakeholders for the proposed project were categorized as follows:

1. Regional level stakeholders - relevant policy and project implementers
2. Authorities of the town (including Kebele administrations)
3. Authorities of Semera-Logia administration and Kebeles administration of each sub cities
4. Local communities in the project implementation sites/Kebeles/villages
5. Engineering team of the consultant
6. Project affected persons/people around the project sites

2.2.5.1 *Identification of Interested Parties*

Both, federal legislation and regulations and the WB Sustainability Guideline clearly state that public and stakeholder engagement is mandatory to give the opportunity to the public, stakeholders, and surrounding community to express their opinion in the project and gain knowledge about the project. This may also lead to altering or modifying the project design, location, etc. to consider the community needs and concerns.

To make sure that all concerned parties are involved in a public and community consultation process and meetings were organized by the consultant in collaboration with the project client. The outcomes and findings of the public consultation and community meetings were integrated into the Environmental & Social Management Plan; the Minutes of meeting was added as an appendix to this ESIA report.

As an initial step towards preparing a Stakeholder Engagement Plan (SEP) (Annika, Jaansoo, 2019), the Consultant has analyzed the relevant stakeholders to the project, who are considered to be affected or affect the project activities. The SEP shall be implemented during the construction and operation phases of the project, where the Contractor and Operator are responsible for ensuring its proper implementation.

Moreover, a Grievance Redress Mechanism (GRM) shall be put in place to allow the below-mentioned stakeholders in communicating their concerns regarding any project activity.

Table 2: List of concerned stakeholders

Group of Stakeholders	Stakeholders	Level of involvement
Local Residents	✓ Residents located near the FSTP facility to be constructed	Directly affected
Property-owner and landowners	✓ Individuals, legal entities, local administration holding land title documents ✓ Tenants or occupiers without formal rights	Directly affected
Public facility	✓ Educational facilities (none-existence) ✓ Religious entities (mosques/churches) (none existing around the FSTP site) ✓ Medical facilities (hospitals, clinics, medical centers) ✓ Utilities (electricity, water supply, road, telecommunication facility and others)	Indirectly affected
Business and Service Providers	✓ Shops, markets, supermarkets ✓ Petrol stations, car wash & service, others ✓ Restaurants ✓ Financial services (banks) (are not at a close distance)	Indirectly affected
Administrative Bodies and Authorities	✓ National and Regional Authorities relevant to WaSH ✓ Ministry of Water and Energy and regional bureaus ✓ Environmental Protection Authority and regional authority/bureau ✓ Water Supply and Sanitation Authority ✓ Regional authorities/bureaus ✓ Local authorities (district and Kebele administration) ✓ Municipal authorities	Indirectly affected, but may have influence over the implementation of the project
International donors	✓ World Bank	Indirectly affected, but may have influence over the implementation of the project
Bodies involved in Project implementation	✓ Construction contractor(s) (management, staff) ✓ Sub-contractor(s) ✓ Supervision contractor (the Engineer) ✓ Suppliers	Directly affected, but may have influence over the implementation of the project
Non-governmental Organizations (NGOs) and community-based Organizations (CBOs)	✓ Specialized environmental and social organizations, NGOs-engaged in WaSH activities ✓ Experts on a national and international level	Indirectly affecting/affected
Community-based Organization engaged in waste management/ emptying/ handling transporting CBOs	✓ Specialized waste management at the local level ✓ Community based organization involved waste collection	Indirectly affected and/or has impacts on project success

2.2.5.2 Consultation Methods

Consultations were undertaken with community members and government officials at Kebele and Woreda levels to obtain the opinions and attitudes towards the proposed FSTP projects for the town. Besides, different governmental offices involved in environmental protection and safeguards) in the Semera-Logia town and its neighboring Kebeles were consulted to collect information and to share their feelings about

the implementation of the proposed projects. One government level (municipality level-lead by the Mayor of Semera-Logia town and the relevant sectoral offices) consultation has been conducted with all relevant stakeholders.

The consultation took place in collaboration with and facilitated by both the Woreda local authorities. The consultation participants were selected giving emphasis on their social status and representative views. Community elders also participated in the discussions. The discussions and inquiries made use of an open-ended checklist, as described below.

- Attitudes towards the project;
- Expected benefits from the project;
- Possible adverse impacts of the project and their mitigation measures to manage/ameliorate the negative impacts; and
- Participation and cooperation from the people to support the implementation of the proposed projects.

2.2.6 Use of Relevant Data Generated by other Disciplines

Data collected by the project design team (engineering team) were reviewed and the relevant data was used to supplement the environmental and social data and to understand the proposed technical features of the project so that to render the impact assessment as comprehensive as possible.

2.2.7 Identification and Analysis of Environmental and Social Impacts

Following the evaluation of the baseline conditions and analysis of stakeholders' opinions, environmental impacts likely to result from the proposed sanitary project were identified and their significance was evaluated. Impact significance was assessed quantitatively/qualitatively based on the magnitude of the impact, relative importance/ value of the affected environmental component, intensity and duration of the impact, and reversibility of the impact.

Subsequent to the identification of potential impacts and evaluation of their significance, appropriate mitigation measures that are capable of preventing, reducing, or offsetting the negative impacts to acceptable levels were identified and recommended. Finally, an ESMP that comprises the outline of significant environmental impacts and their corresponding mitigation measures and the responsible bodies for implementation and monitoring was prepared.

3. POLICIES, LEGAL AND INSTITUTIONAL FRAMEWORKS

The implementation of the FSTP and PCT subprojects have the potential to cause environmental and/or social impacts that shall be addressed in accordance with relevant Ethiopian legislations as well as the requirements of the World Bank Environmental and Social safeguards and standards. The subsections below provide more details on the applicable legislative framework for the ESIA.

3.1 Relevant National Policies and Strategies

This section addresses the legislative and institutional framework relating to ESIA, specifically relevant to the FSTP environmental and social impact assessment associated with the proposed sub projects. For this project, the EIA (here ESIA Assessment Report) has been prepared under specific consideration of the national legal frameworks and safeguard policies.

3.1.1 Constitution of the Federal Democratic Republic of Ethiopia

In consideration of the Constitution of the Ethiopia of 1995, articles 44 states that every citizen is entitled to a healthy and satisfying environment, and that every person has the duty to protect and safeguard the environment. According to this constitution, the state has the responsibility to ensure this right.

To address the environmental concerns to be generated under the clean environment, Article 92 of the Ethiopian constitution further requires that any waste, especially from households and industries and any other dangerous waste, shall be collected, treated, and managed in a manner that does not degrade the environment in order to prevent, eliminate or reduce their adverse effects on human health, natural resources, flora, and fauna and on the nature of the environment.

The Ethiopian Constitution also recognizes ownership of property and every person's right to private property (Article 40). The Constitution also provides that a law should be in place to specify modalities for the acquisition, transfer, and use of land. Thus, the proclamation No. Proclamation 1161/2019 and regulation No 472/2020 relating to expropriation and compensation in the public interest and which defines expropriation in the public interest as, 'an act based on the power of government, public institutions and local administrative entities with legal personality to remove a person from his/her property in the public interest after fair compensation.

Further, fair compensation is defined as 'an indemnity equivalent to the value the activities performed thereon given to the person to be expropriated and calculated in consideration of market prices as well as compensation for disturbance due to expropriation'. These particular provisions will be applicable in the case of Project Affected Persons (PAPs) under this project and will to the extent possible be applied in consideration of the World Bank's requirement for full replacement costs for assets and property lost in the case of Bank-financed operations in line with Operational Safeguard 2 of the Banks Integrated Safeguards System. The constitution also states different treaties ratified by the Government of Ethiopia are parts of the Ethiopian legal system.

3.1.2 Policies

3.1.2.1 Environmental Policy of Ethiopia

All development and other related policies of Ethiopia and all laws (federal and regional), concerned with the environment (forestry, land, water use and other sectoral laws are originated from the supreme law of the country, the FDRE constitution (1995). Accordingly, the Environmental Policy of Ethiopia (EPE) was issued in April 1997.

The policy seeks to ensure the empowerment and participation of the people and their organizations at all levels in environmental management activities, raise public awareness and promote understanding of the essential linkage between environment and development. In addition to its guiding principles, the policy addresses sectoral and cross sectoral environmental issues. Thus, the Environmental and Social impact assessment study will look forward and will develop an Environmental and Social Management Plan (ESMP) to mitigate the impacts that may arise during the construction, implementation and operation phases of the project.

To this end, the policy will be employed as a core guide in promoting coordination of environmental management of the project in the project area so that the ecosystems are not subverted by the subsequent project activities.

3.1.2.2 Ethiopian Water Resources Management Policy

The Ethiopian Water Resources Management Policy was developed in 1999. The overall goal of the policy is to enhance and promote all national efforts toward the efficient, equitable and optimum utilization of the available Water Resources of Ethiopia for significant socioeconomic development in a sustainable manner. The policy aims to ensure access to water for everyone fairly and in a sustainable manner, protect water resources and sources, and promote cooperation for the management. The specific objectives of the policy include:

- ✓ Promote the development of the water resources of the country for the economic and social welfare of the people, on an equitable and sustainable basis;
- ✓ Manage and combat drought as well as other drought associated impacts, and disasters through efficient allocation, redistribution, transfer, storage, and efficient use of water resources; and
- ✓ Conserve, protect and enhance water resources and the overall aquatic environment.

The project proponent is required to acquaint itself to the project management requirements and ensure appropriate monitoring based on the waste management and water resource management strategies of the country and the regional government requirements. The project proponent should allocate sufficient resources including facilities and expertise on fecal waste management requirements to prevent further water pollution due to the waste management process including the proposed subprojects in the Semera-Logia town.

3.1.2.3 National Health Policy

Ethiopia's health policy was issued in 1993, with the aim of giving special attention to women and children, to neglected regions and segments of the population, and to victims of manmade disasters.

The priority areas of the policy are in the field of Information Education and Communication (IEC) of health to create awareness and behavioral change of the society towards health issues, emphasis on the control of communicable disease, epidemics, and on diseases that are related to malnutrition and poor living condition, promotion of occupational health and safety, the development of environmental health, rehabilitation of health infrastructures, appropriate health service management system, attention to traditional medicines, carrying out applied health research, provision of essential medicines, and expansion of frontline and middle level health professionals.

The Government in its Growth and Transformation Plan has reaffirmed its commitment to accelerate progress on maternal and child health and to reduce in child and maternal mortality rates by expanding the provision of essential health and nutrition services to the poor.

To translate the health policy into action the Ministry of Health has developed every five years a Health Sector Development Program (HSDP). Currently it is implementing HSDP IV. HSDP lays an emphasis on service delivery and the quality of service, health facility rehabilitation and expansion, human resource development, pharmaceutical services; Information, Education and Communication (IEC), strengthening health sector management and management information system, monitoring, evaluation and research.

3.1.2.4 National Policy on Women

The National Policy on women was issued in March 1993 emphasizing that all economic and social programs and activities should ensure equal access for both men and women to the country's resources and in the decision-making process so that women can benefit equally from all activities carried out by the Federal and Regional Institutions. Among the main policy objectives is that laws, regulations, systems, policies and development plans that are issued by the government should ensure the equality of men and women and that special emphasis should be given to the participation of rural women.

Consistent with the above policy, Article 25 of the constitution guaranties all people's equality before the law, and prohibit any discrimination on grounds of gender. In addition, Article 35 reiterates principles of equality of access to economic opportunities, including the right of equality in employment and land ownership. The democratization process, the new constitution, the women's policy and the institutional set up have created conducive atmosphere for the promotion and the advancement of women and the implementation of the plan of action. Accordingly, the proposed subprojects in Semera-Logia town shall consider the equal economic opportunities while creating jobs and land acquisition process at various project implementations phases.

3.1.2.5 National Policy on HIV/AIDS

The 1998 Policy on HIV/AIDS of the Federal Democratic Republic of Ethiopia urges communities at large, including government ministries, local governments and the civil society to feel responsibilities for carrying out HIV/AIDS awareness and prevention campaigns "to provide an enabling environment for the prevention and control of HIV/AIDS in the country". So that it is expected that sufficient awareness exists with the community. In addition, all the workers and contractors working in the proposed sub projects shall be treated fairly in accordance with the policy.

3.1.3 Strategies and Programs

3.1.3.1 Climate Resilient Green Economy Strategy

Ethiopia is experiencing the effects of climate change. Some studies indicate that by 2050 the temperature of the country could increase in the range of 1.7 to 2.1 degree Celsius unless appropriate mitigation measures are taken. This incidence would aggravate food insecurity, spread transmitted diseases in the form of epidemic, and cause degradation of land resources and destruction of infrastructures. Besides the direct effects such as an increase in average temperature or a change in rainfall patterns, climate change also presents the necessity and opportunity to switch to a new, sustainable development model. The Government of the Federal Democratic Republic of Ethiopia therefore issued the Climate-Resilient Green Economy strategy in 2011 to protect the country from the adverse effects of climate change and to build a green economy that will help to realize its ambition of reaching middle-income status before 2025. In the long term, if climate change is not tackled, growth itself will be at risk.

Ethiopia is currently in a very strong position of having very low emissions per capita, huge renewable heat and electricity resources and the opportunity to address climate risks into the short term that result from outdated fossil fuel technology and seek clean and renewable alternatives. The Government has recognized this and plays a leading role in driving the climate resilient green economy agenda.

Target of the Plan: The Green Economy (GE) Strategy sets out the plans for developing a low carbon economy in Ethiopia. Detailed analysis showed that Greenhouse Gas (GHG) emissions in Ethiopia would rise from 150 MtCO2e per year in 2010 to 400 MtCO2e in 2030 under a conventional development path („business as usual"). The GE Strategy identified and prioritized more than 60 initiatives, which together enable the country to achieve the envisaged development goals while limiting GHG emissions in 2030 to 2010"s levels. These initiatives would save 250 MtCO2e per year.

Pillars of the Plan: The green economy plan is based on four pillars:

1. Improving crop and livestock production practices for higher food security and farmer income while reducing emissions;
2. Protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks;
3. Expanding electricity generation from renewable sources of energy for domestic and regional markets; and
4. Leapfrogging to modern and energy-efficient technologies in transport, industrial sectors, and buildings.

The agriculture sector (including livestock farming, crop cultivation and forestry activities) in 2010 was the highest contributor to emissions, amounting to about 88% of total GHG emissions. The sector presents the highest abatement potential for GHG emissions reduction; hence was identified as a priority area that needs to be developed resiliently. The other sectors including Transport, Energy, Industry and Buildings each accounted for 3% of GHG emissions in 2010.

In 2010, the transport sector produced five MtCO2e representing 3% of total GHG emissions. Emissions from the transport is projected to reach 70 MtCO2e by 2030 under the business-as usual scenario. To

reduce emissions from the sector, Ethiopia intends to expand its investments in improved transport systems such as rail transport that depends on clean and renewable energy sources; this measure is expected to contribute to a reduction of 10 MtCO2e emissions by 2030 (14% reduction to Business as usual (BAU)). In addition, the country is making efforts to remove subsidies on fossil fuels thereby discouraging excessive consumption of fossil fuel in the transport sector. Ethiopia also plans to implement urban planning that prioritizes accessibility; hence minimizing emissions from motorized transport.

In the energy sector, the Ethiopian government commits to promoting the use of modern energy sources (such as Liquefied Petroleum Gas and electricity) for cooking; and reducing emissions from electricity generation by cutting down on fossil fuel usage and resorting to more renewable sources such as hydroelectric, geothermal, wind and solar sources.

3.1.3.2 Climate Resilience Strategy for Water and Energy

The Climate Resilience strategy sets out the implementation priorities for the Ministry of Water, Irrigation and Energy, building on the Green Economy Strategy. Climate resilience is the ability to cope with, and manage the change brought by weather stresses and shocks. A climate resilient economy is one in which the negative impacts of climatic variability and climate change are minimized and the opportunities realized so that the national growth and development objectives of the country are achieved and sustained. In light of this and given the key role of water and energy in the growth and transformation plan (GTP), the Climate Resilience Strategy for Water and Energy has three objectives:

- Identify the economic and social impacts of current climate variability and future climate change on water and energy in Ethiopia (The Challenge).
- Identify priorities for the water and energy sectors to build climate resilience and reduce the impact of current climate variability and climate change (The Response).
- Map the necessary steps to finance and implement measures in the water and energy sectors to build climate resilience in Ethiopia (Implementation) and deliver an integrated Climate Resilient Green Economy. The main sectors for which the climate resilience strategies concentrated are Power generation (Energy), irrigated agriculture and access to water sanitation and hygiene (WASH).

When it comes to Access to WASH, Ethiopia has the ambition of achieving universal access to water and sanitation as a central part of its poverty reduction ambitions. To this end, a sector wide approach has been developed under One WASH National Program through the Sanitation and Water for All Partnership. Based on the climate planning assumptions, there are three potential impacts on water:

- Reductions in seasonal rainfall reduce surface water flow and long-term reductions in rainfall can reduce groundwater levels.
- However, an increase in the intensity of rainfall can also increase groundwater recharge. Recent studies have shown that rainfall intensity is a much better indicator of groundwater recharge than overall rainfall.
- Temperature rises increase water needs and thermal stress. Increasing temperature also increases evaporation and transpiration, which reduces the amount of water available for productive use. The impacts of climate on sanitation and hygiene are less well understood at this stage, and have not been assessed.

The strategy emphasizes that Access to WASH is the best way of increasing climate resilience as it shifts people from vulnerable surface water sources to more resilient sources such as groundwater. Delivering universal access to WASH through the One WASH National Program is therefore a critical element of climate resilience. The strategies also provide guidance to climate resilience sanitation infrastructure development.

3.1.3.3 Health National Adaptation Plan to Climate Change

This document deals with the national climate adaptation strategies to mitigate the projected adverse effects of climate change and variability in the Ethiopian health sector. The plan outlines key areas of intervention, alongside the implementation strategy, to support realization of the overall goal of a climate resilient national healthcare sector.

3.1.3.4 Climate Change Resilience Water Safety Plan (CR-WSP) Strategic framework

This framework provides the strategic blueprint to develop a climate orientated risk assessment and management approach for drinking-water supplies, from catchment to consumer. Considering global best practice, WHO advocates for the WSP approach as the most consistent means to ensure the safe and reliable supply of safe drinking water. Adapted to the Ethiopian context, this strategic framework outlines a roadmap for the national scale-up of climate resilient WSPs.

3.1.3.5 Urban Wastewater Management Strategy

MoWIE issued this strategy in 2017. The purpose of this strategy is to provide a common understanding of the strategic vision to guide wastewater management partners towards an effective and coordinated response through prioritized interventions and targeted programs, whilst encouraging efficient and sustainable use of resources. The objectives of the strategy geared with the development of strong wastewater management institutions, master plan preparation, implementation methods, protecting the environment from wastewater discharge, social and cultural sustainability, wastewater collection and treatment, wastewater collection transportation and treatment and reuse of treated effluent and sludge. The strategy has the following goals: -

- Develop strong wastewater management institutions at major towns and cities in regions;
- Prepare a national Waste Water Management System (WWMS) plan and management structure aligned with sustainable development goal (SDG 2016-2030) for provision of appropriate wastewater services;
- Protect the public from the potential harmful effects of wastewater through provision of a centralized, decentralized and onsite Urban Waste Water Management (UWWM) system as appropriate under population category of cities and town;
- Coordinate the national UWWM plan in protecting and maintaining safer environment by minimizing adverse environmental effects from wastewater discharge to the natural resources;
- Support cities and town utilities to work with the communities to provide social and cultural sustainability;
- Develop sustainable management structure for wastewater collection, transportation and treatment actions.

Goals are identified in specific, measurable statements of what will be done to achieve the objectives within a particular time frame. In addition, under the strategy, set strategic actions include developing strong wastewater management institutions at all levels, sanitation master plan preparation, implementation of centralized, decentralized and onsite management systems, protecting the environment from wastewater discharge, social and cultural sustainability, wastewater collection transportation and treatment and reuse of treated effluent and sludge.

3.1.3.6 The Second Urban Water Supply and Sanitation Program (UWSSP), 2017 to 2022

UWSSP is a continuation and expansion of the World Bank long-term engagement in the urban water supply and sanitation sector and supports the efforts of the government of Ethiopia to improve sanitation services in the urban areas. The basic implementation principles of this program are formulated in accordance with the One WASH National Program including -

- Integrated town-wide approach to sanitation improvement with mix of service options to accommodate diverse needs in different settlement types: This principle aims to ensure a town wide approach, whereby all the residents of the town irrespective of their cultural and socioeconomic background and location are provided an affordable and appropriate mixed technology option. Mixed options approach provides a practical instrument to pick interventions according to specific contexts and capacities. This approach demands a town-wide sanitation improvement to integrate conventional and non-conventional systems used by different service providers to manage waste holistically. A holistic approach demands strategic technical engagement to manage waste using the different options and technologies starting from the point of waste generation up to its final disposal or reuse;
- A stepped approach to give opportunity for towns to create enabling environment prior to pursuing sanitation infrastructure investment: This principle will also create a sense of competition amongst the implementing units to perform timely while at the same time guaranteeing that the investments will bring the intended outcome and impact;
- Developing a suite of services in every town to collect, transport, treat and dispose/reuse liquid wastes: This principle recognizes the need to provide funds for the development of infrastructure for entire sanitation service chain: collection, transportation, treatment and disposal/reuse. This principle will address the existing gaps in practices in the urban wastewater management; Promotion of public awareness and enhanced social engagement to recognize the need to create public awareness and knowledge amongst the society about the health benefits from proper handling of waste. Public awareness will enable them better understand their role and responsibilities in the sanitation chain and make informed decisions about their sanitation technology choice;
- High emphasis on improving efficiency of utilities, as it is not enough to focus on the supply aspect of the infrastructure but also on efficient use of available resources and water supply and waste water management systems at the utility level to achieve the desired results;
- Encourage and facilitate the involvement of the private sector through engaging them in the implementation of the project for provision of services, supply of goods and construction of work.

3.1.3.7 Integrated Urban Sanitation and Hygiene Strategy

The Ministry of Health (MoH) issued the strategy in 2016. The goal of the strategy is to mitigate the negative impacts of poor urban sanitation and hygiene on health, environment, society, education and the economy by promoting full sanitation and hygiene systems. The basic premises for the MoH to formulate

this strategy were issues around urban sanitation and hygiene, which are complicated due to cross-sectoral interventions and difference between towns. The implementation of the strategy will expect to have a positive impact upon the economy of the country, natural environment, health and wellbeing of all urban dwellers, including the most vulnerable ones. The strategy encourages all sanitation related interventions to be based on town and town development plans, taking advantage of economies of scale, sharing of best practices within the country, and involvement of the private sector and Community Based Enterprises (CBEs). The strategic objectives of the strategy are to:

- To bring sustained behavioral change for better hygienic practices, installation of facilities and delivery and uptake of sanitation services by 2020.
- To ensure open defecation free cities and towns by 2020 from current average of 6% to zero percent open defecation.
- To ensure that 100% of urban households in any given town or town have access to improved latrines or toilets by 2020.
- To increase the fecal sludge management systems capable of safely removing, treating and recycling fecal matter to 70% coverage by 2025 (interim targets of 30% by 2020).
- To install 1,000 decentralized waste water treatment systems capable of treating liquid and fecal matter to a standard that can be directly and safely used in the immediate environment or following further conditioning in localized facilities by 2025 (interim target of 200 by 2020).
- To Reduce, Recycle or Reuse 50% of all solid waste generated in medium and large towns and cities by 2025 (interim target of 20% by 2020).
- To dispose of 100% of the remaining solid waste in controlled tipping and sanitary landfill sites that fully comply with 2014 Guidelines by 2030 (interim target of 50% by 2020).
- To ensure safe disposal of 100% health care waste from all health care facilities by 2025 (interim target of 95% by 2020).
- To enforce safe treatment, reuse or disposal of industrial liquid and solid wastes to ensure ecosystem, agricultural and human protection from all industries by 2035 (interim target of 30% of all industries by 2020).
- To strengthen sector performance through formation of a, "coordination body" that will be managed and financed so as to direct capacity building efforts towards participating individual or clustered municipalities, utilities and contractors. Such coordination body to be fully established by 2020 (interim coordination mechanism 2016).
- To leverage and increase effective utilization of resources for accelerated and cost-effective implementation of the IUSHSAP.
- To establish an effective and reliable monitoring system and sanitation data base by 2020.

3.1.3.8 National Hygiene and Sanitation Strategy

This National Strategy for Improved Hygiene and Sanitation has been developed to complement the existing health policy (developed by the MoH, 2005) and the national water sector strategy (developed by the Ministry of Water Resources) in placing greater emphasis on „on-site" hygiene and sanitation. The primary focus is on blocking feces from entering the living environment through the safe management of feces, hand washing at critical times and the safe water chain from source to mouth. It places responsibility for improving „on-site" household hygiene and sanitation firmly in the hands of the household with the direct support of the health extension worker and other resources at community level.

The strategy is harmonized with the Health Sector Development Program, which places a strong focus on high impact, broad reach, and public health interventions. The strategy has a set of guiding principles for interpretation at the different levels of administration. It is designed to serve a number of purposes. These include to:

- Foster convergence among stakeholders
- Provide a working tool for advocacy Provide a dynamic framework for planning, implementation and monitoring.

Understanding the appropriate technical options people want, can afford and will use is a central pillar of the strategy. The construction of appropriate demonstration facilities at schools, health centers and markets present one opportunity for testing technologies. Promotion will be a central theme and the success of promotional methods and messages (based on understanding and research into behaviors) could be measured in terms of: Increased knowledge and understanding of the linkage between improved sanitation and hygiene and health leading to: Behavioral transformation - improved personal and food hygiene, sanitary excreta management practices with particular emphasis on young children A willingness to pay for some form of sanitation and hygiene improvement with a minimum of capital subsidies (except in special circumstances).

Such changes would be motivated by informed decisions, wider social change, peer pressure and a developing sense of national sanitation and hygiene awareness.

The overall objective of the strategy is progressive individual and collective behavior change which leads to 100% sanitized households within 100% sanitized communities, Woredas, regions and zones, and ultimately within a 100% sanitized Ethiopia. Thus, the ESIA consultant believes that the current subprojects will contribute to the realization of the national hygiene and sanitation strategies.

3.1.3.9 WASH Implementation Framework

The WaSH Implementation Framework (WIF), prepared to achieve the targets of the Growth & Transformation Plan, represents the collective efforts of the Ethiopian WaSH sector and acts as the guiding document for all WaSH implementation in Ethiopia. The WaSH Implementation Framework (WIF) provides the framework and guidelines for implementing the National WaSH Program based on GTP and WaSH Universal Access Plan (UAP) – undertaken by rural and urban communities throughout Ethiopia and supported and facilitated by governmental agencies, civil society organizations, the private sector and Development Partners. The WIF aims to create an integrated One WaSH Program, led by the government of Ethiopia, to ensure that the targets, set out in the GTP, are achieved. The programming and financial input of all WaSH stakeholders is harmonized, and ultimately channeled through a single Consolidated WaSH account, in effect ending separate and disparate Development Partners financed projects. The National WaSH Program is based on the Memorandum of Understanding signed by the Federal Ministries of Water & Energy, Health, Education and Finance & Economic Development. Four of the significant features of the WaSH program as per this Framework are

- Integration,
- Alignment,
- Harmonization and Partnership.

On Integration, the WaSH program encompasses water supply, sanitation & hygiene and WaSH in schools and health facilities (Institutional WaSH) in a single program, aimed at integrating safe water use with good sanitation and hygiene practices at the community level. The structural arrangements recommended for WaSH are designed to build synergy among the sectors through coordinated and collaborative planning, implementation, monitoring, reporting and evaluation of program results. While there are certain mandatory structures, regions are free to design their own structures as long as these are capable of integrated planning, implementation, monitoring and reporting. Mandatory structures are:

- The federal WaSH structures
- The Woreda WaSH Team (WWT)

To harmonize, one of the major aims is to move away from discrete WaSH projects, with the attendant disadvantages in terms of planning, skill and resource allocation, towards a fully programmatic approach. Ideally, this would lead to: One WaSH Plan, One WaSH Budget, One WaSH Report; implying to One WaSH Program. One consolidated WaSH account has been established into which all Development Partners‟ contributions are deposited and from which WaSH activities and investments are supported. On Alignment, major Development Partners and the government have agreed that the WaSH program will be using the country system and the program will be aligned with:

- Policies, priorities and strategies of the pertinent Ministries as outlined in their respective Sector Development Plans
- Administrative systems, standards and procedures of the Federal and Regional Governments of Ethiopia

For Partnership, it is an evolving feature in terms of scope and level of commitment. The scope has been enlarged to include the four Ministries and the commitment has been increased to engage with Civil Society Organizations (CSOs) and the Private Sector as significant partners. This entails the SLWSSE to commit itself towards achievement of the national WASH strategies through the implementation of the proposed subprojects in Semera-Logia town.

3.1.4 Environmental and Social Legislations/Proclamations

3.1.4.1 Proclamation on Establishment of Environmental Protection Organs

The objective of this Proclamation (No. 295/2002) is to assign responsibilities to separate one organization for environmental development and management activities on hand, and environmental protection, regulations and monitoring on the other, in order to ensure sustainable use of environmental resources, thereby avoiding possible conflicts of interest and duplication of effort. It also intends to establish a system that fosters coordinated but differentiated responsibilities among environmental protection agencies at federal and regional levels.

This Proclamation re-established the EPA as an autonomous public institution of the Federal Government of Ethiopia. It also empowers every competent agency to establish or designate an environmental unit (Sectoral Environmental Unit) that shall be responsible for coordination and follow-up so that the activities of the competent agency are in harmony with this Proclamation and with other environmental protection requirements. Furthermore, the Proclamation states that each regional state should establish an

independent regional environmental agency or designates an existing agency that shall be responsible for environmental monitoring, protection, and regulation in their respective regional states.

As per the Proclamation No. 295/2002, each Regional State shall establish an independent regional environmental agency or designate an existing agency based on the Ethiopian Environmental Policy and Conservation strategy and ensuring public participation in the decision-making process, be responsible for:

- Coordinating the formulation, implementation, review, and revision of regional conservation strategies, and
- Environmental monitoring, protection, and regulation.

The Proclamation also states that regional environmental agencies shall ensure the implementation of federal environmental standards or, as may be appropriate, issue and implement their own no less stringent standards. Finally, the Proclamation states that regional environmental agencies shall prepare reports on the respective state of the environment and sustainable development of their respective states and submit them to the EPA.

The Environmental Protection Authority is responsible for environmental protection matters in the Region. The Authority is responsible for the review and approval of ESIA of development proposals under the mandate of the Regional Government and for the follow-up of the implementation of ESIA recommendations of such proposals. Therefore, project proponents in the Region should operate in close cooperation with the Authority to ensure that the adverse environmental effects of sanitary facility development proposals are properly identified, and their mitigation or management actions incorporated in the project design or planning and implemented at the right time. Like the federal level, an Environmental Impact Study Report should be prepared by the project proponents and examined, commented and approved by the Authority.

3.1.4.2 Environmental Impact Assessment Proclamation: General EIA Guidelines 299/2002

EIA guideline determining the modalities of protection, conservation, and promotion of the environment in Ethiopia regulates the conduct of Environmental Impact Assessments (EIAs). In its article, it states that, every project shall be subjected to EIA before obtaining authorization for its implementation. This applies to programs and policies that may affect the environment and with which ESIA has complied. The Vision further requires that an Environmental and Social Impact Assessment (ESIA) be carried out for development and infrastructures activities likely to negatively impact the environment.

As the project must be undertaken in accordance with requirements and guidelines for the environmental impact assessment process in Ethiopia, the project shall be submitted to EPA for review and approval before implementation. Subsequently, an EPA certificate will be issued to the project. The ESIA process included consultations with relevant agencies and stakeholders, including project beneficiaries, staff of EPA, the Water Supply and Sanitation Authority, Environmental Committees at all local government levels in the project beneficiary in the town, lead agencies, experts from different institutions, NGOs, and the public in general.

The aim of this Proclamation (Proc. No. 299/2002) is to make an EIA mandatory for specified categories of activities undertaken by either the public or private sectors and is the legal tool for environmental planning, management, and monitoring.

The Proclamation elaborates on considerations with respect to the assessment of positive and negative impacts and states that the impact of a project shall be assessed because of the size, location, nature, cumulative effect with other concurrent impacts or phenomena, trans-regional context, duration, reversibility or irreversibility or other related effects of a project. Categories of projects that will require full EIA, not full EIA or no EIA are provided (Schedule I, II and III). To implement the requirements of this Proclamation, the EPA has issued a Procedural and Technical EIA Guidelines, which provide details of the EIA process and its requirements.

According to the EPA Guideline, proposed projects are assessed and classified as one of the following schedules:

- **Schedule 1:** Projects which may have adverse and significant environmental impacts, and may, therefore, require full EIA;
- **Schedule 2:** Projects whose; type, scale, or other relevant characteristics have the potential to cause some significant environmental impacts but are not likely to warrant a full EIA study.
- **Schedule 3:** Projects that have negligible direct environmental impacts hence do not require environmental impact assessment.

Therefore, the current project activities fall under schedule II that can cause some significant social and environmental impacts but are not likely to warrant a full EIA study.

Like other projects, this project has to be initiated ESIA to have a minimal environmental damage. As a result of this, the subproject will have strong legal standing; wider global market will be insured; the proponent will have an insight for the pros and cons of the project plus the impacts on the environment by the upcoming subprojects/ project activities. Hence, the project proponent should be committed to abide by the ESIA procedural guideline to achieve the above-mentioned benefits and objectives.

3.1.4.3 Proclamation on Environmental Pollution Control

This Proclamation, Proc. No. 300/2002, is mainly based on the right of each citizen to have a healthy environment, as well as on the obligation to protect the environment of the Country. Its primary objective is to provide the basis from which the relevant ambient make environmental standards applicable to Ethiopia can be developed and to the violation of these standards a punishable act. The Proclamation states that the "polluter pays" principle will be applied to all persons. Under this Proclamation, the EPA is given the mandate for the creation of the function of Environmental Inspectors. These inspectors (to be assigned by EPA or regional environmental agencies) are given the authority to ensure the implementation and enforcement of environmental standards and related requirements. It emphasizes the protection of the environment, in general, and the safeguarding of human health and wellbeing, as well as the maintaining of the biota and the aesthetic value of nature. It is promulgated with a view to eliminating or, when not possible to mitigate pollution as an undesirable consequence of social and economic development activities.

The proclamation addresses the management of hazardous waste, municipal waste, and other related industrial and household wastes, and establishment of environmental quality standards for air, water, and soil, and the monitoring of pollution. In this connection, the proclamation provides a basis from which the relevant environmental standards are applicable to Ethiopia, and violation of these standards is a criminally punishable offense. Thus, the proper installation of fully functioned FSTP is mandatory for the construction and the responsibility of the regulatory bodies such as SLWSSA and EPA.

The project might release various pollutants that have an adverse impact on environment and workers. The project proponent should allocate enough money, facilities and employee environmentalists to implement technologies for better waste treatment and management. This proclamation also helps the project proponent to ensure occupational health and safety of customers and workers.

3.1.4.4 Public Health Proclamation, Proclamation No. 200/2000

The government of Ethiopia issued public health proclamation in March 2000. It is of that the issuance of public health law is an important step for the promotion of the health of the society and for the creation of a healthy environment and for the present and future generations.

The health Policy is linked to a decentralization of the health system and inter-sectorial collaboration. It emphasizes the need for the promotion of occupational health and safety and the development of environmental health. Its provisions for 'accelerating the provision of safe and adequate water for urban and rural populations', 'developing safe disposal of human, household, agricultural and industrial wastes and encourages recycling', and 'developing measures to improve the quality of housing and work premises for health'. The Health Extension Program, a community-based approach to deliver health promotion, disease prevention, and selected curative health services at the community level, is one of the government's primary vehicles to drive the improvement of sanitation at the Kebele level. Of the 16 packages being delivered by extension workers, seven cover hygiene and environmental sanitation.

The project might release various pollutants that have an adverse impact on human health and workers. The project proponent should allocate sufficient amount of money, facilities and expertise on environmental health to implement technologies for better waste treatment and management. This proclamation also helps the project proponent to ensure occupational health and safety of customers, farmers, and workers.

3.1.4.5 Solid Waste Management- Proclamation (Proclamation No. 513/2007)

The objective of the solid waste management proclamation is to enhance capabilities to prevent the possible adverse impacts while creating economically and socially beneficial assets out of solid waste. The proclamation states that solid waste management action plans designed by, and implemented at, the lowest administrative units of urban administrations can ensure community participation and it is essential to promote community participation in order to prevent the adverse effects and enhance the benefits resulting from solid waste. The Proclamation has also listed the management of different solid wastes such as glass containers and tin cans, plastic bags, used tires, food-related solid wastes, construction debris, and demolition wastes.

This proclamation came into force with the objective of implementing effective solid waste management in the country. The Proclamation recognized the existing solid waste management problems in the country and emphasizes the need to prevent environmental pollution that may result from the disposal of solid waste. The EPA is responsible for initiating and overseeing the implementation of overall policies, strategies, and guidelines on solid waste management. Regional environmental agencies are also responsible for drawing out their plans as regard to the implementation of the Proclamation and monitoring its efficacy.

The Proclamation promotes community participation to prevent adverse effects and enhance benefits resulting from solid waste. It provides the preparation of solid waste management action plans by urban local governments. According to Article 5.1 of the proclamation, administrations shall ensure the participation of the lowest administrative levels and their respective local communities in designing and implementing of their respective solid waste management plans. In Article 5.1, each region or urban administration shall set its own schedule and, based on that, prepare its solid waste management plan and report of implementation.

The project proponent is required to acquaint itself to the project management requirements and ensure appropriate monitoring based on the regulation requirements. The project proponent should allocate sufficient resources including facilities and expertise on solid waste management requirements to abide the regulations.

3.1.4.6 Proclamation on Ethiopian Water Resources Management

This Proclamation (Proc. No. 197/2000) was issued in March 2000 and provides legal requirements for Ethiopian Water Resources Management, Protection and Utilization. The aim of the proclamation is to ensure that water resources of the country are protected and utilized for the highest social and economic benefits, to follow up and supervise that they are duly conserved, ensure that harmful effects of water use prevented, and that the management of water resources is carried out properly. As stated in the Proclamation, the Supervising Body (the Ministry pertaining to water resources at central level, or any organ delegated by the Ministry) shall be responsible for the planning, management, utilization and protection of water resources. According to Sub-Article 1 of the Article 11, no person shall perform the following activities without a permit from the supervising body without prejudice to the exceptions specified under Article 12:

- Construct water works.
- Supply water, whether for his own use or for others.
- Transfer water which he/she abstracted from a water resource or received from another supplier
- Release or discharge waste into water resources unless otherwise provided in the water resource management regulation.

As per this proclamation, whenever there is a need to prioritize the available water resources, first priority is given for domestic water supply, livestock watering and ecosystem conservation in that order of importance. Water resources rationing for development actions like irrigation, industry, power generation and construction was put at the tail of the list.

3.1.4.7 Proclamation on the Development, Conservation and Utilization of Wildlife

This Proclamation (Proc. No. 541/2007) was issued in August 2007 and it has the following 3 major objectives. These are:

- To conserve, manage, develop and properly utilize the wildlife resources of Ethiopia.
- To create conditions necessary for discharging government obligations assumed under treaties regarding the conservation, development, and utilization of wildlife.
- To promote wildlife-based tourism and to encourage private investment.

Wildlife conservation areas to be designated and administered by the Federal Government and by regions as well as that will be administered by Private Investors and by Local Communities are clearly indicated under this proclamation. Hunting Permit and Collection of Wildlife or Wildlife Products for Scientific Purposes is also receiving enough attention. Wildlife related economic activities such as wildlife resources-based tourism and trading in wildlife and their products is also the attention of this proclamation.
The segregation of powers and duties of the Ministry (Ministry of Agriculture and Rural Development), Regions, and wildlife anti-poaching officers are made clear here. There is also a provision for penalty considerations and the power to issue regulations and directives.

3.1.4.8 Proclamation on Forest Development, Conservation and Utilization

Proclamation No.1065/2018 was issued in 2018 to secure the Conservation, Development and Utilization of Forests. The previous proclamation, Proclamation No.542/2007 is repealed by this proclamation.
The objectives of the forest development, conservation and utilization proclamation are:

- To promote the role of forest sector in arresting the adverse effects of climate change;
- To promote sustainable forest development, conservation and utilization which play a crucial role to halt environmental, social and economic problems caused by the high level of forest degradation;
- To benefit from the decisive role of forest in preventing soil erosion, desertification and loss of biodiversity;
- To balance the demand and supply of forest products, sustain agricultural productivity and thereby ensure food security;
- In addition to developing forest by state and private owners, to introduce community and association forest development;
- To classify forest into productive, protected, and exclusively protected forests on their environmental, social and economic significance;
- To enhance the environmental, social and economic benefits that may arise from multilateral and bilateral agreements; and
- To strengthen forest sector resource, research, education, investment, trade and information system.

The proclamation classified forest ownership into four. These are Private Forest, community forest, association forest and state forest. The state forest classified into productive forest, protected forest and preserved forest.

The proclamation among others prohibits cutting endangered indigenous naturally grown trees from state forest or those naturally grown in community forest. But the owner of the tree may utilize endangered tree species planted in his possession up on confirmation from the responsible authority. So, in this regard, the relevant stakeholder shall be involved in the site selection for FSTP in Semera town that do not cause any permanent damages to the natural resources in the surrounding environmental settings.

3.1.4.9 Proclamation on Research and Conservation of Cultural Heritage

Proclamation No. 209/2000 provides legal framework for Research and Conservation of Cultural Heritage. The Proclamation establishes the Authority for Research and Conservation of Cultural Heritage (ARCCH) as a government institution with a juridical personality. In addition, it has provisions for management, exploration, discovery and study of Cultural Heritage and miscellaneous provisions.

The Proclamation defines the objectives, powers and duties of the Authority (ARCCH). It also has provisions on Management of Cultural Heritage. Among these are provisions on Ownership and Duties of Owners, Classification, Registration, Conservation and Restoration, Removal, the Use, and Expropriation of Cultural Heritage, Preservation of Cultural Heritage Situated on Land given in Usufruct, and Establishment of Museum.

Furthermore, the Proclamation provides Articles on Exploration, Discovery and Study of Cultural Heritage. Article 41 is on Fortuitous Discovery of Cultural Heritage and Sub-Article (1) states that, any person who discovers any Cultural Heritage in the course of an excavation connected to mining explorations, building works, road construction or other similar activities or in the course of any other fortuitous event, shall forthwith report same to the Authority and shall protect and keep same intact, until the Authority (ARCCH) takes delivery thereof. Connected to this, Sub-Article (2) states that, the Authority shall, upon receipt of a report submitted pursuant to Sub-Article (1) hereof, take all appropriate measures to examine, take delivery of and register the Cultural Heritage so discovered.

Under Miscellaneous Provisions, the Proclamation states that, any person who holds permit to conduct construction works in a reserved area [an area declared to be containing an assemblage of immovable Cultural Heritage or an archaeological site] and who discovers Cultural Heritage in the course of construction activities shall stop construction and shall forthwith report same in writing to the Authority.

3.1.4.10 Proclamation on Classification of Cultural Heritages into National and Regional Cultural Heritages

Projects and other infrastructures development are required to observe the protection and conservation of the Cultural Heritages as defined by law (Proclamation No. 839/2014) by focusing on the following specific thematic areas.

- Sets criteria for Classification of Cultural Heritages;
- Provides for the Procedures and Management of National and Regional Cultural Heritages; and
- Provides for the Establishment the of Cultural Heritages Classification Council.

3.1.4.11 Wildlife protection proclamation of Ethiopia

The Wildlife Policy was developed in 2006 by the Ministry of Agriculture and Rural Development. The prime objective of the policy is to create a conducive environment for the preservation, development and

sustainable utilization of Ethiopia's wildlife resources for social and economic development and for the integrity of the biosphere/biodiversity. It covers a wide range of policies and strategies relating, amongst others, to wildlife conservation and protected areas with four categories from the highest protection ranking 'National Park', followed by 'Game Reserve' and 'Sanctuary' to 'Controlled Hunting Area'.

The wildlife proclamation was enacted in August 2007 as "Development Conservation and Utilization of Wildlife Proclamation No.541/2007" to approve the development conservation and utilization of wildlife in Ethiopia. Hence, this legal enactment is an input and it is appropriate to enhance the contribution of the wildlife sector towards poverty reduction strategy by maximizing the economic and social benefit to be derived from the wildlife resource (FDRE, 2007). Thus, protection and conservation aspects of wildlife species, established mechanisms for conservation and protection of wildlife, etc. shall be assessed to ensure/enhance wildlife management shall be formulated as part of ESMP.

The designated FSTP sites is not under the category of any of the above wildlife conservation areas and do not have any impact on the wildlife and their natural habitats.

3.1.4.12 Ethiopian building code: Proclamation no. 624/2009

This proclamation determines the minimum national standard for the construction or modification of buildings or alteration of their use in order to ensure public health and safety; and will apply in urban centers that have 10,000 or more dwellers. It regulates the design, material used and other minimum standards to guide and control the public safety. Control and regulate the materials intended for use and stored on site or incorporated in the works, to be removed from the sits or the works, ban the use of improper materials.

The regulation also give attention for the surrounding economic and public movement any building shall be designed and constructed in such a way that it shall not impair the safety of people moving around, other constructions and properties, excavation related to a building is likely to impair the safety or stability of any property or service. The owner of the site shall take adequate precautionary measures to ensure that the safety and stability of such property or service is maintained.

This Code applies, to building construction, maintenance, renovation, demolishing and other associated activities to all Classes of Buildings stated in Ethiopian Building Proclamation. This Code covers the Health and Safety precautions for the most common construction activities. If a building construction involves special method/s of construction, the builder needs to come up with the associated Health and Safety precautionary measures for such method/s. The occupational health and safety requirements specified in this document are only the minimum requirements. It is important to consider this national building code at various phases of the proposed subproject construction.

3.1.4.13 Ethiopia's Regulations on Public Consultation

The Constitution recognizes the participation of local communities to give their pre-informed consent regarding development endeavors to be implemented in their milieu and share benefits from it as stated in its article 43 (sub-article 2, 3 & 4). Article 43 proclaims the Right to Development, where peoples' right to:

- Improved living standards and to sustainable development; participation in national development in particular, to be consulted with respect to policies and projects affecting their community; and

- Enhancement of their capacities for development to meet their basic needs, are boldly recognized.

The regulation was well applied in engaging the concerned public and government stakeholders during ESIA document development and shall be approved by the respective regional and/or federal authority.

3.1.4.14 Land Laws-Expropriation and Payment of Compensation (Proclamation 1161/2019 and regulation No. 472/2020

This proclamation is the most central legislation concerning land expropriation in Ethiopia. The proclamation is a federal legal document; hence, it can have regional and town administration varieties in the different regions. The proclamation gives all the basic guidelines for the expropriation process, compensation, and for what purposes expropriation can be done. "A Woreda or an urban administration shall, upon payment in advance of compensation in accordance with this Proclamation, have the power to expropriate rural or urban landholdings for a public purpose where it believes that it should be used for a better development project to be carried out by public entities, private investors, cooperative societies or other organs, or where such expropriation has been decided by the appropriate higher regional or federal government organ for the same the purpose. Hence, process of expropriation and Grievances, as a result, shall be studied.

Concerning the compensation, the government has developed a regulation (Regulation 472/2020) which defines in detail how compensation for the expropriated property should be calculated. If the Proclamation 1161/2019 answers the question "What shall be compensated?" The Regulation 472/2020 answers.

According to the law, people who are displaced due to expropriation in rural lands (lands used for production) have the right to be compensated for the loss of income from the land if they do not receive replacement land. The compensation is defined as 10 times the yearly income from the land, based on the average income from the last 5 years (article 8(1)). The value of the land is not compensated. This is because all land is government owned by the government (public), thus, there is no private ownership of the land and no landowner who is eligible to compensation. Ideally, the landholder should be compensated with replacement land for the land lost in the expropriation process.

3.1.4.15 Labour Law/proclamation 1156/2019

The Labor Proclamation (which was revised in 2019) provides the basic principles, which govern labor conditions taking into account the political, economic, and social policies of the federal government, and in conformity with the international conventions and treaties to which Ethiopia is a signatory. The proclamation under its Part Seven, Chapter One, and Article 92 deal with occupational safety, health and working environment, prevention measures, and obligations of the employers. Accordingly, the Proclamation obliges the employer to take the necessary measure for adequate safeguarding of the workers in terms of their health and safety. Moreover, the Occupation Health and Safety Directive (MOLSA, 2003) provides the limits for occupational exposure to working conditions.

According to the proclamation, the employer shall also pay the entire amount of the wages earned by or payable to the workers. Payment of such wages should be done at the end of a month or based on the agreement between the parties. The intended ESIA will try to assess the availability and level of labor

required for the proper execution of the project and associated measures that need to be taken in to account in safeguarding the socio-cultural component of the area.

3.2 World Bank Environmental and Social Safeguard policies

3.2.1 The World Bank Operational Policy 4.01

In addition to the requirements of the Federal Government of Ethiopia, donor organizations such as the World Bank have requirements for environmental assessment (EA). The WB E&S safeguards polices are applicable as part of the UWSSP II implementation. The World Bank Operational Policy 4.01 requires EA of projects proposed for Bank financing to ensure that they are environmentally sound and sustainable, and thus to improve decision-making.

Environmental assessment is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, setting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The Bank favors preventive measures over mitigatory or compensatory measures, whenever feasible.

EA considers the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, a physical cultural resources); and trans-boundary and global environmental aspects. EA considers natural and social aspects in an integrated way. It also takes into account the variations in project and country conditions; the findings of country environmental studies; national environmental action plans; the country's overall policy framework, national legislation, and institutional capabilities related to the environment and social aspects; and obligations of the country, pertaining to project activities, under relevant international environmental treaties and agreements. The Bank does not finance project activities that would contravene such country obligations, as identified during the EA. EA is initiated as early as possible in project processing and is integrated closely with the economic, financial, institutional, social, and technical analyses of a proposed project.

Based on the outcome of the Bank's environmental screening, projects can be categorized as A, B, C or Fl. The selection of the category is based upon the expected environmental impacts.

- Category A: A full EA is required. I.e., a proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented.
- Category B: Although a full EA is not required, environmental analysis is required. A proposed project is classified as Category B if it is potential adverse environmental impacts on human populations or environmentally important areas-including wetlands, forests, grasslands, and other natural habitats are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases, mitigation measures can be designed more readily than for Category A projects.

- Category C: No EA or environmental analysis is required. A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.
- A proposed project is classified as Category FI if it involves an investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

The World Bank Safeguard Policies are Operational Policies (OP) and Bank Procedures (BP) approved by the Board for addressing environmental and social issues within the Banks supported development projects. The FSTP have been rated Environmental Risk Assessment Category B and trigger three environmental and social safeguard policies, which are Environmental Assessment (OP/BP 4.01); Involuntary Resettlement (OP/BP 4.12); and Physical Cultural Resources (OP/BP 4.11). The same policies will apply to the Sub-Project activities under the proposed FSTP constructions.

This policy requires environmental and social impact assessment (ESIA) of projects/to ensure that they are environmentally sound and sustainable. The ESIA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the sub-projects under the core urban sanitation infrastructure component. The environmental and social impacts are anticipated to come from the implementation of subprojects activities by the contractor. The ESIA process will lead in the preparation of an ESMP for proposed project activities in the town. The ESMP is set out mitigation, monitoring, and institutional measures to be taken during operations of these activities, to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels.

3.2.2 Physical Cultural Resources (OP/BP 4.11)

The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources. For purposes of this policy, "physical cultural resources" are defined as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above ground, underground, or underwater. The cultural interest may be at the local, provincial or national level, or within the international community.

According to approved sub project designs, the proposed projects are such that they do not affect cultural resources. The activities involved in the installation of these components of the sub-project may cause some impacts on the cultural sites unless due precautions and mitigations measures are taken. Hence, the possible impacts of the project activities have been examined and mitigation measures to be taken to avoid the impacts are recommended in the ESMP. Where, procedures have been included in construction and operation phases of the subprojects; Designs and buffer zones will be created to avoid damage to the town's cultural resources.

3.2.3 Involuntary Resettlement (OP/BP 4.12)

WB Involuntary Resettlement Policy OP 4.12 requires that all projects with land acquisition implications are guided by a Resettlement Policy Framework (RPF), which outlines processes and procedures to be followed for the preparation of site-specific Resettlement Action Plan (RAPs) during project implementation.

However, in Ethiopia, there are no explicit requirements for a Resettlement Policy Framework (RPF) or RAP. As regards compensation Ethiopia requires only the rightful land or property owner (statutory or customary rights of occupancy) should be compensated, while the WB OP 4.12 requires that any person (whether is the rightful owner or not) who lose or is denied or restricted access to economic resources including tenants, encroachers, squatters should either be compensated for use of the land or assisted to move. UWSSP-II project will apply both WB requirements and the Ethiopian government's guidelines regarding compensation and resettlement of PAP, and where there are gaps between these two, the most stringent policy will prevail.

Significant efforts are to be made in the design and screening stages of sub-projects to avoid impacts on people, land, and property, including as far as people's access to natural and other economic resources, possible. However, the FSTP subprojects are not expected to cause any involuntary resettlement as the infrastructure of FSTP affect some crop field owned by individuals that required compensation for lost livelihoods.

3.2.4 General Environmental Health and Safety (EHS) Guidelines

The General EHS Guidelines developed by the International Finance Corporation (IFC), cover a wide range of technical references that can be applied to general and industry-specific actions that resonate with Good international Industry Practices. These Guidelines can be applicable to the UWSSP II, along with the mentioned legislation outlined in this chapter. Specifically, the following EHS guidelines can be considered:

- General EHS Guideline (1): Environmental
- General EHS Guideline (2): Occupational Health and Safety
- General EHS Guideline (3): Community Health and Safety
- General EHS Guidelines (4): Construction and Decommissioning
- Donor Safeguard Requirements and Applicable Standards
- General Environmental Health and Safety Guidelines

3.3 Comparison between Ethiopian and World Bank Policies

Project Categorization in World Bank and Ethiopian legislation are more or less similar. In both policies, environmental screening is the requirement to identify whether the project is subject to environmental impact assessment or not. Screening processes in both cases address the need for further EA and its level and scope. However, the categorizations that result from the screening processes are slightly different in their definition, but still are roughly equivalent.

In general, it is understood that "Schedule 1" and "Category A" are roughly equivalent as they both include projects with potential significant adverse impacts that demands a full-fledged ESIA. Though there is slight difference that in some cases schedule 1 projects as per Ethiopian policy could fall under category B of the World Bank.

Schedule 2 and Category B projects are more or less similar in their definitions; both categories refer to projects with less impact than those of Category A or Schedule 1 projects. Under OP 4.01, category B projects require environmental work at the appropriate level, be it an ESMP, an ESIA or the implementation of mitigation measures in the context of an environmental and social screening process. However, the

Ethiopian guidelines do not make provisions for the screening of sub-projects of a smaller scale than those listed in Schedules 1 and 2, and which may have negative localized impacts, which will require mitigation. Therefore, Categorization of wastewater treatment plant has been screened based on the WB policy and it has been classified under category B.

3.4 Gaps between the National and the World Bank OP 4.12

There are some gaps between Ethiopian laws and regulations and the requirements for resettlement as laid out in OP 4.12. In some cases, the Ethiopian laws and regulations are not compatible with the Bank's OP 4.12 provisions. Table 3 below compares Ethiopian Law on land acquisition and World Bank's operational policy and recommended measures to address the gaps:

Table 3: Comparison of Ethiopian policies & legislation and World Bank Policies

Theme	World Bank's Safeguard Policies Applicable	Ethiopian Legislation	Comparison	Measures to Address the Gaps
Eligibility for Compensation	World Bank OP4.12 gives eligibility to: Those who have formal legal rights to the land; Those who do not have formal legal rights to land, but have a claim to such land; and Those who do not have recognizable legal right or claim to the land	Proclamation No1161/2019, Article 8(1) allows' landholders' to be eligible for compensation, No.1161/2019 Article 8, landholders or their agents whose landholdings are to be expropriated shall submit landholding certificates or other proofs that show their landholding rights over the lands that is decided to be expropriated to the urban or rural land administration office on the time schedule of the office. This gives entitlement only to those who have formal legal rights over their land holdings (properties).	According to World Bank OP4.12 eligibility for compensation is granted to "affected parties" Ethiopian Legislation only grants compensation to those with lawful possession of the land, and as per Proclamation No 456, those with traditional possession i.e., Communal lands. It therefore does not recognize those without a legal right or claim as eligible for compensation	Eligibility criteria for compensation and assistance shall be in line with the WB eligibility to benefits.
Public consultation and disclosure procedures	Consult project-affected persons, host communities and local NGOs, as appropriate. Provide them opportunities to participate in the planning, implementation, and monitoring of the resettlement program, especially in	There is specific Guideline entitled with" Guideline on Public Consultations in Environmental and Social Impact Assessments Process" which has entered into force in December 2018 by the FDRE EPA.	The guideline has clearly articulated the role of the PAPs, project proponent, the Commission, consulting firms, Regional Environmental Agencies and interested parties. It also shows how stakeholder analyzed and prioritized. The guideline has incorporated consultation with "hard	Provide project-affected persons and local NGOs/CSOs, local leaders, vulnerable groups, media and women as appropriate the opportunities to participate in

Theme	World Bank's Safeguard Policies Applicable	Ethiopian Legislation	Comparison	Measures to Address the Gaps
	the process of developing and implementing the procedures for determining eligibility for compensation benefits and development assistance (as documented in a resettlement plan), and for establishing appropriate and accessible grievance mechanisms.		to reach" group and individuals, issues to be considered to enhance women`s contribution in the consultation process. Furthermore, public consultation plan should describe the means of notifying and informing and informing the public about the proposal and ESIA process, beginning at an early stage and continue with updates on the progress of the ESIA study and feedback on community concerns and accepts consultation is ongoing and at different stage of ESIA process which also include other safeguard documents. Documents. Above all the guideline has provisions for vulnerable groups.	the planning, implementation, and monitoring of the resettlement program.
Measures for livelihood restoration and assistance to vulnerable groups	Livelihoods and living standards are to be restored in real terms to pre-displacement levels or better. OP 4.12 further requires attention to be given to the needs of vulnerable groups such as those who are below the poverty line, landless, elderly, women and children, indigenous groups, ethnic minorities and other disadvantaged persons.	There are no specific laws or regulations specifying support for livelihood restoration and transition and moving allowances. Ethiopian law makes no specific accommodations for potentially vulnerable groups such as women, children, the elderly, ethnic minorities, indigenous people, the landless, and those living under the poverty line.	Ethiopian policy and legislation would need to be aligned with the Banks policy to effectively guarantee the rights of all affected persons by involuntary resettlement. Vulnerable groups are at highest risk or prone to experience negative effects due to resettlement and should receive special consideration during the preparation of a resettlement policy framework.	Additional support may be needed for vulnerable groups. Vulnerable groups in the project area will be identified and the support need specified in RAP or LRP.

3.5 Multilateral Environmental Agreements

There are quite a number of multilateral agreements in the environment sector to which Ethiopia has become a party. These agreements form part of the body of laws of then country as per Article 9 of the Ethiopian Constitution and are hence important to be considered when checking for the compliance of economic activities with laws in force in Ethiopia. Some of the main Multilateral Environmental Agreements (such as UNFCCC, UNCCD, and UNCBD) are briefly stated below.

3.5.1 United Nations Convention on Biological Diversity (UNCBD)

Ethiopia has ratified this Convention by Proclamation No. 98/94, on May 31, 1994. The Convention has three goals: (i) the conservation of biodiversity; (ii) the sustainable use of the components of biodiversity; and (iii) the fair and equitable sharing of the benefits arising from the use of genetic resources.

3.5.2 United Nations Convention to Combat Desertification (UNCCD)

This Convention has been ratified by Ethiopia in 1997 through Proclamation No. 80/1997. The objective of the Convention is to combat desertification and mitigate the effects of droughts in countries experiencing serious drought and/or desertification, particularly in Africa.

3.5.3 United Nations Framework Convention on Climate Change (UNFCCC)

Ethiopia has ratified the Convention through Proclamation No. 97/1994 on May 2/1994. This Convention takes into account the fact that climate change has trans-boundary impacts. Its basic objective is to provide for agreed limits regarding the release of greenhouse gases into the atmosphere and to prevent the occurrence or minimizes the impact of climate change.

3.5.4 Stockholm Convention on Persistent Organic Pollutants

Ethiopia has ratified this Convention by Ethiopia by Proclamation No. 279/2002, on July 2, 2002. The Convention aims to ban the use of persistent organic pollutants (POPS). Originally, the POPs Convention contain 12 chemicals that were slated for total elimination or decreased use in industrial and agricultural processes. The list is expanding as parties to the convention ascertain the POPs character of other chemicals through the evolution of knowledge and experience. This agreement will support the implementation of the POPs free waste treatment and management strategies during the proposed subproject operation in Semera-Logia, which helps to protect the human health and their environment.

3.5.5 Convention on the Protection of World Cultural and Natural Heritage

Each state which is party to this convention recognizes that the duty of ensuring the identification, protection, conservation, preservation and transmission to future generation of the culture and natural heritage situated on its territory, belongs primarily to the state. Ethiopia has ratified this convention in 1997.

3.5.6 The Vienna Convention on the Protection of the Ozone Layer

The basic objective of the Convention is to combat the negative impact on the environment and human beings resulting from ozone depleting substances by reducing the amounts released and eventually banning their commercial use through internationally agreed measures. The Montreal Protocol entered into force in 1989 to facilitate the implementation of the convention. Ethiopia ratified and become party to the Vienna Convention and the Montreal Protocol in January 1996. The National Meteorological Services Agency has been mandated for the coordination and supervision of implementation of this convention.

3.5.7 Convention on International Trade in the Endangered Species of Fauna and Flora (CITES)

Ethiopia ratified the convention in 1989. It provides an international umbrella for management and control of trade in endangered fauna and flora. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. It is initiated because of the crosses borders nature of the trade in wild animals and plants, which necessitates international cooperation to safeguard certain

species from over-exploitation. CITES provides a framework to be respected by each Party, which has to adopt its own domestic legislation to ensure that CITES is implemented at the national level. The implication of this convention for the current subprojects is to ensure that any activities of the subproject shall not intervene with the convention and respected by the construction enterprises.

3.5.8 Basel and Bamako Conventions

Both of these Conventions have been acceded to by Ethiopia. The agreements regulate the trans-boundary movement of hazardous waste for the purpose of reclamation, or final disposal. In the preparation of this proposed project, these international agreements that Ethiopia signed will be considered when it deems necessary at various phases of the subproject intervention in Semera-Logia town.

3.6 Administrative and Institutional Framework

The FDRE Environmental Protection Authority (EPA) is an autonomous public institution of the Federal Government of Ethiopia entrusted with the protection and conservation of natural resources in Ethiopia. The general role of the EPA is to provide for the protection and conservation of the broad environment, through formulation of policies, strategies, laws and standards, which foster social and economic development in a manner that enhance the welfare of humans and the safety of the environment sustainable. In accordance with the principles of government decentralization and the Proclamation no. 295/2002, each national regional state shall establish an independent Regional Environmental Agency or designate an existing agency that shall, based on the Ethiopian Environmental Policy and Conservation Strategy and ensuring public participation in the decision-making process, be responsible for: Coordinating the formulation, implementation, review and revision of regional conservation strategies; and Environmental monitoring, protection and regulation.

The Semera-Logia town EPA is responsible for environmental protection matters in the town. The Regional Authority is responsible for the review and approval of EIA of development proposals under the mandate of the Regional Government and follow up of the implementation of EIA recommendations of such proposals. Therefore, project proponents in the Region should operate in close cooperation with the Bureau to ensure that the adverse environment effects of development proposals are properly identified and their mitigation or management actions incorporated in the project design or planning and implemented at the right time. Similar to the federal level, an Environmental Impact Study Report should be prepared by the project proponents and examined, commented and approved by the Regional EPAs.

4. DESCRIPTION OF THE PROJECT AREA

4.1 Physical Environment

4.1.1 Location & Topography

Semera-Logia serve as the capital of the Afar Region, one of Ethiopia's 11 regional states Town. It comprises two sub-towns located approximately 7 km apart and close to Ethiopia's border with Djibouti, and about 580 km from Addis Ababa. Semera-Logia town became the Capital of Afar Region in 2007. Semera is located at 11°47'32"N and 41°0'31"E while Logia is located at 11°43'19" N and 40° 58' 28" E.

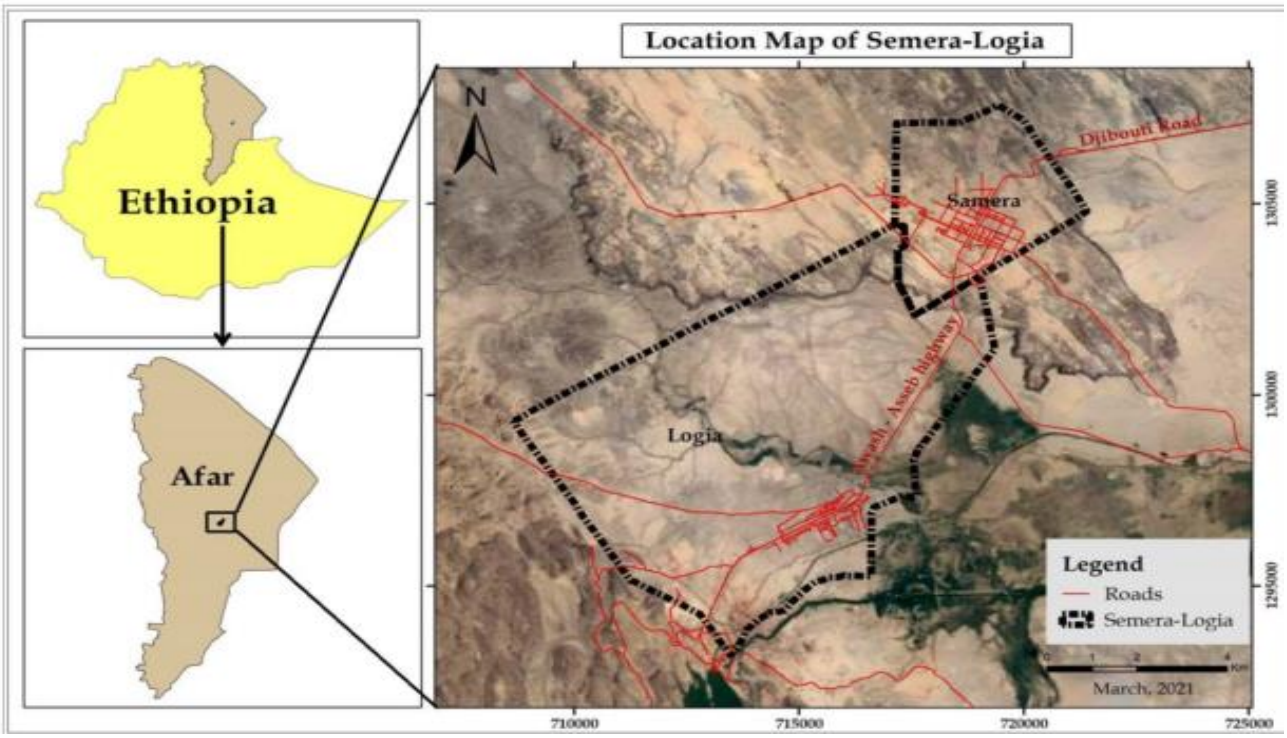

Figure 1: Project Area Location Map and Layout

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

The two sub-towns Semera and Logia are located in relatively flat plains of the Rift Valley with an average elevation of 433 m above sea level. Semera sub-town lies on the Semera, Koka and Inkisa plains while Logia sub-town is in the Logia plains.

According to the feasibility study[2], the physiographic land features of the Semera-Logia are formed by the volcanic activities, erosion and deposition processes, and the underlying geology with some local structural influence. Two major types of landforms generally characterize the two sub-towns: volcanic ridges and hills surrounding the catchment with deep slopes at western and eastern part and flat landforms in central, northern and southern part characterized by valley floor with flat to gentle slopes.

Furthermore, the FSTP Site is bounded by a series of hills on the northern, northeastern, and flatter hills on the southwestern side. The site is located in a flat topography, outskirt of Semera town, road to Djibouti.

[2] Feasibility Study and Design Report SEMERA-LOGIA (SEURECA Veolia JV Seureca East Africa Ltd & GENCON)

Generally, the topographic feature of the project site makes the surrounding mountains drain towards the edge of the site. But the place has no perennial or annual rivers in very close vicinity.

4.1.2 Geology and Soils

The physiographical and features of the study area are formed by the volcanic activities, erosion and deposition processes, and the underlying geology with some local structural influence. Two major types of landforms generally characterize the study area: volcanic ridges and hills surrounding the catchment with deep slopes at western and eastern part and flat landforms in central, northern, and southern part characterized by valley floor with flat to gentle slopes.

The alluvial and lacustrine deposits cover 85%, while volcanic units account 15% of the total study area. The different soils in and around Semera-Logia town and the surroundings were observed and classified according to color, texture and composition. In many cases, distinction between the individual soil types could not be made due to their similarity in origin and soil properties and gradual transitions from one soil type to the other. Nevertheless, the dominant type of soil material on the two sub-towns' corridor is covered by grey brown and silt- sandy mixed with different sizes of gravels.

The soil development in the study area is mostly due to the physical and chemical weathering of volcanic rocks. The weathering products either remain in places and form residual soils or are transported and deposited to form alluvial deposits in low-lying areas. The soil type of site mainly is sandy soil cover with varying thicknesses. Previously the site was used to dump solid waste indiscriminately as evidenced by litter spread all around the area. The road to Djibouti passes through the valley on the upper side of the site. But there is enough distance between the road and the actual FSTP site.

Soil depth: This refers to the thickness of soil available for use as cover material during operations and at closure. Ideally, the FSTP should not be placed within a depression or an excavation lower that the surrounding ground, since water can collect in it. The optimal sitting of the facility is therefore at ground level and sourcing the cover material from a nearby location. Therefore, Sand soils of alluvium type are available at the FSTP site.

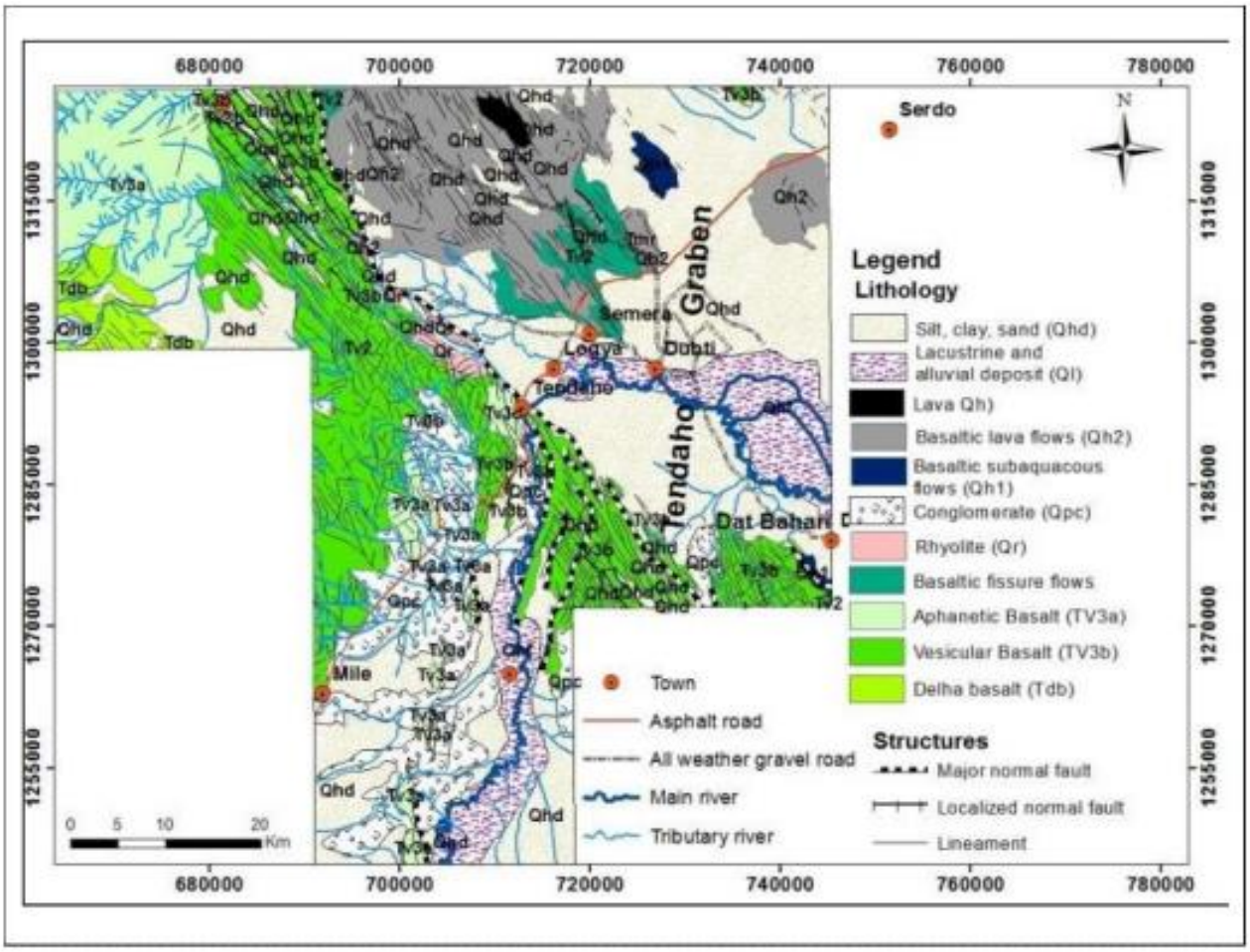

Figure 2: Geological map of the project area

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

4.1.3 Wind Speed and Direction

According to studies[3], the wind experienced at any given location around Semera is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely. The average hourly wind speed in Semera indicates significant seasonal variation over the year. The average wind speed from October 17 to May 5 (for 6.6 months) is more than 6.8 miles per hour; the average wind speed on January is about 8.8 miles per hour while that of May 5 to October 17 (the calmer season) is about 5 miles/hour and that of the calmest month (September about 4.8 an average hourly wind speed).

The wind direction also predominately varies from season to season. During May to July and September the wind is most often from the north with a peak percentage of 52% during June; from the west with a peak percentage of 35% on mid-August; the wind is from the east from September 20 to May 26, with a peak percentage of 60% on the first week of January.

Therefore, highly pollutant urban activities in terms of smoke, dust particles, and unpleasant smells are recommended to be located opposite to the prevailing wind direction. However, non-pollutant activities

[3] https://weatherspark.com/y/101920/Average-Weather-in-Semera-Ethiopia-Year-Round

that can be easily protected by simple mechanisms such as buffer zone can be located in all parts of the town if they would be compatible with other urban functions

4.1.4 Climate

Climatic elements such as precipitation, temperature, humidity, sunshine, and wind speed are affected by geographic location and altitude. According to the Ethiopian agro-ecological classification, the climate of Semera and Logia is mostly Kolla (qolla) (semi-arid to arid environment). The region exhibits desert-like conditions with average temperatures in the hottest season reaching 45°C and the mean maximum temperature is 36.2oC with a minimum of 19.8°C

The most significant climatic factor is rainfall. The study area is in the country's northeast, where annual rainfall is relatively low. The annual rainfall of Semera-Logia town varies from 200mm-400mm with a mean annual value of 205mm. The rainy period extends from April to September with a slight decline in June. The maximum rainfall occurs in April and the minimum in January. The rainy season extends from July to October.

Generally, the climates of Semera-Logia town have dry climatic conditions and experience two distinct wet and dry seasons. As per the study report on the region's potential resources, the rainfall in the region has a weak bi-modal pattern with the first peak in April-May and the second and main peak occurring in July – August.

4.1.5 Hydrology

Awash River is the major surface water body in the Semera-Logia greater area. The river is currently being used for large-scale irrigation and it has potential for use for Municipal Water Supply. The Awash River begins in the West Shewa Zone near Ginchi and empties into a series of linked lakes that start with Lake Gargori and terminate with Lake Abbe (or Abhe Bad) on the Djiboutian border. Within the project area, the main tributary to Awash River is the seasonal river in Logia passing between Logia and Semera sub-towns. The upper part of its watershed is in the North Wollo Zone of the Amhara Region. Lower down it is in the Afar Region. The other significant drain in the project area is Adadera drain/river that is located to the Southwestern end of Logia. The groundwater in the area is not only recharged by the river water but also runoff from highland plateau through structural influence of the Rift Valley, as the rift margin is cross-cut by transverse fault zones that channel water into Semera-Logia area.

The project area has no rivers or wetland areas. The groundwater level is usually well in excess of 20 meters deep and consequently should present no problem. It should, however, be noted that the proposed sub-project which are the construction of FSTP does not come close to any major water sources. The proposed project activities (FSTP) are not directly connected and in nearby to any water bodies.

4.1.6 Water supply system for Semera and Logia sub towns

Water supply services in Semera-Logia are provided by the Water and Sewerage Service Agency. Semera-Logia Town currently receives piped water from groundwater sources by pumping water from boreholes situated near the Logia sub-town, along the flood plain of the Awash and Logia River. The Utility had reported that major pipelines had already been installed and that there were nine water wells and four

reservoirs in the town. The community water supply has nine functioning boreholes. The Town Administration recently constructed two new boreholes and installation of head works and distribution system are ongoing. The nine wells' data show a range of 2 to 7 liters per second.

4.1.7 Water Quality

During the field data collection, sample was collected from two sites; one from surface water (Tendaho dam near Logia) and the other from borehole located near Logia Town. On-site water quality test on some parameters was conducted. The result of the test is indicated below.

Table 4: on site water quality test results

Site	Location		TDS	EC	PH	Temperature
Dam	Latitude	11°41'19.43'' N	2290 ppm	4580 µs/cm	8.1	@42.2°C
	Longitude	40°57'12.66''E				
Bore well	Latitude	11°44'95.29'' N	852 ppm	1704 µs/cm	8.5	@29.4°C
	Longitude	40°59'29.62''				

The result indicates that there is high concentration of heavy metal in Tendho dam and the PH is alkaline for both the dam and the borehole.

4.1.8 Ambient Air Pollution

Since it is rarely routinely monitored, ambient air quality statistics are often scarce in Ethiopian towns and cities in general and in the case of Semera-Loggia town in particular.

Semera-Logia town is in the main road to Djibouti and it is exposed to air pollution related to fossil fuel combustion such as airborne lead and carbon monoxide as there is a high presence and movement of heavy trucks in the area. In addition, dust re-suspension is one of the major causes of air quality problems in Semera-Logia as there is high prevalence of wind and the area is characterized bare land with sand soils. Thus, due diligence needs to be taken during the design, construction, and operational phases of the sanitation projects so as to protect the already exposed ambient air conditions in the sub towns.

In general, air quality is influenced by anthropogenic activities distinguishing two main sources, namely mobile and stationary sources associated with the project activities. Excavation and vehicle activities are major sources of ambient air pollution arising from the project activities during construction. In addition, the exhaust from the vehicles during the construction is a short-term source of ambient air pollution with insignificant levels. During operation, there may be also potential sources of ambient air pollution from the dry mater and evaporation of liquid wastes with some toxic materials from fecal sludge treatment plan as the area is characterized by strong wind and high temperature.

Emissions to the ambient air from vehicles may include pollutants particulate matter (PM), Carbon dioxide (CO_2), Nitrous oxide (NOx) as well as Sulphur oxide (SOx). Prolonged exposure to these activities poses the risk of acute respiratory infections. However, these toxic substances will not be released in a significant amount since the construction phase takes only a few months.

Similarly, the main pollutants from exhaust emissions from motor vehicles include Hydrocarbon and Benzopyrene, Phosphorus, Carbon monoxide, Sulphur oxides, and Nitrous oxide. Exhaust emissions are highest in urban centers and along the major highways and vary according to periods of peak traffic flow. However, FSTP sites are not subjected to such congestion during construction and operation phases.

4.1.9 Noise Pollution and Vibrations

Noise and vibrations from the project activities are considered to be very low given the small number of physical activities present and especially the FSTP is far from human settlement areas. Road traffic noise levels are considered below 75 to 80 dB (A), and the range of densely traveled roads as established by WHO (1997) is representative of urban town areas.

Considering the planned FSTP construction and further development of the surrounding residential area, the construction works itself may generate some noise and/or vibrations. But, the scale of noise and vibrations is limited and insignificant to the direct neighborhood of the construction site and of temporary character.

4.1.10 Land Use

Pastoralism is the main source of income for the community living in the surroundings of Semera-Logia. They also practice crop cultivation where rain fall/irrigation is available. As per the site survey and observations made on the proposed FSTP site, the main land use is characterized as scattered vegetation dominated by invasive species, *Prosopis julifera*. However, around FSTP site, bush encroachment represents a land cover and causes greater threat to the quality of grazing lands, where local respondents believe the spread of *Prosopis julifera* is an important land cover that changes the vegetation patterns of the area. Accordingly, there are no risks of displacement of households or no impacts on local livelihood since the site is not used for grazing for their livestock, the main likelihood of the neighboring communities. No compensation shall be paid for the loss of property and livelihood since no project-affected community.

The survey result revealed that basic social facilities like potable water, school, health, telephone, access road, etc. are not available within the proposed FSTP site. The site allocated for the FSTP is owned in full by the community (the municipality) and the regional government of Afar and is used by the community for various economic activities including public services. The FSTP site is considered low slope to flat and located on an outskirt (about 4km) of a residential area Semera sub town. There are no informal land use patterns occurring on-site. Therefore, the site is suitable for construction activities with no direct impacts on land use. However, this site is close to the Semera industrial park and might have conflict of interest during construction and operation of the FSTP.

Though the site selected for the FSTP is currently owned by the government and given to the construction of the FSTP, according to our discussion with the local community, municipality, and relevant stakeholders. Since the area is a pastoralist, community groups or individuals may claim title when construction work begins and may obstruct the construction activities. Therefore, continuous consultation with the local community and clan leaders is necessary before and during the construction period.

Table 5: Location of proposed Fecal sludge treatment sites (FSTP)

S/No	Sub-city	Type of Facility	Eastings	Northings
1	Semera	Proposed FSTP-Option 1	720160	1307361
2	Semera	Proposed FSTP-Option 2	727414	1307890

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

Figure 3: Site selected for FSTP at Asboda, Semera

4.2 Biological Environment

Considering the natural biological environment, the flora and fauna information at the proposed site can be summarized as follows:

- The proposed FSTP site is not located in any preserved area.
- No threatened, rare or endangered species of fauna or flora were registered or known to exist around the site.
- No sensitive or fragile habitats were noted in relation to the extent and magnitude of the envisaged works.
- No species of fauna or flora that could be exploited for commercial purposes have been noted in proximity to the proposed works.
- The current degree and extent of the proposed works do not interfere with any protected area.

4.2.1 Flora

An observation-based biodiversity assessment was made in the site proposed for the FSTP. The area proposed for the FSTP site has not been identified as an area of significant sensitivity. No threatened, near threatened or any rare and declining species as identified to occur on the study site.

Most of the immediate habitat surrounding the proposed development is scattered desert shrubs dominated by *Prosopis juliflora.* Therefore, the conservational issue is insignificant and the project can have minimal or no impact on local Vegetation & flora.

Figure 4: one of the sites selected for FSTP (potential site for the construction of the FSTP)

4.2.2 Fauna and Habitats

The sub-project areas and their vicinity are poorly endowed with wildlife resources. There are no sensitive bird species that would occur in the vicinity of each of the sites. Most of the proposed sub-projects are situated in areas which have no wildlife resources of conservation interest. At the urbanized municipal center there are virtually no game species whereas there are reports that migratory hyenas are occasionally seen in the peripheral areas. The ecological setting of the larger part of the municipality does not allow wildlife game species to flourish. The habitat for wildlife has been significantly modified because of human activities of deforestation and nearby urbanization. Therefore, there is a poor presence of wildlife in the area. In general, there are no known rare or endangered species in the municipality and its vicinity.

4.2.3 Conservation Areas

The sub-project investment areas have no forest reserves, no National Parks, or any form of the conservation area as defined in the National Wildlife Policy. Similarly, there is no culturally, historically, and archeologically sensitive areas close to the FSTP sites.

4.3 Socio-economic Environment

The two sub-towns are mainly categorized into arid agro-ecological zones with an average elevation found below 1500 meter above sea level. The settlement pattern of the two sub-towns is completely urban. The livelihood of the population is basically depending on non-farming activities such as, trade/small business, and employment in the formal sectors at government, private, and non-governmental offices.

4.3.1 Administrative Context

The project area consists of two sub-towns Semera and Logia. Semera is divided into 4 Kebeles (the smallest administrative boundary) which is about 2,448.5 hectares. Similarly, Logia has 4 Kebeles in 718 hectares.

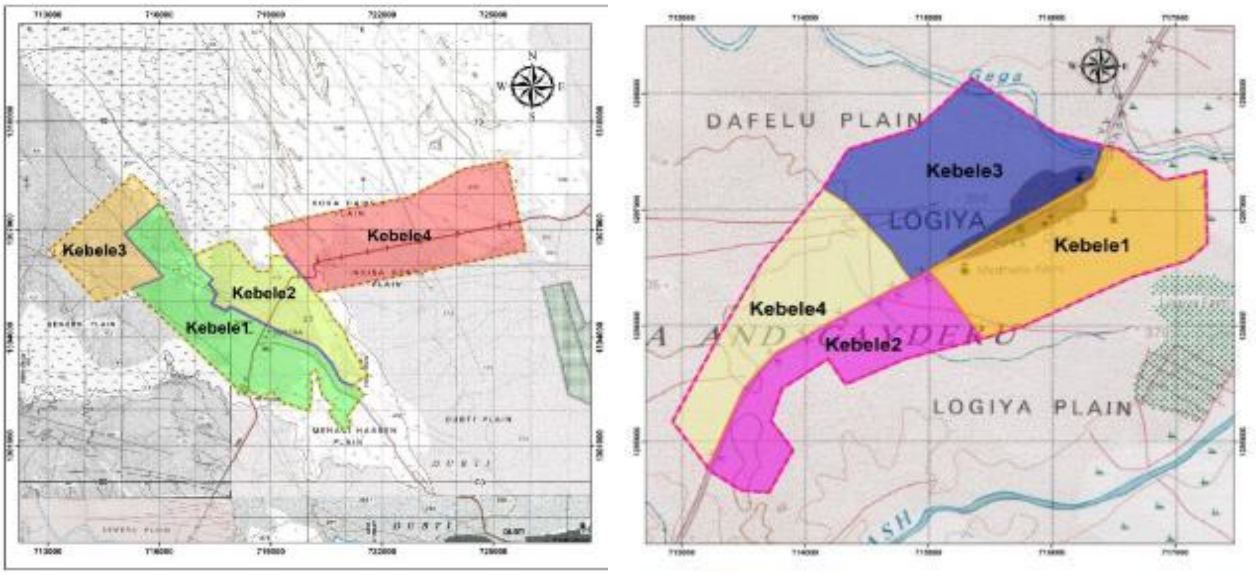

Figure 5: Topographic map of Semera sub-town (left) and Logia Sub town (right)

Source: Final feasibility study and preliminary Design report (May 2022)

4.3.2 Demographic Profile

According to the National Population and Housing Census of 2007 conducted by the Central Statistical Agency of Ethiopia (CSA), the population of Semera and Logia was registered to be 2,625 and 14,038 respectively and, the religion of majority of the inhabitants of the two town is reported to be Islam.

As of July 2022, the CSA projects that Semera will have a population of 6,444 people (3,303 men and 3,135 women), while Logia's population is estimated to be 34,494 people (18,549 men and 15,945 women). Age-wise, 5.2% of the towns' population is 60 years or older, 65.9% are between the ages of 15 and 59, and 28.9% are under the age of 15. The age distribution reveals that youth and middle-aged people, who are regarded as contributing members of society, predominate in the towns.

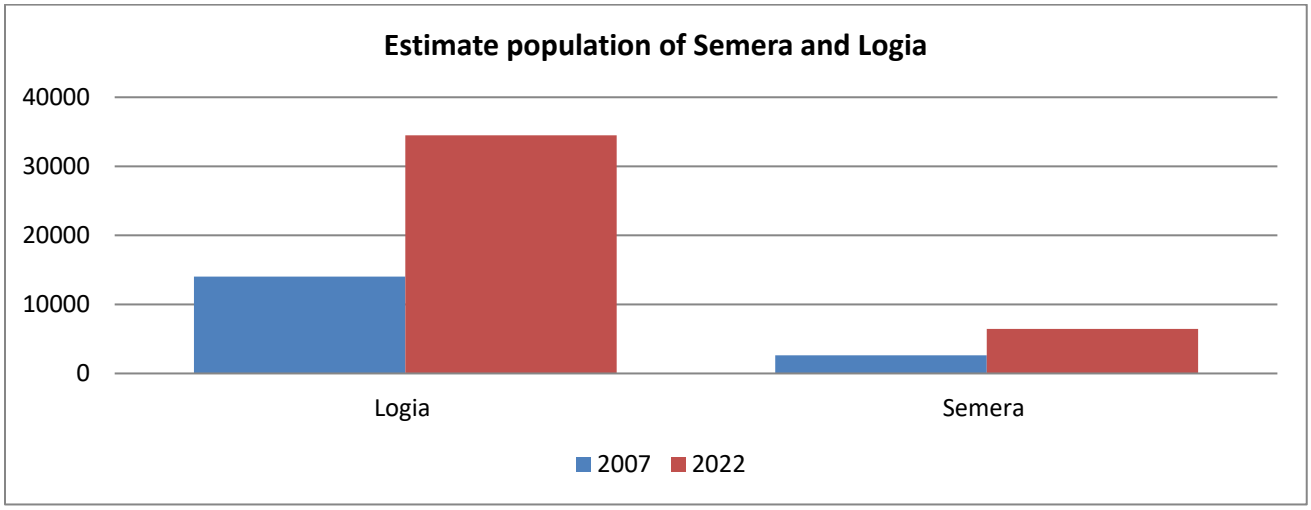

Figure 6: estimated population of Semera and Logia Sub cities

Source: CSA (2007, 2022)

Between 2007 and 2022, the population of Semera and Logia towns increase by 145% and 146% respectively. From this fact, it can be deduced that the population of the two towns will continue to increase which in turn will lead to increased volume of urban waste.

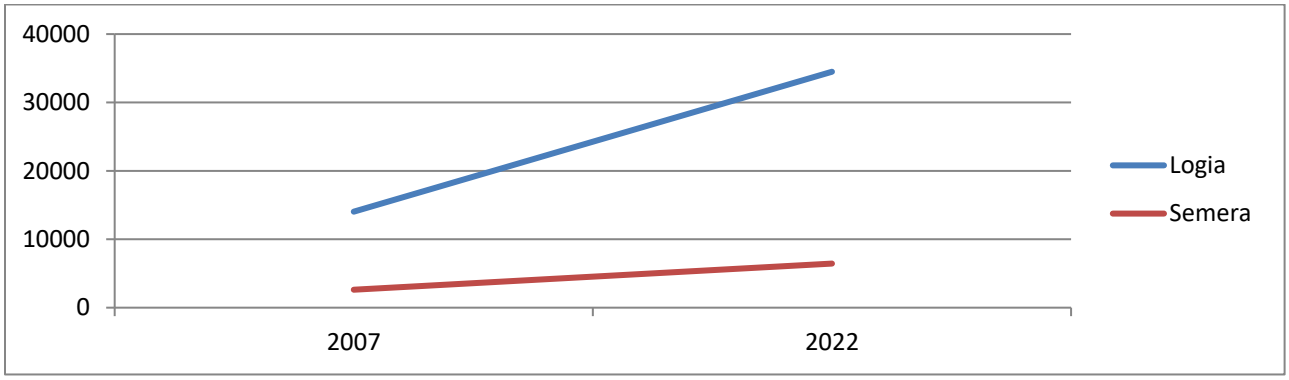

Figure 7: Population trends of Semera and Logia sub cities

Source: CSA

4.3.3 Housing Conditions

The feasibility study of these sub projects indicates that 85.5% of houses are of wood walls with corrugated iron roof and soil or cemented floors, while 9% of houses are blocks/stone wall with corrugated iron roof, 5% of the houses are traditional/ mobile houses. In Logia, the houses are closely spaced and making the sub-town fairly congested.

4.3.4 Local Economic Development

Given the fact that employment in the formal sector has been increasing recently in addition to the main economic activities (livestock and agriculture) in the region, the income-generating activities of a bigger part of the municipal population are mainly through petty businesses, daily labor, and other non-farming activities.

The majority of the town's residents work in small and medium-sized businesses to support their families. Small-scale and microbusinesses, hotels, retail trade, the marketing of grain, flour mills, clothing, and cattle products are a few of the significant ventures in Semera-Logia town. The majority of town residents, per the feasibility study, derive their income from both public and private work, as well as from participating in various economic endeavors. As a result, Semera- Logia's primary source of cash flow is from business operations. About 33.7% of people work for the government, 16.9% for the private sector, and 22.8% are business owners, and the remainder people make a living through diverse economic activities (Semera-Logia Final feasibility study and preliminary design report, 2022).

Semera-Logia is located upstream of a major irrigation scheme at Dubit on Awash River that occupies an area of over 300 km^2. The scheme is of great significance to the town as a major source of food, employment and revenue. The larger section of the irrigation scheme is under sugarcane plantation, which supplies the Tendaho Sugar Factory. Tourist attractions in the vicinity of the town include Awash natural reserves, Yagabu-Ras natural park and Dallol depression, which are expressions of desert beauty. Besides the above, Hadar is the area where a 4.4 million years old humanoid was recently discovered.

4.3.5 Educational Facilities

Due to the Afar people's pastoral lifestyle, the Afar area has one of Ethiopia's lowest percentages of elementary and secondary school enrolment. The lowest enrolment rate was also influenced by insufficient investments in infrastructure, education, and the development of curriculum in the Afar language. According to information from the Regional Socioeconomic Profile Report, there are four (4) kindergartens, seven (7) first-cycle primary schools, four (4) second-cycle primary schools, and two (2) comprehensive secondary schools in the region. Additionally, there is a university, a technical and vocational training college, and a college of public health.

4.3.6 Health Facilities

According to health data from the Regional Health Bureau, diseases connected to water borne are a significant source of illness in the Region. Reports indicate that water and hygiene-related diseases rank among the 10 top leading causes of morbidity and mortality (e.g., Typhoid, paratyphoid and other includes acute upper respiratory infections, shigellosis, and functional intestinal disorders). This situation calls for a more coordinated and concerted effort to improve the situation. According to the Regional Bureau of Finance and Economic Development, two government health centers, one in each of the two sub-towns of Semera and Logia, two private clinics, and one private pharmacy and the five (5) health institutions serve the two sub-towns.

4.3.7 Road Network and Transport

There is asphalt road in Semera and all-weather gravel road in Logia. Minibuses are utilized for transportation between Semera-Logia town whereas Bajaj is the primary mode of transportation within Semera-Logia town. Buses, minibuses, and trucks, on the other hand, are the primary modes of transportation to adjacent towns and Addis Ababa along a network of asphalt and gravel roads.

About 33% of the town's complete road network is made up of paved surfaces such cobblestone, red ash, and gravel, with the rest 67 percent being earth packed. The majority of town roads lack storm drainage channels.

4.3.8 Water Supply and its Sources

The lack of suitable supplies of water lays at the root of many of the difficulties experienced by developing countries. Besides fulfilling basic life requirements, water availability is a cornerstone of satisfactory sanitation, public health, agricultural production, industry, recreation, environmental maintenance, and urban development. Semera-Logia has a severe surface water scarcity. Most water resources, with the exception of Logia's permanent river, are found underground in the region's well fields. Water supply service in Semera-Logia is provided by the Water and Sewerage Service Enterprise. Currently, Semera-Logia town is getting piped water from boreholes located along flood plain of Awash and Logia River, near to Logia sub-town. The Utility had reported that major pipelines had already been installed and that there were nine water wells and 4 reservoirs in the town.

4.3.9 Waste Management practices

4.3.9.1 Solid Waste Management

The major sources of solid waste in Semera-Logia could be categorized into domestic, commercial, institutional, municipal, and construction and demolition. The predominant quantities of waste generated in the sub towns are from domestic and commercial followed by others.

In Semera-Logia, waste collection systems are not properly planned to effectively utilize available resources. Less than half of the generated waste is collected and almost all of the collected waste is dumped haphazardly in a crude manner and no evidences that the collected wastes are used as inputs for various production such fertilizers and biogas etc.

In Semera-Logia, the other major solid waste contribution comes from the streets and open markets of the towns where different inorganic and organic material like vegetables, fruits, chat, plastics, etc. are generated daily in huge volumes. The Municipality commences a regular cleaning and collection of solid wastes from streets and open markets as one of its major activities of solid waste management.

4.3.9.2 Fecal Sludge Management

It is known that the provision of toilets and septic tanks is not by itself the end to proper sanitation. Fecal sludge is formed through the process of decomposition of fecal matter in the pits of latrines and septic tanks. Currently, the Semera-Logia sub towns do not have a properly designed and constructed fecal sludge treatment system.

Treatment of sludge solids generally involves reduction in water content and stabilization of the sludge. The purpose of solids stabilization is to reduce the odors and bacteria levels in the sludge, leaving the stabilized sludge relatively inert. Thus, a sludge treatment system that properly dewaters the sludge during dry months, provide proper storage and treatment during rainy season, provide further treatment of the percolated leachate and the dried sludge for use in agriculture is recommended in this design. In the two sub towns, there are 13 communal (5 in Semera, 8 in Logia) and 9 public (4 in Semera and 5 in Logia) at

different stages of construction. Some of the existing communal and public toilets are not functional due to poor management and lack of water for sanitation.

4.3.9.3 Wastewater Management

Semera-Logia lack waterborne sanitation, and sanitation in households largely depends on the accessibility to onsite sanitation usually pit latrines. One of the major concerns for Semera-Logia, poor liquid waste management, is threatening public health in addition to menacing the natural environment. Grey water and black water are the two main types of wastewaters, which are being generated in Semera-Logia from households, commercial entities, health facilities, hotels, public and non-public institutions, industries, and community gathering places. Both on-site and off-site management of wastewater requires improvement.
To alleviate this sanitation problem, efforts to plan and implement wastewater management, including rehabilitation and construction of communal latrines and effective fecal sludge management have been put in place by different organizations. Despite all efforts made to alleviate the sanitation problem, wastewater management is still posing threats. The study indicated that only 42.4% of households have improved toilets (such as namely flush to septic tank, VIP and pit latrine with a concrete floor slab) yet other uses a communal or shared toilet with other households. A further 18.2% of the interviewed households use an unimproved pit latrine without a concrete floor slab. The remaining 36.6% of the population practice of open defecation mainly poor income households and households that live in informal settlement areas in Logia sub town 04 Kebele and Semera sub-town 04 Kebele. The open defecation is also practices in many other parts of the two sub towns.

The existing public toilets, which are pit latrine types, are not enough to provide services for the two sub towns given its size, commercial importance, and high level of people's mobility. Semera-Logia has five public toilets, each having 4 cubicles making a total of 20 cubicles which are not enough to meet people's public toilet needs. A quite large number of the community members were not satisfied with their current sanitation facilities in the Semera-Logia. Even though the public toilets have showers, they are not functional due to a shortage of water. According to the Ethiopian Demographic and Health Survey (EDHS) 2016, only 20.1% of the urban population had access to improved sanitation facilities. However, this study has found that at least 0.26 % of the households have access to flush toilets, 56.03 % use improved pit latrine with and without slabs, 4.28% are VIP and only 36.6 % of households use open defecation in the two sub towns.

Only about 12.2% of the residents in Semera-Logia currently empty their pit latrines/septic tanks. The situation could be attributed to the highly permeable sandy soils predominant in Semera-Logia town that allow the infiltration of leachate from pits and soak away, resulting in the great majority of tanks and pits operating for longer periods without the need to be emptied. However, for high groundwater table areas, areas near well fields and congested areas, the sludge which is not emptied may risk contamination of the groundwater. Liquid waste management of the two sub-towns is carried out by the general services of the municipality. The Water and Sewerage Utility has 6 m^3 vacuum truck each for Semera and Logia sub-towns for sludge emptying services alongside the private ones. Semera University also has one sludge truck. The emptying services are charges for emptying are Birr 1,400 per truckload. The government institutions do not pay any charge for the service. They get the service simply by covering only fuel and daily allowance

(Semera-Logia Development of an Integrated City-Wide Sanitation Plan feasibility study and preliminary Design report (May 2022).

4.4 Project Beneficiaries

The primary project beneficiaries are expected to be 40934(21852 males and 19080 females) residing in Logia and Semera sub towns from improved sanitation facilities. The project will facilitate the creation of job opportunities for women and youths through the economic opportunities related to the management and operation of water and sanitation service delivery. Poor households, which in most cases represent the most vulnerable, will be particularly targeted to benefit from public and communal latrines.

5. DESCRIPTION OF THE PROPOSED PROJECT

5.1 Overview of UWSSP-II project

Ethiopia's rapid urbanization is putting stress on the already inadequate water supply and sanitation system in urban areas. The capacity of urban centers to adequately dispose of fecal sludge and wastewater is low, exposing natural resources to pollution and posing a risk to human health. In line with this, the Government of Ethiopia has successfully secured finance from the World Bank under the Second Ethiopia Urban Water Supply and Sanitation Project (UWSSP-II). The UWSSP-II is primarily intended to improve urban sanitation holistically and equitably in the urban space and provide assistance to improve operational efficiency in 22 Ethiopian towns.

The objective of the Project is 'to increase access to improved sanitation facilities and improve efficiency in water supply service delivery in Addis Ababa and other 21 secondary towns[4]. This objective will be addressed through the following three major components: (i) sanitation and water supply services improvement in Addis Ababa; (ii) sanitation and water supply services improvements in select secondary towns; and (iii) Project management and institutional strengthening.

Semera-Logia towns are among the secondary towns benefiting from the portion of the finance secured under Component 2 of UWSSP-II. A project under the 2nd UWSSP is to construct seven (7) Public toilets and five (5) communal toilets in the Town and a fecal sludge treatment plan. For the fecal sludge treatment component, the proposed treatment technology is the solar drying technology as opposed to the thermal dryer, which, although can dry the material more rapidly, will be more expensive as it requires additional energy. The overall objective of the subprojects is to improve and increase access to sanitary conditions through constructing public and communal toilets, and construction of fecal sludge treatment plants to ensure a sustainable waste management system. Other objectives include improving the hygiene and public health conditions and reducing the deterioration of the quality of the environment.

5.2 Components of the Project

The project will cover two sub towns namely, Semera, and Logia. Logia sub-town is the oldest compared to the two sub-towns with an unplanned settlement structure, while Semera is a new planned sub-town with modern amenities, regional administrative facilities and Semera University. Each of the two sub towns has 4 Kebeles. Semera occupies an area of 718 hectares and is 2448.5 hectares in size.

The following is a summary of the proposed development subprojects:

- Extension of the current onsite sanitation facilities in the town with improved sanitation technologies, meaning that the percentage of dry latrines will be replaced in step with either VIP latrines or wet latrines.
- Construction of fecal sludge treatment plant.
- Construction of Public toilet facilities in areas where open defecation is noted
- Construction of Communal latrines for residents living in neighborhoods without latrine facilities.
- Provision of vacuum trucks and small vehicles in order to collect and transport fecal sludge.

[4] 1 Dire Dawa, Mekelle, Adama, Bahiredare, Hawassa, Jimma, Gonder, Sodo, Adigrate, Harere, Jigjiga, Gambella, Assosa, Semera Bishoftu, Dessie, Shashemene, Nekemte, Asela, Arbaminch, and Debrebereha.

Table 6: Proposed sanitation infrastructure in the initial phase (2021-2026)

Intervention proposed in the short term	Quantity	Unit
Communal toilets (8 seats)	5	Number
Public toilets (8 seats)	7	Number
Vacuum trucks (m^3)	2	Number
Fecal Sludge treatment plant	1	Number

This chapter provides a description of the proposed public and communal toilets and fecal sludge treatment plant. The proposed works will be as described in the Design Consultant's feasibility and final design Study and Report (October 2022).

5.2.1 Communal Toilets

About 5 communal toilets are to be constructed in selected kebeles (3 in Logia and 2 in Semera) in the near future due to the huge demand for them. In general, population density, living standards (slum areas, older neighborhoods, kebele rented houses, newly established villages, etc.), and the availability of space/land for construction were taken into consideration while choosing the suggested communal toilet sites. Two in Logia and three in Semera are now being built as part of the proposed communal toilets.

It is expected that 1 communal toilet with 8 seats can serve about 6,000 users (750 users per toilet seat)
The consultation with the stakeholders has identified 5 sites in the town for the construction of communal toilets as part of the immediate sanitation interventions, as presented in Table 7 below.

It is proposed to construct five communal toilets, in low-income areas: 3 in Logia and 2 in Semera. The toilets are proposed to be managed by community volunteers under the supervision of the Kebele Administration on rotation basis. The layout adopted the lay of the communal toilets that are under construction in Semera-Logia Town.

Design of Communal toilet: According to the engineering consultant, to encourage usage, the design of the toilets considered, gender segregation, the needs of the disabled with the following minimum requirements.

Communal toilets are basically VIP latrines with a large and dip pit and eight cubicles within a communal building block. Each cubicle, having a lockable door, is assigned for the restricted use of households. Households using each cubicle work over a cleaning program and make monthly payment to cover the sludge collection and disposal. This type of latrine is proposed at densely populated areas where private latrine cannot be constructed due to space limitation and financial constraints. The toilets are of stone walling construction and comprise flush toilets with a septic tank, showers, wash hand and disabled facilities.

The selected communal toilets have the following basic characteristics:
Sanitary Appliances: Type I communal toilet will be furnished with 8 Turkish type WC, 1 hand washbasins, 2 Shower unit, and 2 assisted WC for physically challenged users and 1 urinal.

***Plumbing services*:** Besides the provision of the required sanitary fixtures, the plumbing system has been designed to possibly avoid nuisance from foul air. Floor gullies (factory-made and easily available on the market) is proposed for shower tray. Waste pipes are laid with a vent at the upstream end for the avoidance of foul air release to the block from the septic tank and drainage lines. Sanitary site work comprises a septic tank and percolation ditch, to be constructed within selected area. It includes an elevated watering system for the constructed toilets with the RHS tower proposed.

Two types of typical communal toilets have the following dimensions: Floor dimensions 1.0m by 1.5m and 1.5m by 1.5m for Person with Disability (PWD) stances.

Key Minimum Standards:

I. Toilet stances: 2 stances for females and 2 stances for males
II. Double hooks (for hanging) fixed behind cubicle doors
III. Floor trap in stances with the ablution tap and flooring should drain towards floor trap so as to keep the floor as dry as possible
IV. Design rule of thumb: one stance for 100 users per day for public places such as markets and parking areas
V. Urinals for males: If 2 or more urinals are installed, one should be installed at child's height
VI. A hand washing facility with soap for each side (male and female)
VII. A fence with a lockable gate
VIII. Windows clear enough to provide day light
IX. Provide ramps with:
    - Hard and non-slip surface
    - landing of minimum 1.3m wide by 1.3m long at every 10m, change of direction and bottom of ramp
X. Access road of minimum 4.0m width to facilitate septic tank emptying with a vacuum truck

5.2.2 Public Toilet

Public toilets are proposed to be located in highly congested public areas to cater for traders, customers, day workers, service seekers and travelers. Public toilets connecting with septic tanks should be provided solely for use by people who are away from available private facilities. It is expected that 1 public toilet with 8 seats will serve about 6,000 users (750 users per toilet seat).

Table 7: proposed public toilets location with coordinate points

No	Area name	Latitude	Longitude	Type
1	Delala Genda	N 11°43'50.379"	E 40°59'3.469"	Public
2	Kera	N 11°43'54.789"	E 40°59'4.997"	Public(alternative)
3	Taxi Station /menaharia)	N 11°43'51.701"	E 40°59'12.496"	Public
4	Police station compound	N 11°43'39.110"	E 40°58'59.745"	Public
5	Semera (inside the compound of the water reservoir)	N 11°47'29.246"	E 40°0'35.972"	Public
6	Kebele 02(near High school)	N 11°47'39.048"	E 41°1'3.214"	Public

While the location of other public toilet is appropriate, the one that is located inside the compound of water reservoir in Semera may not be appropriate and it is recommend to change the site as locating toilet near the water reservoir will affect the esthetic value even though it may not have pollution effect.

Two types of public toilets are proposed, with different sizes and number of users depending on characteristics of sites, Type I and Type II. Type I Public toilet is proposed for the Market area, bus stations area and areas where there is no space limitation. Whereas Type II is proposed in public places, where there is limited space. Type I and Type II Public toilets have a footprint area of 45 m^2 and 32 m^2 respectively.

Based on the nature and types of sanitary problems identified during the feasibility study, about 7 public (3 in Semera and 4 in Logia) toilets were recommended in the short term. The construction of 5 public toilets (3 in Semera and 2 in logia) are under construction (in some cases, near completion) on jointly identified and selected five sites in the two-sub town.

Proposed typical public toilets: the engineering consultant compared different alternative design options. After analyzing the social, technical, and economic issues, it is proposed that these public toilets be of permanent blocks construction. Further, that they may be of flush toilet with low-level pans connected to septic tanks emptied regularly by sludge trucks. That the blocks be provided with water storage tanks to be serviced by a water truck operated by the sanitation section of the Utility. It is further proposed that the public toilets be operated by small and medium enterprises (SMEs) on a pay-to-use business model with controlled nominal charge.

The construction of toilet facilities, which includes activities such as excavation of septic pits, stone masonry work for the pit, superstructure, water tanks, etc., is a standard civil engineering construction involving mainly concrete works. A reasonable time period for the construction of toilets was suggested to be about 1 year.

All the proposed public toilets will be flush toilets with septic tanks and soak away pits. The proposed public toilet will be connected to the water supply network plus to be equipped with water tank.

5.2.3 Fecal Sludge Treatment Plant

5.2.3.1 FSTP Sites

The treatment plant site is located in Semera sub town on the main road to Djibouti. The area required for the project is five hectares. The land selected for FSTP is open space owned by town administration and there is not settlement around it. This will help to further expansion. The site located about 4km from Semera to the north or to Semera Djibouti route. According to the design report, FSTP will have a capacity of 21.4 m^3 per day. The figure below shows conceptual arrangement of facilities at the proposed FSTP site (site 1). The construction of the FSTP is expected to be completed with 12 months after the bid award.

Fecal sludge management is a set of scientific practices that ensures safe collection, transportation, treatment, and disposal of onsite collected excreta without polluting the environment. The FSTP site was evaluated against the following criteria: distance from the residence/rural villages, distance from the center, from the water bodies, conservation areas, intact natural forest and wildlife-protected areas. This

site was selected by the design consultant based on the following criterion: availability of 5 ha land, settlement conditions, distance from service area, risk of flooding, risk of ground and surface water pollution, Nuisance to neighboring activities, and risks to the ecosystem service and conservation of natural resources. During the field observation, the ESIA team has witnessed the suitability of the selected site (which is site 1). However, the consultant has reservations on the proximity of the selected site to Semera industrial park. The recommendation is to construct the FSTP following the wind direction and create a buffer zone around the FSTP site. In addition, it is recommended to have strong working relationships with the industrial park management. There are multiple fecal sludge treatment technologies available, and each technology has a different field of application. Treatment technology was chosen based upon the desired product. Selected technologies have been discussed below.

Figure 8: Proposed conceptual arrangement of FSTP facilities
Source: Final Feasibility Study and Preliminary Design Report (May 2022)

5.2.3.2 Technical components

The development objective of the current project is to contribute to the improvement of the social economy for the residents of Semera-Logia town by providing effective and efficient sanitation services. The overall objective of the project is to improve and increase access to improve sanitary conditions through constructing public and communal toilets and construction of FSTP to ensure a sustainable waste management system. Other objectives will include improving the hygiene and public health conditions and reducing the deterioration of the quality of the environment and water resources.

The main components of fecal sludge treatment plant include access pathways and roads, operators' cloth changing rooms and toilets/washroom, waste deposit and sorting area, waste dumping trenches, composting unit, compost storage facility, hazardous waste pit, area for storing the recyclable waste, leachate collection and aeration areas, electricity networks. The leachate from the landfill shall be pre-treated and directed to the fecal sludge treatment plant below the solid waste landfill.

5.2.3.3 Construction and operation of fecal sludge treatment

The plant will include improvement of storage, collection, transport, and disposal of fecal sludge wastes, the establishment of a disposal facility, and treatment for fecal wastes (sludge). The FSTP component will have a capacity of 21.4 m^3/2026, but could be increased by 2041 (ultimate target year). The main components of fecal sludge treatment plant include access pathways and roads, operators' cloth changing rooms and toilets/washroom, waste deposit and sorting area, waste dumping trenches, composting unit, compost storage facility, hazardous waste pit, area for storing the recyclable waste, leachate collection and aeration areas, electricity networks. The leachate from the landfill shall be pre-treated and directed to the fecal sludge treatment plant below the solid waste landfill.

- ✓ Pretreatment: Screening and Grit removal, grease removal unit & oil and grease removal unit,
- ✓ Thickening: Screw press, centrifuge, or Disc thickener,
- ✓ Solar Drying beds:
- ✓ Covered sludge area for treated sludge and infiltration pit for wastewater and leachate treatment phase,
- ✓ Construction of anaerobic baffled reactor- Anaerobic baffled reactors are septic tanks that have been upgraded with a series of baffles along the treatment chamber,
- ✓ The treated effluent from the ABR is allowed to flow to a facultative pond for further treatment. Facultative ponds are essentially designed for pathogen removal and retaining suspended stabilized solids, and
- ✓ Maturation pond
- ✓ Anaerobic ponds will provide the basic biological treatment for the sludge;

The following sludge treatment options are ranked by considering key technology aspects including technology viability and affordability. Moreover, the ESIA team further evaluated the feasibility of the technologies in terms of socio-environmental viability and contribution to the clean city development and social development. Finally, the end use of the fecal sludge considered for use to produce byproducts such as composting, energy recovery, and treated wastewater for irrigation. The design consultant has proposed the following fecal sludge treatment plant configuration alternatives which is suitable for Semera-Logia in terms of economic, environmental, and social contexts:

1) Biological Treatment with ABR, Facultative and Maturation Ponds System (Alt1).
2) Biological Treatment with Anaerobic Pond, Facultative and Maturation Ponds System (Alt 2)
3) Biological Treatment 3: ABR, Facultative and Constructed Wetlands (Alt 3)

Fecal sludge treatment takes place in four stages; namely: (1) Pre-treatment, (2) Solids Separations, (3) Biological treatment, (4) Sludge drying. Available treatment technologies for each of the stages may be natural or mechanized, or physical operations or biological processes. According to the Feasibility Study & Preliminary Design Report, a Multi criteria analysis that included a generic comparison of various methods of fecal sludge treatment, resulted that the ABR system with facultative & maturation pond is the most advantageous suitable and optimum system for the Project area. The proposed FSTP comprises the following components: 1) Inlet Works, 2) Biological Treatment Units, 3) Sludge Drying Beds, and 4) Site Works.

1) Inlet Works

The FSTP inlet works comprise a tanker discharge bay, coarse screen and a constant velocity channel. Vacuum trucks shall empty into the tanker discharge by which will comprise a rectangular paved area with raised walls on three sides to contain any splattering from the tanker at the time of discharge. The screenings will be dried and disposed through burial in excavated trenches within the treatment plant. A standpipe will be provided at the inlet works to allow for hosing of all septage spillage to maintain cleanliness while flushing the waste downstream through the inlet works. The inlet works are designed for the ultimate fecal sludge flow.

a) Discharge Bay The discharge bay is designed to allow emptying of the sludge without spilling over, by providing a wide emptying space with sidewall that also holds the sludge to allow flow through the screens. The floor is sloped at 5% to towards the screens chamber. The bay will be cleaned by hosing for which a standpipe is provided.

2) Biological Treatment Units

Anaerobic Baffle Reactor with combination of facultative pond and maturation pond require a small footprint and have eliminated the need for a separate settling tank, they maintain passive operation and low construction and operating cost; however, they will need to be desludged periodically. This option includes the following treatment facilities

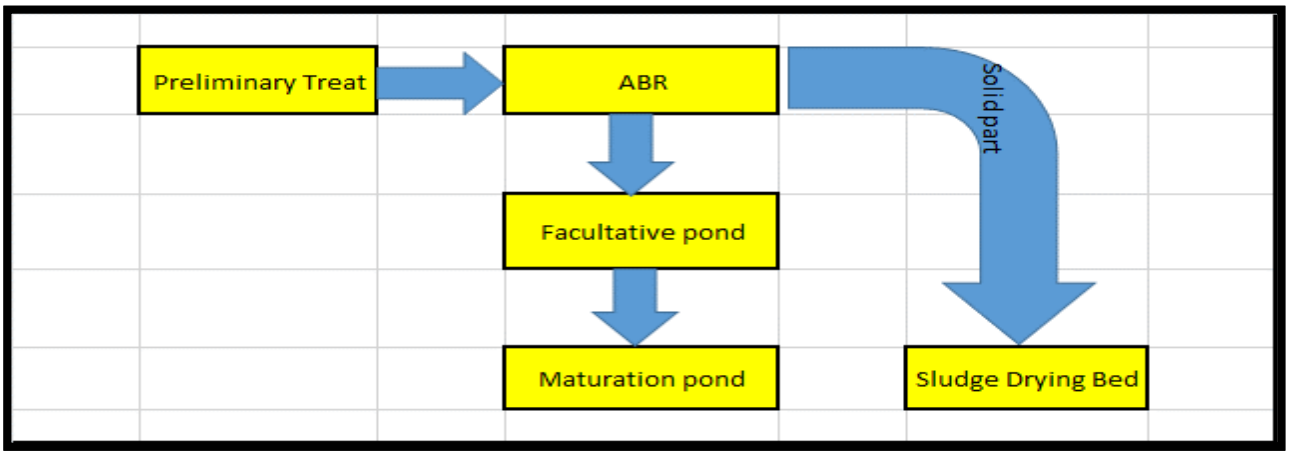

Figure 9: FSTP Layout of ABR with Facultative and maturation treatment system

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

Preliminary treatment: Preliminary treatment involves removal of trash, debris, fats, oil, and grease (FOG) found in raw sewage. It is designed to prevent potential damage to equipment, upsets to subsequent treatment processes and, in some cases, improves the effectiveness of downstream processes. Pre-treatment processes involve use of gravel and stone traps, screens, grit chambers, and FOG removal technologies.

Coarse Screens: Manually raked screens are the simplest option for coarse screening. The spacing between bars on a coarse screen is usually between 2-10mm. The coarse screens are installed on a hinge system so that the operator can tilt up the screen, and then rake the debris into the trough. The standard practice however is to have the screen bent over at the top so that the trash can be raked up into a trough to avoid

having a hinge that can fail. Mechanically raked screen can be used in cases where supply of spare parts and skilled labor for operating and maintaining these systems is available. Also, adequate supply of wash water will be required for regular cleaning of the mechanized rakes.

3) Liquid part of the Fecal sludge

Anaerobic baffle reactor: An anaerobic baffled reactor is an improved Septic Tank with a series of baffles under which the wastewater is forced to flow. The increased contact time with the active biomass (sludge) results in improved treatment. Anaerobic baffled reactors are concrete, masonry, or prefabricated fiberglass tanks consisting of several compartments in series.

Table 8: Sizing of ABR tank

	Parameter	Decision criteria	Provided
1	Inflow (m3 /day)		30.01
2	No. of streams		1
3	Capacity per stream (m3 /day)		30.01
4	Hydraulic retention time (HRT) (day)	Minimum 8hrs 2-3 days	2
5	Volume of each stream (m)		60.02
6	Depth (m)		1.8
7	Plan area per stream (m)		33.3
8	No. of Up-Flow Chambers	3-6	3
9	Length of each Chamber (m)		2
10	Width of each Chamber (m)		5.6
	Overall ABR Dimensions		6.75mx5.75mx2m
11	Up follow velocity of wastewater	<06m/h	0.375 ok
12	Solids Retention time	30-60 days	60 days
13	Assumed influent BOD		5,000 mg/l
14	Optimal Performance	BOD removal up to 90% E. Coli Removal- 1 log	80%
15	Effluent BOD (mg/l)		1000

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

Facultative ponds; Facultative ponds are the simplest form of secondary treatment. Its main purpose is to remove organic material and solids but they can also remove ammonia that is incorporated into biomass (Mara, 2010). When used in fecal sludge and septage treatment, they will normally follow anaerobic ponds. The upper layers of facultative ponds are aerobic, with oxygen introduced through atmospheric oxygen diffusion and algal photosynthesis. Anaerobic conditions prevail near the bottom of ponds while intermediate levels may be intermittently aerobic and anaerobic, depending on the time of day and whether or not photosynthesis is occurring.

Table 9: Sizing of Facultative Pond

S/N	Parameter	Provided
1	Overall Capacity (m^3 /d)	21.4
2	No. of streams	1
3	Capacity of each stream (m^3 /day)	21.4
4	Surface Loading λv (kg/ha/day) 350*(1.107- 0.002T) T-25	265.3
5	Influent BOD (g/m3)	1000.00
6	Pond Surface Area (m^2)	1893
7	Water Depth (m)	1.5

S/N	Parameter	Provided
8	Mid-depth Area (m^2)	806.7
9	Side slope	1:2.5
10	Freeboard (m)	0.5
11	Crest level dimensions (m)	**22.65 x 55.44**
12	Bottom dimensions (m)	12.65 x 45.44
13	Retention Time (d)	56.5
14	Effluent BOD (mg/L)	121.39

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

Maturation pond: Maturation ponds normally follow facultative ponds and are designed for pathogen removal. Their shallow depth, typically 1−1.5 m, allows sunlight to penetrate to the bottom of the pond and inactivate pathogens. The sunlight also encourages photosynthesis, and aerobic bacterial and algal growth. Fecal coliform concentrations are normally used as a proxy for the presence of specific pathogens as they are relatively easy to measure. Since their main purpose is to remove pathogens rather than reduce the organic and suspended solids loads, maturation ponds must follow processes that have already removed BOD and TSS. Ponds should have a length-to-width ratio of at least 2:1 and up to 10:1. Higher ratios provide better model plug flow conditions (Mara, 2010). Ponds can be constructed with vertical concrete walls but the more normal practice is to provide sloping sides, as already described for facultative ponds. Baffles can be used to prevent short-circuiting, but the more normal procedure is to provide several ponds in series, since this maximizes pathogen removal.

Table 10: Size and retention time of maturation pond

S.N	Parameter	Design criteria	Details
1	Overall capacity	-	21.4 m^3/d
2	Number of streams	-	1
3	Capacity of each stream	-	21.4 m^3/d
4	Number of bonds in each stream	-	3
5	Influent BOD	-	121.39 g/m^3
6	Retention time per pond	-	7 days
7	Pond volume		149.8 m^2
8	Freeboard		0.5 m
9	Pond depth		1.5m
10	Crest length		23.56 m
11	Side slopes	-	1:2.5
12	Mid depth length	-	17.31m
13	Mid depth width	-	5.77m
14	Crest width		12.02 m
15	Overall dimension	-	23.56X12.02
16	Effluent BOD	<30	0.07 mg/L
17	Effluent coliforms)		202.57 coliforms/100ml

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

4) Solid treatment

Sludge drying beds: Sludge drying beds are the longest established and simplest option for sludge dewatering. It is a simple, permeable bed that, when loaded with sludge, collects percolated leachate and allows the sludge to dry by evaporation. Approximately 50% to 80% of the sludge volume drains off as liquid or evaporates. The sludge, however, is not effectively stabilized or sanitized. The bottom of the

drying bed is lined with perforated pipes to drain the leachate away that percolates through the bed. On top of the pipes are layers of gravel and sand that support the sludge and allow the liquid to infiltrate and collect in the pipe. It should not be applied in layers that are too thick (maximum 20 cm), or the sludge will not dry effectively. The final moisture content after 10 to 15 days of drying should be approximately 60%. When the sludge is dried, it must be separated from the sand layer and transported for further treatment, end-use or final disposal. The drainage pipes are covered by 3-5 graded layers of gravel and sand. The bottom layer should be coarse gravel and the top fine sand (0.1 to 0.5 mm effective grain size). The top sand layer should be 250 to 300 mm thick because some sand will be lost each time the sludge is removed. To improve drying and percolation, sludge application can alternate between two or more beds. The inlet should be equipped with a splash plate to prevent erosion of the sand layer and to allow for even distribution of the sludge.

The ESIA team has come up with the idea of designing the sludge drying beds to be solar drying systems. Drying bed is usually designed using concrete and the top of the bed is covered by transparent material to allow the passage of sunlight. This is basically a greenhouse structure where sludge is stored and kept for drying 10–20 days depending on solar intensity and length. The system is usually designed to operate in both batch and continuous mode with control airflow, temperature, ventilation facility, which affect the evaporation efficiency (Chaisar and Garg, 202). The main advantages of this system are low investment, less energy input, high dewatering efficiency, etc. Drawback of this system is more space requirement and mechanical system required for turning the sludges. But it is also an opportunity for creating huge jobs for local peoples. Therefore, the ESIA consultant highly recommends using solar energy source to run the FSTP.

Table 11: Sludge drying bed Design parameters

S/N	Parameter	Design Criteria	Details
1	Population served	-	106,451
2	Application rate (m2/person)	0.025	0.017
3	Required Drying area	-	1,810
4	Provide length (m)		62
5	Required width (m)		29.2
6	Sludge Depth (mm)		200
7	Sand Layer		Depth 300mm;Size 0.3-0.75mm
8	Gravel Layer		Depth 300mm;Size 5-25mm

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

Figure 10: Proposed Sludge drying Bed (phase 1)
Source: Final Feasibility Study and Preliminary Design Report (May 2022)

5.2.3.4 Auxiliary project components

In addition to the main fecal sludge treatment plant the project will have the following auxiliary site works or constructions activities. The site works at the treatment plant include fencing, gate and gatehouse, access roads, office, washing platform. The works are described in the following sections.

Fencing, Gate and Gatehouse: A concrete posts chainlike perimeter fence 1.8 m high 700 m long fence with 7 m wide steel get consisting of two wings will be constructed to keep out intruders and livestock from the site.

Office Building: A small office building comprising of an office for the operator and record keeping and a store, are envisaged.

Laboratory: Due to cost consideration, the laboratory will not be constructed in the site but it proposed to construct a Water Quality Laboratory for the Utility either at the Utility offices.

Ablution block: This will comprise of two toilets for use by the workers, sludge truck drivers and crew and visitor.

Clean Water Tank: Clean Water storage tank with a capacity of 10 m^3 on 3 m high reinforced concrete tower to store water for use at the site.

Access roads and Parking: About 2100 sq. m access roads will be provided for access of sludge trucks to the discharge bay, and sludge drying beds. The road will be constructed from compacted sub-base and base layers with cobblestoned finish are proposed.

Drainage-Flood Protection: Since the FSTP site is not found in close proximity with any major drainage way, an earth-made channel (trapezoidal, bottom width 1.00m, average depth 1.00-1.50m side slopes 3:2 w:h) is proposed to be constructed along the fence in order to protect the site from runoff reaching from neighboring areas. In addition, a retaining wall will be constructed in the upstream of the FSTP. Furthermore, the road system of the facility will be protected with unlined (earth-made) channels formed along both edges of the roads in order to prevent localized flooding within the Plant.

Vehicle Washing Area: There will also be an additional paved area to be used for tanker washing. The paved areas shall be sloped towards a common outlet leading to a constant velocity of the channel preceded by a coarse screen. Similarly, the construction of these auxiliary facilities mainly involves earth and concrete work. No electromechanical work is involved and a reasonable period for construction of the above civil works was suggested to be about 12 months.

5.2.3.5 Construction of civil works related to FSTP

The construction of the above components mainly involves earth and concrete work. No electromechanical work is involved and a reasonable time frame for construction of the above civil works was suggested to be about 30 months.

Source of Energy for FSTP: The ESIA team is also considering solar power as sources of energy for running the FSTP. The solar energy can be used for lightning, for running the treatment plant, and drying the sludges. The Semera-logia is best suited for solar energy harvesting with strong and longer hour of sun.

5.3 Cost Estimates

This chapter provides a description of the proposed FSTP that assists in determining the significance of impacts that may arise. The proposed works for Semera-Logia town are described in the Design Consultant's feasibility and preliminary Study Report (May 2022).

5.4 Implementation Arrangements

The construction has been proposed to be undertaken in three phases. The first phase (short term) is between 2021 and 2026; the second phase (medium-term) is between 2026 and 2031, and the final phase (long term) is between 2031 and 2041. The current project is planned to be implemented in the short-term period: from 2021 to 2026. The horizon was discussed in table 1 on page xix in this report.

The proposed project horizon has a specific activity as described in below:

Short term: construction of public and communal toilets, purchase of vacuum trucks and construction of fecal sludge treatment plant, phase I

Medium term: Extension of the present emptiable on-site individual toilet facilities in the other parts of the town, Rehabilitation of Public toilets c/w septic tanks, purchase of additional vacuum truck and extension of FSTP-Phase II

Long term: construction of Simplified Sewerage for Individual houses, Simplified Sewerage for Communal, Public, Institutional, and Commercial Septic tanks' filtered wastewater, and Decentralized waste treatment plants (DEWATS)-Phase III.

To pursue the smooth implementation of projects activities proposed in the Plan, this sub-section presents an organizational arrangement shown below composed of concerned organizations:

The SLWSSE is the central unit responsible for the implementation of the overall subproject activities together with municipal and regional stakeholders. In this regard, SLWSSE is on a project management unit, which will oversee front-line activities and day-to-day management in the course of the implementation. The enterprise is responsible at pre construction (designing), construction, operation, and decommissioning phases. The project management unit is to be headed by the enterprise and supported by the regional water and energy Bureau. The management unit is further composed of the divisional officers concerned from relevant sectorial offices. The unit may be assisted by experts or consultants on a technical assistance basis (assistance concept). On top of this MoWE is an overarching institution to facilitate the implementation and sustainability of the proposed project. The other entities include health, education, agriculture, culture and tourism, urban development and construction, women and children affairs, labor affairs, etc.

Implementation Mechanism: Though the implementation mechanism related to the tendering procedure is subject to the rules and regulations of the financing agency, the packaged contract tendering is the most recommended implementation mechanism that attracts the most competent local contractors.

6. SUBPROJECT ALTERNATIVE ANALYSIS

The purpose of the analysis of alternatives is to identify other options, including not implementing the project, to achieve the project objectives and compare their impacts with the original proposal. The analysis, then systematically compares feasible, less adverse, alternative technologies, designs, operations, and sites including the "no project" option – to the proposed project in terms of:

- Their effectiveness of achieving the project objectives as well as potential trade-offs
- Their potential environmental and social impacts
- The feasibility of mitigating these impacts
- Operational requirements and their suitability under local conditions
- Their institutional, training, and monitoring requirements
- Their estimated cost-effectiveness; and
- Their conformity to existing policies, plans, laws and regulations.

Proper FSTP site selection is the fundamental step in the sound waste disposal and the protection of the environment, public health, and quality of life. It determines many of the subsequent steps in the fecal sludge process, which, if properly implemented, should ensure against nuisances and adverse long-term effects. In the contrary inappropriate selection of a site can contribute to a bad image and reputation affecting the FSTP operations. FSTP site selection is a step-by-step process, in which environmental, engineering and economic criteria are applied successively. Environmental and social impact assessment constitutes the first and most crucial stage in the selection process, aiming to quantify the impacts according to the natural characteristics of the sites. A method is presented to facilitate the proper selection of FSTP site for fecal sludge management. The method follows specific principles, called "selection criteria", the aim of which is to compare the considered sites to a hypothetical "ideal one". As a result, the more a site matches the ideal and fulfills the criteria requirements, the more suitable it is as a FSTP site.

The selection of a site for construction of FSTP for Semera-Loggia Sub towns is one of the most important and challenging decisions to be made by the SLWSSE and town administration in developing and implementing its fecal sludge management plan. The existing master plan of the town has not designated a site for fecal sludge disposal site so far. Consequently, the Consultant team (engineering) in consultation with the Client, particularly the SLWSSE, and the regional bodies, conducted an exhaustive field visit to the potential site of the towns. Accordingly, two sites on the Semera-Djibouti Road were proposed for preliminary site assessment. According to the SLWSSE and design consultant report the site near the Semera Industry Park is selected for FSTP construction

The proposed subproject intervention site was assessed at this preliminary phase with the objective in addressing issues, which will be related to the FSTP development. The site evaluation gave stresses to the following points.

- From the point of view of selecting the most degraded area under no/little economic activity
- From the perspective of optimizing site selection with the rehabilitation of degraded area with the development of FSTP site
- From the point of view of enhancing the opportunity for minimizing land ownership and compensation issues

- To adopt previous dumpsites and incorporate the Client's interest in the assessment (it is new site). Repeated field visit and study was conducted to select the social and environmentally suitability. Geological investigations is not done for the FSTP sites.

6.1 'No sub-project' option

The "no action" option was one of the many choices provided and examined in the comprehensive ESIA in order to meet the program objectives. Technical, economic, environmental, social, and climate risk comparisons were made amongst the alternatives, taking into account the public's concerns as expressed during public discussions. In order to reduce the requirement for compensation, the project alignment was assessed to look into alternative FSTP sites where needed. Doing nothing will jeopardize or delay the long-term town development plan since a good sanitation system is important for maximizing the effects of other development measures and elevating the town's reputation.

Under the Do-Nothing Alternative, FSTP will not be built and operated, and the insanitary conditions associated with the unsafe dispersal of fecal sludge on lands and open defecation surrounding the town will continue. The do-nothing alternative would mean that land and water and ultimately the surrounding environment will continue to be polluted and loaded with untreated fecal matter and potential disease vectors. The system released the untreated micro-nutrients (mainly nitrogen and phosphorus) into the natural environment.

These FSTP in Semera-Logia Town is expected to: improve sanitation and public health in the urban setting. The municipal population is growing fast amid the absence of adequate and quality sanitation services and facilities. Thus, choosing the 'no project' option is, from the economic perspective as well as health and social considerations, the following benefits will be realized: i) improved sanitation; ii) enhance modern FSM; iii) employment; and iv), low incidence of pollution, diseases, and accidents. For this subproject, the alternative of "no-project" will increase the risks of poor public health and environmental degradation. Hence, the 'no sub-project' option is not a viable alternative.

6.2 Alternative Fecal Sludge Treatment Plant

6.2.1 Alternative to site selection

Based on different criteria two separate FSTP sites were proposed by the town administration in collaboration with SLWSSE and the Design consultant as well as other relevant stakeholders. Selection of the FSTP location has been done by applying the criteria listed above. Various options have been considered and most favorable sites was analyzed.

Figure 11: Proposed FSTP Site (option 1 is selected for FSTP construction)
Source: Final Feasibility Study and Preliminary Design Report (May 2022)

6.2.2 Site Area 1 potential plot

This site is located about 4km from Semera in the Semera-Djibouti route. It is located between 720160 eastings and 1307361 northings with an elevation of 396masl. The area is owned by the city administration and the site and its surrounding was previously used as a quarry site and now open. Furthermore, the selected location is located on land that did not require resettlement and RAPs. It is characterized by scattered shrubs, bare land and rocky and unproductive, and no settlement is found around the site. The area is also accessible and near to Semera- Djibouti highway. The site seems more suitable compared to the site area 2 potential plot from the point of view of proximity to Semera and Logia, which may reduce transportation, cost, less flood risk, and other criteria. But it is found within one Km radius with the Semera industry park which may have an impact on the industry park functioning.

6.2.3 Site Area 1 potential plot

This plot is located about 14 km from Semera and the site is publicly owned, not productive and has excess area for further expansion. It is located 727,414 east and 1,307,890 north.

Site area 1 potential plot and site area 2 potential plot are in the same general direction on the Northeastern side of Semera town, publicly owned, and are not productive with limited settlement. However, Option 2 site is 6 km further than Option 1. Preliminary screening has therefore settled on Option 1 by the design consultant.

Despite there are other technical matter that need to be consider for final selection of the site such as the geological investigation results the ESIA consultant team has observed that this site is within 1km radius of the industrial park and this may have an impact on the industry operation as a result of bad odor. Moreover, due to the prevalence of high wind in the area, dry matter may be disposed from the treatment plant to the industrial park. Hence, site 1 is preferred over site 2 for its socio-economic and environmental benefits. So that, ESIA consultant team recommends site 1 than site 2. During the decision-making on site 1,

the consultant considered the following selection criteria: proximity to road, water points and other utilities in the surrounding areas, residential areas, public and private institutions such as schools, health posts, markets, and shops. In addition, the land suitability and availability have been considered in addition to the technical inputs from the design consultant.

According to design consultant, the suitability of the proposed FSTP based on site selection criteria is summarized in the following table.

Table 12: Site Selection Criteria

No.	Criteria	Condition at the Site	Remarks
1	Land availability	The required 5 ha of land is available	Suitable
2	Land acquisition	The Town Authorities have assured that the land is available for acquisition	Suitable
3	Minimum resettlement	No compensation is required	Suitable
4	Distance from service area	Site is 4km from the Semera and less than the maximum 15 km from the extreme service area in Logia sub-town	Suitable
5	Risk of flooding Minimum	Land is on a slope and not a flood plain	Suitable
6	Risk to ground & Sources water	There are no known groundwater sources in the neighborhood	Suitable
7	Nuisance to neighboring activities	Currently, there are no settlement around the site the only activities in the neighborhood is the road to Djibouti	Suitable
8	Disturbance to ecosystem	The area currently do not have a lot of trees and vegetation Construction activities will minimally disturb the current ecosystem Minor mitigation measures will be required as provided for in the ESIA	Suitable

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

6.2.4 Technology Alternatives of FSTP

Fecal Sludge Management involves the use of onsite facilities and the management of the resultant sludge usually by emptying, transportation, treatment and finally disposal or reuse; the handling of sludge from all points of generation poses various contamination risks and requires proper management.

Fecal sludge can be treated in a variety of ways and there is no single best option considering the widely varying conditions of urban areas.

The Design Consultant suggests that the following limitations/criteria should be considered when selecting treatment technologies:

- low cost - both in terms of capital and of operation and maintenance;
- simplicity of operation and maintenance;
- low, preferably zero, energy usage- essential for low operational costs;
- low, preferably zero, use of chemical, especially chlorine or others;
- low land takes, although this is only occasionally really relevant;
- high performance - ability to produce an effluent of the required quality;
- low sludge production.

Various options for treatment of sludge are available. Because sludge comprises of complex organic minerals, most of the treatment options involve some form of anaerobic digestion to complete the process of mineralization. Subsequent treatment processes may include solid liquid separation, liquid treatment, solid treatment and pathogen removal in liquid stream. Table below presents the treatment methods that could be considered.

As per feasibility study, Screened Fecal Sludge Treatment Options for Semera-Logia comprise different options for Solid Liquid separation, Primary liquid treatment and Secondary effluent treatment and Solid's treatment. To assist in making informed decision on selection of the most appropriate treatment process, these technologies are evaluated for each treatment step and for different treatment configurations. Table below presents Screened Fecal Sludge Treatment options.

Table 13: Screened fecal sludge Treatment options

Solid-liquid Separation/Anaerobic processes	1st stage Liquid treatment	2nd stage Liquid Treatment	Solids Treatment
Anaerobic ponds	Facultative ponds	Maturation pond	Sludge Drying bed
Anaerobic Baffle Reactor	Aerated Ponds	Constructed wetlands	

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

6.2.4.1 Solid liquid separation options

Solids-liquids separation is the most important step in the fecal sludge treatment process. Effective separation at this stage can reduce the loading requirements of downstream processes, and significantly improve the overall efficiency of the plant. The following Table and Figure below summarize and compare several solids-liquid separation technologies against key factors, such as % DS (Dissolved Solid), design, construction and operation considerations, which are important for selection consideration.

Table 14: Criteria for Pre-selection of technologies for solids-liquid separation

NO	Criteria)	Anaerobic Pond	Gravity Thickener	Sludge Separation Chamber	Sludge Drying Bed	Mechanical Dewater
A.	**Performance**					
1	Achievable consistency and biochemical stability of bio solids	Pre-treatment	Pre-treatment	Pre-treatment	poor	poor
2	Achievable hygienic quality of bio solids	Pre-treatment	Pre-treatment	Pre-treatment	poor	poor
3	Achievable quality of liquid effluent	Good	Moderate	Moderate	Moderate	Moderate
B	**Process simplicity & reliability**					
1	O+M requirements	Low	Low	Low	Low	High
2	Skills required for operation and supervision	Low	Low	Low	Low	High
3	Risk of failure related to installations or to managerial or procedural measure	Low	moderate	moderate	moderate	Very High

NO	Criteria)	Anaerobic Pond	Gravity Thickener	Sludge Separation Chamber	Sludge Drying Bed	Mechanical Dewater
C	**Cost-related**					
1	Land requirement	Moderate	low	Moderate	Moderate	Low
2	Investment costs	Moderate	Moderate	Moderate	Moderate	Very High
3	Operation and maintenance Cost	Low	Low	Low	Low	Very High
	Selection	**Select**	**Select**	**Select**	**Omit**	**Omit**

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

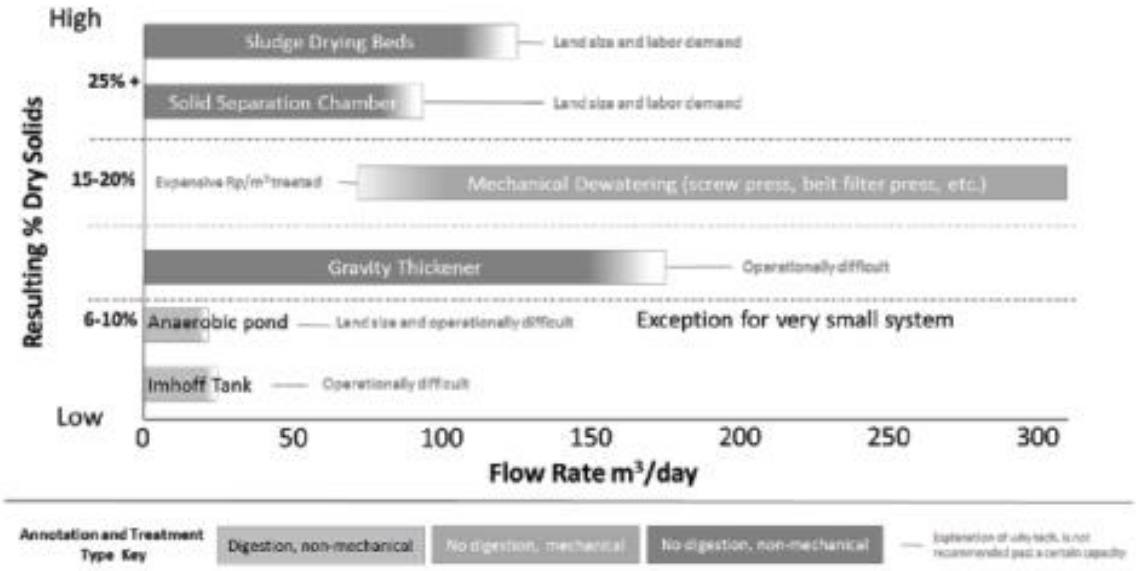

Figure 12: Comparison of technologies for solids-liquid separation with respect to flow rate
Source: Final Feasibility Study and Preliminary Design Report of the project

The selection of a technology for solid-liquid separation for any location is governed by a number of factors that include land availability, sludge characteristics, cost, energy requirement, and required skills. For Semera-Logia land is relatively available, but there is low funding for both capital investments and O&M, and relatively low staff skills. Consequently, the situation favors low-cost technologies with little or no energy requirement and that can be constructed and operated with minimum skills. The characteristics of the expected sludge will be both aged and therefore mineralized mainly from pit latrines, and fresh from hotels restaurants and institution, which requires some form of anaerobic process.

Based on the above evaluation of solid-liquid separation technologies, Anaerobic ponds and sludge drying beds option is proposed as the most suitable and favorable technology to be adopted for solid - liquid separation.

6.2.4.2 Liquid treatment options

Supernatant from the solids-liquid separation step will resemble to very high strength wastewater. After the solids-liquid separation step, the BOD and TSS in the liquid stream are expected to be reduced to high degree; this is almost an order of magnitude higher than domestic sewage. The higher strength of septage/fecal sludge creates a need for more than one treatment stages, if an acceptable effluent standard is to be achieved.

The liquid portion separated from the septage/fecal sludge, as well as the liquid removed during the solid's treatment process, can be treated using passive methods, such as waste stabilization ponds or anaerobic baffled reactors, or mechanical processes, such as aerated ponds, oxidation ditches, and trickling filters.

The Table below summarizes and compares liquid unit treatment processes against design, construction, and operation factors that are important for the selection of appropriate technology. Different treatment mechanisms, such as anaerobic and aerobic, are distinguished by various shades of color. Practical capacity range for each type of liquid treatment units is also summarized in Figure hereunder.

Table 15: Criteria for Pre-selection of technologies for organics removal (liquid Treatment)

NO	Criteria)	Anaerobic Baffle Reactor (ABR	Waste Stabilization Ponds	Trickling Filter	Oxidation Ditch
A.	**Performance**				
	Achievable quality of liquid effluent	Pre-treatment	Pre-treatment	Pre-treatment	Pre-treatment
B	Process simplicity & reliability				
	O+M requirements	Low	Low	High	Very High
	Skills required for operation and supervision	Low	Low	High	High
	Risk of failure related to installations or to managerial or procedural measure	Low	Low	High	High
C	Cost-related				
	Land requirement	Moderate	Moderate	Low	Low
	Investment costs	Moderate	Moderate	High	High
	Operation and maintenance Cost	Low	Low	High	Very High
	Selection	**Select**	**Select**	**Omit**	**Omit**

Source: Final Feasibility Study and Preliminary Design Report (May 2022)

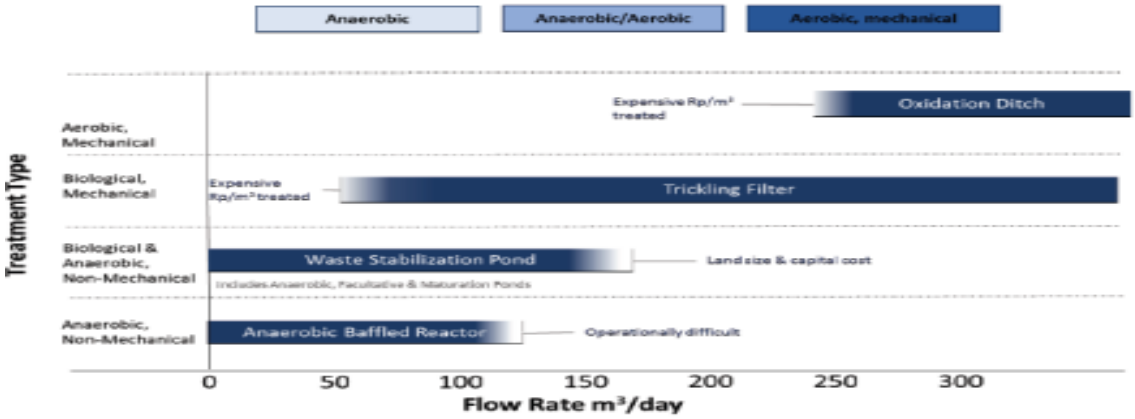

Figure 13: Comparison of technologies for liquid treatment organics removal with respect to flow rate

Source: Final Feasibility Study and Preliminary Design Report of the project

The selection of a technology for liquid treatment for any location is governed by a number of factors that include treatment process, simplicity of construction, requirement of electro-mechanical equipment, cost, energy requirement, and required skills and others.

Consequently, the situation favors low-cost technology with little or no energy requirement and that can be constructed and operated with minimum skills. Thus, technologies like waste stabilization ponds, and Anaerobic Baffled Reactor will be best suited for Semera-Logia.
Based on the above evaluation of liquid waste treatment alternatives, Anaerobic Baffle Reactor and Waste Stabilization Pond are proposed as the most suitable and favorable technology to be adopted for liquid waste treatment.

6.2.4.3 Solid treatment options

Solids' treatment technologies are primarily used for dewatering and drying of sludge, and for stabilization and pathogen reduction. The septage entering the treatment plant is typically 1% to 3% dry solids content (by mass). The solids liquid separation step thickens the solids in the septage to a dry solids content typically between 6% - 30% depending on the process used, and even up to 50-60% for sludge drying beds Selection of solids treatment technologies should consider the end use of the final sludge product.

Table below categorizes solids' treatment technologies by various treatment goals and summarizes their requirement for design, construction and operation considerations. Figure that follows shows the practical capacity range for each solids' treatment technology and explains the reasons behind.

Table 16: Summary and comparison of technologies for solids treatment

Process	Design and Construction				Operation			
	Treat Goal	**Capacity Range**	**Construction**	**Equipment**	**Energy**	**Labor**	**Chemical/ consumable**	**Operator skill**
Sludge Drying bed	Dewater	Medium-High	Simple	No	No	High	Sand	Low
Composting	Pathogen reduction	Low-Medium	Moderate	May be	Yes	High	Bulking agent	Medium
Solar Drying	Dewater, pathogen reduction	Medium-High	Moderate	No	No	High	No	Low
Thermal Drying	Dewater, pathogen reduction	Medium-High	Complex	Yes	high	Medium	No	High

Source: Final Feasibility Study and Preliminary Design Report of the project

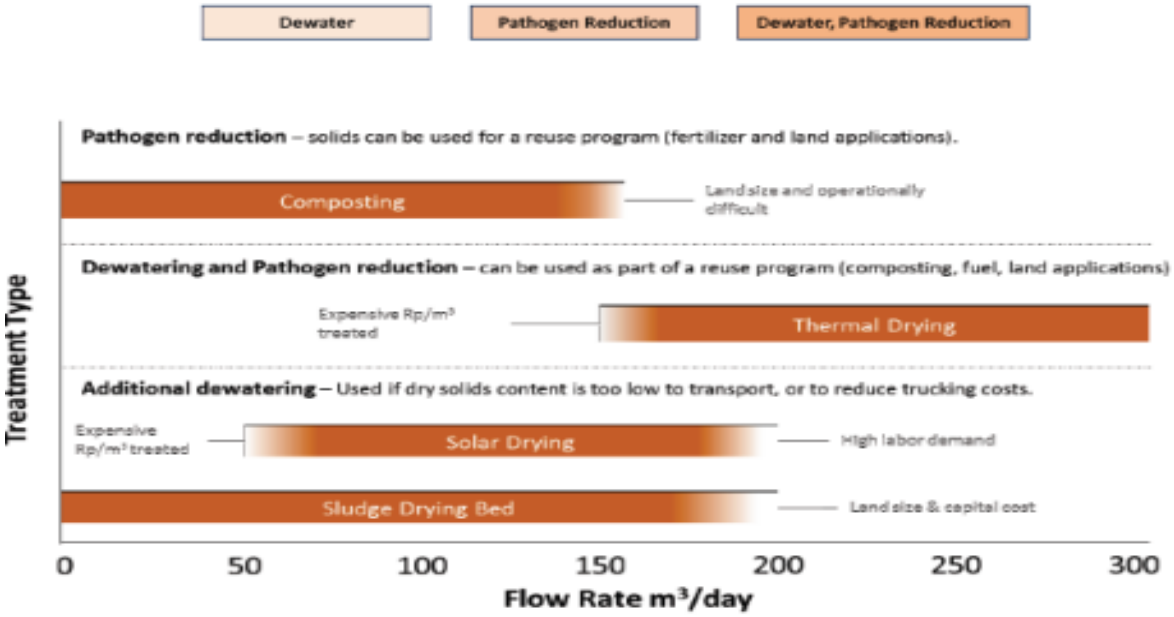

Figure 14: Comparison of technologies for solids treatment with respect to flow rate
Source: Final Feasibility Study and Preliminary Design Report of the project

Sludge drying beds provide a simple dewatering option, and is proposed as the most suitable and favorable technology to be adopted. Pros and cons include respectively simple construction, no energy and skilled labor need, but the method requires relatively high land surface to develop. Sludge drying beds provide a simple dewatering option, and is proposed as the most suitable and favorable technology to be adopted for the project area. Pros and cons include respectively simple construction, no energy and skilled labor need, but the method requires relatively high land surface to develop.

Equipment for thermal drying is highly sophisticated and requires specialized design and engineering from equipment manufacturers. This process requires electricity, skilled labor, reliable manufacturer support, and a supply chain for spare parts. The availability of these factors should be considered together with impacts to operating costs and reliability. Therefore, this technology is not suitable for Semera-Logia.

Solar drying is very simple and effective for obtaining high dry solids content, but requires a lot of available land, reasonably long drying times, relies upon environmental conditions and ventilation for performance, and requires significant manual labor for turning. Therefore, it is not recommended for Semera-Logia. Because the site has considerable large land area as well as the area is characterized by high temperature almost all year round.

6.2.4.4 Treatment Process for Pathogen Removal in Liquid Stream options

The following are several treatment processes that can be used as a final polishing step to remove pathogens and disinfect water in the liquid stream. It is important that influent into these processes is sufficiently treated to remove most solids and organic matter, or the efficacy of these processes will be greatly diminished.

Table 17: Summary and comparison of technologies for liquid treatment pathogen removal

S/N	Criteria	Score	Maturation Pond	Constructed wetland
1	Construction method/costs	20	17	8
2	Equipment	5	5	5
3	Land	5	4	3
4	Pathogen removal	20	18	15
5	Ammonia Removal	10	5	8
6	Solid Removal	10	6	8
7	Energy Requirement	5	5	5
8	Operator Skill	5	5	4
9	Labor	5	5	4
10	Desludging/Re-planting	10	8	5
11	Mosquito breeding	5	2	5
	Total	100	80	70

Source: Final Feasibility Study and Preliminary Design Report *(May 2023)*

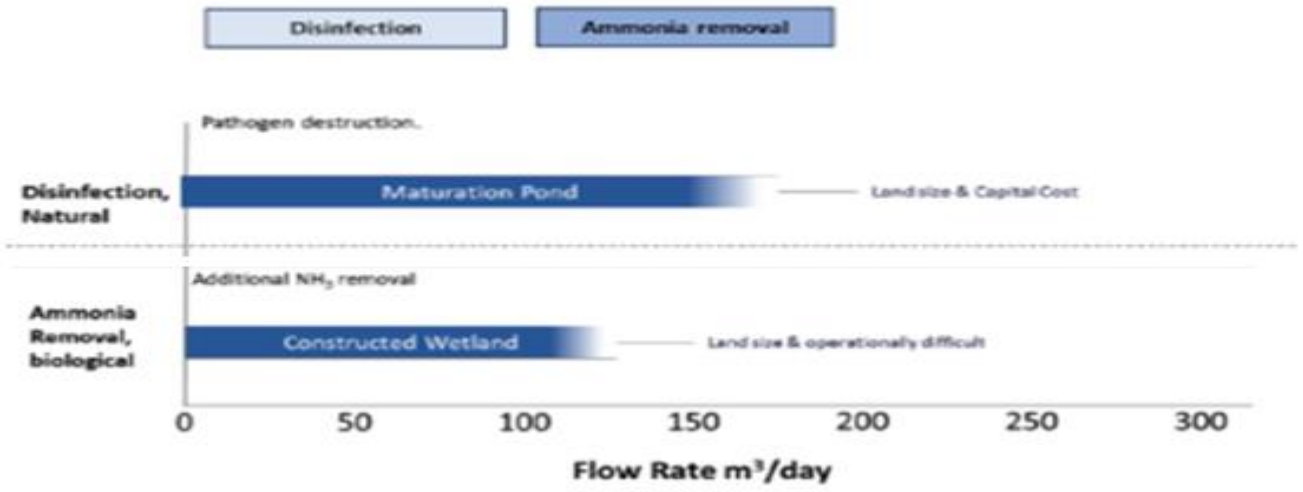

Figure 15: Comparison of technologies for liquid treatment pathogen removal with respect to flow rate
Source: Final Feasibility Study and Preliminary Design Report of the project

Due to the availability of land, constructed wetland treatment and maturation ponds are recommended treatment process in order to reduce pathogen concentrations to the levels required for either restricted or unrestricted irrigation.

Due to logistic complications involving supply chain, transportation, and storage associated with chlorine disinfection in addition to health and safety concerns, disinfection using chlorine is not recommended.

6.2.4.5 Effluent discharge

The necessity to provide safe disposal of fecal sludge (FS) wastes in a way that minimizes negative effects on the environment and human health, as well as cost-effectiveness as defined by the distance to disposal sites, was highlighted through different scenarios and site selection for the FS disposal component. Alternative scenarios and site selection for FS collection and treatment highlighted the necessity for secure FSM.

The selected FSM technologies are also able to meet ESMF provided effluent standards as stated in table 18 below.

Table 18: ESMF recommended Treated Effluent Standards

Parameter	Unit	Value
BOD	Mg/l	125
COD	Mg/l	30
TSS	Mg/l	50
TKN	Mg/l	10
TP	Mg/l	2
Fecal Coliforms	No/100ml	<100

6.2.4.6 Cost Estimation

The cost estimates of different components of the faecal sludge treatment plan is presented in table 19 below

Table 19: Summary of estimated cost of FSTP development

In No	Discerption	ABR with Maturation Pond (USD)	Anaerobic Pond with Maturation Pond(USD)	ABR Constructed Wetland(USD)
1	Fecal Sludge Treatment Plant	804,760.00	779760	854760
2	Laboratory Building and Equipment's	250,000.00	250000	250000
3	Add 15% preliminary and General Items	158,214.00	154,464.00	165,714.00
4	Add 10% Contingency	121,297.40	118,422.40	127,047.40
		1,334,271.40	1,302,646.40	1,397,521.40

Source: Final Feasibility Study and Preliminary Design Report *(May 2023)*

Following a multi-criteria analysis comparing the above fecal sludge treatment options against a number of technical, financial and other criteria, the ABR system with Facultative and Maturation ponds (Alternative 1) was selected as the most advantageous and optimum system. The selection further evaluated against available FSTP technologies in terms of technology use capacity, land availability, economic feasibility, social and environmental benefits by the ESIA consultant. Hence, some of the proposed technology alternatives are not feasible for Semera-Logia case, though they are the best available.

The above selected technologies not involve the use of expensive equipment for aeration, pumping, building of concrete structures or other mechanical processes, these systems are also an attractive option for use in remote communities and arid climates. Therefore, due to the remote location of Semera-Logia from major towns where skills, services and equipment are available, its levels development with limited funds for operation and maintenance, available land, and (5) mixture of aged and fresh sludge. Screening of technologies on the identified treatment options, it also excluded mechanical dewatering, thermal drying, trickling filters on basis of large capital and operating costs, mechanization, external energy requirement, and requirement of highly skilled operators. The technologies that are applicable to Semera-Logia Town are selected to be biological treatment options with the combination of ABR, facultative and maturation bonds.

7. CONSULTATION PROCESS

ESIA was prepared for phase I subproject implementation (2021-2026) and an environmental impact statement certificate will be given for the project to start.

Article 43 of the constitution of Ethiopia, other national legislations and international conventions require the need to consult and participate the interested and affected parties in the planning and implementation of development projects. Financial Institutions like the World Bank also require different consultations to be made with concerned public and stakeholders. Hence, the public consultation process in Semera-Logia was conducted in accordance with the above policy and legislations.

Accordingly, different consultations have been conducted with the key stakeholders including the project affected with the objective to:

- Provide clear and accurate information about the proposed subproject to communities living in the subproject area, especially along with the proposed subprojects in order to obtain feedback/valuable
- Assesses and identify the major existing socio-economic problems of the project area with particular focus on loss of property, livelihood, and related effects on the biophysical environment
- Assess the perceptions and attitudes and concerns of the stakeholders and community towards the proposed sub project
- Identify the potential economic and social impacts of the sub projects project.
- Find out possible mitigation measures that would help to avoid and/or minimize the major negative impacts and to enhance the positive impacts.
- Share experience from the implementation of previous SLWSSE works particularly how impacts were mitigated
- Share information with stakeholders on proposed improvement works, implementation schedule, and expected impact on the physical, biological, and socio-economic environment of the subproject.
- Promote understanding through the active engagement of individuals, groups, stakeholders, and organizations who have a stake in the subproject and its outcomes. Public/PAP consultation plays a critical role in raising awareness of the impacts of the new developments.

For Semera-Logia FSTP construction, several stakeholder engagement activities were conducted, including Steering Committee meetings, public hearings, and bilateral meetings with institutional stakeholders.

During the preparation of the ESIAs, extensive consultations were conducted. In general, communities were given some detailed information about the project through presentations by the consultant team. The presentations highlighted the project background, objectives, expected upcoming activities, and potential socio-economic and environmental impacts. After the presentations, the community was given an opportunity to give their views, comments, and queries. Questions were answered, clarifications offered and their recommendations received. Some of the key questions raises as part of management of the FSTP sites. Community consultations were held at the Semera sub town Kebele 04 at Asboda project intervention sites and stakeholder meeting at Semera-Logia mayor office (Asboda 09 April 2022 and Mayor Office on 08 April 2022). Staffs in charge of infrastructure in all sectors attended the consultative meeting at Mayor

Office where the project will be implemented. Mayor of the town and SLWSSA representatives chaired meetings.

In addition to the Steering Committee, public hearings were also conducted. On 09 April 2022 one public consultation were held at Asboda, where the FSTP is planned to be constructed, and one with the mayor cabinet which consists of environment and land, land administration, Health, Education, Women and children affair, finance, communication, and others relevant key stakeholders who involved in the process. On 10 April 2022, two institutional stakeholder meetings were organized in the sectors of Semera-Logia sub town, where the FSTP systems will be developed.

The people in the project impact areas of influence have also been approached with questionnaires for a number of key informant interviews and FGD (see pictures below). The project ESIA process also involved the development of a separate Stakeholder Engagement Plan (SEP) report which provides guidance for the engagement and disclosure activities for the future project stages, starting from the project preparation to the actual operation of the wastewater project. For the fecal sludge components, discussions and interviews were conducted with the local authorities, and stakeholders, as well as with temporary workers in the existing open dumping sites.

Figure 16: FGD at Semera Keble 01 (left) and proposed public toilet site (right) (high school area)

In general, communities were given detailed information about the project through presentations by the consultant team. The presentations highlighted the project background, objectives, expected upcoming activities, and potential socio-economic and environmental impacts of the proposed subproject interventions. After the presentations, the floor was open to the community for discussion and to forward their views, comments, and queries. Questions were answered (that need an immediate response by the ESIA consultant and SLWSSE staff), clarifications offered, and their recommendations received for further deliberation. Some of the key questions rose during the public consultations.

7.1 Consultation methods

Consultations were undertaken with community members and government officials at Kebele levels to obtain the opinions and attitudes towards the proposed FSTP projects for Semera-Logia town. Bedsides, different governmental offices in Semera-Logia were consulted to collect information and to share their feelings about the implementation of the proposed projects.

The consultation took place in cooperation with and facilitated by both the municipality and local authorities (Kebeles). The consultation participants were selected giving emphasis on their social status and representative views. Community elders also participated in the discussions. The discussions and inquiries made use of an open-ended checklist, as described below.

- Attitudes towards the project
- Expected benefits from the project
- Possible adverse impacts of the project and their mitigation measures to manage/ameliorate the negative impacts
- Participation and cooperation from the people to support the implementation of the proposed projects

Figure 17 Opening meeting project staff (Semera-left) and Consultative meeting municipality stakeholders (Logia - right)

Figure 18: Community consultation meeting in Asboda, Semera 04 Kebele

Figure 19: FGD in Semera 01 Kebele (high school)

Figure 20: Key informant interview (sample) Logia-Bilal Mosque (left) and Semera, Asboda (right)

7.2 Consultation with Semera-Logia Municipality

All members of consultation meetings were very interested to participate discussions and in discussions sharing their views and opinions on the points of matters raised. The discussion took place in the Semera-Logia Mayor office and office of SLWSSA. All participants in the meeting have discussed and forwarded their opinions on the issues of the implementation of the proposed FSTP project planned for phase one. They discussed in detail the expectations of the people from the proposed project, the possible adverse impacts and their mitigation measures, the role of the local administration plays in the implementation of the project. The attitudes of the administration and the residents towards the realization of the proposed FSTP projects were discussed.

All participants of the meeting have mentioned that the two-sub town's resident has serious sanitary challenges. The town administration tried to convince and raise awareness about nature and type the

project. In general, they agreed to provide lands (it is already secured) for the FSTP at kebele 04, Semera on the way to Djibouti). However, the meeting participants raised the issue of safe disposal of the fecal sludge and proper treatment in order to ensure the health of the resident and the environment. There is an agreement between the project client and the local administration and thus with the local community. According the Semera-Logia administration and the local community, there is no any complain about the land and damages on the property. Furthermore, the municipality owns the allocated lands for FSTP. During the community consultation, none of the participants raised about land and any damaged property.

Furthermore, the officials confirmed that they are not standing against the arrangements made to FSTP to Semera-Logia town. They felt that the development of these projects is very vital to improving the hygiene and sanitation problems of their people.

7.3 Consultation with governmental stakeholders at Semera-Logia town

The Socio-Environmental Impact Assessment Team has consulted different government stakeholders at the mayor office, in Semera. The objectives of the consultation are to discuss the issues of the project and to identify the possible solutions and mitigations measures for the problems that would be caused due to the project intervention in Semera-Logia town. All the consulted organizations were very cooperative to share their concern and information about the project. These organizations include:

- Semera-Logia Water Supply and Sewerage Authority
- Afar Environmental Protection Authority
- Afar Water, Irrigation and Energy Bureau
- Semera-Logia town administration Agriculture and Natural resources department/bureau
- Health Department of Semera-Logia town
- Semera-Logia Women and Children Affairs
- Semera-Logia municipality
- Semera-Logia Urban development and construction.

The outcome of the discussions is briefly presented below:

- The project is critical and needs to be urgently started it construction and designed in such a way to ensure the health and wealth of the public. The implementation of this project is critical to bring about sustainable development and ensuring equitable share considering the interests of all stakeholders;
- The sanitation and FSTP are long-standing problems of the town of Semera-Logia (since uses open fecal sludge disposal site), that need to engage all stakeholders in the design, implementation, and operation;

One of the mechanisms to disclose the project is conducting public consultation with the project affected people and relevant stakeholders. The public consultation is part of the ESIA Study and it should be conducted at various levels of the project study. Public consultations at these levels of the study are vital to disclose the type and nature of the project to directly affected people and to incorporate the public concerns, feelings, and advice in the design of the project. Projects designed through such public participation will be well recognized by the public and induce a feeling of ownership. Timely disclosure of

the project to the public is also important to empower communities and involve them in the project implementation process. This eventually will make the project sustainable and socially acceptable.
As part of the ESIA study, the socio-environmental impact assessment team conducted public consultations and discussions with different stakeholders. During the discussions, we learned that there was a different level of knowledge and understanding about the proposed project among the local people. As a result, they were curious to know the detail of the project and its benefits to them. Moreover, we feel that further discussions and consultations between SLWSSE and local communities at the FSTP site would be important to disclose the project and incorporate their needs in the project implementation.

7.4 Consultation with the local communities at the project intervention site

The participants of the meeting were included from Kebele officials and community elders. Before the start of the official discussion, the study team briefed the participants about the proposed FSTP and Semera-Logia town sanitation problems and about the proposed project activities within the time horizon. Then after, the team requested them to express their feelings, anticipated positive and negative impacts, and the possible mitigation measures to avoid the expected adverse impacts in various phases of the project implementation.
Participants of the consultation were assigned a chairperson of the Kebele to lead the discussion and the Kebele secretary to take the minutes of the discussion.

Major issues raised by the participants of the meeting were:

- Occurrence of bad smells;
- Prevalence of diseases (due to pests and other insects);

The participants of the consultation meeting never raised property issues and nothing to compensate. The problem of nuisance odor needs to be properly addressed during the project design and construction phase. The project needs to properly manage the site and make it suitable for local people.

The consulted community members explained that they do not have problems owning the project and giving the lands to the proposed project implementation and the government makes the necessary arrangements for the construction lands before the start of construction. Other possible impacts discussed during the consultation were the problem of drainage and erosion from the proposed project implementation. They emphasized that these problems should get proper attention from the concerned stakeholders before it causes damage to croplands next to the project site.
Mitigation:

- Fencing the compound to protect entering wild animals (such as Hyenas) and other scavengers;
- Implement the FSTP as indicated in the design so that reduce/avoid bad smells from the treatment plan; and
- Create an employment opportunity for the local people.

Finally, they concluded that they would support the project and participate in its implementation with full heart if they are sure that they will get the expected benefit from the project.

7.5 Summary of Issues Raised by stakeholder at the project intervention

The outcome of the consultation meeting is provided in Table 20 below.

Table 20: Issues and Concerns as rose during stakeholder meeting for proposed work

Stakeholder	Subproject impacts/concern raised	Mitigation suggested
Institutional stakeholders	Project delay and lack of coordination	Improve project communication and capacity of the client and its stakeholders

7.6 Public Disclosure

Start of the project study has been disclosed to PAPs and relevant stakeholders through series of consultations made at City administration, Woreda and Kebele levels. Through these consultations, project information (including purpose, project type, project location) and the ESIA requirements was disseminated to the stakeholders and PAPs. This helped to gain feedback and concerns that need to be addressed during the project planning, construction and implementation processes. This draft ESIA report has been prepared taking into account all the feedbacks from stakeholder and PAPs consultations. In accordance with the World Bank policy on access to information, disclosure of relevant project information needs to be posted on the World Bank external website to receive the opinion and suggestions of civil societies, academics, other professionals as well.

7.7 Stakeholders Engagement Plan (SEP)

For establishing successful and positive relations between the Project and its stakeholders including the communities to be affected from the Project, the Stakeholders Engagement Plan needs to be prepared.

The project proponent has to conduct public and stakeholder's consultation starting from the project inception to the completion of the project. So far, number of public consultations have been conducted during the project identification, scoping and ESIA assessment phases and more consultations should be continued during the construction phase of the project to settle any issues related to construction activities and interaction of construction workforce with local community. Hiring a community liaison officer from local community/project Woreda or Kebele would facilitate consultation and grievance redressing processes during the construction phase. Public consultation sessions should involve Woreda and Kebele officials, community elders, women representatives, and representatives of youth and NGOs if available. All the consultation should be minted and properly filed.

Consultation conducted during the scoping and ESIA phases revealed that the consulted stakeholders at FSTP site are positive towards the proposed project. However, further consultation will be needed.

Consultation is expected to continue in the subsequent phases of the project. The essential objectives of the Stakeholders Engagement Plan can be defined as:

- Identifying relevant stakeholders to be engaged in consultations.
- Creating an open dialogue with the communities being affected from the Project and all the related stakeholders.
- Informing the disadvantaged groups, understanding the opinions of these groups and ensuring that they actively participate to opinion exchange activities.

- Increasing the social benefits of the Project and preventing or mitigating the negative social impacts.
- Informing all the stakeholders about the project in a timely and clearly understandable manner.
- Monitoring the concerns and information requirements of the communities being affected by the Project.
- Providing an open communication between the Project owner and the project-affected people and other stakeholders).
- Providing timely and correct information about the project and its progress to all the stakeholders including project-affected persons, related institutions, local and government authorities,
- Ensuring that all the related stakeholders and the project-affected persons to attend to the meetings organized.
- Giving priority to the project-affected persons while hiring workforce from the local community.
- In case of any planned interruption or unplanned damage at the infrastructure of the nearby residential locations during construction, notifying the public and the relevant institutions for reaching a solution within the shortest time possible.

SEP will encourage keeping record of all the complaints, concerns and feedbacks received regarding the Project and ensure resolution of any reaction, disagreement or disputes related to the Project impacts via an open communication method. It will help to establish an internal formal grievance mechanism for compliant resolution. It will contribute for caring life and property safety during construction works & ensure the continuity of the good relations with the local community. Therefore, during the construction phase contractor is required to prepare SEP that to be implemented during the construction phase. The plan to be prepared should take into account the above objectives and should be updated regularly based on the actual condition of the project activities and interaction with stakeholders.

Whenever stakeholder's consultation requires, stakeholders can be approached through existing administrational structures such as through Woreda Administration, Kebele administration and project sub city administration. Future consultation can be initiated by the community or by project proponent or by other stakeholders depending on the issue to be discussed.

8. IMPACT IDENTIFICATION, ANALYSIS AND POSSIBLE MITIGATION MEASURES

8.1. General considerations

This part of report addresses potential impacts associated with the proposed MoWE subproject and measures for avoidance, reduction or restoration of the negative impacts and enhancing (improvements) of positive effects of the subprojects. For the assessment of the socio-environmental impacts of the proposed subprojects, the following issues were considered:

- Impacts should be assessed for all phases of the project cycle including construction, operation, and decommissioning;
- All elements of the project infrastructure and activities associated with the project, including actions by third parties on which the project depends, should be assessed, whether they are funded as part of the project or by other parties;
- The assessment should address the potential impacts of the project on the physical and natural environment, social, economic and cultural environment including impacts on the health and safety of the local communities and project workers;
- The assessment should address positive impacts as well as adverse effects, and measures to enhance the beneficiary impacts and mitigation measures for the adverse impacts should be proposed.

Any impact analysis should be viewed in light of available data and information on the baseline environment, an appropriate description of the project, and subsequent positive and negative changes that are anticipated as the result of project implementation.

8.2. Scoped Out Topics

With reference to the analysis of the legal and institutional framework (Chapter 3) and collected information in the baseline (Chapter 4), there are certain topics considered not relevant or with less importance to the subproject and therefore proposed to be scoped out. Topics of less importance and therefore proposed to be scoped out

- Biodiversity conversion and sustainable management of living natural resources. Not relevant, given that there are no threatened, rare or endangered species of fauna or flora registered or known to exist around the site.
- Climate change assessment (climate check).

8.3. Impact Identification

When identifying the potential impacts of the subprojects on the existing environment, it is necessary that it should be measured against the existing baseline conditions. The possible impacts that are expected under each stage of the project activities were identified and analyzed for the proposed subproject in relation to the various stages of their implementation.

For the purpose of this assessment, the impacts identified were those which are considered to be ‘significant impacts. This is not to say that minor impacts were disregarded, but that their impact, whilst detectable, is not considered significant. The overall level of predicted impacts, this being both positive and negative ones, are evaluated. Realistic assumptions have been made and qualified. The impacts may be

positive as well as negative and, may be short or long-term, temporary, and reversible or permanent. The impact assessment for the proposed project works has considered the level of the potential impacts, this being based on both the value of the environment and the nature and magnitude of the potential impact.

Identification of boundaries within which the ESIA was undertaken is an important component of the study. The identification process focused and delineated the FSTP within an area where impacts both positive and negative will be felt on the environment, economy and the local community. The types of boundaries considered were institutional, temporal, and spatial in nature.

8.3.1 Institutional Boundaries

The institutional boundaries are comprised of institutions and sectors, which are relevant to the project development. These can be determined from the political boundaries, regulations, institutional mandates, and structures. The proposed project is likely to affect directly or indirectly the interests of the surrounding institutions. Therefore, these institutions will be adequately consulted during the ESIA process.

The institutional framework for environmental management and handling ESIA requirements in the town\region exists at the regional, sector, Municipality/ SLWSSE/ local government and Village (Kebeles). The relevant institutions for handling ESIA requirements for the construction sector include the following: National and regional environmental protection authority, Afar regional state Urban development and construction, Health bureau, education, culture and tourism, women and children affairs, and Municipal Environment Management Committees, village Committees, and SLWSSE.

8.3.2 Temporal Boundaries

Temporal boundaries refer to project life span and the reversibility of impacts. For example, the impact of construction works on natural vegetation may be short-lived if measures to restore vegetation and the land are taken after material extraction. However, the resettlement of the community to give way for proposed works if applicable may have a long-lasting impact, stretching far into the future in terms of loss of income, land, and disruption in cultural life and livelihood of the people. However, the proposed sanitation subprojects will not have permanent impacts to the local community in terms of resettlement but there will be little loss of properties at FSTP sites.

Table 21: Shows estimated temporal boundaries of the project.

Project phase	Duration
Construction	Up to 2 years
Operation	20 years
Decommissioning	After 20 years depending on the conditions

8.3.3 Spatial Boundaries

Spatial boundaries refer to the area affected by the project. The area of direct impact for the proposed FSTP will be within the legal framework of the project where most of the activities will take place. The immediate impact area of the proposed projects is adjacent to the farm site and the village residence where some of the impacts, such as the damage to people's properties or interference to business; traffic accidents; spread of communicable diseases such as COVID-19/ public health; and dust pollution will be felt directly.

The influential impact area is defined as the one comprising area where decisions are made. For this project, decisions are made mainly at regional, district/ Municipality, and village administration levels. In addition, regional land administration and environmental protection, SLWSSE together with town administration may all have input regarding land ownership and construction permits and issues.

8.4. Impact Characterization and Significance

When identifying the potential impacts of a new project on the existing environment, it is necessary that it should be measured against the existing baseline conditions.

Impact significances of each identified impacts was decided by expert's judgment based on past experience, field observation, outcome of consultation with stakeholders and project related legal frameworks, regulations and standards. Key experts involved in the impact assessment were assigned impact significance for each impact separately and finally each rating of experts combined into one significance rating (low, medium, high) for each impact.

The overall significance of the possible impacts has been determined by combining the perceived 'Likelihood of Occurrence' of the source of the impact in combination with the corresponding impact 'Consequence' describing the severity of the impact, 'Significance' describing the level of required mitigation measures, the 'Spatial Influence', describes the proximity of the impact, 'Temporal Influence' describes the duration of the impact, and finally, 'Reversibility' describes the ability to return to original conditions after implementing mitigation measures. The detailed classification of impacts is provided in Tables 22 - 23 below and Matrix of Potential impacts against classification and significance for each subproject.

Table 22: provides the detailed impacts classification approach

Impact Criterion	Effect on Environment	Classification of Effect	
		Expression	**Impact description**
Likelihood of occurrence	What certainty of occurrence is associated with impact?	Unlikely	Probably will not occur
		Likely	May occur
		Certain	Will occur
Consequence	How severe the impact will be?	Marginal	Little impact
		Critical	Moderate impact
		Severe	High impact
Significance	How important is impact in Project design?	Low	Impact of little importance, needs limited mitigation
		Medium	Impact has influence and requires mitigation
		High	Impact of great importance, mitigation is a must
Spatial influence	How the impact shall be extended spatially?	Local	Within the surrounding area of the project
		Regional	Extends beyond the surrounding area
Temporal influence	How shall the impact extend over time?	Short term	The impact shall last short period of time
		Medium term	The impact shall last medium period
		Long Term	The impact shall be permanent
Reversibility	Can the influence of the impact be removed once the impact end or the influence will remain?	Reversible	The influence of the impact can be reversed
		Irreversible	The influence of the impact cannot be reversed and shall be permanent

Table 23: Prediction and significance of potential impacts of FSTP subproject activities

No	Identified Potential Impacts	Type of Impact		Likelihood of occurrence			Consequence			Spatial influence		Temporal influence			Reversibility		Significance without Mitigation/ Enhancement Measures			
		Positive	Negative	Unlikely	Likely	Certain	Marginal	Critical	Severe	Local	Regional	Short	Medium	Long	Reversible	Irreversible	None	Low	Medium	High
	CONSTRUCTION PHASE																			
1.	Loss of land and Land use change		X			X		X		X				X		X			X	
2.	Soil compaction and erosion		X		X			X		X		X			X				X	
3.	Risk of flooding, erosion, landslide		X		X		X			X		X			X				X	
4.	Noise dust and vibration		X			X	X			X		x			x				X	
5.	Impact on ambient air quality		X			X	X			X		x			x				x	
6.	Pollution of surface water		X	X			X			X		X			X				X	
7.	Impact on flora and fauna		X	X			X			X			X			X			X	
8.	Traffic congestion and accident		x		x				x	x		x							x	
9.	Impact on livelihood		X	X			X			X				X		X				
10.	Job creation	X				X				X			X						X	
11.	Skill transfer to local workers	X			X					X			X					X		
12.	Indirect job opportunities for coffee and tea venders	X		X			X			X				X				X		
13.	Security risk		X		X		X			X		X			X				x	
14.	Occupational Health and safety of workers		X		X			X		X		x	x		x				X	
15.	Health impact (HIV AIDS/ STDs)		X		X			X		X		X				x			X	
16.	GBV/SA		X		X		X	X		x		X			x	X			X	
17.	Impact on archaeological & cultural heritage sites		X	X				X		X	X		X		X				X	
	OPERATION PHASE																			
1.	Odor (Foul smell) at the site and surrounding environments		X			X	x			X				X	X				X	
2.	Impact on ambient air quality		X			x	x			x				x	x				x	
3.	Impact on water and soil bodies		x		x			x			x			x		x				x
4.	Risk of flooding, erosion, landslide		X	X				X		X			X		X				X	
5.	Impact on downstream and riverine flora		x		x			x			x			x	x			x		
6.	Impacts on Fauna		x		x		x			x				x	x				x	

No	Identified Potential Impacts	Type of Impact		Likelihood of occurrence			Consequence			Spatial influence		Temporal influence			Reversibility		Significance without Mitigation/ Enhancement Measures			
		Positive	Negative	Unlikely	Likely	Certain	Marginal	Critical	Severe	Local	Regional	Short	Medium	Long	Reversible	Irreversible	None	Low	Medium	High
7.	Impact on public health		X		X			X			x		X		X				X	
8.	Occupational safety		X		X			X		X				x	X				x	
9.	GBV/SA		X		X		X			X				X	X				X	
10.	Job creation	X								X	X			X					X	
11.	Compost generation from sludge	X								X				X					X	
	DECOMMISSIONING PHASE																			
1.	Air and Noise pollution		X			X		X		X			X		X				X	
2.	Impact on soil and water bodies		X		X		X				X		X			X				X
3	Soil compaction and erosion		X		X		X			X		x			x				x	
4	Spoil disposal		X			x	x			X		x			x				X	
5	Loss of Job opportunity		X		X		x			X									X	
6	Health impact		X		X					X									X	
7	GBV/SA		X		X		X			X				X		X			X	

8.5. Positive Impacts and Enhancement Measures

The most significant benefit derived from these subprojects will be the well-developed institutional capability for sanitation and hygiene service delivery and eventually a cleaner natural and living environment, and greatly improved health standards in the Semera-Logia targeted by each subproject. This then has much broader implications in terms of better economic productivity, and it will contribute to boosting development, particularly in the tourism sector and boosting service sector investment (hotels) for which reliable and affordable sanitation and hygiene facilities are essential.

The subprojects will result in many socio-economic and environmental benefits for the sub towns and for those in their peri-urban areas (avoid open dumping sites). It is expected that the projects will result in better access to safe sanitation and hygiene facilities and treatment units leading to an improved standard of living in terms of reduction of diseases, access to basic services as well as the creation of temporary/permanent employment during construction and operation. Not last longing negative environmental or social impacts are expected from this activity, as it does not involve permanent changes in the socio-economic and environmental settings except for few households who lose some of their farming plots. It will mainly benefit the poor in the urban center by providing access to clean and affordable sanitation and hygiene facilities.

The fecal sludge component will contribute to alleviating the impacts of the existing uncontrolled fecal waste disposal into the environment, which include nuisance odors, poor aesthetics, and risk of ground water pollution/contamination, among others.

The impact analysis presented above-identified positive impacts of the proposed subproject activities. The positive impacts have been ranked depending on their anticipated impacts during the construction, operation, and decommissioning phases. *The potential positive impacts are more or less the same for all subproject developments due to the basic aim of the subproject.* The identified impacts and their enhancement measures are briefly described in the sections below.

8.5.1 Job creation

The construction, operation, and decommissioning of the subproject activities will create both short- and long-term employment opportunities. Most of it will be during the construction phase where the possibility of engaging skilled and unskilled labor from the project-affected communities can be created. Indirect job opportunities like coffee and tea selling around the construction site, mainly by women is another benefit of the project, particularly during the construction phase. Skill transfer from experienced and skilled workers to others will also one of the beneficiary impacts of the project. This beneficiary impact is rated as low to high based on different phases of the project (duration and extent of the subproject). Low job creation is expected during the decommissioning phases, while high amount of job creation is predicted to occur during the construction and operation phases.

Enhancement measures: Benefits from job opportunity can be enhanced by providing priority for women and old peoples. By providing on job training and capacity building, it is possible to enhance job opportunity in the project area.

8.5.2 Health

The implementation of the proposed subprojects will prevent any health related-problems, particularly from outbreaks of waste-related diseases (such as cholera dysenteric disease caused by poor sanitation). Health reports indicate that sanitation and hygiene related diseases are a major health problem in the town. According to the Region Health Bureau, diarrhea; bacterial intestinal infection, and typhoid fever were ranked among the top ten diseases that caused morbidity. Moreover, Health bureau expert who participated in the consultations disclosed that the existing practice of disposing of fecal sludge in undesignated and uncontrolled locations is unacceptable from a health point of view. The proposed subprojects will positively contribute towards improving the environmental sanitation and community health in Semera-Logia.

Enhancement measures: Health advantage from fecal waste management would be enhanced by creating awareness among the users and local community as well as its advantage and disadvantage. Advising residents to organize environmental health committee and follow up their environmental sanitation status. Provision of health centers by responsible government offices in areas where there are no health facilities. It is also advisable to provide sufficient information and raise local communities at the FSTP subproject sites.

8.5.3 Air Quality in the Catchment

Though the localized odor at treatment sites and their boundaries is expected to be adverse, the overall air quality of the catchment will be improved. This is because fecal sludge that is being discharged to wider environment without treatment will be collected at treatment plants and treated to remove harmful components. The project itself is designed to mitigate environmental pollution. Hence, the impact of the project on air quality will be highly positive.

Enhancement measures: To improve the air quality around Semera where the FSTP is located (FSTP project intervention site) in particular and in the town in general, promoting construction and implementation appropriate management strategies such as regular monitoring.

8.5.4 Improvement of Water Quality

Fecal sludge treatment is essential to protect water resources. The quality of water flowing from the FSTP to the nearby rivers can be improved by way of changing positively water quality parameters such as the BOD, COD, turbidity, color, pH, temperature, total dissolved and suspended solids, conductivity, coliforms, nutrients, and trace metals, if there is any discharge released to the natural watercourses. Concerning surface water, including the bottom sediment, the major positive impact from the operation of the FSTPs is the improved water quality of within the project area and downstream. Therefore, the proper management of FS will play a key positive role in protecting water pollution.

Enhancement measures: In order to enhance the positive impacts on downstream water quality, it would be important to regularly monitor the quality of the effluent if any to be released to downstream rivers and check whether the effluent quality complies with the Ethiopian effluent discharge standards. Furthermore, it advisable to plan and implement integrated watershed management in the micro-catchment that helps to enhance the quality of water resources and reduce the negative impacts of FSTP residues. This can be implemented in collaboration with the BGR water and energy and agriculture and natural resource bureau.

8.5.5 Production of Compost/Fertilizers

Dewatered sludge removed from the FSTP process can be utilized for fertilization and conditioning of the soils in the immediate irrigated agriculture area and far beyond the project area. Biodegradable materials removed in the process can be given to the agricultural sector for natural fertilizers to be used in place of other products that may be more harmful to people and the environment.

In addition, the Semera-Logia town, water and energy office, can mobilize resources to take an advantage of FS wastes to generate biogas for household and institutions. The good learning and collaboration point will be Semera University, biogas infrastructure. In this regard, the related office will collaborate with the institutions in the Semera and Logia towns to convert the wastes into biogas. Motion consultancy and Training is ready to provide an advice on the design and development of both household and institutional biogas development projects.

Enhancement measures: Creating a demonstration field and of training farmers/agro-pastoralists/urban dwellers on how to use the compost on their farm plots/households and biogas to fuel their houses would enhance the benefit. Producing marketable compost will enhance the benefit and generate income to the concerned authority/enterprise (establishing small enterprise that prepare marketable compost). This need to closely work with the regional bureau of agriculture to ensure the quality of compost prepared.

8.5.6 Supplementary measures

The following proposed measures would scale up the expected benefits obtained due to the implementation of the subproject activities. These include:

- Capacity Building: The other broad area of intervention required to enhance the identified positive impacts is conducting capacity-building programs within SLWSSE, municipality and other relevant stakeholders including environmental protection, health and agriculture. The implementation of training and capacity-building programs would serve the sustainability of the project. Furthermore, it would inform and publicize the benefits that can be achieved as a result of the implementation of the proposed FSTP.
- Strengthening the legal enforcement: Another recommended enhancement measure is to work on and strengthen the legal aspect. Laws relevant to solid and liquid waste management (including the disposal methods) should be reinforced and their application must be monitored to minimize the ongoing gap. Seeing that waste is an inherent part of the production system, the ‘Waste is Wealth’ (waste to wealth) approach that must be viewed as an important waste management principle. This approach can be supported through continuous awareness raising and local capacity building on handling and processing of the generated wastes.
- Awareness rising on construction, proper utilization and maintenance of sanitation and hygiene facilities: the Community’s awareness on construction and proper utilization of the sanitation and hygiene facilities and services is low. In addition to hardware component, integrating hygiene promotion and awareness creation activities will enhance the positive impacts or results of the proposed subprojects. In this regard, national one WASH approach can be followed. Give priority of job opportunities for the local people in general and for the women and disabled community groups in particular.

Table 24: ESMP for Enhancing Beneficial Impacts

Socio-Environmental Component	Proposed Enhancement measures	Responsibility		Timing of Execution	Cost Estimate (Eth. Birr)
		Implementation	Supervision		
Job opportunities	Benefits from job opportunity can be enhanced by providing priority for the project-affected people and for women. By providing on job training and capacity building, it is possible to enhance job opportunity for the project-affected people. Recruit local labor in consultation with project administration office	Construction Contractor	SLWSSE/ Supervisory Consultant SC	construction phase	Not require
	Give priority of skilled and unskilled job for project affected people. Provide on job training to build the capacity of workers.	SLWSSA/FSTPs Management	Labor office	Operation phase	500,000
Improvements on public health	Creating awareness among the users on clean and polluted water as well as its advantage and disadvantage. Advising residents to organize environmental health committee and follow up their environmental sanitation status. Responsible governmental office should provide health centers in areas where there are no health facilities. Promote proper solid waste collection, treatment and disposal system to supplement the benefit obtained from treatment.	Semera-Logia Health Office	Community Health Promotion Office	Operation phase	Cost for establishing health facilities like health center is part of the Government budget.
Production of compost/fertilizers from the Sludge	Creating a demonstration field and training farmers on how to use the compost on their farm plots would enhance the benefit. Producing marketable compost will enhance the benefit and generate income to GWSA.	SLWSA/FSTPs Management in cooperation with Agriculture Offices	Afar EPA		Part of the FSTPs operation budget

8.6 Negative Impacts and Recommended Mitigation Measures

An impact evaluation matrix has been used for the identification and assessment of potential negative impacts of the proposed subproject activities in terms of spatial extent, duration, level of significance, probability of occurrence, and reversibility of the issue for the stages of construction, operation, and decommissioning.

The assessment is made against each issue or medium of impact on physical elements that include water bodies (surface and ground), soils, ambient air and flora as well as the human or socio-economic elements that include the socio-economy, health, and safety, noise and vibration, traffic accidents referring to the impacts on the overall wellbeing. These impacts areas that are of concern for the implementation of the subprojects and their proposed mitigation measures are presented below:

8.6.1 Construction phase

Loss of land and Land use change: The FSTP is planned to be implemented in open area owned by the town administration hence there will not be impact on livelihood due loss of land. However, as pastoralists dominate the area clans in the surrounding area may claim the right.

Moreover, the proposed project activities would lead to the land use/ land cover change such as removal of vegetation covers (bushes) and the new land-use type will be semi-built. These impacts will be permeant and moderately significant. Excavation for construction material may also have a medium impact on landscape.

Mitigation measures

- Create awareness and consensuses among the landholders and the project.
- Undertake continuous consultation with the clan leader and member in the surrounding area to
- Backfill of borrow pits and exposed excavation sites as soon as possible.

Soil Compaction and Erosion: Potential impacts on soils during the project construction phase include soil compaction, soil erosion, and soil contamination by hazardous substances. Among the activities that would affect the soil resources include site clearing, stripping of topsoil, excavation in soil, and loading of spoils and hauling of the same to disposal sites; these activities would involve operation of heavy-duty equipment and dump trucks. These undertakings have the potential to cause soil compaction as well as damages to soil structure, expose the soil to runoff water, and wind erosion. This will increase the risk of soil erosion and silt transport to rivers, streams, and other watercourses as well as air pollution.

In addition, there will be a risk of soil contamination from leakages of hazardous substances such as fuel and oils from equipment and vehicles. Soil pollution could also occur due to spillages of toxic substances (fuel, lubricants, and oil) resulting from poor handling of the substances especially during maintenance of machinery and vehicles can contaminate the soil. These impacts on soils are predicted to be moderate, localized and temporary.

Mitigation measures

- Limit land clearing and excavation works only to what is necessary and carry out the works in the dry season only to reduce exposure of soil to runoff water erosion.

- Careful removal and proper stockpiling of the topsoil removed from the sites, and re-using it for site restoration when construction works are ended.
- Reduce the time-exposed surfaces or excavated soils remain bare following completion of works and implement restoration measures such as re-vegetating exposed areas as quickly as possible.
- Refilling the trenches and other excavated/exposed places soon, covering with topsoil, leveling to surrounding landscape
- Ploughing the compacted areas to restore and improve infiltration into the soil and reduce water runoff.
- Prevent environmental pollution by hazardous substances such as fuel, oil, cement sludge, and detergents through proper storage and handling of the substances. Among the precautions to be taken is that the Contractor shall install drip pans and fuel funnels at dispensing points of fuels and lubricants. Oil exchange should be taken place only in the pre-prepared workshop area. Washing of vehicles and machinery should only be conducted in the workshop area and never done in rivers and open soils.
- Use only existing roads to the extent possible and do not drive through farmlands or unpaved soil.
- Park all the vehicles and machineries at only designated parking areas.
- If temporary access road is constructed, scarify and loosen the compacted soil when use for the access road is completed or no more needed.
- Construction sequencing, locating stockpiles away from watercourses, and disposing of grit, screenings, and sludge from existing lagoons in a landfill.

Risk of flooding, erosion, and landslide: During construction, phase occurrence of damages from flooding, erosion and landslides is anticipated to be less adverse, unlikely, reversible, of moderate significance, and short-term. However, a precautionary action needs to be taken before the start of the construction including the site preparation works to avoid any risks of flooding/erosion and landslide.

Mitigation measures

The following activities shall be considered to avoid and protect the surrounding environment and social amenities from risks of flooding, erosion and landslides.

- Providing appropriate waterways or not blocking the natural waterways.
- Removing/clearing any materials including soils and other construction materials from the natural waterways.
- Providing awareness to the construction site manager and the employee on flood/erosion and landslide management as appropriate.

Noise and Vibration Impact: Similar to air pollution, noise pollution is one of the adverse impacts of construction activities that involve operation of vehicles and heavy equipment. Specially, high noise level above WHO and Ethiopian noise standards can cause health impact on recipients. The Ethiopian noise standard for daytime at residential area is 55 dB and for night time it is 45 dB. The long-term exposure to noise level above this standard at residential areas is expected to cause health impact.

The activities that are expected to generate significant noise and/or vibration include:

- Operation of the traffic that will deliver construction materials to and from the lay down areas and to site.
- Excavation works to construct the proposed wastewater treatment plants.

- Excavation and materials moving activities.
- Drilling of pipe jacking to install underground pipes.
- The activities involved in the production of concrete pipes. and
- Operation of quarries to extract rocks and production of the aggregates required for concrete works.

Considering the nature and extent of construction works and machineries involved, the noise impact of the project is rated as moderate, localized, short-term and reversible impact.

Mitigation Measures

- Carryout noisy construction activities in the vicinity of sensitive areas during normal working hours only;
- Use update technology or modern equipment in excavation works that will minimize noise emissions and vibration.
- Keep noise level near sensitive areas such as residential areas, heath facilities, schools, religious sites and camps below the WHO and Ethiopian maximum allowable noise level standards;
- Provide ear protection equipment (earplugs) for workers in vicinity of noise emissions;
- Incorporate low-noise equipment in the design and/or locate such mechanical equipment in properly acoustically lined buildings or enclosures.
- Conduct situation assessment before starting excavation works where there are sensitive buildings, fences and houses near the subproject sites,
- Use machineries that will not produce heavy vibration, If the houses, fences and buildings are cracked or damaged by the excavation work, the contractor has to fix the damage or pay compensation for the PAPs, include a clause in the contract document that clearly indicates the contractor's responsibility to fix any damage caused by the activities

Impacts on Ambient Air Quality: The emission sources in the construction phase are:

- Site clearance;
- Excavation and earth moving activities;
- stone crushing or batch plant operations
- Dust emissions from handling and transportation of excavated materials, construction inputs, and auxiliary materials;
- Vehicular traffic movements on unpaved roads and earth moving activities;
- Gaseous emissions from vehicles and construction equipment; and
- Cutting and welding operations.

The impact on air quality is rated as moderate, localized, short-term and reversible without applying any mitigation measures.

Mitigation measures

- Implement measures that will reduce dust emission including regular spraying of water on unpaved access roads, exposed earth and any stockpiles on site, and where feasible, covering stockpiles on site with plastic materials.
- Use update technology or modern equipment in excavation works that will minimize dust generation from earthen materials.

- Regular vehicle inspections and maintenance of equipment and vehicles to reduce excessive exhaust emissions.
- Minimize excavation and earth moving to only what is required for the specific nature and type of construction.
- Limit stockpiling of excavated topsoil to the maximum of 2m height.
- As much as possible use paved roads. and
- Limit speed of vehicles to 30km/hour on unpaved access roads especially near sensitive areas (residential and business areas, social services, religious places).
- Use dust collectors or water spray systems as appropriate to prevent high dust emissions from stone crushing or batch plant operations at PSTP.

Pollution of Water Bodies: Pollution of water bodies could be anticipated during the construction phase due to inadequate handling and spillage of pollutants (like fuel, oils and paints). Release of solid and liquid wastes from construction camps has the potential to affect the surface and ground water quality. In addition, spillages of hazardous substances such as fuel and oils from workshops may affect the water quality of nearby streams. The impact on surface water bodies before mitigation measure is anticipated to be moderate, short term while the impact on groundwater is rated to be low.

Mitigation Measures

- Perform excavation works and earth moving activities during the dry season only thereby minimizing erosion or transport of excavated materials by runoff water-to-water bodies.
- Prevent environmental pollution by hazardous substances such as oil, fuel, cement sludge, and detergents through proper storage and handling of these substances. Among the precautions to be taken is that the Contractor shall install drip pans and fuel funnels at dispensing points of fuels and lubricants. Oil change should be taken place only in the pre-prepared workshop area. Washing of vehicles and machinery should only be conducted in the workshop area and never done in rivers and open soils.
- Locating storage areas and compounds away from watercourses if any,
- Appropriate storage of fuel and materials,
- Properly collect used oil and other chemicals and safely dispose of them through accredited oil reprocessing or disposal agency or in other manner approved by the Supervision Engineer.
- Adopt good site management that considers good pollution prevention measures such as locating storage areas and compounds away from watercourses, appropriate storage of fuel and materials, providing suitable facilities for workers, disposing of waste according to approved waste management plan (avoid open waste disposal practices).
- Providing suitable facilities for workers

Impacts on Fauna and Flora: The construction of the proposed subproject is not expected to cause significant adverse impacts on fauna and flora. There are only few scattered bushes that would be affected by the subproject development.

In general, the impact on flora during the construction phase is considered as minor to moderate, localized, and temporary.

Mitigation measures

- Planting of appropriate trees and shrubs either indigenous or exotic species, which are friendly to the environment, is proposed to compensate for the unavoidable losses during the construction.
- The selection of appropriate tree species and locations of planting shall only be done in consultation with the concerned Environmental Protection natural resource management Offices.
- Plant appropriate trees at the boundaries of the site to improve the aesthetic value of the areas, to absorb air pollutants from the air, and to serve as a windbreak as well as to increase the biodiversity of the area.

Traffic congestion and Accident Risks: During construction, there will be increased traffic volume on the roads along the construction of FSTPs and commensurately this may result in increased traffic accident risks to the workers, to local community and their livestock.

In general, the factors that could contribute to traffic accidents include:

- Low awareness of many drivers about traffic safety and traffic regulations and signs as well as lack of discipline.
- Lack of awareness of pedestrians about traffic safety and regulations and signs.
- Presence of roadside poles, trees, ditches, and barriers that impair the visibility of the road.
- Absence of adequate zebra crossings, lack of parking areas, and bus stop arrangements.

Traffic accident risks during construction anticipated to be moderate, short-term and direct adverse impacts.

Mitigation measures

- Develop and strictly implement and follow up a well-designed work program and traffic management plan (TMP) that would consider local conditions like the normal traffic and socio-economic conditions.
- Provide necessary information such as speed limits, hazard locations, sensitive sites (e.g., schools, religious areas, health centers, etc.) by putting appropriate signs and hazard markings.
- Assign traffic regulators or traffic police to control traffic flows at critical sections or periods where/when traffic safety is a significant issue.
- Provide awareness training for operators of equipment and construction vehicles in traffic safety measures.
- Establish speed limits and controls for construction vehicles and discipline for the drivers.
- Sensitization of the nearby communities about the increased traffic. Provide awareness education for the nearby residents in traffic safety measures at public meetings, social gatherings, schools, mosques and churches, etc.

Obstruction of access to human and animals during Excavation: The excavated trenches, stockpiles and other construction activities may prohibit a free movement of human and animals. However, this impact is short term moderate.

Mitigation measures

- Appropriate warning signs shall be placed in areas where accidents are expected to occur.
- Prohibit the construction sites for the people (children) and animals.
- Collect and dump excess spoils as quickly as possible

Impact on livelihood: As the land is not productive, and owned by the town administration their will not be livelihood negatively affected by the project activities

Occupational Health and Safety Impact: Large-scale construction work by its nature is a hazardous job, and hence it requires adopting appropriate occupational health and safety measures. There could be safety risks related to storage and use of hazardous chemicals and explosives. Moreover, there might be accidents of various nature to project workers. Furthermore, dust and exhaust emissions may affect the respiratory tract of project workers and local people exposed to such emissions. The impact on the health and safety of project workers, local people and users of the existing roads or paths affected during construction of FSTPs is anticipated to be a moderate to high, short term to long term and direct adverse impact.

Mitigation measures

- Take maximum care and minimize accident risks by applying internationally accepted standards and recognized occupational health and safety guidelines.
- Provide a Healthy and Safety Plan prior to the commencement of works to be approved by the resident engineer
- There should be safety policy clearly displayed on the site.
- Take appropriate care in storing and using hazardous chemicals and explosives and provide training to workers in handling hazardous chemicals.
- Provide first aid kits at workshops, construction worksites, and inside vehicles.
- Provided workers with appropriate PPE such as hand gloves, eye goggles, safety shoes, reflective vests, helmets, etc., based on their work condition as much as possible, create awareness on safety issues and strictly inspect proper use throughout the construction phase.
- Appropriate signs must be erected on the site to warn workers and visitors
- Conduct general medical check-ups for recruits and subsequently, conduct periodic medical check for all employees and take appropriate action and keep all records.
- Hung-up fire extinguisher bearing detailed information about its status at appropriate places.
- All personnel, vehicles, and machinery should be covered under an appropriate Insurance System.
- Carefully record and keep all incidence of injuries and accidents including date, time, and place of occurrence, level of injuries, resources damage, people injured/dead, major causes for the accident, measure taken, etc.
- Provide awareness creation on safety procedures and HIV/AIDS and avail healthcare services.
- Provide temporary toilets and bathrooms for the construction workers at the work sites.
- Regularly spray water in dusty roads and work areas. and
- Introduce a traffic management plan with speed and traffic regulation through the neighboring areas by using appropriate traffic signs.

Exposure to HIV/AIDS and Other Sexually Transmitted Infections (STIs): It is known that large-scale construction project workers are considered to have a high potential for the spread of HIV/AIDS and other sexually transmitted infections partly because construction workers are mostly young, sexually active group of the population, mobile and they are forced to live in hotel rooms or in construction camps.

It is obvious that the presence of a large number of workforces at construction site attracts sex workers to the area and entices young girls from the locality to go into the business. This makes the project area highly vulnerable and easily exposed to the spread of HIV/AIDS and sexually transmitted Diseases (STDs).

Mitigation Measures

- Contractors should assign experienced HIV/AIDS sub consultant to handle the issues related to HIV/AIDS awareness and prevention.
- Launch awareness and education campaigns about HIV/AIDS and STDs among the construction workers and community to make them informed. This has to be done on the one hand by the contractor's sub consultant and on the other hand by the local health institutes along the project road targeting especially women and sex workers.
- Condoms shall be provided at a subsidized rate or for free to construction workers and health facilities must be supported with a supply of condoms. To prevent young and school age people, schools should include information campaigns and/or special training.
- Town administrations and health offices, HIV/AIDS Prevention and Control Office, Elders, and NGOs operating in the area need to work jointly to create positive impact and bring major attitudinal and behavioral changes.

Gender and Gender Based Violence/SH Risks: Experiences from different infrastructure projects show that there is lack of knowledge and understanding on Gender issues and GBV/SH and Social Environmental Assessment (SEA) by Contractors, consultants and construction workers. Due to this, female construction workers could face difficulties in their work places, such as, GVB and sexual harassment. Hence, there is a potential that gender abuse might occur during the construction of the proposed fecal sludge treatment plant construction through unequal distribution of work, sexual harassment, discrimination against women, and unequal pay for women, among others. This impact is short term and rated to be moderate for the reason that contractor is expected to include gender specialist among the workforce to create awareness to prevent GBV/SH and SEA.

Mitigation measures

- Create awareness among workers on the GBV/SH to the staff/workers.
- Prepare and implement code of conduct that sufficiently addresses gender and sexual harassment issues. strictly forbid sexual harassment /GBV and to be signed by all workers including international workers if involved and subcontract workers
- Include in the employment contract for the construction workers that any GBV and sexual harassment against women workers will lead to administrative measures and legal actions.
- Take appropriate actions on workers violating the CoC.
- Design gender core labor standards and employment and contract procedures, and design gender responsive workers manuals.
- Assign women in works that do not affect their biological condition.
- Provide and avail a separate sanitation facility for women at construction camp
- Provide women workers with appropriate type of safety equipment and protective materials.
- The Contractor should ensure that women are paid equal for equal work with their male counterparts.
- Provision of gender disaggregated bathing, cloth changing areas & sanitation facilities.
- Include gender expert among the consultant's team to follow up Gender mainstreaming activities.
- Ensure that women construction workers do not face GBV and sexual harassment.

- Ensure equal pay for women and men for equal job.
- Assign gender specialist at construction site to aware and prevent GBV and sexual harassment

Security risk: Although, the FSTP security situation will not be a serious problem in the proposed project area, it needs to be put into consideration. There may be few insecurity cases that need a precautionary action at various project phases including construction. If the risks of security may be raised, it might affect the construction of the FSTP infrastructure and may cause delay in project implementation, affect quality of construction. However, the level of security risk in the project site could be moderate, reversible and short time.

Mitigation measures:

- Proper consultation with local authorities and community about the existing situation.
- Appropriate training on security issues and potential risk management including reporting to appropriate authority.
- Establishing and collaborate with the local security organs.

Impact on Cultural, religious and Archaeological Sites: According to site observations, the proposed subproject site is not located in any historical or cultural and archaeological sites, is unlikely to be affected. However, the Project Contractor must take appropriate measures not to affect any chance find or discovered cultural or archaeological assets during the project construction and immediately report to relevant Culture and Tourism Office.

Mitigation measures

If archaeological, cultural and religious resources are discovered during excavation for construction of the proposed subproject, the Contractor shall stop the construction at that specific location and report to relevant Culture and Tourism Office. After culture and tourism bureau takes necessary measures, construction work could be resumed.

8.6.2 Operation Phase

Bad Odor (Foul smell): The frequent dumping of truckloads for fecal sludge may cause bad smell in and around the FSTP. However, as the FSTP is located outside the town, obnoxious smell from the treatment plant area is expected to be of minor significance for the large community. However, the impact on the workers is rated moderate.

Mitigation measures

- Create awareness to the FSTP works and even to the local community on proper management precautionary action.
- Regular facility maintenance and monitoring operational practices including process control and chemical treatment, continuous process of the operation; avoidance of pools of dirty stagnant waters and spills.
- Covering swampy parts of the settlement and drying beds with a layer of earth or sand.
- Aerate, adjust chemical dosing and oxidation or pH to reduce odor from plant influents.
- Cover tanks or installation of exhaust hoods.
- Operate equipment at optimum/design conditions.
- Adopt effective and efficient housekeeping procedures (regular cleaning of the grit and screenings).

- Operate especially the secondary treatment processes at optimum condition.
- Plant layers of shrubs and trees along the periphery and provide adequate stack height to exhaust emissions.
- Provide adequate buffer zone, particularly along the major windward.
- planting relevant plant species around the FSTP in the buffer zone

Impact on ambient air quality: The inherent presence of multiple contaminants (CH4, CO2, and H2S) in biogas requires an effective purification or use as a source of energy. Actually, these gases will be generated from fecal sludge treatment plants and there will be a release of these gases into the atmosphere, and impact on the environment through generation of bad odors. The impact is adverse, possible, reversible, of moderate significance, and long-term. Therefore, it is better to adopt treatment process such as alkaline, oxidation and chemical precipitation treatments in the FSTP in Semera town to reduce nuisance and bad odors. A more elegant strategy is to regulate key operational parameters (such as PH, temperature etc.) and suppress sulphate-reducing bacteria to restrict or eliminate H2S formation.

Biotechnologies based on hydrogen trophic such as (decarbonation) CO2 reduction to CH4 (power-to-gas), algal–bacterial symbiosis, or chemo lithographic H2S oxidation (desulphurization) can be implemented depending on the AWSSE capacity to reduce their impacts.

There are two technologies for H2S removal. The first is post-treatment which is efficient and could induce an addition cost to the treatment. The second alternative is pre-treatment process is a simple and potentially low-cost strategy. It removes significant amount of H2S from the sludge/anaerobic digester by reducing H2S formation during anaerobic digestion. It is a mechanism by which, Sulphur in the substrate is removed by precipitation prior to anaerobic digestion, thus can reduce Sulphur content in the sludge/substrate, followed by liquid–solid separation and the suppression of sulphate-reducing bacteria.

Mitigation Measures:

- Regular monitoring of the ambient air including measuring H2S presence in air,
- Control an aerobic digester parameter (pH, Temperature, oxygen level etc.) for H2S producing bacteria/microorganism (creating unfavorable environment),
- Changing redox potential, which helps in reducing or oxidizing capacity of anaerobic digestion system.

Impact on water and soil bodies: The waste is treated inside properly designed units. Neither the sludge nor the drained water will be allowed to leave the FSTPs without proper treatment. For this reason, the impact of FSTPs rated as very high positive for downstream areas and would minimize the existing uncontrolled discharge of wastewater into the water bodies. However, if there is leakage or overflow, the contamination risk will be high. The heavy metals in the treated wastewater may have potential human and environmental health impacts. The proposed FSTPs will have the capability to retain a significant amount of such contaminants, but they can just transfer from the liquid phase into the solid phase (sludge) in case of primary and secondary treatment. It is anticipated that most of the high molecular and non-polar petrochemicals can be efficiently retained in the proposed FSTPs. However, as some of them are persistent in both aerobic and anaerobic biodegradation processes of treatment, they can easily be accumulated in

the sludge. This will prohibit the potential use of a large amount of sludge as a fertilizer. The impact associate with heavy metals in sludge is adverse, irreversible, of high significance and long term.

Mitigation Measures

- Dispose sludge with dangerous substances only in a designated sanitary landfill
- Close monitoring of the facility to ensure it functions as planned; this involves monitoring of ground and surface waters in the surroundings of the FSTP.
- Ensuring that the facility's effluent complies with the national effluent standards

Risk of flooding, erosion, and landslide: the impact from flooding, erosion and landslides to the FSTP structure and associated infrastructure in the proposed FSTP is less expected. If occurs, the impact is adverse, unlikely, reversible, moderate, and short-term. Therefore, precautionary activities need to be done to avoid any risks of flooding/erosion and landslide. The following activities shall be considered to avoid and protect the infrastructure from risks of flooding, erosion and landslides.

Mitigation Measures

- Protecting the FSTP surroundings with appropriate protection walls based on the slopes and topographic gradients.
- Plantation of the FSTP surroundings with appropriate forest and vegetation that helps to protect the risks from flooding, erosion and landslides.
- Training the FSM unit staff on handling these risks.

Impact on downstream and riverine flora: During operation phase aquatic plants, riverine trees and shrubs will get better water for their growth that is free from toxic substances. By using treated water, it will be possible to develop riverside green areas and botanical gardens. This impact is beneficiary impact and rated as very high. However, if the treatment plant release for some unforeseen reasons any untreated or practically treated waste effluent into downstream rivers, it would adversely affect the riverine and aquatic plants. This impact is less probable and rated to be moderate significant.

Mitigation measures

- Seal the foundation of treatment plants and influence areas with concrete lining to avoid leakage of wastewater through permeable soils and weathered and fractured rocks into the groundwater system.
- All pipe work and fittings should be a class a rating more than the maximum pressure attained in service including any surge pressure.
- Dispose the sludge with dangerous substances in designated landfill.
- Close monitoring of the facility to ensure it functions as planned, this involves monitoring of ground and surface waters in the surroundings of the TP, and ensuring that the facility's effluent complies with the acceptable national effluent standards.
- Whenever the quality of effluent fails to meet the standard, stop discharging the effluent into receiving streams and rivers.
- As appropriate, promote integrated watershed management schemes around the FSTP which enable to reduce any potential spillover of the liquid wastes into the natural environment.

Impacts on Fauna: The overall impact of properly operating the treatment plant on fauna is highly positive. However, if improperly treated wastewater is released to rivers, it may affect bird species resting near the

rivers through contaminants production and reduce the necessary nutrients available for their growth and development due to eutrophication and hence birds‟ variety and number will reduce. Bird species and some domestic animals living in the surrounding of the FSTPs, such as horses, cows, and oxen, may be affected by the discharge of improperly treated wastewater and sludge production from the FSTPs. This problem is probable, of moderate significance and of long-term duration in the sense that the risk is always there, but reversible.

Mitigation measure

- Ensure proper quality control of “treated” wastewater and sludge before releasing
- Develop green belt around the treatment plant site to compensate trees removed during the construction phase and to increase the aesthetic view of the treatment plant sites as well as to sequestrate GHG and to absorb bad odor and noise pollution.
- Control any accidental spill of untreated or partially treated wastewater into environment.
- Install regular monitoring system on the quality of water discharged to natural environment if any.

Public Health impact and risks

a) Health impact on people contact with sludge:

It is understood that sludge should be removed from the treatment system from time to time to give the way for fresh sludge. This partially dried sludge should be collected and dumped at appropriate area or convert into useful products, otherwise its impact on human health and environment would be adverse.

Partially dewatered or dried sludge is reach in pathogenic organisms such as bacteria, virus, eggs and cysts of nematodes, cystoids, ‘giardia’ and amoeba. This shows that negligently handled sludge cake could impose adverse health impacts on nearby residents and workers involved in day-to-day operation of the system.

Die-off or survival of excreted pathogens is an important factor influencing transmission of disease. In principle, all pathogens die off upon excretion. Prominent exceptions are pathogens whose intermediate stages multiply in intermediate hosts such as Schistosoma, which multiply in aquatic snails and are later released into the water body. Some bacteria (Salmonellae & Shigellae have the potential to multiply outside the host primarily on food and at warm temperature. The pathogens have varying resistance against die-off, and worm eggs are among the more resistant with Ascaris eggs surviving longest in the extra-intestinal environment. The main factors influencing die-off are temperature, dryness and UV-light. The survival rate of pathogens can also vary depending on the media they are attached. For example, the survival duration of pathogens usually longer in soils than in crops, this impact is long term, regional reversible and rated to be moderate.

Mitigation measures

- Provide awareness training to the facility operators on the handling and management of the system and potential dangers. Equip the operators with the necessary precautionary measures (including reporting system) for any pathogenic incidents during the operation of FSTP.
- Careful handling of fecal sludge
- Use of protection clothes such as gloves and masks and a good hygiene (washing hands after work etc.).

- Most importantly, the workers be aware of the nature of the health risks to which they are exposed and that they know how to protect themselves.
- Training of staff and targeted information may therefore be the most successful measures.
- Department of SLWSSE dealing with sludge should introduce rules for use of protection by their staff and care should be taken to enforce those rules.
- Site shall be entirely fenced and access to site restricted to employees having received the adequate training.
- Restricting access to the site for unauthorized users

b) Health impact from use of untreated fecal sludge in agriculture

Fecal sludge is a good organic fertilizer and soil conditioner and therefore frequently used in agriculture. If the sludge is not adequately treated, pathogenic organisms contained in the sludge are dispersed on the fields. Here they can infect the farmers working on the fields as they permanently enter in contact with the contaminated soil and usually do not use protection measures. Bacteria and worm eggs may also attach to the plants and infect consumers if the crops are eaten raw and are not thoroughly washed.

Mitigation Measures

- Create appropriate awareness on preparation and utilization of composts from such sources.
- Fecal sludge should always be treated prior to its use in agriculture. Treatment has then to provide sufficient pathogen reduction in the sludge to guarantee the safety of its use. The most resistant organisms in treatment are eggs of parasitic worms, in particular those of Ascaris lumbricoides. These eggs can only be destroyed by exposure to temperatures above 60°C, by desiccation at moisture contents lower than 10%, or by awaiting the natural die off after at least ½ year.
- Use thermophilic composting. If composting is well done (the substrate has the right composition, moisture content and aeration are optimized) the temperature in the heaps usually rises above 55°C for several days and all pathogens are destroyed.
- Storage of sludge over a period long enough to allow natural pathogen die off (minimum 6 months) is the other possibility to disinfect sludge without using expensive technologies.
- Sun drying of sludge can enhance the pathogen destruction during storage and therefore increase the security of this method. To enhance the effect of sun drying, construct a separate sun-drying floor, preferably concrete and coat with black color or lay black plastic so that it could absorb much solar energy that increases the temperature and kills most of the pathogens.
- Avoid Use of untreated sludge for growing food crops: Agricultural use of fecal sludge for non-food crops can be possible without prior disinfecting treatment. In this way, the health risks for consumers can be excluded. However, the farmers handling the fecal sludge are still at risk. Therefore, it is important to not use untreated sludge for growing food crops. Particularly, abstain from irrigating edible vegetables & crops with untreated sludge water or percolated water from the drying bed. Irrigating edible crops and vegetables with untreated sludge would directly result in the transmission of intestinal nematode and bacterial infections.
- Avoid Use of untreated sludge for growing cattle feed: Cattle grazing on pasture irrigated or contaminated field with raw sludge could be heavily infected with the larval stage of the tapeworm Taenia saginata (Cysticercus bovis). Therefore, avoid cattle from feeding contaminated grasses or grasses grown through irrigation with untreated fecal sludge.

- Hygienic Education and Treatment: Good personal hygiene breaks the direct contact routes by which pathogens are transmitted and the full impact of the measures described above will only be achieved if they are accompanied by efforts to improve hygiene. Hygienic education should be targeted on all aspects of hygiene and sanitation. Particularly, promote hand washing with soap after any contact with fecal sludge. If any person is proven to be infected, he should go to health facilities and consult health experts or health doctors.

c) Non-Pathogenic Health Risks

Chemical contamination is another potential health risk associated with fecal sludge. Contamination of soil and water can be easily possible by chemical constituents embodied in the fecal sludge, particularly heavy metals. Eventually, these chemicals accumulated in soils and water and directly or indirectly affect human health through various routes or through food chain. Further non-pathogen risks result from impurities of non-biodegradable origin such as Glass splinters or other sharp objects contained in the sludge. Such impurities can affect health by physically piercing or cutting those who could involve in the manipulation of the waste. Also, health risks due to the attraction and proliferation of rodents and other disease carrying vectors are common feature of improperly managed sludge treatment and dumping sites. Due to the smell, several rodents, flies, some birds (vultures), monkeys, hyena, and dogs will be attracted to the area and increase the routes of contamination and disease transmission.

Mitigation Measures

- Avoid use of percolated liquid from the sludge dry bed for irrigation or any use before adequately treating and disinfecting.
- Create awareness among these people who are potentially exposed to the direct and indirect health impact of the sludge.
- Fence the area to prevent the entrance of dogs and other nocturnal animals. and
- Keep the area neat and attractive so that flies and rodents could not be attracted.

Occupational Safety: Hydrogen sulfide is a colorless, toxic gas with a characteristic rotten egg odor. It is considered a broad-spectrum poison, meaning it can poison several different systems in the body. Breathing very high levels of hydrogen sulfide can cause death within just a few breaths. Loss of consciousness can result after fewer than three breaths. Exposure to lower concentrations can result in eye irritation, a sore throat and cough, shortness of breath, and fluid in the lungs. Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness. The OSHA permissible exposure limits for hydrogen sulfide are 10 ppm (time-weighted average) and 15 ppm (short-term exposure limit). Other potential health and safety impacts include accidents and plant malfunctions. The probability and impact of the following events were categorized; Spills, Process Upset, Natural Hazards, Power Failures, Fires, Injury/Death. The impact is adverse, possible, reversible, of moderate significance, and long-term.

Mitigation measures

- Provision of adequate and appropriate Personal Protective Equipment (PPE) to workers.
- Regular checking of the adequacy of the facility, particularly when beds are (nearly) full and during the rainy season.
- Timely heightening of the bund surrounding the facility and / or increasing the bed capacity.
- Organize and ensure medical checkup for the relevant employees at least on every six months,

- Special working schedule to workers who are working in hazardous environment which includes high temperature to minimize impacts on their health
- Emergency plan and medical help to be made available to workers working in hazardous condition like sludge removal from sludge beds etc.;

Impact on Aesthetic value: During the operation sludge, drying beds and stabilization bonds may have a negative impact on aesthetics of the surroundings. This impact is long term and irreversible but its significance is medium if it is the operation and mitigation measures are implanted properly.

Mitigation measures

- Plant trees around the treatment plant and buffer zone.
- Keep the buffer zone and open areas within the treatment plant neat all the time.

Gender and Gender Based Violence (GBV)/Sexual exploitation Abuse (SEA) Risks: During Operation phase there might be risk of Gender Based Violence (GBV)/ Sexual exploitation Abuse (SEA) at different development projects sites due to lack of knowledge. Hence, there is a potential that gender inequality might occur during the operation of the FSTP through unequal distribution of work, sexual harassment, discrimination against women, and unequal pay for women, among others. The impact is adverse, possible, reversible, of moderate significance, and long-term.

Mitigation measures

- Prepare and implement code of conduct that among others strictly forbid sexual harassment /GBV and to be signed by all workers including international workers if involved and subcontract workers. and
- Incorporate measures to be taken against those workers who commit GBV and sexual harassment.
- Ensure that women workers do not face GBV and sexual harassment.
- Provide and avail a separate sanitation facility for women and men at the treatment plants.
- Provide women friendly safety equipment and materials.
- Assign women in works that do not affect their biological condition.
- Ensure equal pay for women and men for equal job

8.6.3 Decommissioning phase

At the end of the design life of the FSTPs, SLWSSE could upgrade or decommission the treatment plants. Most probably upgrading the system will be expected. If decided to decommissioned treatment plants, impacts associated with disposal of contaminated soils from the treatment plant sites and solid waste generated from the demolishing of treatment plant structures would be expected. At the end of their design lifetime, if the waste treatment plants is decommissioned, the following impacts are predicted to occur

Air pollution: During the decommissioning, structures installed to aid the treatment plants will be dismantled and demolished, which will cause release of dust and other pollutants imbedded in the demolished structures. This impact is temporary, local and medium significant.

Mitigation measures

- Systematically demolish structures considering reuse of materials for other use.
- Wet the materials before demolishing to suppress release of dust.

- Avoid burning of any material.

Impacts on Soil and Water Bodies: During the decommissioning phase, it would be necessary to remove contaminated soil from the treatment site and dispose at designated disposal site. If the contaminated soil is dumped outside the designated area or outside the properly designed and constructed sanitary landfill, it would pollute the soil and water resources including ground water. However, the effect is of medium significance. However, decommissioning of the sites without availing better substitute for the treatment of ever-increasing wastewater would adversely affect the soil and water resources of the area and it's downstream. Downstream reservoirs would be exposed for eutrophication and hyper eutrophication and aquatic organisms would be killed. The impact is irreversible, regional and highly significant.

Mitigation measures

- Remove all the contaminated soil from the treatment plant site and dispose it at a designated waste disposal site or at sanitary landfill.
- Level the ground in such a way that it will be used for other purposes.
- Reclaim polluted soil with appropriate technologies such as phytoremediation.
- Avail advanced FSTP that technology of the time offers before decommissioning the one at hand.

Site Reclamation: The treatment plant sites should be reinstated after the plants stop their function. In order to make the site productive, properly planned reinstatement work needs to be conducted by the project owner or subcontracted entities. All the unwanted structures should be removed and disposed at a designated waste disposal landfill. The reinstated area could be developed to recreational site or assigned for other development purpose. Site reclamation work is very essential and highly positive. However, if the reinstatement work not conducted properly, the area would be lost and the value of the land would be undermined.

Mitigation measures

- Properly reinstate the abandoned fecal sludge treatment plant site.
- After reinstatement, SLWSSE could use the area for other purpose. or
- Develop the areas for recreational park or plant trees to increase the aesthetic value of the area or handover to the nearby community in consultation with their respective Woreda administrations so that they can develop what they think important for the community.
- Integrate with the micro-watershed management system.

Impact of Spoil Disposal: Spoil from demolishing of structures and scraped contaminated soil has to be dumped at a designated spoil dumping site. If the spoil simply dumped at unauthorized area, it will adversely affect the environment and cause loss of valuable land. This impact is expected to be moderate and short term since the amount of spoil materials to be generated during the decommission phase is not big in quantity.

Mitigation measures

- Properly collect all the debris generated while demolishing the structures and transport to the designated disposal site.
- Scrap any contaminated soils from the demolished treatment site, safely collect, and transport to the designated waste disposal site or sanitary fill site.

- Reinstate the treatment plant site including tree plantation unless the site is reserved for other construction purposes. Or integrate it with the micro-watershed management system in collaboration with the bureau of agriculture and natural resource.

Soil Compaction and Erosion: Potential impacts on soils during the project-decommissioning phase include soil compaction and soil erosion. Among the activities that would affect the soil resources loading of spoils and hauling of the same to disposal sites; these activities would involve operation of heavy-duty equipment and dump trucks. These undertakings have the potential to cause soil compaction as well as damages to soil structure, expose the soil to runoff water, and wind erosion. This will increase the risk of soil erosion and silt transport to rivers, streams, and other watercourses as well as air pollution. These impacts on soils are predicted to be moderate, localized and temporary.

Mitigation measures

- Implement restoration measures such as re-vegetating exposed areas as quickly as possible.
- Use only existing roads to the extent possible and do not drive through farmlands or unpaved soil.
- Park all the vehicles and machineries at only designated parking areas.
- Disposing of grit, screenings, and sludge from existing lagoons in a landfill.

Loss of Job Opportunity: During decommissioning of the treatment plants, previous skilled and unskilled workers that were enjoyed by the project during the operation phase will not be continued. This loss of jobs would adversely affect workers and their families who were depend on it for their livelihood. However, this impact is expected to be moderate.

Mitigation measures

- Give job priority in other related projects.
- Secure pension benefit if the age of the job looser is in the set range of pension.
- Organize, train and promote to establish their own small-scale enterprises through the facilitation of loan or financial support. Create link with appropriate government agency and financial sources.

Health Impact: Expansion of HIV/AIDS and other STDIs is expected to be very low during the decommissioning phase of the project. Hence, except commonly used cars and precautions no additional measures are required.

In addition, health impacts associated with dismantling of concrete structures and reinstatement of the area could occur. In addition, health impact from the removal process of contaminated sludge and soil could adversely affect the workers involved in demolishing works.

Mitigation measures

- Create appropriate awareness before starting the operation to the local community and local administration including (agriculture, water and energy and health offices).
- Plan the decommissioning work ahead of time to avoid sudden stop of the treatment plant before completely treating the influent reached to the treatment plant.
- Provide appropriate PPE for the workers to be involved in decommissioning works.

Gender and Gender Based Violence/SH Risks: Gender and gender-based violation and sexual harassment is expected to be low to moderate during the decommissioning phase of the project. This is because number of workers expected to involve in the decommissioning phase activities will be few.

Mitigation measures

- Provide appropriate awareness training to the staff and local communities.
- Provide and avail a separate sanitation facility for women and men.
- Provide women friendly occupational health and safety equipment and materials.
- Assign women in works that do not affect their biological condition.
- Ensure that women workers do not face GBV and sexual harassment.
- Incorporate measures to be taken against those workers who commit GBV and sexual harassment.
- Prepare and implement code of conduct that among others strictly forbid sexual harassment /GBV and to be signed by all employees.
- Ensure equal pay for women and men for equal job.

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Environmental and social management plan (ESMP) is the key to ensure that the environmental quality of the project area does not deteriorate due to the implementation of the proposed subprojects. ESMP is generally used as the basis for establishing the environmental behavior that the proposed project requires during its various stages including the decommissioning phase.

The ESMP for the proposed subproject consists of set of mitigation and institutional measures to be taken during the implementation and operation phases to eliminate the adverse environmental and social impacts identified and predicted in the previous stages, offset them, or reduce them to acceptable levels. The plan will also include the actions needed to implement these measures. The ESMP identifies feasible and cost-effective measures that will reduce potentially significant adverse environmental impacts to acceptable level. The plan includes compensatory measures if mitigation measures are not feasible, cost effective, or sufficient. Mitigation plan is a key to ensure that the environmental qualities of the area will not deteriorate due to the implementation of the subprojects. The mitigation plan covers all aspects of implementation of the project in its various phases related to environment and social health.

The purpose of the ESMP is to describe in detail, the necessary actions to be taken to ensure that serious impacts will be mitigated. Where impacts cannot be mitigated, compensation will be paid, as well as any environmental enhancement activity that will be required to offset, where possible, those impacts that cannot be mitigated.

This ESMP provides a schedule for the implementation of recommended mitigation activities. Table 25 presents identified impact, mitigation measures proposed in the ESIA, for the implementation arrangements, including responsibilities for implementation, the timeframe, and the budgetary implications. The ESMP identifies measures to address any potential environmental and socio-economic impacts that might occur during the implementation of the FSTP.

The objective of this ESMP is to ensure the integration of environmental and social requirements and proposed mitigation and monitoring measures into the construction contractor's obligations. The ESMP shall be fully integrated into the construction activities, hereby addressing the responsibilities of the construction contractor (the contractor), the Engineer, and the Employer. Furthermore, an ESMP has been developed for impacts resulting from the operational phase, which shall be full integration in operational activities. Responding adequately to the nature of the envisaged FSTP construction the ESMP is referring to the following issues:

- Environmental and Social Mitigation Measures during Construction.
- Environmental and Social Mitigation Measures during Operation.
- Environmental and Social Quality Monitoring during Construction.
- Environmental and Social Quality Monitoring during Operation. and
- Obligations, roles, and responsibilities amongst concerned parties.

Due to the long-term life of the intervention facilities and related components, a decommissioning assessment will be undertaken at least 1 year before the process for any of the components commences, following a notice to decommission. The decommissioning process will be guided by a comprehensive

decommissioning plan developed through the decommissioning audit process. However, the following features will need to be decommissioned upon completion of the works.

i. Contractor's camp and installations that will need to be removed without compromising on the safety and general welfare of the immediate residents. Special care to be given to associated wastes and dust emitted in the process.
ii. Materials stores that will comprise fresh materials and used items. Each category will be moved safely out of site ensuring minimal or no impacts to the related environment and social setting.
iii. Wastes and debris holding sites will be cleared with maximum re-use of the debris either on surfacing the passageways or other grounds such as schools and church compounds.
iv. Under normal circumstances, the project will be maintained and sometimes rehabilitated. During rehabilitation, a new ESIA can be instituted or an environmental management plan can be prepared depending on the degree of rehabilitation.

The following table (table 25) shows environmental and social management plans for proposed works for FSTP.

Table 25: Environmental and Social Management Plan for proposed subprojects

S/N	Issue/ Main impact	Proposed Mitigation measures	Responsibility		Timing of Execution	Cost Estimate (Eth. Birr)
			Implementation	Supervision		
	CONSTRUCTION PHASE					
1.	Loss of land and land use change	• It is noted that the land allocated for FSTP does not have any ownership issues and belongs to the public or the local government. Therefore, it does not require any RAP for the lands acquired for FSTP establishment. However, all grievances issues if any associated to the land acquisition process shall be reasonably redressed, in accordance to the GRM implementation mechanism suggested for the project. • Create awareness and consensuses among the landholders and the project. • Undertake continuous consultation with the clan leader and member in the surrounding area to • Backfill of borrow pits and exposed excavation sites as soon as possible.	SLWSSE & land use agency	Grievance Handling Committee Regional land administration	Before start of construction	This cost is part of the government RAP cost if any
2.	Impacts on soils (soil erosion, compaction & contaminatio n)	• Limit land clearing and excavation works only to what is necessary and carry out the works in the dry season only to reduce exposure of soil to runoff water erosion. • Careful removal and proper stockpiling of the topsoil removed from the sites, and re-using it for site restoration when construction works are ended. • Reduce the time-exposed surfaces or excavated soils remain bare following completion of works and implement restoration measures such as re-vegetating exposed areas with appropriate grass, shrub and/or tree species as soon as possible. • Refilling the trenches and other excavated/exposed places soon, covering with topsoil, leveling to surrounding landscape • Ploughing the compacted areas to restore and improve infiltration into the soil and reduce water runoff. • Prevent environmental pollution by hazardous substances such as fuel, oil, cement sludge, and detergents through proper storage and handling of the substances. Install drip pans and fuel funnels at dispensing points of fuels and lubricants. Oil exchange should be taken place only in the pre-prepared workshop area. Washing of vehicles and machinery	Construction Contractor	SLWSSE/ Supervisory Consultant SC Environmental protection agency	Throughout Construction phase	Part of the construction and supervision cost to be covered by the contractor and consultant

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
		should only be conducted in the workshop area and never done in rivers and open soils. • Use only existing roads to the extent possible and do not drive through farmlands or unpaved soil. • Park all the vehicles and machineries at only designated parking areas. • If temporary access road is constructed, scarify and loosen the compacted soil when use for the access road is completed or no more needed. • Construction sequencing, locating stockpiles away from watercourses, and disposing of grit, screenings, and sludge from existing lagoons in a landfill.				
3.	Risk of flooding, erosion, landslide	• Pre-preparation for the waterway/flood ways in the project area and providing appropriate waterways or not blocking the natural waterways • Not damping or removing/clearing any materials including soils and other construction materials from the natural waterways. • Providing awareness to the construction site manager and the employee on flood/erosion and landslide management as appropriate.	Construction Contractor	SLWSSE/ Supervisory Consultant SC Environmental protection agency	Throughout Construction phase	Part of the construction and supervision cost to be covered by the contractor and consultant
4.	Noise impact	• Follow good site practices incorporating appropriate mitigation measures to reduce nuisance noise and vibrations impacts. • Service the exhaust systems of all vehicles and • All machinery and plants should conform to the applicable noise standards, and plants should be provided with effective noise mufflers. • Service the exhaust systems of all vehicles and equipment on regular basis to ensure that noise and exhaust emissions are kept to appropriate levels. • Construction workers should adhere to health and safety standards pertaining to noise, such as wearing ear protection when operating plant or heavy machinery. • Carryout noisy construction activities in the vicinity of sensitive areas during normal working hours only; • Use update technology or modern equipment in excavation works that will minimize noise emissions and vibration.	Construction Contractor	Supervisory Consultant (SC), EPA	Throughout Construction phase	Included in the contract for the Contractor & SC

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
		• Keep noise level near sensitive areas such as residential areas, heath facilities, schools, religious sites and camps below the WHO and Ethiopian maximum allowable noise level standards; • Provide ear protection equipment (earplugs) for workers in vicinity of noise emissions; • Incorporate low-noise equipment in the design and/or locate such mechanical equipment in properly acoustically lined buildings or enclosures				
5.	vibration	• Conduct situation assessment before starting excavation works where there are sensitive buildings, fences and houses near the subproject sites, • Use machineries that will not produce heavy vibration, If the houses, fences and buildings are cracked or damaged by the excavation work, the contractor has to fix the damage or pay compensation for the PAPs, • Include a clause in the contract document that clearly indicates the contractor's responsibility to fix any damage caused by the activities.	Construction Contractor	SLWSSE/ Supervisory Consultant SC EPA	Before start of construction	Part of the construction and supervision cost to be covered by the contractor and consultant
6.	Impacts on Ambient Air Quality	• Implement measures that will reduce dust emission including regular spraying of water on unpaved access roads, exposed earth and any stockpiles on site, and where feasible, covering stockpiles on site with plastic materials. • Use update technology or modern equipment in excavation works that will minimize dust generation from earthen materials. • Regular vehicle inspections and maintenance of equipment and vehicles to reduce excessive exhaust emissions. • Minimize excavation and earth moving to only what is required for the specific nature and type of construction. • Limit stockpiling of excavated topsoil to the maximum of 2m height. • As much as possible use paved roads. and • Limit speed of vehicles to 30km/hour on unpaved access roads especially near sensitive areas (residential and business areas, social services, religious places). • Use dust collectors or water spray systems as appropriate to prevent high dust emissions from stone crushing or batch	Construction Contractor	SLWSSE/ Supervisory Consultant SC EPA	Throughout Construction phase	Part of the construction and supervision cost to be covered by the contractor and consultant

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
		plant operations at PSTP.				
7.	Pollution of on water bodies	• Perform excavation works and earth moving activities during the dry season only thereby minimizing erosion or transport of excavated materials by runoff water-to-water bodies. • Prevent environmental pollution by hazardous substances such as oil, fuel, cement sludge, and detergents through roper storage and handling of these substances. Install drip pans and fuel funnels at dispensing points of fuels and lubricants. Oil change should be taken place only in the pre-prepared workshop area. Washing of vehicles and machinery should only be conducted in the workshop area and never done in rivers and open soils. • Properly collect used oil and other chemicals and safely dispose of them through accredited oil reprocessing or disposal agency or in other manner approved by the Supervision Engineer. • Adopt good site management that considers good pollution prevention measures such as locating storage areas and compounds away from watercourses, appropriate storage of fuel and materials, providing suitable facilities for workers, disposing of waste according to approved waste management plan (avoid open waste disposal practices).	Construction Contractor	Supervisory Consultant Water and energy bureau, EPA	Throughout construction phase	Part of Contractor's Contract
8.	Impact on flora and fauna	• Compensatory plantation program at least saplings of 10 seedlings for each tree felled (staggered to follow Civil Works) including 3 years of maintenance. • Planting of appropriate trees and shrubs either indigenous or exotic species, which are friendly to the environment, is proposed to compensate for the unavoidable losses during the construction. • The selection of appropriate tree species and locations of planting shall only be done in consultation with the concerned Environmental Protection natural resource management Offices. • Plant appropriate trees at the boundaries of the site to improve the aesthetic value of the areas, to absorb air pollutants from the air, and to serve as a windbreak as well as to increase the biodiversity of the area.	Construction Contractor	Supervisory Consultant -wildlife authority/agency	During construction	-Part of the construction and supervision cost to be covered by the contractor and consultant

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
9.	Traffic congestion and Accident Risks	• Develop and strictly implement and follow up a well-designed work program and traffic management plan (TMP) that would consider local conditions like the normal traffic and socio-economic conditions. • Provide necessary information such as speed limits, hazard locations, sensitive sites (e.g., schools, religious areas, health centers, etc.) by putting appropriate signs and hazard markings. • Assign traffic regulators or traffic police to control traffic flows at critical sections or periods where/when traffic safety is a significant issue. • Provide awareness training for operators of equipment and construction vehicles in traffic safety measures. • Establish speed limits and controls for construction vehicles and discipline for the drivers. • Sensitization of the nearby communities about the increased traffic. Provide awareness education for the nearby residents in traffic safety measures at public meetings, social gatherings, schools, mosques and churches, etc.	Construction Contractor	Supervisory Consultant, traffic management office of the towns	During construction	-Part of the construction and supervision cost to be covered by the contractor and consultant
10.	Obstruction of access to human and animals during Excavation	• Appropriate warning signs shall be placed in areas where accidents are expected to occur. • Prohibit the construction sites for the people (children) and animals. • Collect and dump excess spoils as quickly as possible.	Construction Contractor	Supervisory Consultant	During construction	-Part of the construction and supervision cost to be covered by the contractor and consultant
11.	Occupational Health and safety	• Take maximum care and minimize accident risks by applying internationally accepted standards and recognized occupational health and safety guidelines. • Provide a Healthy and Safety Plan prior to the commencement of works to be approved by the resident engineer • There should be safety policy clearly displayed on the site. • Take appropriate care in storing and using hazardous chemicals and explosives and provide training to workers in handling hazardous chemicals. • Provide first aid kits at workshops, construction worksites, and inside vehicles.	Construction Contractor	Supervisory Consultant -SLWSSE -Health office	During construction	-Part of the construction and supervision cost to be covered by the contractor and consultant

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
		• Provided workers with appropriate PPE such as hand gloves, eye goggles, safety shoes, reflective vests, helmets, etc., based on their work condition as much as possible, create awareness on safety issues and strictly inspect proper use throughout the construction phase. • Appropriate signs must be erected on the site to warn workers and visitors • Conduct general medical check-ups for recruits and subsequently, conduct periodic medical check for all employees and take appropriate action and keep all records. • Hung-up fire extinguisher bearing detailed information about its status at appropriate places. • All personnel, vehicles, and machinery should be covered under an appropriate Insurance System. • Carefully record and keep all incidence of injuries and accidents including date, time, and place of occurrence, level of injuries, resources damage, people injured/dead, major causes for the accident, measure taken, etc. • Provide awareness creation on safety procedures and HIV/AIDS and avail healthcare services. • Provide temporary toilets and bathrooms for the construction workers at the work sites. • Regularly spray water in dusty roads and work areas. and • Introduce a traffic management plan with speed and traffic regulation through the neighboring areas by using appropriate traffic signs.				
12.	Health impact (HIV/AIDS/ STDs)	• Assign experienced HIV/AIDS sub consultant to handle the issues related to HIV/AIDS awareness and prevention. • Launch awareness and education campaigns about HIV/AIDS and STDs among the construction workers and community to make them informed, along the project road targeting especially women and sex workers. • Condoms shall be provided at a subsidized rate or for free to construction workers. To prevent young and school age people, schools should include information campaigns and/or special training. • Support nearby health facilities and work in cooperation with nearby health offices	Contractor & Health Office	Supervisory Consultant & Health office	Prior to start & during construction	-Part of the construction and supervision cost to be covered by the contractor and consultant

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
		• Town administrations and health offices, HIV/AIDS Prevention and Control Office, Elders, and NGOs operating in the area need to work jointly to create positive impact and bring major attitudinal and behavioral changes.				
13.	Gender Equity, GBV/SEA and Sexual Harassment	• Create awareness among workers on the GBV/SH to the staff/workers. • Prepare and implement code of conduct that sufficiently addresses gender and sexual harassment issues. strictly forbid sexual harassment /GBV and to be signed by all workers including international workers if involved and subcontract workers • Include in the employment contract for the construction workers that any GBV and sexual harassment against women workers will lead to administrative measures and legal actions. • Take appropriate actions on workers violating the CoC. • Design gender core labor standards and employment and contract procedures, and design gender responsive workers manuals. • Assign women in works that do not affect their biological condition. • Provide and avail a separate sanitation facility for women at construction camp • Provide women workers with appropriate type of safety equipment and protective materials. • The Contractor should ensure that women are paid equal for equal work with their male counterparts. • Provision of gender disaggregated bathing, cloth changing areas & sanitation facilities. • Include gender expert among the consultant's team to follow up Gender mainstreaming activities. • Ensure that women construction workers do not face GBV and sexual harassment. • Ensure equal pay for women and men for equal job. • Assign gender specialist at construction site to aware and prevent GBV and sexual harassment.	Contractor	Supervisory Consultant -Office of Women, Children and Youth Affairs.	Prior to start & during construction	-Part of the construction and supervision cost to be covered by the contractor and consultant

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
14.	Security Risk	• Proper consultation with local authorities and community about the existing situation. • Appropriate training on security issues and potential risk management including reporting to appropriate authority. • Establishing and collaborate with the local security organs	Construction contractor, SWSSE	Town Municipality	During construction	Part of the construction and supervision cost to be covered by the contractor and municipality
15.	Impact on archaeological & cultural heritage sites	• No known archaeological sites are expected on-site, however, if encountered the Contractor/ Supervising Consultant is to inform the local authority for further action. • Apply the chance finds procedure.	Construction Contractor	Supervisory Consultant, culture and tourism bureau	During construction	-Part of the construction and supervision cost to be covered by the contractor and consultant
	OPERATION PHASE					
1	Odor/obnoxious smell from the TP and from open manholes	• Create awareness to the FSTP works and even to the local community on proper management precautionary action. • Regular facility maintenance and monitoring operational practices including process control and chemical treatment, continuous process of the operation; avoidance of pools of dirty stagnant waters and spills. • Covering swampy parts of the settlement and drying beds with a layer of earth or sand. • Aerate, adjust chemical dosing and oxidation or pH to reduce odor from plant influents. • Cover tanks or installation of exhaust hoods. • Operate equipment at optimum/design conditions. • Adopt effective and efficient housekeeping procedures (regular cleaning of the grit and screenings). • Operate especially the secondary treatment processes at optimum condition. • Plant layers of shrubs and trees along the periphery and provide adequate stack height to exhaust emissions. • Provide adequate buffer zone, particularly along the major windward. • planting relevant plant species around the FSTP in the buffer zone	- Facility manager	-SLWSSE -EPA	Throughout the operation phase	Part of the FSTP operation budget
2	Ambient air	• Regular monitoring of the ambient air and measuring of the	SLWSSE	SLWSSE	Througho	Part of the FSTP

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
	Quality	H2S presence and level in the air, • Control an aerobic digester parameter (pH, Temperature, oxygen level etc.) for H2S producing bacteria/microorganism (creating unfavorable environment), • Changing redox potential, which helps in reducing or oxidizing capacity of anaerobic digestion system.	Facility manager	Afar region EPA,	ut the entire operation phase	operation budget
3	Soil	• Dispose sludge with dangerous substances only in a designated sanitary landfill • Close monitoring of the facility to ensure it functions as planned; this involves monitoring of ground and surface waters in the surroundings of the FSTP. • Ensuring that the facility's effluent complies with the national effluent standards.	SLWSSE Facility manager	SLWSSE Afar region EPA,	Througho ut the entire operation phase	Part of the FSTP operation budget
4	Water Bodies	• Seal the foundation of treatment plants and influence areas with concrete lining to avoid leakage of wastewater through permeable soils and weathered and fractured rocks into the groundwater system. • All pipe work and fittings should be a class a rating more than the maximum pressure attained in service including any surge pressure. • Dispose the sludge with dangerous substances in designated landfill. • Close monitoring of the facility to ensure it functions as planned, this involves monitoring of ground and surface waters in the surroundings of the TP, and ensuring that the facility's effluent complies with the acceptable national effluent standards. • Whenever the quality of effluent fails to meet the standard, stop discharging the effluent into receiving streams and rivers. • As appropriate, promote integrated watershed management schemes around the FSTP, which enable to reduce any potential spillover of the liquid wastes into the natural environment.	SLWSSE Facility manager	SLWSSE Afar region EPA, and water bureau	During design, constructi on and operation of TPs	Part of the FSTP operation budget
5	Risk of flooding, erosion, landslide	• Protecting the FSTP surroundings with appropriate protection walls based on the slopes and topographic gradients. • Planation of the FSTP surroundings with appropriate forest and vegetation that helps to protect the risks from flooding, erosion and landslides.	SLWSSE Facility manager	SLWSSE Afar region EPA, and water Bureau of agriculture and	operation of FSTP	Part of the FSTP operation budget

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
		• Training the FSM unit staff on handling these risks.		Natural resource		
6	Fauna & Flora	• Ensure proper quality control of "treated" wastewater and sludge before releasing. • Develop green belt around the treatment plant site to compensate trees removed during the construction phase and to increase the aesthetic view of the treatment plant sites as well as to sequestrate GHG and to absorb bad odor and noise pollution. • Control any accidental spill of untreated or partially treated wastewater into environment. • Install regular monitoring system on the quality of water discharged to natural environment if any	-FSTP Quality Control	-SLWSSE, Env. Prot. Office (both town administration and region)	Throughout the operation phase	Part of the FSTP operation budget
7	Health Impact on people handling the sludge	• Provide awareness training to the facility operators on the handling and management of the system and potential dangers. Equip the operators with the necessary precautionary measures (including reporting system) for any pathogenic incidents during the operation of FSTP. • Careful handling of fecal sludge • Use of protection clothes such as gloves and masks and a good hygiene (washing hands after work etc.). • Most importantly, the workers be aware of the nature of the health risks to which they are exposed and that they know how to protect themselves. • Most important is that workers be aware of the nature of the health risks to which they are exposed and that they know how to protect themselves. • Training of staff and targeted information may therefore be the most successful measures. • Department of SLWSSE dealing with sludge should introduce rules for use of protection by their staff and care should be taken to enforce those rules. • Site shall be entirely fenced and access to site restricted to employees having received the adequate training.	-SLWSSE Facility manager	-SLWSSE -Health -Afar EPA -Labor and skill at Semera-Logia -Bureau of water and energy	Throughout the entire operation phase	Part of the FSTP operation budget
8	Health impact from use of untreated fecal sludge	• Fecal sludge should always be treated prior to its use in agriculture. Treatment has then to provide sufficient pathogen reduction in the sludge to guarantee the safety of its use. • Use thermophilic composting. • Storage of sludge over a period long enough to allow natural	SLWSSE Facility manager	-SLWSSE -EPA -Health office -Bureau of agriculture and	Throughout the entire operation phase	Part of the FSTP operation budget

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
	in agriculture	pathogen die off (minimum 6 months) is the other possibility to disinfect sludge without using expensive technologies. • Sun drying of sludge can enhance the pathogen destruction during storage and construct a separate sun-drying floor, preferably concrete and coat with black color or lay black plastic so that it could absorb much solar energy that increases the temperature and kills most of the pathogens. • Avoid use of untreated sludge for growing food crops. • Hygienic Education and Treatment. • Avoid use of percolated liquid from the sludge dry bed for irrigation or any use before adequately treating and • Disinfecting. • Create awareness among these people who are potentially exposed to the direct and indirect health impact of the sludge. • Fence the area to prevent the entrance of dogs and other nocturnal animals. and • Keep the area neat and attractive so that flies and rodents could not be attracted.		natural resources		
9	Non-Pathogenic Health Risks	• Avoid use of percolated liquid from the sludge dry bed for irrigation or any use before adequately treating and disinfecting. • Create awareness among these people who are potentially exposed to the direct and indirect health impact of the sludge. • Fence the area to prevent the entrance of dogs and other nocturnal animals. and • Keep the area neat and attractive so that flies and rodents could not be attracted.	SLWSSE Facility manager	-SLWSSE -EPA -Health office -Bureau of agriculture and natural resources	Throughout the entire operation phase	Part of the FSTP operation budget
10	Occupational Health and Safety Impact	• Maximum care and minimize accident risks by applying internationally accepted standards and recognized occupational health and safety guidelines. • Appropriate warning signs shall be placed in areas where accidents are expected to occur • Awareness creation among the local community on the hazardous nature of chemicals, explosives if it is used during the construction works • Provided workers with appropriate PPE such as hand gloves, eye goggles, safety shoes, reflective vests, helmets, etc., based on their work condition as much as possible and strictly	SLWSSE Facility manager	-SLWSSE -EPA -Health office	Throughout the entire operation phase	Part of the FSTP operation budget

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
		inspect proper use throughout the construction phase • Regular checking of the adequacy of the facility, particularly when beds are (nearly) full and during the rainy season. • Timely heightening of the bund surrounding the facility and / or increasing the bed capacity. • Organize and ensure medical checkup for the relevant employees at least on every six months, • Special working schedule to workers who are working in hazardous environment which includes high temperature to minimize impacts on their health • Emergency plan and medical help to be made available to workers working in hazardous condition like sludge removal from sludge beds etc. • Provide first aid kits at workshops, construction worksites, and inside vehicles. • Hung-up fire extinguisher bearing detailed information about its status at appropriate places. • Strict prohibition of operation of equipment by unauthorized personnel. • Operators shall be provided with regular medical check-up and safety training.				
11	Impact on Aesthetic value	• Plant trees around the treatment plant and buffer zone. • Keep the buffer zone and open areas within the treatment plant neat all the time.	-SLWSSE Facility manager	-SLWSSE, Afar EPA, Semera-Logia environment protection, culture and tourism	Throughout the entire operation phase	Part of the FSTP operation budget
12	Gender and Gender Based Violence/SH/ SEA Risks	• Prepare and implement code of conduct that among others strictly forbid sexual harassment /GBV and to be signed by all workers including international workers if involved and subcontract workers. and • Incorporate measures to be taken against those workers who commit GBV and sexual harassment. • Ensure that women workers do not face GBV and sexual harassment. • Provide and avail a separate sanitation facility for women and men at the treatment plants.	SLWSSE Facility manager	-SLWSSE -Women and children affairs -Semera-Logia health office -Office of justice/police department focus on women and children	Throughout the entire operation phase	Part of the FSTP operation budget

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
		• Provide women friendly safety equipment and materials. • Assign women in works that do not affect their biological condition. • Ensure equal pay for women and men for equal job.				
	Decommissioning					
1	Air pollution	• Systematically demolish structures considering reuse of materials for other use. • Wet the materials before demolishing to suppress release of dust. • Avoid burning of any material.	SLWSSE	Afar EPA	Decommissioning	Part of the Semera Logia WSSE operation budget
2	Impacts on Soil and Water Bodies	• Remove all the contaminated soil from the treatment plant site and dispose it at a designated waste disposal site or at sanitary landfill. • Level the ground in such a way that it will be used for other purposes. • Reclaim polluted soil with appropriate technologies such as phytoremediation. • Avail advanced FSTP that technology of the time offers before decommissioning the one at hand.	SLWSSE	Afar EPA Afar Water and Irrigation Bureau	Decommissioning	Semera Logia WSSE operation budget
3	Site Reclamation	• Properly reinstate the site of abandoned fecal sludge treatment plant • After reinstatement, SLWSSE could use the area for other purpose. or • Develop the areas for recreational park or plant trees to increase the aesthetic value of the area or handover to the nearby community in consultation with their respective Woreda administrations so that they can develop what they think important for the community. • Integrate with the micro-watershed management system.	SLWSSE	Afar EPA, Health Bureau	Decommissioning	Semera Logia WSSE operation budget
4	Impact of Spoil Disposal	• Properly collect all the debris generated while demolishing the structures and transport to the designated disposal site. • Scrap any contaminated soils from the demolished treatment site, safely collect, and transport to the designated waste disposal site or sanitary fill site. • Reinstate the treatment plant site including tree plantation unless the site is reserved for other construction purposes. Alternatively, integrate it with the micro-watershed management system in collaboration with the bureau of	SLWSSE	Afar EPA and Agriculture Bureau	Decommissioning	Semera Logia WSSE operation budget

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
		agriculture and natural resource.				
5	Soil Compaction and Erosion	• Implement restoration measures such as re-vegetating exposed areas as quickly as possible. • Use only existing roads to the extent possible and do not drive through farmlands or unpaved soil. • Park all the vehicles and machineries at only designated parking areas. • Disposing of grit, screenings, and sludge from existing lagoons in a landfill.	SLWSSE	Afar EPA and Agriculture Bureau	Decommissioning	Semera Logia WSSE operation budget
6	Loss of Job Opportunity	• Give job priority in other related projects. • Secure pension benefit if the age of the job looser is in the set range of pension. • Organize, train and promote to establish their own small-scale enterprises through the facilitation of loan or financial support. Create link with appropriate government agency and financial sources	SLWSSE	Labor and Labor Affair bureau	Decommissioning	Semera Logia WSSE operation budget
7	Health Impact	• Create appropriate awareness before starting the operation to the local community and local administration including (agriculture, water and energy and health offices). • Plan the decommissioning work ahead of time to avoid sudden stop of the treatment plant before completely treating the influent reached to the treatment plant. • Provide appropriate PPE for the workers to be involved in decommissioning works.	SLWSSE	Afar Health Bureau	Decommissioning	Semera Logia WSSE operation budget
8	Gender and Gender Based Violence/SH Risks	• Provide appropriate awareness training to the staff and local communities. • Provide and avail a separate sanitation facility for women and men. • Provide women friendly occupational health and safety equipment and materials. • Assign women in works that do not affect their biological condition. • Ensure that women workers do not face GBV and sexual harassment. • Incorporate measures to be taken against those workers who commit GBV and sexual harassment. • Prepare and implement code of conduct that among others strictly forbid sexual harassment /GBV and to be signed by all	SLWSSE	EPA and Afar women and social affair	Decommissioning	Semera Logia WSSE operation budget

S/	Issue/ Main	Proposed Mitigation measures	Responsibility		Timing of	Cost Estimate
		employees. • Ensure equal pay for women and men for equal job.				

10. ENVIRONMENTAL AND SOCIAL MONITORING PLAN

Environmental and social monitoring is applicable to the FSTP. The updated ESIA will contain an ESMP to manage all identified impacts and enhance identified benefits. Issues that will be monitored during the development of the provincial water supply and sanitation utilities, capacity development and project management include:

- The development of utility environmental management plans, water quality monitoring plans, occupational health and safety plans, leakage monitoring plans, energy, and chemical management plans.
- The development of a Gender Policy for the sector, which will be based on gender assessment and intensive consultations with relevant stakeholders.
- Strengthening of the environmental and social safeguards of the SLWSSE and other relevant stakeholders.
- Capacity building of the existing environmental and social safeguards of the SLWSSE through increased the capacity of the Environmental Health and Safety Safeguards expert, social mobilization initiatives and effective communication.
- Inclusive hygiene promotion.

The environmental and social impact assessment requires the developer to prepare and undertake a monitoring plan and regular auditing. Therefore, this is a supplement ESIA according to the aforementioned regulation. The objectives of environmental monitoring upon executing activities are to:

- Monitor the effective implementation during the construction and operation phases of proposed mitigation measures.
- Confirm compliance with environmental, public health, and safety legislation/regulations during construction.
- Control the risks and ecological/social impacts.
- Ensure best practices management as a commitment for continuous improvement in environmental performance.
- Provide environmental information to community/stakeholders.
- Provide early warning signals on potential environmental degradation for appropriate actions to be taken to prevent or minimize environmental consequences. The system shall acquaint itself with national climate change adaptation and mitigation strategies including climate resilient WASH policy and emission reduction from waste.

Recommendations for monitoring responsibilities and estimated costs have been included in under the implementation of the ESMP.

Tables 26 below provide the monitoring indicators and monitoring activities at various phases. Monitoring plan: As the Executing Agency, SLWSSE will bear overall responsibility for monitoring the implementation of the ESMP. In addition, the relevant Semera-Logia town stakeholders shall be engaged as deemed necessary.

However, for day-to-day monitoring, it is expected that the supervising Consultant will hold the Contractor(s) accountable for all ESMP implementation requirements, including implementation of all approval conditions as stated in the approval. It is expected that regional and Federal EPA (or appropriate

regulatory body), as the agency responsible for the environment will also conduct oversight monitoring on ESMP implementation as appropriate. The WB, on the other hand, will conduct routine bi-annual supervision missions to ensure all activities, including ESMP implementation is on track. The individual ESIAs and ESMPs have identified areas for monitoring by the enterprise, the contractor(s), the Supervising Consultant(s), and other relevant stakeholders. Key aspects of the monitoring program will include, among others; water quality monitoring, especially with respect to effluent discharged FSTP and receiving waters, sound operation of fecal sludge treatment plants, reinstatement of areas disturbed by earthworks, occupational health and safety aspects, and related construction-related accidents and protection of workers as well as the status of PAPs livelihood programs after compensation.

The key verifiable indicators which will be used to monitor the impacts will mainly include pollution (noise, soil, air-dust, waste), erosion and loss of resources, occupational and health safety, land use change, the spread and occurrence of diseases (Pathogenic and non-pathogenic-HIVE/AIDS, COVID-19 etc.) and accidents as well as job creation.

Table 26: Environmental and Social Monitoring Plan

S/N	Issue/ Subproject main Impacts	Monitoring Indicators	Monitoring Party	Monitoring Frequency	Method of Measurement	Budget Estimate (Birr)
	CONSTRUCTION PHASE					
1.	Impacts on soils and landscape quality	• Evolution of erosion signs (sheet erosion, gully formation, siltation in nearby watercourses or drains, flood course). • Length/ area of trenches and other exposed surfaces properly refilled, leveled to surrounding landscape and replanted with appropriate plant species following completion of woks to minimize soil erosion, slope failures or to improve the quality of the affected landscape. • Area of land affected due to exploitation of quarries and borrow sites and area reinstated after exploitation has ceased. • Incidence of soil pollution by spillage of hazardous substances.	Supervisory Consultant (SC) & Afar EPA, Agriculture and Natural resource department, local land administration Representatives of the community	Minimum twice per month during the construction contract period	Visual observation, area measurement	250,000
2.	Impacts on water quality; sedimentation pollution by hazardous substances and wastes generated by the project	• Location/distance of the contractor's site facilities (camps, storage site, workshop/garage) from water bodies (min. of 1km is recommended). • Provision of a secondary containment system for fuel storage facilities. • Proper handling of hazardous substances (oil, fuel) and disposal system used oils. • Incidence of water pollution by spillage of hazardous substances. • Sediment load/turbidity of nearby streams & rivers.	SC SLWSSE, EPA, Representatives of the community	As required	Visual observations, water quality analysis in laboratory or using field kits	250,000
3.	Impacts on air quality	• Dust levels or incidence of dust pollution in the construction areas & rate of application of dust suppressants (spraying water) on dusty areas. • Use of dust collectors or water spray systems in stone crushing or batch plant operations. • Noise and exhaust emission levels generated by construction vehicles and equipment. • No. of complaints due to nuisance noise or	Supervisory Consultant (SC) Regional EPA, Water and Energy Bureau/office at Semera-Logia town, health office	As required	Visual observations & Recording of case Complaint from the community	200,000

S/N	Issue/ Subproject main Impacts	Monitoring Indicators	Monitoring Party	Monitoring Frequency	Method of Measurement	Budget Estimate (Birr)
		dust pollution.				
4.	Flooding, erosion, landslide impact	• Evaluation of erosion signs (sheet erosion, gully formation, • Provision of awareness creation trainings • Existence of flood, erosion and landslide protection measures	SWSSE,EPA	Minimum twice per month during the construction contract period	Visual observations	Part of the project supervision cost
5.	Impacts on flora and fauna	• Area of vegetation cleared for the project within the boundary of FSTP • Number of trees/land area replanted and survived to replace the trees removed and the plantation affected. • Number of wild animals killed during the construction works.	Supervisory Consultant -Wildlife enterprise Afar regional state EPA SLWSSE, agriculture and natural resources	As required during the contract period	Visual observations, surface area measurement & Recording of trees affected & Animal fatalities	250,000
6.	Impacts on infrastructures	• Length or area of infrastructures (roads, drainage facilities & pedestrian walkways) damaged due to the project activities, • Length or area of damaged infrastructures reinstated to original state after completion of the works	Supervisory Consultant, Municipality	As required	Visual observations & measurement community complaint	250,000
7.	Impacts on traffic mobility and safety issues	• Number of construction sites provided with appropriate signals to minimize obstruction to traffic mobility & safety hazards. • Number of risky construction sites prohibited for the people and animals or fenced to minimize safety risks. • Timely collection and disposal of excess spoil materials availability of adequate number of protective kits and whether workers are using protective kit	Supervisory Consultant, Municipality Traffic management office	Once per day or as required construction works are ongoing at road crossings or pedestrian access	Visual Observations, report and community compliant	150,000
8.	Impacts on public health	Number of awareness raising and education campaigns about HIV/AIDS given for project workers and vulnerable local population.	SC, Health Office, EPA, Representatives of the community	As required	Communication with the implementers & interviewing the vulnerable groups and reports	300,000
	OPERATION PHASE					

S/N	Issue/ Subproject main Impacts	Monitoring Indicators	Monitoring Party	Monitoring Frequency	Method of Measurement	Budget Estimate (Birr)
1.	Odor	Intensity of odor and spatial coverage around the treatment plant and nearby surrounding areas	Afar-EPA	Whenever there is compliant from the affected people	Visual observations & Recording of cases. Community complaint	Part of the regular budget of regulatory body
2.	Impacts on ambient air quality	• Emissions and discharges from the facilities shall comply with the notified standards	Regional EPA,	Every month	Measurement of Emission	150,000
3.	Sludge water treatment & disposal of the cake	• Proper functioning of the installed drying lagoons as thickeners for sludge water. • Proper disposal & control of the dewatered sludge at the properly located dumping/landfill site	SLWSSE Afar-EPA, Bureau of agriculture, water and energy, Representatives of the community	As required	Visual Observation, reports and community complaint	Part of SLWSSE operation cost and cost of regulatory body and 350,000 monitoring cost
4.	Water quality monitoring	• Physical-chemical indicators such as PH, turbidity, total dissolved solids, electrical conductivity, nutrients (nitrate, phosphate), residual chlorine, etc. • Bacteriological indicators such as Escherichia coli (E. coli) – an indicator of fecal contamination	SLWSSE, EPA, Health office, Bureau of water and energy, Representatives of the community	Twice/year for nearby source water intake), once per month for treated water at WTP	Sampling & testing in laboratory or using field kits with portable incubators for microbiological testing, community complain and reports	Part of SLWSSE operation cost and cost of regulatory body and 400,000 monitoring cost
5.	Public health & Environmental sanitation issues	• Number or availability of adequate drainage facilities for disposal of wastewater. • Wastewater disposal situation by the local people using available facilities	Municipality SLWSSE Health office, EPA, Representatives of the community	As required	Visual observations, review of drainage plans & documents (reports), community complaints	Part of the regular budget of regulatory Body and 250,000 monitoring cost
6.	Operation and Maintenance of the TP System	• Adequacy of implementation of preventive and all unscheduled/ emergency maintenance work • Periodic housekeeping of the system, • Allocation of human and financial resources for the preventive and unscheduled maintenance	SLWSSE, Bureau of water and energy	Monthly	Performance reports	Part of SLWSSE regular maintenance cost and 250,000 monitoring cost
7.	Monitoring cost	Total monitoring cost				2,900,000

10.1 Institutions Responsible for Implementation of ESMP

The Program will use the existing institutional arrangements and a dedicated Program Implementation Team, who are employees of the executing agency (SLWSSE). SLWSSE has an established position for an Environmental Officer and positions for sociologists, which will provide oversight on the implementation of the environment (ESIA) and social (RAP) components of the program. Accordingly, SLWSSE shall fill the said positions prior to initiation of the subproject physical activities. It is further planned that the contractor will further supplement oversight on environmental issues through the recruitment of additional environment expertise and supervising consultant once the project commences. In the interim, this staffing arrangement is deemed adequate.

The responsibility for implementing the ESMP of the supplement ESIA during construction will be of the contractor, SLWSSE and the bureau of Health. The regional environmental authority is also mandated for the follow up and compliance monitoring of the E&S related aspects. During the operation and maintenance of the FSTP works, the responsibility will be mainly under the SLWSSE.

The environmental sustainability of the FSTP subproject is dependent on the capacity of institutions at all levels (i. e. staffing, training, and other necessary support services) to carry out the associated ESMP implementation work. Thus, it is vital that SLWSSE allocate sufficient resources for training and capacity building. These efforts will not only benefit the authorities but will also build local capacity to undertake other development initiatives.

The institutional capacity to implement, enforce and monitor the subproject environment and health was assessed based on the technical, financial, and physical capability of the Community leaders and SLWSSE. They are responsible to carry out ESMP and monitoring activities. The findings indicated that these different groups have different capacity building and training needs in terms of raised awareness, sensitization to the issues, and detailed technical training. The SLWSSE is found to have a limited institutional capacity to implement the provisions of the ESMP, especially regarding the FSTP management sub-project. Although general awareness on environmental issues exists within the steering committee stakeholders and SLWSSE professional staffs, focused training and capacity building would enhance the ESMP implementation capacity substantially on their part.

It is recommended that capacity building interventions including trainings should take place at all levels i.e., community-based organizations relevant to waste management, relevant government officials (E&S, environmental protection, health, women and labor), community leaders, SLWSSE management team. The SLWSSE environmental and social experts should be exposed to short-term training in the management of environmental and social issues. The training program for various role-players will include an orientation program on the ESMP, Environmental Assessment Processes, Participatory Methodologies, and Project Management and monitoring. The training on ESMP may be integrated with the social framework and another related training program for cost-effectiveness.

Table 27: Institutions Responsible for the Implementation of ESMP

Stakeholders	Roles and Responsibilities
Semera and Logia sub town Administration	Allocate Budget to the Client project office and monitor its utilization; Monitor the implementation and operation of the proposed project; Coordinate the activities of the sub town and Kebele Administrations for the successful implementation of the project. Also involve in GRM
SLWSSE	Responsible for the implementation of the proposed subproject as proponent; Coordinate the efforts of the different organizations responsible for the management and monitoring plan; Follow-up the rehabilitation of the affected part. Coordination of stakeholder during monitoring of subproject activities at various phases.
Afar region EPA	Provide technical advice about environmental protection during the project implementation; Audit the project from an environmental protection point of view; monitoring the implementation of environmental and social mitigation actions.
Semera-Logia health office	Provide technical advice about the social health issues such as HIV/AIDS, Covid-19, STD and others.
Semera-Logia Women and children office	Provide technical advice about the social issues on GBV, child labor etc. and monitoring at various phases.
Regional water and energy bureau	Provide technical advice (2nd UWSSP) and capacity building and monitoring. The bureau will participate in monitoring during water quality measurement.
MoWE	Technical advice and capacity building (2nd UWSSP).
The World Bank	Finance the project as per the agreement. Monitor and evaluate the progress of the work and check the correct use of the allocated fund. Demand work progress reports on the implementation of the project.
Contractor	The Contractor has to prepare Construction's ESMP and implement it. To this end, the contractor should mobilize environmentalist, sociologist, health and safety expert and gender specialist at construction site.
Supervision Consultant	The Consultant's EHS team in cooperation with SLWSSA social and environmental impact assessment & monitoring and evaluation sub process will conduct regular monitoring of the project activities and give advice and instruction to the Contractor to perform environmental, social and health and safety issues as per the ESIA, ESMP and financers environmental, social and health safeguard guidelines.

10.2 Training and Capacity Building

Training programs is developed and shall be delivered to the project developer for the implementation of environmental safeguards of the proposed subprojects.

Following training needs assessment; specific and tailored training will be developed and agreed upon developer and key stakeholders for implementation of safeguards in the course of project implementation.

- Target groups for the training: SLWSSE Civil and Sanitary Engineers, Environmental, Community development Officers, Contractors and community representatives in the project area.
- Training schedule: at least 1 month before construction starts.
- In service and refresher Training: The training programs proposed below will take place every six months on a yearly basis and their content updated and adapted to implementation issues. Training frequency and the content will be reviewed in the course of the subproject's operation lifespan depending on needs or technical requirements. Table 28 outline the training and capacity-building requirement and estimated costs.

Table 28: Training Programs for Capacity Building and associated costs

Target Group	SLWSSE Staff, MoWE (regional water and energy bureau), Health officers, EPA, and other relevant stakeholders	Cost estimation in birr
Training title	Environmental supervision, monitoring and reporting	500,000
Participants	Environmental staff and social workers of SLWSSE and other stakeholders who are going to engaged in the management and monitoring (total 15 participants)	
Training frequency	Soon after project effectiveness but at least 2 weeks -1 month before the start of subprojects work. In-service /refresher training during operation.	
Time	Training twice a year, and then to be repeated on a yearly basis until year three of implementation.	
Training content	• Public health and safety of FSTP management. • Social mitigations for environmental projects • Community participation in environmental supervision monitoring • Supervision of contractors, Subcontractors, and community representatives in the implementation of environmental supervision • Risk assessment, response, and control • Awareness creation • Public and communal toilet management approaches	
Responsibilities	SLWSSE with the facilitation from the MoWE environmental and social safeguard specialists	
Training title	Implementation of mitigation measures	350,000
Participants	On-site construction management staff; environmental and social safeguard staffs; village/group authorities.	
Duration	After bidding, and determining based on needs	
Time	3 days of training for contractors and 2 days of training for others, to be repeated twice a year on an annual basis depending on needs	
Training Content	• Overview of environmental monitoring • Requirements of environmental monitoring • Role and responsibilities of contractors • Scope and methods of environmental monitoring • Response and risk control • Propagate monitoring forms and guide how to fill in the forms and risk report • Preparation and submission of reports • Other areas to be determined • Grievance handling and reporting • GBV reporting	
Responsibilities	SLWSSE with facilitation from the MoWE	
Target groups	Local communities/ stakeholders, SLWSSE, Health Officers and, municipality, urban infrastructure technicians/ Engineers/EPA	
Training title	Environmental sanitation and safety	450,000
Participants	Representatives of community and/or worker leaders (as appropriate) (up to 30 participants)	
Training frequency	Bi-yearly or every 6 months for the first two years	
Time	One-day presentation and one-day on-the job training twice a year, to be repeated on as needed basis	
Training content	• Environmental and Social safeguards • Safety and health issues • Environmental Pollution risks and management • Management of environmental safety and sanitation on work sites • Mitigation measures at construction sites • Procedures to deal with emergency situations	

Target Group	SLWSSE Staff, MoWE (regional water and energy bureau), Health officers, EPA, and other relevant stakeholders	Cost estimation in birr
	• Other areas to be determined	
Responsibilities	SLWSSE and another relevant stakeholder	
Subtotal 1		1,3000,000
Training title	Customer service management:	450,000
Course content	Marketing (promotion), customer handling, record keeping and reporting, financial management	
Target group	Head of Core Process, Fecal Sludge (FS) Emptying Customer Service Team Leader, Head of Finance Accountant (up to 20 participants)	
Responsibilities	SLWSSE and another relevant stakeholder	
Training title	Safety measures for proper FS emptying	500,000
Course content	Training on risks, safety measures and good practices for FS sludge collection and conveyance	
Target group	Head of Core Process, FS Emptying Customer Service Team Leader Sludge Truck Drivers Sludge Emptying Crew	
Responsibilities	SLWSSE and another relevant stakeholder	
Training title	Operation and maintenance of treatment plant	750,000
Course content	Treatment plant operation principles, operation and maintenance procedures, and treatment processes	
Target group	Head of Core Process FSTP Team Leader FSTP operators	
Responsibilities	SLWSSE and another relevant stakeholder	
Training title	Leadership and communication	570,000
Course content	Training on group coordination, team leading and communication	
Target group	Utility Director General Head of Core Process, FS Emptying Customer Service Team Leader FSTP Team Leader Finance Team Leader	
Responsibilities	SLWSSE and another relevant stakeholder	
Subtotal 2		2,270,000
Total estimated cost		3,570,000

10.3 ESMP implementation costs

Environmental and social management/monitoring is essential for ensuring that identified impacts are maintained within the allowable levels, unanticipated impacts are mitigated at an early stage (before they become a problem), and the expected project benefits are realized. Thus, the aim of an ESMP is to assist in the systematic and prompt recognition of problems and the effective actions to correct them, and ultimately good environmental performance is achieved. To support this, the ESIAs have provided a budget estimate for ESMP implementation, and this will be included in the overall project implementation budget. As a result, the total cost, which takes into account mitigation, monitoring, and capacity building, as shown in Table 29, is about ETB **10,197,000.00**.

Table 29: Summary of Budget Estimate for ESMP

No.	Component	Project phase	Unit/Reference	Estimated cost in birr
1.	ESMP			
	Buffer zone protection for intake site	Throughout all phases	Lump sum	200,000.00
	Implementation of replanting program to compensate for trees or plantation forest lost	construction phases	Lump sum	500,000.00
	HIV/AIDS awareness and prevention	construction phases		50,000.00
	ESMP enhancing beneficial impacts	All phases	Table 24	500,000
	Subtotal 1			**1,250,000**
2.	Environmental and Social Monitoring Costs			
	Impact on soil and landscape			250,000.00
	Water quality monitoring	Throughout all phases	Table 26	650,000.00
	Air quality monitoring	Throughout all phases	Table 26	350,000.00
	Impacts on flora and fauna	Throughout all phases	Table 26	250,000
	Impact on public health and Environmental sanitation issues	Throughout all phases	Table 26	550,000.00
	Impacts on infrastructures	Construction	Table 26	250,000
	Impacts on traffic mobility and safety issues	Construction	Table 26	150000
	Stakeholder monitoring costs	All phases	Lump sum	1400,000
	Sludge water treatment & disposal of the cake	Operation	Table 26	350,000
	Operation and Maintenance of the TP System	Operation	Table 26	250000
	Subtotal 2			**4,450,000.00**
3.	Training cost including skill development	All phases	Table 28	3,570,000.00
	Subtotal 3			**3,570,000.00**
	Subtotal 1+2+3			**9,270,000.00**
	Contingency 10%			**927,000.00**
	TOTAL			**10,197,000.00**

10.4 Grievance Redressing Mechanisms

A grievance redressing mechanism (GRM) is expected to outline procedures to respond to project-related grievances in an efficient and effective manner. As per OP 4.12 of the WB, GRM should be accessible and appropriate to bring about remedial measures for complaints. Appropriateness and accessibility basically signify the need to have a workable GRM arrangement tailored to local context. Without these main ingredients of GRM, complaint procedures will have no expected outcome in redressing grievances. In case of complaints by PAPs on project related activities, the preferred way of settlement is through amicable means so as to save time and resources as opposed to taking the matter to formal courts.

To ensure that the PAPs have avenues for redressing grievances related to any aspect of environmental and social impacts, compensation, construction management negligence, and any other relevant project related matters procedures for the redress of grievances should be established for the project. The objective is to respond to the complaints of the PAPs efficiently, i.e., the mechanism to be easily accessible, transparent

and fair and to avoid the need to resort to complicated formal channels to redress grievances. Accessible and appropriate GRM not only help to have more effective and efficient procedure but it also has strong bearing on the project implementation progress, as PAPs grievances tends to thwart timely accomplishments of project activities. For the project at hand, grievance redress committee needs to be established that consists of members from project administration office, PAPs, elders/religious leaders and local NGOs.

Procedure

- Complainants can log/file their complaint(s) in written form, verbally, through telephone call, text message or any means of channels convenient to them.
- Complain to be registered in a standard format prepared for the same purpose.
- The filed complaint(s) need to be itemized, clear and concise with remedial suggestions
- Present the form for the relevant designated officer (first contact point, in this case secretary of the Grievance Redress Committee-GRC)
- Address of the compliant/Ps (Telephone, Kebele, etc.)

Obligation of the GRC

- Check the complaint is project-induced
- Registering all complaints and organize them properly (Secretary of the GRC)
- Forwarding the case to the committee
- If it is not settled by the GRC, inform/forward the same to project owner /client
- Feedback from the project owner to be communicated
- Feedback /or GRC committees‟ decision should be communicated to the PAP(s) at a maximum of 30 working days.
- Amicable dispute settlement continues to be explored
- In case amicable arbitration not working, PAP (PAPs) can use their own right in formal court procedures
- As it has been repeatedly mentioned, the GRM should be based on the core principles of: fairness, objectiveness, simplicity (localized and contextual), accessibility to PAPs, responsiveness and efficient. In addition, GRM should not only deal with compensation issues, rather it also takes into account all other project –induced complaints partly listed above.
- Capacity building and awareness creation interventions for local level GRC are essential. The project owner/client is expected to facilitate such trainings for better performance of the project at large.

The following steps will be followed in order to achieve consensus for any grievance related to any aspect of the project.

- PAPs can complain orally or in writing to the established GRC. If it is an oral complaint, the GRC must record the complaint in writing and must respond to the complaint within one week.
- If PAPs are not satisfied with the respondent, PAPs can appeal to the court for final decision.

10.5 Code of Conduct

The project shall develop and implement a Code of Conduct to deal with the environmental and social risks related to construction. The Code of Conduct shall be applied to all staff, laborers and other employees at the construction site or any other places where construction related activities are being carried out. It also applies to the personnel of each contractor, subcontractor, consultant and any other personnel assisting the contractor in the execution of the Works.

The purpose of the Code of Conduct is to ensure an environment where unsafe, offensive, abusive or violent behavior should not be tolerated and where all persons should feel comfortable raising issues or concerns without fear of retaliation. More specifically, the Code of Conduct should include the following core requirements applicable to the project workers.

Every person involved in the project activities should:

- 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 environment, 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 is 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 or migrant workers;
- 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.
- Not engage in Sexual Assault, which means sexual activity with another person who does not consent.
- Not engage in any form of sexual activity with individuals under the age of 18, except in case of a pre-existing marriage.
- Complete relevant training courses that shall 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. 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.

- The contractor shall require all employees and the employees of sub-Contractor to individually sign the Code of Conduct, and shall proactively address any breach to the Code of Conduct.
- A copy of the Code of Conduct in Amharic shall be displayed in a location easily accessible to workers.

11. LIMITATION OF THE ASSESSMENT

Even though some progress is made regarding ESIA on the various projects in the country, there are lots of issues to be done more to realize objectives of the ESIA in developing countries like Ethiopia. Lack of similar study alike UWSSPII sub projects in the country is others limits that might affect the quality of the ESIA study. The following limitations have been made/identified during the assessment process and in the compilation of this ESIA Report:

- Getting sufficient and reliable primary and secondary data of the baseline for the existing socio-economic activities.
- Lack of systemic networking among concerned government organizations so as to accomplish the study as per the guideline of ESIA.
- The duration allotted for the specific task was short and more secondary data are used to analyze the impact.
- Unavailability or lack of previous works on similar subproject in the country.

The limitations listed above can be taken as the draw back for systematic, complete and scientific analysis of the environmental and social impacts of the sub-project.

The implication of these identified gaps is that the limitations should be considered in decision making though the impact assessment could only indicate the most likely cause of the subproject activities on the social and environmental aspects. The limitation can be avoided if more time is given for the task so that more primary site-specific date can be included in the study.

12. CONCLUSION AND RECOMMENDATIONS

12.1 Conclusion

Lack of FSTP facility is among the bottleneck for the development of the town. This poor sanitary situation is affecting the public health and the aesthetics of the town. Considering all this condition of the town, the need for an improved fecal sludge management system (fecal sludge treatment plants and collection system) is indisputable.

It is therefore, planned to construct fecal sludge treatment plant. The proposed sub projects will have a great contribution to the overall sanitation improvement of the Sub towns. The new treatment plant will be installed in newly designated land FSTP at the distance about 4km from Semera. In order to maintain current treatment as well as future goals, Biological Treatment (ABR, Facultative and Maturation Ponds System) drying bed is recommended for the treatment plant (FSTP).

The selected technology for the fecal sludge treatment plants allows the proper management and create new capacity to the municipality and opportunity. The selection of the treatment technology was carried out based on construction and operation cost, space requirement, ease of operation, etc. The appropriateness of the sanitation facilities and technologies have been critically evaluated against pre-defined multi criteria from available alternatives. Accordingly, the selected treatment technology is appropriate to the local context.

The ESIA study results show some limited negative environmental implications of the project activities, the proposed works will have high socio-economic benefits to the residents of Semera and Logia Sub towns and project intervention Kebeles. The associated negative impacts will be significantly reduced or eliminated through careful engineering design, best construction practices, and effective implementation of mitigation measures. Specific mitigation measures have been suggested in this report to offset some of the inherent adverse impacts, especially those linked natural, human, and social environment. Effects in the construction phase include effects on ambient air quality due to dust, noise pollution, soil erosion, poor solid waste disposal, and storm water. In addition, interference to business and residential access, occupational health, and spread of social diseases e.g., COVID-19 risk may result from project activities.

Many of the adverse environmental and socio-economic impacts in the FSTP site are minor and can be easily mitigated. The identified ‘major impacts’ are all subjective which may happen under rare conditions, as in case of negligence, accident, etc. These also have appropriate mitigation measures and are indicated in the ESMP.

It is, therefore, concluded that effective implementation of the proposed subprojects works will mitigate the predicted impacts to non-harmful or near non-harmful levels. Their implementation should be adequate and timely. The ESMP has been prepared as shown in chapter 9. Overall, the anticipated positive impacts will outweigh the negative ones by far. In particular, sanitary facility improvement decreased the socio-environmental impacts of the poor sanitary facility hence increasing social development and welfare for the community of the municipality.

Moreover, the stakeholders and the affective communities have positive attitudes about the proposed projects and needs their immediate implementation.

Predicted impacts shall be managed through the proposed mitigation measures and implementation regime laid down in this ESIA. Semera-Logia water supply and sanitation enterprise is committed to implementing all the proposed recommendations and further carrying out environmental auditing and monitoring schedules as well as enhancing the anticipated positive impacts, especially the creation of a healthy environment (social and natural environment).

The summary of recommended mitigation and management measures to minimize the potential impacts are:

- Proper design to accommodate measures for, flood effects and soil erosion, and slopes destabilization during FSTP construction.
- Measures to safeguard job opportunities and gender balance during both construction and operation of subprojects.
- Measures to encourage local employment.
- Mitigation measures against workplace health and safety.
- Measures against noise and dust effects.
- Management of traffic accidents.
- Measures against the possible increase of social diseases COVID-19 prevalence.
- Monitor compliance to environmental, health, and safety measure.

In general, the ESIA study indicates that the implementation of the project is expected to have enormous significance. The positive impacts by far outweigh the negative impacts. The implementation of the project will improve the health and livelihood of the town residents; it reduces the prevalence of waterborne diseases and other diseases born due to poor sanitation. The project will also create short and long-term employment opportunities and potentially enables reuse of the treated fecal sludge waste for agriculture and allows producing biogas for energy and organic fertilizer (compost) from the by-products of fecal sludge treatment process in the future.

The project is important and timely to reduce the problems associated with the disposal of fecal sludge in Sub towns. The project will certainly play important role in bringing about a more ecologically, socio-culturally and economically sustainable and equitable environment in the project intervention sites.

12.2 Recommendations

Overall, the ESIA shows that the benefits of the Semera-Logia FSTP construction project outweighs much more significantly than the adverse effects. The adverse impacts identified can be mitigated through implementing the proposed management and monitoring plans to acceptable limits. Therefore, it is recommended to implement the project with strict observation to the environmental and social management and monitoring plans. However, the project supervision consultant once mobilized should prepare ‘Construction Supervision Plan’ before the beginning of construction works and this plan should be part of the contract. In addition, the environmental management plans should be made part of contract documents of contractor so that ESMP compliance is ensured. The ESMP recommends environmental

monitoring at the different phases of the project. The monitoring should be conducted to check the efficacy of mitigation measures. Moreover, the Environment and Safety Division should develop an environmental checklist for the daily environmental audit of the project activities. This should be filled up by the environmental expert of the contractor and should be verified by the Regional EPA.

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APPENDIXES

Appendixes	Appendix title	Appendix Attachment
1	Minutes of community consultation	Appendix 1 Minute of consulation.pdf
2	Lists of participants	Mayor Office_semera.docx; FGD Ketena 1 k01.docx; FGD k02_Delala Genda_logia.docx
3	Primary data collection checklist	Appendix 3 Primary data collection chec
4	Secondary data collection Checklists	Appendix 4 Secondary data colle
5	Checklist and Formats	Appendix 5 Other checklist and Forma
6	Ambient Factors	Appendix 6 Environment-Ambie
7	The ESIA Team	Appendix 7 The ESIA Team.docx
8	GRM form	Appendix 8 GRM Form.docx
9	Environmental and Social Clause for Construction Contractor	Appendix 9 Environmental and S
10	Chance Find Procedure	Appendix 10 Chance Find Proced
11	Gender Action Plan	Appendix 11 Gender Action Plan.
12	Scoping checklist	Scoping Checklist.docx

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