ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT ON FECAL SLUDGE TREATMENT PLANT

ASSELA TOWN, OROMIA

Client: Ministry of Water and Energy

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LIST OF ACRONYMS

ABR	Anaerobic Baffled Reactor
ARAP	Abbreviated Resettlement Action Plan
BOD	Biochemical Oxygen Demand
CBE	Community Based Enterprise
COD	Chemical Oxygen Demand
CSA	Central Statistical Agency
CT	Communal Toilets
CTMP	Contractor's Traffic Management Plan

CWIS	City Wide Inclusive Sanitation
DAF	Dissolved Air Floatation
DEM	Digital Elevation Model
EA	Environmental Assessment
EFY	Ethiopian Fiscal Year
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EPA	Environmental Protection Authority
EPO	Environmental Protection Office
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ETB	Ethiopian Birr
FDRE	Federal Democratic Republic of Ethiopia
FGDs	Focus Group Discussions
FSM	Fecal Sludge Management
FSTP	Fecal Sludge Treatment Plant
GHG	Green House Gases
GIS	Geographic Information System
GoE	Government of Ethiopia
GPS	Global Positioning System
GSEMC	Green Sober Environmental Management Consultant
KII	Key Informant Interview
MoH	Ministry of Health
MoWE	Ministry of Water and Energy
NBP	National Biodiversity Policy
NFSTSS	National Fecal Sludge Treatment and Sanitation Strategy
NPW	National Policy of Women
NUDP	National Urban Development Plan
OD	Open defecation
OHS	Occupation and Health Safety
OHSR	Occupational Health and Safety Risks
OP	Operational Policy
PAPs	Project Affected Peoples
PC	Public Consultation
PCR	Physical Cultural Resources
PCT	Public and Communal Toilets
PPE	Personal Protection Equipment
PT	Public Toilets
PWD	Persons with Disability
STD	Sexually Transmitted Disease
STT	Sludge Thickening Tank

SUWSSP	Second Urban Water Supply and Sanitation Project
ToR	Terms of Reference
WB	World Bank

EXECUTIVE SUMMARY

INTRODUCTION

Ethiopia is a country with a population of over 100 million people and a rapidly growing economy that achieved six Millennium Development Goals out of the eight goals set out despite it is one of the Sub-Saharan African countries with poor sanitation services which is stressed by rapid population growth and urbanization (Oliver, 2015). As a result, people in many cities lack access to adequate sanitation systems, consequently causing environmental and social problems (ESMF, 2017). Despite these challenges, the Ethiopian government is working to improve the fecal sludge treatment and sanitation services through creating the enabling environment through policy, legal and institutional arrangement and resource allocation. In particular, the government of Ethiopia has developed a national fecal sludge treatment and sanitation strategy (NFSTSS) in 2016, and it has implemented a number of projects to improve fecal sludge treatment and sanitation services. The implementation of the NFSTSS has had a number of positive impacts. The number of fecal sludge treatment plants in Ethiopia has increased from 10 in 2016 to 100 in 2022. The number of people with access to improved sanitation has also increased from 20% in 2016 to 30% in 2022. However, the implementation of the NFSTSS has also faced several challenges. The main challenge has been a lack of financial resources. The government has not been able to provide enough funding to support the implementation of the strategy.

It is, therefore, based on the aforementioned considerations that the Ethiopian government and the World Bank have launched the second Urban Water Supply and Sanitation Program (UWSSP-II). The UWSSP-II aims at increasing access to water supply and sanitation services in 22 secondary cities and Addis Ababa of Ethiopia. Assela town is one of the secondary cities benefiting from the portion of the finance secured under UWSSP-II (Component 2). This project aims at development of Fecal Sludge Treatment Plant (FSTP) in the short-term (2023-2027) that will improve the provision of a sanitation service for the city. Although this infrastructure development brings multifaceted benefits to the city, it may also bring adverse impacts on the environment and social aspects that need to be minimized and mitigated to make the project environmentally and socially acceptable. Hence, this study aims to provide an insight into the possible environmental and social beneficial and adverse impacts which can occur during design, construction and operation of the FSTP in Assela town. It also forwards possible enhancement mechanism for the positive impacts and mitigation measures for the various impacts. In connection with this, MoWE signed consultancy service contract with Green Sober Environmental Management Consultant (GSEMC), to undertake the Environmental and Social Impact Assessment (ESIA) Study for the above stated project in Assela town. The overall objective of the ESIA is to identify, predict and evaluate the potential beneficial and adverse impacts and propose mitigation measures of the FSTP on the biophysical and socio-economic environment in the city.

METHODOLOGY

To achieve the objectives stated in the TOR for consultants, this ESIA collected and evaluated comprehensive socioeconomic and environmental data from the project area. In line with the

type of assessment, and nature of data sources, a mixed approach was adopted. This was selected because the assessment was relatively complex and requires a more comprehensive understanding of the phenomenon being studied. In accordance with the EIA guideline of Ethiopia, the GSEMC utilized both quantitative and qualitative data from primary sources (FGD and field observation) and secondary sources (literatures, the ESMF, and project operational manuals), feasibility and design study report and Assela town profile document). Socioeconomic and Environmental data were described and explained at the required scale. Descriptive method is mainly adopted to describe the impact of the project on receiving biophysical, socio-cultural and economic environment as the impact and risk assessment was conducted using various methods, such as Screening, Matrix method, and Expert judgment. Mitigation measures have been proposed to reduce or avoid the potential environmental impacts of the project. Project alternatives, use of alternative technologies, or operational measures have also been duly considered. Monitoring and evaluation method further includes developing a plan to monitor and evaluate the environmental and social impacts and implementation of the mitigation measures of the project over time.

POLICIES, LEGISLATIONS AND INSTITUTIONAL FRAMEWORK

The Constitution of 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 by project implementation. The Environmental Policy of Ethiopia, issued in 1997, also has overall policy goals of improving and enhancing the health and quality of life of all Ethiopians, promoting sustainable social and economic development through sound management and use of natural, human-made and cultural resources and their environment. 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 GoE include Water Resources, Health, HIV/AIDS and Women Policies were reviewed. Applicable strategies and programs include Climate Resilient Green Economy Strategy, Urban Wastewater Management Strategy, Integrated Urban Sanitation and Hygiene Strategy, Environmental pollution Control Proclamation, Solid Waste Management proclamation, Hazardous Waste Management and Disposal Proclamation, Expropriation of Land, Payment of Compensation and Resettlement Proclamation, Labor Legislation proclamation, and Cultural Heritage Conservation.

The World Bank's Safeguard Policies, OP/BP 4.01 Environmental Assessment (EA) is also among the most relevant documents reviewed. The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through scientific analysis of the projects actions and the 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. Hence, following the contribution/impact it will have on the environment and the society, the proposed subprojects fall under category B.

DESCRIPTION OF BASELINE CONDITIONS

Physical Environment: Assela town is located 175 km south-east of Addis Ababa which is the capital city of the country. It is situated in the central part of Oromia Regional state with altitude range from 2300-3100m, latitude between 70 55' 42.47''N to 80 00' 59.94'' N and longitude between $37^0$30'E to 39^0 11' 5.07''E and is bounded by Tiyo district. The city is structured with 8 administrative kebeles. Assela town falls within the summer maximum rainfall regime of the country with an average annual rainfall of about 1078 mm. It receives maximum rainfall during the months of June, July and August. December, January and February experience the lowest annual rainfall. The city has a daily mean maximum temperature range from 21.7°C in September to 25.7°C in May; while the daily mean minimum temperature ranges from 2°C in December to 5.1°C in May. The mean annual temperature of the city is 13.88ºc. The wind direction analysis showed that the dominant wind directions are Northerly, Easterly and Southerly. Therefore, the location of different pollutants of urban activities that have smoke, dust, noise, and nuisance smells should be located against the dominant wind direction that is southwest, west or northwest with some wind breaking mechanisms. The average wind speed of the city is 5.16 kmh.

Biological Environment: Assela town has protected green areas namely millennium park, Diaspora Park, Ashebeka Park and farmlands at the peripheries. Ecologically, green spaces are significant for nature conservation as they provide habitats for a wide range of flora and fauna. Since the city is densely populated and disturbed with human interaction such as expansion of buildings and urban farming, there are no wild mammals except some common species like Bushbuck, nocturnal animals such as hyena, crested porcupine, Abyssinian hare and few primates like service Monkey, Colobus Monkey and squirrels dwelling on trees found at shores of Welkasa river, protected and forested green areas. Similarly, few species of birds were observed in the city, which particularly prefer feeding on garbage and city waste disposal areas. The main bird species observed during the site visit include Egyptian vulture, Sacred Ibis Marabou and pied crow.

Socio-Economic Environment: The population data of the town as per population and housing census 2007 report, was projected to be 139,537 in 2022; of which 69,459 **(**49.8%) were males and **70,078** (50.2%) were females. The area of the city was estimated to be 16.98Km^2 and the population density is to be 8218/Km^2. Most of the population, 48045 (71.4 %), belonged to the age group 15-64; about 17,125 (25.5%) belonged to the 0-14 and the rest belonged to the old age

group. The average household size was 3.2 as it was indicated in the Census 2007 report. The overall dependency ratio in the 2007 census was 40 percent; and the young dependency ratio was calculated at 35.6 as the number of unemployment has been high in the city. The annual rate of growth of the population is 4.95%. Assela town serves as a center of trade and market for the neighboring urban centers and the hinterland and region at large. Trade in various levels, manufacturing, microenterprises, services and urban agriculture are the major socioeconomic activities practiced in the city dominantly.

DESCRIPTION OF THE PROPOSED SUBPROJECT

The existing sanitation situation in Assela Town is rampant, which puts human health at risk and pollutes the environment. Accordingly, the proposed town-wide inclusive sanitation (CWIS) project in Assela town calls for the building of communal and public toilets and fecal sludge treatment infrastructure as a short-term intervention, over the course of the next 20 years. In the short-term intervention, a total number of 5 new public toilets and 28 communal toilets are under construction. The short-term intervention of the city-wide inclusive planning also targets the provision of sanitary facilities, creating awareness, and imparting appropriate health education to follow hygienic practices to protect public health and the environment. Fecal sludge production from residential sources is predicted to be about a design capacity of $70m^3/d$ for the Short-Term Horizon. The main treatment unit in the proposed FSTP is a sludge drying bed (SDB) which is the most popular technique for getting rid of fecal sludge. Sludge is dried using both mechanical and natural methods, depending on how much water is present.

SUBPROJECT ALTERNATIVES

The do-nothing alternative entails that human waste could contaminate the environment and local ground and drinking water sources without thorough fecal sludge management, which raises the danger of epidemics in already susceptible populations. Therefore, a do-nothing alternative option is not a viable option. Sanitation facility development and implementation is important.

Accordingly, the site for the FSTP was proposed by the design consultant using the various specified criteria, which took a number of considerations into account. It is located around 2.5 km southeast of the town center. This site will trigger economic displacement of farmers who are currently owned the land for farming purpose and will cause destruction of 4 local houses and cutting of eucalyptus plantations around farms and houses. The houses are used during farming season as temporary resting shelter. During consultation and household survey made on site all the community members confirmed to deliver their land for the intended FSTP construction after reasonable compensation.

With repeated and detail discussion among the town administration higher officials, MoWE sanitation and safeguard staffs, Oromia BoWE supervising engineer, ACWSSSE staffs and ESIA team and incorporating the opinions of the PAHHs the alternative proposed by the feasibility study, which was one km away from residential area, was selected for the FSTP construction in Assela town. Considering all the environmental and social concerns, the town administration has

taken its commitment to secure the land of the first alternative which amounts 5 hectares of land for construction of the FSTP which covers 3.7 hectares (as per the design) for construction works and 1.3 hectares buffer zone for walk way, greenery and wind break plantations.

The technology options analysis for the project has been carried out with respect to land requirement, energy requirement, skill requirement, capital cost (CAPEX), operating cost (OPEX) and groundwater level of the project area. These parameters strongly influence the decision-making about the selection of the Fecal Sludge treatment technology for Assela town. Furthermore, the selection of a FS treatment technology for Assela town also depends on the local conditions and priorities of the region with regard to sanitation such as population coverage, environmental and health benefits, elimination of open defecation. Sludge drying bed which is proposed by the design consultant in general are less sophisticated compared to others, more flexible, and easier to operate, and use less energy during operation than mechanical systems, which would make the preferable dewatering option for Assela town.

STAKEHOLDER CONSULTATION

Part of the ESIA preparation process, conducting consultation with officials of the concerned offices and/or steering committee members is quite critical. Doing so helps for supporting the project risk management process, specifically for early identification and avoidance/management of the potential impacts and carry out cost effective project design. First round consultation was held in 21 August 2015EC in the office of the mayor with Assela town concerned officials under the moderation of Assela town deputy mayor and the ESIA consultant team. The discussants during the meeting explained that they have partly participated especially during the time of project site selection. But, they said, it's the design consultant team that mainly carried out the project design. Meaning, stakeholders' level of participation in the project design is quite low.

Project affected people are expected to be meaningfully consulted and be active participants in the negotiated settlements and need to have accessible grievance redressing mechanisms. Accordingly, a consultation was made with project affected household held on 23/12/2015 EFY at the office of Gara Silingo kebele where 8 household heads (5 males and 3 females) took part. In fact, there are about 12 PAHs whose properties/lands are required for the project. Out of the 12 PAHHs, four of them left the site and living somewhere else renting their farmlands to others and difficult to get them. Those PAHs which were not consulted during the first round consultation were addressed during the second round consultation. Agreements were reached among community members and kebele leaders to implement the land acquisition process in consent and transparent manner including all land owners whose lands will be taken or the project implementation.

Further, in the office of the MOWE, discussion was made on the technology option and site alternatives with the ESIA consultant, the MOWE, the design consultant and Oromia water and energy bureau representatives. The consultation outcome was that the design consultant proposed FSTP treatment technology option was accepted among the participants. Regarding the site alternative team of experts comprised from the MOWE, ESIA consultant and the Oromia water

and energy bureau made second round site visit in between 18 and 19 November 2023. During this site visit discussion with the Assela town administration mayor, deputy mayor, and municipality land administration representative, the water supply and sanitation utility head and project affected households was also made. Thus, during this 2nd round discussion in Assela town and the site visit it was agreed to accept the design consultant proposed site alternative.

POTENTIAL IMPACTS AND MITIGATION MEASURES

FSTP construction project is proposed mainly to improve the quality of the social and natural environment of Assela town. The existing sanitation situation in the town is very poor. The absence of well-organized sanitation facilities has caused deterioration of the social and natural environment with adverse consequences on human health and the environment, which is directly or indirectly associated with water, air and soil pollution resulting from improper fecal waste disposal. Although this project clearly brings many positive changes, some negative impacts are expected to occur during the construction, operation and decommissioning phases of the project. Taking the receiving environment into consideration, the ESIA study identified major negative impacts during construction and operation phases and proposed key mitigation measures as follows:

Project activity phases	Adverse impacts of the project activity	Mitigation measures
Pre-construction, design and planning phase	Involuntary economic displacement of 12 PAHs from their own lands. This HHs were resettled some years back and they are going to be subjected to double displacement by this project	• ARAP has to be conducted prior to any civil work of the project since there will be economic displacement and PAP needs to be properly compensated in cash and in kind for the losses. • Compensate those affected according to the laid down laws such as Ethiopian Proclamation No. 1161-2019 and World Bank safeguard policy on involuntary resettlement.
	Ambient Air Quality reduction	• Spray water on dusty and unpaved access roads and dusty working areas to suppress dust emission, • Limit speed of vehicles to 20 km/hr. when they are driven through residential areas and on unpaved roads
	Noise pollution	• Do not use noisy machinery during the rest time, particularly nighttime. • Do not allow noise level above 45dB at night and 55dB daytime at residential areas.
	Traffic congestion	• Use alternative routes or roads which are not crowded, • Choose hours of less traffic volume on roads for mobilizing materials and construction machinery.
	Clearance of natural and plantation vegetation coverage in the project site	• Re-vegetation of ¼ of the area delineated and perimeters of the FSTP with indigenous type of tree species. • Including outside of the project site plant 10 times more trees to replace lost during site clearance;
	Soil degradation, flooding,	• Store topsoil and subsoil removed from the site during site

Construction phase	erosion and loss of Topsoil	preparation properly for backfilling and reinstatement. • Contour temporary and permanent access roads / lay down areas so as to minimize surface water runoff and erosion. • Develop a stable landform that mirrors the pre-disturbed condition to minimize the risk of preferential erosion and therefore facilitate natural grass and bushes recovery. • Excess soil must be removed from the site timely (in hourly or daily bases as applicable) manner and deposited at an approved site; • Sheet and rill erosion of soil shall be prevented where necessary through the use of sandbags, diversion beams, culverts, or other physical means
	Air quality loss and noise pollution	• Construction workers will be made aware of the Ethiopian Ambient Environment Standard Guideline (2003); • The contractor has to ensure that all construction equipment is properly maintained and fully functional. • Workers be provided with the necessary personal protective equipment (PPE) such as earmuffs, masks whenever needed and as found appropriate; and
	Alteration of natural drainage pattern	• Proper drainage channels shall be constructed within the construction site. • Drainage channels shall be installed in all areas that generate or receive surface water and channels shall be designed with regard to maximum expected volumes.
	Traffic congestion affecting movement of people and other transport facilities	• The Contractor should provide temporary road signs or notices to indicate ongoing works; • The Consultant and Contractor should choose traffic routes to reduce the impact in the neighborhood and any sensitive areas.
	Water pollution due to leakage of oil, grease and fuel	• All construction equipment will be kept in good operating condition to avoid oil, grease or fuel leakages; • All routine maintenance of construction machinery and vehicles shall be carried out in a designated workshop or maintenance area with concrete hard standing surface and drainage to an oil interceptor. • All hazardous wastes and empty containers of hazardous materials shall be stored in a designated area on site and regular;
	Occupation health and safety risks related to construction activities and risk of accidents for surrounding community and animals	• The contractor shall prepare site specific health and safety management plan. • Qualified health and occupational safety officers will be recruited by the contractor to oversee OHS matters on a daily basis. • All construction workers will be oriented on safe work practices and guidelines (OHS) first and ensure that they

		adhere to them.
	Risk of impacts on Physical Cultural resources (PCRs)	• Chance Finds Procedure (CFP) has to be followed when an event of buried PCRs being unexpectedly encountered or "chance find" during construction phase of the project and duly reported to respected bodies.
	Impact on Landscape and Aesthetic Value	• Planting more than 10 indigenous seedlings to replace the cut tree during construction time. • Reinstate borrow and quarry sites used for the construction purposes. • Implement flood control measures.
	Impact on Vulnerable Groups	• Ensure women headed HHs and elderly treated during land acquisition &compensation. • Ensure that women and girls equally get job opportunities during the project construction processes and the benefits of the Project implementation.
	Gender and Gender Based Violence Risks	• Provide and avail a separate sanitation facility for women at construction camp, • Provide women friendly safety equipment and materials, • Assign women in works that do not affect their biological condition, • Ensure that women construction workers do not face GBV and sexual harassment,
Operation phase	Air emission and dust pollution	• Watering dusty roads during operation. • Using new vehicles and giving proper service to the trucks on regular basis to improve their fuel performance and reduce emission; and • Turn on generators only during power cut-offs period,
	Occupational health and safety adverse impacts	• Hire qualified and trained OHS and environmental health crew for regular monitoring and management FSTP. • Develop and work on EHS Plan including health and safety measures to avoid accidents and injuries during work at the FSTP. • The FSTP should be fenced, and signals put in place
Decommissioning phases	Pollution of soil and water bodies	• Develop a decommissioning plan that outlines the steps and working procedures. • Engage local stakeholders including nearby residents, businesses, and community organizations in the decommissioning process to ensure their concerns are addressed. • Restore the project site to its original or to a condition that is acceptable to local stakeholders and regulatory authorities. • Monitor the decommissioned site to ensure that there are no potential environmental or health risks associated with

		the decommissioned plant.
	Occupational health, safety and Air pollution	• Recruiting a qualified health and occupational safety officer who will oversee OHS matters on site. • Providing training and education to workers on the proper use of equipment, PPE, and hygiene practices. • Provide appropriate, adequate PPE, such as gloves, masks, and protective clothing, OHS personnel protective gear to the employees.
	Socio economic adverse impacts on employee and dependents	• Based on their skill, knowledge, experience and interest, vulnerable community groups must be transferred to another secured job opportunity. • Providing adequate provident fund or pension for those who want to retire. • Providing retraining programs in new industries or skills opportunities for workers. • Supporting workers to start their own businesses.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

ESMP is the key to ensure that the environmental and social quality of the project influence area so that it does not deteriorate due to the implementation of the proposed development project covering all aspects of project implementation in its different phases. 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 of the adverse environmental and social impacts identified. 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 can be translated into project documentation and provides the basis for a legal contract that establishes the responsibilities of the contractor. In turn, the contractor can use the ESMP to establish environmental and social performance standards and requirements for those carrying out the works or providing supplies. It can also be used to prepare an environmental and social management system for the operational phase of the project.

ENVIRONMENTAL AND SOCIAL MONITORING PLAN

The environmental 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. Monitoring should be performed during all stages of the project to ensure that the impacts are no 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.

Institutional arrangements and implementation strategy: The key organizations for the implementation of the ESMP during the construction phase are Construction contractor; Supervision consultant; and AWSSSE. The actual physical implementation works are carried out mostly at this stage.

Currently AWSSSE staffs are recruited at positions of project coordination, Environmental and social safeguard, and procurement. This staff shall be maintained throughout the project life during construction, operation, and decommissioning phases. In addition, civil engineers and OHS specialists shall be recruited as project staff to follow up the implementation of mitigation measures during construction and operation period of the project. The supervising consultant should be staffed at least with environmental engineer, civil engineer, sociologist and OHS specialist during construction phase of the project. The contractor in its part will take necessary responsibilities to implement the ESMP. It should recruit civil engineers, environmental engineers, sociologists and OHS specialists to properly plan and implement day-to-day activities of ESMP.

The contractor shall submit regular weekly and monthly progress reports to the project coordinator. The supervising consultant should report to AWSSSE and project coordinator on a quarterly basis. A review session must be organized by the project coordinator each quarter with the presence of all stakeholders including the AWSSSE, contractor, supervising consultant and the EPO.

The overall estimated budget for the ESMP implementation and monitoring, community mobilization and capacity building including specialized safeguard trainings were Eth birr **14,254,500** with ±10 error due to the current market dynamics.

1. INTRODUCTION

1.1. Background

Ethiopia is a country with a population of over 100 million people and a rapidly growing economy that achieved six Millennium Development Goals out of the eight goals set out despite it is one of the Sub-Saharan African countries with poor sanitation services. The sanitation services of the country are exacerbated by rapid urbanization which in turn stressed by population growth, fast growing infrastructure development such as hotels, trade, industrialization, changes in the way of life and awareness level of the residents. The increasing demand of sanitation services and the inadequacy of the existing sanitation services and facilities pursuits the government of Ethiopia to tackle with it (ESMF, 2017). Despite these challenges, the Ethiopian government is working to improve the fecal sludge treatment and sanitation services through creating the enabling environment through policy, legal and institutional arrangement, and resource allocation to resolve the (Oliver, 2015). In particular, the government of Ethiopia has developed a national fecal sludge treatment and sanitation strategy in 2016, and it has implemented a number of projects to improve fecal sludge treatment and sanitation services. The implementation of the NFSTSS has had several positive impacts. The number of fecal sludge treatment plants in Ethiopia has increased from 10 in 2016 to 100 in 2022. The number of people with access to improved sanitation has also increased from 20% in 2016 to 30% in 2022. However, the implementation of the NFSTSS has also faced several challenges. The main challenge has been a lack of financial resources. The government has not been able to provide enough funding to support the implementation of the strategy. It is, therefore, based on the aforementioned considerations that the Ethiopian government and the World Bank have launched UWSSP-II.

The UWSSP-II aims at increasing access to water supply and sanitation services in 22 secondary cities and Addis Ababa. The project is intended to aid in the government's efforts to eliminate open defecation, rise the proportion of the population using a "safely managed" sanitation service, and improve current water supply services through increased operational effectiveness and expansion of water supply service to underserved areas. The project has three key components: i) Addis Ababa Sanitation and Water Supply Services Improvement, (ii)Secondary Cities Sanitation and Water Supply Services Improvement, and (iii) Project management and institutional strengthening and financed by the WorldBank. However, Components 1 and 2 of the projects are identified as having some adverse environmental and social impacts that need mitigation actions. Soil erosion, soil and water pollution, loss of vegetation, traffic accidents, air pollution, the health and safety of people near construction sites, and the taking of privately owned land are just a few of the social and environmental impacts the project will have.

Therefore, the FDRE Water and Energy Ministry hired Green Sober Environmental Management Consultant PLC to conduct an ESIA on FSTP construction for the implementation of UWSSP-II in Assela town.

1.2. Objective of the Environmental and Social Impact Assessment

1.2.1. General Objective

The main objective of the consultancy service is to carry out the ESIA on FSTP construction, operation and decommissioning phases. It identifies, predicts, and evaluates potential beneficial and adverse environmental and social impacts during the life cycle of the FSTP and recommends appropriate enhancement mechanism for the positive impacts and mitigation measures for the adverse impacts. Further, the assignment aims at preparing environmental & social management and monitoring plans (ESMP). Additionally, it targets to develop indicative socio-economic survey for the preparation of resettlement action plans for potentially affected community.

1.2.2. Specific Objectives

The assignment specifically

- Examines the National and the World Bank environmental and social safeguard policies and regulations that will be triggered by the project activities.
- Describes the views and concerns of the public and stakeholders towards implementation of the subproject.
- Establishes baseline features of the biophysical, socio-economic, and cultural attributes in the project influence area.
- Identifies and evaluates significant impacts (both beneficial and adverse) that occur due to the project implementation that require appropriate mitigation measures.
- Proposes specific mitigation measures for inclusion in the project detail design and management plan to reduce or avoid adverse environmental and social impacts.
- Conducts analysis of alternatives to the proposed sub-projects in terms of sites, technology, design, including the "without project" scenario.
- Assesses and identifies capacity gap and proposes training and capacity building requirements for implementation of environmental mitigation and monitoring.
- Prepare ESMP.
- Undertakes cost estimation for each proposed mitigation measure and monitoring program.
- Develops a monitoring program that will be followed during the project implementation.
- Recommends environmental and social compliance requirements, design measures, and staffing that should be included in the works contract documents.

1.3. Project Scope

1.3.1. Scope of the ESIA

The scope of the ESIA includes both desk and field assessment and description of the physical, social, and cultural environment of Assela town in general and the project area in particular.

Experts keen site observation, flora and fauna species composition and diversity identification, climatological data collection and analysis, hydro-geological data collection and analysis, GIS based site physical environment, soil, geology, geomorphology, cultural heritage, and PAPs mapping were also part of the ESIA study. In addition, the scope includes conducting community consultation and household survey for PAPs. Moreover, impact identification, analysis, and presentation of mitigation measures with management and monitoring plan for adverse impacts were prepared. Furthermore, the scope comprises suggestion of enhancement measures for positive impacts during project planning, construction, operation, and decommissioning phases.

During the ESIA, the consultant has considered issues and concerns that arose during stakeholders and community consultations and incorporated these issues and concerns into the environmental and social analysis. One of the beneficial project impacts of UWSSP-II is the production of job opportunities for citizens during construction as well as operation phases and hence occupational Safety and Health of workers has given special attention.

Generally, scope of works undertaken by the consultant includes the following tasks:
Task 1: Description of the Proposed Sub-Project
Task 2: Review of Regulatory and Policy Framework
Task 3: Public Participation and Consultations
Task 4: Biological, physical, social, cultural, and economic Baseline Conditions assessment
Task 5: Impact Identification, Characterization and Evaluation
Task 6: Setting of alternatives/options for comparison
Task 7: Impacts Mitigations and Management plan development
Task 8: Environmental and Social Monitoring Plan
Task 9: Institutional arrangement, human resources, and capacity building plan development
Task 10: Grievance Redress mechanism

2. APPROACH AND METHODS

2.1. Approach/Design

ESIA requires collection and evaluation of comprehensive socioeconomic and environmental data. In line with the type of assessment conducted and the nature of data sources collected, the

study adopted a mixed approach. This was because the assessment was relatively complex and requires a more comprehensive understanding of the phenomenon being studied. In accordance with the EIA guideline of Ethiopia, the GSEMC utilized both quantitative and qualitative data from primary and secondary sources.

Environmental and socioeconomic data were described and explained at the required scale. Descriptive method was mainly adopted to describe the impact of the project on receiving biophysical, socio-cultural, and economic environment as it is. It looks at individuals, groups, institutions, methods, and materials to describe, compare, classify, analyze, and interpret the entities and the events that constitute the various fields of inquiry. Moreover, as a supplement, explanatory design was employed by professionals when elaboration and enrichment of socioeconomic, cultural, and environmental issues on the ground is required.

2.2. Period of Field Data Collection and Site Visits

From the project site the first round field data was collected in between August 7th and 12th 2023 and the second round was in between 18 and 19 November 2023. A team of experts were participated in collection of information from public, stakeholders, project owners, experts, different environmental components (such as flora and fauna, soil and water bodies) and proposed project sites.

2.3. Method

The ESIA comprises a variety of methods. Information related to biophysical, socio-cultural, and economic environment of the proposed project was collected exclusively on environmental safety, social acceptance, and economic viability as key points of project implementation. Moreover, data related to vulnerable groups' management, land acquisition, access to job opportunities, compensation, relocation, and infrastructure facilities were also collected and examined. This ESIA typically involves a range of methods including baseline studies, stakeholder's engagement, impact prediction, impact assessment, risk assessment, mitigation measures, monitoring, and evaluation.

Baseline studies: Baseline data collection was one source of information which involves collecting data on the current environmental and social conditions like data on the physical, biological, and social environment. This method is used to establish a baseline against which the potential impacts of the project can be compared.

Impact and risk assessment: Impact assessment covers identifying and assessing the potential environmental and social impacts of the project. Impact and risk assessment is conducted using various methods, such as Screening, Checklists, Matrix method and Expert judgment.

- Checklists are used as a method to list potential environmental impacts that may be caused by the proposed project. The checklist is used to identify impacts and their scopes.

- The matrix assessment method also applied for assessing the potential environmental impacts of the project and to evaluate the significance of the impacts.
- Expert judgment was also utilized to obtain opinions of experts in relevant fields, such as ecologists, hydrologists, environmentalists, sociologists, and others.
- Geographic Information System (GIS) mapping was used to visualize and analyze spatial data.

Stakeholder engagement: individuals or groups who were affected by the proposed project and relevant stakeholders were consulted to incorporate the stakeholder's opinions, interests and obtain their values, concerns and perspectives on the project and its potential environmental impacts.

Mitigation measures are proposed to reduce or avoid the potential environmental and social impacts of the project. Project alternatives, use of alternative technologies, or operational measures were also duly considered to get the best from the interventions.

2.4. Sources of Data

Project-related data were obtained from both primary and secondary sources. Primary data sources used were structured surveys, experiments, and field observations while secondary data sources were obtained from government statistics, institution reports, public records and others.

The data collected comprises both qualitative and quantitative types. Qualitative data are non-numerical data from FGD, field observations, or open-ended survey responses. The quantitative approach addresses data collected through survey (questionnaire) methods.

2.4.1. Field Surveys

Field survey was conducted to collect new information on the environmental setting, baseline conditions, and potential impacts associated with the proposed project. Collecting physical, social, and biological data from the project site and surrounding area was done by using direct observation, stakeholder engagement, and GPS data collection.

2.4.2. Documents, Policies and Guidelines review

Secondary data sources can provide valuable information on the environmental setting, baseline conditions, and potential impacts associated with the proposed project. Review of relevant documents, policies, and guidelines were conducted to ensure that the proposed project is in compliance with the country's and the WB's legal and regulatory framework. Among others, some of the reviewed documents comprise of the feasibility and design study of the proposed project, country's Laws, policies, WB's safeguard policies, guidelines, reports, and others.

2.5. Data Collection Tools

Data collection tools are instruments or methods used to collect data from primary or secondary sources. Town wide socioeconomic environmental data were collected by pre-developed data collection instruments. This data collection instruments are presented as follow.

2.5.1. Survey Questionnaires

Survey questionnaires are questionnaires designed to collect large amounts of data at a particular point of time. Survey questionnaires are vital to describe the nature of existing conditions, to identify standards, and determine the relationships of specific events. Thus, these tools were used to acquire appropriate information about the existing situation of the physical, social, and cultural environment, and institutional issues. Office data collection questionnaire was also utilized to get data on demographic characteristics, human resources and capital, natural resources and settings, infrastructural facilities of the town, cultural and economic resources within and around the project site as a receiving environment.

2.5.2. Public Consultation Checklist:

Public consultation checklist was also one form of data collection tool. Representatives of local government (Kebele) leaders, community members composed of elders, the youth, women, religious leaders, and vulnerable community groups which are found nearby of the project site were engaged in this event. The consultation was freely carried out without any persuasion and interference to push the interests of the consultant or any other body's interest.

2.5.3. Focus Group Discussion (FGD):

FGD checklist was another data collection tool used to collect relevant data. In the FGD conducted in the project site,8 individuals participated. The moderator was responsible for asking open-ended questions and guiding the discussion. FGD is particularly useful for gaining insights into complex or sensitive topics, where individual perspectives and interactions among participants can provide a deeper understanding of the issues at hand. FGD was conducted at the FSTP site, and the information related to the discussion was documented through Minutes and analyzed.

2.5.4. Observation checklist

Observations are typically conducted in a natural environmental setting, such as project sites at a workplace or community. Direct observation involves visually inspecting the project site and surrounding areas to identify potential environmental impacts. This involves documenting the presence of sensitive ecosystems, wildlife habitats, or cultural heritage sites.

2.5.5. Hand-Held GPS and Google tools

A global positioning system (GPS) coordinate points of study site were collected for development of GIS based maps. GPS coordinates were collected at site-level investigation

points for identification of location features and to ensure accurate mapping, analysis and visualizing environmental parameter data. Satellite data or images were also generated from Google earth to comprehend the information on the project site and surrounding areas.

2.6. Impact Identification and analysis

Data analysis was mainly done through evaluation of baseline conditions; risk assessment, stakeholder's analysis and information were triangulated to see their associations. For each identified impact, risk assessment was done through quantifying the likelihood and severity of potential environmental, social, and health impacts of the project. The significance of the predicted or identified impacts has been quantified and evaluated by considering the magnitude of the effect and the sensitivity, value, and importance of the receptor. For the quantification and evaluation of impacts, interaction matrices were applied. Each major impact is evaluated using the criteria assigned by experts' professional judgment based on the impact intensity, extent, duration and sensitivity of the receiving biophysical and socio-cultural environment. After evaluation of impacts, appropriate and justified mitigation measures were forwarded for the negative impacts and enhancement measures were indicated for the positive impacts.

3. POLICY FRAMEWORKS AND INSTITUTIONAL ARRANGEMENT

The implementation of the FSTP subproject has the potential to cause environmental and 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. This section provides details on the applicable legislative framework for the ESIA.

3.1. Policy and Legal Frameworks

3.1.1. Constitution of the Federal Democratic Republic of Ethiopia

The Constitution of the FDRE is the supreme law of the country, whose provisions must be complied with by all other policies, regulations, and institutional frameworks. The Constitution of the FDRE (Proclamation No. 1/1995 as amended) is the foundation for human rights, and natural resources and environmental management. Concepts of sustainable development and environmental rights are enshrined in articles 43 and 44. These articles state about, among others, the right to development and the right to live in a clean and healthy environment. Article 44(2) of the Constitution states that all persons who have been displaced, or whose livelihood that have been adversely affected as a result of state programs have the right to commensurate monetary or alternative means of compensation including relocation with adequate State assistance. Moreover, the Constitution states that, without prejudice to the right to private property, the government may expropriate private property for public purposes subject to payment in advance of compensation commensurate to the value of the property (Article 40(8)). Moreover, Article 43 (2) deals with the rights to development and states that nationals have the right to participate in national development and, in particular, to be consulted with respect to projects affecting their community.

3.1.2. Environmental Policy and Strategies

To further amplify the Constitutional provisions on environmental protection, the Environmental Policy of Ethiopia was approved in 1997 (EPA, 1997). The policy goal is to improve the health and quality of life of the peoples of Ethiopia and to promote sustainable social and economic development through sound management and use of natural, human-made and cultural resources and the environment.

The policy seeks to ensure that essential ecological processes and life support systems are sustained, biological diversity is preserved, and renewable natural resources are used in such a way that their regenerative and productive capabilities are maintained and where possible enhanced so that the satisfaction of the needs of future generations is not compromised, where this capability is already impaired.

3.1.3. Land Tenure Policy

The Constitution of the FDRE states that the right to ownership of rural and urban land, as well as all the natural resources, is exclusively vested in the State and People of Ethiopia. Article 40 of the Constitution indicates that land is a common property of the Nations, Nationalities, and the Peoples of Ethiopia, and shall not be subjected to sale or to other means of transfer. The constitution of FDRE retained land under the control of the people and government of Ethiopia thus, prohibiting its buying and selling. Article 4(5) of the proclamation 94/1994 also deals with provision of land for the conservation, development and utilization of state forests or protected

areas. However, this can be effective only after the consultation and consent of the peasantry and subject to the assurance of their benefits.

3.1.4. National and Regional Conservation Strategy

Since the early 1990s, the Federal Government of Ethiopia has undertaken a number of initiatives that aims to develop regional, national and sectoral strategies to conserve and protect the environment. Paramount among these was the conservation strategy of Ethiopia (CSE, 1996). This document provides a strategic framework for integrating the environment into new and existing policies, programs and projects. It is also an important policy document, which views environmental management as an important component of development. It recognizes the importance of incorporating environmental factors into development activities from the outset.
The major environmental and natural resources management issues facing Ethiopia are well documented in the CSE (FDRE, 1997). The CSE sets out detailed strategies and action plans as well as the institutional arrangements required for the implementation of sectoral as well as cross-sectoral interventions for the management of Ethiopia's natural, man-made and cultural resources.

3.1.5. National Biodiversity Policy

The National Biodiversity Policy (NBP) was established in 1998 based on a holistic ecosystem approach to conserve, develop and utilize the country's biodiversity resources. The policy provides for guidance towards effective conservation, rational development, and sustainable utilization of the country's biodiversity, and contains comprehensive policy provisions for the conservation and sustainable utilization of biodiversity. Integration of biodiversity conservation and development in federal and regional sectoral development initiatives, and mobilization of international cooperation and assistance, have been identified as the principal strategies for implementation of the policy.
This policy framework provides direction and regulatory tools on overall conservation and sustainable development of the country.

3.1.6. Ethiopia's Climate Resilient Green Economy (CRGE) Strategy

To cope with the prevailing environmental problems such as land degradation and climate change, and speed up its socioeconomic development, the Government of Ethiopia handcrafted a climate-resilient green economy development strategy known as the CRGE. This development direction promotes environmental protection and reducing fossil fuel consumption which releases Green House Gases (GHGs) into the atmosphere. With demand for energy growing with the increasing population, industrialization and urbanization, the government realized that harnessing clean and renewable energy sources such as wind, solar, hydro, and geothermal energy sources was critical. It is indicated in the CRGE that these natural resources would deliver electricity at virtually zero GHGs emissions. The government also decided to increase its income through exporting electric power generated from clean sources to neighboring countries.

3.1.7. Ethiopian Water Resources Management Policy

The overall goal of water resources policy is to enhance and promote all national efforts towards the efficient, equitable and optimum utilization of the available water resources of Ethiopia for significant socioeconomic development on sustainable basis. The policy has three sub-polices: water supply and sanitation policy, irrigation policy, and hydropower policy. For this particular ESIA study Water Supply and Sanitation Policy objectives are summarized here under as follows:

The Water Supply and Sanitation policy objectives are provision of, as much as conditions permit, sustainable and sufficient water supply services to all the peoples of Ethiopia; satisfying water supply requirements for livestock, industries and other users as much as conditions permit; carry out operation and maintenance of all water supply and sanitation services in a sustainable and efficient manner; promoting sustainable conservation and utilization of the water resources through protection of water sources, efficiency in the use of water as well as control of wastage and pollution; creating sustainable town building in terms of the enabling environment, including institutions, human resources development, legislation and regulatory framework for water supply and sanitation; and enhancing the wellbeing and productivity of the people by creating conducive environment for the promotion of appropriate sanitation services (FDRE, 2010).

3.1.8. National Policy of Women

The National Policy of Women (NPW) was issued in March 1993. In this policy, it is indicated that government policies, laws, regulations, plans, programs and projects should be based on the following objectives: to ensure participation of women in the formulation of government policies, laws, regulations, programs and projects that directly or indirectly benefit and concerns of women; to insure participation and involvement of women in implementation and decision-making processes; and to ensure equal access of men and women to the country's resources.

3.1.9. National Health Policy

Ethiopia had a low level of health coverage even in comparison with other Sub-Saharan countries. This is largely related to low levels of income and widespread poverty, low levels of education, nutritional deficiencies, poor environmental conditions, and inadequate access to health services.

Health Sector Development Plans and Strategies have been designed to implement the stated health principles within a defined period. The strategies include raising the awareness of personal and environmental health care and sanitation through Information, Education and Communication; control of disease; and promotion of primary health care through community participation.

3.1.10. 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 on the proposed sub projects shall be treated fairly in accordance with the policy.

3.1.11. Urban Wastewater Management Strategy

The MoWE 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.

3.1.12. Integrated Urban Sanitation and Hygiene Strategy

The Integrated Urban Sanitation and Hygiene Strategy was issued by the Ministry of Health (MoH) 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 differences between cities. The implementation of the strategy will be expected 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 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).

3.1.13. Environmental Impact Assessment (Proclamation No, 299/2002)

Proclamation (No 299/2002) aims primarily at making the ESIA mandatory for schedule I and schedule II category projects and programs. The proclamation specifies that the proponent of the project must prepare the ESIA following the format specified in the legislation. The proclamation requires, among other things:

- ✓ Licensing agencies to ensure that the requisite authorization has been duly received prior to issuing an investment permit, a trade or operating license or a work permit to a business organization;
- ✓ Specified categories of projects to be subjected to an ESIA and receive an authorization from the competent or the relevant regional environmental agency prior to commencing implementation of the project;

- ✓ The authority or the relevant regional environmental agencies may issue an exemption from carrying out an ESIA in projects supposed to have an insignificant environmental impact;
- ✓ A licensing agency may suspend or cancel a license that has already been issued where the institution responsible for environment at the federal level or the relevant regional environmental agency suspends or cancels environmental authorization;
- ✓ Procedures that need to be followed in the process of conducting an environmental impact assessment are described in the Proclamation. Thus, a project developer is expected to act as follows: Undertake a timely environmental impact assessment; Identifying the likely adverse impacts, incorporating the means of their prevention; and submitting the environmental impact study report accompanied by the necessary documents to the institution responsible for environment at the federal level or the relevant regional environmental agency for review and approval.

Based on the proclamation the EPA Guideline (2003) was developed, and proposed projects need to be 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 ESIA;
- ✓ **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 Assela town FSTP construction activities fall under schedule II as they can cause some environmental and social impacts.

3.1.14. Environmental Pollution Control Proclamation

Ethiopian environmental pollution control proclamations No-300/2002 proves that some social and economic development activities may cause environmental harm that could jeopardize production. Article 3/1 of the proclamation explains about environmental standards and simultaneously prohibits no person to pollute or cause any other person to pollute the environment by violating the relevant environmental standard. Article of 4 this same proclamation elucidates about management of wastes, chemical and radioactive substances by the producer.

3.1.15. Solid Waste Management Proclamation

The main objective of solid waste management proclamation (No 513/2007) is to enhance all stakeholders' capacity to manage the possible adverse impacts while creating environmentally, economically, and socially beneficial resources out of solid waste.

In article 17(1), it is depicted that without obtaining authorization, a person who implements solid waste management project that requires special permit before its implementation as

determined in a directive issued by the relevant environmental agency commits an offence and shall be liable according to the relevant provision of the Criminal Code. And article 17(3) states that any manufacturer, importer, or seller who violates the provision of this Proclamation commits an offence and shall be liable according to the relevant provision of the Criminal Code.

3.1.16. Hazardous Waste Management and Disposal Control Proclamation

The objectives of the Hazardous Waste Management, Disposal Control Proclamation (Proc. No.1090/2018) are to create a system for the environmentally sound management and disposal of hazardous waste and to prevent the damage to the human or animal health, the environment, biodiversity, and property due to the mismanagement of hazardous waste. The law addresses the management of hazardous waste including the application of cleaner production principles to minimize hazardous waste, the responsibilities of hazardous waste Generator, transportation of hazardous waste, precautionary measures to be taken during transportation and storage of hazardous wastes, and reuse, recycle and disposal of hazardous wastes. In this proclamation wastewater in general term has been categorized as hazardous waste in Annex One of this Proclamation. In addition, any waste which has substances or wastes containing viable microorganisms or their toxins which are known or suspected to cause disease in animals or humans is also considered to be hazardous.

Under the proclamation, the hazardous waste generator shall have the responsibilities to collect, segregate and dispose or cause to be collected, recycled or disposed of hazardous waste by authorized body; ensure that the container of hazardous waste are properly packed and conspicuously labeled with Amharic and English languages or other languages of the country as may be necessary; keep record on the type and quantity of hazardous waste that exist at the temporary hazardous waste storage facility; and show the record at any time when requested by inspector, and not to store hazardous waste at a temporary storage facility for a period exceeding one month. The relevance of this proclamation for the subproject is that it is a legal base regarding the way of wastewater and sludge handling and management, and discharge to the environment as well as workers welfare.

3.1.17. Expropriation of Land, Payments of Compensation & Resettlement Proclamation

The Expropriation of Land holdings for Public Purposes, Payments of Compensation and Resettlement Proclamation (No. 1161/2019) has revoked proclamation No. 455/2005 and is applicable throughout the country in rural and urban centers on matters relating to land expropriation, payment of compensation and resettlement of landholders whose land is expropriated for public purpose. The Proclamation defines public purpose as a decision that is made by the cabinet of a regional state or town administration or the appropriate federal authority on the basis of approved land use plan / development plan / structural plan under the belief that the land use will directly or indirectly bring better economic and social development to the public.

3.1.18. Labour Proclamation No. 1156/2019

The essence of the proclamation is to ensure worker-employer relations are governed by basic principles of rights and obligations with a view to enabling workers and employers to secure durable industrial peace; sustainable productivity and competitiveness through cooperative engagement towards the all-round development of Ethiopia. The proclamation also lay down a working system that guarantees the rights of workers and employers to freely establish their respective associations and to engage, through their duly authorized representatives, in social dialogue and collective bargaining, as well as to draw up procedures for the expeditious settlement of labour disputes, which arise between them. it is also aimed to create favorable environment for investment and achievement of national economic goals without scarifying fundamental workplace rights by laying down well considered labour administration; and determine the duties and responsibilities of governmental organs entrusted with the power to monitor labour conditions; occupational health and safety; and environmental protection together with bilateral and tripartite social dialogue mechanisms; political, economic and social policies of the Country.

3.1.19. Cultural Heritage Conservation

The objectives of the Research and Conservation of Cultural Heritage Proclamation No. 209 /2000 are among others to carry out registration and supervision of cultural heritage, to protect cultural heritage against man-made and natural disasters. There is an Authority for the Research and Conservation of Cultural Heritage accountable to the Minister of Culture.

3.2. World Bank Group Environmental, Health, and Safety Guidelines

The general approach to the management of Environmental, Health, and Safety (EHS) issues at the facility or project level is for the effective inclusion of EHS considerations into corporate and facility-level business processes in an organized, hierarchical approach that includes the following steps:

- ✓ Identifying EHS project hazards (threats to the human health and what they value) and associated risks as early as possible in the facility development or project cycle, including the incorporation of EHS considerations into the site selection process, product design process, engineering planning process for capital requests, engineering work orders, facility modification authorizations, or layout and process change plans.
- ✓ Involving EHS professionals, who have the experience, competence, and training necessary to assess and manage EHS impacts and risks and carry out specialized environmental management functions including the preparation of project or activity-specific plans and procedures that incorporate the technical recommendations.
- ✓ Understanding the likelihood and magnitude of EHS risks, based on:
  - Θ The nature of the project activities, such as whether the project will generate significant quantities of emissions or effluents or involve hazardous materials or processes.

- Θ The potential consequences to workers, communities, or the environment if hazards are not adequately managed, may depend on the proximity of project activities to people or to the environmental resources on which they depend.
- Θ Prioritizing risk management strategies with the objective of achieving an overall reduction of risk to human health and the environment, focusing on the prevention of irreversible and / or significant impacts.
- Θ Favoring strategies that eliminate the cause of the hazard at its source, for example, by selecting less hazardous materials or processes that avoid the need for EHS controls. When impact avoidance is not feasible, incorporating engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences, for example, with the application of pollution controls to reduce the levels of emitted contaminants to workers or environments.
- Θ Preparing workers and nearby communities to respond to accidents, including providing technical and financial resources to control such events effectively and safely, and restoring workplace and community environments to a safe and healthy condition.

The WB Guideline of EHS for wastewater and ambient water quality set standard for basic parameters for sanitary discharge limit (Table1).

Table 1) Indicative value for treated sanitary sewage discharges.

Pollutant	Unit	Maximum value
pH	pH	6-9
BOD	mg/l	30
COD	mg/l	125
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50

Source: WB Guideline EHS (2007) standard of Wastewater and ambient air quality

Thus, it is important to comply with the required discharge limit for all effluent parameters during the entire operation period which implies that it is possible to use the treated Fecal sludge for different purposes.

3.2.1. World Bank Safeguard Policies

The WB has a number of Operational Polices (OP) to ensure the environment and human populations are protected during the development process. The proposed project will trigger some of the WB safeguard policies due to the nature & location of the project of the receiving environment. The ESIA will identify which impacts are likely to be contrary to these OPs. Where mitigation, management or monitoring is required, it will be identified in the Environmental and Social Management Plan. Relevant WB OPs that may be considered are:

Environmental and Social Assessment (OP 4.01): This policy requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. The proposed UWSSP II triggers the WB OP 4.01, Environmental Assessment Policy. Thus, according to the WB categorization, Assela town FSTP was grouped under category 'B'.

Natural Habitats (OP 4.04): This policy is triggered for environmentally sustainable development through protecting, conserving, maintaining, and rehabilitating natural habitats and functions. Moreover, when there is a potential for significant degradation of natural habitats, directly through construction or indirectly through human activities induced by the project. In Assela town FSTP construction site on the other hand OP 4.04 will not be triggered because the proposed site was fully a farmland. Thus it has no any natural or artificial forest to be removed or disturbed during the FSTP construction or operation phase except very few Eucalyptus trees not more than 25 in number.

Indigenous Peoples (OP 4.10): The objective of this policy is to (i) ensure that the development process fosters full respect for the dignity, human rights, and cultural uniqueness of vulnerable and historically under-served communities and peoples; (ii) ensure that they do not suffer adverse effects during the development process; and (iii) ensure that such communities and peoples receive culturally compatible economic benefits. In Assela town UWSSP II is going to be implemented within urban centers with variable and intermingled ethnic diversity, so it does not trigger OP 4.10.

Physical Cultural Resources (OP 4.11): The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources (PCR). 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 and these may trigger OP 4.11.

Involuntary Resettlement (OP 4.12): This policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to bank appraisal of proposed projects. OP 4.12 is triggered as FSTP requires lands for its implementation and farmland of 12 households will be affected and hence there could be involuntary resettlement of economic displacement from their farmland that results in direct social and economic impacts such as relocation, loss of income and asset.

3.3. Comparison of the World Bank Safeguard and National Polices

The short summary of the Ethiopian and the World Bank safeguard policy comparison was indicated in Table 2.

Table 2) Ethiopian and the World Bank policy comparison

Theme	The Ethiopian legislations	WB safeguard OP	Comparison	Measures
Social issues in ESIA	EIA proclamation 299/2002 overlooked social issues. That is the proclamation title itself was written as "Environmental Impact Assessment (EIA)" not as Environmental and Social Impact Assessment (ESIA) and the public disclosure of the ESIA is not mandatory. Preliminary social screening was not stated.	The Bank's operational policy OP 4.01 gives impasses to both environmental and social impact assessment of programs or subprojects. It also made the public disclosure of category A & B ESIA is mandatory.	The EIA proclamation 299/2002 overlooked social assessment of subprojects and programs and public disclosure of the ESIA whereas the OP 4.01 give special focus for them	When the government legislation is found less stringent in addressing issues compared to the WB procedures, the safeguard policies of the WB will be applied
Eligibility for compensation	Proclamation No1161/2019, Article 8(1) allows landholders' to be eligible for compensation, when the 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	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.	According to World Bank OP4.12 eligibilities for compensation is granted to all affected parties but the Ethiopian Legislation only grants compensation to those with lawful possession of the land is expropriated. It 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
Concern for the indigenous people right	The Expropriation of Land holdings for Public Purposes, Payments of Compensation and Resettlement Proclamation No. 1161/2019 does not clearly articulate the rights indigenous people. Moreover, it does not importance of separate social assessment to address how indigenous people are closely tied to land, forests, water, wildlife, and other natural resources,	The World bank BP 4.10-gives focus for Indigenous Peoples separate social assessment and the need for indigenous people plan (IPP) preparation to manage their wisdom in sustainable manner.	The World bank BP 4.10-necessitates the need for separate social assessment and gives special consideration to land and related natural resources to address how. Indigenous Peoples have closely tied them, but the Proclamation No. 1161/2019 overlooked it.	When the livelihood of the indigenous might be affected social assessment and preparation of IPP should be in line with the world bank BP 4.10.

Theme	The Ethiopian legislations	WB safeguard OP	Comparison	Measures
Actions for livelihood restoration and assistance to vulnerable groups	There are no specific laws or regulations specifying support for livelihood restoration and transition& 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.	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 like people with disabilities below the poverty line, landless, elderly, women and children, indigenous groups, ethnic minorities, and other disadvantaged persons	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.	The treatment of the vulnerable groups should be in accordance with OP 4.10

3.4. UWSSP II Specific Legal Frameworks

3.4.1. Environmental and Social Management Framework (ESMF)

The overall objectives and purposes of the ESMF of UWSSP II can be summarized as follows:

- Review Ethiopia's environmental policies, legislation, regulatory and administrative frameworks in conjunction with the World Bank's ten safeguard policies. Where there are gaps between these policies make recommendations as to how to bridge these gaps in the context of the proposed project as appropriate,
- Develop a stakeholder consultation process that ensures that all key stakeholders, including potentially affected persons, are aware of the objectives and potential environmental and social impacts of the proposed project,
- Assess the current ability at the regional and/or town level to implement the recommendations of the ESMF, and make appropriate recommendations,
- Assess the potential environmental and social impacts of planned sector investments and rehabilitation activities in the urban areas,
- In light of the available information, develop an environmental and social screening process for the future rehabilitation and construction activities referred to above; and,
- Prepare an Environmental and Social Management / Monitoring Plan (ESMP), including monitoring indicators, for the UWSSP,

3.4.2. Resettlement Policy Framework (RPF)

The main objective of this RPF is to ensure adequate management of land acquisition process is done in accordance with the World Bank Operational Policy as well as the country's legal requirement and provide guidance for the preparation and implementation of Resettlement

Action Plans for the subprojects of the UWSS-II Project. The RPF aims to ensure that any possible adverse impacts of proposed project activities are addressed through appropriate mitigation measures. It addresses issues of land acquisition, loss of property or access, or more of livelihoods resulting from implementation of Fecal Sludge Treatment Plant.

3.5. Administrative and Institutional Framework

The FDRE EPA is an autonomous public institution of the Federal Government of Ethiopia entrusted with the protection and conservation of natural resources in Ethiopia. Its general role is to provide the protection and conservation service for the 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. In accordance with the principles of government decentralization each national regional state shall establish an independent Regional Environmental Agency or designate an existing agency that is responsible for coordinating the formulation, implementation, review and revision of regional Environmental monitoring, protection, and regulation.

3.6. Oromia Regional State Environmental Protection Authority

Oromia Regional State EPA is responsible for environmental protection in the region. It has the mandate of enacting regional environmental proclamations, regulations, standards, and guidelines. It is responsible for the review and approval of ESIA of the development proposals under the mandate of the Regional Government. The review and approval of the current ESIA for the FSTP is the responsibility of Regional EPA. It is also mandated to follow up construction and execution of the project at least on a semiannual basis. It can conduct environmental and social safeguard audits every two years and give technical assistance and guidance to the zone and town administration environmental regulatory agencies.

3.7. Assela Town Admiration Environmental Protection Office

Assela town Administration Environmental Protection Office (EPO) is mandated to ensure concerned stakeholder involvement in the FSTP planning, construction, and operation. Follow up of the implementation of ESIA recommendation becomes a joint responsibility of regional EPA and the town EPO. Town EPO should follow up every quarter and compile progress report to the regional EPA. The regional EPA at least should visit twice per year and give written feedback to the developer. Therefore, project proponents should operate in close cooperation with both the regional and Town EPO to ensure that the adverse environmental and social effects of development proposals are properly identified, and their mitigation or management actions incorporated in the project design, planning, and implemented at the right time.

4. SOCIO-ECONOMIC AND BIOPHYSICAL BASELINE

4.1. Description of Project area

This project will be implemented in the central part of Oromia Regional state, Arsi Zone, Assela town which is located 175 km south-east of the National capital town, Addis Ababa. Assela town, with altitude range from 2300-3100m, is found in the latitude between 7^0 55'42.47''N to 8^0 00' 59.94'' N and in the longitude between $37^0$30' E to $39^0$11' 5.07'' E and is bounded by Tiyo district. The current structural plan revision of the town indicated that the area of the town is 5,395.6 hectares (Assela town municipality, 2023). Assela is the capital town for Arsi Zone and the administrative center for Tiyo district. Assela town is located in the foot hill of mount Chilalo and there are wider low-lying areas that can be affected by flood from the surrounding chain of mountain.

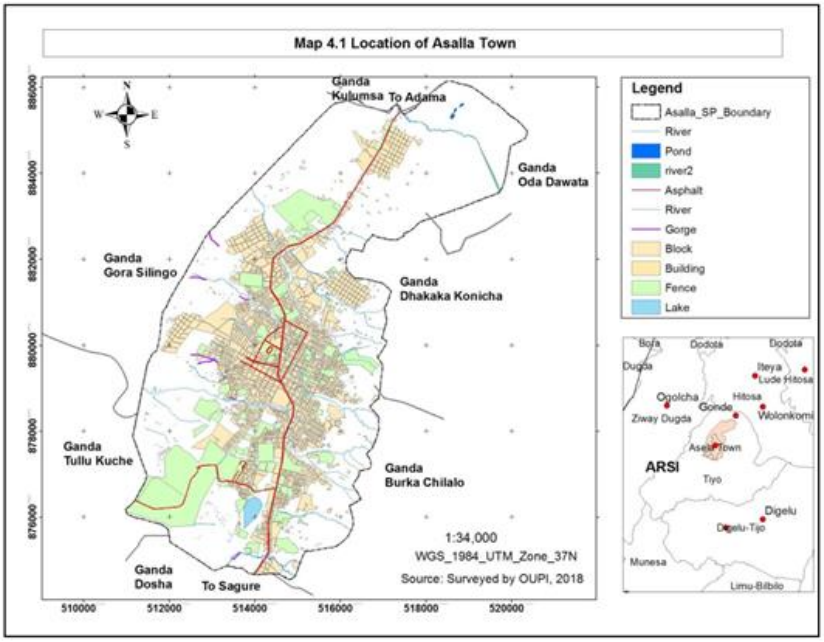

Figure 1) Location map of Assela town (Source: Assela town Development and Plan ocffice, 2023)

4.2. Physical Environment

4.2.1. Rainfall

The average annual rainfall of the town is about 1078 mm. It receives maximum rainfall during the months of June, July, and August. December, January, and February experience the lowest monthly rainfall. The maximum precipitation occurs in August with an average monthly total precipitation of 158 mm. Potential evapotranspiration is higher than precipitation in the area, ranging from October to Mid-June. The town is located in the foot of Chilalo Mountain with wider low-lying areas that are exposed to flooding in case of high rainfall.

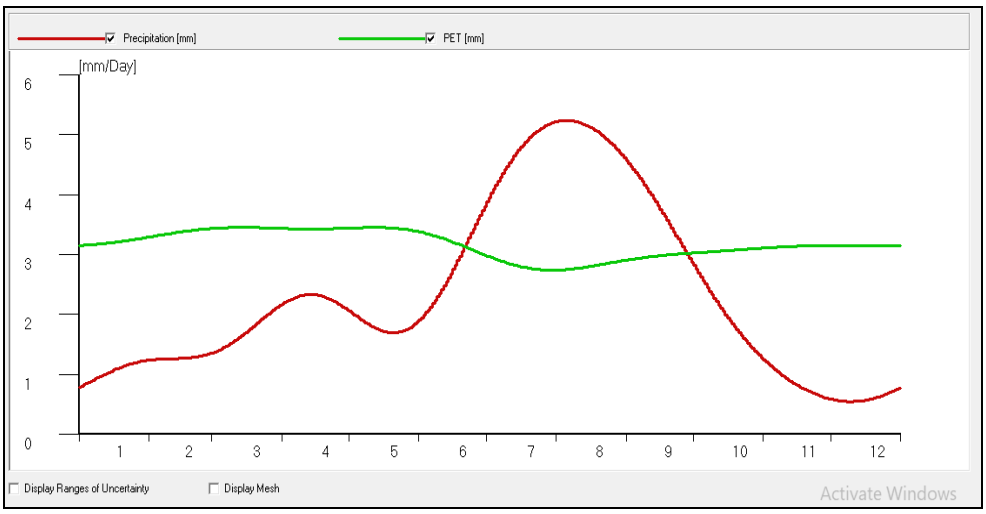

Figure 2) Rainfall trend of Assela town (Source: FAO, New_LocClim_1.10 database)

4.2.2. Temperature

The town has a daily mean maximum temperature range from 21.7°C in September to 25.7°C in May; while the daily mean minimum temperature ranges from 2°C in December to 5.1°C in May. The mean annual temperature of the town is 13.88ºc. This amount of temperature reflects the characteristics of sub-tropical region climate.

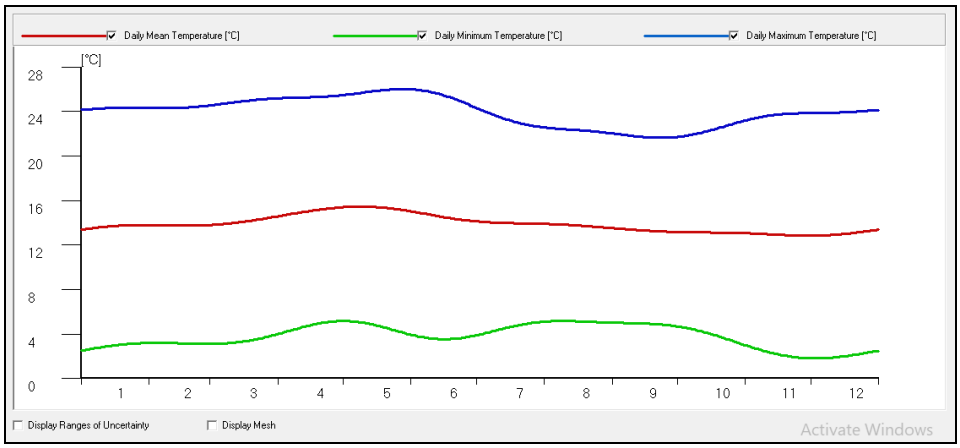

Figure 3) Temperature trends of Assela

4.2.3. Wind direction:

The prevailing or dominant wind directions of Assela town are Northerly, Easterly and Southerly. In addition, the Chilalo Mountain, which can topographically affect the local climate is located to the southeast of the town. Therefore, the location of different pollutants of urban activities that have smoke, dust, noise, and nuisance smells should be located against the dominant wind direction that is Southwest, west or northwest with some wind breaking mechanisms. The average wind speed of the town is 5.16 kmh.

4.2.4. Air Quality

It is believed that urban air may be contaminated, primarily because of urban activities such as constructions, vehicle smoke, municipal and industrial wastes. Traffic movement is relatively large in Assela due to significant economic activities related to the cereal crops production, different Agro-processing industries and route to Bale Mountains that may lead to release of air polluting chemicals. It is unlikely that the air quality will surpass WHO guidelines due to construction of FSTP in the town.

4.2.5. Noise Pollution

The main sources of noise in the town are vehicles, enterprises, and residences. The main route from Addis and Adama to Bale Mountains and Robe town accommodates traffic movements that may generate noise. There is also construction, small scale enterprises working on metal and

wood works which can contribute to noise disturbances. However, it is unlikely that noise levels inside and outside of the town will exceed legal limits. The project site is reasonably far from the main road so that the noise pollution could not be major problem.

4.2.6. Geomorphology of the Study Area

The area around Assela town exhibits a significant variation in elevation, leading to notable surface drops. The highest point in the vicinity is Mt. Chilalo, located to the east of Assela, with an altitude of 4,000 meters above sea level. The west of Assela town lays the Main Ethiopian Rift Valley, characterized by a lower elevation. The floor of the Rift Valley in this region is situated at approximately 1,700 m above sea level. This indicates a significant drop in elevation from the higher areas surrounding Assela.

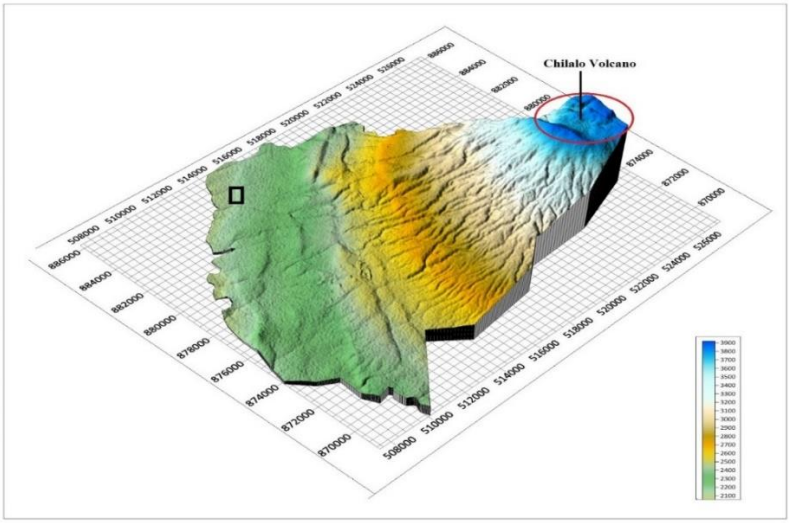

Figure 4) 3-D geomorphological setting of the study area

4.2.7. Slope of the study Area

The slope change of the town varies from 0 to 35%. This suggests there is a wide range of slopes in the area, which can have implications for the stability of infrastructures. Based on the slope percentage, the study area has been reclassified into 5 slope classes and at the proposed FSTP the slope is gentle to moderate slope.

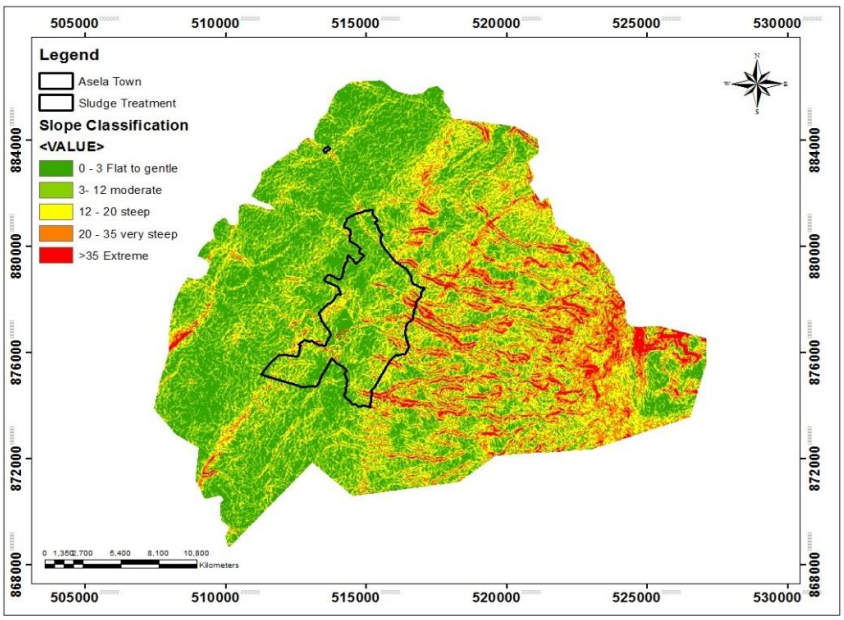

Figure 5) Slope map of the study area

4.2.8. Physical Characteristics of the Soil

Effective Soil Depth: Soil depth refers to the thickness of the soil layer that provides structural support, nutrients, and water for plants. Soil series that have bedrock between 30 and 50cm deep are described as shallow, while those with bedrock between 50 and 100cm are moderately deep. Soils with bedrock greater than 150cm are classified as very deep. In the FSTP site, most of the soil falls under the very deep category, with a soil depth of 150-200 cm.

Soil Color: In the FSTP being considered, the soil color ranges from black cotton to brownish at the bottom. The black color indicates the presence of organic matter, contributing to soil fertility and moisture retention. The brownish color suggests the presence of iron oxides, which can affect drainage, fertility, and nutrient availability.

Soil Texture: The soil texture of the project area is assessed using the hand feeling test method. This method involves taking a small amount of soil in hand and moistening it to determine its texture based on its feel and behavior. The results of the hand feeling test indicated that the texture of the soils in the topsoil varied from very fine to fine. Very fine-textured soils typically have a high clay content, which gives them a smooth, sticky, and cohesive feel. Fine-textured soils, on the other hand, have slightly lower clay content but still exhibit some cohesive properties.

Figure 6) Soil profile at FSTP site

4.2.9. Regional Hydrogeology

Porous materials of the Quaternary and Tertiary age are represented by fluvial and colluvial sediments developed in depressions (sediments of lakes) and/or along valleys of former and existing rivers. The porous aquifers are only locally developed and scattered over the study area. The porosity of lava flows may be high, but the permeability is largely a function of a combination of the primary and secondary structures (joints and fissures) within the rock. In addition, the permeability of lava flows tends to decrease with geological time. This is clearly demonstrated by the higher permeability of Ginnir and Chilalo young volcanic rocks. The pyroclastic rocks between lava flows are generally porous but usually less permeable due to poor sorting. Layers of paleosoil of various thicknesses in between lava flows are also less permeable and consist usually of clay material on the one hand, whereas layers of fluvial and lake sediments between various lava flows can enhance yield well. Hence, extensive volcanic ash beds may form semi-horizontal barriers to water movement (infiltration) resulting in lower productivity of basaltic units located at greater depth.

4.2.10. Water Supply of the study Area

As it is described in the feasibility study of this project, the water supply system in the town depends mainly on a conventional surface water treatment plant taken from the Ashebeka river at 34 km away from Assela town with a capacity of 6741 m3/d. Depending on the population baseline and projection as well as the current water production in the town, the current per capita water production is estimated to be 53 L/c/d and decrease to 43 L/c/d in 2025 in case of no additional water sources. The water consumption is estimated at 53 and 56 L/C/d in 2020 and 2025 respectively. Hence, the water demand is estimated to be 8826 m3/d in the year 2025. Thus, the water supply system is inadequate as it provides the town with only 76 % of the demand and is recommended to be increased up to 8826 m3/d in year 2025. The site selected for the intended project has no access to water.

Figure 7) Assela town Water treatment

4.2.11. Ground Water Flow and Recharge

4.2.11.1. Groundwater Flow

The deep local groundwater flow in the area penetrates even further and gives rise to deep regional groundwater flow. This deep regional groundwater flow plays a significant role in recharging aquifers present in sedimentary rocks. The deep regional groundwater, in turn, is discharged by the main perennial rivers of the lowlands, namely the Genelle, Dawa, and Wabe Shebelle rivers, as well as their primary tributaries in the eastern region. These rivers act as outlets for the deep regional groundwater flow, carrying it away from the area. It is important to note that both surface water and groundwater flow are influenced by the overall inclination of the eastern plateau, which slopes towards the southeast. This topographic feature has a significant impact on the direction of water movement in the region, affecting both the surface rivers and the underlying groundwater systems.

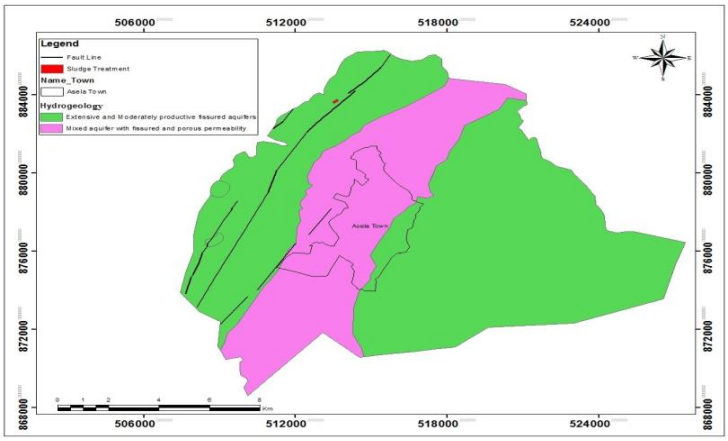

Figure 8) Hydrogeological Map of the study area

4.2.11.2. Groundwater Recharge

The main recharge area for the Assela area, specifically for groundwater replenishment, extends from Chilalo Mountain up to Lake Ziway. Chilalo Mountain is an important geographical feature

in the region and serves as a significant source of groundwater recharge. The mountain receives precipitation, which infiltrates into the ground and replenishes the underlying aquifers. The water percolates through the subsurface layers, recharging the groundwater reservoirs in the vicinity. From Chilalo Mountain, the groundwater continues its flow towards Lake Ziway. The intermediate area between the mountain and the lake acts as a pathway for groundwater movement. The geological and hydrological characteristics of this area, including rock formations, soil types, and permeability, influence the rate and direction of groundwater flow.

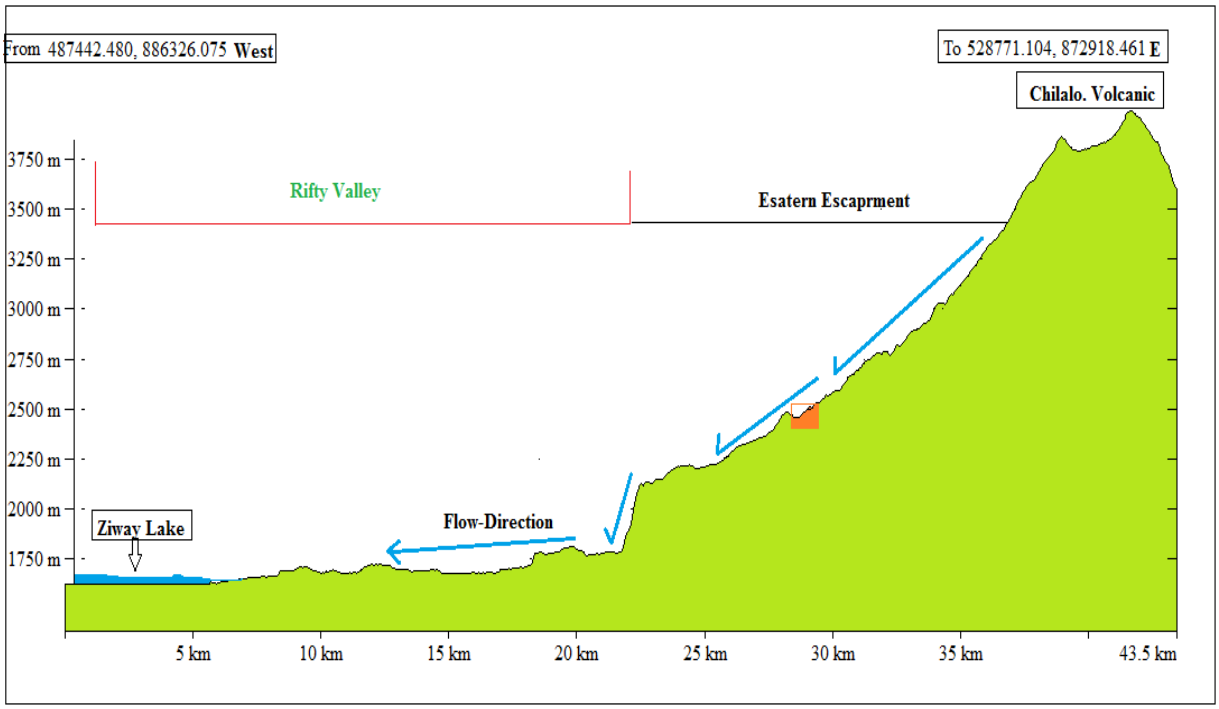

Figure 9) Groundwater flow cross-section

4.2.12. Regional Geology

The Assela area is located within the southeastern Ethiopian Plateau and the Main Ethiopian Rift Valley. The region's geology comprises a combination of rock formations. The landmass of the plateau in the upper Wabe Shebelle and Genale-Dawa basins is underlain by Precambrian crystalline basement successions, which are part of Ethiopia's basement complexes. These basement rocks are exposed in specific areas of the Genale-Dawa and Wabe Shebelle basins. In some parts of the region, Cenozoic volcanic rocks cover the Precambrian basement rocks. These volcanic rocks are found in the northern and northwestern parts of the Genale-Dawa basin and the western and northern regions of the Wabe Shebelle basin.

Mesozoic sedimentary rock exposures dominate the remaining basins, particularly the Wabe Shebelle basin. These sedimentary rocks were deposited during the Mesozoic Era. During the Tertiary period, volcanic lava flows were widespread in the area. However, these Tertiary volcanic rocks are now primarily found at higher elevations and in fertile and populated areas. The youngest volcanic rocks in the area belong to the Quaternary period, representing basaltic flows from the Cenozoic Era. The geology from Chilalo towards the rift in the Assela area exhibits a range of rock types and formations. As we move from Chilalo towards the rift, the sequence of rocks encountered includes basalt, trachy basalt, and ignimbrite. These rock formations are further overlain by a thin layer of pumiceous tuff.

In the lower portion of the rift, particularly along major fault lines, the dominant cover consists of young lava flows. These lava flows either intrude the underlying ignimbrite when located near the source or overlie the ignimbrite. In some areas, the lava flows may also overlie volcano-lacustrine sediments. On the Rift floor, there are elevated areas that are characterized by the presence of agglomerates. These agglomerates contain fine- to medium-grained ignimbrite, which is rich in obsidian, andesite, and pumice. These elevated areas with agglomerates contribute to the diverse geology of the Assela region.

4.2.13. Local Geology of Study Area

Assela ignimbrite and tuff (Ai) local geology which belong to the Nazret series ignimbrite are formations found below the Bekoji basalt, trachyte, and tuff (B3), while the Ashbeka ignimbrite (Asi) is not exposed at the surface in the southern part of the Katar catchment and around Assela town. The Assela ignimbrite and tuff exhibit at least three types of local variations, characterized by minor differences in color, texture, degree of fracturing, and thickness. These variations may be observed within the rock units in different locations. In some areas, the Assela ignimbrite and tuff display well-developed crystals and/or cavity-like inclusions. These inclusions are filled with secondary infillings, which in most samples show signs of partial decomposition. These inclusions often exhibit a preferred elongation along the regional structures that dissect the rocks of the area.

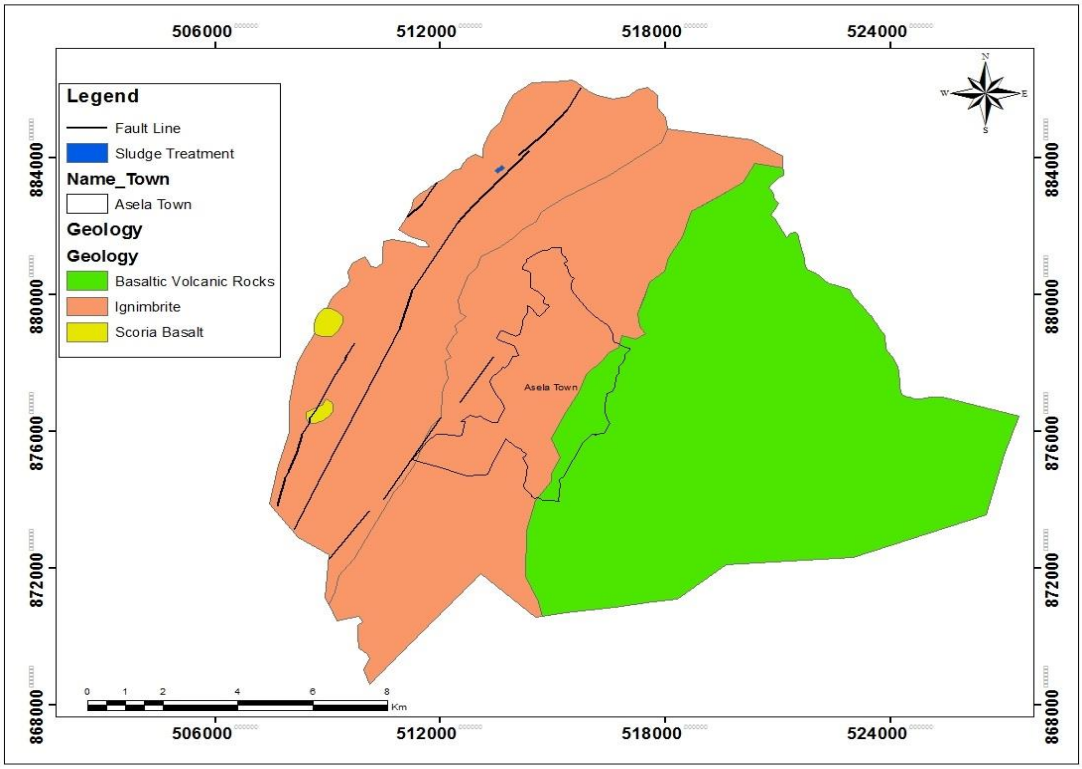

Figure 10) Geological Map of the study area

4.3. Biological Environment:

The natural vegetation of the area is highly scarce through human intervention for urbanization and agriculture. The climax-vegetation in the town is Podocarpus forest, Juniperus forest and Juniperus woodland. These forests are found in pockets of riverbanks, gullies and religious and government institutions and private compounds. These forests, particularly in the riverbanks and gullies should be protected to keep the natural environment, biodiversity, landscape, and the climate.

Indigenous and exotic trees are observed in the town planted at road medians, roadsides, and protected green areas. Protected areas and university compounds are endowed with indigenous tree species. Endangered tree species such as Podocarpus falcatus, Hagenia abyssinica, Juniperus procera and Cordia africana are common in the green areas and green parks. River sides are also occupied with indigenous tree species. Other tree species planted in the road medians and roadsides include Pine spices, cupressus lusitanica, Grevillea robusta, Phoenix canariensis, Azadirachta indica, Jacaranda mimosifolia and Spathoda campanulata.

Since the fecal sludge treatment site is not located on the protected green areas of the town, the impact of construction and operation of the plant could have lower adverse impacts on the identified indigenous trees and protected green areas of the town.

Since the town is densely populated and disturbed with human interaction, there are no wild mammals except some common species like Bushbuck, nocturnal animals such as hyena, crested porcupine, Abyssinian hare and few primates like service Monkey, Colobus Monkey and squirrels dwelling on trees found at shores of rivers, protected and forested green areas.

Similarly, few species of birds were observed in the town, which are particularly feeding on garbage and town waste disposal areas. The main bird species observed during the site visit include Egyptian vulture, Sacred Ibis Marabou, and pied crow.

In general, from ecological point of view, the project area is not an area of special concern, such as areas designated as having national or international importance (e.g., world heritages, wetlands, biosphere reserve, wildlife refuge, or protected wildlife parks). Hence, the fecal sludge treatment plant is not expected to cause major adverse impact on fauna and flora of the area.

Figure 11) Partial view of existing condition of farmlands and remained tree species

4.4. Socio economic Environment

4.4.1. Demographic Characteristics

The population data of Assela town as per population and housing census 2007 report was projected to be 139,537 in 2022; of which 49.8%were male and 50.2% were female. The population density of the town is estimated to be 8218/Km^2. Most of the population, 48045 (71.4 %), belonged to the age group 15-64; about 17,125 (25.5%) were aged 0-14 and the rest belonged to old age group. The average household size was 3.2 as it was indicated in the Census 2007 report. The overall and young dependency ratio was 40 and 35.6 percept respectively. The annual rate of growth of the population is 4.95%. Generally, population issues have been recognized as an integral part of overall development planning and taken into consideration in provision of basic social services and physical infrastructures like sanitation services.

4.4.2. Land use pattern

The different components of urban land use combined to form the future structural plan. The analyses of existing land use and town structure are divided into street network and transport, town centres, social and municipal services, housing, environment, manufacturing, and storage.

4.4.3. Education

Information from Assela town education office indicated that there are in total 81 private and public educational institutions; 33 Kindergarten schools, 19 primary schools (1-8) and 10 high schools (9-12) in the town. Regarding number of students attending school, the town education office reported that by 2014/15 the number of children attending kindergarten schools were 6085 from which 925 was in public and 5160 were in private schools; the number of students from grade 1 to 8 was 17209 from which 10035 were in public schools and 7174 in private schools. Similarly, students from grade 9 to 12 were 15109 from which 13074 were in public and 2035 were in private schools. Although all schools have latrines that are constructed in different ways, toilets in the school have not watertight septic tanks.

Table 3) Private or public schools with toilets and water consumption

Category of schools	Number of students	Is there latrine		Latrine (with/out septic tank)		M^3 Water use/month	Remark
		Yes	No	With	Without		
Private	14881	✓			✓	4000	Septic tank not watertight
Public	31302	✓			✓	8347	;
Total	46183					12347	

In addition to the above educational institutions, Assela town has higher institutions including 2 universities, 1 Teachers Training College, and 8 TVET and other institutions that are run by private investors and faith-based organizations.

4.4.4. Health

In Assela town, there are several health institutions including Arsi University teaching and referral hospital that provides teaching and medical services for Arsi zone with a population of 4 million. Assela town has 39 health institutions of different levels that have well facilitated waste management systems. As per the information obtained from Assela Health office, the total health coverage was reported to be 100% for Hospital and 75% by Health centre at the time of data collection. In addition, all the health institutions have toilets with septic tanks.

Table 4) Health facilities in Assela town

Health Institution	**Number**	**Toilet with Septic tank**	
		Yes	**No**

	Government	1	√	
	NGO	1	√	
Hospitals	Private Primary	1	√	
	Government	2	√	
Health Centre	NGO	1	√	
	Private Special	1	√	
	Private Medium	19	√	
	NGO Medium	2	√	
	Private Dental	5	√	
	Private Eye	1	√	
	Government	3	√	
Clinics	Institutional Based	2	√	
Pharmacies	Private	14	√	
Drug Store	Private	16	√	
Total		69		

In the town, there are about 58 diploma graduates, 454 first degree, 15 second degree and 275 Medical Doctors health professionals. In total about 324 female and 478 male professionals are working in the health institutions.

According to the record kept data by the town Health office, the top communicable diseases identified are Typhoid and paratyphoid fever, Pneumonia, Urinary tract infection and other bacterial diseases; and the non-communicable deceases identified were Dyspepsia, Soft tissue disorders and acute tonsillitis.

4.4.5. Trade, Industry and Other services

The town of Assela, like any other urban centre, serves as a centre of trade and market for the neighboring urban centers and the hinterland and region at large. Trade in various levels, manufacturing, microenterprises, services, and urban agriculture are the major socioeconomic activities practiced in the town dominantly. As per household survey result of the feasibility study of this project, about 25 % of the sampled population are civil servants, 13 % merchant, 5 % are engaged in petty trade. There are small scale industries (9 food processing factories, 17 metal and woodwork services and three textiles manufacturing).

4.4.6. Agriculture

Urban agriculture is a vital sector in sustaining livelihood and supporting the urban food supply from rural hinterlands and plays an important role in feeding the increasing urban populations and creates job opportunity for the poor and unskilled labor. Assela is known in its surplus crop (wheat, barley, maize, Bean) production as well as vegetable production. In addition, the livestock production in the area is poultry, dairy, sheep and goat fattening, cattle fattening, swine production and beekeeping on the arable open space.

4.4.7. Tourism

The Arsi Oromo in general and Assela area is endowed with rich culture of both tangible and intangible heritages. The cultural and ritual sites of Muda Gorado, Gaara Guuticha, Oda Daakko, Hunde Cave, Irrecha Dooshaa, Seera Gada Arsi, Seera Gumaa, Seera Ambaa Siinqee, Ateetee Chilalo Mountain which is one of the largest mountains of the region are fascinating potential tourism economy that should be promoted and sustained.

According to the data obtained from Assela town culture and tourism office, there are 25 Mosques, 10 Orthodox believers churches, 15 protestant believers churches and 2 cemetery sites. All these religious institutions provide religious services for the residents and have the potential to serve as tourist destinations.

4.4.8. Energy and Power Supply

Assela town is connected to hydroelectric power serving 24 hours. The substation that serves the town is located within Assela town. The condition of the electric service rendering in Assela town indicates that still there are localities, neighborhoods and sectors that are not connected to the service. The project site is lacking access to electric power service.

4.4.9. Transport

Assela town has an asphalted road network that connects the town with other urban cities like Adama, Finfine/Addis Ababa and towns surrounding the Assela town on the belts from Addis to Bale and Shashemene crossing via the town. Even though there are intra town roads, they are not adequate in terms of serving the increasing population of the town. The town has a bus station which is highly congested. The minibuses and small buses are the main vehicles that contribute to the inter-urban transport. As the tri wheel vehicles/Bajaj/ share the highway as terminal, they created traffic congestion. Therefore, it needs to establish terminals to alleviate the traffic congestion.

5. PROJECT DESCRIPTIONS OF FSTP

5.1. Overview of UWSSP-II project and Its Components.

The existing underdeveloped water supply and sanitation (WSS) system in urban areas of Ethiopia is under stress due to its rapid urbanization. Urban areas have a limited ability to properly dispose of fecal sludge and wastewater, which puts human health at risk and pollutes the environment. Addis Ababa town reached a wastewater handling capacity of 111,600 m3 per day. This scenario is considerably worse in other secondary cities, such as Mekelle (0.35%), Bahirdar and Hawassa (0.22%), Gondar (0.07%), Dire Dawa (0.05%), and Adama (0.41%).

In light of these difficulties, the UWSSP-II is primarily designed to improve urban sanitation comprehensively and equitably in the urban environment and to offer help to increase operational effectiveness in 22 Ethiopian cities. Assela town is among the secondary towns benefiting from the portion of the finance secured under the project.

5.2. Components of the Project

UWSSP-II financing from the World Bank was successfully negotiated with Ethiopian government and got into implementation. The development goal of the project is to expand access to improved water supply and sanitation services in Addis Ababa and 22 selected Secondary Cities while maintaining operational efficiency. The following three project components will contribute to achieving this goal:

- Θ Sanitation and water supply services improvements in Addis Ababa will finance the construction of sanitation facilities in various settlements and socio economic situations;
- Θ Sanitation and water supply services improvement in selected 22 secondary cities from all the regional states and Dire Dawa town administration; and
- Θ Project management and institutional strengthening component will help manage the project and strengthen their institutional capacity.

5.2.1. Short term interventions (5-years horizon: 2025-2030)

The five-year implementation window for the short-term intervention was set between 2025 and 2030. This initiative's main objective is to end OD by building enough extra public toilets and communal toilets. In several of Assela town's wards and slums, open defecation often occurs.

In the short-term intervention, different types of communal and public toilets will be developed in Assela town. For this planning horizon: a total number of 5 new public toilets and 28 communal toilets are under construction. Currently, there are 3 public toilets and 64 communal toilets in the town. The public toilets are planned to be built in locations where a public gathering occurs, such as marketplaces, open defecation hotspots, mosques, churches, public squares, particularly where festivals take place, parks, and public areas. The communal toilets during the short-term intervention will be built in locations with a shortage of sanitary facilities and/or where high densities of households share a single facility. Containment-level intervention will also involve renovating the current public toilets in addition to building new ones. With the exception of the public toilets associated with the churches, all toilet facilities are operated and maintained by the community. The exception is the public toilet at Hunde Gudina Kebele, although they are all operational. There are no hand-washing facilities in any public or communal toilets throughout the entire facility. Furthermore, the doors are either steel or wooden and the flooring is concrete. Hence, 15 public toilets require immediate maintenance, and 1 should be demolished since it is impractical to maintain. The majority of the currently used public toilet has deteriorating shelters and are in poor shape. Each toilet is given a particular remodeling recommendation in the situation assessment report. All the current public toilets that

were identified for reconstruction have been chosen for rehabilitation as part of this project. The WSSSE came to the realization that the town's current toilet facilities are insufficient to end open defecation. As a result, more attempts are being made to decrease open defecation by putting up more up-to-date communal and public toilets in places where people congregate regularly, such markets. The new toilet spaces are 60 to 200 square meters, with 10 cubicles for the new public toilets, and 30 to 100 square meters, with 5 cubicles for the new communal toilet.

Assela town currently lacks both a recognized liquid waste treatment infrastructure such as FSTP. Vacuum trucks are used to empty septic tanks (holding tanks), and the sludge is then brought to disposed at open site. In the town two vacuum trucks (One Red Cross vacuum truck is in fair condition and one private truck is in good condition) provide services to transport FS from sources to the dumping site. According to the project coordinator of the town, each truck makes an average of 2-3 trips every day.

5.2.2. Existing Fecal Sludge Dumping Site

Despite one open dumping site at about 4 kilometers from the town center for both Fecal Sludge and solid waste in western direction of the town, there are no treatment or reuse practices. In Assela town, currently Fecal Sludges are being collected and discharged into the environment untreated. Vacuum trucks are used to empty septic tanks (holding tanks), and the sludge is then brought to be disposed at an open site. Two vacuum trucks (One Red Cross vacuum truck is in fair condition and one private truck is in good condition) provide services to transport FS from sources to the dumping site. Based on the project coordinator, each truck makes an average of 2-3 journeys every day to collect and dispose of sludges. Toilets, latrines, and septic tanks are some of the town's current containment infrastructure.

FSTP is intended to be built as part of the FSM because the town currently lacks any FS Treatment facilities. It is also conceivable to set a medium-term goal for the transportation and treatment of fecal that is currently being produced as an intermediate mid-term stage. Figure 13 depicts the location of the existing dumping site compared to the newly proposed FSTPs.

Figure 12) Location of existing dumping site compared to the new FSTPs sites

5.2.3. The proposed fecal sludge treatment Plant site

The proposed fecal sludge treatment site is selected by the design study in the Northwest direction of the town in Gora Silingo kebele. It is found at geographic location of 7.99 N and 39.12 E with an elevation range between 2156m and 2179m above sea level. The location is approximately 2.5 kilometers from the town center. To accommodate the building of fecal sludge treatment units for the short-term horizon, the site has a total area of 5 hectares. The planned area is based on the presumption that fecal sludge would be produced from the communities and transported by vacuum trucks during the rainy and dry seasons of the year in the short-term phase of the project.

The proposed area is owned by individual farmers who use the land for field crop production, and plantation (Eucalyptus tree). This necessitates the project to expropriate the land with commensurate compensation for assets and land substitution before commencing the construction of the project. It was agreed to locate the FSTP construction site at a distance of more that 400m from any residential area.

Road infrastructure rehabilitation and construction is important to facilitate the mobility of vehicles for the construction phase as well as provision of service for vacuum trucks to FSTP during operation phase of the project since the area is dominated by black cotton soil having high swelling, shrinking, and cracking characteristics. The site also has no access to electric power and water supply unless its installation was done before the commencement of the project.

There is a gully near the FSTP site that is likely to be extended further in the near future. Figure 14 illustrates how the ground heights in Assela town decrease in one direction from the northeastern to southwestern. If flood control measures are not implemented, high-water flooding from the surrounding to the planned site may damage and flood several FSTP components and structures in the future (Figure 15). The terrain of the land could become gentle slope and the land could be degraded by uncontrolled rainwater runoff floods from the surrounding area.

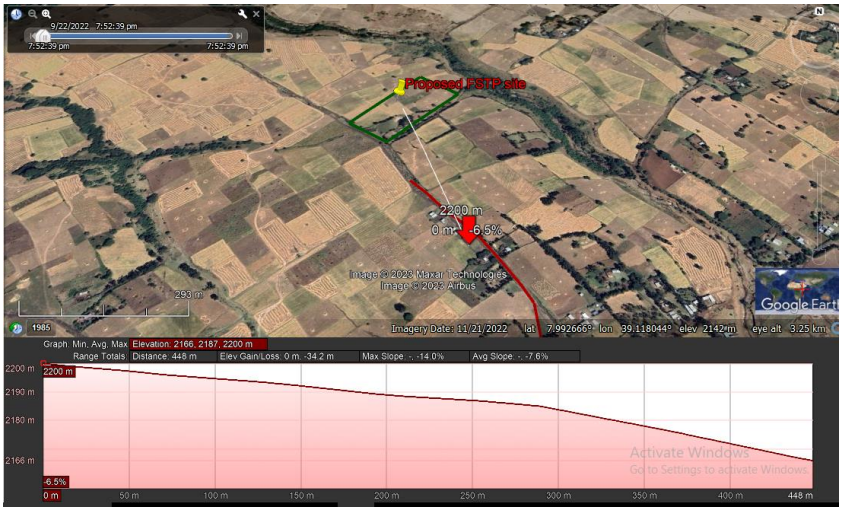

Figure 13) Topography (elevation profile) of the FSTP

5.3. Treatment System Components of FSTP

The proposed system includes:

- Θ Inlet, screening equalization.
- Θ Influent solids-liquid separation: Drying beds.
- Θ Liquid treatment: Anaerobic ponds.
- Θ Liquid stabilization: Facultative ponds.
- Θ Pathogen reduction: 3 Maturation ponds.
- Θ Drainage to storm drainage.

To allow sunshine to reach the sludge storage while keeping out rain, the proposed drying beds will be covered with translucent or semi-transparent roofs. A total height of 1.0 m was intended for each bed. The plant is designed for the short term and can accommodate the long term and the following schematic shows the proposed system.

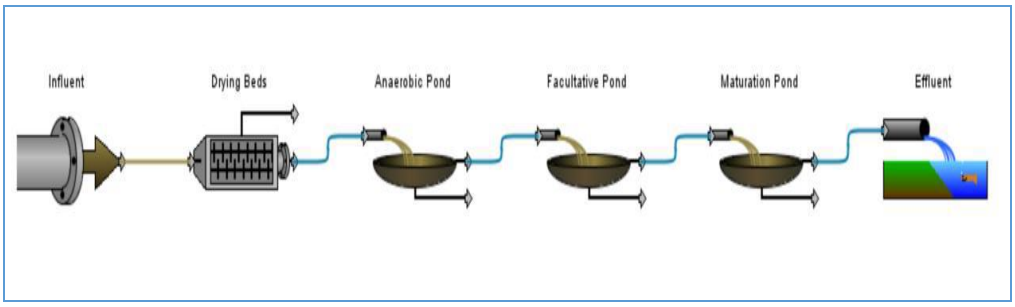

Figure 14) FSTP allocation on the site Layout

Figure 16 illustrates typical process stages of the treatment plant. With a maximum capatown of 150 m^3/day, the plant is divided into three lines up to the long-term phase 2050 (one line will be added for each phase). With a capacity of 70m^3/day, one line should be run in the near future while work is done in the next phases. One line will be introduced in each phase as a plant extension over the long term.

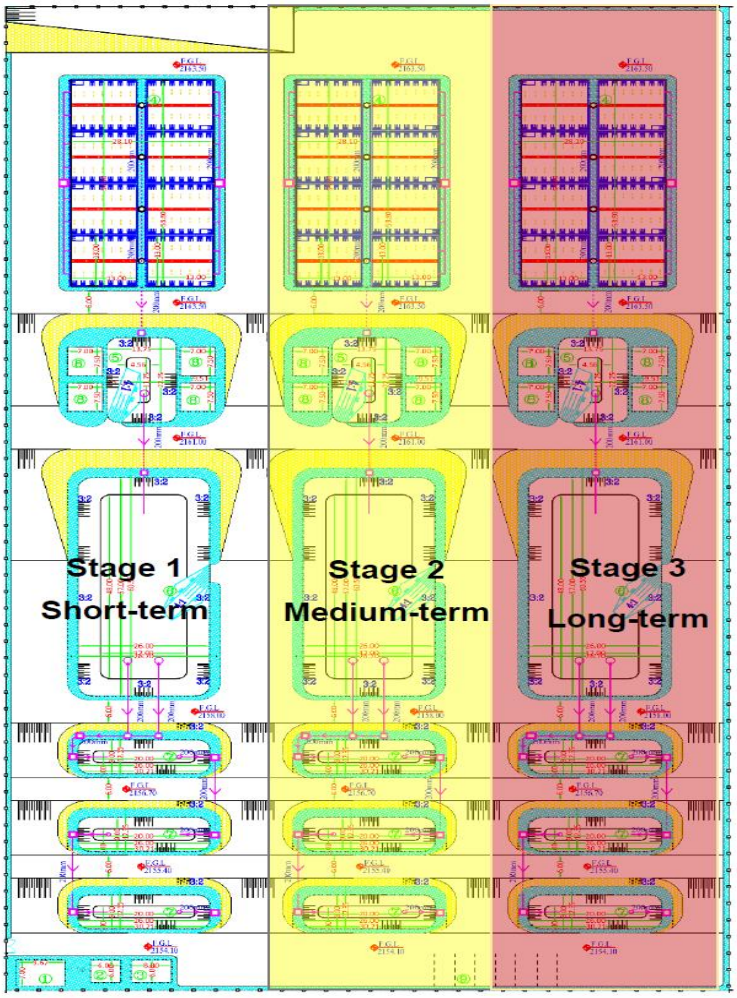

Figure 15) Layout of the FSTP for short, medium, and long-term extension for Assela town

5.3.1. Conveyance (Vacuum Trucks)

Nowadays, in order to transport fecal sludge from Assela town from the sources to the disposal site, two vacuum trucks were used. In the context of immediate actions and with regard to conveyance and transportation, the town may consider increasing the number of vacuum tracks and smaller vehicles, either as a public service or as a private initiative. In order to efficiently collect fecal sludge from residential and non-residential sources, extra vacuum trucks will be provided. To service the town during this short-term intervention, four extra vacuum trucks, with a capacity of (2 VT 12 m^3 + 1 VT 8 m^3 + 1 VT 6 m^3) including the spare parts are planned to be purchased. In addition, it is advised that to purchase 2 portable pumps (Q= 15 L/s, H= 10 m) to access the narrow areas. The town supply vans to utility and private service providers so they can reach neighborhoods with small roads.

5.4. Implementation Strategy

The proposed town-wide inclusive sanitation (CWIS) project in Assela town calls for the building of communal and public toilets and fecal sludge treatment infrastructure over the course of the next 20 years. It will be carried out in three phases. The components of the short-term and mid-term interventions are as follows:

Short term interventions (2025-2030): it strives to increase containment, collection, and a secure discharge site by offering adequate public and community toilets. It also involves construction of drying beds for fecal sludge treatment facility. Since it is a temporary solution, immediate, cheap actions are put into effect immediately.

Medium term interventions (2025-2030): rehabilitate existing sanitation infrastructure in short term to improve containment and collection. It also comprises construction of fecal sludge treatment plant to improve management of the existing poor sanitation situation.

6. PROJECT ALTERNATIVE

6.1. Without Project alternative

The No-project alternative neglects the construction and operation of public toilets, communal toilets, and FSTPs in favor of maintaining the unsanitary conditions brought on by the spread of raw, untreated excrement on the grounds surrounding Assela town. It causes a poor environment that has been polluted with human waste. Hence, the no project option is the least preferred option from both the socio-economic, health and partly environmental perspective. On this basis, the 'No Project Alternative' is rejected as an option to be carried forward for the project implementation option is maintained.

6.2. Alternative Fecal Sludge Treatment Plant

6.2.1. Alternative to site selection

The design study has chosen the FSTP site using the various specified criteria, which took a number of considerations into account. In actuality, the desired location is on privately owned ground that has already been developed, necessitating land resettlements. There are eight farmers that are currently using the authorized area for farming which necessitate the relocation and compensation. In addition, there are 4 local houses constructed in the proposed site which are serving as refreshment shelter during farming activities. There are Eucalyptus trees bordering the farms and the houses which need replacement through re-plantation. The ESIA consultant in discussion with the community and stakeholders recognized that the site has to be slightly modified as feasible as possible to avoid damaging houses and cutting of eucalyptus plantations. As a result, two additional locations were proposed as alternative as follows:

- Alternative one: this location is proposed by the design consultant with GPS points of UTM N883627 and E513715, N883503 and E513585, N883684 and E513383, and N883820and E513506. The site was commented for its damaging of 4 local houses and economic displacement and cutting of plantations for acquisition of the land for the proposed project.
- Alternative two: this location is proposed by the community, and it is slightly moving to northwest of the 1st alternative of project site. This area is located at GPS points of UTM N883674 and E513422, N883802 and E513270, N883933 and E513393, and N883830 and E513549 and will result in relocation of 12 landowners economically and minimize the cutting of plantations. This alternative will result in economic displacement of HHs from their farmland which requires implementation of ARAP.
- Alternative three: This location is proposed by the community leaders and ACWSSSE head. It is located southwest of the 1st alternative at GPS location of UTM N883449 and

E513539, N883288 and E513346, N883404 and E513253, and N883561 and E513436 and will result in relocation of additional land owners but will avoid damaging of houses and cutting of plantations.

With the above alternatives stakeholder consultation was conducted among representatives from MoWE sanitation and safeguard staffs, Oromia BoWE supervising engineer, ESIA team, ACWSSSE staffs, Assela town administration higher officials and the PAHs representatives during the 2nd round consultation. During the 2nd round consultation the PAH confirmed that they are happy to leave the site for the FSTP construction because the town administration /the mayor conformed to them to pay proper land for land and cash compensation. Again this site is more than one kilometer away from residential area. The other point is that the four PAHs who have house over the land are not living in the house but they use as a shelter during farming seasons. After detail discussions with the concerned officials and PAHs and field observations; alternative one which was proposed by the design consultant was selected for FSTP construction in Assela town.

Considering all the environmental and social concerns, the town administration has taken initiatives to secure the land selected for the FSTP construction. The land size of the selected area amounts 5 hectares of land for construction of the FSTP which covers 3.7 hectares (as per the design) for construction works and 1.3 hectares buffer zone for walk way, greenery and wind break plantations.

However, the distance from the main asphalt road to the town, which is only 2.5 km away, necessitates upgrading of the existing earthen road to gravel access road since it is covered by black cotton soil that affects truck movement even with small showers. The existing access road is 14m width earthen road. So the upgrading is important to make high load vehicles movement during project life cycle easier. On the other hand the upgrading can not cause any land acquisition, social and environmental impact because the road is already existing and functional to the local community.

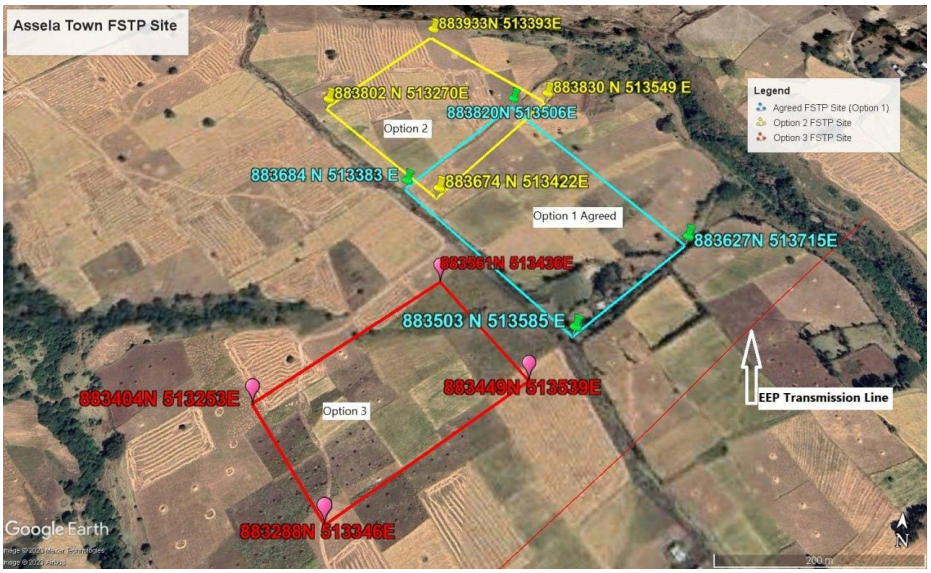

Figure 16) the Fecal sludge site (selected, light blue) relative to alternatively proposed sites

6.2.2. Selection of Fecal Sludge Treatment Technologies

Fecal sludge treatment techniques typically consist of three stages: primary treatment, where the solid and liquid components of the waste are separated, sludge treatment, and liquid or leachate treatment, which is the last step of treatment and is produced by the first treatment. The primary and sludge treatment methods that are most suitable for Assela town were identified through a literature analysis, feasibility study and detailed study report assessment.

6.2.2.1. Technology for Primary Treatment

Primary treatment is used for solid-liquid separation (dewatering) as well as for the treatment of solid and liquid parts of fecal sludge that is generated from the septic tank, pit latrine and other onsite sanitation systems. The technologies used for both primary and solid and liquid parts treatment include: 1) Drying Bed (UDB), 2) Planted Drying Bed (PDB), 3) Up-Flow Anaerobic Sewage Blanket (UASB) reactor, 4) Settling and Thickening (S&T) Tank, 5) Imhoff Tank (IT).

1) Unplanted Drying Bed

An unplanted drying bed is a simple, permeable bed that has numerous drainage layers as demonstrated in Figure 18. When loaded with sludge, it collects leachate that has percolated through the bed and enables the sludge to dry by percolation and evaporation. Between 50 and 80 percent of the volume of the sludge flows out as liquid or evaporates. But the sludge has not truly stabilized or sanitized. Before the dried sludge may be properly disposed of or utilized as a nutrient-rich soil additive in agriculture, it may require further treatment by composting.

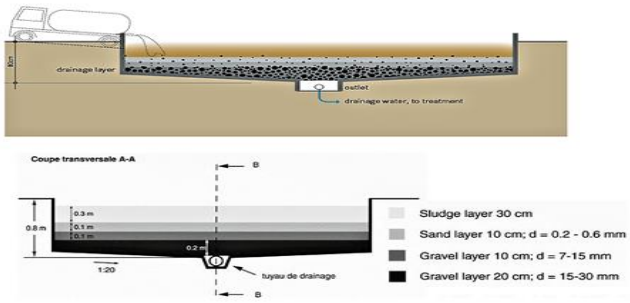

Figure 17) Schematic of an unplanted drying bed

Although frequent desludging necessitates huge surface areas, personnel, or mechanical power, drying beds are very simple to build and maintain (Table 5).

Table 5) Comparative analysis of Unplanted Drying Bed

Advantages	**Disadvantages**
Relatively low capital costs; low operating costs	High land requirements
Good dewatering efficiency, especially in dry and hot climate	odors and flies are normally noticeable
No energy requirements	Labor intensive removal
Can be built and repaired with locally available materials	Limited stabilization and pathogen reduction
Simple operation, only infrequent attention required	Leachate requires further treatment
No experts, but trained community required	Requires expert design and construction supervision

2) Planted Drying Bed (PDB)

A planted drying bed is comparable to an unplanted drying bed as demonstrated in Figure 19, but the presence of plants adds the advantages of increased sludge treatment and transpiration. For the purpose of separating the solid from the liquid part of fecal sludge from latrines, septic tanks, biogas reactors, trickling filters, etc., it is a sealed shallow pond filled with various drainage layers. By using a mix of percolation and evaporation, sludge is naturally dried. The filters do not need to be desludged after each feeding/drying cycle, which is the main advantage of the planted bed over the unplanted bed (See Table 6).

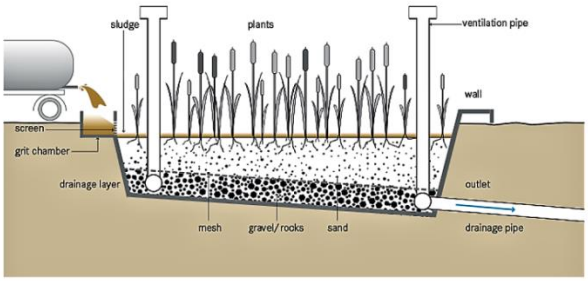

Figure 18) Schematic of a planted drying bed

The plants and their root systems maintain the porosity of the filter, allowing new sludge to be put directly over the preceding layer. Unlike unplanted drying beds, planted drying beds (also known as humification beds) only require desludging once every five to ten years. The removed sludge provides a nutrient-rich soil amendment that may be utilized right away in farming.

Table 6) Comparative analysis of Planted Drying Bed (PDB)

Advantages	**Disadvantages**
Can handle high loading	Requires a large land area
Better sludge treatment than in unplanted drying beds	odors and flies may be noticeable
Easy to operate (no experts, but trained community required)	Long storage times
Can be built and repaired with locally available materials	Labor intensive removal
Relatively low capital costs; low operating costs	Requires expert design and construction supervision
No electrical energy required	Leachate requires further treatment
Fruit or forage growing in the beds can generate income	Only applicable during dry seasons or needs a roof and contour bund

3) Up-Flow Anaerobic Sewage Blanket (UASB) reactor

The UASB reactor uses anaerobic digestion to treat fecal sludge and wastewater, and it has the ability to both decrease sludge volume and create biogas. Figure 20 illustrates the schematic representation of UASBR reactor. Before employing the UASB reactor technology, the fecal sludge properties must be examined since fresh or less stabilized fecal sludge will have larger quantities of organic matter but will also include inhibitory substances.

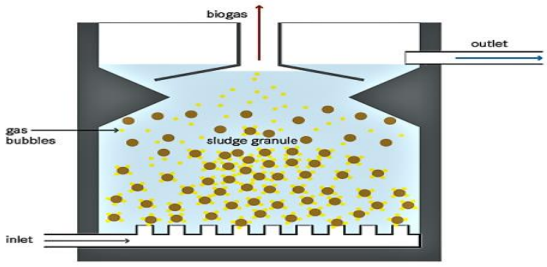

Figure 19) Cross-section of an Up Flow Anaerobic Sludge Blanket (UASB) reactor

Every two to three years, the septic tank's digested fecal sludge is drained; however, because the sludge in the septic tank has already undergone some digestion, this procedure might not be suitable for anaerobic co-treatment. In this instance, the digested fecal sludge's low organic matter concentration will result in poor biogas generation but significant solid buildup, which will raise operating expenses at the expense of small benefits (Table 7).

Table 7) Comparative analysis of Up-Flow Anaerobic Sewage Blanket (UASB) reactor

Advantages	**Disadvantages**

High nutrient recycling	High level of skill for operation and maintenance (O&M)
Energy balance and CO_2 emission	Effluent and sludge require further treatment and/or appropriate discharge
High reduction of BOD_5	Longer start-up period
Low sludge production	A proper temperature range is required for the anaerobic process (15ºC to 35ºC), therefore it is not applicable during cold season
A low energy requirement for the treatment process	Some equipment (i.e. pH meter, thermometer etc.) and professional staff is necessary for monitoring the internal condition of the reactor.
Less nutrients required;	A constant source of electricity is required
System can be shut down for extended periods without serious deterioration; and	Need import of electro-mechanical equipment and shortage of locally available spare parts
Can handle organic shock loads effectively.	Requires expert design and construction

4) Settling and Thickening (S&T) Tank

Settling-cum the thickening tank primarily permits heavier septage particles to sink to the bottom of the tank due to gravity while lighter septage components (fats, oils, grease, and water) remain above. The supernatant is expelled from ST tanks by an outlet on the other side from the intake, which is rectangular in form. To stop the scouring of settled sludge and the separating of scum, a baffle can be put at the outflow. The tank primarily has two compartments, occasionally three compartments, which can be alternately utilised for loading septage as illustrated in Figure 21.

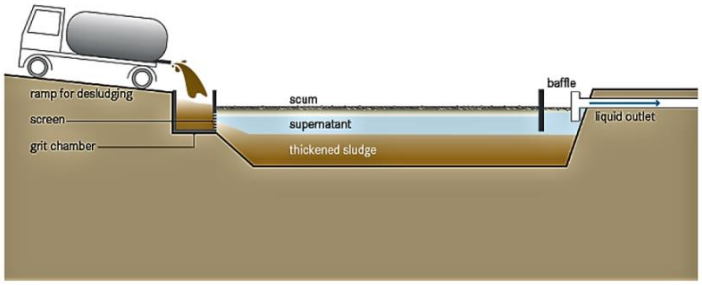

Figure 20) Schematic of a Thickening Pond

Each tank is loaded for a minimum of a week, after which the sludge is allowed to thicken and settle, stabilizing the settled solid through the anaerobic sludge digestion process. Then, at regular intervals, thickened sludge is injected to the sludge drying bed. If the sludge is not thick enough, it is often removed by vacuum truck, excavator, or pumping (Table 8).

Table 8) Comparative analysis of Settling and Thickening (S&T) Tank

Advantages	**Disadvantages**
Thickened sludge is easier to handle and less prone to splashing and spraying	Requires a large land area
Can be built and repaired with locally available	odors and flies are normally noticeable,

materials	Requires expert design and construction supervision
Relatively low capital costs; low operating costs	Long storage times, Effluent and sludge require further treatment
No electrical energy is required	Requires front-end loader for desludging

5) Imhoff Tank (IT)

The Imhoff tank is a main wastewater treatment method that separates solids from liquids and digests settled sludge (Figure 22). A V-shaped settling compartment sits above a sludge digesting chamber that is tapering and equipped with gas vents. The settling sediments are anaerobically digested in the digestion chamber, producing biogas. In order to avoid the gas from interfering with the settling process, baffles direct it towards the gas vent pipes. Small settlements employ Imhoff tanks, and the subsurface structure severely restricts the usage of land.

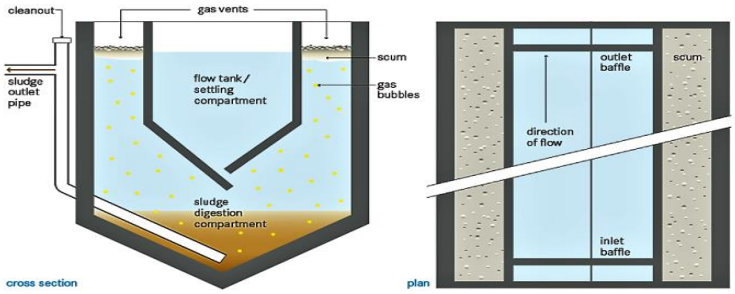

Figure 21) Schematic of an Imhoff Tank

Low investment expenses are combined with straightforward operation and maintenance. However, because of the low treatment effectiveness, a further treatment of the effluent is necessary. Furthermore, the tanks need to be frequently emptied (See Table 9).

Table 9) Comparative analysis of Imhoff Tank (IT)

ADVANTAGES	**DISADVANTAGES**
Solid-liquid separation and sludge stabilisation are combined in one single unit	Very high (or deep) infrastructure; depth may be a problem in case of high groundwater table
Resistant against organic shock loads	Requires expert design and construction
Small space requirements	Low reduction of pathogens
The effluent remains fresh (i.e., not septic)	Requires desludging
Low operating costs	Inefficient treatment option if not regularly desludged
Suitable for small settlements and house clusters	Odor occurs from escaping gases
Standardized designs available	Effluent, sludge and scum require further treatment
Simple operation and maintenance	Less simple than septic tank

6.2.2.2. Decision matrix for primary treatment technology (solid-liquid separation)

The groundwater level, land need, energy requirement, skill required, capital cost (CAPEX), operational cost (OPEX), and sludge treatment technical possibilities were taken into consideration while creating the decision matrix for the Assela town for ESIA (Table 10). These factors have a significant impact on the decision-making process when choosing the best fecal sludge treatment technology alternative. The selection of fecal sludge treatment technology for Assela town also depends on the UWSSP-II sanitation goals, the minimum/indicative wastewater quality standard values set out within the UWSSP-II ESMF, WBG and EHSG.

Table 10) Main characteristics of the sludge dewatering process

CHARACTERISTICS	**UDB**	**PDB**	**UASB**	**S&T**	**IT**
Land requirements	+++	+++	+	+	+
Energy requirements	-	-	+	+	+
CAPEX	+	+	++	+	++
OPEX	+	++	++	+	++
Groundwater level	+	+	+	++	++
Skill requirement	+	++	++	+	+++
Discharge standard	++	++	+++	++	++
Operational complexity	+	++	++	++	++
Maintenance requirements	+	++	++	++	++
Complexity of installation	+	++	+++	++	++
Influence of climate	+++	+++	+	+	+
Sensitivity to type of FS	+++	+++	+	+	+
Chemical product requirement	-	-	+	+	+
Dewatered sludge removal complexity	++	++	+	++	++
Level of dryness	+++	+++	++	+	+
Odors and vectors	+++	+++			
Noise and vibration	-	-	+	+	++

The decision matrix compares the benefits of various technologies based on factors related to the economy, the environment, and social safety. The UDB and PDB require a lot of area but no energy need, whereas the UASB reactor has high discharge standards but has moderate CAPEX and OPEX (Table 10). The groundwater level should be deep for IT and S&T tanks, although the UDB, PDB, and USAB reactor do not depend on it for operation. UDB is determined to be the most appropriate option based on the decision matrix analysis for Assela town FSTP as liquid-solid separation. Consequently, for Assela town FSTP, UDB, the principal treatment (solid-liquid separation) technique, was selected. Evaluations conducted with drying beds have shown that they offer effective treatment, simple operation and maintenance methods, resistance to shock loads, and climate adaption.

6.2.2.3. Technology for sludge treatment and disposal

Sludge that has undergone partial treatment is produced after dewatering. This treated FS cannot be used directly in agriculture since it still contains pathogenic bacteria and parasite eggs. Further treatment is needed to raise the sludge's quality by 1) Co-composting, 2) vermicomposting, 3) shallow trenches, and 4) solar drying techniques.

1. Co-composting

Fecal sludge and municipal solid waste co-composting is a biological process that uses microorganisms to break down organic material in an aerobic environment (Figure 23). Fecal sludge is dewatered, and the partially treated sludge is combined in a ratio of 1:2 or 1:3 with the organic portion of municipal solid waste. Municipal solid waste has strong bulking qualities and is rich in organic content; whereas, faeces have a high moisture and nutrition content.

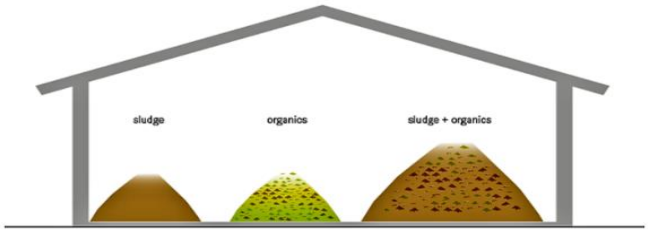

Figure 22) Schematic of the Co-compost

A high temperature (50-70^{o}C) is maintained during co-composting for 3 weeks in order to destroy helminth eggs and harmful bacteria. Stabilized organic matter that may be utilized as a soil conditioner is the final outcome of co-composting. The co-composting procedure takes 10–12 weeks. Comparative analysis of Co-composting is given in Table 11.

Table 11) Comparative analysis of Co-composting

Advantages	**Disadvantages**
Relatively straightforward to set up and maintain with appropriate training	Requires a large land area (that is well located)
Provides a valuable resource that can improve local agriculture and food production	Long storage times
A high removal of helminth eggs is possible (< 1 viable egg/g TS)	Requires expert design and operation by skilled personnel
Can be built and repaired with locally available materials	Labor intensive
Low capital and operating costs and no electrical energy required	Compost is too bulky to be economically transported over long distances

2. Vermicomposting

Earthworms are used in the low-cost composting process known as vermin-composting to break down organic waste. This system for managing fecal sludge is quick, simple to use, economical, energy-efficient, and waste-free. Earthworm biomass and vermin-composting are the two beneficial byproducts of vermin-composting. Practically every type of organic matter may be consumed by earthworms, and they can consume as much as their own body weight in one day.

Table 12) Comparative analysis of Vermi-composting

Advantages	**Disadvantages**
Compact size	Maintenance requirements
Nutrient-rich compost	Limited types of waste
Reduction of waste	Potential for odor
Educational opportunity	Risk of pests

3. Solar Drying

Treatment by solar drying is generally done in greenhouse structures with glassy covers, concrete basins, and walls. Sludge is disposed of into the concrete basin and processed for about 10-20 days. Options exist for batch or continuous operation, with devices to control the conditions in the greenhouse (e.g., ventilation, air mixing, temperature). The main factors influencing the evaporation efficiency in these systems are the solar variation, air temperature, and ventilation rate, with the initial dry solid content of the sludge and air mixing also influencing.

Table 13) Comparative analysis of Solar Drying

Advantages	**Disadvantages**
High efficiency for dewatering	Large space requirements
Low energy requirements	Need mechanical means to turn sludge
Low investment cost	Ventilate the greenhouses

4. Shallow trenches

It is a straightforward approach that aids in the cleanup of contaminated soil and does not smell bad or seem unattractive to nearby residents. No matter how much or how little sludge there is, a shallow trench may be employed. However, the area needed and the demand for routine groundwater monitoring is the key limitations of this system.

6.2.2.4. Decision matrix for sludge treatment technologies option

Based on the sludge treatment technical options, a decision matrix was prepared for Assela town with respect to land requirement, energy requirement, skill requirement, CAPEX, OPEX and groundwater level and discharge standard (Table 14).

Table 14) Decision matrix for sludge treatment technology

Constraint	**Co-composting**	**Vermicomposting**	**Solar drying**	**Shallow trenches**
Land requirement	+++	+++	+++	+++

Energy requirement	+	+	+	+
Groundwater level	+	+	++	++
CAPEX	+++	+++	++	+
OPEX	+++	+++	++	+
Skill requirement	+	++	++	+
Discharge standard	+++	+++	+++	-
+: low favorability; ++: moderate favorability: +++: high favorability; -: no need				

Based to the decision matrix (Table 14), solar drying treatment is the best alternative sludge treatment technique that ESIA teams could provide based on the real conditions in Assela town in terms of the selected solid-liquid separation treatment plant, current sanitation level, and climate consideration. Furthermore, co-composting and vermicomposting were strongly advised as a first and second order alternative by an ESIA consultancy team as a secure solution for disposing of dried sludge.

6.2.2.5. Technology for leachate /liquid effluent treatment

To meet the standards for water reuse or release into the environment, the liquid effluents from dewatering technology must first undergo further treatment. This liquid effluent frequently needs extra treatment to fulfill criteria for discharge quality.

1. Waste Stabilization Ponds

The cheap capital and operating and maintenance expenses of waste stabilization ponds (WSP) make them a viable choice for wastewater treatment in underdeveloped nations. In general, they are made up of a number of ponds with different names depending on what they are used for: facultative, maturation, or anaerobic ponds for lowering organic, nutrient, and pathogen loadings (Figure 24).

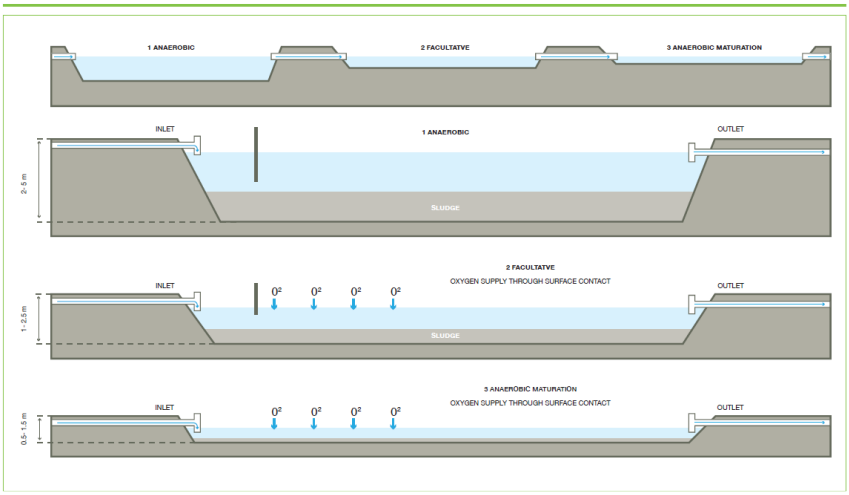

Figure 23) Typical scheme of a waste stabilization system: an anaerobic, facultative & maturation pond in series.

The ponds might be sealed with clay, asphalt, or any other impermeable material to stop water penetration. The properties of WSP will change depending on the scenario of liquid fecal sludge dewatering and thickening effluent. The effluent properties, which can be very diverse as indicated in Table 15, will dictate the number of ponds and the type of maintenance necessary.

Table 15) Key features of selected treatment options for liquid effluents from dewatering units

	KEY FEATURES	**ADVANTAGES**	**DISADVANTAGES**
Waste Stabilization Ponds	Consists of bioreactors in series operating under anaerobic, facultative and aerobic conditions	Low construction costs	Requires large land area
	BOD removal: 80-95%	Low O&M costs; main O&M requirement includes weeding (to prevent breeding of mosquitoes) and removal of scum	May promote breeding of insects
	Residence time: 20-60 days	Low energy demand	Odor may be generated in some cases
		Appropriate for treating high-strength effluent	Well suited for tropical and subtropical countries
Wetlands	Organic loading rate: 30-110 g COD m^{-2} d^{-1} (typical: 75 g$BOD_5$$m^{-2}$ d^{-1})	Does not require chemicals, energy or high-tech infrastructure	Requires large land area
	Hydraulic residence time: typically, 3-6 Days	Suited for combination with aquaculture or sustainable agriculture (irrigation)	Delayed operational status (vegetation establishment needed for peak removal efficiency might take 2-3 years)
		Good control of odor	Pretreatment of the effluent may be required to prevent clogging of the filter bed
		Low construction, O&M costs	Not very tolerant to cold climates

2. Constructed Wetlands

In the treatment of wastewater, there are three types of constructed wetlands as illustrated in Figure 25. These include free water surface wetlands (FWSW), subsurface flow wetlands (SSFW) and vertical-flow constructed wetland (VFCW). The direction of the wastewater's flow channel is a key distinction between VFCW, FWSW and SSFW wetlands.

In contrast to the other two systems, which constantly function under aerobic circumstances, occasional aerobic-anaerobic situations occur in the VFCW. The horizontal-flow systems, on the other hand, are more susceptible to clogging. As a result, they should primarily be employed to remove dissolved pollutants, with the VFCW being more successful at doing so. To properly treat wastewater, a hybrid unit can mix FWSW, SSFW, and VFCW.

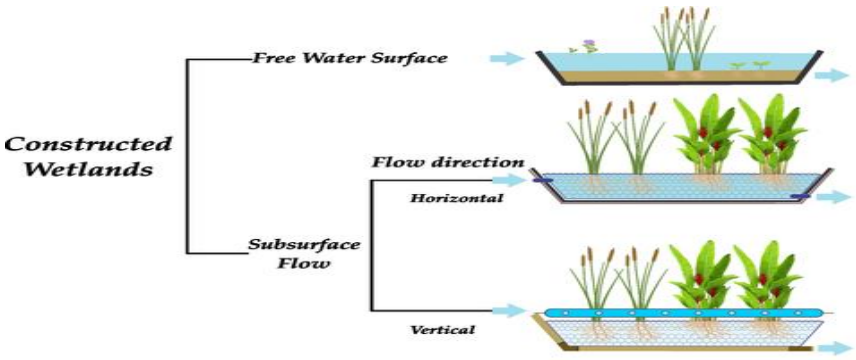

Figure 24) Scheme of types of constructed wetland

3. An anaerobic baffled reactor (ABR)

An anaerobic baffled reactor (ABR) is an enhanced septic tank with a series of baffles that compel grey, black, or industrial effluent to flow under and over the baffles from the entrance to the output. Although ABRs are strong and can handle a variety of wastewater types, further treatment is still required before residual sludge and effluents may be adequately recycled or released.

6.2.2.6. Fecal Sludge Treatment Process Technologies Adopted for Assela town

Diverse combination methods were implemented worldwide for solid-liquid separation throughout the treatment process, and then wastewater underwent further treatment before being released into the environment. The decentralized wastewater treatment system was the most widely used technology in developing countries. It treats fecal sludge through a settler, anaerobic baffled reactor (ABR), planted gravel filter (PGF), and polishing pond, and starts treatment with a planted or unplanted sludge drying bed with or without ABR.

In conclusion, Assela town lacks a facility for the treatment of fecal sludge or wastewater, thus vacuum trucks are used to transfer sludge to illegal dumps on the outside of the town. Various fecal sludge management options have been examined by CATS and UNICONE Consultancy PLC and reported in the feasibility study and detailed design of CWIS for Assela town. Based on the analysis, unplanted sludge drying bed and with waste stabilization pond without ARB was proposed. The sequence of the proposed fecal sludge treatment process was: Reception-drying Beds-Anaerobic pond-facultative pond-maturation pond-Effluent as illustrated in Figure 26.

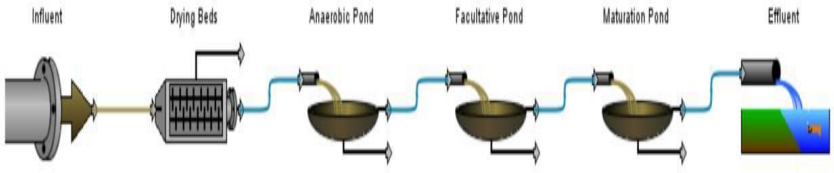

Figure 25) FSTP allocation on the site Layout

The ESIA team also recognized the suggested method for treating fecal sludge in Assela town by the design and feasibility study Consultancy PLC (CATS and UNICONE). These technological possibilities offered the possibility of successfully treating fecal sludge to generate leachate effluent that could be safely disposed of without damaging the environment.

7. Stakeholder Consultation

As stated by World Bank Policy OP 4.01 and OP 4.12 consultations are expected to be held with key stakeholders while preparing ESIA reports so as to develop plans for mitigation of the potential impacts during the project preparation, implementation and decommissioning phases. Accordingly, consultation was held in Assela with essential stakeholders from concerned offices, particularly the utility manager and vice mayor. Another consultation was also held with PAHs whose farmland and other assets are impacted for the proposed FSTP. Stakeholder consultation at the office was held on August 2, 2015, EFY. And consultation session was held with PAHs on August 3, 2015, EFY. The consultations were facilitated by the ESIA consultant team consisting of an environmentalist, environmental and social safeguard expert, and sociologist.

7.1. Consultation with Project Affected Householdss

Consultations with PAHs are expected to be conducted and their active participation must be ensured. Accordingly, consultation was made with project affected household heads on 23/12/2015 EFY at the office of Gora Silingo kebele where 8 household heads (5 males and 3 females) took part. However, the ESIA team realized that there are about 12 PAHs whose properties/lands will be taken for the project and 4 of them were not available due to the act that they rented the land and are not living in the area. It was confirmed that one of them is living in Shashemene town, the other in Adama town and the remaining somewhere else. In agreement was made with community and the kebeles leaders that similar land acquisition should be made for all landowners in the project site.

Figure 26) Participants of the consultations (FGD) with PAHs and office level stakeholders

The consultation has been moderated by ESIA consultant team. The consultation was arranged by officials of Gora Silingo kebele, Tiyo woreda, where the proposed FSTP site is placed. The main points forwarded to the discussants are as follows:

- Θ The reason behind the need for the consultation having with you is that parcels of your farmland are in a position of being taken for FSTP to be constructed in the town. In fact, the ESIA consultant team is not mandated to determine the compensation to be paid to you. But we are expected to identify PAHs, amount of land to be taken and the magnitude/productivity level of the land which, in turn, will help as an indicative measure for compensation determinations to be done by the concerned bodies of the town administration in the near future prior to project implementation.

- Θ The FSTP in the short run will be constructed on about 2.77 hectares of land and in the long run the land will be increased to a total of around 7 hectares including buffer zone. The significance of the consultation is to let PAHs know that none of the farmlands/assets will be taken before commensurate compensation has been done which will be carried out in accordance with the enshrined rules and regulations. The project also has significant benefits to the town and community members of Gora Silingo kebele in improving sanitation, water supply, employment opportunities etc.

- Θ Finally, the ESIA team explained that consultation has the objective of hearing what you could say so as to make it included in the ESIA report.

The participants had responded to the issues raised and reflected important concerns as follows:

i) Level of information about the proposed project

All projects affected people who took part in the consultation mentioned that nobody let them inform about the project. Hence, till the time of the consultation held with ESIA team, neither community members nor PAHs get consulted during project site selection and design phases.

ii) Identification of PAHs/landowners whose land required for the project

Even if none of the PAHs were pre-informed their lands are required for the project till the time of the consultation held with ESIA team, concerned officials of Gara Silingo Kebele mentioned the lists of households whose lands are needed for the proposed FSTP. The proposed FSTP will be constructed on the farmlands of 12 households. List of the household heads are: (1) Yilma Damte, (2) Tilaye Shenkute, (3) Gashaw Hailemariam, (4) Almaz Kaptimer, (5) Emebet Tadesse, (6) Fetlework Shenkutie, (7) Aselefech Kitaw, (8) Almaz Shenkutie, (9) Bogalech Shenkutie (10) Feleku, (11) Tasew Aregahegn, and (12) Abebe Alemayehu. This was made after an introduction of the overall project significance to the attendants of the consultation and the inevitability of compensations proportionate, if not better, to what they are going to lose for the project.

Figure 27) Pictures showing the proposed sites for FSTP

iii) Presence of cultural or tourist heritages on the land proposed

All participants of the consultation/discussion confirmed that none of the places/farmlands proposed to be taken for the upcoming FSTP have had historical, cultural and religious functions. The participants also described that such places have not been serving as tourist/heritage or artifact sites.

iv) Perceptions of individual households on the FSTP site

Project affected household heads who took part in the consultation explained their views and/or reservations on the proposed FSTP to be constructed on their lands as follows:

- ΘW/ro Aselefech replied “our household members are all dependent on the land proposed to be taken for the project and it’s through farming on such lands that we are managing our

children to grow up. Nonetheless, if we are fairly compensated for what we may lose taking the very significance of the land to our households' livelihoods, I don't mind".

ΘW/ro Almaz on her part asked "how/why the places where our farmlands placed selected for the project?" Anyway, if an equivalent compensation is done, I don't have reservation against the project to be constructed on our farmland as far as it will have a multifaceted significance for our community and the town at large".

ΘW/ro Fetlework, on her part said that the proposed land required for the project is a place where she was born and grew up and her family members' livelihoods depend on. And she asked whether the place where the house her household resides is required to be part of the project or not.

ΘAto Tilaye, also replied that "as said before, we will be in trouble if the land where our houses are placed is taken for the proposed project. It's known that no matter how much money is given to us in the name of compensation; it will not help us to have a sustainable livelihood as far as the continuously diminishing value of money is considered. So, I recommend/prefer (a) if the land where our houses placed be excluded or not to be taken for the project and (b), it would be better if the compensation is made in kind (land to land) than in a monetary wise."

ΘAto Gashaw on his part said that his household members' annual income is being covered from farm products of the land proposed to be taken for the project. He also mentioned that he prefers land-to-land compensation to be made for them than monetarily. He also explained his reservation that the compensation could not be implemented as fairly and timely as stated in the said rules/directives which may lead his household members to face financial and psychological problems. Because, he mentioned, such problems are being seen in so many other places/cities. He advised that for such types of problems not to occur, the compensation procedures are expected to be told to them (PAHs) in a transparent way from the legal perspective.

ΘAto Gezahegn explained "since the project may have significant (positive) impact, I really felt happy for the project for coming in our community. But I have a strong reservation whether the compensation could be paid in accordance with the law or not as mentioned by my friends. Especially when land to land compensation is going to be implemented, care should be given because it would not be important if unproductive/infertile land is given to us in place of the ones that we are going to lose for the project. In addition, if the compensation is to be made through monetary way, it should be proportional enough".

ΘAto Abebe explained that a number of problems are being faced by people in other places related to compensation because, most of the time, compensations are not being given as properly and timely as promised/planned. He also explained that family members of the PAHs need to get priority whenever employment opportunities are created during project intervention periods. And he recommended that time value of money should be considered

when compensation determination study is carried out. He described "the compensation study will be done this year, but it would not be implemented right after the study and whenever the time gap is elongated between the compensation study and its implementation, the buying value of money will be diminished".

ΘW/ro Almaz on her part explained that all issues raised by the discussants of this consultation should be noted to the concerned higher-level officials of the town so as to implement the compensation activity as fairly and timely as possible.

v) Responses of the ESIA team to concerns of the PAHs

The ESIA team members who took part in the consultation responded to the questions raised by the attendants (PAHs) as follows.

- Θ The proposed place for the FSTP to be constructed has been selected through scientific analysis and found to be the ideal place.
- Θ The project physical activity will be commenced after compensations have been paid to all PAHs taking the compensation proclamation of the country enacted in 2012 EFY, the ESMF and related WB triggering policies into account.
- Θ PAHs whose land is in a position of being taken for the project can continue farming on it till deprived of the land use rights with essential compensations given.
- Θ The ESIA consultant team will conduct a survey-based study to collect basic data from PAHs which will serve as an indicator for those who are going to intensively gather detailed data and make inventory to determine the compensation estimate.
- Θ Even after the compensation is done and the project construction began or in the middle of the project intervention, assessment will be conducted on the livelihoods condition of the PAP. This helps to make corrective measures if there are households who get in to trouble as a result of the project induced displacement.
- Θ The project will be implemented in accordance with the enacted rules and regulations. And if there is a single reasonable complaint which is left unresolved, the project intervention will not proceed.

Generally the ESIA consultant team explained that (1) essential comprehensive needs assessment of PAPs will be conducted, (2) need based capacity building trainings on businesses which they want to engage will be carried out, (3) due priority will be given for PAPs whenever there are employment opportunities in the project in accordance with the need they want to engage and the skill they have, (4) appropriate and timely follow up, supervision and monitoring of the implementation of activities done to PAPs will be curiously assessed including compensations made for the assets they may lose as a result of the project, and (5) women and vulnerable members of PAPs will be given due emphasis as part of the mitigation measures for potential impacts to be faced due to the project induced asset losses; this helps them maintain the quality of life not less than their pre-project status.

The consultation has been closed up reaching to an agreement with all projects affected household heads who took part in the discussion that they will not be concerned when their land is taken for the project **if they are appropriately and timely compensated.**

7.2. Concerned institutions and officials Consultation

Part of the ESIA preparation process, conducting consultation with officials of the concerned offices and/or steering committee members is quite critical. Doing so helps for supporting the project risk management process, specifically for early identification and avoidance/management of the potential negative impacts, enhance positive impacts and carry out cost effective project design. Consultation was held with office level stakeholders with the moderation of ESIA consultant team. However, due to overlapping missions, all members of the steering committee couldn't take part in the consultation. Hence the vice Mayor and utility manager of the town took part in the consultation/discussion held at the mayor's office. The main points raised by the ESIA consultant team members, including the challenges faced while conducting data collection, have been mentioned hereunder.

The team leader of the ESIA study opened the consultation and explained "we have been here before a couple of days to collect essential data as we are in charge to carry out ESIA for the proposed FSTP to be implemented in the town. But due to different reasons (unavailability of concerned officials), we couldn't manage to proceed with our task by the time. We visited the proposed FSTP site which is ideal enough to the ESIA team view. Our visit to your kebele has 3 main goals; (1) to have consultation with (a) office level stakeholders and (b) PAHs whose assets on one way or another, are in a position to be affected by the proposed FSTP in the town, (2) to collect socioeconomic data from responsible offices of the town like health, education, agriculture etc. and (3) to conduct household survey from people whose land/assets are going to be taken for the upcoming FSTP construction".

He also said that the survey to be conducted will only be used as indicative data for the compensations to be given for PAHs. Meaning, it will not, directly, be used to determine the compensation to be paid for PAHs. Instead, it is expected to be managed by the town administration. So, letting the key office level stakeholders know the expected duties and responsibilities was the main objective behind the consultation.

Member of the GSEMC and environmentalist explained that the primary objective of the consultation is to identify PAHs whose land/assets are in a position to be taken for the proposed FSTP and have consultations with them so as to include their say in the report.

Other team member and climatologist explained that "as the objective of this study team is to conduct ESIA for the proposed FSTP to be implemented in the town, concerned individuals of the town administration are also expected to take part in the consultation to be conducted with PAHs". The overall issues mentioned by those who took part in the consultation for the issues raised by the ESIA team are summarized here under.

Information about the proposed FSTP: The discussants replied that they are informed about the upcoming FSTP to be constructed in the town.

The utility manager of the town explained that he is well informed about the upcoming project. He described "the project will have significant contribution for the town. However, it's the place proposed for FSTP which has only been identified and, particularly, the issue of PAHs hasn't been dealt till now. Even, PAHs didn't get informed whether their assets/lands are required for the FSTP to be implemented in the town."

Vice mayor of the town replied that he is informed about the forthcoming FSTP to be constructed in the town. He explained "we have had discussions with utility manager and project staffs, the team that conducted the feasibility study and the mayor of the town by the time on how to identify the proposed FSTP site taking the very significance of the project in to account".

Level of participation during project design and site selection: the discussants explained that they have partly participated especially during the time of project site selection. But, they said, it's the design consultant team that mainly carried out the project design. Meaning, stakeholders' level of participation in the project design is quite low.

Issues that need due emphasis and coordination by stakeholders: the discussants mentioned a number of issues to be considered by concerned bodies of all levels. Some of the issues raised are described as follows:

- The issue of compensation and land substitution is expected to be done by direct follow-up of top-level town administration. And concerned officials of Tiyo woreda and Gora Silingo Kebele where the proposed FSTP site is placed should be made to take part in informing the PAHs before the consultation to be held with the ESIA team.

- It was also agreed in the closed up that the PAHs should be proportionally compensated for the land and other assets they will lose for the FSTP. And the ESIA team should consult them in a careful way so as to reduce further complaints to be raised as a result of insufficient information on the way the compensations are to be paid.

7.3. Second Round Stakeholder Consultation

Second round stakeholder consultation and site visit was conducted in Assela town in between 18 and 19 November 2023 to discus and reach in consent on sites proposed for the FSTP construction. The participants of the consultation include the mayor and deputy mayor of Assela town administration, ACWSSSE utility staffs, MoWE UWSSP-II sanitation and safeguard staffs, Oromia BoWE project supervision engineer and GSEMC ESIA team (figure 29). The purpose of the consultation was to identify and figure out the most feasible site among the FSTP site proposed by the design consultant and the alternative sites proposed by the ESIA based on different environmental and social concerns of the project.


Figure 28) Partial view of Stakeholder meeting & site visit

The meeting was chaired by the mayor of Assela town, His Excellency Mr. Sime Tsegaye. During the opening session, participants representing different parties were introduced each other with the facilitation of the town utility head. The team leaders from MoWE, GSEMC and Oromia BoWE presented the concerns with site alternatives regarding the FSTP construction in Assela town. It was clarified that the site proposed for the FSTP by the design consultant will cause displacement of 12 HHs economically from their farm lands. In addition, 4 HHs have houses constructed within the proposed site that will be damaged though the PAHs are not living in the houses except they use as a refreshment shelters during farm operations.

It was further clarified that during the first consultation, the town administration has directed specific to the site alternative that as much as possible, the project should not cause physical displacement and damaging of private assets and reasonably minimize cost of compensation. Following this concern, the ESIA team has made site visit and conduct consultation with the PAHs and the utility head on the alternatives to the site selection and alternatives were proposed by then.

One of the alternative sites was at 200 meters downstream (northwest) of the 4 houses owned by the farmers in the project site to avoid damaging of the houses. The second alternative was proposed on the land opposite side (south west) to the design consultant proposed site. Both alternative sites were laid on farm lands that farmers are using for field crop production such as teff, barley and wheat. The ESIA team has recognized that shifting the site to the newly proposed site will not only avoid damaging houses but also reduce the cutting of eucalyptus trees found adjacent to their houses. Therefore, participants of the second round meeting have appreciated the alternatives proposed by the design consultant and ESIA team. Accordingly through discussion was conducted at office and then field visit was made on 19 November 2023 with the presence of deputy mayor of Assela town and all participants o the meeting.

After site visit and detail consultation, all the participants agreed on the site proposed by the design consultant or alternative one as feasible site for FSTP construction. One of the reasons to this agreement is that the farm lands are highly fertile and well improved, and hence the cost of

compensation will be higher than the cost of compensating the houses and part of the farm lands than acquiring lands that are totally farm land. It was also considered that alternative two and three will cause design revision which is physically difficult as this activity would require allocation of additional budget and time.

On this regard, the opinions of the farmers (HHs) were also taken and they confirmed that if proper and commensurate compensation is paid they will be in agreement to provide the lands of their farm and the houses. In addition, as the houses which will be taken for the project implementation is not serving as the permanent residence instead as refreshment shelter, it will not cause significant adverse impact on the life the PAHHs as long as compensation is given based on ARAP procedure. It is also reasonable and impact minimizing strategy to reduce the farms lands to be taken by the project.

Considering all the environmental and social concerns, the town administration has taken its commitment to secure the first alternative which amounts 5 hectares of land for construction of the FSTP which covers 3.7 hectares (as per the design) for construction works and 1.3 hectares buffer zone for walk way, greenery and wind break plantations. This finally accepted plot of land is almost one km away from residential area.

8. Indicative Socioeconomic Survey of PAHHs

As one of the data collection methods of the ESIA, a census was conducted with 12 households whose farmlands are required for the proposed FSTP site. Before expropriation of the land for the proposed FSTP, PAHs must be identified and provided with compensations commensurate with their lost properties associated with land acquisition. The overall demographic features of the households together with the amount of land to be taken for the project, productivity level of the land and the livelihoods were the main issues dealt in the census. Semi-structured questionnaire was used as a tool for data collection. The place where the FSTP proposed to be constructed is not residence and serving for production of crops. This indicative census will provide foundation for compensation study to be conducted by the town administration following the country and WB laws. Hence, all the PAHs are expected to be appropriately and timely get compensated for what they are going to lose as a result of the project.

8.1. Demographic features of the PAHs

The census assessed the demographic conditions of the 12 households whose farmlands and properties required for the proposed FSTP to be constructed in the town. Age, sex, marital status, educational status, and household size were the main variables considered.

Table 16) Sex and Household size of PAHs

No.	Household head sex	Number	Percent
1	Male	4	33.33
	Female	8	66.67
	Total	12	100
2	**Household Size**		**Average HH size**
	HH1	6	
	HH2	5	
	HH3	7	
	HH4	5	
	HH5	8	
	HH6	7	
	HH7	11	
	HH8	6	
	HH9	9	
	HH10	7	
	HH11	8	
	HH12	2	
	Total	**81**	**7**

Source: (Household Survey, Green Sober, 2023)

As indicated in table (16) above, 12 PAHs whose properties appear to be required for the proposed project served as respondents of the household survey questionnaire. A total of 81 people are living in all the surveyed PAHs whose farmlands are in a position to be taken for the proposed project. On average, there are 7 people living in each PAH. As shown in table 16, FHHs are 8 (66.67%) and MHHs are 4 (33.33%). This shows that majority of the project affected households are headed by females. Thus, due consideration should be given for gender issues, including gender mainstreaming while conducting compensation studies for those who are going to lose properties for the proposed FSTP.

Table 17) Age composition and Marital Status of Household Members

No.	Marital status of HH heads	Number	Percent
1	**Marital status**		
	Married	9	75
	Widow	3	25
	Total	12	100
3	**Age of HH members**		
	<7 year	5	6.17
	8-15	11	13.58

No.	Marital status of HH heads	Number	Percent
	16-63	63	77.78
	>64	2	2.47
	Total	81	100

Source: (Household Survey, Green Sober, 2023)

As presented in table 17 above, 9 (75%) of the HHs are married and 3 (25%) of them are widowed. All the three widowed HHs are females. Age wise, 63 (77.78%) household members are with the age range of 16-63 or working age and 11 (13.58%) are with the range of 8-15 years of age. And 5 (6.17%) of all the household members are under 7 years of age. Of all the 81 household members, 16 (19.75 %) are children under 15 years of age. And 2 (2.47%) are elders with above 64 years of age. This shows that of all members of the surveyed households, 18 (22.22%) are within the non-working ages or dependent group. And there are not any orphans living in the surveyed project affected households. Hence, as far as significant numbers of dependent segments of people are living in the PAHs, due care also needs to be given while compensation studies are to be conducted by the town administration.

8.2. Educational Status of Household Heads

The educational status of all the 12 HHs subjected to the survey was assessed. It helps to assess the critical thinking or reasoning capability of the surveyed household heads in securing their rights in accordance with compensation proclamations of the country and the World Bank Operational policies. This, in turn, helps PAHs to be proportionally and timely compensated for what they may lose as a result of the project. Table (18) presents educational status of the surveyed HHs and the extent of special training (skills) they are capable of.

Table 18) Educational status of household heads

No.	Education Status	Frequency	Percent	Remarks
1	**Levels of education**			
	Illiterate	-		
	Read and write	2	16.67	
	Grade 1-8	7	58.33	
	Grade 9-12	3	25	
	Higher Education	-	-	
	Total	12	100	
2	**Special Trainings**			
	Yes	1	8.33	Driving license
	No	11	91.67	
	Total	12	100	

Source: (Household Census, Green Sober: 2023)

As presented by table (18) out of the 12 HHs subjected to the survey, the majority (58.33%) have attended primary schools and 3 (25%) have attended high school. The remaining 2 (16 %) of all

the HHs can read and write. One (8.33%) of all the 12 HHs has special training (male) with driving license. This indicates that the surveyed household heads are in a relatively better position in terms of educational background. However, their level of education can no longer help them get employed in other sectors with better salaries and, hence, have no other economic opportunities other than staying on farming activities. Since farming is the main economic activity on which PAHs engaged with, due consideration needs to be done while implementing compensation and land substitution. In addition, priority should be given to PAPs whenever job opportunities are created during construction and operations phases of the project.

8.3. Waste Disposal Practice of PAHs

Waste disposal practice of PAHs was considered in the survey since the upcoming project can have a contributing factor. The ways PAHs are disposing both solid and liquid wastes from the houses have been assessed and presented in table (19).

Table 19) Waste disposal system of PAHs

No.	Waste Disposal practice	Frequency	Percent
1	**Wastewater Disposal system**		
	Septic tank based sewerage system	-	
	At back yard of the house	3	25
	In open area	4	33.33
	Discharged to river	5	41.67
	Total	12	100
2	**Solid waste disposal system**		
	Collected by municipality	-	-
	Disposed to predefined landfill	-	-
	Disposed to wild area	3	25
	Disposed to river/lake	1	8.33
	Disposed irregularly	3	25
	Burning	4	33.34
	Using for compost preparation	1	8.33
	Totals	12	100

Source: (Household Survey, Green Sober, 2023)

As shown in table (19), 5 of the 12 PAHs (41.67%) are getting the wastewater (liquid waste) discharged to the nearby river followed by 4 (33.33%) who directly dispose to open areas nearby their house. The remaining 3 (25%) are discharging the waste waters at back yards of their houses. There is not any septic tank or any other selected and/or reserved waste dumping site near their community. When we see solid waste disposal systems, as revealed by table (19) about 4 (33.34%) of PAHs are getting solid waste burned in an open area. 3 (25 %) are disposing solid wastes to wild areas and similar number of PAHs are disposing such solid wastes in an irregular way to unspecific places. A single household head responded that the household is disposing solid waste into a nearby river. One (8.33%) of all the 12 HHs responded that his household is using the waste to produce compost and using it as fertilizer.

8.4. Livelihood Features and occupations of PAHs

The proposed FSTP to be constructed will have impacts on the livelihoods of PAHs. Even if none of the houses of the PAHs are included for the proposed project, the project sites will lay on the farmlands. Hence, the proposed project will lead to property displacement against the PAHs. That is why this survey seeks to find out the amount of land and all other properties that are going to be lost for the proposed project, types of occupations they are engaged with, types of products/crops being cultivated and the level of productivity. Doing so will serve as an indicator for the compensation studies to be carried out by the town administration so that PAPs will get commensurate compensation. Livelihood sources and types of PAHs are presented in table 20.

Table 20) Source of Income and type of occupation engaged by PAHs

No	Livelihood features	Frequency	Percent	Remark
1	**Types of occupation/sources of income**			
	Farmers/crop cultivators	8	67	Multiple response questions were included
	Civil Servant	1	8.33	
	Merchant	-	-	
	Husbandry and poultry	7	58.33	
	Unemployed/not working	-	-	
2	**Monthly income**			
	<1000	-	-	
	1001-5000	3	25	
	5001-10,000	4	33.33	
	>10,001	5	41.67	
	Total	12	25	

Source: (Household census, Green Sober, 2023

Table 20 shows that farming is the main source of income for all the 12 (100%) of PAHs. All of them engaged in cultivating crops using rainfall. One (8.33%) of the 12 PAHs is working as an employee in Assela malt factory on which she is substantiating her farm-based income source. Out of the 12 household heads, 7 (58.33%) are supplementing their crop cultivation (farming) based income source through animal husbandry and poultry. In terms of income, 5 (41.67%) of PAHs responded that they are getting more than 10,000 birr per month and 4 (33.33 %) are getting a monthly income within the range of 5,000-10,000 birr. The remaining 3 (25%) are getting about 1,000-5,000 birr per month. This infers that PAHs are making a considerable amount of money (income) from the lands proposed to be taken for the project implementation.

8.5. Properties of Households to be affected by the Project

As mentioned above, the proposed FSTP will be constructed in the farmlands of 12 households. Accordingly, forms of ownership and the land holding size of the PAHs have been dealt with in table (21). This will help as an indicator for the compensation processes to be done by the town administration.

Table 21) Ownership status and land holding size of PAHs

No.	ownership status	Frequency	Percent

No.	ownership status	Frequency	Percent
1	**Forms of ownership**		
	Owner and cultivator	8	66.67
	Owner but rent the land out	4	33.33
	Owner but don't cultivate it	-	-
	Total	**12**	**100**
2	**Landholding size in hectare**		
	<0.5	5	41.67
	0.5-1	3	25
	1-1.5	3	25
	1.5-2	1	8.33
	Total	**12**	**100**

Source: (Household census, Green Sober, 2023

Table 21 above presents that all the PAHs have legal ownership of the lands to be taken for the proposed project. Accordingly, about 8 (66.67%) of the PAHs responded that they themselves are cultivating the lands and the remaining 4 (33.33%) are renting their lands out since they are not capable of undertaking cultivation by themselves. This infers that the lands required for the proposed project have a multifaceted function in ensuring the livelihoods of the PAHs. Therefore, since such lands required for the proposed FSTP are quite crucial for the livelihoods of PAHs, due care is expected to be given while conducting compensation studies.

8.6. Level of Productivity of the lands to be expropriated

The levels of productivity of the lands to be taken for the proposed FSTP have been thoroughly studied by the ESIA consultant team which, in turn, will have a role in carefully implementing compensation to be paid for PAHs. Productivity levels of the lands for the last five years have been taken as a benchmark for this survey. The level of productivity has been measured whether it has been increased, decreased or remained constant. Besides, the magnitude of productivity per hectare has been studied as shown in table (22).

Table 22) Agricultural productivity of PAHs in the last 5 years

No.	Agricultural productivity	Frequency	Percent	Remark
1	**Productivity level of the land for the**			
	Increased	5	41.67	
	Decreased	2	16.67	
	Do not change	5	41.67	
	Total	**12**	**100**	
2	**Magnitude of productivity per hectare (in quintals) in the last 5 years**			
	1-10	-	-	
	11-20	2	16.67	
	21-30	5	41.67	
	31-40	5	41.67	
	Total	**12**	**100**	

Source: (Household Survey, Green Sober, 2023)

As revealed in table (22) above, about 5 (41.67 %) of PAHs responded that agricultural productivities of the required lands for the project have been increasing during the harvesting seasons of the last five years. Similar number of household heads, on the other hand, replied that the productivity levels of the lands remained constant with no significant change in the last 5 years. Two (16.67%) of the respondents explained that, due to shortage of some agricultural inputs, including improved seeds and chemical fertilizers, the productivity levels lands is getting decreased from time to time since the last five years. This shows that though the lands required for the proposed FSTP are fertile enough, there is no change in the level of productivity throughout the harvesting seasons of the last five years.

In terms of magnitude of the products, 5 (41.67 %) of the household heads described that they have been harvesting about 20-30 quintals of agricultural products per hectare in a single harvesting season. A similar number of PAHs replied that they are producing from 30-40 quintals per hectare. Two (16.67%) of the surveyed respondents confirmed that they used to harvest about 10-20 quintals per hectare. Respondents complained that shortages of agricultural inputs such as chemical fertilizers and improved seeds have had significant contributions for the aforementioned data.

PAHs also described that production of wheat takes the lion share of the crops being mainly cultivated in the lands to be expropriated for the proposed FSTP in the town followed by the production of teff, bean, sorghum and maize respectively. And respondents of the survey explained that they are using the farm products for subsistence and selling to internal market.

8.7. Major problems of the community and associated expectations from the project

PAHs mentioned some major problems affecting the community where the proposed project is expected to be placed. The problems listed by the respondents are (1) inaccessibility of road, (2) high level of flooding during rainy season, (3) poor hygiene and sanitation system, (4) inexistence of infrastructures like electric light, (5) inexistence of proper solid and liquid waste dumping site and (6) the alarmingly increased cost of life.

PAHs expect the upcoming FSTP induced interventions will help community members in enhancing or reducing the above problems. Creations of job access (opportunities), improvement in sanitation systems, accessibility to fertilizers, accessibility to electric power and water, improvement of irrigation-based agriculture and reduction of flooding are some of the expected positive impacts of the proposed project for the community.

9. IMPACT IDENTIFICATION, ANALYSIS AND MITIGATION MEASURES

9.1. Introduction

Many projects or project components may have impacts on society and the environment in different ways. Like any other project, the project, Sustainable Town-Wide Inclusive Sanitation Management project, planned to be carried out by the budget obtained from World Bank, could leave diverse environmental and social implications. The impacts could be beneficial and/or adverse. ESIA involves the investigation of both positive and negative environmental and social impacts that may arise from a development, whereas it also aims at identifying alternatives that would result in less adverse impacts. This assessment mainly focused on fecal sludge treatment plant to be constructed in Assela town, Gora Silingo Kebele. Some of the impacts are site specific and others are temporal and reversible. The impact level of such sanitation related projects on the environment depends on the nature of receiving environment and its assimilation capatown, quality and quantity of sanitation infrastructures; the proportion of population covered; and the utilization of the sanitation facilities by the population. The sensitivity of the receiving environment is determined by specialists' keen field observation, feedback from the relevant stakeholders and environmental baseline information analyses. In this chapter, prediction and analysis of possible positive and negative impacts of construction and operation of the sanitation project is presented.

9.2. Assessment Methodology

The impact assessment was done through a standardized structured impact assessment process. After the project documents and design were well analyzed, identification of impacts, impact magnitude and receptor sensitivity were assessed first by collecting a comprehensive list of key

potential environmental impacts related to the project and their significance was determined by specialists based on knowledge and experience gained in other similar activities. Field visits to the proposed location and public and stakeholder consultations and document analysis were deployed.

Impact identification: It is important to predict possible impact of the project on the environment in line with what could potentially happen to resources and receptors because of the project and its associated activities. The sections of the environment in this report include the physical environment (landscape, geology, soil, air and water), biological environment (wildlife habitats, biodiversity), and the socio-economic environment (economic systems, cultural heritage, settlement patterns, and employment levels). Moreover, the potential impacts on resources and receptors were identified in accordance with the project stages such as pre-construction, during construction and operational phases. The identification of sources of possible impacts was conducted by using checklists. This was followed by listing possible receptors of the impacts in the environment. The Possible impact receptors in the environment were identified through surveying the existing environmental and socioeconomic condition through baseline studies and consultation with concerned parties.

Impact Description: An impact is both a description of the planned project activities and their effects on the environmental or social receptors. Impact description technically characterizes the causes and effects of impacts, and their secondary and synergistic consequences on the environment and the local community. Potential impacts of the proposed projects, their characteristics and the attributes of the receiving environment were predicted and presented for tenable mitigation measure development. Project impact characteristics include whether the impact is: adverse or beneficial; direct or indirect; short, medium, or long-term; and permanent; affecting a local, regional or global scale; including trans-boundary; and cumulative or not. Each of these characteristics are addressed for every major impact identified during analyses.

Impact Evaluation: The significance of the predicted or identified impacts has been quantified and evaluated by considering the magnitude of the effect and the sensitivity, value, and importance of the affected resource or receptor. For the quantification and evaluation of impacts checklists and interaction matrices were methods applied for this purpose.

Each major impact is evaluated using the criteria assigned by experts' professional judgment based on the impact intensity, extent, duration and sensitivity of the receiving biophysical and socio-cultural environment. The judgment of impact evaluation and significance has been determined based on the comparison of national/international laws, regulations or accepted standards; consultation with the relevant decision makers; reference to government policy objectives, concern of the local community or the general public. After evaluation of impacts, appropriate and justified mitigation measures for the negative impacts and enhancement measures for the positive impacts forwarded.

Table 23) Classification of Impact Evaluation

Classification	Description

Classification	Description
Extent	Evaluation of the area of occurrence or influence of the impact on the subprogram environment; whether the impact will occur **on site**, in a limited area (**2km radius**); locally (**5km radius**); regionally (town wide, nationally or internationally).
Duration	Evaluation of the duration or persistence of impact on the subprogram environment, whether the impact was temporary (<1 year); short term (1 – 5 years); medium term (5 – 10 years); long term (subprogram design period); or permanent (bound design period).
Sensitivity	Assessment of the impacts for sensitive receptors in terms of physical, ecological, social, and cultural setting, and major potential for stakeholder conflicts. The sensitivity classification is: **High sensitivity**: Entire community Involuntary displacement, Property damage or Loss, biodiversity disturbance and species extinction, destruction of world heritage and important cultural sites, large scale stakeholder conflict according to RPF, etc. **Medium sensitivity**: Displacement of some households according to the RPF, moderate level of stakeholder concern, medium and reversible damage to the natural environment, etc **Low sensitivity**: No displacements, no potential for stakeholder conflict, negligible impact on the natural environment, etc.
Severity (Overall Impact rating)	Using a combination of the above criteria, the overall severity of the impact was assigned a rating Severe, Substantial, Moderate, Minor and negligible. Note: These are just guidelines that will constitute professional judgment required in each individual case.

Impact severity: The impact severity was determined by professional experts through evaluating the intensity of the impact and the sensitivity of the environmental and social receptors, which is largely subjective. This is basically a semi-qualitative method designed to provide a broad ranking of the different potential impacts of a project. Impact severity assessment was done by assigning numerical descriptors to the impact intensity, as well as the environmental and social receptors, for each potential impact. The numerical descriptors are 1, 2, 3, or 4; which are equivalent to very low, low, medium or high. The impact severity is then calculated as the product of the two numerical descriptors, which is equivalent to negligible, minor, moderate or major, as indicated in Table (24).

Impact Significance: Impact significance is determined from an impact severity matrix which compares severity of the impact with probability of its occurrence. Impact significance criteria are as follows:

- **Major:** These denote that the impact is unacceptable and further mitigation measures must be implemented to reduce the significance. It is shaded in red in Table (24)
- **Moderate:** Impacts in this region are considered tolerable but efforts must be made to reduce the impact to levels that are as low as reasonably practical. Shaded in Yellow.
- **Minor:** Impacts in this region are considered acceptable. Shaded in Gray.
- **Negligible:** Impacts in this region are almost never felt. Shaded in Light green.

Table 24) Determination of impact severity

			Sensitivity of receptor			
			Very low	Low	Medium	High
			1	2	3	4
Impact intensity	Very low	1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	3	3 Minor	6 Moderate	9 Moderate	12 Major
	High	4	4 Minor	8 Moderate	12 Major	16 Major

The scale of intensity is defined on the basis of social and ecological consideration and expert's professional judgment Table (25).

Table 25) Intensity scale gradation for socio-environmental impacts

Intensity	**Criterion**
Very low	Environmental changes are within the existing limits of natural variations or carrying capatown
Low	Environmental changes exceed the existing limits of natural variations. Natural environment is completely self-recoverable or renewable.
Medium	Environmental changes exceed the existing limits of natural variations and result in damage to the separate environmental components. Natural environment is remains self-renewable.
High	Environmental changes result in significant disturbance to environmental components and ecosystems. Certain environmental components lose self-recovering ability.

Table 26) Overall Impact Rating and Description

Overall Impact Rating	**Description of Impact**	**Significance**
Major	• Non-compliance with national policy, environmental laws and regulations • Highly noticeable, irreparable effect upon the environment • Significant, widespread and permanent loss of resource • Major defilement of water/air quality and noise guidelines representing threat to human health in long and short term • Causing widespread nuisance both on and off site • Extensive property damage or loss,	>12

Overall Impact Rating	Description of Impact	Significance
Moderate	• Noticeable effects on the environment, reversible over the long term. • Localized degradation of resources restricting potential for further usage • Increased traffic in sensitive environments • Widespread physical resettlement, affecting livelihoods	6 – 12
Minor	• Noticeable effects on the environment but returning naturally to original state in the medium term. • Slight local degradation of resources but not jeopardizing further usage. • Small contribution to global air problem through unavoidable releases • Infrequent localized nuisance • Population increases not expected to stress existing infrastructure	2 – 4
Negligible	• No noticeable or limited local effect upon the environment, rapidly returning to original state by natural action. • Unlikely to affect resources to noticeable degree. • No noticeable effects on regionally endangered species • No significant contribution to global air pollution problem • Minor elevation in ambient water/air pollutant levels well below guidelines • Temporary or intermittent changes to livelihoods or life quality aspects	< 2

Cumulative Impacts: Cumulative impact is the effect on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions. Cumulative impact results from the aggregated effect of more than one project (or more than an action of the same project) occurring at the same time, or the aggregated effect of sequential projects. Cumulative effects manifest when socio-environmental conditions are already or will be affected by present, past or rationally probable future developments or activities. The ESIA identifies current and probable future impacts of the CWIS project in Assela town on the receiving environment.

9.3. Positive Environmental and Social Impacts and Their Enhancement Measures

The development and operation of the proposed project will have substantial direct or indirect positive environmental and social impacts to the local people, town and region at large. Specifically, the following positive impacts are anticipated during construction and operation phases of the project.

Improved Health Status of Households and Communities

FS is highly hazardous for human health & for the environment. As it was identified during field visit, Assela town is dumping all kinds of wastes generated town wide in an open space at the

very proximity of dwellers. The community is totally devoid of these critical infrastructures and is affected in many ways.

Thus, the provision of adequate sanitation facilities for safe disposal of human excreta can positively impacts health of users by greatly reducing the incidence of communicable enteric and infectious related diseases and reduce environmental pollution enhancing ecosystem services. So, the construction of the FSTP will reduce and/or eliminate the indiscriminate disposal of human excreta that contains a variety of harmful pathogens and wastewater in the town.

Enhancement measures

Creating awareness for the general public on how to use and manage the FSTP. Proper maintenance should be done in case necessitated. Proper fencing of the FS treatment plant, prompt removal of dried matter and effective monitoring should be there.

Using FSTP Sludge as Fertilizer

FSTP sludge cake is a nutrient-rich organic material (including nitrogen, phosphorus, and potassium) that can be used as a fertilizer if it is properly handled, treated and allowed to be matured to remove pathogens and other harmful substances. The treatment process for FSTP sludge typically involves a combination of physical, chemical, and biological processes. These processes can remove pathogens, heavy metals, and other contaminants. The treated sludge can improve soil fertility, increase crop yields, and reduce the cost and need for chemical fertilizers. Recycling of sludge for agricultural purposes and soil amendment is an appealing solution for sustainable management of sludge.

Enhancement measures

Provide the required training and create awareness for the general public and technical workers about the potential of fecal sludge as an alternative fertilizer than chemical fertilizer and on how they can safely use sludge substances should be given. Encourage local people to participate in the preparation and use of compost. Apply careful management, treatment and continuous test of it to ensure that it is free of harmful substances and pathogens.

Employment

The project can create a significant number of job opportunities for skilled and unskilled workforces either in permanent or temporary terms during the construction, demobilization, operational and even during decommissioning phases of the project. Possible job opportunities may be created for Engineers of different departments, Project Mangers, Construction workers, equipment operators, Laborers, and Technicians. This job opportunity will be available for residents, especially the PAHs, woman, and youths, in the project area.

Enhancement measure

It is recommended to provide priority for local communities with the opportunity to be hired in the project work. Wherever feasible, unskilled or semi-skilled local people should be considered for job opportunities commensurate with their level of skills and qualifications or backing them up with relevant training when necessary. In this process special considerations and priority has to be given for vulnerable groups of the society like women, the youth and the disabled.
An adequate occupational health and safety standards training program for artisans and availing safety materials in the project area has to be facilitated by the contractor to ensure conducive work environment.

Skill and Knowledge Transfer (Capacity Building)

Design construction and operation of modern FSTP and other related sanitation facilities is complex systems and new technology. Skill and knowledge transfer is essential for the successful design, construction and operation of FSTPs. This can be achieved through on-the-job and formal training and though working alongside experienced individuals. It is important for ensuring that FSTPs are constructed and operated in a safe and efficient manner. It is expected that for smoother implementation of the proposed project, some degree of capatown building trainings will be given to participating workers and implementing agents to facilitate the transfer of new technologies and new skills, mainly to the un-skilled workers.

Enhancement measures

Programs and technical training courses as well as on-the- job training that are tailored to the needs of local communities will be provided in specific skills areas for suitable candidates.

Income to material/ equipment suppliers and contractors

Some of the inputs, instruments and equipment to be used in the construction and operation of the FSTP may come from the locality or even other countries. A number of equipment and materials (such as gravel, bricks, plumber, steel reinforcement and cement for civil works) can be sourced locally and the neighboring areas. Local suppliers of construction materials and equipment in the project area will benefit financially.

Enhancement measures

Construction materials might be supplied from legal or illegal supplier, but it has to be a contractual obligation for contractors to procure construction materials from quarries/suppliers legitimately licensed/legal by the respective district authorities. Work on local sourcing of construction materials that will boost the livelihoods of residents.

Activating the Local Economy

FSTP establishment can create employment opportunities in various sectors such as construction, engineering, operations, maintenance, transportation or other small businesses (local) shops, food and beverage, local agricultural producers. During the construction phase of the project,

relatively large number of workforces will be employed. These opportunities can have positive impacts on the economy, poverty reduction, social welfare, and environmental protection.

Enhancement measures

Provide adequate awareness about the business opportunity that the project has to the local community. Encourage vulnerable groups of the local community (women, youth) to participate on pity trade activities.

Urban Infrastructure Improvement

The installation of FSTP will improve the service delivery and contribute a lot for the development and will definitely improve image of the town, play pivotal role in attracting tourists, enhance employment opportunity and helps improve the sanitation and hygiene level of the society.

Enhancement measure

To ensure sustainability of the infrastructure service, effective and efficient utilization of the developed infrastructure and maintenance for malfunctioning systems has to be done timely with the required standard. Recurrent societal training is required to improve awareness on sustainable waste management, and sustainable use and ownership of the developed infrastructure.

9.4. Identification and Analysis of Negative Impacts of the project

The implementation of FSTP in the town may have adverse impacts on the socioeconomic conditions and the environment at large. The pre-construction and construction phases of the project involve planning and design, resource mobilization, transportation of construction materials, site clearing, land labeling, compaction and construction of access roads. Potential adverse impacts associated with the above activities are presented as follow:

9.4.1. Pre-construction, Planning and Design Phase

Major activities involved in this phase are topographical surveys; site selection; geotechnical investigation; finding of natural resources for construction materials; mobilization of construction machineries; land acquisition; and resettlement issues. The planning and design processes were already completed. The main impact in this phase is related to project affected people (PAPs).

Land Loss of PAHs

FSTP site is currently occupied by 12 private individual households. The community that has an interest in the FSTP site is currently using it as cropping field for barley, wheat, teff, and beans.. The PAHs indicated that the town has to compensate them before the start of the project. During the 2nd round consultation the town administration confirmed the PAHs to give them propoer

compensation both in cash and kind prior to any civil work commencement based on ARAP findings. The team also saw that there are four local houses at the site which are being used as refreshment shelter during arming activity. The ESIA team recommended Abbreviated Resettlement Action Pan (ARAP) that has to be prepared and compensation has to be paid before the start of the project. The concerned town official and the ACWSSSE agreed that the landowners need to be adequately compensated as per the World Bank policy on involuntary resettlement and Ethiopian laws on compulsory land acquisition. During the 2nd round site visit and stakeholder consultation the town administration agreed to give proper compensation for the PAHs and the PAHs also agreed to give their land after proper compensations. On the other hand access road construction can not lead to any land acquisition, environmental and social impact. Since earthen road is already existing and the upgrading does not lead to any property loss or environmental or social impact.

Impact Significance

The implementation of FSTP is directly affecting 12 households that use the proposed FSTP site for construction. Among the PAPs some of them are vulnerable community groups such as women headed families such as Ms. Fetlework. The likelihood of the impact occurring is **high** and also permanent. The extent of the impact will be limited to the project site. The **intensity of the impact and** the **sensitivity** of the receptor are **high** given the high potential to affect the poor households. This results in **major** impact **significance**.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Proposed Mitigation measures

1. Conduct awareness creation program to PAPs regarding the potential impacts of the project, issues related compensation and displacement and about the project in general;
2. ARAP need to be conducted to identify the extent of the impact of the FSTP. This ARAP has to be conducted carefully prior to any civil work of the project commences. PAHs should directly involve in the entire ARAP study and make their own informed decisions;
3. Compensate those affected according to the laid down policies in collaboration with Assela Municipality, taking Ethiopian laws, Proclamation No. 1161-2019 as well as World Bank safeguard policy on involuntary resettlement (OP 4.12). Tenable and commensurate compensation must be paid both in cash and kind for the properties to be lost, damaged and transferred;
4. Vulnerable community groups like female headed HHs, and elderly must get priority during compensation study, land delivery and post livelihood rehabilitation works;

5. The town administration shall negotiate with each PAP independently, not with their representative, as is being done currently, because negotiations are private and unique. Representation may create communication gap and interests and demands of PAPs;
6. The resettlement site must have access for social amenities at least commensurate to their original lost property;
7. Implement an institutional structure or a mechanism for monitoring and evaluating the compensation/resettlement process including the Grievance Redress Mechanism.

The planned and careful adoption of the aforesaid mitigation measures can reduce impact intensity to "**low"** resulting in residual impact of **"minor significance**".

Ambient Air Quality reduction

During mobilization, vehicular movements along the access roads to the construction sites could cause dust emission from unpaved roads. Emissions from vehicles that transport machinery, equipment, construction materials, and workers to the site occur. This cloud be significant if the mobilization work is going to be done during dry weather conditions along settlement areas.

Significance of the impact

Material transportation, loading and unloading will release dust and emissions. The likelihood of the impact is high, and duration of the impact will generally be temporary during pre-construction phase. The intensity of the impact and the sensitivity of the receptor are medium given the high potential to the people near the way to the project site. This results in Moderate significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

- Θ Spray water on dusty and unpaved access roads and dusty working areas to suppress dust emission,
- Θ Limit the speed of vehicles to 30 km/hr. when they are driven through residential areas and on unpaved roads.

Noise Pollution

During mobilization construction machinery may produce high noise levels that could affect the health of people residing along the way to the project sites. The noise level set by Ethiopia for the residential area is 45dB and 55 dB during night and daytime respectively.

Significance of the impact

During material transportation, loading and unloading machineries will release noises that may affect the people near and along the way to the project site. The likelihood of the impact is high although the duration of the impact is temporary. The intensity of the impact and the sensitivity of the receptor are medium. This results in Moderate impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

- Θ Do not mobilize noisy machinery during the rest time, particularly during the nighttime.
- Θ Do not allow noise level above 45dB at night and 55dB during the daytime at residential areas

Traffic Congestion

During mobilization, vehicles and machinery movements are likely to increase traffic congestion along the way project site and in the town. This will affect the movement of people, especially students during to and from schools, market days and others.

Significance of the impact

The likelihood of the impact occurring is high although the duration of the impact is temporary. The intensity of the impact and the sensitivity of the receptor are low given that the population density around the project area is moderate. This results in minor impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation measures

- Θ Use alternative routes or roads which are not crowded,
- Θ Choose hours of less traffic volume on roads for mobilizing materials and construction machinery.
- Θ Implement appropriate traffic management plan.

9.4.2. Construction Phase

Loss of Vegetation Cover

Although there are few natural vegetation and plantations, they will be cut at the proposed FSTP site. Land clearing and removal of the existing vegetation can be a cause for the removal of trees, grasses and change in land use pattern in the project area.

Impact Significance

The intensity of the impact will be **medium** since there are few plants in the area and the **sensitivity** of the receptor is also estimated **medium**. This results in **moderate** impact **significance**.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Plant more than 10 times trees lost during site clearance both at the FSTP site and anywhere in the town;
2. Spare the vegetation that must not necessarily be removed such as trees;
3. Minimize the amount of destruction caused by machinery by promoting non mechanized methods of vegetation removal;
4. Prior to undertaking vegetative clearance from environmentally sensitive areas the contractor shall seek approval from the relevant authorities and comply to the conditions provided;
5. All areas planned for clearing of vegetation must be demarcated prior to the commencement of the construction;

A planned and careful adoption of the aforesaid mitigation measures can reduce both sensitivity of receptor and impact intensity to "**medium"** resulting in residual impact of **"minor impact significance**".

Soil Degradation, Erosion and Loss of Top Soil

Topsoil stripping during leveling and trenching will break up the soil structure. Construction equipment engaged in the activities might cause light contamination of soil due to leakage of fuels and lubricants from equipment. Prolonged storage of topsoil can lead to a loss in soil nutrients (leaching effect) viability of seed bank in the soil.

Impact Significance

These are short term and direct impacts of the project on soil. Medium impact intensity is expected since the construction of FSTP will be done by registered qualified contractors that apply soil conservation measures. The duration of exposure of stockpiles shall be relatively

short. Both **intensity** of the impact and **sensitivity** of the receptor are rated as moderate impact significance and these results in moderate impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. The valuable topsoil containing organic material, nutrients as well as seeds and the soil fauna should be piled in a manner for re-use where applicable. Use the subsoil for backfilling of trenches;
2. Contour temporary and permanent access roads / lay down areas so as to minimize surface water runoff and erosion;
3. Avoid using of more than 10 years old and properly unmaintained machineries which can most likely lead to oil, grease and fuel leakages;
4. Develop a stable landform that mirrors the predisturbed condition, for instance contours, shape, level of compaction etc.;
5. All waste generated during site preparation and construction will be transported and disposed to an authorized disposal area only. The contractor will seek guidance from project implementer on the final waste transportation and disposal site;
6. Excess soil must be removed from the site in hourly or daily bases as applicable and deposited at an approved site;
7. Protect adjacent area to the construction site from disturbance and wherever possible construction work will take place during the dry season;
8. Sheet and rill erosion of soil shall be prevented where necessary through the use of sand bags, diversion beams, culverts, or other physical means; and

The adoption of the mitigation measures can reduce impact intensity to "**very low**" resulting in residual impact of "**minor** impact significance".

Dust Emission, Air quality and Noise pollution

Dust emission: Project site clearing, earth works, and vehicle movement over unpaved areas will generate fugitive dust. Actually, elevated levels of dust emissions resulted in temporary air pollution. So, the air quality in the construction sites along transportation routes of project pollution of gases expected from the engines. The emissions of dust from construction activities will be localized & the dust is likely to settle in close proximity to the project. Sustained high level of dust could impact negatively on various groups of the people who spend considerable time within the area adjacent to the project sites, such as construction workers and roadside businesses.

Air quality: In regions being excavated for trenches, pits, or ponds, along transportation routes and at the building site dust and engine pollution gases may accumulate. During dry times, this is probably going to happen. Emissions of CO_2, CO, SO_2, NO_X and PM_5 and $PM_{2.5}$ and other pollutants are produced by the continuous operation of trucks and equipment. Moreover, some welding fumes such as metal oxides (Fe_2O_3, SiO_2, K_2O, CaO) and CO, NO_x can be produced during construction phase, but this work happens in a short time and impact is localized and temporary.

Noise pollution: The use of heavy equipment including bulldozers, graders and dump trucks during site preparation and transportation of materials will generate noise and vibrations. The levels of noise generated will depend on the types and conditions of equipment employed by the contractor. With noise being perceived as one of the most undesirable consequences of construction activity, it might become a nuisance to the settlements and animals within its environs. Generally, construction phase noise level exceeding 70 decibels (dB) has significant impacts on surrounding sensitive receptors within 50m of the construction site.

Impact Significance

The FSTP sites before the construction have ambient noise level with good air quality. The construction phase of the project might disturb these ambient conditions. The air quality impacts associated with dust generation, noise pollution to the receptor sensitivity is considered to be "medium". The **intensity** of impact is assessed as **medium** resulting in **moderate** impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Construction workers will be made aware of the permissible noise levels at the workplace and surrounding environment;
2. According to Ethiopia Ambient Environment Standard Guideline (2003); noise levels at construction sites or industrial areas should not exceed 75 dBA and 70 dBA during the day and night, respectively;
3. Contractor has to ensure that all construction equipment is properly maintained and fully functional;
4. During periods of off work time, equipment will be switched off whenever possible. A limited number of construction activities may have to continue on a 24-hour basis;
5. Movement of haulage vehicles be limited to day time since the noise impact will be less felt;
6. During dry season the dust emission will become higher than expected, so it is recommended to spray the location with water to reduce the impact;

7. Workers should be provided with the necessary personal protective equipment (PPE) such as earmuffs and masks.

Adoption of these mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of **low** significance.

Changes on Natural Drainage line

The proposed FSTP site is located on a gently sloped area that drains into a local stream. At one side of the site a wet season drainage line expanding its span though time. This drainage line has a probable chance to affect the plant unless it is directed to the natural waterway to the opposite side of it. The diversion of this line may result in changes in drainage system and landscape view of the area. In addition, since the construction of the FSTP may collect small naturally draining lines to one trunk line, there is a need to carefully design this trunk line not to affect the local stream. Moreover, the built areas will increase run-off while reducing percolation of water into the ground and thereby also changing the sub-surface hydrology.

Impact Significance

The construction phase of the project might disturb natural drainage lines and conditions. The impact associated with alteration of natural drainage line to the receptor sensitivity is considered to be "**medium**". I**ntensity** of impact is assessed **low** resulting in **moderate** impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Plan and work on integrated water shade management to protect gully formation and water diversion works;
2. Storm water drainage planning, design and management activities should ensure the participation of the people and other stakeholders at all levels;
3. Proper drainage channels shall be constructed within the construction site to allow for convenient and free flow of storm water;

Traffic Congestion

Traffic congestion is anticipated from the construction phase of the project. Construction heavy-duty trucks traffic can obstruct or damage roads and increase the likelihood of accidents. Project activities could have adverse impacts on the movement of vehicles and pedestrians by blocking road access and delaying travel times. Since there is no high movement of vehicular traffic in the

locality, traffic congestion to the receptor sensitivity is considered "low". The **intensity** of impact is also assessed to be **low** resulting in **minor** impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. The Contractor should provide temporary road signs or notices to indicate ongoing works;
2. Ensure that vehicles for the construction work are operated only by qualified drivers;
3. All vehicles need to use only designated areas for parking, loading and unloading; and

Risk of Accidents

Accidental risks associated with the project could happen due to trenches created for the construction. People in the area including children, domestic and wind animals could be affected by this. Most of the access roads to the proposed site traverse some communities with a significant number of people. Traffic accidents would have significant social impact and likely to affect children, women, disabled, elderly people and livestock.

Impact Significance

The receptor sensitivity is **Low** given that the number of people and animals along the roads and near the project area are lower while the intensity is **Medium** given the temporary nature of the construction activities. However, some of the impacts like loss of life or severe physical damage may be irreversible. The impact significance is thus assessed to be **Moderate**.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. The contractor shall develop TMP (Traffic Management Plan) and incorporate proposed arrangements for traffic diversions with details of all necessary budget and signals;

2. No drivers or personnel under the influence of alcohol or any drug abuse shall be allowed onsite;
3. Travel speeds of construction vehicles along the road should be controlled by setting travel speeds and informing through signals; and
4. Fencing or placing obstacles to trenches and ditches to avoid interference and accidents of wild and domestic animals and children.

Water Pollution

The FSTP is located near a seasonal river called Welkessa. Unless potential contaminants of the construction phase are properly managed, water pollution could happen. Hence, mismanagement of construction wastes might affect this river. Potential contaminants associated with the construction activities include sediments; fuels and lubricating oils; domestic wastes; welding wastes; wastes from paints and solvents; and corrosion inhibitors.

Impact Significance

The likelihood of the impact occurring is **high.** The **intensity** of the impact is assessed to be **medium** where intensive sedimentation/flooding during the rainy season around the project area. The **sensitivity** of the receptor is also **medium** given the close proximity of the river. This results in **Moderate** impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. All construction equipment will be kept in good operating condition to avoid oil, grease or fuel leakages that might contaminate the water bodies;
2. Stockpile areas for materials such as sand, gravel, stone, and topsoil as well as overburden dumps will be located away from water courses;
3. Fuel handling and oil spill measures must be implemented to prevent, control and address spills or leaks. Use trained personnel for fuel and oil handling; and
4. Construction has to be done mainly on the dry season to avoid sediment transport to the river;

Solid Wastes

Different types of solid waste will be generated during construction phase. These solid wastes come from vegetation clearance, excavation of rock and soil works. Moreover, other activities that will generate related solid wastes include packaging waste, stones, wood, broken glasses, containers, wire cuttings, metal scrap, wooden planks, sharp objects (nails) etc. If solid waste is not properly managed, it will lead to health and safety issues related to accidents.

Impact Significance

The likelihood of the impact occurring is **high**. The extent of the impact will be local since the pollution remains in the local environment. The **intensity** of the impact is assessed to be **medium** that waste will be generated during construction activities and packaged materials. The **sensitivity** of the receptor is also rated **medium**. This results in **Moderate** impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Prepare solid waste management plan prior to commencement of work including appropriate waste storage areas, collection and disposal schedule;
2. Soils from excavation works shall be reused for backfilling and landscaping;
3. Solid waste collection bins shall be placed at strategic locations within the site as collection centers to facilitate separation and sorting of the various types of wastes;

Hazardous Wastes

Some of the waste generated at the construction phase is categorized as hazardous waste. The waste materials such as paints, cement, adhesives, spills clean-up and contaminated materials and cleaning solvents will also be considered and managed as hazardous waste substances. Plastic containers are not biodegradable and can have long-term and cumulative effects on the environment. Hazardous waste mishandling and uncontrolled disposal would have major health impacts for onsite workers, inhabitants in the project area of influence, and people who get in contact with waste during transportation and disposal. The liquid form in particular, would cause soil contamination through direct contact or leaching and affect ground water quality through extended leaching. Thus, the proposed project would require an adequate waste management strategy, occupational health and safety strategy, and hazardous material safety plan.

Impact Significance

The probability of impact occurrence is medium. The **sensitivity** of receptors is assessed as "low "given that the workers will be awarded how to handle hazardous waste. The impact intensity is assigned **low** resulting in minor impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impact	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)

	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Hazardous wastes require segregating hazardous waste from the non-hazardous waste and keep it in designated storage facilities at project site;
2. Hazardous wastes such as paints, accessories and adhesives should be properly sealed, labeled, secured, kept inside a locked area to prevent access by unauthorized personnel, and covered to prevent water accumulation before transportation;
3. A hazardous waste label that has a "Hazardous Waste" mark on it must be placed on the container while still at the generation point;
4. Waste collection is made at least once in 24 hours and done in such a way to minimize nuisance of smell and dust during collection.

Occupational Health and Safety (OHS) risks

Construction sites are considered the most potentially hazardous and accident-prone parts of any working environment. Grinding, cutting, masonry, and construction workers will be exposed to risks of accidents and injuries. In construction phase some causes of risks to OH (occupational health) are related to lack of safety signals at specific and required areas; improper storage/ handling and use of dangerous substances/chemicals; inadequate lighting and ventilation in workplaces; lifting of heavy and sharp objects; and misuse of equipment and materials for functions they are not designed.

Impact Significance

Due to the high probability of occurrence and the high risk involved, accidents could cause considerable damage, financial loss and harm to human life. The receptor sensitivity is considered **high** given that such impacts may be irreversible once they occur. The impact intensity is considered to be **medium** resulting in Major **impact significance**.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. The contractor shall prepare site specific health and safety management plan and recruit qualified health and occupational safety officer to oversee OHS matters on daily basis;
2. All construction workers will be oriented on safe work practices and guidelines and ensure that they adhere to them;

3. Appropriate signal will be used to warn staff and/ or visitors that are not involved in construction activities in dangerous places;
4. Contractor will provide first aid kits and ensure availability of trained first aiders within the construction site;
5. Contractor shall ensure that the project site is fenced from external human, pet and wild animal interferences and accidents;
6. Contractor will ensure that its Code of Conduct is followed to regulate the performance and behavior of all workers;
7. Adequate OHS personnel protective gear such as nose, ear mask and clothing will be provided to the employees and good camp management shall be provided.

Adoption of these mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of **negligible** significance.

Spread of Communicable Diseases (HIV/AIDs, STIs/STDs)

Job seekers and other service providers such as food vendors would come from different places, and this might induce illicit contact and sexual relationships. The project will employ more young workers at lower skill levels. These categories of workers are prone to engage in high risks unsafe sexual activity and soliciting schoolgirls, widows and others for sexual intercourse. This can cause unwanted pregnancy, break families and heighten risk of contracting STDs and HIV/AIDs. If this impact occurred, extent of disease spread would be local, national or international depending on origin and next destination of infected persons.

Impact Significance

Duration of the impact is short-term or long-term based on the contracted person. In most of the cases when elderly and immune-compromised, people who have chronic illness like hypertension, diabetics, TB, cancer, HIV/AIDS etc., it is mostly deadly. The likelihood of the impact occurring is medium if contractors do not adequately sensitize workers about responsible and safe behavior. The **intensity** of the impact is **low** given that the prevalence of HIV/AIDS is lower. **Sensitivity** of the receptor is rated **high** given that HIV/AIDS, if contracted, has a long-term effect. Therefore, impact significance is **moderate**.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. As a contractual obligation, contractors shall prepare HIV/AIDS management plan (staff, action plan and sensitization budget) to implement during project construction;
2. The contractor shall prepare and enforce a Code of Ethical Conduct (CEC). The code of ethical conduct of workers has to be translated into the local language. The workers should quarterly be sensitized on the code of conduct.
3. All construction workers shall be orientated and sensitized about responsible sexual behavior in project communities.

Physical Cultural Resources (PCRs)

PCRs can be movable or immovable objects, sites, structures or groups of structures having archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. From the field visits on the site survey and the stakeholder engagements held in the project sites the consultant team has not confirmed the presence of PCRs at the FSTP site. The probability of occurrence of PCRs is low. The **intensity** of the impact is low given that the project has no PCRs in the site. **Sensitivity** of the receptor is rated **high** because the implementation of the project brings long-term if chance finds are occurred, thus has Moderate impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Awareness has to be given for workers on the chance Finds Procedures.
2. Chance Finds Procedure (CFP) has to be followed when an event of buried PCRs being unexpectedly encountered or “chance find” during construction phase of the project and duly reported to respected bodies.

Rise of Deviance and Conflicts due to influx of labor

Many societies have social norms and expectations that guide behavior and promote social cohesion. Adhering to these social norms can help maintain a harmonious and functional society, while violating them can lead to social disorder and conflict. Usually, it is common among construction workers to use money and gifts to flirt with young girls living in and around project sites. Besides, if priority is not given to unemployed people, especially for youths during hiring manual labor, members of local community could develop resentment toward construction workers and the project. Due to an influx of labor may violet some social norms of the society and may result in incidences of deviance, conflict and Gender-Based Violence on the job site or in the neighborhood. Hence, the contractors need to create awareness about appropriate social behaviors expected from their workers in interacting with local community.

Impact Significance

The probability of impact occurrence is medium. The **sensitivity** of receptors is assessed as **'**medium 'given that the project site is located with low number of people. The impact intensity is rated **very low** resulting in minor impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Unskilled and skilled (if available) labor should be hired from the local population as far as possible to minimize influx of foreigners into the community;
2. Effective communication and collaboration are key to addressing the challenges and opportunities presented by an influx of labor;
3. Local governments, businesses, and community organizations to work together to develop strategies for ensuring that workers are paid fair wages;
4. Awareness has to be given to the newcomers about the importance of respecting the norms of the local community living in the project area.

Impact on Landscape and Aesthetic Value

During Construction phase landscape view and aesthetic value will be impacted due to clearing of trees and excavation works. As the location of the FSTP (Flooded Sewage Treatment Plant) is at slopy gradient, it makes susceptible potential risk of flood impact. The impact will be permanent and site specific in extent.

Significance of the impact

The probability of impact occurrence is high. The **sensitivity** of receptors is assessed as **'**medium 'given that there are no plantations that are expected to be cut except few trees and eucalyptus trees around one of the farmlands. In addition, the area is flat and cuts on the earth will not become risky to alter the landform. However, material quarry sites will be impacted unless reinstated. The impact intensity is rated **medium** resulting in Moderate impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
I n	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)

	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

- Planting indigenous plant seedlings to replace each cut tree during construction time.
- Reinstate borrow and quarry sites used for construction purposes and plant indigenous trees.
- The FSTP can be designed with an elevated platform or raised foundation to minimize the risk of flood damage. This ensures that the critical components of the plant are positioned above the flood level.
- Implementing flood control measures such as embankments, levees, or flood walls can help prevent floodwater from reaching the FSTP site or diverting it away from the facility.
- Effective drainage systems should be in place to manage excess water during heavy rainfall or flooding events. This includes proper stormwater management and the installation of drainage channels or culverts.

Impact on Vulnerable Groups

During the construction phase, potential negative effects and more risks are anticipated on vulnerable groups including female household heads, old aged, and physical and/or mentally disabled people during land substitution, compensations and direct project physical impacts.

Significance of the impact

The probability of impact occurrence is medium since there are no vulnerable members observed during field study except widowed women. The **sensitivity** of receptors is assessed as **'**medium 'given that the receptors will be few. The impact intensity is rated **low** resulting in Moderate impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

- Ensure vulnerable groups properly treated during land acquisition and compensation;
- Ensure that women and vulnerable groups equally get job opportunities during the project construction processes and the benefits of the Project implementation;
- Aware local governments and community members to solicit their assistance for the project affected vulnerable groups;

Gender and Gender Based Violence

Due to lack of awareness and understanding on gender and GVB by Contractor and also the construction workers, female construction workers could face difficulties in their work places, such as, GVB and sexual harassment. Hence, there is a potential that GBV might occur during the construction of the proposed FSTP construction through unequal distribution of work, sexual harassment, discrimination against women, and unequal pay for women, among others.

Impact Significance

The probability of impact occurrence is medium since contractors will have awareness and experience on how to treat gender issues in the work place. The **sensitivity** of receptors is assessed as 'medium 'given that the receptors or girls and women can act to protect their rights. The impact intensity is rated **medium** resulting in Moderate impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

- Provide and avail a separate sanitation facility for women at construction camp,
- Provide women friendly safety equipment and materials,
- Assign women in works that do not affect their biological condition,
- Ensure that women construction workers do not face GBV and sexual harassment,
- 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,
- Ensure equal pay for women and men for equal job,

9.4.3. Operation Phase

Emissions and Dust

During the operation phase there are no permanent emission sources except the stand-by diesel generators and vacuum trucks during hauling of the fecal sludge. Dust can be a problem, especially during dry weather conditions. Given the scale and duration of operation of standby generators and emissions from vacuum trucks, comparatively small volumes of emission will be generated as a result. The impacts of these emissions to cumulative air quality are considered to be of minor significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)

	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Dust and air emissions are inherent and cannot be completely eliminated. Few mitigation measures that can be applied at locality will be enough to overcome or significantly reduce the problem.

Mitigation Measures

- Enforcing regulation of speed limit to a suitable speed (20 km/h) for all vehicles entering the village's boundaries;
- Watering dusty roads during operation;
- Using vehicles not older than 10 years and giving proper service to the trucks on regular basis to improve their fuel performance and reduce emission; and
- Turn on generators only during power cut-offs only, implementing preventive maintenance programs for vehicles and equipment.

Air Pollution/Odor

Different types of odors such as ammonia or organic might be produced especially from the handling of the liquid waste when it is unloaded from the waste trucks at the sorting area or when leachates are generated and accumulated in storage pond. The main constituent of these odors is hydrogen sulfide (H_2S) due to its relatively high concentration in wastewater. This can be carried by wind to nearby settlements, thus unpleasant breathing environments. In general, the impact of odor nuisance, though localized, can be immense magnitude, will be permanent and irreversible. Odor can be a significant problem for the people working in the waste treatment plant area and people living in the surroundings of the site. Due to the location of waste treatment site and wind direction the probability of the odor reaching the Assela town is less but there are rural settlements near and around the selected waste treatment sites that the pungent odor may reach to them.

Impact Significance

The above impacts will affect the communities neighboring the FSTP project, workers and road users. Given that the location of the project site general wind direction the likelihood of the impact is **low** and the extent is local. The intensity of impact is assessed as **low** given that intensive greenery can serve as wind break and sensitivity of the receptor becomes **medium**. The impact significance is therefore **moderate**.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Plant indigenous trees at the perimeter of the project area with varying heights thereby forming wind breaks in addition to masonry or brick fences;
2. Project office must ensure proper operation to render unfriendly emissions during discharge of treated leachates due to overloading of the systems or negligence of the operators;
3. Odors generated by the facility can be controlled by use of suppressants and daily cleaning of the receiving areas;
4. Use of Ferric chloride (FeCl3) which will be added to control the generation of hydrogen sulfide (H2S) the main source of odor in the sludge digestion process;
5. Good maintenance of wastewater stabilization ponds, removal of accumulated debris and other solids at the inlets and outlets, removal of floating scum and floating macrophytes from the pond surface; and
6. The volumetric BOD loading should lie between 100-400 g/m^3 in order to maintain anaerobic conditions and at the same time control odor release.

Pollution to Water Sources, Channels and Swampy Lands

Improper treatment and disposal of fecal sludge can lead to the contamination of water sources including groundwater, surface water and swampy areas. This can lead to the spread of waterborne diseases such as cholera and typhoid fever. It can also adversely affect aquatic biodiversity. There could be soil and groundwater pollution if sludge treatment facility does not work as intended. If appropriate design and construction methods and improper effluent management are not strictly followed, there is a possibility of ground or surface water pollution from leachate. This can happen as a result of overloading of the system, breakdowns in operating machines, and vehicles and equipment failures that lead into deterioration of treatment efficiency.

Impact significance

The likelihood of the impact occurring is medium and its duration will generally be long term if the water body is once polluted. The intensity of the impact is assessed as **medium** given that the design and construction activity will be carefully done by the responsible bodies and the contractor. It is also believed that continuous monitoring mechanisms will be devised and in place to protect both ground and surface water from contamination. The extent of the impact is regional since the pollutants of surface and ground water may cover large areas through ground water flow. The sensitivity of the receptor is **medium** given that once it is contaminated treatment measures would take some time; resulting in **moderate** impacts.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. The national standard working procedures of building code has to be followed to avoid errors of construction that may finally lead to leakage and contamination of the ground and Welkesa river;
2. Institute quarterly periodic testing of the Welkesa river the downstream of the project site; and taking appropriate measures when signals of contamination is detected;
3. Monitoring the normal operating functions of the system and environmentally sensitive receptors like ground and surface waters found nearby and others;
4. Strict monitoring on chemical and biological loads entering the FSTP and swift adjustment of treatment process to cater for overloads in effluent quality;
5. Work and ensure that the FSTP facilities effluent complies with the national effluent discharge limit standards;
6. Protect the natural receptors technically through impermeable lower layer that prevents the leakage and infiltration of leachate from the facility;
7. Ensure proper preventive and routine maintenance inspections of FSTP which will be vital to avoid breakdowns; and
8. Regularly monitor the quality of effluent discharged from the FSTP against with discharge limits.

Occupational Health and Safety Risks

FSTP can pose several occupational health risks to workers involved in the collection, transportation, and treatment of fecal sludge. Workers who would contact fecal sludge directly or indirectly may be at risk of exposure to these pathogens. Moreover, fecal sludge treatment can generate dust and fumes which can cause respiratory problems and other health issues for workers who inhale them during the operational phases. Fecal sludge treatment facilities can be wet, slippery, and uneven which can increase the risk of slips, trips, and falls. Workers at the facilities might experience work related adverse health impacts, particularly during the operational and maintenance phases of the project. This is particularly observed if they do not have access to proper personal protective equipment or if they do not follow appropriate hygiene practices. So, it is important to identify and mitigate occupational health risks associated with fecal sludge treatment to protect the health and safety of workers.

Impact Significance

Accidents could cause considerable damage, financial loss and harm to human life. While largely reversible, some impacts such as loss of human life and bodily injury are irreversible. The receptor **sensitivity** is considered **medium** given that although such impacts may be irreversible once they occur; workers will get adequate trainings, provided with safety protective equipment. The impact **intensity** is considered to be **medium** since the project office will hire qualified experts who are aware of OHS measures; this gives rise to an impact of **moderate** significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Very low (1)		Negligible (1)	Minor (2)	Minor (3)	Minor (4)

	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Hire qualified and trained OHS and environmental health crew for regular monitoring and management FSTP;
2. To reduce the occupational risks, FSTP Workers has to use appropriate PPE, proper protection gears such as cut resistant and high visibility protective clothing, gloves, safety boots (foot wares) and providing appropriate respiratory protection equipment and face masks;
3. Develop and work on EHS Plan including health and safety measures to avoid accidents and injuries during work at the FSTP and implementing appropriate safety procedures;
4. Routine maintenance including the removal of garbage, screenings and grit; slashing around the embankments; and repair of the fence shall be done timely;
5. Providing appropriate training and equipment, and implementing appropriate ergonomic practices are important to minimize ergonomic hazards;
6. Provide accessible easy to reach first aid in & immediate medical care in case of injuries & accidents;
7. Vaccinate all labor working force at the site properly & provide regular health examinations access;
8. The FSTP should be fenced and signals put in place with security personnel to stop unauthorized people from accessing the site;
9. Exercise regular fumigation of the FSTP stores, administration rooms and similar places to minimize / kill disease vectors such as vermin, rodents and mosquitoes;
10. Maintain important information of emergency resources in easily available place; and
11. Strict follow operation in accordance with manufacturer's instructions and Material Safety Data Sheets (MSDS) procedures to store all chemicals utilized in FSTP.

Overflowing of Sludge into the Surrounding area

FSTP can pose accidental risks to the surrounding community if not properly designed, constructed, and operated. Poor management and working procedures could lead to sludge treatment overflowing with untreated sludge that could end up in highways, water sources and can contaminate nearby environment, and can potentially expose the surrounding flora, fauna and the community to harmful pathogens and pollutants. This can pose significant public health and environmental risks if not properly managed.

Impact Significance

The likelihood of the impact arising from improper management of overflowing of fecal sludge facilities is **medium** given that proper operational procedures are strictly followed, and good maintenance of infrastructures are carefully done by the responsible bodies. The **sensitivity** of

the receptor is **medium** given that once contaminated treatment measures would take some resource and time, resulting in **Moderate** impact significance.

		Sensitivity of receptor			
		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Utilize emergency pumping and transportation to remove the excess sludge and transport it to a suitable treatment or disposal facility;
2. Use of additional pumping equipment and trucks, and work in collaboration and coordinated manner with local authorities and emergency services;
3. If emergency pumping and transportation is not feasible, consider temporary storage tanks /lagoons for accumulation of excess sludge is necessary;
4. To prevent overflowing of fecal sludge, it may be necessary to reduce the inflow of sludge into the treatment plant or storage facility; and
5. If overflowing of fecal sludge is a recurring problem, it may be necessary to upgrade the treatment plant or storage facility to increase its capacity. This can involve expanding existing facilities, constructing new facilities, or implementing alternative treatment technologies that are more efficient or have higher capacity.

9.4.4. Decommissioning Phase Negative Impacts

Pollution of Soil and Water bodies

Decommissioning the FSTP can result in release of contaminants or pollutants into the surrounding environment, particularly if it has not been properly maintained or cleaned. This can result in soil and water contamination, as well as potential health risks to wildlife and humans. Spillage of contaminated water, sludge, chemicals, grease, or oil is the main cause of soil contamination.

Impact Significance

The effect of the impact will be long-term, and the extent of the impact will be on site. Since standardized working procedure followed, the intensity of the impact given for kind of the proposed facilities is **low** but the sensitivity of the receptor is rated **High** given that the impact to the natural environment is long term. Therefore, the significance of the impact is rated as **moderate**.

	Sensitivity of receptor			
	Very low(1)	Low (2)	Medium (3)	High (4)

Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Conduct review of plant records, site inspections, and environmental sampling to identify potential contaminants or pollutants that may need to be addressed;
2. Develop a decommissioning plan that outlines the steps and working procedures for decommissioning of the plant;
3. Engage local stakeholders including nearby residents, businesses, and community organizations in the decommissioning process to ensure their concerns are addressed;
4. Conducting environmental quality assessment of the water body and the treated wastewater prior to the commencement of the decommissioning;
5. The topsoil and subsoil removed for decommissioning will be stored properly and used for backfilling and reinstatement.
6. Back-filling materials will be compacted to a level similar to the original surrounding soils to avoid subsidence as a consequence of rainwater channeling;
7. Restore the project site into its original or to a condition that is acceptable to local stakeholders and regulatory authorities;
8. Monitor the decommissioned site to ensure that there are no potential environmental or health risks associated with the decommissioned plant; and
9. Monitor through regular sampling of soil, water, and air to identify any potential contaminants or pollutants, and can be used to ensure that the site is safe for future use.

Occupational Health and Safety and Air Pollution

Decommissioning a FSTP can pose several occupational risks to workers involved in the decommissioning process. Workers involved in decommissioning may be exposed to hazardous materials through inhalation, ingestion, or contact with the skin or eyes that can pose a risk to their health. Workers may also be exposed to biological hazards, such as harmful pathogens or infectious diseases, which can be present in fecal sludge. Moreover, workers might be exposed to physical hazards including accidents, falls, and crushing injuries when they are working in confined spaces, with heavy equipment, or at heights.

Impact Significance

Accidents could cause considerable damage, financial loss and harm to human life. The receptor **sensitivity** is considered **medium** given that although such impacts may be irreversible once they occur, the workers will get adequate training, provided with safety protective equipment. The impact **intensity** is considered to be **medium** since project office will hire qualified experts who are aware of OHS measures; this gives rise to an impact of **Moderate** significance.

	Sensitivity of receptor

		Very low(1)	Low (2)	Medium (3)	High (4)
Intensity of impacts	Very low (1)	Negligible (1)	Minor (2)	Minor (3)	Minor (4)
	Low (2)	Minor (2)	Minor (4)	Moderate (6)	Moderate (8)
	Medium (3)	Minor (3)	Moderate (6)	Moderate (9)	Major (12)
	High (4)	Minor (4)	Moderate (6)	Major (12)	Major (16)

Mitigation Measures

1. Recruit a qualified health & occupational safety officer who will oversee OHS matters on site;
2. Proper induction of the workers prior to decommissioning commencement. Providing training and education to workers on the proper use of equipment, PPE, and hygiene practices;
3. Implement ergonomic interventions, such as job rotation or use of assistive devices to reduce ergonomic hazards;
4. Provide appropriate, adequate PPE, such as gloves, masks, and protective clothing, OHS personnel protective gear to the employees; and
5. Implementing engineering controls, such as ventilation systems and barriers to reduce exposure to hazardous materials and physical hazards.

Socio-economic Impact

Decommissioning the fecal sludge treatment will halt the essential services the community was getting from these infrastructures. This may also have economic impacts on the surrounding community, particularly if the plant has been a source of employment or revenue. Decommissioning can result in job losses and reduced economic activity, which can have ripple effects on the local economy. Some unskilled workers will get temporary employment during the dismantling of the plants but the skilled workers that were hired to manage day-to-day operation of the FSTP are expected to lose their job during this phase.

Mitigation Measures

1. Based on their skill, knowledge, experience and interest, vulnerable community groups must be transferred to another secured job opportunity;
2. Provide financial assistance to affected workers. This can involve providing loans, grants, or other forms of financial support to help workers transition to new opportunities;
3. Providing adequate provident fund or pension for those who want to retire;
4. Providing retraining programs in new industries or skills opportunities for workers who have been impacted by the process.
5. Supporting workers to start their own businesses; and repurposing the site for other uses, such as a park or community center, can help to mitigate the economic impact of decommissioning.

10.ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

An Environmental and Social Management Plan (ESMP) is a planning document that outlines the measures and actions that will be taken to mitigate potential environmental and social impacts associated with a project or activity. The ESMP summarizes the identified potential impacts, mitigation measures, expected outcomes, indicators, monitoring and evaluation. The ESMP report identifies parties responsible for management and monitoring actions, associated costs, indicators and reporting.

The ESMP is a critical component of ESIA because it takes the project-specific environmental and social safeguards as integral part of the project execution. The purpose of an ESMP is to ensure that potential environmental and social risks and impacts associated with a project or activity are identified, assessed, and effectively managed. The ESMP establishes a comprehensive framework that outlines the measures and actions that will be taken to minimize or eliminate negative impacts on the environment and local communities, while promoting positive environmental, social and economic outcomes.

Table 27) Summary of Environmental and Social Management Plan

Adverse Impact	**Mitigation measures**	Responsibility for		Time frame	Budget (birr)
		Execution	Regulation		
Phase: construction					
Involuntary displacement, Land Acquisition & Property damage	For FSTP: Conducting ARAP prior to the start of the project.	AWSSSE	Asela town EPO	Once-off	40,000
	The ARAP team start work on field can be taken as Cut-off date	AWSSSE	Town EPO	Once-off	
	Tenable compensation paid both in cash & kind to the PAHs.	Assela town administration	Assela Town EPO & women affairs office	Pre-civil work	45,000
	Vulnerable community groups like female headed HHs, and elderly must get priority during compensation study, land delivery and post livelihood rehabilitation works.	AWSSSE & Town municipality	Town women affairs office	During ARAP	100,000
Ambient Air Quality reduction	Spray water on dusty and unpaved access roads and dusty working areas to suppress dust emission,	Contractor	AWSSSE	Per day	500,000
	Limit speed of vehicles to 30 km/hr. when they are driven through residential areas and on unpaved roads.	Contractor	Assela EPO	Per day	
Noise Pollution:	Screen out noisy machineries,	Contractor	Assela traffic office	Once off	
	Do not mobilize noisy machineries during the rest time, particularly during the nighttime.	Contractor	Assela traffic office	Entire phase	50,000
	Do not allow noise level above 45dB at night and 55dB during the daytime at residential areas.	Contractor	Assela EPO	Entire phase	50,000
Traffic Congestion	Choose hours of less traffic volume on roads for mobilizing materials and construction machinery.	contractor	Assela town traffic office	Night time	30,000
	Implement appropriate traffic management plan.	Contractor	Assela Town Traffic Office	Entire phase	100,000
	Work in close coordination with local traffic police.	Contractor	Assela Town Traffic Office	Entire phase	00

Adverse Impact	**Mitigation measures**	Responsibility for		Time frame	Budget (birr)
		Execution	Regulation		
Phase: construction					
Water Resource Pollution	All construction equipment will be not older than 10 years and kept in good operating condition to avoid oil, grease or fuel leakages that might contaminate the water bodies.	Contractor	Assela town Transport office	Once –off	25,000
	Stockpile areas for materials such as sand, gravel, stone, and topsoil, as well as overburden dumps will be located away from water courses	Contractor	Assela town EPO	Every quarter	40,000
	Fuel and oil handling will be assigned to trained personnel and procedures for fuel storage, operation of mobile fuel tankers and refueling areas will be well defined	Contractor	Assela Transport office	Every weekend	200,000
	All hazardous wastes including materials soiled with hazardous wastes and empty containers of hazardous materials shall be stored in a designated area on site for regular removal	Contractor	Assela Town EPO	Every quarter	100,000
	A Spill Kit will be maintained onsite to clean-up any accidental spills.	Contractor	Assela Town EPO AWSSSE	Every quarter	200,000
Removal of Vegetation	Re-vegetation of ¼ of the area delineated in the perimeters of the FSTP with similar number of cut trees or lost during site clearance. Extra trees shall also be planted elsewhere in the town administration to compensate for lost vegetation (if the space inside the FSTP compound is not enough).	Contractor	Assela Town EPO AWSSSE	Once –off	1,000,000
	Topsoil and subsoil removed from the site during site preparation will be stored properly (away from runoff and possible contaminants) for reuse elsewhere or for backfilling and reinstatement.	Contractor	Assela Town EPO AWSSSE	Every weekend	1,000,000
Soil erosion	Contractor will avoid use of old and damaged equipment's, which can most likely lead to oil, grease and fuel leakages.	Contractor	Assela town transport office	Every quarter	50,000
	During reinstatement, the trench back-fill material will be compacted to a level similar to the original surrounding soils to avoid subsidence as a consequence of rainwater channeling.	Contractor	Assela Town EPO	Every quarter	50,000
Land use Pattern	Recreation of a stable landform that mirrors the pre-disturbed condition.	Contractor	Assela Town EPO	End of civil work	500,000

Adverse Impact	**Mitigation measures**	Responsibility for		Time frame	Budget (birr)
		Execution	Regulation		
Phase: construction					
Alteration	Upon completion of subsoil and topsoil reinstatement, disturbed areas will be inspected jointly by the contractor and project office.	Contractor	Assela Town EPO	End of the civil work	200,000
	All wastes generated during site preparation and construction will be transported to an authorized disposal area.	Contractor	Assela Town EPO	Every weekend	100,000
	The contractor develops mobile or temporary sanitary facilities in the construction site	Contractor	AWSSSE	Once- off	100,000
Improper hazardous and solid Management	Hazardous wastes such as paints, Asbestos Cement (AC) pipes and accessories and adhesives should be properly sealed, labeled, secured, kept inside a locked fenced area to prevent access by unauthorized personnel, and covered to prevent water accumulation.	Contractor	Assela Town EPO	Every quarter	200,000
	The wastes are properly segregated and separated to encourage recycling of some useful waste materials, that is, some excavated material can be used as backfills.	Contractor	Assela Town EPO	Every quarter	250,000
	Washing shall not be done at working areas but should be restricted to workers' camps and on paved areas to control runoff.	Contractor	Assela Town EPO	Every quarter	150,000
	Trucks will be covered during haulage of construction materials to reduce on spillage of materials and wherever dust suppression is necessary, water will be sprayed over dusty areas.	Contractor	Assela Town EPO	Every quarter	500,000
Air pollution	Travel speeds of construction vehicles along the road (especially at public & business centers) should be controlled using signals and setting travel speeds not exceeding 20km/h. Carriage ways shall also be regularly watered during dusty conditions. (to contain dusts)	Contractor	Assela Town traffic office	Every weekend	200,000
	All surfaced roads shall be subject to road cleaning and dust control watering through traffic management techniques of the contractor shall be implemented.	Contractor	Assela Town traffic office	Every weekend	200,000
Traffic congestion	Access to or from an individual property should not be closed for more than 2 hours.	Contractor	Assela Town traffic office	Every day	

Adverse Impact	**Mitigation measures**	Responsibility for		Time frame	Budget (birr)
		Execution	Regulation		
Phase: construction					
problems	Pedestrian access to schools, health facilities, and other premises frequently accessed by the public will be maintained with the use of traffic management plan	Contractor	Assela Town traffic office	Every day	500,000
	Backfilling and temporary reinstatement shall be completed within 2 weeks after trench excavations. It should not extend 2 weeks after excavation.	Contractor	Assela Town EPO	Every quarter	100,000
Risk of Accidents	All workers will undergo an OHS and environmental induction before commencing work on site.	Contractor	Assela Town EPO	Every quarter	100,000
	The contractor shall incorporate proposed arrangements for traffic diversions in the form of a Traffic Management Plan in the bid document / agreements, with details of all necessary budget and signals.	Contractor	Assela Town traffic office	Every quarter	300,000
	Restrictions on hours of driving (including nighttime restrictions where sensitive receptors may be affected) and timing of vehicle movements will be emphasized to avoid busy periods in urban areas, particularly the start and end of school and the working day.	Contractor	Assela Town traffic office	Every weekend	50,000
	No drivers or personnel under the influence of alcohol or any drug abuse will be allowed onsite.	Contractor	Assela Town traffic office	Every week	50,000
	Travel speeds of construction vehicles along the road especially at public and business centers like schools, hospitals and market area should be controlled using signals, flagmen and setting travel speeds not exceeding 30km/h.	Contractor	Assela Town traffic office	Every weekend	50,000
Noise pollution	Contractor will be careful when selecting the working equipment to avoid use of old or damaged ones; besides check every day proper functioning of all the machines on duty.	Contractor	Assela Town traffic office	Every quarter	100,000
	All generators and heavy-duty equipment will be insulated or placed in enclosures to minimize disrupting ambient noise levels.	Contractor	Assela Town transport office	Every quarter	100,000

Adverse Impact	**Mitigation measures**	Responsibility for		Time frame	Budget (birr)
		Execution	Regulation		
Phase: construction					
	During periods of off work time, equipment will be switched off whenever possible. A limited number of construction activities may have to continue on a 24-hour basis.	Contractor	Assela Town traffic office	Every quarter	50,000
Occupational Health and Safety Risks	A qualified health and occupational safety officer will be recruited by the contractor to oversee OHS matters on a daily basis.	Contractor	Assela Town EPO	Every quarter	240,000
	All construction workers will be oriented on safe work practices and guidelines and ensure that they adhere to them.	Contractor	Assela Town traffic office	Every quarter	75,000
	Appropriate signal will be used to warn staff and/ or visitors that are not involved in construction activities in dangerous places.	Contractor	Assela Town traffic office	Every quarter	75,000
	Personnel will only undertake tasks for which they are trained or qualified.	Contractor	Assela Town traffic office	Every quarter	75,000
	Adequate OHS personnel protective gear will be provided to the employees.	Contractor	Assela Town EPO	Every quarter	500,000
Spread of STDs and by Workers	As a contractual obligation, contractors shall be required to have an HIV/AIDS management plan (responsible staff, action plan, sensitization budget and others) to implement during project construction.	Contractor	Assela Town EPO	Every quarter	100,000
	All construction workers shall be orientated and sensitized about responsible sexual behavior in project communities.	Contractor	Assela Town EPO	Every quarter	50,000
	Priority should be given to unemployed members of local community especially for youths and women.	Contractor	Assela Town EPO	Every quarter	100,000
Impact on Landscape and Aesthetic Value	Planting more than 10 indigenous and exotic seedlings to replace the cut tree during construction time.	Contractor	Assela Town EPO	Every quarter	100,000
	Reinstate borrow and quarry sites used for the construction purposes and plant trees preferably indigenous trees.	Contractor	Assela Town EPO	Every quarter	100,000

Adverse Impact	Mitigation measures	Responsibility for		Time frame	Budget (birr)
		Execution	Regulation		
Phase: construction					
Impact on Vulnerable Groups:	Ensure vulnerable groups properly treated during land acquisition and compensation	Contractor	Assela Town EPO	Every quarter	100,000
	Ensure that women and vulnerable groups equally get job opportunities during the project construction processes and the benefits of the Project implementation.	Contractor	Assela Town EPO	Every quarter	100,000
	Aware local governments and community members to solicit their assistance for the project affected vulnerable groups,	Contractor	Assela Town EPO	Every quarter	100,000
Gender and Gender Based Violence/SA Risks:	Provide and avail a separate sanitation facility for women at construction camp,	Contractor	Assela Town EPO	Every quarter	100,000
	Provide women friendly safety equipment and materials,	Contractor	Assela Town EPO	Every quarter	100,000
	Assign women in works that do not affect their biological condition,	Contractor	Assela Town EPO	Every quarter	100,000
	Ensure that women construction workers do not face GBV and sexual harassment	Contractor	Assela Town EPO	Every quarter	100,000
	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,	Contractor	Assela Town EPO	Every quarter	100,000
	Operation phase				
Polluting Water Resources	Collaborate with water & wastewater quality testing laboratory for the regular monitor of the effluent.	AWSSSE	Assela Town EPO	Every quarter	20,000
	ACWSSSE should ensure adequate operation and management of the project to avoid leakages and discharge of inadequately treated effluent.	AWSSSE	Assela Town EPO	Every quarter	20,000
	The treated wastewater should be discharged into the nearby water body or recharged groundwater body	AWSSSE	Assela Town EPO	Every quarter	20,000

Adverse Impact	**Mitigation measures**	Responsibility for		Time frame	Budget (birr)
		Execution	Regulation		
Phase: construction					
	Leakages from treatment ponds & sludge drying beds will be avoided or minimized by regular monitoring & maintenance of the network.	AWSSSE	Assela Town EPO	Every quarter	50,000
	An awareness campaign will be launched every half a year for all the beneficiaries about proper operation and maintenance of sanitation facilities put in place.	AWSSSE	Assela Town EPO	Every half years	50,000
Improper Management of Solid Waste	The ACWSSSE should ensure adequate operation and management of the project to avoid improper management of solid waste.	AWSSSE	Assela Town EPO	Every quarter	50,000
	The dried sludge should be used as **organic fertilizer.**	urban agriculture	Assela Town EPO	Every quarter	25,000
	Adequate bins will be provided to prevent access by vermin at the treatment plant	AWSSSE	Assela Town EPO	Every quarter	45,000
Land Degradation and Soil Erosion	The project staff will be trained for proper management of screenings and sludge to avoid soil contamination.	AWSSSE	Assela Town EPO	Every quarter	50,000
	The dried sludge shall be removed regularly from the sludge drying area and shall be given to local interested farmers as soil conditioner (fertilizer) and should not burnt/ nor end up in landfill.	Urban agriculture office	Assela Town EPO	Every quarter	50,000
	Cutoff drains will be provided to FSTP to control flooding, build drainage lines to protect gully formation in the project area	AWSSSE	Assela Town EPO	Every quarter	50,000
	Follow- up and regular maintenance will be taken to avoid overtopping of the sludge, which can overburden the FSTP & cause discharge of partially or untreated wastewater onto land.	AWSSSE	Assela Town EPO	Every quarter	45,000
	Periodic tests will be done to assure the quality of effluent and treated sludge, to avoid partially treated wastewater and sludge to reach the soils.	AWSSSE	Assela Town EPO	Every quarter	45,000
Landscape and Land Use Impacts	During operation water impounded in derelict borrow pits should be immediately removed and the site should be restored to its natural conditions to avoid breading of mosquitoes, vermin and other insects.	AWSSSE	Assela Town EPO	Every quarter	45,000

Adverse Impact	**Mitigation measures**	Responsibility for		Time frame	Budget (birr)
		Execution	Regulation		
Phase: construction					
	Restoration of borrow pits as close pre-project maintenance conditions as possible will be done immediately after use in cases where they are opened for maintenance and repair of the project. Native vegetation must be used for re-seeding the excavated site.	AWSSSE	Assela Town EPO	Every quarter	45,000
	During maintenance or replacement, reinstatement of the previous condition will be done in such a way that the return of the visual integrity of the landscape as closely as possible to its previous condition.	AWSSSE	Assela Town EPO	Every quarter	45,000
	Where sections of the road and other public amenities are cut, these will be reinstated immediately after maintenance activities of any of the project components.	AWSSSE	Assela Town EPO	Every quarter	45,000
	Where sewers are not buried in ground, if any, they will be painted to blend with the environment. They will be adequately supported by concrete pillars and of such materials that cannot easily be damaged by the communities.	AWSSSE	Assela Town EPO	Every quarter	45,000
Air Pollution	The perimeter of the proposed sites will be vegetated with trees, bushes grasses and plants of varying heights thereby forming wind breakers in addition to a chain link fences.	AWSSSE	Assela Town EPO	Every quarter	450,000
	ACWSSSE must ensure adequate operation and management of the FSTP facilities to avoid foul odors that would arise from improper management of the facilities. The PO should develop an Operations and Maintenance Manual for the Fecal Sludge Treatment Plant to guide staff on how to run it effectively.	AWSSSE	Assela Town EPO	Every quarter	45,000
	ACWSSSE needs to ensure adequate operation and management of the facilities to avoid obnoxious smell.	AWSSSE	Assela Town EPO	Every quarter	45,000
	Regular maintenance and monitoring need to be taken to avoid accidental surface runoff intrusion from upstream of the plant, which can overburden the facilities and cause foul odors.	AWSSSE	Assela Town EPO	Every quarter	45,000

Adverse Impact	**Mitigation measures**	Responsibility for		Time frame	Budget (birr)
		Execution	Regulation		
Phase: construction					
	ACWSSSE needs to develop an Operations and Maintenance Manual for the FSTP to guide staff on how to run it effectively.	AWSSSE	Assela Town EPO	Every quarter	45,000
	Facultative ponds need to be commissioned before anaerobic ponds to avoid odor nuisance when anaerobic pond effluent discharges into an empty facultative pond.	AWSSSE	Assela Town EPO	Every quarter	45,000
Occupational Health and Safety Risks	Qualified and trained OHS and environmental health crew must be hired	AWSSSE	Assela Town EPO	Every quarter	45,000
	Adequate OHS personnel protective equipment's (PPE) gears shall be provided to the employees.	AWSSSE	Assela Town EPO	Every quarter	45,000
	Routine maintenance including but not limited to facilities involved in the removal of garbage and grit screenings, slashing around the embankments & repair damages to the fence.	AWSSSE	Assela Town EPO	Every quarter	45,000
	The site needs to be fenced and signalization put in place with security personnel to stop unauthorized people from accessing the site.	AWSSSE	Assela Town EPO	Every quarter	45,000
	Regular fumigation of the plant will be undertaken to kill disease vectors such as vermin and mosquitoes.	AWSSSE	Assela Town EPO	Every quarter	50,000
	An Accident Log will be maintained onsite to register all injuries and to investigate their causes.	AWSSSE	Assela Town EPO	Every quarter	50,000
	Emergency resources (e.g., fire extinguishers, stocked First Aid kits, and Emergency Contacts)	AWSSSE	Assela Town EPO	Every quarter	200,000
	Decommissioning phase				
Pollution of Soil and Water bodies	Properly transporting all the metallic, AC pipes, and chemical containers to a predetermined site for disposal or storage.	Contractor	Assela Town EPO	Every weekend	50,000
	Topsoil and subsoil removed for decommissioning will be stored properly and used for backfilling and reinstatement.	Contractor	Assela Town EPO	Every weekend	50,000

Adverse Impact	**Mitigation measures**	Responsibility for		Time frame	Budget (birr)
		Execution	Regulation		
Phase: construction					
	Back-filling materials will be compacted to a level similar to the original surrounding soils to avoid subsidence as a consequence of rainwater channeling.	Contractor	Assela Town EPO	Every weekend	50,000
Occupational Health, Safety and Air pollution	A qualified health and occupational safety officer will be recruited to oversee OHS matters on site.	AWSSSE	Assela Town EPO	Every weekend	20,000
	Proper induction of the workers prior to work decommissioning commencement.	AWSSSE	Assela Town EPO	Every weekend	25,000
	Adequate OHS personnel protective gear will be provided to the employees.	Contractor	Assela Town EPO	Every weekend	50,000
	Trucks will be covered during haulage of materials to reduce dust emissions.	Contractor	Assela Town EPO	Every weekend	50,000
Socio-economic impact	Providing adequate provident fund or pension those who want to retire	AWSSSE and town administration	Assela Town EPO	Every weekend	50,000
	Local young workers, particularly the vulnerable groups, need to be given priority during hiring in position commensurate with their skill, interest and experience	AWSSSE and town administration	Assela Town EPO	Every weekend	50,000
	ESMP Cost estimation in Birr				9,,474,500

10.1. Institutions for the Implementation of the ESMP

Effective environmental and social management will be achieved only if it is taken as an integral part of the overall project management. In order to effectively implement a comprehensive ESMP, the coordination of efforts of the various Federal and Regional Agencies is necessary with a concept comprising three sub-components, namely: clear framework of inter-organizational coordination measures; a specific information strategy; and tailored capacity building program.

The key organizations for the implementation of the ESMP during the construction phase are Construction contractor; Supervision consultant; and AWSSSE. The actual physical implementation works are carried out mostly at this stage.

Currently AWSSSE staffs are recruited at positions of project coordination, Environmental and social safeguard, and procurement. This staffs shall be maintained through the project life during construction, operation and decommissioning phases. In addition, civil engineers and OHS specialist shall be recruited as a project staff to follow up the implementation of mitigation measures during construction and operation period of the project. The staff of AWSSSE from the relevant department or a designated unit in the department should acquire basic knowledge of the environmental management activities to effectively assume the responsibility. During the operation and maintenance of the FSTP works, the responsibility will be mainly under the AWSSSE.

The supervising consultant should be staffed at least with environmental engineer, civil engineer, sociologist and OHS specialist during construction phase of the project. The supervising consultant is responsible to provide consultancy service to the project on the implementation the ESMP during construction phase of the project.

The contractor in its part will take necessary responsibilities to implement the ESMP. It should recruit civil engineers, environmental engineers, sociologists and OHS specialists to properly plan and implement day to day activities of ESMP.

The contractor shall submit regular weekly and monthly progress reports to the supervising consultant. The supervising consultant in turn should report to AWSSSE and project coordinator on a monthly basis. Finally, the PMU and MoWE shall compile monthly performance reports and share it with the WB and the federal or regional EPA at least on a quarterly basis. A review session has to be organized by the project coordinator each quarter with presence of all the stakeholders including the AWSSSE, contractor, supervising consultant and the EPO.

Mitigation measures proposed for socio-economic issues like compensation to damaged properties, lost/degraded plots of land should be handled by a committee, composed of representatives of all stakeholders, including AWSSSE, local government administrative organs, NGOs, and the affected group.

Environmental controlling responsibilities of the project during the construction and operation phases of the project shall be handled by AWSSSE and Oromia region or Assela town Environmental Protection Authority.

10.2. Training Programs and Capacity Building

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. 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 AWSSESE. They are responsible for carrying out ESMP and monitoring activities. The findings indicated that these different groups have different capatown building and training needs in terms of raising awareness, sensitization to the issues, and detailed technical training. The AWWSSSE is found to have a limited institutional capatown to implement the provisions of the ESMP, especially regarding the FSTP management sub-project. Training programs required budget is presented for the three phases of the project in Table 28.

Table 28) Capacity building program or ESMP implementation

S.N.	Capacity building activity	Phase of project	Participants	Budget (Birr)
1	Awareness raising and sensitization workshops	Start of construction and operation phases	Representatives of stakeholders and responsible staffs (50)	200,000
2	Technical trainings on environmental and social safeguard and OHS issues	Beginning of the three phases	Environmental and social safeguard and OHS staffs	200,000
3	Review workshops on quarterly and annual bases	Construction and operation phases	Officials and staffs (8 years)	1,000,000
4	Trainings on project management and coordination	Construction and operation phases	Officials and staffs (4 rounds)	1,000,000
Total				2,400,000

It is recommended that capacity building interventions including training should take place at all levels i.e., Community Based Organizations (CBOs), relevant government officials, community leaders, AWSSSE management team. The AWSSSE environmental and social safeguard expert 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.

11. ENVIRONMENTAL AND SOCIAL IMPACT MONITORING PLAN

A monitoring plan is a formal document that outlines the procedures and methods for monitoring the environmental and social performance of a project or activity. The monitoring plan is a key component of an ESMP and helps to ensure that the mitigation measures outlined in the ESMP are effective and that potential environmental and social impacts are identified and addressed in a timely manner.

11.1. Environmental Monitoring and Evaluation

Environmental monitoring is one of the required activities in a given project. It is important to assess the status of environment during project operation, identify unexpected changes, and measure the effectiveness of the operational procedures, to confirm statutory and mandatory compliance. Hence, monitoring of identified mitigation measures is a key for sound environmental and social safeguard management, project sustainability and community sense of ownership development. It can also give clues for environmental audit planning for unforeseen adverse impacts management. The objective of environmental monitoring is to design a regular plan for the proper and timely execution of the mitigation measures and further helps evaluate and design further remedial actions for unforeseen events.

The ACWSSSE should establish both compliance and effects monitoring plans starting from pre-construction phase. The compliance monitoring mechanism will ensure that the various project concerned institutions are implementing the provisions of the ESMP effectively due date. Moreover, with the knowledge of baseline conditions, the environmental monitoring program will serve as an indicator for any deterioration in environmental conditions due to operation of the project, to enable taking up suitable mitigation measures in time to safeguard the environment. The effects monitoring part will check on the impacts which the project is causing on the receiving physical, biological, and social environment by regular measuring of indicators. The results will be fed back to the project management body for evaluation and curative actions. The following Table examines the extent to which the adverse impacts identified can be controlled through the adoption of mitigation measures.

Table 29) Environmental monitoring plan for Assela town

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
Involuntary displacement, Land Acquisition & Property damage	For FSTP: Conducting ARAP by Town administration.	ARAP document and Number of PAHs	Measurement	MoWE & WB	One –Off	Pre-Construction phase	100,000
	Tenable compensation paid both in cash & kind to the PAHs.	Documentation and PAHs witness	Document review and interview	ACWSSSE, MoWE	One –Off	Pre-Construction phase	
	Vulnerable community groups like FHHHs and elderly must get priority during compensation process	Documentation and PAHs witness	Document review and interview	ACWSSSE, MoWE, Local EPA, MoWE	One –Off	Pre-Construction phase	
	Induction about the project for the town community every year at least once during construction phase.	Induction plan, material and report	Document review and interview of community	ACWSSSE, Local EPA, MoWE	once per year	Construction phase	100,000
Air Quality reduction	Spray water on dusty and unpaved access roads and dusty working areas to suppress dust emission,	Target and achievement document	Document review and interview	ACWSSSE, Local EPA, MoWE	During dry periods		100,000
	Limit speed of vehicles to 20 km/hr. when they are driven through residential areas and on unpaved roads.	Traffic reports	Traffic reports review	ACWSSSE, Local EPA, MoWE	Quarterly		
Noise pollution	Do not mobilize noisy machineries during the rest time, particularly during the nighttime.	Reports and documents	Review and interview of community	ACWSSSE, Local EPA, MoWE	Quarterly		
	Do not allow noise level above 45dB at night and 55dB during the daytime at residential areas.	Noise level recordings and analysis	Evaluation of analysis	ACWSSSE, Local EPA, MoWE	Quarterly		
Traffic Congestion	Use alternative routes or roads which are not crowded,	Traffic reports	Review of reports	ACWSSSE, Local EPA, MoWE			10,000
	Choose hours of less traffic volume on roads for mobilizing materials and construction machinery.	Traffic reports	Review of reports				10,000
Water Resource Pollution	Implement appropriate traffic management plan.	Age of machines, frequency of maintenance/ presence	Observation & document	ACWSSSE, Contractor, Local EPA, MoWE	Pre-construction	Construction phase	50,000

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
		of malfunctioning parts					
	Work in close coordination with local traffic police.	Ageof vehicles/machines, frequency of maintenance and presence of malfunctioning parts	Observation & document	ACWSSSE, Contractor, Local EPA, MoWE	Every month	Construction phase	
	Stockpile areas for materials such as sand, gravel, stone, and topsoil, as well as overburden dumps will be located away from water courses.	Measurement from water courses	Observation & document	ACWSSSE, Contractor, Local EPA, MoWE	Every month	Construction phase	
	Fuel handling and oil spill measures will be implemented to prevent and control spill or leaks. Fuel and oil handling will be assigned to trained personnel and procedures for fuel storage, operation of mobile fuel tankers and refueling areas will be well defined.	Presence of labelled and defined areas	Observation & document	ACWSSSE, Contractor, Local EPA, MoWE	Every month	Construction phase	
	All hazardous wastes including materials soiled with hazardous wastes and empty containers of hazardous materials shall be stored in a designated area on site for regular removal.	Designation of araes for these materials	Observation & document	ACWSSSE, Contractor, Local EPA, MoWE	Throughout the construction phase	Construction phase	
	A Spill Kit will be maintained onsite to clean-up any accidental spills.	Presence of spill kit	Observation & document	ACWSSSE, Contractor, Local EPA, MoWE	Every quarter construction phase	Construction phase	
Removal of Vegetation	Re-vegetation of ¼ of the area delineated in the perimeters of the FSTP with 10 times more trees. Commensurate amount of trees shall also be planted elsewhere in the town administration to compensate for lost vegetation. (If the space inside the FSTP compound is not enough).	Hectares of the FSTS covered with trees, bushes and vegetation	Area re- vegetated	Assela Municipality, ACWSSSE, Contractor, Local EPA,	Construction phase	Construction phase	100,000

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
Soil erosion	Topsoil and subsoil removed from the site during site preparation will be stored properly (away from runoff and possible contaminants) for reuse elsewhere or for backfilling and reinstatement.	Documented verification of top & subsoil reused for backfilling, leveling & greening. Landscape recovery	Observation & document	ACWSSSE, Contractor, Local EPA,	Throughout the construction phase	Construction phase	
	Contractor will avoid use of old and damaged equipment's, which can most likely lead to oil, grease and fuel leakages.	Age of vehicles/machines, frequency of maintenance and presence of malfunctioning parts	Documentation and site observation	Assela Municipality, ACWSSSE, Contractor, Local EPA,	Throughout the construction phase	Construction phase	
Land use Pattern Alteration	Contractor will avoid use of older than 10 year and damaged equipment's, which can most likely lead to oil, grease and fuel leakages.	Age of vehicles/machines, frequency of maintenance and presence of malfunctioning parts	Observation & document	Assela Municipality, ACWSSSE, Contractor, Local EPA,	Throughout the construction phase	Construction phase	100,000
	During reinstatement, the trench back-fill material will be compacted to a level similar to the original surrounding soils to avoid subsidence as a consequence of rainwater channeling.	Incidence of gullies or channels	Observation & document	Assela Municipality, ACWSSSE, Contractor, Local EPA,	Throughout the construction phase	Construction phase	
	Recreation of a stable landform that mirrors the pre-disturbed condition.	Visual appearance of the landscape	Observation & document	Assela Municipality, ACWSSSE, Contractor, Local EPA,	Throughout the construction phase	Construction phase	
	Upon completion of subsoil and topsoil reinstatement, disturbed areas will be inspected jointly by the contractor and project office.	Documented Inception	Observation & document	Assela Municipality, ACWSSSE, Contractor, Local EPA,	End of construction phase	Construction phase	
	All wastes generated during site preparation and construction will be transported to an authorized disposal area.	No complaint from communities around the site. No litter at project site and complaints from Authorities	Observation & document	Assela Municipality, ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	150,000
Improper hazardous	The contractor develops mobile or temporary sanitary facilities in the construction site and in the vicinity of	Presence of sanitary facilities that are well-	Observation & document	Assela Municipality, ACWSSSE,	Pre-construction	Construction	50,000

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
and solid Management	the project area.	maintained		Contractor, Local EPA,	phase	phase	
	Hazardous wastes such as paints, asbestos cement (AC) pipes and accessories and adhesives should be properly sealed, labeled, secured, kept inside a locked fenced area to prevent access by unauthorized personnel, and covered to prevent water accumulation.	Presence and condition of the storage facility records of waste disposal; proof of waste delivery and safe disposal	Observation & document	Assela Municipality, ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	130,000
	The wastes are properly segregated and separated to encourage recycling of some useful waste materials, that is, some excavated material can be used as backfills.	Waste management plan, presence of waste segregation	Observation & document	Assela Municipality, ACWSSSE, Contractor, Local EPA,	Pre-construction phase	Construction phase	100,000
	Washing is not done at working areas but should be restricted to workers' camps and on paved areas to control runoff.	Prepared washing site at the camp	Observation & document	Assela Municipality, ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	
Air pollution	Trucks will be covered during haulage of construction materials to reduce on spillage of materials and wherever dust suppression is necessary, water will be sprayed over dusty areas.	Workers and local community opinions and suggestions on the contractor's efforts to minimize dust nuisance	Observation & document	Assela Traffic /Transport Office, Assela Municipality, ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	50,000
	Travel speeds of construction vehicles along the road (especially at public & business centers) should be controlled using signals and setting travel speeds not exceeding 30km/h.	Errected signals, number of accidents and/ or complaints reported	Observation & document	Assela Traffic /Transport Office, Assela Municipality, ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	
	All surfaced roads shall be subject to road cleaning and not surfaced roads to dust suppression through traffic management techniques of the contractor.	Nearby community opinions and documented reports	Observation & document	Assela Traffic /Transport Office, Assela Municipality, ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
Traffic congestion problems	Pedestrian access to schools, health facilities, and other premises frequently accessed by the public will be maintained with the use of walking boards.	Documented verification from municipality and public opinions	Observation & document	Assela Traffic /Transport Office, Assela Municipality, ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	
Risk of Accident	All workers will undergo an OHS and environmental induction before commencing work on site.	Documented induction material and plan	Observation & document	ACWSSSE, Contractor, Local EPA,& social affairs office	Entire construction phase	Construction phase	
	The contractor shall incorporate his proposed arrangements for traffic diversions in the form of a Traffic Management Plan in the bid document, with details of all necessary budget and signals.	Traffic Management Plan with budget indications	Observation & document	Assela Traffic /Transport Office, ACWSSSE, Contractor, Local EPA,	Pre-construction	Construction phase	
	Restrictions on hours of driving (including nighttime restrictions where sensitive receptors may be affected) and timing of vehicle movements will be emphasized to avoid busy periods in urban areas, particularly the start and end of school and the working day.	Traffic Management Plan	Observation & document	Assela Traffic /Transport Office, ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	
	No drivers or personnel under the influence of alcohol or any drug abuse will be allowed onsite.	Traffic Management Plan & an especial induction plan for drivers	Observation & document	Assela Traffic /Transport Office, ACWSSSE, Contractor, Local EPA	Entire construction phase	Construction phase	
	Travel speeds of construction vehicles along the road especially at public and business centers like schools, hospitals and market area should be controlled using signals, flagmen and setting travel speeds not exceeding 20km/h.	Documented evidence of signals and speed limit put in place	Observation & document	Assela Traffic /Transport Office, ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	
Noise pollution	Construction workers will be made aware of the permissible noise levels at the workplace and surrounding environment.	IFC (2007) EHS &Ethiopia Ambient Environment standard (2003)	Observation & document	ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	100,000
	Contractor will be careful when selecting the working equipment to avoid use of old or damaged ones; besides check every day proper functioning of all the machines on duty.	Site noise level testing, workers reflections	Observation & document	ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	230,000

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
	All generators and heavy-duty equipment will be insulated or placed in enclosures to minimize disrupting ambient noise levels.	Site inspection & workers reflections	Observation & document	ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	
	During periods of off work time, equipment will be switched off whenever possible. A limited number of construction activities may have to continue on a 24-hour basis.	Site noise level test inspection & workers reflections	Observation & document	ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	
	No construction activities will take place at night for sites where the closest residence is within less than 100m from the project site.	Site noise level test & residents' reflections	Observation & document	ACWSSSE, Contractor, Local EPA,	Entire construction phase	Construction phase	
Occupational Health and Safety Risks	A qualified health and occupational safety officer will be recruited by the contractor to oversee OHS matters on a daily basis.	Presence of qualified OHS officer	Observation & document	ACWSSSE, Contractor, Local EPA,	Throughout Construction	Construction phase	
	All construction workers will be oriented on safe work practices and guidelines and ensure that they adhere to them.	Induction plan & records of verification of workers' orientation	Observation & document	ACWSSSE, Contractor, Local EPA,	Pre-construction phase	Construction phase	
	Appropriate signal will be used to warn staff and/ or visitors that are not involved in construction activities in dangerous places.	Presence of signals	Observation & document	ACWSSSE, Contractor, Local EPA,	Pre-construction phase	Construction phase	
	Personnel will only undertake tasks for which they are trained or qualified.	Verification documents for personnel	Observation & document	ACWSSSE, Contractor, Local EPA,	Entire construction	Construction phase	110,000
	Communication line will be ensured between workers and drivers of heavy equipment.	Verification of creation of communication routes	Observation & document	ACWSSSE, Contractor, Local EPA,	Entire construction	Construction phase	
	Adequate OHS personnel protective gear will be provided to the employees.	Budgeted verification of protective gears	Observation & document	ACWSSSE, Contractor, Local EPA,	Entire construction	Construction phase	
Spread of STDs and Social Misdemeanor by Workers	As a contractual obligation, contractors shall be required to have HIV/AIDS management plan (responsible staff, action plan, sensitization budget and others) to implement during project construction.	HIV/AIDS management plan	Observation & document	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase	Construction phase	
	All construction workers shall be orientated and sensitized about responsible sexual behavior in project communities.	Interview with workers and induction manual in place	Observation & document	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase	Construction phase	

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
Land scape and aesthetic value	Planting more than 10 indigenous and exotic seedlings to replace the cut tree during construction time.	Number of seedlings planted compared to cut	Observation and report review	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase		100,000
	Reinstate borrow and quarry sites used for the construction purposes and plant trees preferably indigenous trees.	Observation report and community onion	Field observation	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase		100,000
	Ensure vulnerable groups properly treated during land acquisition and compensation	Number of vulnerable groups fairly treated	Documentation and interview	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase		50,000
Vulnerable groups service provision	Ensure that women and vulnerable groups equally get job opportunities during the project construction processes and the benefits of the Project implementation.	Number of girls and women get job compared total jobs crested	Reports and interview	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase		50,000
	Aware local governments and community members to solicit their assistance for the project affected vulnerable groups,	Number of community members received awareness	Report review	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase		100,000
	Provide and avail a separate sanitation facility for women at construction camp,	Presence of separate sanitation rooms	Field observation and interview	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase		
	Provide women friendly safety equipment and materials,	Number of women/girls using friendly equipment	Interview women and girls	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase		50,000
	Assign women in works that do not affect their biological condition,	Number of women/girls assigned to proper jobs	Interview women	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase		
	Ensure that women construction workers do not face GBV and sexual harassment,	Number of women/girls facing GBV	Interview	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase		
	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,	Document and awareness	Review of documents	Assela town Health bureau, ACWSSSE, Contractor, Local EPA	Entire construction phase		100,000

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
Polluting Water Resources	Establishing water & wastewater quality testing laboratory for the regular monitor of the effluent.	Wastewater quality measurement	Observation, number and type of wastewater quality tested	MoWE, ACWSSSE, Local EPA	Entire Operation phase	Operation phase	100,000
	ACWSSSE should ensure adequate operation and management of all the project components to avoid leakages and discharge of inadequately treated effluent.	Quarterly wastewater quality monitoring	Observation & document	ACWSSSE, EPO	Entire Operation phase	Operation phase	
	The treated wastewater should be discharged into the nearby water body	Nearby water quality test	Number and type of Water quality tested	EPO		Operation phase	
	Leakages from toilets, PSs, sewer aqueducts, treatment ponds & sludge drying beds will be avoided or minimized by regular monitoring & maintenance of the network.	Site inspection, public opinions, system regular maintenance & follow-up	Observation & document	ACWSSSE, Local EPA,	Entire operation phase	Operation phase	
	A maintenance crew will be put in place to monitor and repair the sewage network immediately a damage or leakage occurs to avoid accidental surface runoff intrusion into water points.	Qualified, experienced & well-equipped staff in place	Observation & document	ACWSSSE, Local EPA,	Entire operation phase	Operation phase	
	Maintain, repair and refuel vehicles and machinery at an offsite Garage or workshop.	Site visit of the workshop	Observation & document	ACWSSSE,	Entire operation phase	Operation phase	
	A quarterly laboratory quality tests for effluent and receiving water resources will be done to ensure that the quality of effluent meets the national discharge standards or requirements.	National Ambient Environment Standard (2003)	Observation & document	ACWSSSE,	Entire operation phase		
	Awareness campaign will be launched every half a year for all the beneficiaries about proper operation and maintenance of sanitation facilities put in place.	Documented verification of public awareness campaign guideline	Observation & document	ACWSSSE, Local EPA,	Entire operation phase	Operation phase	150,000
	Emergency telephone lines should be established to enable the public to immediately notify the ACWSSSE of any damages to the sewer lines and other components of the network to ensure timely response and repair of such damages.	Monthly bill of emergency telephone line used	Observation & document	Assela town Administration, ACWSSSE,	Entire operation phase	Operation phase	

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
Improper Management of Solid Waste	The ACWSSSE should ensure adequate operation and management of the project to avoid improper management of solid waste.	No accumulation of waste in facilities' vicinity. No complaint of littered waste from community and authority; internal and external environmental audit reports	Observation & document	ACWSSSE,	Entire operation phase	Operation phase	
	The dried sludge should be used as **organic fertilizer.**	Number of local famers using the treated sludge as fertilizer	Observation & document	ACWSSSE, Local EPA, Assela town Urban Agriculture Office	Entire operation phase	Operation phase	
	Adequate bins will be provided to prevent access by vermin at the sludge treatment plant	Number of wastes collecting bins in place	Observation & document	ACWSSSE,	Entire operation phase	Operation phase	
Land Degradation	The project staff will be trained for proper management of screenings and sludge to avoid soil contamination.	Soil waste well managed and no any soil contamination record due to the project	Observation & document	ACWSSSE,	Entire operation phase	Operation phase	170,000
	The dried sludge shall be removed regularly from the sludge drying area and shall be given to local interested farmers as soil conditioner or taken to tip and should not burnt.	No accumulated sludge on site; livelihood of farmers improved due to sludge usage as fertilizer; and farmers reflections	Observation & document	ACWSSSE,	Entire operation phase	Operation phase	
	Follow- up and regular maintenance will be taken to avoid accidental surface runoff, which can overburden the FSTP and cause discharge of partially or untreated wastewater onto land.	Follow-up and maintenance plan to avoid accidental surface runoff	Observation & document	ACWSSSE,	Entire operation phase	Operation phase	
	Periodic tests will be done to assure the quality of effluent and treated sludge, to avoid partially treated wastewater and sludge to reach the soils.	Sludge and treated wastewater quality test report	Observation & document, Sludge quality tests	ACWSSSE, Local EPA,	Entire operation phase	Operation phase	250,000

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
Landscape, Land Use Impacts	During operation water impounded in derelict borrow pits should be immediately removed and the site should be restored to its natural conditions to avoid breading of mosquitoes, vermin and other insects.	Site visit, local community and workers reflections	Observation & document	ACWSSSE	Entire operation phase	Operation phase	
	Restoration of borrow pits as close to pre-project maintenance conditions as possible will be done immediately after use in cases where they are opened for maintenance and repair of the project. Native vegetation must be used for re-seeding the excavated site.	Project repair & maintenance plan	Observation & document	ACWSSSE Local EPA,	Entire operation phase	Operation phase	
	During maintenance or replacement, reinstatement of excavations will be done in such a way that the return of the visual integrity of the landscape as closely as possible to its previous condition.	Site inspection & local community reflection	Observation & document	ACWSSSE Local EPA,	Entire operation phase	Operation phase	
	Where sections of the road and other public amenities are cut, these will be reinstated immediately after maintenance activities of any of the project components.	Monitoring of maintenance plan & local beneficiaries or public opinions	Observation & document	ACWSSSE Local EPA,	Entire operation phase	Operation phase	
Air pollution	The perimeter of the proposed sites will be vegetated with trees and plants of varying heights thereby forming wind breakers in addition to a chain link fence.	Length of perimeter vegetated; fence around the FSTP sites	Observation & document	ACWSSSE Assela town Administration	Entire operation phase	Operation phase	
	ACWSSSE must ensure adequate operation and management of the FSTP facilities to avoid foul odors that would arise from improper management of the facilities. The ACWSSSE should develop an Operations and Maintenance Manual for FSTP to guide staff on how to run it effectively.	Well organized and developed operation manual and information level of the workers to use the manual	Observation & document	ACWSSSE	Entire operation phase	Operation phase	
	Regularly the ACWSSSE will ensure adequate operation and management of the facilities to avoid obnoxious smell that would arise from dysfunctional.	No obnoxious smell grievance from workers & the local residential communities	Observation & document	ACWSSSE	Entire operation phase	Operation phase	
	Regular maintenance and monitoring will be taken to avoid accidental surface runoff FSTP which can overburden the facilities and cause foul odors.	Follow-up and maintenance plan to avoid accidental surface runoff	Observation & document	ACWSSSE, Local EPA	Entire operation phase	Operation phase	

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
	ACWSSSE will develop an Operations and Maintenance Manual for the FSTP to guide staff on how to run it effectively.	Presence of an Operations and Maintenance Manual for FSTP	Observation & document	ACWSSSE, Local EPA	Entire operation phase	Operation phase	
	Facultative ponds will be commissioned before anaerobic ponds to avoid odor nuisance when anaerobic pond effluent discharges into an empty facultative pond.	Commissioning of facultative ponds before anaerobic ponds	Observation & document	ACWSSSE,	Entire operation phase	Operation phase	
Occupational Health and Safety Risks	Qualified and trained OHS and environmental health crew must be hired for regular community sensitization, capatown development, and management and monitoring of social and environmental issues.	Presence of qualified OHS officer with well-organized qualification documents	Observation & document	ACWSSSE	Entire operation phase	Operation phase	
	Adequate OHS personnel protective equipment's (PPE) gears will be provided to the employees.	Record of PPE provided and staff; use of PPE on site	Observation & document	ACWSSSE	Entire operation phase	Operation phase	
	Routine maintenance including but not limited to facilities involved in the removal of garbage and grit screenings, slashing around the embankments & repair damages to the fence.	Clean, green conducive work environment and well managed fences	Observation & document	ACWSSSE	Entire operation phase	Operation phase	
	The site, where possible, will be fenced and signalization put in place with security personnel to stop unauthorized people from accessing the site.	Well established security system	Observation & document	ACWSSSE	Entire operation phase	Operation phase	
	The manufacturer's instructions and Material Safety Data Sheets (MSDS) must be followed for the storage of all chemicals used in the treatment plant.	Absence or presence of chemical usage or handling related spillage to the environment	Observation & document	ACWSSSE	Entire operation phase	Operation phase	
	Regular fumigation of the Plant will be undertaken to kill disease vectors such as vermin and mosquitoes.	Stockpile of chemicals for fumigation and public opinion regarding proper use	Observation & document	ACWSSSE	Entire operation phase	Operation phase	
	An Accident Log will be maintained onsite to register all injuries and to investigate their causes.	Keeping accident logbook	Observation & document	ACWSSSE & Health Bureau	Entire operation phase	Operation phase	
	Emergency resources (e.g., fire extinguishers, stocked First Aid kits, and Emergency Contacts)	Standby emergency communication facilities	Observation & document	ACWSSSE & Health Bureau, local Police, Local Fire Department	Entire operation phase	Operation phase	

Adverse Impact	Mitigation measures	Monitoring indicator	Method of monitoring	Monitoring institutions	Monitoring frequency	Phase/ status	Budget in birr
Pollution of Soil and Water bodies	Properly transporting all the metallic, AC pipes, and chemical containers to a predetermined site for disposal or storage.	Documented evidence of proper transportation of indicated materials	Observation & document	ACWSSSE, Local EPA	During commissioning	Decommissioning phase	
	Topsoil and subsoil removed for decommissioning will be stored properly and used for backfilling and reinstatement.	Volume or meter cube of soil used	Observation & document	ACWSSSE, Local EPA	During commissioning	Decommissioning phase	
	Back-filling materials will be compacted to a level similar to the original surrounding soils to avoid subsidence as a consequence of rainwater channeling.	Documented evidence of materials used	Observation & document	ACWSSSE, Local EPA	During commissioning	Decommissioning phase	
	Conducting environmental quality assessment of the water body and the treated wastewater prior to the commencement of the decommissioning.	Water and treated wastewater analyzed	Observation & document	ACWSSSE, Local EPA	During commissioning	Decommissioning phase	
Occupational Health and Safety	A qualified health and occupational safety officer will be recruited to oversee OHS matters on site.	Number of quality professionals document	Observation, tested water quality parameters & document	ACWSSSE	Start of commissioning phase	Decommissioning phase	
	Proper induction of the workers prior to work decommissioning commencement.	Presence of induction for workers participating in the decomissioning	Observation & document	ACWSSSE	Start of commissioning phase	Decommissioning phase	
	Adequate OHS personnel protective gear will be provided to the employees.	All OHS protective gear provided	Observation & document	ACWSSSE	During commissioning phase	Decommissioning phase	
	Trucks will be covered during haulage of materials to reduce dust emissions.	Number of trucks covered during haulage	Observation & document	ACWSSSE	During commissioning phase	Decommissioning phase	
Socio-economic impact	Providing adequate provident fund or pension those who want to retire.	Number of employees covered by the pension system	Observation & document	ACWSSSE	Commissioning phase	Decommissioning phase	
	For young workers, particularly the vulnerable groups, facilitating to be hired in similar position commensurate with their skill, interest and experience.	Number of local young and vulnerable people hired	Observation & document	ACWSSSE, Women and Social affairs office	Commissioning phase	Decommissioning phase	
	Total monitoring cost						**2,380,000**

The above Environmental and Social Management and Monitoring Plan table summarized the main possible negative impacts, possible mitigation measures, monitoring indicators, monitoring plan, responsible institution for monitoring, time duration and cost estimations in Birr. Even though it is very rough and subjective the overall ESMP cost estimated during pre-construction, construction and operation phase is about **14,254,500** (fourteen million two hundred fifty four thousand five hundred) Birr. However, assuming the market dynamics and complexity of the study, the price estimation might have an error of **±10**% of the current value.

11.2. Construction Monitoring

During construction phase, ACWSSSE shall require contractors to comply with this ESMP and to recruit an environmental and occupational health and safety officer to affect the implementation of this ESMP. The contractor should have a designated environmental officer to follow up day-to-day project construction activities. In addition, both the project and site managers should familiarize themselves with the ESMP so as to execute required environmental, health and safety supervision roles. It is also preferable that the site engineer has to work by considering environmental issues related to the project. The project manager shall have the ultimate responsibility for the implementation of ESMP and will, therefore, ensure that resources are duly provided. The project manager shall be responsible and ensure staff are adequately inducted and trained at site regarding environmental and social management including emergency procedures. The Contractor's site supervisors and foremen will ensure that the provisions in this ESMP are implemented within the sites under their supervision and to collect and transmit relevant information to the environmental and occupational safety and health Officers.

11.3. Reporting

During construction, monthly monitoring reports should be compiled and submitted by the contractor. The report shall highlight the different activities undertaken to manage environmental and social aspects of the project in line with contract specifications, laws, standards, policies, and plans of Ethiopia and WB safeguard policies. The report will be discussed during the monthly progress meetings among Assela town EPA, ACWSSSE, the contractor and other concerned utility agencies as necessary. ACWSSSE's Environmentalist and Social Specialist for the supervising engineer will approve the contractor's monthly environmental and social monitoring report that will then be transmitted to Assela town EPA and ACWSSSE for final approval. ACWSSSE's Environmental Management and Social Specialist will also independently monitor the implementation of the ESMP and/or verify the accuracy and content of the contractor's monitoring report and then report to project coordinator. The report will also be shared with the MoWE, WB and other relevant stakeholders at least on a quarterly basis. Approval of the environmental monitoring report will be the basis for the supervising engineer to approve payment of the respective environmental and social bill of Quantity (BoQ) items.

During operation phase the monitoring activity mostly depends on Assela town EPA and ACWSSSE Environmental Management and Social Specialist for effective project execution.

The role of ACWSSSE is both implementation and internal monitoring. Assela town EPA monitoring reports should be shared with project coordinator, regional EPA and MoWE for further remedial actions.

11.4. Environmental Audit

Audits will be necessary both during construction and project operation. While construction audits will aim to verify compliance to impact mitigation requirements, post-construction audits are a regulatory requirement to ensure effects and compliance monitoring and the implementation of the mitigation measures within 12 months and not more than 24 months after the start of the operation of the FSTP. Both construction and post-construction audits can be conducted internally by project coordination unit or by a consultant hired with a technical support from Assela town EPA.

11.5. Grievance handling procedure

This section describes the avenue for affected persons to lodge a complaint or express a grievance against the project, its staff or contractors during project implementation. It also describes the procedures, roles and responsibilities for addressing grievances and resolving disputes. Every aggrieved person shall be able to trigger this mechanism to quickly resolve their complaints. The objectives of the grievance handling are to:

- Ensure that appropriate and mutually acceptable corrective actions are identified and implemented to address complaints;
- Verify that complaints are satisfied with outcomes of corrective actions; and
- Avoid the need to resort to judicial proceedings.

The grievance mechanism at each project facility will be fed from four main sources:

- Project affected persons (PAPs) or project affected Household (PAHs);
- Local community residents and the respective local leaders;
- Supervising engineer, clerk of works or contractor; and
- Monitoring team who will forward issues/concerns identified in the field.

According to the RPF (2016) the grievance resolution committee is indicated in Table below.

Table 30) Grievance Resolution Committee

No	Institution/ individual representation	Role
1	Municipality representative	Chairperson
2	ACWSSSE representative	Secretary
3	Community representative	Member
4	Representative of PAPs	Member
5	Women affairs	Member
6	Two respectable citizens from society including one from the underserved community, one of them should be women	Members

Steps of the grievance process

Step One: Receipt of complaint

A verbal or written complaint from a complainant will be received by the Clerk of Works or Grievance Redress Committee and recorded in a complaints log that is kept on site. The log will indicate grievances, date lodged, action taken to address complaint or reasons the grievance was not acted on; information provided to complainant and date the grievance was closed. The process for lodging a complaint is:

- Clerk of works on site or project office receives complaint(s) from complainant and records it in log;
- Clerk of Works or Grievance Redress Committee reads the recorded grievance for the complainant to confirm correct detail of complaint has been documented; and
- Both the complainant and clerk of work or Grievance Redness Committee sign the log to confirm grievance was accurately recorded.

Step Two: Determination of corrective action

If in his/her view, a grievance can be solved at this stage, the Clerk of Works or Grievance Redness Committee will determine a corrective action in consultation with the aggrieved person. Remedial action(s) and the timeframe within which they must be accomplished has been described and the party responsible for implementing them will be recorded in the complaint log. For cases that are not resolved within 5 days, detailed investigations will be undertaken, and results discussed not more than 15 days from lodging a grievance.

Step Three: Meeting with the complainant

The proposed remedial action and the timeframe in which it is to be implemented will be discussed with the complainant within 5 days of receipt of the grievance. Consent to proceed with the corrective action will be sought from the complainant and witnessed by a local government chairperson.

Step Four: Execution of Corrective Actions

Mutually agreed corrective action will be commenced by the project office or its contractor within the agreed timeframe. The date of the completed action will be recorded in the log against the complainant's grievance.

Step Five: Verification of the Remedial Actions

To verify satisfaction, the aggrieved group or person will be asked to return if not satisfied or bring the case to court with corrective action.

Step SIX: Action by the project office and/or the contractor

If the project office or contractor cannot solve the grievance within 15 days, s(he) will refer it to court through the social safeguard and/or occupational safety and health professional. It is believed that most of possible grievances can be solved at this level.

12. CONCLUSIONS AND RECOMMENDATIONS

12.1. Conclusions

Assela town, with technical support from the federal MoWE and financial support from the WB, planned to build Fecal Sludge Treatment Plant. The construction of the FSTP can contribute immensely to the improvement of the town's sanitation by reducing practices of open defecation and the outbreak of water-borne diseases; create job opportunity for various segments of the society; build capacities; and create opportunities for local construction companies and their professionals and help in the transfer of new technology and knowledge to the town and the

nation at large. The long term environmental and social benefits include reduce morbidity and increased productivity of households; increase enrolment of children in educational institutions and improved tourist destination and economic development.

Taking the receiving environment into consideration, the ESIA study identified negative impacts during construction and operation phases as follow; involuntary displacement, land expropriation, property damage, biodiversity disturbance, landscape and integrity change, water, air and noise pollution, among others. The negative impacts can cause damage to the biological, physical and social environment if they are not properly planned and managed as indicated in the mitigation measure or ESMP section of this report. The utility office, the town municipality and the contractor have a lion's share role in the execution of the mitigation measures presented. The regulatory work, monitoring and evaluation mostly rely on the town EPA, MoWE, and the WB in addition to the project staffs in utility itself. The PAHs, the local community particularly the youth, woman, and vulnerable groups and kebele leaders should properly involve in the compensation procedure, study and decision making to minimize grievance and ensure tenable benefit from the project development. Although various impacts were identified by this study and different mitigation measures are proposed, the issue of compensation of the right holders where the FSTP is going to be constructed should be given utmost attention from all stakeholders. In the project site, there are 12 households that are going to lose farmland as a result of the construction of the FSTP need to be properly compensated before the commencement of the project. It is also very important to carefully consider made compensation or houses that are going to be affected due to the construction of the FSTP.

In conclusion, if the FSTP is constructed and operated in conformity with the legal and other requirements provided in the ESMP, the benefits of the project to the town and the nation will by far outweighing its potential negative effects.

12.2. Recommendations

As clearly indicated in the conclusion sub-section, with proper implementation of the mitigation measures and legal frameworks, the environmental and social benefits of the Assela FSTP construction outweigh the adverse effects. It is repeatedly noted that the adverse impacts identified can be mitigated through proper implementation of the proposed management and monitoring plans. Therefore, it is strongly recommended to implement the project with strict monitoring of the environmental and social issues. Hence, monitoring teams shall closely follow the state of implementation of the environment and social management and monitoring plans.

Moreover, the town, especially the ACWSSSE, and the MoWE need to ensure that the ESIA studies of projects are completed before commencement of construction. The environmental management plans should be made part of the 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 town EPA.

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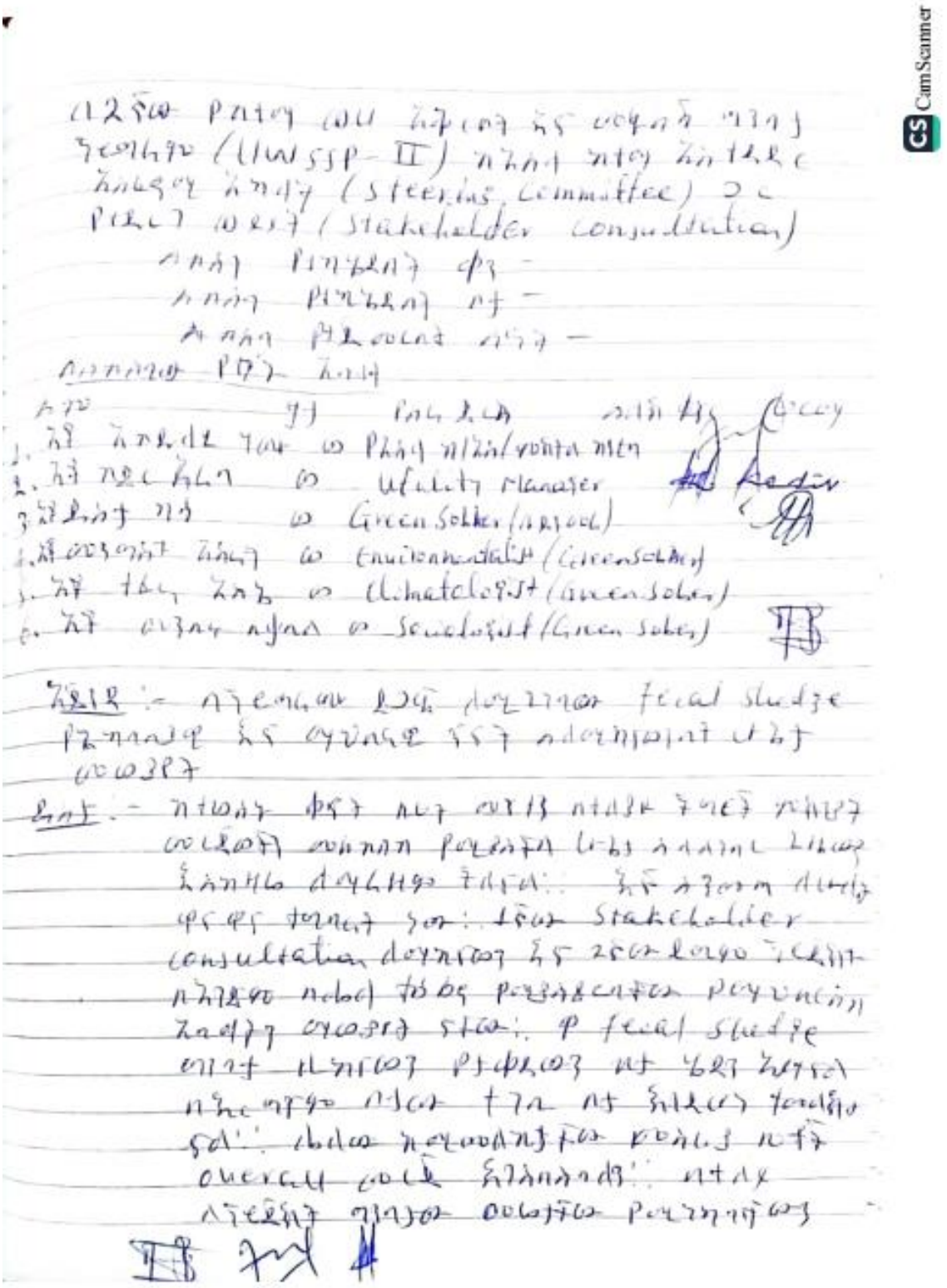
14. Annexes

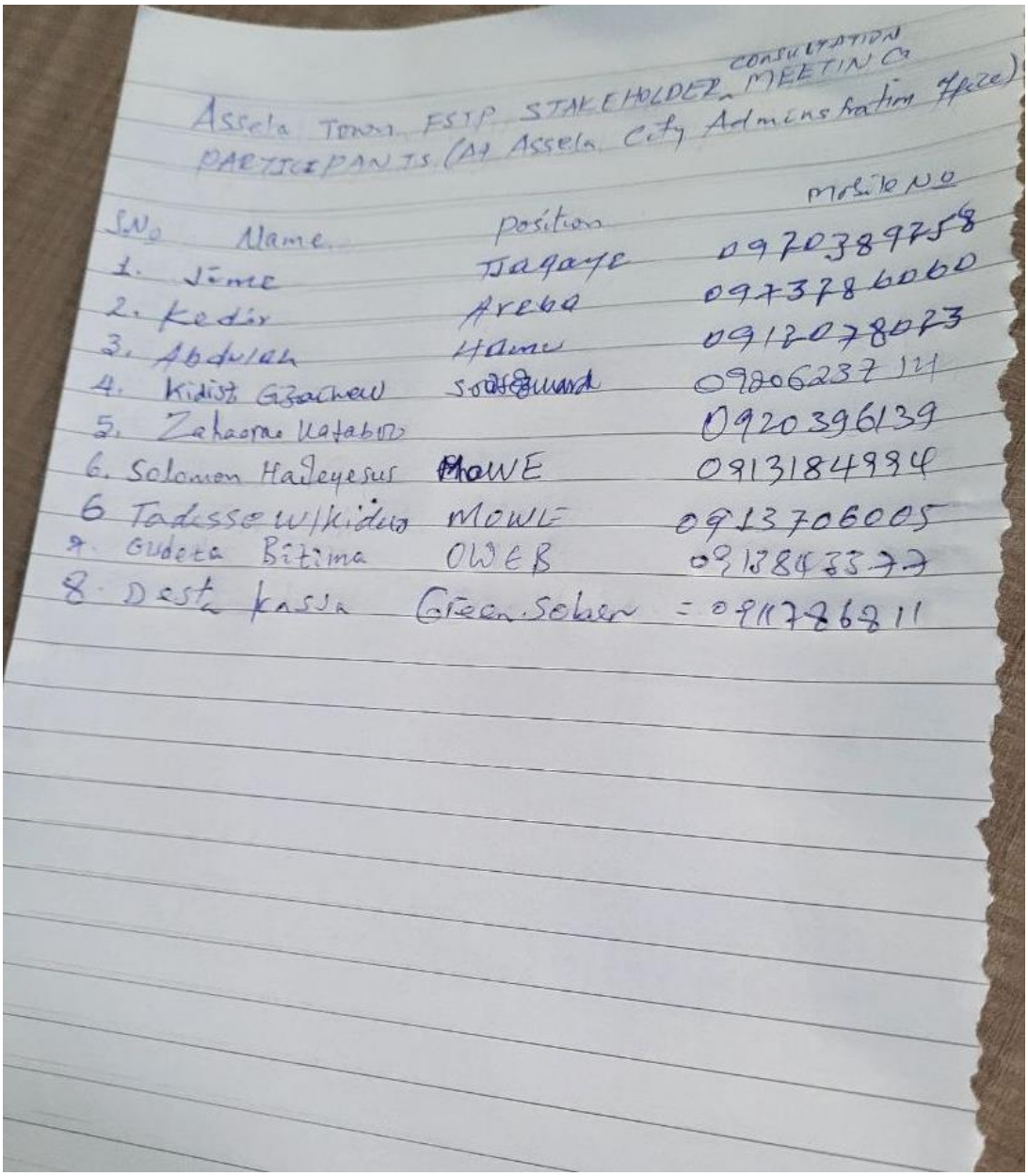
Annex-1: Community Discussion Minutes

CamScanner

Annex-2: Stakeholder analysis



Annex 3: Second Round Stakeholder consultation participant lists



Assela Town ESIP STAKEHOLDER CONSULTATION MEETING (At Assela City Administration Hall)
PARTICIPANTS

S.No	Name	position	Mobile No
1.	Jeme	Tagaye	0920389758
2.	Kedir	Arebo	0923786060
3.	Abdulah	Hamu	0918078023
4.	Kidist Gizachew	Sodo Guard	0920623711
5.	Zahaora Kafabo		0920396139
6.	Solomon Hailyesus	MoWE	0913184994
6	Tadesse W/Kidan	MOWE	0913706005
7.	Gudeta Bitima	OWEB	0913845377
8.	Desta Kasa	Green Sober	0911786811

Annex 4: Chance Find Procedures

The chance find procedure is a project-specific procedure that outlines actions required if previously unknown Physical cultural resources (PCR) are encountered during project construction or operation. If any person discovers a physical cultural resource, such as (but not limited to) archaeological sites, historical sites, remains and objects, or a cemetery and/or individual graves during excavation or construction, the following steps shall be taken

1. Stop all works in the vicinity of the find, until a solution is found for the preservation of these artifacts', or advice from the relevant authorities is obtained;
2. Immediately notify a foreman. The foreman will then notify the Construction Manager and the Environment Officer (EO)/Environmental Manager (EM);
3. Record details in Incident Report and take photos of the find;
4. Delineate the discovered site or area; secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities take over;
5. Preliminary evaluation of the findings by archaeologists. The archaeologist must make a rapid assessment of the site or find to determine its importance. Based on this assessment the appropriate strategy can be implemented. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage such as aesthetic, historic, scientific or research, social and economic values of the find
6. Sites of minor significance (such as isolated or unclear features, and isolated finds) should be recorded immediately by the archaeologist, thus causing a minimum disruption to the work schedule of the Contractor. The results of all archaeological work must be reported to the Ministry/Agency, once completed
7. In case of significant find the Agency/Ministry (Agency for Protection of National Heritage or Archaeological Research Centre, hereinafter referred to as Heritage team) should be informed immediately and in writing within 7 days from the find (ref. law on heritage protection).
8. The onsite archaeologist provides the Heritage team with photos, other information as relevant for identification and assessment of the significance of heritage items
9. The Ministry must investigate the fact within 2 weeks from the date of notification and provide response in writing. Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
10. Construction works could resume only after permission is granted from the responsible authorities.
11. In case no response received within the 2 weeks period mentioned above, this is considered as authorization to proceed with suspended construction works.
12. In case no response received within the 2 weeks period mentioned above, this is considered as authorization to proceed with suspended construction works.

One of the main requirements of the procedure is record keeping. All finds must be registered.

Photo log, copies of communication with decision making authorities, conclusions and recommendations/guidance, implementation reports – kept.

Additional information Management options for archaeological site

- **Site avoidance**. If the boundaries of the site have been delineated attempt must be made to redesign the proposed development to avoid the site. (The fastest and most cost-effective management option)
- **Mitigation**. If it is not feasible to avoid the site through redesign, it will be necessary to sample it using data collection program prior to its loss. This could include surface collection and/or excavation (The most expensive and time-consuming management option.)
- **Site Protection**. It may be possible to protect the site through the installation of barriers during the time of the development and/or possibly for a longer term. This could include the erection of high visibility fencing around the site or covering the site area with a geotextile and then capping it with fill. The exact prescription would be site- specific.

Management of replicable and non-replicable heritage: Different approaches for the finds apply to replicable and non-replicable heritage.

Replicable heritage: Where tangible cultural heritage that is replicable 26 and not critical is encountered, mitigation measures will be applied. The mitigation hierarchy is as follows

Avoidance; **Minimization** of adverse impacts and implementation of restoration measures, in situ; **Restoration** of the functionality of the cultural heritage, in a different location; **Permanent removal** of historical and archaeological artifacts and structures; **Compensation of loss** - where minimization of adverse impacts and restoration not feasible.

Non-replicable heritage: Most cultural heritage is best protected by in situ preservation, since removal is likely to result in irreparable damage or even destruction of the cultural heritage.

Annex 4: Environmental Guidelines for Construction Contractors

This Environmental Guideline applies to the Contractor. It also applies to any sub-contractors present on Project work sites at the request of the Contractor with permission from the Client. Besides, the regular inspection of the sites by the supervisor appointed by the Client for adherence to the Contract conditions and specifications, the Client may appoint an environmental inspector to oversee the compliance with these environmental conditions and any proposed mitigation measures. Regional Environmental Authorities may carry out similar inspection duties. In all cases, as directed by the Client's supervisor, the Contractor shall comply with directives from such inspectors.

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

Within 6 weeks of signing the Contract, the Contractor shall prepare an EHS-MP for the Client's approval. No works shall commence until the EHS-MP has been approved. The plan is to ensure the adequate management of the health, safety, environmental and social aspects of the works.

The Contractor's HSE-MP will set out the precise actions that the contractor will take to deliver: the mitigation measures and environmental performance requirements set out in the ESIA and the ESMP; any conditions or recommendations associated with the consenting process of the ESIA; relevant requirements of the contract (as set out in the General/Particular Conditions and General/Specific Specifications); the General Protection Measures and the Specific Protection Measures (as appropriate) as set out in this ESMF. As a minimum it shall include:

• A description of procedures and methods for complying with the E&S requirements stated above;

• A description of specific mitigation measures that will be implemented in order to minimize adverse impacts;

• A description of all planned monitoring activities and the reporting thereof;

• The internal organizational, management, inspecting, monitoring and reporting mechanisms, including the roles and responsibilities for the contractor's personnel.

The Contractor's HSE-MP will be a focused document/manual in the order of 50-100 sides and Environmental and Social Management Framework - Second Phase of UWSSP shall be reviewed and approved by the Client before start of the works.

General Protection Measures In general, environmental protection measures to be taken at any work site shall achieve the following aims:

A. Minimize the effect of dust on the environment resulting from earth mixing sites, vibrating equipment, construction related traffic on temporary or existing access roads, etc. to ensure safety, health and the protection of workers and communities living in the vicinity of work sites and access roads.

B. Ensure that noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) comply with the most stringent of the Ethiopian legal requirements or the World Bank EHS Guidelines and are generally kept at a minimum for the safety, health and protection of workers within the vicinity of high noise levels and nearby communities.

C. Ensure that existing water flow regimes in rivers, streams and other natural or irrigation channels are maintained and/or re-established where they are disrupted due to works being carried out.

D. Prevent any construction-generated substance, including bitumen, oils, lubricants and wastewater used or produced during the execution of works, from entering into rivers, streams, irrigation channels and other natural water bodies/reservoirs. Maintain water quality of these water resources.

E. Avoid or minimize the occurrence of standing water in holes, trenches, borrow areas, etc. (to minimize breeding grounds for mosquitos etc)

F.Prevent and minimize the impacts of quarrying, earth borrowing, piling and building of temporary construction camps and access roads on the biophysical environment including protected areas and arable lands; local communities and their settlements. Restore/rehabilitate all sites to acceptable standards.

G. Ensure that all drums, containers, bags, etc. containing oil/fuel/surfacing materials and other hazardous chemicals or materials shall be stored at construction sites on a sealed and/or bonded area in order to contain potential spillage. All waste containers, litter and any other waste generated during the construction shall be collected and disposed of at designated disposal sites in line with applicable Ethiopian government waste management regulations.

H. Ensure that all drainage and effluent from storage areas, workshops, housing quarters and generally from camp sites shall be captured and treated before being discharged into the drainage system in line with the more stringent of the national and World Bank EHS Guidelines Environmental and Social Management Framework - Second Phase of UWSSP applicable water pollution limit values. Sufficient and appropriate spill kits (as agreed with the client) shall be provided and workers trained in their use to contain and clear up spills.

I. Ensure used oil from maintenance shall be collected, properly stored in sealed containers, and either disposed of appropriately at designated sites or be re-cycled.

J. Restriction of entry of runoff into construction sites, staging areas, camp sites, by constructing diversion channels or holding structures such as berms, drains, dams, etc. to reduce the potential of soil erosion and water pollution.

K. Inhibit the leaving of construction waste along the road in stockpiles, but ensure it is removed and reused or disposed of on a daily basis.

L. Ensure, where temporary dump sites for clean excavated material are necessary, that they shall be located in areas, approved by the Client's supervisor, where they will not result in supplemental erosion. Any compensation related with the use of such sites shall be settled and all necessary consents obtained prior to their use.

M. Ensure areas for temporary storage of hazardous materials such as contaminated liquid and solid materials are approved by the supervisor and appropriate local and/or relevant national or local authorities before the commencement of work: these shall be sufficiently constituted to prevent accidental or intentional discharge to the environment. Disposal of such waste shall be in existing, approved sites.

N. Restrict vegetation clearing to the area required for safe operation of construction work. Vegetation clearing shall not be done more than two months in advance of operations.

O. Ensure Stockpile areas are located in areas where trees or other natural obstacles can act as buffers to prevent dust pollution, and generally at a distance from human settlements. Wind shall be taken into consideration when siting stockpile areas. Perimeter drains shall be built around stockpile areas.

P. Upon discovery of graves, cemeteries, cultural sites of any kind, including ancient heritage, relics or anything that might or believed to be of archeological or historical importance during the execution of works, immediately stop works and report such findings to the Client so that the Ministry in charge of Culture may be expeditiously contacted for fulfillment of the measures aimed at protecting such historical or archaeological resources. In this instance the chance finds procedures (Annex VI) should be followed.

Q. Compliance with a workers code of conduct that amongst its measures, shall prohibit construction workers from engaging in the exploitation of natural resources such as hunting, Environmental and Social Management Framework - Second Phase of UWSSP fishing, and collection of forest products or any other activity that might have a negative impact on the social and economic welfare of the local communities, and prohibit explicitly the transport of any bush meat in Contractor's vehicles.

R. Prohibit the transport of firearms in Project-related vehicles.

S. Prohibit the transport of third parties in Project-related vehicles.

T. Implement soil erosion control measures in order to avoid surface run off and prevent siltation, etc.

U. Ensure that garbage, sanitation and drinking water facilities are provided in construction workers camps.

V. Ensure that, in as much as possible, local materials are used to avoid importation of foreign material and long distance transportation.

W.Ensure public safety, and meet Ethiopian traffic safety requirements for the operation of work to avoid accidents.

X. Ensure that any trench, pit, excavation, hole or other hazardous feature is appropriately demarcated and signposted to prevent third-party intrusion and any safety hazard to third parties.

Y. Comply with Ethiopian speed limits, and for any traffic related with construction at UWSSP sites, comply with the following speed limits unless Ethiopian speed limits are lower: • Inhabited areas: 50 km/h • Open road: 90 km/h.

Z. Ensure that, where unskilled daily-hired workforce is necessary, such workers are hired from neighboring communities.

(aa) Generally comply with any requirements of Ethiopian law and regulations.

Specific Protection Measures: Drilling

The Contractor will make sure that any drilling fluid, drilling mud, mud additives, and any other chemicals used for drilling at any UWSSP construction site complies with the more stringent of the Ethiopian environmental, health and safety legal and regulatory requirements and World Bank EHS Guidelines. In general, only bio-degradable materials will be used. The Contractor may be required to provide the detailed description of the materials he intends to use for review and approval by the Client.

Drilling fluids will be recycled or disposed of in compliance with Ethiopian regulations in an authorized disposal site.

If drilling fluids cannot be disposed of in a practical manner, and if land is available near the drilling site that is free of any usage rights, the Contractor may be authorized Environmental and Social Management Framework - Second Phase of UWSSP to dispose of drilling fluids near the drilling site. In this occurrence, the Contractor will be required to provide to the Client due evidence of their total absence of potential environmental impacts, such as leachate tests certified by an agreed laboratory. In this case, drilling fluids will be dried at site, mixed with earth and spread at site. Any site affected by drilling work will be restored to its initial condition. This applies to drilling pads, access roads, staging areas, etc.

Topsoil will be stripped ahead of any earthmoving, stored near the construction site, and replaced in its original location after the re-contouring of the area affected by the works. Where successive aquifers are intersected by the drilling works and upon order by the work supervisor, the Contractor may be required to take measures to isolate aquifers from contamination by each other. The Contractor will take all measures to avoid bacteriological or chemical contamination of the intersected aquifers by the drilling equipment.

Similarly, the Contractor will take all measures to avoid bacteriological or chemical contamination of the intersected aquifers from the surface by providing an adequately sealed well-head. When greasing drilling equipment, the Contractor will avoid any soil contamination. In the event of a limited hydrocarbon spill, the Contractor will recover spilled hydrocarbons and contaminated soils in sealed drums and dispose of them in an authorized waste management facility. Unless duly requested by the Contractor and authorized by the supervisor, no servicing of drilling equipment or vehicles is permitted at the drilling site.

Specific Protection Measures: Pipelines

No trench shall be left open for more than 7 days, unless duly authorized by the supervisor upon Contractor's request. Trenches and other excavation works shall be established, demarcated/fenced and/or signposted sufficient to prevent accident or injury to workers or the public, including during hours of darkness. . General conditions related with topsoil stripping, storage and restoration apply. The Contractor will take measures to dispose of water used for pressure tests in a manner that does not affect neighboring settlements.

Specific Protection Measures: Quarries and Borrow Areas and deposit sites

The Contractor shall obtain appropriate licenses/permits from relevant authorities to operate quarries or borrow areas prior to their first use. The location of quarries and borrow areas shall be subject to review and approval by relevant local and national authorities. Environmental and Social Management Framework - Second Phase of UWSSP New sites:

A. Shall be located 1km or more from settlement areas, archaeological areas, and cultural sites - including churches and cemeteries, wetlands or any other valued ecosystem component, or on high or steep ground.

B. Shall not be located in water bodies, or adjacent to them, as well as to springs, wells, well fields.

C. Shall not be located in or near forest reserves, natural habitats or national parks.

D. Shall be designed and operated in the perspective of an easy and effective rehabilitation. Areas with minimal vegetation cover such as flat and bare ground, or areas covered with grass only or covered with shrubs less than 1.5m in height, are preferred.

E. Shall have clearly demarcated and marked boundaries to minimize vegetation clearing and safety hazards for third parties.

F. Shall be operated in accordance with the General Environmental Protection Requirements, the Construction ESMP for the project and in accordance with any consent / permit conditions.

The Contractor shall deposit any excess material in accordance with the principles of these guidelines, and any applicable ESMP, in areas approved by local authorities and/or the supervisor.

General Protection Measures: Rehabilitation of Work and Camp Sites

Topsoil shall be stripped, removed and stored for subsequent rehabilitation. Soils shall not be stripped when they are wet. Topsoil shall not be stored in large or high heaps more than 3m in height: low mounds of no more than 1 to 2m high are recommended to preserve topsoil structure. Generally, rehabilitation of work and camp sites shall follow the following principles:

- To the extent practicable, reinstate natural drainage patterns where they have been altered or impaired.

- Remove toxic materials and dispose of them in designated sites. Backfill excavated areas with soils or overburden that is free of foreign material that could pollute groundwater and soil.

- Ensure reshaped land is formed so as to be stable, adequately drained and suitable for the desired long-term land use, and allow natural regeneration of vegetation.

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

- Compacted surfaces shall be deep ripped to relieve compaction unless subsurface conditions dictate otherwise. Environmental and Social Management Framework - Second Phase of UWSSP

General Protection Measure: Management of Water Needed for Construction Purposes

The Contractor shall at all costs avoid conflicting with water needs of local communities. To this effect, in the case of any temporary water abstraction for construction needs from either ground or surface water maps outlining current water shortage and drought situation should be first consulted. Following this proposed abstraction plans shall be submitted to the following community consultation process:

- Identification of water uses that may be affected by the planned water abstraction,

- Consultation with all identified groups of users about the planned water abstraction,

- In the event that a potential conflict is identified, report this to the supervising authority.

This consultation process shall be documented by the Contractor (minutes of meeting) for review and eventual authorization of the water withdrawal by the Client's supervisor. Abstraction of both surface and underground water shall only be done with the consultation of the local community as mentioned and

after obtaining a permit from the relevant authority. Abstraction of water from wetlands is prohibited. Temporary damming of streams and rivers is subject to approval by the Client's supervisor and any permits/consents required by law or regulation to be in place prior to works occurring. It shall be done in such a way as to avoid disrupting water supplies to communities downstream, and to maintain the ecological balance of the river system.

No construction water containing spoils or site effluent, especially cement and oil, shall be allowed to flow into natural water drainage courses. Similarly, wash water from washing out of equipment shall not be discharged into water courses or road drains. Washing bays shall be sited accordingly. Washout waters should be collected and appropriately treated prior to discharge in accordance with legal requirements and meeting the most stringent of limit values (national or World Bank EHS guidelines.) Site spoils and temporary stockpiles shall be located away from the drainage system, and surface run off shall be directed away from stockpiles to prevent erosion.

General Protection Measures: Traffic Management and Community Safety

The contractor shall prepare a Traffic Safety Management Plan that sets out the approved routes and safety measures (such as signalization, fencing safe crossings, diversions, traffic sign locations etc.) to be taken, for the approval of the Client's supervisor. Location of temporary access roads shall be done in consultation with the local community and based on the screening results, especially in important or sensitive environments.

Temporary access roads shall not traverse wetland areas or other ecologically sensitive areas. The construction of any access roads shall be submitted to a prior consultation process with Environmental and Social Management Framework - Second Phase of UWSSP potentially affected communities that will have to be documented (minutes of meetings) for supervisor's review and approval. Upon the completion of civil works, all temporary access roads shall be ripped and rehabilitated. Measures shall be taken to suppress dust emissions generated by Project traffic. Maximum speed limits for any traffic related with construction at UWSSP sites shall be the following, unless Ethiopian speed limits are locally lower:

•Inhabited areas: 50 km/h and Open road: 90 km/h.

General Protection Measure: Salvaging and Disposal of Obsolete Components Found by Rehabilitation Works

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

Any asbestos cement material that might be uncovered when performing rehabilitation works will be considered as hazardous material. Upon discovery it shall be segregated and covered as necessary to prevent the spread of fibres/dust. A plan shall be prepared by the contractor for the safe removal to a suitable facility, and the plan shall be affected only following its approved by the client.

General Protection Measure: Compensation of Damage to Property

Compensation of land acquired permanently for Project purposes will be handled under Client responsibility based on the provisions of the RPF. However, in the event that the Contractor, deliberately

or accidentally, damages property, he shall repair the property to the owner's satisfaction and at the contractor's own cost. For each repair, the Contractor shall obtain from the owner/user a certificate that the damage has been made good satisfactorily in order to indemnify the Client from subsequent claims. In any case where compensation for inconveniences, damage of crops etc. are claimed by the owner, the Client has to be informed by the Contractor through the supervisor.

General requirement: HSE Reporting

The Contractor shall prepare bi-monthly progress reports to the Client on compliance with the HSE-MP. The content of the Contractor's reports will agreed with the client and will include as a minimum information on: Environmental and Social Management Framework - Second Phase of UWSSP

- HSE management actions/measures taken, including approvals sought from local or national authorities;

- Problems encountered in relation to HSE aspects. For example number of time lost accidents, accidents involving non-worker personnel, injuries, fatalities, environmental incidents and infringements, grievances recorded and closed, no. of inspections undertaken;

- Non-compliance with contract requirements on the part of the Contractor;

- Changes of assumptions, conditions, measures, designs and actual works in relation to HSE aspects; and

- Observations, concerns raised and/or decisions taken with regard to HSE management during site meetings.

The reporting of any significant HSE incidents shall be done as soon as practicable and within 24 hours of the contractor becoming aware of the incident. Such incident reporting shall therefore be done individually. The Contractor shall keep his own records on health, safety and welfare of persons, incident reports and damage to property and shall provide access and copies of these records to the Supervising Engineer and/or Client upon request.

General requirement: Training of Contractor's Personnel

The Contractor shall provide sufficient training to his own personnel to ensure that they are all aware of and suitable equipped to comply with the approved Contractors HSE-MP. Specific training will be provided to those employees that have particular responsibilities associated with the implementation of the HSE-MP. Training activities will be documented for potential review by the Client. Amongst other issues, training will include an awareness session for all employees on HIVAIDS addressing the following topics:

• What is HIV/AIDS? • How is HIV/AIDS contracted? • HIV/AIDS prevention.

General Requirement: Code of Conduct

The Contractor shall prepare, for the client's approval, a code of conduct for all workers (including sub-contractors) and provide details of the methods that the contractor will use to ensure compliance with the code.

Annex 5: TOR MOWE 2ND UWSSP-FSTP

Project Proponent

1.1 The Federal Democratic Republic of Ethiopia, Ministry of Water and Energy

1.2 Background

Ethiopia is among the countries that have made considerable achievement in meeting the Millennium Development Goals (MDGs). Despite progressive economic growth the country lag behind from the regional average on access to safe water and improved sanitation services to have a significant impact on better health and nutrition, lower school dropout rates and improved household incomes. Ethiopia's rapid urbanization is putting stress on the already inadequate water supply and sanitation system in urban areas. Towns are growing horizontally and vertically

and rural villages are also being clustered with small towns faster than ever before. The growing demand generated by rapid population growth, fast growing infrastructure development, service sector growth such as hotels, trade, and industrialization, as well as changes in way of life and awareness level of the residents have mounted pressure in the already inadequate WSS system.

The UWSSP-II is designed to support service providers in Addis and select secondary cities move towards a longer term goal of efficient, universal and affordable service provision within a supporting policy and regulatory framework. 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 selected secondary cities. The project will support the Government's effort to respond to the increasing urban demand through investments in sanitation infrastructure, and engaging private operators to improve O&M of the facilities. There will also be activities to improve WSS services levels by facilitating the establishment of institutional arrangements for modernizing the operational and management systems of utilities in Addis Ababa and the selected secondary cities.

The project will also undertake legal, institutional and sector reforms that will permit selected urban water and sewer utilities to function in a more efficient manner deliver better service and achieve a higher degree of financial sustainability. To achieve its development objectives, the project will finance the following components in selected secondary cities.

The project includes three components to achieve the revised PDO: (i) sanitation and water supply services improvement in Addis Ababa; (ii) sanitation and water supply services improvements in select secondary cities; and (iii) Project management and institutional strengthening. To realize component 1, the project has designed three sub-components, namely; Sub-component 1.1: Sanitation services improvement in Addis Ababa: Sub-component 1.2: Operational efficiency improvements in Addis Ababa: and Sub-component 1.3: Project management and Institutional strengthening in Addis Ababa

Similarly, for secondary cities the project has classified component 2 into three sub-components, namely Sub-component 2.1: Sanitation improvement in secondary cities and towns: Sub-component 2.2: Water supply and operational efficiency improvement in secondary cities and Sub-component 2.3: Project Management & Institutional Development in secondary cities and towns.

The proposed investments are likely to incur some adverse environmental and social impacts requiring mitigation (that is, soil erosion, soil and water pollution, a potential increase in malaria, loss of vegetation, traffic accidents and air pollution, health and safety of people near construction sites, taking of privately owned land) due to the project's construction and rehabilitation activities under Components 1 and 2. This will mitigated by screening of projects and implementing relevant WB operational policies.

Limited capatown and experience of selected secondary cities on implementation and management of urban sanitation could substantially affect implementation progress and effective operationalization of the facilities. Most of the participating cities have weak capatown in safeguard that could substantially affect implementation. The project will require availability of critical safeguard staffs and capatown building at every level to support safeguards.

The Water Development Commission which was designated as the implementing agency as established by proclamation No 1097/2018 will be replaced by Ministry of water and Energy after project approval to carry out study, design and construction of potable and sustainable water supply and sanitation infrastructure.

1.3 Brief Description of Sub Projects

1.3.1 Proposed Infrastructures/Activities

The project will implement in each town for the immediate, intermediate and long-term sanitation interventions based of demand assessment findings. It is considered that the population will continue to increase, and it is assumed that a number of infrastructure service improvements will be implemented as presented below:

- **Fecal Sludge Treatment System (FSTS)**

The FST plant will be constructed in order to treat the daily produced fecal sludge. It will consist of the following: truck reception (fecal sludge feeding); grid separation and/or screening; settling- thickening tanks and sludge drying beds. The liquid phase coming from the settling tanks and drying beds is led to the biological treatment phase for further treatment.

- **Toilets**

New public toilets and new communal toilet construction are planned in areas where the availability of sanitation facility is low and/or where more households share the same facility;

The toilets to be constructed are water closet/flush type public latrine, potentially connected to septic tank. The sludge and waste water will be transported by vacuum trucks to FSTP for safe disposal.

Moreover, public awareness campaigns should also be launched, preparing the population for such an incremental change in their sanitation status, with the aim of raising the acceptance of the envisaged works (e.g. the WWTPs to be constructed), raising the value of safe and hygienic sanitation facilities, the willingness to pay ensuring the feasibility of the system, as well as ensuring the necessary funding for the next phases;

1.3.2 Location of the Sub projects (Jimma, Nekemte, Assela, Shashemene, Bishoftu, Arbaminch and WolaitaSodo towns)

Jimma is the largest town in south-western Oromia. It is a special zone of the Oromia Region and is surrounded by Jimma Zone. It has a latitude and longitude of 7°40′N 36°50′E. Prior to the 2007 census, Jimma was reorganized administratively as a special Zone. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this Zone has a total population of 120,960, of whom 60,824 are men and 60,136 women. The national 1994 census reported this town had a total population of 88,867, of whom 43,874 were men and 44,993 were women. With an area of 50.52 square kilometers, Jimma has a population density of 2,394.30 all are urban inhabitants. A total of 32,191 households were counted in this Zone, which results in an average of 3.76 persons to a household, and 30,016 housing units.

Nekemte is a market town and separate woreda in western Ethiopia. Located in the East Welega Zone of the Oromia Region, Nekemte has a latitude and longitude of 9°5′N 36°33′E and an elevation of 2,088 meters. The 2007 national census reported a total population for this woreda of 75,219, of whom 38,385 were men and 36,834 were women. Nekemte is host town to the newly built Wollega University as of 2007.

Assela is a town located in the Arsi Zone of the Oromia Region about 159 kilometers from Addis Ababa, this town has a latitude and longitude of 7°57′N 39°7′E, with an elevation of 2,430 meters. The 2007 national census reported a total population for Assela of 67,269, of whom 33,826 were men and 33,443 were women.

Bishoftu is a town and separate woreda of Ethiopia, lying south east of Addis Ababa. The town is located in the East Shewa Zone of the Oromia Region, and has an elevation of 1,920 meters.

Bishoftu is located 47.9 kilometers southeast of Addis Ababa along its route highway. The 2007 national census reported a total population for Bishoftu of 99,928, of whom 47,860 were men and 52,068 were women.

Shashemeneis a town of West Arsi Zone, Oromia Region, Ethiopia. The town lies on distance of 240 km from the capital of Addis Ababa. It has a latitude of 7° 12' north and a longitude of 38° 36' east.

The 2007 national census reported a total population for this town of 100,454, of whom 50,654 were men and 49,800 were women. A plurality of the inhabitants practiced Ethiopian Orthodox Christianity, with 43.44% of the population reporting they observed this belief, while 31.15% of the population said they were Muslim, 23.53% of the population were Protestant, and 1.3% were Catholic.

Arba Minch is a town and separate woreda in southern Ethiopia. It is located in the Gamo Zone of the Southern Nations, Nationalities, and Peoples Region. The town is located at a distance about 500 kilometers south of Addis Ababa, at an elevation of 1285 meters above sea level. It is the largest town in Gamo Zone and the second town in SNNPR next to Awassa. It is surrounded by Arba Minch Zuriaworeda and the most resourceful zone in southern region including two largest Lakes in Ethiopia (Chamo and Abaya), more than 40 springs, National Nechsarpark, crocodile market, several fruits including banana, apple, mango, avocado, etc. Based on the 2007 Census conducted by the CSA, this town has a total population of 74,879, of whom 39,208 are men and 35,671 women.

WolaitaSodo is a town and separate woreda in south-central Ethiopia. The administrative center of the Wolaita Zone of the Southern Nations, Nationalities, and Peoples Region, it has a latitude and longitude of 6°54′N37°45′E with an elevation between 1,600 and 2,100 meters above sea level. It was part of the former Sodoworeda which included SodoZuria which completely surrounds it. Based on the 2018 Population Projection by the CSA, this town has a total population of 254,294, of whom 125,855 are men and 128,439 are women. This makes WolaitaSodo the second most populous town in South Region after Awassa.

1.4 Purpose of the Terms of Reference

This ToR essentially outlines the issues that should be considered in preparing the ESIA reports for the **seven sub projects** under UWSSP-II. Furthermore, the ToR provides the framework for

the ESIA, including information on the purpose the ESIA and factors considered to be most significant for the project proposal. It indicates the types of studies and the data that should be provided in the ESIA.

1.5 Objective of the Consultant's Service

The main objective of Consultancy is to carry out the Environmental and Social Impact Assessment for Second Urban Water Supply and Sanitation Project seven subprojects in seven towns (Jimma, Nekemite, Assela, Shashemene, Bishoftu, Arbaminch and Wolaitasodo towns). The consultant is expected to identify environmental and social impacts during the life cycle of the sub-projects and recommend appropriate mitigation measures. Further, the consultant shall prepare environmental and social management and monitoring plans. Additionally, under the ESIA study process, the consultant will develop an indicative socio-economic assessment for preparation of resettlement action plans (RAPs) for potential affected villages.

1.4.1 Specific Objectives:

- Examination of the National and the World Bank environmental safeguard policies and regulations that will be triggered by the subproject activities at any development phase of the sub project and these shall include but not limited to the project ESMF, GAP, World Bank's Gender strategy and GBV requirements.
- Describe the views and concern of the public and stakeholders towards implementation of the subproject.
- Establish baseline features of the biophysical, socio-economic and cultural attributes in the subproject influence area.
- Identification and evaluation of significant impacts (both beneficial and adverse) due to the subproject implementation that require appropriate mitigation measures.
- Propose specific mitigation for inclusion in the subproject detail design and management plan to reduce or avoid significant adverse environmental and social impact including gender and potential GBV risks.
- Conduct analysis of alternatives to the proposed sub-projects in terms of technology, design, and operation; including the "without project" situation.
- Assessment and identification of capatown gap and propose training and capatown building requirements for implementation of environmental mitigation and monitoring.
- Preparation of Environmental and Social Management Plan.

- Cost estimate for each proposed mitigation measure and monitoring program.
- Develop a monitoring program that will be followed during the project implementation.
- Recommend environmental and social compliance requirements, design measures, and staffing that should be included in the works contract documents.

The ESIA shall be prepared in a level of detail specific enough for incorporation of environmental and social measures into a tender package for potential construction works, to allow these activities to be adequately priced and become part of the successful bidder‘s works contract. The ultimate aim is to foster on the ground implementation of effective environmental and social measures during the project execution and operational phases.

The Consultant shall be an independent firm, hired on a competitive basis and shall not be connected to the study and design consultant/firm of the project to avoid a conflict of interest. The ESIA consultant shall be a qualified and licensed consultancy firm that will prepare separate full ESIA reports to the **seven sub-projects**

2. Scope of Work and Guideline for Preparation of Environmental and Social Impact Assessment Studies

General: All potentially significant environmental and social impacts of the proposed sub-projects are to be investigated, socio-economic and cultural situation at the project site be addressed, and requirements for the mitigation of any adverse impacts are to be detailed in the ESIA and the ESIA should address at least the requirements as set out in this ToR. Any prudent and feasible alternatives should be discussed and treated in sufficient detail. The reasons for selection of the preferred option should be clearly identified. The nature and level of investigations should be relative to the likely extent and gravity of impacts.

The guideline should, however, not be interpreted as excluding from consideration of any matters which are currently unforeseen, which may arise during the course of the ESIA studies, which may arise from any changes in the nature of the proposal during the preparation of the ESIA, and based on the outcome of community consultations.,

2.1 Scope of the Work

The consultant shall carry out desktop review and field studies in order to fully describe environmental and social baseline of the affected areas. The consultant is expected to undertake investigation on social aspects, economic activities, and conservation of natural resources, historical and anthropological heritages, and conduct public consultation. Based on the

knowledge of the affected environment, the consultant shall identify and describe impacts and associated mitigation measures for the design, construction and operation phases.

During the study, the consultant shall take into account issues and concerns raised during stakeholders/community consultations and incorporate these issues and concerns into the environmental and social analysis.

One of the beneficial project impacts of UWSSP is the production of job opportunities for citizens during construction as well as operation phases. Especially during these two phases of the projects, Occupational Safety and Health of workers should be given special attention. In this respect, to manage health, safety and environmental issues with regard to the community and workers. The consultant should assess the following health and safety issues, but not limit to:

- review conditions of the proposed site asset , especially underground works regarding structural stability, potential spilling and rock fall risks during waste water treatment plan(if applicable) .
- review the experience of the organization /utilities regarding emergency equipment and communication system, first aid equipment and rescue service
- Review experience of personal protection equipment for surface and underground works.
- Review site health and safety management procedures.
- Draw up recommendations to improve Health and Safety conditions on construction site, elaborate comprehensive H&S measures. And other health and Safety issues will be clearly identified with their mitigation measures.

The Consultant shall be responsible for carrying out all necessary preparatory studies, field work, research and investigations (including the generation of new field data, as deemed necessary or appropriate) to compile the information required for the work. The scope of the works to be undertaken by the consultant shall include the following tasks:

Task 1: Description of the Proposed Sub-Project

The consultant shall prepare detailed descriptions of the subprojects including but not limited to the following:

- The proposed subprojects design, size and nature of the development supported with appropriate descriptive diagrams, plans, or maps;

- Estimated duration of subprojects development phases including pre-construction, construction, operation, and decommissioning (as appropriate) along with the nature of program/activities & method of execution;
- Type and characteristics of resources required including land (for temporary and permanent works), water, energy, construction materials, machineries/vehicles, estimated number of workers, etc.
- Estimates types and quantities of waste, energy (noise, vibration, light, heat, radiation, etc.), and residual materials generated during construction and operation of the subprojects, and rate at which these will be produced.

Task 2: Review of Regulatory and Policy Framework

The Consultant shall review policy, institutional and legal framework related to water development by giving special attention to institutions responsible for environment and social management relevant to implementation of the water supply and sanitation projects including land acquisition. The Consultant is also expected to review the project's ESMF, RPF and Gender Action Plan (GAP).

Based on the National legislations and regulations identified in the ESMF and RPF, the Consultant shall identify any relevant changes occurred since the time the ESMF and RPF were prepared, and identify the practical implications thereof in preparing the ESIA. The Consultant is also expected to review relevant World Bank safeguard policies applicable to the subprojects, such as Environmental Assessment (OP/BP 4.01), Physical Cultural Resources (OP 4.11), Involuntary Resettlement (OP /BP 4.12.), Projects on International Waterways (OP/BP 7.5), and the Bank's Environmental, Health and Safety Guidelines, and GBV requirements.

The Consultant will summarize in the ESIA reports the applicable regulatory and policy background with a focus on practical implications in terms of:

- ✓ ESIA process, including public consultation and disclosure,
- ✓ ESIA scope of work,
- ✓ Contents of the ESIA report,
- ✓ Sub-project description:

- The legal, policy and institutional framework should be reviewed the following, but not limited to:

- ✓ The Constitution of Ethiopia
- ✓ Environmental Policy of Ethiopia
- ✓ National Sanitation Strategy
- ✓ National Social Protection Policy
- ✓ Ethiopian water resource management policy
- ✓ Environmental Impact Assessment Proclamation No 299/2002
- ✓ Environmental Pollution Control, Proclamation No 300/2002
- ✓ Regulation No 159/2008, Prevention of Industrial Pollution Regulation
- ✓ Addis Ababa Town Regulation No 25/2007, on pollution control
- ✓ Public Health Proclamation No 200/2000
- ✓ Expropriation of landholding for Public Purposes & Payment of compensation and resettlement Proclamation No 1161/2019 and Regulation 472/2020
- ✓ The Labour Law, Proclamation No 1156/2019
- ✓ Women Policy
- ✓ Policy on People Living with Disability
- ✓ Environmental Guidelines and Standards
- ✓ The World Bank Safeguard Policy Requirements
- ✓ Institutional Framework for Environmental and Social Management etc…

Task 3: Public Participation and Consultations

The purpose of the consultation process on environmental and social aspects is to ensure that the views of all key interested and affected parties and public communities are heard, so that their views can be taken into account where appropriate during physical design of the subprojects. The views shall influence the mitigation measures and the formulation and design of any complementary environmental and social measures and activities that will be included in the tender documentation. Key activities include:

- The consultant shall undertake identification of interested parties (beneficiary communities, communities potentially affected by the project, downstream water users, local authorities, regional authorities);
- The consultant shall undertake initial meeting with each of the identified parties, to introduce the sub-projects and acquire input to further develop the preparation of the environmental and social assessment activities;

- At least one official consultation meeting shall be arranged in each subproject sites involving representatives from key interested and affected parties and public communities, business communities, local administration and institutions where the subproject components are located.
- The consultation interview meeting shall also extend to relevant institutions and facilities including, but not limited to, the following:
    - Representative from communities, institutions and facilities;
    - Respective Cities Environment Protection Authority
    - Cities Utility offices, sub-cities and Woreda's.
    - Local and national representatives from agencies responsible for environmental protection, agricultural development, health facilities, water management, cultural heritage, archaeology, infrastructure and service provision
    - Local community leaders and community representatives comprising women participants (including government, non-government and civil society organizations)
- The consultant, after the environmental and social assessment work is completed, shall follow up with second round consultations through presentation of the results of the environmental and social assessment such as identified impacts and proposed mitigations measures so as to get input for the enrichment of the assessment report on those proposed environmental management measures. The second round consultations shall include dissemination of information to identified interested parties in a form of brief summary in local languages and/or English;
- Any public consultation meeting undertaken by the consultant shall be reviewed and discussed with the client and documented in an appropriate format.
- Main issues raised during consultation meetings shall be summarized in the ESIA reports, with a description of the manner in which these issues were addressed in the ESIA process.
- The Consultant shall keep a written record of all meetings, and ensure that they reflect an accurate and true reflection of the discussions.

Consultation with local Community: Community participation and consultation is an important step in the ESIA preparation process. Public consultation is instrumental in assessing the socio-economic impacts of projects. Community consultation meetings shall be convened to

draw together the issues and concerns of stakeholders and project affected parties. Consultations with project-affected parties include woman and youth, community leaders and the disadvantaged groups such as the elderly and disabled individuals and community members whose livelihood or income generating activities will be directly affected by the project activities.

Discussion with the project design team: Project alternatives, designs and processes shall be thoroughly discussed with the design engineers to understand the nature of the sub projects. Similarly, discussions shall also be made with the relevant experts from the cities' relevant administration offices to develop common understanding on the scope of the assignment.

Discussions with the government authorities: The Federal, regional/town offices or any responsible for environment will be consulted and their institutional framework, policies, procedures, guidelines etc. will also be reviewed.

Task 4: Baseline Conditions

The consultant shall undertake baseline assessment and provide description of the environment that will be affected by the subproject. During field work information on physical, biological and socio-economic environmentshallbe collected. In addition, water samples from the rivers where treated wastewater will be discharged to the nearby river shall be collected for analysis in order to establish baseline data useful for monitoring impact during construction and operation phases of the projects. This will be done using checklist, matrices or other methods as required.

Description of the baseline conditions include:

- Physical and bio-physical environment (climate, topography at the sub-project site(s), geology, hydrogeology/groundwater, surface water, soils, erosion sensitivity, flora, fauna, including the identification of any protected or endangered species);
- Description on socio-economic data including population, demography, community structure, standard of living, housing condition, energy and water supply, socio-political organization, access to public services, economic state of local population, extent of poverty, cultural properties, heritage sites, building and other, existing livelihoods and employment, transport patterns;
- Human environment: description of neighboring communities (population size, population structure and demography, socio-political organization, livelihoods, access to public services),
- Description on gender considerations (that incorporates gender disaggregated data and

analysis) including the gender-based violence and sexual exploitation and disadvantaged groups including vulnerable women and other people with special needs. The project's benefit for poor people other than employment opportunity and special treatment to be proposed for them, identify potential risk and mitigation measures for downstream residents for wastewater treatment plant sites (if applicable),

- Land tenure, land use rights, land use system in and around the subproject areas;
- Existing infrastructure services utilities found in and around the subproject influence area interfered during the subproject construction period
- Access to health centers, primary and secondary schools, other public private and government facilities;
- On-going and planned activities that may affect implementation of the subprojects
- Health issues, prevalence of major disease such as HIV/AIDS and likely trends, availability of health centers and likely health trends including GBV issues mainly potential GBV risks;
- Labor and employment condition;
- Physical cultural resources defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance;

  For the above baseline data collection purpose, the consultant shall collect available documents from credible sources and stakeholders' consultations, data gap on key relevant baseline aspect shall be identified, and the consultant will possibly address the gap/weakness through interview and meeting with stakeholders during the ESIA study;
- The consultant may also obtain data based on the design consultant survey which are relevant supporting baseline information, environmental and social opportunities and constraints;
- The baseline assessment will be summarized using the format presented in the "typical ESIA report structure" hereunder;
- Reports of field observations and bibliography used will be presented as appendices;

Task 5: Impact Identification, Characterization and Evaluation

The consultant shall briefly describe methodology for identifying, predicting and evaluation of impacts (both negative and positive). The consultant shall assess cumulative impacts (positive

and negative, direct and indirect, long-term and short term) due to implementation of multiple interventions of the sanitation sub-projects. With regard to each impact, the following shall be included:

- Criteria used for determining significance of impact (magnitude, geographic extent, duration, frequency, reversible or irreversible, risk of uncertainty, size of group affected); in addition it shall take in to account views and concern of stakeholders, sensitivity of the environment, considering consistency with international environmental and social agreement/standards, environmental and social objectives and policies; effect on resources/heritage/cultural sites protected by laws, socio-economic and gender consequences (vulnerable groups including women);
- Brief description and analysis of each impact (nature, significance, and extent);
- Affected stakeholders in and around the subproject area;
- Impacts on the environment which results from the incremental impact of the proposed subproject when added to other past, current and reasonably foreseeable future proposals;
- Identify potential accident or hazard scenarios covered in the assessment and the impacts that might arise from non-standard operating conditions
- Indicate whether predictions, judgments and assessments of significance have been made based on expert opinion, standards, models, case studies, stakeholder perceptions or personal experience and judgments.
- Clearly identify which environmental and social impacts are significant and need to be mitigated against and monitored, and which are not likely or only marginally likely to be affected and do not need to be considered further.

The consultant shall pay particular focus, among others, to the following environmental, social and gender impacts/issues:

- Air pollution related to subproject site excavation work and transportation of materials;
- Solid and liquid waste generation;
- Soil erosion and land stability, especially with the construction of underground crossings;
- Flooding concerns;
- Loss of access to resources, livelihood, and income due to temporal and permanent land acquisition, give due attention to identification of displacement effect on Female Headed

Households (FHH) livelihood since women are mostly engaged in small informal business along road corridor;

- Loss of household infrastructure such as granaries, outside toilets and kitchens;
- Effect the quantity or quality of surface waters (e.g. rivers, streams, wetlands), or groundwater (e.g. wells);
- Effect on vulnerable groups, people with disabilities (PWD);
- Traffic congestion during construction works;
- Community/workers safety and health related issues;
- Potential GBV risks;
- Effect on available vegetation/trees;
- Loss of access to services due to construction works and detours
- Construction traffic management.

Task 6: Setting of alternatives/options for comparison

It is expected that the design consultants will develop at least two (2) alternative fecal sludge treatment systems for each town mentioned above consisting a variety of conceptual solutions for the liquid waste sanitation problem. Thus, the ESIA consultant shall provide inputs for setting feasible alternatives in relation to the nature of the plan and objectives. Alternative redesign options should be sought if sever impacts have the possibility to occur due to subprojects implementation.

Consideration of alternatives shall include a minimum comparison between the "do-nothing" scenario and the proposed subprojects implementation. In this regard, the ESIA consultant shall assess and evaluate the likely evolution of the current state of environment and identified environmental, social and gender priorities without implementation of the subprojects.

Task 7: Impacts Mitigations and Management

Based on the typical Environmental and Social Management Plan (ESMP) presented in the UWSSP II Environmental and Social Management Framework, and the actual findings of the ESIA, the Consultant shall develop site specific ESMP for each of the seven sub projects **(Jimma, Nekemte, Assela, Shashemene, Bishoftu, Arbaminch and WolaitaSodotowns)** which will include as a minimum for each identified impact:-

- Identified impacts;
- proposed the mitigation measures;
- detail description of monitoring measures including monitoring indicators,
- responsible bodies for implementation,
- frequency of monitoring,
- Implementation responsibilities for the mitigation measures and monitoring;
- Cost estimate with budget;
- Assessment of residual impact after implementation of the mitigation;
- If any changes to the Environmental Guidelines for Construction Contractors presented as an appendix to the ESMF are warranted, the Consultant will propose such changes.

Such recommendations for the development of monitoring plan shall ensure implementation of the feasible and cost-effective mitigation measures to prevent or reduce significant negative environmental impacts to acceptable level. As necessary, specific additional protection measures to those included in the Environmental Guidelines for Construction Contractors presented as an appendix to the ESMF shall also be proposed by the Consultant.

The ESMP will consist of the following information for each identified impact (Note that mitigation and management for identified gender and GVB issues shall form an integral part of the ESMP):

- **2.2 Grievance Redress mechanism**

The consultancy firm shall assess mechanism established to identify and solve grievances and shall develop a process for grievance procedures, which shall be accessible to all affected persons (taking into account literacy and numeracy constraints), open and transparent, and take into account judicial, community and traditional dispute resolution systems. The GRM shall also entertain grievance and related aspect to gender and GBV issues.

3. Deliverables

All the ESIA reports of each seven sub projects (Jimma, Nekemite, Assela, Shashemene, Bishoftu, Arbaminch and WolaitaSodo towns)shall be reviewed by the proponent institutions and the World Bank environment and social safeguard team of experts. The report shall also be acceptable to the requirement of the national and World Bank's standard to be disclosed in all the

necessary websites as per the ESMF requirement. The below table shows expected deliverables of the assignment, schedule of deliverables and number of copies:

Table 1 Expected deliverables period and number of copies

Major Outputs	Key Activities	Number of copies
1. Inception report	• Review of existing project and policies • Outline of work plan, methodology, activity timeline, outline of the ESIA report, • Roles of team members, and key information for achieving the objectives of the assignment, • Preliminary field finding as well as any new findings/changes that may affect the tasks and, among others.	5 hard copies & electronic copy on a CD
2. Draft ESIA report	• Field assessments, surveys, analysis • Brief description and analysis of each impact • Affected stakeholders in and around the subproject area • identify which environmental and social impacts are significant and need to be mitigated • submission of due diligence reports and draft report and recommendation of clients, WB and other stakeholders	6 hard copies & electronic copy on a CD
3. Final ESIA report	• Completion of report and recommendation linked documents from clients, WB and other stakeholders	6 hard copies & electronic copy on a CD

4. ESIA Consultancy Firm Staffing

The ESIA consultant shall be qualified and licensed firm with the required educational qualification of the team. The firm shall have renewed level-1 (senior consultancy firm) environmental consultancy license from Environment Protection Authority (EPA) with relevant work experiences in different projects and specifically WaSH projects.

The consultant shall undertake the environmental and social impact studies in multidisciplinary manner. Therefore, according to EPA (former ECFCC) environmental and social impact assessment consultant competence licensing directive no. 03/2010 the consultant shall have seven licensed professionals in the team. The licensed professional team composition includes: i) Environmental Pollution Analyst, ii) Social Issues Analyst, iii) Environmental Health Analyst, iv) Biodiversity and Ecosystem Analyst, v) Economic Issues Analyst, vi) Water Resource Utilization Analyst and vii) Green House Gases Emission (GHGs) Analyst. The required skills and experience of the consulting service includes but not limited to the following as presented in the table 2 below.

Table 2 Details of Team Composition, Required qualification and experience for the assignment

S/N	Team Composition and Leadership	Minimum Skill (Education and Work Experience)
1	Team Leader/ Environmental Pollution Analyst	• The team leader should have a PhD. /masters/bachelor's degree in Environmental Engineering, Chemical Engineering, Environmental Management, Environmental Science, Chemistry or related fields. • At least 10 years of experience in environmental studies particularly in Environmental and Social Impact Assessment • Should have Senior Consultant level professional competence renewed license, experience in infrastructure development projects, preferably in urban settings and preferable on WASH sector, • Previous experience and good knowledge of ESIA study. • 3 years of specific experience and good knowledge of ESIA study in Urban WASH projects, and other World Bank funded projects • Fluency in English
2	Social Issues Analyst	• The Social Issues Analyst should have at least Masters/bachelor's degree in Sociology, Social Studies, Social Works, Social Anthropology or related fields. • At least 8 years of experience in environmental and social Studies particularly related to involuntary resettlement issues, indigenous peoples, gender mainstreaming. • Should have Senior Consultant level professional competence renewed license, experience in infrastructure development projects, in urban settings and preferable on WASH sector, • 3 years of specific experience on Resettlement for development projects, SIA/RAP, Socio-economic study preparation in Urban WASH projects, and other related World Bank financing projects. • Fluency in English
3	Environmental Health Analyst	• The Environmental Health Analyst should have at least Masters/bachelor's degree in Environmental Health, Environmental Science, Occupational Health and Safety or related fields. • At least 8 years of experience in conducting environmental health investigations. • Should have Senior Consultant level professional competence renewed license, experience in infrastructure development projects, preferably in urban settings and preferable on WASH sector, • 3 years of specific experience in Health and safety or related activities in Urban WASH projects, and other related World Bank financing projects. • Fluency in English
4	Biodiversity and Ecosystem Analyst	• The Biodiversity and Ecosystem Analyst should have at least Masters/bachelor's degree in Biodiversity, Forestry/Wild Animal/, Biology, Plant Science/Agronomy or related fields. • At least 8 years of experience in conducting assessment of biodiversity and ecosystem for establishing baseline information. • Should have Senior Consultant level professional competence renewed license, experience in infrastructure development projects, preferably in urban settings and preferable on WASH sector,

S/N	Team Composition and Leadership	Minimum Skill (Education and Work Experience)
		• 3 years of Specific experience of ESIA study in Urban WASH projects, and other World Bank funded projects • Fluency in English
5	Economic Issues Analyst	• The Economic Issues Analyst should have at least Masters/bachelor's degree in Economics, Environmental Economics, Agricultural Economics or related fields. • At least 8 years of experience in undertaking project economic assessment. • Should have Medium level Consultant professional competence renewed license, experience in infrastructure development projects, preferably in urban settings and preferable on WASH sector, • 2 years of Specific experience of ESIA study in Urban WASH projects, and other World Bank funded projects • Fluency in English
6	Water Resource Utilization Analyst	• The Water Resource Utilization Analyst should have at least Masters/bachelor's degree in Water Resource Utilization, Natural Resource Management, Water Engineering, Geology or related fields. • At least 8 years of experience in water and sanitation studies particularly environmental and social impact assessment. • Should have Medium level Consultant professional competence renewed license, experience in infrastructure development projects, preferably in urban settings and preferable on WASH sector, • 2 years of specific experience of ESIA study in Urban WASH projects, and other World Bank funded projects • Fluency in English
7	Greenhouse Gases (GHG) Emissions Analyst	• The GHG Emissions Analyst should have at least Masters/bachelor's degree in Climate Change, Chemistry, Environmental Science, Environmental Health or related fields. • At least 8 years of experience in conducting assessment of GHG emission and evaluation of the significance. • Should have Medium level Consultant professional competence renewed license, experience in infrastructure development projects, preferably in urban settings and preferable on WASH sector, • 2 years of specific experience of ESIA study in Urban WASH projects, and other World Bank funded projects • Fluency in English

- **4.1Consulting Service Staff Inputs**

ESIA shall be implemented over a period of 120 days. The estimated inputs of the consultant's staff are presented in the below table.

Table 3 Summary of ESIA Key Experts Requirement

S/N	Team Composition and Leadership	Person- months

S/N	Team Composition and Leadership	Person- months
1	Environmental Pollution Analyst (Team Leader)	6
2	Social Issues Analyst	3
3	Environmental Health Analyst	1.5
4	Biodiversity and Ecosystem Analyst	2
5	Economic Issues Analyst	1.5
6	Water Resource Utilization Analyst	1
7	Green House Emission Gases Analyst	1

Therefore, to carry out the assignments on the scheduled time the consultant shall deploy at least three teams at a time with the required profession. Accordingly, the consultant shall make his/her own assessment of the manpower requirements in terms of man-month for various categories of persons proposed to be deployed to carry out the services as envisaged in the ToR.

The Consultant is required to furnish the company profile of the firm and CVs of the required licensed professionals. The CV's of all the key experts will be evaluated. The evaluation of the team is the main criterion in the evaluation of the proposal.

The Consultant staff shall work closely with the Client's Environment, Social and Climate Change Directorate safeguard specialists assigned to the work, and lead design consultant working on the concept and detail design components of the subproject. The Consultant shall liaise and undertake meetings with the design consultant to obtain details on subproject components and exchange information to facilitate the high-quality execution of both the technical and environmental and social assignments.

The consultant is expected to be fluent in English and be able to work closely with the clients' staff, the World Bank Environment and Social Specialists and other third parties relevant to the assessment.

5. Working Language

The ESIA should be written in English language. Charts, diagrams, site plans, photos and maps should be provided wherever useful to clarify the text, including perspective drawings that convey what the developed sites would look like. The executive summary of the ESIA and any necessary checklists should be translated to local languages, as required.

6. Starting Period

The consultant shall start the assignment within 15 days after signing the contract agreement with the client.

7. Timeline of the Consultancy Service

The timeline for the proposed consultancy service including field works and preparation and submission of final ESIA reports shall be completed within 150 days or four months of the contract period.

- **7.1 Working Schedule for Submission of Deliverables**

Table 4 Schedule of deliverables

S.N	Deliverables	Duration (in Days)	Starting date
1	Inception Report	15	after commencement
2	Draft ESIA report	100	after inception report submitted
3	Final ESIA report	35	after comment on the draft ESIA report is submitted
	Total	**150**	

Appendix I

Content of the Environmental and Social Impact Assessment (ESIA)

The ESIA report should include at least the following sections but need not be limited to these sections. The indicative outline of the ESIA shall be updated as part of the Inception Report.

1. Executive Summary

Provide a plain language Executive Summary that provides the reader with a concise but complete overview of the ESIA and includes the following information:

• Background on the Proponent(s)

• Project overview

• Project setting: geographic, physical, biological and human environments

• Summary of environmental & social impacts as well as mitigation measures

• key information of the ESIA

As it may be used as a stand-alone document, the Executive Summary should present the information in a general manner focusing on the main issues and findings. The use of maps and

figures to aid in the presentation of information is encouraged. The purpose of the executive summary is to convey the most important aspects and options relating to the project on the findings of the ESIA to the reader in a concise and readable form. The summary shall be interpreted and presented with local languages.

2. Introduction

- Scope of the ESIA
- Team in charge of the ESIA, with list of consultants involved and tasks assigned for each
- Summary of requirements applying to the ESIA
- General Ethiopian legal requirements
- ESMF requirements
- RPF requirements
- Other World Bank requirements if applicable
- Time frame for implementation of the ESIA

3. Description of the Proposed Sub-project

- Technical components, including description of the methods used for construction and operation
- Sub-project decommissioning at the end of the operation period
- Implementation arrangements
- Implementation schedule and cost

4. ESIA Methods

- Terms of Reference of the ESIA, and process through which they were arrived at
- Description of the methods used for the ESIA, including description of field investigations, mathematical models, social investigations, available literature
- Description of standards and guidelines used
- Statement on the extent of involvement
- Identification of information gaps and uncertainties

5. Outline of the main alternatives

- Identification of alternatives in terms of site, technology, engineering options.

6. Consultation

- Identification of interested parties

- Description of consultation with affected parties (timeframe, methods)

Main issues arising from consultation and how they were addressed in the ESIA process

7. Description of the baseline environmental and socio-economic conditions

- Focus of the baseline assessment depending on the nature of the sub-program and on its likely impacts
- Description of the physical environment (climate, topography, geology, hydrogeology, surface water, soils in the sub-program area)
- Flora and fauna - brief description of the baseline situation at sub-project site, with a specific focus on endangered species if any, and assessment of the general biodiversity situation in the program area
- Description of the human environment:
  - ✓ Identification of neighboring communities, description thereof
  - ✓ demography, sociopolitical conditions),
  - ✓ Land use pattern, land tenure, and related social organization,
  - ✓ Livelihoods
  - ✓ Water usages
  - ✓ Noise
  - ✓ Health situation

8. Potential Sub-project Impacts

Generally, prediction and assessment of each impact at all stages of the program cycle for each alternative, including, but not limited to;

Pre-construction Phase

- Land acquisition

Construction phase

- Employment
- Impact on land use
- Impact on flora and fauna, with a specific focus on endangered species if any
- Noise, Dust and Vibration
- Impact on ground water quality
- Impact on surface water quality (related with erosion at the vicinity of the work site for example)
- Impact on surface water usage

- Impact on ground water usage
- Impact on soils (compaction by drilling equipment, removal of top soil)
- Potential uses of the environment that will be affected
- Impact on Buildings and structures;
- Impact on Other structures (wells, channels, agricultural or commercial buildings, etc...);
- Impact on livelihoods;
- Impact on infrastructure service/water, electritown and access road/ during trench excavation and related works;
- Temporary acquisition of land/for camping, Quarry production and storage area of Pipes and Fittings/;
- Impact on cash crop (e.g., Papaya, Mango, Avocado and other);
- Impact on Vegetables in Urban agricultural area;
- Impact on Standing Crops;
- Impact Trees and perennial crops;
- Impact on Annual crops, etc …

Operation phase

- Impact on ground water levels, flow and quality
- Impact on surface water (quantity - flow, quality)
- Impact on surface water usage with a focus on potential conflicts between upstream and downstream users if relevant
- Impact on ground water usage
- Impact of changes in water regimes on flora and fauna, and bio-diversity in general, with a specific focus on wet zones if any
- Potential uses of the environment that will be affected

Decommissioning phase

- Summary table assessing the significance of each identified impact in terms of magnitude, extension, duration or frequency of occurrence and probability of occurrence

1. Consultation Process

- Description of the consultation process (who was consulted, how, when)
- Results: main issues raised and how they are addressed in the program design and in the ESIA in general

2. Mitigation Measures

- Table showing for each identified impact at each of the main three phases of the program the proposed mitigation measures, with narrative justifying them
- Table showing the residual impacts once the mitigation measures are implemented,

3. Environmental and Social Management Plan (ESMP)

Table showing for each identified impact both the mitigation and the monitoring measures proposed in the ESIA, with for each the implementation arrangements, including responsibilities for implementation, the timeframe, and the budgetary implications

4. **Monitoring Plan**

- Table showing for each identified impact the monitoring measures that will be taken, with indication of indicators used, frequency of measurement, frequency of reporting and any relevant details on the methods to be used for collecting and treating monitoring data