Environmental and Social Impact Assessment Report on City Wide Inclusive Sanitation Management System

Nekemte Town, Oromia

Client:

Ministry of Water and Energy

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MINISTRY OF WATER AND ENERGY
የኢትዮጵያ ፌዴራላዊ ዴሞክራሲያዊ ሪፐብሊክ | Federal Democratic Republic of Ethiopia

Consultant:

Green Sober Environmental Management Consultants PLC
ግሪን ሶበር ኢንቫሮመንታል ማኔጅመንት አማካሪ

Telephone: - +251911786811
Email: - greensoner2@gmail.com

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Table of Contents

List of Tables

List of Figures

List of Acronyms

ABR	Anaerobic Baffled Reactor
ARAP	Abbreviated Resettlement Action Plan
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
CSA	Central Statistical Agency
CWIS	City Wide Inclusive Sanitation
EA	Environmental Assessment
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EPA	Environmental Protection Authority
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FDRE	Federal Democratic Republic of Ethiopia
FGD	Focus Group Discussion
FSM	Fecal Sludge Management
FSTP	Fecal Sludge Treatment Plant
GIS	Geographic Information System
GoE	Government of Ethiopia
GPS	Global Positioning System
GSEMC	Green Sober Environmental Management Consultant
NTPDO	Nekemte Town Plan and Development Office
NTWSSE	Nekemte Town Water Supply and Sewerage Enterprise
KII	Key Informant Interview
MoH	Ministry of Health
MoWE	Ministry of Water and Energy
OHS	Occupation and Health Safety
OP	Operational Policy
PAPs	Project Affected Peoples
PC	Public Consultation
PPE	Personal Protection Equipment
PWD	Persons with Disability
RAP	Resettlement Action Plan
STD	Sexually Transmitted Disease
STT	Sludge Thickening Tank
WB	World Bank

Executive Summary

Sanitation problems are common in developing countries. These problems are persistent in urban centers where the supply of infrastructure and services is in short supply. In addition, rapid urbanization is exacerbating the situation in many countries. As a result, residents of many towns and cities in these parts of the world suffer from preventable environmental and social problems. Ethiopia, as one of such countries, is faced with challenging social and environmental situations. That is why the Ethiopian government and the World Bank launched the second Urban Water Supply and Sanitation Program (UWSSP) in Addis Ababa and 22 secondary cities.

Nekemte, a town located in the western part of Ethiopia, is one of the towns benefiting from this project. This project mainly aims, among other targets, to construct Fecal Sludge Treatment Plant (FSTP) to improve sanitation service in the town. Although this infrastructure development brings multifaceted benefits to the town, it may also bring adverse impacts on the environment and the society that need to be minimized and mitigated to make it environmentally and socially acceptable. Hence, this study aims to provide an insight into the possible environmental and social impacts which can occur during design, construction and operation of the FSTP in Nekemte town. It also forwards possible mitigation measures for the various impacts. In connection with this, the 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 Nekemte. 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 and around the town.

Methodology

To achieve the objectives stated above, this ESIA study collected and evaluated comprehensive socioeconomic and environmental data from Nekemte town. In line with the type of assessment, and nature of data sources, mixed approach was adopted. This mixed approach 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 (FGD, KII and field observation) and secondary sources (literatures and feasibility and design study report).

Environmental and socioeconomic 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, Checklists, 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. The assignment, reviewed relevant policies and strategies and other relevant legal frameworks of the Ethiopian Government, and the World Bank safeguard policies and Environmental, Health and Safety (EHS) Guidelines.

Description of Baseline Conditions

Nekemte is the largest urban center in western Oromia. The town is found in the Western Region of Oromia at a distance of about 328 Km west of Addis Ababa/Finfinne. Geographically, it lays between the latitude and longitude of $9^{o}46'$North and $36^{o}31'$east. Nekemte has a typical tropical wet and dry, or savanna climate. The town's yearly average temperature is 14.83^{o}C, which is 7.4% lower than Ethiopia's average. Nekemte typically receives on average 88.99 millimeters (3.5 inches) of precipitation per month and has 189 rainy days (51.82% of the time) annually. The location of the proposed the FSTP site is found in Guto Gida district, 3.6 km away from the town (300 m cobble stone road and 3.3 earth road).

Nekemte and its surrounding areas were covered by dense indigenous tree species. Interviews made with rural farmers revealed that there are about 37 types of tree species that are dominant in the project area. The proposed site that is located in Tinfa village consists of scattered shrubs and bushes. As per the forecast made based on CSA's census, the population of the town in 2020 has reached 138,127. However, data obtained from Oromia Water & Energy Resources Development Bureau, on the other hand, indicates that the population has reached over 230,000 in the year 2021.

Description of the Proposed Subprojects

Currently, there is no FSTP in Nekemte and hence vacuum trucks transport sludge to open dumping sites located at the periphery of the town in Beke Jema area. The solid waste disposal system in Nekemte town is open dumping without any segregation. Based on the information from the municipality of the town and water and sewage authority, the existing dumping site around Bake Jema receives more than 107 m^3/day transported from various sites in the town through skip loaders, vacuum trucks, and donkey carts. The liquid waste dumping site is located adjacent to the solid waste dumping area. Both disposal sites pose various environmental, socio-economic and health problems.

Subproject Alternatives

During the feasibility study, alternative sites and alternative technologies were assessed, analyzed, compared and selected. In the framework of project implementation alternative, the ESIA team assessed technological choices for Nekemte town and evaluates their advantages as well as the potential for revenue generation from reuse. Three sludge processing technologies were reviewed for the selection of best alternative for Nekemte town. The first is unplanted sludge drying bed. The second alternative technology is planted sludge drying bed and the third alternative is settling and thickening tank. With consideration of technical, economic and efficiency point of view the ESIA team proposed the unplanted sludge drying bed technologies with sunlight transparent roof for facilitation of evaporation and prevention from additional moisture from precipitation. This is consistent with the technology options proposed in the feasibility study of Nekemte FSTP. In the overall system design, the feasibility and design consultant chose an alternative with system component “Reception and screening chamber-SDB-Constructed Wetland-Maturation Pond-Extended Sludge Storage” as their top priority for properly treating the produced fecal sludge in Nekemte town. Thus the ESIA team also agrees with this technology options proposed.

With regards to site selection, three alternatives were proposed and analyzed in terms of environmental, social, and economic feasibility point of view. The first and the second site alternatives were located in Negasa Kebele in Guftie and Tinfa villages respectively. The third alternative was located in Bullo Kebele around Chelelek River. The first alternative which was located at about 3.6 km in the southwest direction from the Nekemte town was the most preferred site. Based on the baseline analysis made this site has minimal environmental, social

and economic negative impact than the other two alternatives. For this main reason site alternative one was proposed as the first alternative. It was also proposed as the best alternative in the design and feasibility report.

Stakeholder Consultation

The land selected for FSTP construction is under use by 3 land right holders in Negassa Kebele - around Tinfa area of Guto Gida district. The ESIA team was informed that NTWSSSE has received a legal title deed for the FSTP site from this district. During the visits made, especially on the 10th of June 2023, the ESIA team had an interview with some of the PAP about the site and the surrounding environment. It was confirmed during the visit that these 3 land right holders are actively engaged in crop production on the proposed FSTP site. Formal public consultation about the FSTP was conducted on the 12th of June 2023 at NTWSSSE meeting hall. The consultation was attended by over 20 participants drawn from the PAP, concerned officials of the Guto Gida district and other stakeholders. This consultation was co-chaired by the vice manager of NTWSSSE (Ato Yadeta Tesema) and the ESIA team leader. It was learnt that this project could affect properties of 3 households in Boke (of Tinfa area in Negassa Kebele). These people will lose their agricultural land due to this project. Though many points were raised during the consultation, participants agreed that the project is beneficial both to the community and the town. In addition, they stated that they will cooperate with the implementation of the project given that proper compensation is paid to PAP and the promised infrastructures (electricity, water and road) are provided to the community.

Ato Desta Kassa from the consulting firm took the opportunity and conveyed the information that: Proper compensation needs to be paid for all kinds of damaged properties before the commencement of the project; The project will go ahead only after such compensation issues are addressed; and the public can use the proposed location until the project commences (but shall not plant permanent trees until the site is cleared).

In addition, the ESIA team also conducted stakeholders' consultation. The consultation took place on the 8th of June 2023 at the town administration building. It was chaired by the Mayor's office head Ato Solomon. Generally, the community clearly indicated they will fully cooperate with project implementation but strongly stressed that proper compensation shall be paid to PAP

and the promised public infrastructures that are gravely needed in the locality (the Tinfa area of Negassa Kebele) are supplied along with the project.

Potential Impacts and Mitigation Measures

The FSTP is proposed mainly to improve the quality of the social and natural environment of Nekemte town. 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 for impacts that would occur during the four phases: pre-construction, planning and design phase; construction phase; operation phase and decommissioning phase. As the site is located on land that is being used by 3 private land right holders (farmers) and located more than 400 meters away from settlements, the ESIA team recommended the preparation and implementation of ARAP. Moreover, the team also proposed appropriate mitigation measures for the negative impacts identified in the aforementioned four phases.

Summary of Major Negative Impacts and Proposed Mitigation Measures:

Pre-construction, planning and design phase:

- Θ **Involuntary economic displacement of 3 PAHs from their farm lands.**
  - ✓ ARAP need to be conducted to identify the extent of the impact of the FSTP. This ARAP has to be conducted carefully prior to the commencement of any civil work. PAPs should directly involve in the entire ARAP study and shall make their own informed decisions;
  - ✓ Compensate those affected according to the laid down policies in collaboration with Nekemte Municipality, taking Ethiopian laws, Proclamation No. 1161-2019 as well as World Bank safeguard policy on involuntary resettlement (OP 4.12) into consideration;

Construction phase:

- Θ **Loss of vegetation cover/ Vegetation Clearance.**
  - ✓ Minimizing the amount of destruction caused by machinery by promoting non mechanized methods of vegetation removal and ensuring the replacement of 10 seedlings per each of the removed trees, followed by protection and watering of the seedlings until it reaches to at least 1.5 meters height;
- Θ **Soil Erosion / Degradation, Land slide, Flooding, Erosion and Loss of Top Soil.**
  - ✓ Store topsoil and subsoil removed from the site during site preparation properly for reuse elsewhere or 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, for instance contours, shape, level of compaction and etc, as this will 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; abandoned quarries be used for the disposal of excessive quantities of excavated soil material;
- ✓ Work on the watershed management especially for the upper catchment. Sheet and rill erosion of soil shall be prevented where necessary through the use of sand bags, diversion beams, culverts, or other physical means;

Θ **Air quality loss and noise pollution.**

- ✓ Construction workers will be made aware of the permissible noise levels at the workplace and surrounding environment; 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;
- ✓ It is the responsibility of the contractor to utilize well maintained and functional working equipment. 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 ear muffs, masks whenever needed and as found appropriate; and

Θ **Alteration of natural drainage pattern**

- ✓ Proper drainage channels shall be constructed within the construction site to allow for convenient and free flow of storm water. Drainage channels shall be installed in all areas that generate or receive surface water. The channels shall be designed with regard to maximum expected volumes;
- ✓ To prevent possible erosion and flood, collaborative work needed for the stabilization of gullies and drainage lines; and
- ✓ Integrated work of stakeholders to water shade management with careful planning and abatement of drainage lines are required.

Θ **Slope failure and risk of landslide due to depth earth work.**

- ✓ Relatively very weak landform slopes should be protected using engineered structures (retaining walls), especially at the lower courses of the FSTP site;
- ✓ Protect the susceptible areas of the project by using temporary or permanent drainage works;
- ✓ Minimize the possible risk by undertaking all earthwork construction activities during the dry season;
- ✓ The eroded channels will be backfilled and restored to natural contours.

Θ **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;
- ✓ All of the drivers have to obey the speed limit of vehicles and strictly stick to these limits particularly in the residential areas.

Θ **Risk of Accidents**

- ✓ Develop Traffic Management Plan and incorporate proposed arrangements for traffic diversions with details of all necessary budget and signals;
- ✓ Restrictions on hours of driving (including night time restrictions where sensitive receptors such as wild animals are affected) and timing of vehicle movements will be emphasized to avoid busy periods in urban areas, particularly the start and end of school, market, and the working days;
- ✓ No drivers or personnel under the influence of alcohol or any drug abuse shall be allowed onsite;
- ✓ Travel speeds of construction vehicles along the road should be controlled by setting travel speeds and informing through signals; and
- ✓ Fencing or placing obstacles to trenches and ditches to avoid interference and accident of wild and domestic animals and children.

Θ **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 that might contaminate the water bodies;
- ✓ 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 removal and disposal has to be done in accordance with the national hazardous waste management regulation; and

Θ **Solid Wastes**

- ✓ Prepare solid waste management plan and site prior to commencement of work including appropriate waste storage areas, collection and disposal schedule;
- ✓ Apply integrated solid waste management system in the project site;
- ✓ Materials from excavation of the ground and foundation works shall be reused for earthworks and landscaping;
- ✓ 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;
- ✓ The solid wastes shall be properly segregated and separated to encourage recycling of some useful resource; and
- ✓ The contractor and the client shall work hand in hand to facilitate sound solid waste management.

Θ **Hazardous Wastes**

- ✓ Develop mobile or temporary sanitary facilities in the construction site and in the vicinity of the project area which should be adequate at construction sites;
- ✓ Hazardous wastes require segregating hazardous waste from the non-hazardous waste and keep it in designated storage facilities at project site;
- ✓ Hazardous wastes such as paints, 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 before transportation;
- ✓ A hazardous waste label that has a "Hazardous Waste" mark on it must be placed on the container while still at the generation point;
- ✓ Prepare a hazardous waste management plan that will ensure proper collection, storage and transport to identified disposal site; and

Θ **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. Moreover, qualified health and occupational safety officer 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. All must be fully aware and mentally prepared for potential emergency;

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

- ✓ Prepare and enforce a Code of Ethical Conduct (CEC); in the camp to encourage respect for the local community & to maintain cleanliness of the camp at all times. The code of ethical conduct of workers has to be translated in to local language and sensitized the workers on quarterly;
- ✓ All construction workers shall be orientated and sensitized about responsible sexual behavior in project communities.
- ✓ Prepare an HIV/AIDS awareness campaign plan to reduce risks of spreading of HIV/AIDS and other STDs as part of contractual obligation.

Θ **Risk of impacts on Physical Cultural resources (PCRs)**

- ✓ The town administration has to remove bodies of the rested bodies in a dignified manner, if the project forced removal of bodies; and
- ✓ 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.

Θ **Rise of Deviance and Conflicts due to Influx of Labor**

- ✓ Unskilled and skilled (if available) labor should be hired from the local population as far as possible to minimize on influx of labourers from other places into the community;
- ✓ Effective communication and collaboration are key to addressing the challenges and opportunities presented by an influx of labor;
- ✓ Any new employee will be required to sign a code of behavior; and

- ✓ Awareness has to be given for the new comers about the importance of respecting the norms local community living in the project area.

Operation phase

- Θ **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, implementing preventive maintenance program for vehicles and equipment and promptly repair vehicles with visible exhaust fume.
- Θ **Pollution of water sources, channels and swampy lands**
  - ✓ Plant indigenous trees at the perimeter of the project area with varying heights thereby forming wind breakers in addition to masonry or brick fences;
  - ✓ Good site management of the operation must regularly ensure to avoid foul odors that would arise from improper functioning;
  - ✓ 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;
- Θ **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 and implementing appropriate safety procedures;
  - ✓ The FSTP should be fenced and signals put in place with security personnel to stop unauthorized people from accessing the site.

Decommissioning phases

- Θ **Pollution of soil and water bodies**
  - ✓ Develop a decommissioning plan that outlines the steps and working procedures for decommissioning of the plant;
  - ✓ Engage local stakeholders including nearby residents, businesses, and community organizations in the decommissioning process to ensure their concerns are addressed;
  - ✓ Restore the project site into its original or to a condition that is acceptable to local stakeholders and regulatory authorities. Apply site grading, replanting vegetation, or other measures to restore the site to its natural state;
  - ✓ Monitor the decommissioned site to ensure that there are no potential environmental or health risks associated with the decommissioned plant;
- Θ **Occupational health, safety and Air pollution**
  - ✓ Recruiting a qualified health and occupational safety officer who will oversee OHS matters on site;

- ✓ 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;
- ✓ Provide appropriate, adequate PPE, such as gloves, masks, and protective clothing, OHS personnel protective gear to the employees;

Θ **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 who have been impacted by the process. Supporting workers to start their own businesses;

Environmental and Social Management Plan

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. This ESMP defines the roles and responsibilities of various stakeholders for ensuring smooth and well integrated implementation and monitoring of the project operations. It also contains commitments that are binding on the contractor. It can be translated into project documentation and provide the basis for a legal contract that establishes responsibilities of the contractor.

Environmental and Social Monitoring Plan

Environmental monitoring plan is also developed to provide a basis for evaluating the efficiency of the proposed mitigation measures and for updating the actions and impacts of baseline data. This ESIA identified various negative impacts of the FSTP on the environment and the society in the four phases (Pre-Construction, Planning and design phase, Construction phase, Operation phase and decommissioning phase). Although the ESMP mainly focuses on the proper implementation of the proposed mitigation measures, it also encompasses the monitoring of construction activities (from environmental and social perspective), institution of proper reporting procedures, following up of environment auditing by the concerned offices, and the implementation of grievance handling mechanisms. Regarding manpower, the NTWSSSE currently has an environmentalist and social safeguards. However, since the technology is new to the area and as these experts do not have sufficient experience to deal either with such complex

projects they require training and assistance to fully implement the ESMP. Various trainings have been proposed for different staff. These trainings cost about 3 million Birr.

Hence, the cost for implementing mitigation measures is estimated to reach 9,000,000 (Nine million) birr. In addition, there is a monitoring cost of about 8,010,000 (eight million and ten thousands) birr and human resource development cost of 3 million that may push the overall cost of the ESMP to around 20,010,000 (Twenty million ten hundred thousand) Birr.

1. Introduction

1.1. Background

Ethiopia is one of the Sub-Saharan African countries with poor sanitation services, and rapid urbanization that exacerbating the situation (Oliver, 2015). As a result, people in many cities and towns lack access to adequate sanitation systems, consequently causing environmental and social problems (ESMF, 2017). In addition, cities and towns have increased in size and number over the past 20 years. Such trends will result in an increase in the need for more basic urban services and infrastructure in the years to come, including adequate sanitation. Meeting this goal depends on the cities and towns' ability to meet urban standards of living that include improved sanitation. 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, raise 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 and Towns Sanitation and Water Supply Services Improvement, and (iii) Project management and institutional strengthening and financed by the World Bank. 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, a possible increase in malaria, loss of vegetation, traffic accidents, air pollution, the health and safety of people near construction sites, and the taking of land holding right of individuals are just a few of the social and environmental impacts the project will have.

Therefore, the MoWE hired GSEMC Pvt. Ltd. Co. to conduct an ESIA and come up with proper mitigation measures, ESMP and monitoring plan for the potential negative impacts of the FSTP construction and implementation in Nekemte 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 environmental and social impact assessment on FSTP of Nekemte town. It identifies, predicts and evaluates potential environmental and social impacts during the life cycle of the FSTP and recommends appropriate mitigation measures. Further, the assignment aims at preparing ESMP. Additionally, it targets to develop an indicative socio-economic survey for the preparation of the Abbreviated Resettlement Action Plan (ARAP) 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 project.
- 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, operation, including the "without project" scenario.
- Assesses and identifies capacity gap and proposes training and capacity building requirements for implementation of environmental mitigation and monitoring.
- Prepares Environmental and Social Management Plan.
- 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. Scope of the ESIA

The scope of the ESIA includes field assessment and description of the physical, social and cultural environment of Nekemte 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, site geology and geomorphology analysis, hydro-geological data collection and analysis, GIS based site physical environment, soil, geology, geomorphology, cultural heritage and PAPs mapping are also part of the ESIA study. In addition, the scope includes conducting community consultation, key informant interview, house hold survey for PAPs. Moreover, impact identification, analysis and presentation of mitigation measures with management and monitoring plan for adverse impacts. 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 taken into account 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 is the creation 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: Institutional arrangement, human resources, and capacity building plan development

Task 9: 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 being conducted, and the nature of data sources being collected, the study adopted a mixed approach. This mixed approach 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 (numerical) and qualitative (non-numerical) data from primary and secondary sources.

Environmental and socioeconomic 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 they are. Descriptive assessment design sets out to describe and interpret what exists as it is. It looks at individuals, groups, institutions, methods and materials in order to describe, compare, classify, analyze and interpret the entities and the events that constitute the various fields of inquiry. Moreover, as 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

The required field data from Nekemte town was collected from June 6th to 13th 2023. Team of experts participated in collection of information from the public (mainly from PAPs), stakeholders, project owners, experts, different sites (such as water bodies) and proposed project sites.

2.3. Method

The ESIA study comprises of wide variety of methods. Information related to biophysical, socio-cultural and economic environment of the proposed project were 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 scoping,

baseline studies, stakeholder's engagement, impact prediction, impact assessment, risk assessment, mitigation measures, monitoring and evaluation.

2.4. Sources of Data

Project linked data sources were obtained from both primary and secondary sources. Primary data sources used were structured surveys, experiments, observation while secondary data sources were obtained from government statistics, institution reports, academic research, public records and others.

Basically, the type of data collected comprises qualitative and quantitative ones. Qualitative assessment methods involve collecting non-numerical data from Key Informant Interviews (KII), observations, or open-ended survey responses. This assessment method typically used when the required information involves Focus group discussions (FGD), exploring people's experiences, opinions, or attitudes towards the FSTP. The quantitative approach addresses data collected through survey (questionnaire) and experimental (environmental samples) 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. Depending on the parameter measured and project requirements; one can apply various field survey methods for the Environmental and Social Impact Assessment (ESIA) process. Collecting physical, chemical, and biological data from the project site and surrounding areas were done by using direct observation, sampling, Stakeholder engagement and Geographical Information Systems (GIS) remote sensing.

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 comprises of the feasibility study and design of the proposed project, country's Laws, policies, WB's safeguard policies, guidelines, government reports, academic publications, and others.

2.5. Data Collection Tools

Data collection tools are instruments or methods used to collect data from primary or secondary data sources. 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 amount 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 existing situation of the physical, social and cultural environment, and institutional issues. Office data collection questionnaire were 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 administration, 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. Consultation was held by using checklist and data related to public views, concerns, questions and comments of local communities were documented through minutes. 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. Each FGD includes participants between 8 and 12 individuals. The moderator was responsible for asking open ended questions and guiding the discussion. Focus group discussions 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. Discussions were made on particular issues information was documented through Minutes. FGD was conducted at most of the proposed public and or communal toilets and at the FSTP site.

2.5.4. Key Informant Interview (KII):

KII is method used to collect in-depth data on a particular topic or issue by interviewing an individual who has specialized knowledge or experience relevant to the research question. Project related semi structured question items were prepared for the interviewee. Data collected by semi-structured interview guide includes a list of open-ended questions designed to elicit detailed information on the topic of interest. Semi-structured interview items have flexibility advantages in which new questions could be forwarded during the interview based on the responses of the interviewee.

2.5.5. Informal Interview Guideline

Another data collection tool used in this study was a spontaneous and on-site informal interview guide. Though this tool, informative and suggestive data about individuals, local communities, households, and town officials was collected.

2.5.6. Observation

Observations are typically conducted in a natural environmental setting, such as project sites 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. By using experts' keen observation, GSEMC assessed the social settings, physical characteristics, economic activities, environmental features, plants and crops found in and around the proposed project sites. The observation activities were also supported by taking photographs and video recordings.

2.5.7. Hand-Held GPS

A global positioning system (GPS) coordinate points of study site were collected for development of GIS based maps. GPS coordinates collected at site-level investigation points for identification of location features and to ensure accurate mapping, analysis and visualizing environmental parameter data. These data were then analyzed using various software tools, including ArcGIS for preparing different maps, Digital Elevation Model (DEM) 12.5X12.5m by global mapper software for preparing 3-D geomorphological maps, and other software used for various data analysis and visualization. Data collected for the hydrogeological and geological maps involved office-level analysis and site-level investigations. Office-level analysis focused on reviewing existing maps and data sources to identify key features of the hydrogeological and

geological formations in the catchment area. While site-level investigations involved collecting detailed information on the hydrogeological and geological formations at specific locations within the catchment area.

2.5.8. Impact Identification and Analysis

The type and sources of collected data greatly vary based on the required analysis. Analysis was mainly done through the 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. 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. 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 and Institutional Arrangement Review

The implementation of the FSTP subproject has the potential to cause environmental and/or social impacts that shall be addressed in accordance with relevant Ethiopian legislations as well as the requirements of the World Bank Environmental and Social safeguards and standards. Subsections below provide more 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 (FDRE)

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 the constitution of the FDRE through articles 43 and 44. These articles state about, among others, the right to development and right to live in 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. The government shall pay fair compensation for property found on the land but the amount of compensation shall not take into account the value of land. 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), an article that deals with the rights to development, states that nationals have the right to participate in national development and, in particular, to be consulted with respect to policies and 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 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 climatic hazards (rainfall fluctuation, increasing temperature, flooding), and speed up its socioeconomic development, the Government of Ethiopia has crafted a climate-resilient green economy development strategy known as the CRGE. This development direction promotes environmental protection, reducing fossil fuel consumption which releases greenhouse gases 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 Green House Gases (GHG) emissions. The generated electricity is a fundamental enabler of modern economic development, from powering cities and fueling industrial activity to pumping water for irrigation purposes in agriculture. 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 capacity 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 of time. 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 in the proposed sub projects shall be treated fairly in accordance with the policy.

3.1.11. Urban Wastewater Management Strategy

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 difference between towns. The implementation of the strategy will expect to have a positive impact upon the economy of the country, natural environment, health and wellbeing of all urban dwellers, including the most vulnerable ones. The strategy encourages all sanitation related interventions to be based on town and town development plans, taking advantage of economies of scale, sharing of best practices within the country, and involvement of the private sector and Community Based Enterprises (CBEs).

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 EPA Guideline (2003) and proclamation, 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.

Accordingly, the Nekemte town FSTP construction activities fall under schedule II (category B) 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 shall 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 substance 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 in 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 Legislation (Proclamation No. 1156/2019)

The recent labor proclamation promulgated in 2019 obliges employers that they shall take all the necessary measures to adequately safeguard the health and safety of the workers and comply with the OHS standards such as the provision of appropriate clothing and protection gears including the PPE at working places. To ensure workers safety and job security the need to respect this proclamation has been clearly stated in this document. Under this proclamation the following specific issues have been found relevant and important to be recognized and be

implemented accordingly during the operation of the FSTP and toilets under consideration. Freedom of association and collective bargaining: the right of all workers to form and join trade unions and bargain collectively. Representatives should not be subjected to discrimination and shall have access to all workplaces necessary to enable them to carry out their representation section.

Living wages: wages and benefits paid for a standard working week should meet at least legal or industry minimum standards and always be sufficient to meet basic needs of workers and their families and to provide some discretionary income. Pay should be in cash, direct to the workers, promptly and in full. Information to wages should be available to the workers in an understandable and detailed form.

Equal handling: workers should have access to jobs and trainings on equal terms, irrespective of gender, age, ethnic origin, color, marital status, sexual orientation, political opinion, religion and social origin. Physical harassment or psychological oppression, particularly of women workers must not be tolerated.

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 Safeguard Policies

WB has a number of Operational Polices (OP) to ensure that the environment & human populations are protected during the development process. Five of the ten WB safeguards Policies are triggered as part of implementation of the UWSSP II (Environmental Assessment (OP/BP 4.01), Safety of Dams (OP/BP 4.37), Physical Cultural Resources (OP/BP 4.11), Involuntary Resettlement (OP/BP 4.12) and Projects on International Waterways OP/BP 7.50). Besides, the World Bank Group (WBG) Environment, Health and Safety Guideline (EHSG) shall be applicable as deemed necessary. However, the following safeguards policies are more relevant and applicable as part of implementation of the proposed FSTP subproject activities; Environmental Assessment (OP/BP 4.01); Involuntary Resettlement (OP/BP 4.12); and Physical Cultural Resources (OP/BP 4.11):

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. According to the WB OP 4.01, EA, and the National EIA guideline (2003) the proposed project falls under category B. The proposed UWSSP II triggers the WB OP 4.01, Environmental Assessment Policy. Thus, according to the WB categorization, Nekemte town FSTP was grouped under category 'B'.

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.

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. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement. 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 require land for its implementation (will affect land holding rights of three HHs in the Project area) and hence there could be involuntary resettlement of land that results in direct social and economic impacts such as relocation, loss of income, assets or access to asset.

3.3. 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, which 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 effectively and safely control such events, 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 (Table 1).

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 entire operation period which implies that it is possible to use the treated Fecal sludge for different purposes.

3.4. Comparison of the World Bank Safeguard and National Polices

Below is a short summary of comparison of the Ethiopian and the World Bank safeguard policies

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
Actions for livelihood restoration and assistance to vulnerable groups	Specific laws or regulations specifying support for livelihood restoration and transition& moving allowances are stagnant and do not receive regular updates following changing conditions. 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

3.5. UWSSP II Specific Legal Frameworks

3.5.1. 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.

3.5.2. 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 (RAP) or Abbreviated Resettlement Action Plans (ARAP), depending on the conditions, 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 the proposed project.

3.5.3. 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. The general role

of the FDRE EPA is to provide for the protection and conservation of the broad environment, through formulation of policies, strategies, laws and standards, which foster social and economic development in a manner that enhance the welfare of humans and the safety of the environment. 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 shall, based on the Ethiopian Environmental Policy and Conservation Strategy and ensuring public participation in the decision-making process, be responsible for: Coordinating the formulation, implementation, review and revision of regional Environmental monitoring, protection and regulation.

3.5.4. Oromia Regional State Environmental Protection Authority

Oromia Regional State EPA is responsible for environmental protection matters in the region. It has the mandate of enacting regional environmental proclamations, regulations, standards and guidelines. The Regional EPA is responsible for the review and approval of ESIA of 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 in semiannual bases. It can conduct environmental and social safeguard audit every two year and give technical assistance and guidance to the zone and town administration environmental regulatory agencies.

3.5.5. Nekemte Town Admiration Environmental Protection Office (Local EPA)

Nekemte 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 and Local EPA. Local EPA 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 Local EPA 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. Description of the Project

4.1. Overview of Urban Water Supply and Sanitation Project

UWSSP-II is a category "B" project which is financed by the Word Bank with the aim of increasing and expanding improved sanitation services in 22 secondary cities in Ethiopia where Nekemte is one. The project is designed to support efforts toward achieving the 6th Sustainable Development Goals; GoE's attempt to end Open Defecation (OD), increase access to improved sanitation facilities to disadvantaged and low income areas; increase provision of safely managed sanitation services and facilities in urban areas as well as enhancing operational efficiency and institutional competency of organizations in their provisions of water supply and sanitation services.

4.2. Project Area description and accessibility

The proposed FSTP will be constructed at around 3.6 Km far from Nekemte town. The town is located at a distance of about 328 Km west of Finfinne/Addis Ababa, 110 Km north-east of Gimbi, and 250 Km north-west of Jimma town. It serves as the administrative center of East Wollega Zone. The administrative location of the proposed FSTP site is in Guto Gida district. The site can be accessed by traveling 3.6 Km distance from the edge of Nekemte town of which about 300m is cobble stone road and 3.3 earth road that need to be upgraded as part of the project construction. The Guto Gida district has offered a legal title deed to the town administration for the implementation the aforementioned sub-project. Distribution of the proposed public and communal toilets and the fecal sludge treatment plant was described in the following figure 1.

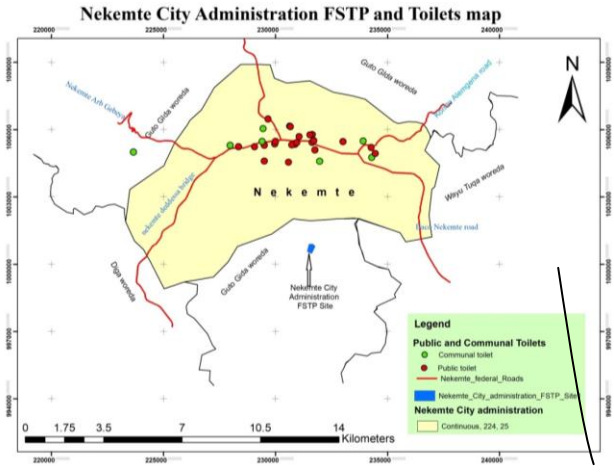


Figure 1: Location map of the toilets and the FSTP

4.3. 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 city administration; and
- Θ Project management and institutional strengthening component will help manage the project and strengthen their institutional capacity.

In urban areas like Nekemte with a high rate of urbanization and rapid population increase, waste management is a severe problem. There is no waste water infrastructure (including FSTP) built for Nekemte and onsite sanitation is the dominant waste management practices on which the community uses septic tanks and pit latrines to collect of the fecal sludge.

4.3.1. Short term Interventions (5-years horizon: 2025-2030)

The short-term interventions of the citywide inclusive planning targets the provision of sanitary facilities, creating awareness, and imparting appropriate health education to follow hygienic practices to protect public health and the environment. 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 the short-term intervention, different types of communal and public toilets and FSTP will be developed in Nekemte town as part of UWSSSP-II.

4.4. Design of Fecal Sludge Treatment Plant

There is no FSTP in Nekemte and hence vacuum trucks transport sludge to illegal dumping sites designated for this purpose. Fecal sludge discharged through open ditches or land surface with no prior treatment is the cause of worsened environmental pollution by flowing down into the rivers or infiltrating into soil to end up polluting groundwater resources.

For the construction of FSTP in the Short-Term Horizon, it is estimated that 315 m^3/day of fecal sludge is generated from residential sources (Feasibility and Design Report, 2022). Three alternative design options were critically analyzed and compared to select the most suitable alternatives using environmental, social and economic criterion. Hence, the proposed and designed FSTP in Nekemte is with several treatment units with a sludge drying beds (SDB). The components of the treatment plant include Reception and screening chamber, Sludge Drying Beds (SDB), Constructed Wetland, Maturation Pond and Extended Sludge Storage (figure 2).

SDBs are the most widely used method for fecal sludge disposal. Sludge drying involves natural ways of drying to mechanical ways of removing water content. Sludge is applied to the sand bed and is allowed to dry by evaporation and drainage of excess water over a period of weeks depending on climatic conditions.

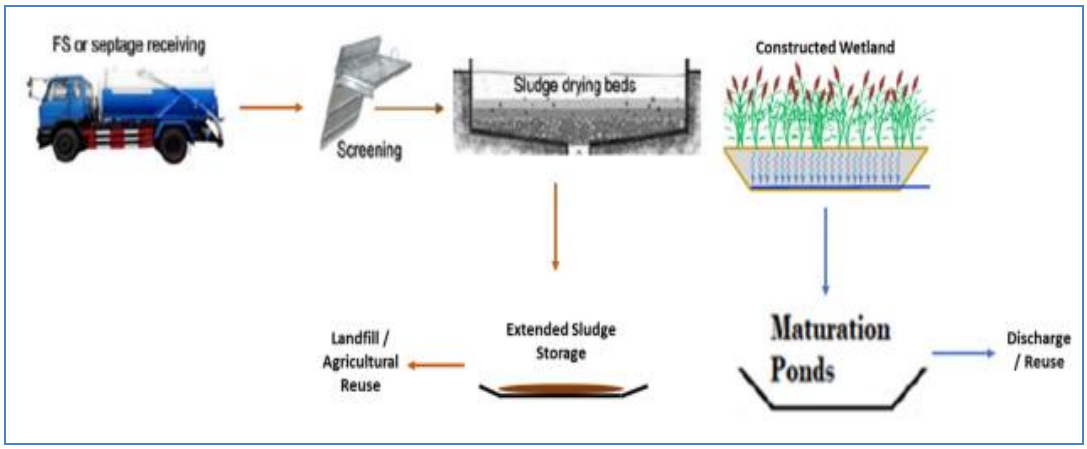


Figure 2: Flow chart of the selected FSTP

4.5. Fecal Sludge Treatment Plant Capacity

The planned short-term treatment interventions deal with the urgent work required for the functioning of the current FSTP in Nekemte town. To better and more successfully treatment of fecal sludge (FS), the fecal sludge treatment process will be updated. During this project phase, it is anticipated 315 m^3/day of waste will be generated for the Short-Term Horizon. The proposed FSTP will comprised from a receiving chamber and screening unit, Sludge drying beds, extended sludge storage, constructed wetlands and Maturation ponds.

4.6. Disposal Standard

The only effluent standard that applies to Ethiopia is that of industrial wastewater effluent. For the purposes of this study, the international criteria for treated residential wastewater/fecal sludge

effluent was referred. The UWSSP- II: Environmental and Social Management Framework report and WHO/EPA guidelines served as the basis for the modification of the effluent standard for Nekemte town.

4.6.1. Fecal Sludge Treatment

In the case of drying beds, further treatment is necessary in order to eliminate of pathogens in the dried sludge. While co-composting is the most suitable choice for the end product and reuse, mixing with lime is a cost-effective procedure. Co-composting allows the sludge to be stabilized and the product can be reused as nutrient-rich soil amendment. Co-composting is far more expensive (since it requires mixing with organic waste), but it might be practicable if the finished product could be sold as fertilizer.

Leachate that has been collected from drying beds and drained through them has to undergo further treatment before it can be disposed of or utilized properly. An aerobic baffle tank reactor (ABR) reactor could be a cost-effective option if the facility is small in size. A Low-cost technology such as waste stabilization ponds or wetlands prepares the liquid for reuse in irrigation or aquaculture or for surface water disposal.

4.6.2. Options for Disposal, Recovery / Reuse

Liquid Disposal options

To minimize and eventually restrict the uncontrolled discharge or dumping of untreated fecal sludge into the environment is one of the goals of this project. Both leachate discharges and other forms of reuse should be subject to standards. The possible disposal option of the treated wastewater/ leachate effluent can be:

- Θ discharged directly to the surface of water bodies (river);
- Θ collected to ponds/tanks/basins for later reuse;
- Θ Used for indirect or direct aquifer recharge, under certain conditions.

Solid matters Disposal options

Sludge from the treatment process, solid materials (screenings, grit, and grease), and processed fecal sludge can all be disposed of as part of the solid matter disposal. The screens, grit, and grease that are eliminated throughout the treatment procedure should be drained before disposal and should only be sent to a controlled landfill. It is strongly advised to reuse the sludge (fecal and/or biological) following treatment (dewatering, drying, stabilization, etc.). The sludge has

extremely nutrient and calorific value; making immediate disposal of them is a waste of energy. When disposal is required, it should be regulated, watched over, and shielded from leaks in waterproof basins.

Treated Wastewater /Leachate Reuse

The planned FSTP processes transform the physical, chemical, and biological properties or composition of the plant influent (wastewater, fecal sludge, or supernatant) to make it safe for use. Regarding to the sake of this project, resort to the international standards for treated effluent from fecal sludge because in the case of Ethiopia, as previously said, the only effluent standard that is accessible is that of industrial wastewater effluent. The treated wastewater can be utilized as process water in various manufacturing facilities, as well as for irrigation (landscape and agriculture), municipal road cleaning, toilet flushing, and fire extinguishing.

Soil Conditioner (Organic matter) and Nutrient Recovery

In Ethiopian soils, organic matter has been severely reduced. One of the most practical reuse techniques is the use of treated sludge, resulting in a win-win scenario by allowing for both the sustainable use of sludge and an increase in agricultural output. The cost of the treatment depends on its application and specifications; however, it is recommended as a workable option for much depleted soils. The price is reasonable, particularly in rural and semi-urban locations where the supply is nearby and there is plenty of room for stockpiling. Composting is the typical method used to produce organic matter from sludge. Both the fecal sludge and the biological sludge should be examined before being used for composting to ensure that the levels of heavy metals exceed the standard limits.

Compost production and use have a long history, especially in Asian nations. The end results of treated fecal sludge, however, are not subject to any guidelines in Ethiopia. Based on this, it is important to carefully analyze the current political/legal, social, technical, institutional, and economic environments that may have an impact on the operation of the co-compost plant and the market for co-compost before beginning a co-composting project in order to create a business plan and financial projections.

5. Environmental and Socio-Economic Baseline

5.1. Physical environment

5.1.1. Historical background of Nekemte Town

Nekemte is one of the oldest towns in the country, established in the mid-19th century. The town is found in the Western Region of Oromia at a distance of about 328 Km west of Finfinne/Addis Ababa. It serves as the administrative center of East Wollaga Zone. Geographically, it lays between the latitude and longitude of 9^{o}46' North and 36^{o}31' East. The town linearly stretches, mainly along the Addis Ababa-Assosa highway, covering 8,204.06 hectares. Locally, the town is surrounded by Guto Gida district (Woreda) in the North, Wayu Tuka district in the east, and Diga district in the West. According to the latest structural plan, the town is administratively divided into seven kebeles, including Keso, Bekanisa Kese, Cheleleki, Burka Jato, Darge, Beka Jema, and Sorga, comprising 510 enclosed villages (Gares).

5.1.2. Geomorphology

The elevation of the town ranges from 1,900 to 2,200 m a.s.l. However, the highest peaks around the town are the mountains of Komto and Tuka which rise slightly more than 3,150 meters above sea level. The ground elevation decreases away from these volcanic peaks, followed by undulating domes and ridges towards the south and South-West to the Dhedhessa sub-basin and towards the north to Anger Gutin (a low-lying area in the North-West). Furthest in the North and South of the town, the surface morphology becomes gentle to flat, and the elevation drops below 1,400 meters above sea level at Anger Gutin and Wama Hagalo extended valley in the east direction.

5.1.3. Soil Types and Textures

5.1.3.1. Soil Deposits

According to FAO taxonomical classification, the main soil group of the project area is Nitosols, comprising reddish-brown stiff (firm) clayey sandy soils rich in Iron (Fe^{+3}), alternatively with Magnesium (Mg^{+2}) and Aluminum (Al^{+3}). These soils are in-situ formed as a result of weathered underlying volcanic formations. These soils are old and residual, characterized by low fertility as important minerals are leached away by fast overland run-off and creeping shallow sub-surface groundwater. The complete soil horizons (layers) are observed in the entire study area. The observed soils around the project area belong to soils formed by climate, organisms, and time, referred to as **Podzol (Pz),** which is the result of excessively contained Iron and Aluminum Oxides.

5.1.4. Land use land Cover Changes

Before the past couple of decades, Nekemte and its surrounding areas were covered by dense indigenous tree species. However, a study undertaken by Tolera Meersa (2020) shows that built-up area coverage increased by 70% in 2016 compared to the 2006 coverage of 43%, while forest coverage decreased to 5.1% in 2016 from 9.7% in 2006, and wetlands coverage decreased to 2.7% in 2016 from 4.2% in 2006. This trend indicates that through time, with urbanization, the built-up area will continue to increase while others decrease. In general, the current land use (total = 8,204.06 ha) type of the town consists of residential (23.1%), roads (24.3%), Urban agriculture (16.59%), commercial (7.8%), social services (9.6%), environmental and recreational (7.39%), administration (2.79%), manufacturing (4.29%), and special functions such as mining, geological hazards (4.1%), etc.

5.1.5. Climate

5.1.5.1. Precipitation, Temperature and Humidity

Nekemte has a typical tropical wet and dry, or savanna climate. The town's yearly average temperature is 14.83^{o}C, which is 7.4% lower than Ethiopia's average. Nekemte typically receives on average 88.99 millimeters (3.5 inches) of precipitation per month and has 189 rainy days (51.82% of the time) annually. The total annual rainfall of the project area is about 2,067 mm.

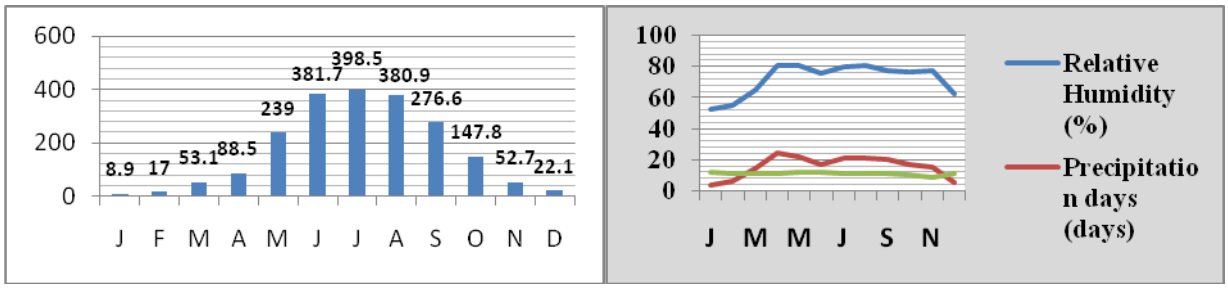


Figure 3: Mean monthly rainfall and Humidity of the project area, June 2023 (rainfall Left) and (humidity right)

The mean monthly temperatures range between 12^{0}C and 19.5^{0}C and thus constructions should be planned between Octobers to April which are relatively dry months.

5.1.5.2. Evapotranspiration (ETo)

The hydrological assessment conducted by the Engineering Corporation of Oromia (ECO, October 2021) calculated the evapotranspiration value at 1,564.2 mm/year. The actual evaporation is considered to be 80% of the evapotranspiration values. It is also noted that surplus water is available

from Mid-April to Mid-October, almost for 7 months of the given year, while the deficient months are from the end of October to mid-March, which is almost 5 months. Hence, there is surplus water between the months of April and October.

5.1.5.3. Hydrology

ECO (October 2021) identified some 12 cold springs at/around Nekemte town. According to this observation, some two springs found in the Anger Gutin sub-basin have a discharge of 0.32 l/s to 1 l/s, while some eight cold springs belong to the Diddessa sub-basin with discharges varying from 0.12 l/s to 1.85 l/s, and the other two are just on the sub-basin divide line with discharges ranging from 0.5 l/s to 0.8 l/s.

At the lower land surface, particularly around tilting flatlands, the streams tend to develop a dendritic to parallel geometrical shape. Roughly counted data reveals that there are some seven smaller sub-watersheds appearing and draining out of the town. Experts at the Nekemte water and sewage services authority estimate that about 60% (four smaller sub-watersheds) of the drainage drains to Tinfa via Diddessa, while 40% (three smaller sub-watersheds) of the watersheds drain to the Anger Gutin sub-basin. The seven sub-watersheds are partially or fully included in the sub-watersheds locally known as Bakanisa Kase, Qasso, Cheleleki, Bakke Jema, Darge, Sorga, and Burka Jato (figure 4). The popular Anger Gutin and Diddessa Rivers (sub-basins) are found within the boundary of the East Wollega zone.

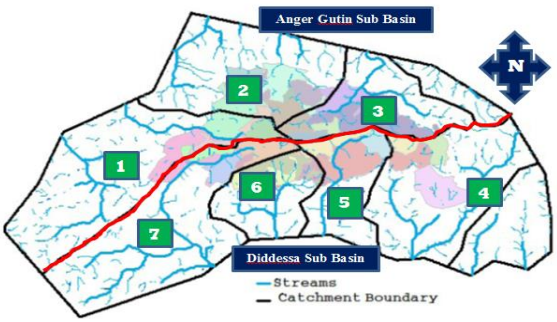


Figure 4: Diddessa sub-basin catchment boundary

5.1.5.4. Infiltration

Infiltration is considered as a recharge of groundwater. As 60% of Nekemte's drainage is towards Diddessa, the recharge is taken as valid for the Nekemte area. Academic research conducted by Kassahun Abera (2008) on the upper Dhidhessa sub-basin groundwater assessment was reviewed and given due attention. Some of the research findings are that the annual recharge of the Dhidhessa sub-

basin, as estimated from base flow, is about 324 mm, and actual evaporation (AE) is about 910mm. The researcher also suggested that the major potential aquifers for groundwater prospecting are volcanic aquifers, mainly Basalts and trachytes. The HME map suggested that the Nekemte area is categorized as highland 1, with gross recharge to groundwater in the order of 250mm to 400mm.

5.1.6. Geological Set-up of the Project Area

5.1.6.1. Regional Geology

At depth, underlying the volcanic rocks (basaltic lava flows), the Metamorphic basement of rocks on the Nekemte map sheet is a part of the Protozoic rocks of the Western Ethiopian Shield, which are assumed to be the southern extension of the Arabian Nubian Shield (Kazmin, V. 1979), and some others have studied the Protozoic rocks of Western Ethiopia. The Precambrian rocks of Western Ethiopia were studied and classified into three NS running zones. This is the Western high-grade gneiss; the central low-grade volcanic sedimentary belt is bound both in the East and West by a high-grade belt. The low-grade volcanic sedimentary belt is bound both east and West by high-grade gneiss (Kazmin, V. 1979).

5.1.6.2. Local Geology

According to the study by ECO, covering a total area of 3,220 km^2, most of Nekemte town and its surrounding areas (2,040 km2) (63%) are covered by Wollega Basalts. Furthermore, there are also rock units deposited at or around the town, covering areas to varying degrees. These include Adigrat Sandstones (15%), an undifferentiated lower complex of basement rocks (12%), and basalts to volcanic centers (4%), post-tectonic granites (4%), and colluvium (2%).

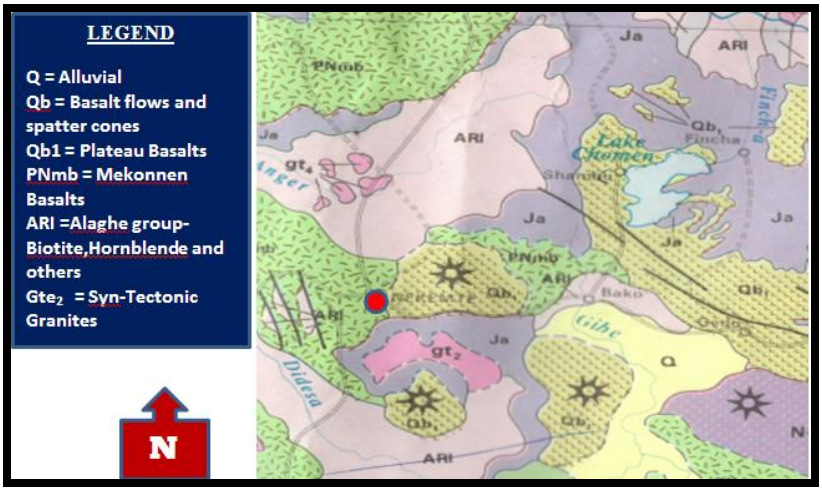


Figure 5: Geological Map around Nekemte town

5.1.6.3. Geo – hazards and Seismic of the Study Area

Earth tremors and local earth movements can affect the FSTS infrastructure. Seismic shocks are concentrated along the Ethiopian Rift Valley system. As can be understood from Figure 6, Nekemte town is outside the influence radius. Therefore, Nekemte town and its surrounding areas are safe and stable, free from earth tremors and shocks.

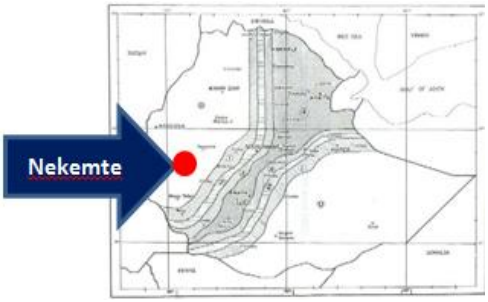


Figure 6: Seismic radius

5.1.6.4. Landslides

The recently observed landslide in the Wollega University (WU) compound is a typical disaster phenomenon that affected student living buildings, cafeterias, retaining walls, and inter-compound roads where the problem has not been solved yet. Nevertheless, the study made by A.A.D. (August 2020) concluded that the root cause of the landslide is the pore water pressure induced by rising groundwater tables along sloppy lands. The expert recommended the local indigenous solution called "the MURA solution" (excavated trench to drain shallow groundwater in engineering terms) is learned from surrounding farmers such that the ground water (pore) pressure affecting their agricultural lands is resolved by implementing "the MURA Solution". The study concluded that the landslide is more facilitated in the presence of sloppy and wetland by rising water table.

Figure 7: Landslides in Wollega University Compound

5.1.7. Hydro-geology of the Study Area

5.1.7.1. Groundwater Potential

(i) Hand dug wells

Interviews made with local residents indicate that, before modern piped water supply, the major water supply system for the entire town's residents was water from hand-dug wells. Earlier, each household had its own hand-dug well. The relics of such dug wells still persist in the town. A sample of the representative dug wells was visited by the team, the GPS readings were documented, and the Static Water Levels (SWLs) were measured as indicated in the table below. As can be seen from the table, the wells have the lowest SWL at valleys (0.7m) and 9m to 10m at the raised tablelands of Nekemte town. Most of the dug wells are excavated within the reddish-brown stiff clays, and the groundwater mostly appears from the weathered and fractured zones, which could be considered local shallow aquifers.

Figure 8: GPS locations and depth of visited hand dug wells in Nekemte town, June 2023

(ii) Boreholes

The ECO (2021) reported that all wells are very shallow and have a depth below 166m. There are wells drilled around Nekemte Town; a few boreholes sunk in basement rocks remained dry, such as Uke in the Anger Gutin sub-basin, where metamorphic rocks exist. All wells are very shallow and have a depth strictly less than 166 m. The majority of the wells are shallower than 120m (table 4), with yields ranging from 5 lit/sec to 27 lit/sec. The wells were developed in the shallow aquifer of fractured and weathered basalt and Scoriaceous basalt. Their Transmissivity ranges from 15.41 m^2/day to 829 m^2/day at Hadya wells, and they were developed in the shallow aquifer of fractured and weathered basalt.

Table 3: Boreholes around Nekemte town

No	District	Site_name	Sub_basin	X	Y	Z	Depth_m	SWL	Q_lit/sec	T_m2/day	K_m/day	Storativity	Remark
1	Sasiga	Sanbat Dure	Anger	223088	1015565	1725	82.45	21.83					secondary data
2	Sasiga	Tsige	Anger	226118	1016499	1685	93	20.85					observed
3	G/Wayu	Nekemte BH#1	Dhidhessa	232004	999157	1933	160	12.75	5	15.41			observed
4	G/Wayu	Nekemte BH#2	Dhidhessa	232779	999521	1934	134	23.85	27	164.16			observed
5	G/Wayu	Nekemte BH#3	Dhidhessa	231931	1000097	1938	166	23.7	6.2				observed
6	G/Wayu	W_Universty BH_1	Dhidhessa	233774	1001690	1947				829	17.28	2.27E-04	observed
7	G/Wayu	W_Universty BH_2	Dhidhessa	233689	1001493	1941							observed
8	G/Wayu	Hadiya well#1	Dhidhessa	235734	1004115	2054	140	2.33	20.5				observed
9	G/Wayu	Hadiya well#2	Dhidhessa	235830	1004164	2055	125	3.2	23				observed
10	G/Wayu	shibii	Dhidhessa	236582	993060	1838							observed (PVC Casing)
11	G/Wayu	Ganda Chala	Dhidhessa	231240	993704	1922	50						observed
12	Leka Dulacha	Gatama (Old)	Dhidhessa	223035	984213	2139	60.76	1.5					secondary data
13	Leka Dulacha	Gatama	Dhidhessa	223405	984897	2110	60	1.37					secondary data

Source : Groundwater investigation (hydrogeology) report by Engineering Corporation of Oromia (ECO), October, 2021)

5.1.7.2. Aquifer Characteristics

The same source of information reported that Metamorphic, Mesozoic, and Tertiary volcanic rocks characterize the study area. Specifically, Nekemte town and the surrounding area are covered by basaltic rock, as observed during field work and inferred from lithological borehole logs. The basalt unit has thick clay intercalations, demonstrating different episodes of volcanism. This basaltic unit, which is highly fractured and weathered, can be a major water-bearing formation. The productivity of the basalt unit varies from 5 l/sec to 166m b.g.l. at Tinfa. The well at Hadiya has a discharge of around 26 l/s and a total depth of 140m. Thus, this great variability indicates the intensity of fracturing and weathering significantly varies at different places and probably affects recharge and storage conditions.

The ECO report shows that the yield of aquifers as estimated from spring yield varies from 0.1 lit/sec to 5 lit/sec in the study boundary, and boreholes have 6 to 27 lit/sec at Tinfa. In Hadiya sub catchment, two boreholes were developed by Wollega University, and their aquifer test result shows each well yields about 22 lit/sec. The thickness of basalt varies from less than 100m to above 1,200m at Tuka.

5.1.7.3. Ground Water Depth and Flow direction

The borehole inventory conducted by ECO (2021) in Nekemte town and surrounding districts revealed that the boreholes have a total depth as shallow as 50m b.g.l. and as deep as 166m b.g.l. ECO (October 221) identified some 13 drilled boreholes in the town and the surrounding districts, approximately

within a 50-kilometer radius. The identified boreholes by ECO are tabulated in Table 4 above. The SWLs values generally range from 1.37m b.g.l. to 23.7m b.g.l.

The local groundwater of Nekemte town can have variable flow directions due to different reasons, for instance, the existence of aquifers and faults. It is hypothesized that ultimately, the groundwater flow follows the surface water flow direction. Hence, we can assume two general flow directions: to the Anger Gutin and the Diddessa sub-basins.

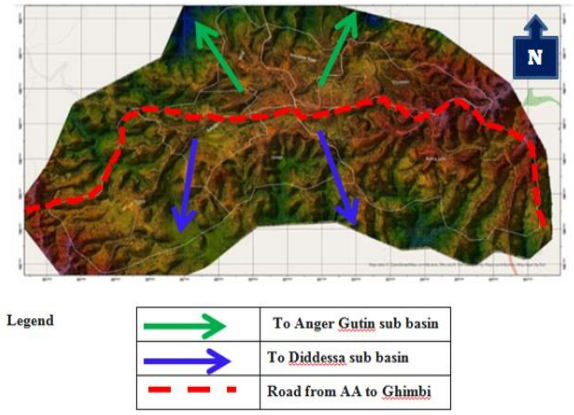


Figure 9: Groundwater flow

5.1.7.4. Surface Water

The water bodies encountered in and around Nekemte are both artificial and natural. Two artificial bodies were encountered around Nekemte town: the Chancho Rockfill dam constructed by Oromia Construction Corporation and the dam at Sorga constructed by EEMCY. On the other hand, Burka Jato and Sorga streams were the major natural streams that mixed together at a place called Tinfa, a small village in Negassa Kebele of Guto Gida district.

Figure 10: Surface Water View

5.1.7.5. Hydro-chemistry and Water Quality

The study made by ECO (2021) concluded that the groundwater quality of Nekemte town and its surrounding area is very fresh and potable and the concentration of ions is in the acceptable range as compared to national (Ethiopia) and international (WHO) standards. Most dominant ions are calcium (Ca^{2+}), magnesium (Mg^{2+}) and bicarbonate (HCO_3^-) at shallow depth but relatively increased sodium (Na+) content detected at deep.

Based on the secondary data of ECO 2021, the water samples from 15 boreholes indicated that TDS in groundwater varies between 114 mg/l to 2028 mg/l. About 93% of the local groundwater has TDS less than 500mg/l, the only exception is the artesian well of Gatama has TDS above the 2000 mg/l. Data from similar sources also revealed that, the Nitrate (NO_3) concentrations are lower than 31.9 mg/l and Fluoride content is tested as maximum of 1 mg/l.

5.2. Biological Environment

Nekemte and its surrounding areas were covered by dense indigenous tree species. Interviews made with rural farmers revealed that there are about 37 types of tree species that are dominant in the project area, including *Croton macrostachyus (ክሳና), Acacia nilotica (ግራር), Vernonia amygdalina (ግራዋ),* Ficus vasta (ዋርካ), juniper (ፅድ), and Syzygium guineense (ዶቅማ). However, the proposed site that is located in Tinfa village consists of scattered shrubs and bushes. Some of the area around the project sites, Tinfa, consists of grazing land, crops, marshy areas and small follow lands. The wet grassland areas are found mainly in the valley bottoms and along streams and springs. These areas are moist throughout the year with good ground cover due to the high water table, and it provides the main grazing area for livestock.

Figure 11: Partial view of vegetation cover of the project area

5.3. Socio-economic environment

5.3.1. Demographic Characteristics

Nekemte is one of the largest towns in the western part of the country. The town is one of the oldest urban establishments in the history of Ethiopian urbanization in general and Oromia in particular. It was founded in 1832, during the reign of Bakaree Godanaa, the then chief commander of the area.

The town is located at the cross roads that connect Addis Ababa with Asosa (East-west) and Bure (Gojjam) with Jimma (North-South). Currently, it has seven sub-cities. As per the forecast made based on CSA's census, the population of the town in 2020 has reached 138,127[1]. However, this figure doesn't consider the recent influx of migrants from all zones of Wollega that came to the town due to economic problems and security challenges that affected various parts of the western part of the country. Data obtained from Oromia Water & Energy Resources Development Bureau, on the other hand, indicates (as shown in Nekemte City Administration, Plan & Economic Development Office, September 2021) that the population has reached over 230 thousand in the year 2021.

As per the data obtained from a publication by Wollega University, the age composition of the population follows the national pattern as the majority (about 60 percent) of the population has an age of below 30 years. This is also a typical feature of developing countries. Only 4.5 percent of the town's population is over 61 years old. Children below the age of 10 account for 15.3 percent of all people. Regarding sex composition, the same source indicates that 50.24 percent are males while the balance (49.76 percent) is females.

5.3.2. Education

Nekemte has many educational institutions. As per the data obtained from the town, there are 45 kindergartens (KGs) owned by the private investors, NGOs and the government in 2020. The Gross-Enrolment ratio (GER) in the KGs is 103.33 showing that there are underage and overage children in the schools. So may also have come from surrounding rural kebeles or small towns.

The town also has large number of primary schools that enroll about 21,115 students in 2020. The GER in primary schools is 129 percent still higher that the national target of 106 percent (due to the same reason mentioned above). School age population in the town is 16,375 during the same year.

[1] Wollega University (2021). Socio-Economic Profile of Nekemte City, Oromia National Regional State of Ethiopia.

Regarding secondary education in the town, as data from Wollega University shows, GER is 88 percent (which is still higher than the national target). School age population during the indicated years was 16,214 whole enrolments were 14,244. At national level the target for GER in secondary education is 74 percent.

5.3.3. Health

There are a number of health institutions in Nekemte town. As per the publication by Wollega University, there are two government owned hospitals, two health centers, one health post, and over 45 differently sized private clinics in the town.

Data obtained from the local health office (of the town) there are over about 40 medical doctors (including specialists), 44 health workers with masters qualification, 882 degree holders, and 361 diploma holders serving the local population in various health institutions.

FGDs and interviews conducted with residents of Nekemte town revealed that the community suffers from diseases related to sanitation problems. The following, as per information obtained from the town's health office, are the top diseases affecting the health of residents in the town. These are: Typhoid Fever, Dyspepsia, Urinary Tract Infection, Pneumonia, Diarrhea, Respiratory Infection, Tonsillitis, Injury and Cataract.

Top ten diseases recorded among children of less than 5 years of age, on the other hand, are Pneumonia, Tonsilities, Diarrhea, Upper urinary tract infection, other bacterial infections, Helmenthiasis, thyphoid fever, FUO, Dermatities, and Musculo-skeletal. These show the prevalence of communicable diseases that commonly affect communities having poor sanitation facilities.

5.3.4. Local Economy

Nekemte and its surrounding are known for being surplus producers (net exporters) of agricultural products such as coffee, cereals, livestock products and etc. The town, as the administrative capital of the zone and as the biggest town in that part of the country, hosts large number of salaried workers mainly employed by government offices. There are also large number of employees of NGOs and the private sector. Data obtained from the publication by Wollega University indicates that 24 percent of income earners get their income from salary; while 71 percent get their means of life from self-employment in small scale industries, trade, and agriculture and from daily labour. The rest live on remittance and other sources of income.

The other important indicator of economic performance is revenue collection. As per the same source, Nekemte collects revenue from various streams such as from salary income tax (41.4%), service income tax (26.84%) and trade income tax (19%) and other non-income tax sources. The total revenue the town collected from tax and non-tax revenue streams in 2020 were Birr 206.1 million.

As a sign of being the financial hub of the region, in the year indicated above, about 13 banks have over 35 branches in Nekemte town alone. Commercial Bank of Ethiopia alone has 10 branches followed by Awash bank that opened 6 branches in this town.

Moreover, trade and investment activities are growing and the town has licensed over 344 investors in the past few years, many of whom have gone operational. In addition, an agro-industrial park is being constructed by the Oromia regional state in the town. And, this is believed to change the economic role of the town in few years' time.

Agriculture: Urban agriculture is one important economic activity from which a significant number of households support their livelihood. The major economic bases of the project areas surrounding the Town are agricultural activities or mixed-farming system (production of crop including coffee and livestock rearing). Major crops produced in the area include Teff, maize, fruits and vegetables and finger millet. The farming system in the rural areas is mainly expressed as small landholding sizes, rain-fed production method employing traditional farm tools and limited irrigation practice and use of modern inputs.

In addition, the town and the surrounding is known for its livestock population and production. Local population looks after large number of cattle (2624), sheep (509), goat (311), donkey (163), mule (19), horse (83) and 78 bee hives (Oromia Water & Energy Resources Development Bureau -2020/21). The team also saw a small lake called Sorga where limited fishery activities are practiced.

5.3.5. Tourism

There are natural and historical tourist-attraction resources in and around the town. Forests, mountains and artificial water reservoirs, 1 palace (Kumsa Moroda Palace) and 1 museum (Wollega Museum) are worth visiting in the area. In addition there are also 10 Orthodox churches, 11 Muslim mosques, 40 Protestant churches, 3 Adventist churches, 1 Catholic church and 1 Waaqeffannaa centre in the town. The presence of these resources has made the town attractive to tourists.

5.3.6. Energy and Power Supply

Nekemte gets its energy mainly from Hydro-power, biomass, and solar energy. The town gets hydro-power from the national grid. In addition, there are many fuel stations in Nekemte with supplying Benzene, Kerosene and Gasoline to local consumers such as for transportation, electricity generation (for generators) and for cooking. In addition to this, local people also use charcoal, firewood, and cow dung for cooking.

5.3.7. Communication

Communications services refer to all activities of telecommunications, postal services, radio stations, television broadcasting and printed press. Although figural information is not accessed large number of residents in the town are users of Telecommunication services (fixed line, Internet, Mobile phones). Concerning postal services, the town has branches of the Ethiopian Postal service which is providing service to the residents since decades ago. As per data obtained from the town, there are 3 post offices and postal 20 agents in the town.

5.3.8. Transport

Nekemte is connected to other towns and cities mainly through road transport. Locally, the town has over 10 km of asphalt roads, 42 km of cobble stone roads, 19 km of gravel road and 134 km of earthen roads. Currently Ethiopian Airports Enterprise is constructing an airport near the town and this is believed to improve transport access to the people.

Regarding the availability of public transportation facility, it was learnt that there are 120 minibuses, 1134 Bajajs (tri-wheeled small vehicle), 3 city buses, and 1219 motor cycles. In addition to serving the local population, these transport facilities connect the town to its surrounding and other urban centers in East Wollega Zone and beyond.

5.3.9. Water Supply and Sanitation

5.3.9.1. Water Supply Status

Significant portions of water supply sources in Nekemte town are from a rock fill dam and couple of drilled boreholes. In the earlier time, 1977, the town water supply was through the construction of diversion weir constructed on Hadya River. The diversion was upgraded to an earth dam in 1989 to enhance water storage capacity. To overcome the increasing water shortage problem of the town, 3 boreholes were drilled in 2005. Moreover, in 2012, a big Rock Fill Dam was constructed at the locality

of Chancho or Meka having ability to harvest more than $4x10^6$ m^3 per annum of raw water. The treatment plants for the raw water from the dam have a clean water production capacity of 13,000m^3/day which is directly distributed to the town residents by gravity system. Additional two boreholes in 2021 and one borehole in 2023 were also drilled to increase the water supply coverage of the town. At the moment, because of fast urbanization, increased population the water supply is still insufficient.

Under the new 2nd UWSS project constructed one additional water resevoir and aeration structure with the capacity of aerating raw water of 20,000m^3 per day (to remove high concentration Iron and Magnesium) are constructed and currently operating as part of the provision of efficiency improvement.

5.3.9.2. Solid and Liquid Waste Management

Solid waste management is one of the basic municipal services that are currently receiving wide attention in the urban development agenda of many developing countries. Waste management in general and solid waste management in particular are in crisis in many of the world's urban areas as the population attracted to cities continues to grow, and this has led to an ever-increasing quantity of domestic solid waste space for disposal decreasing (Word Bank 1999).

The solid waste disposal system in Nekemte town is open dumping without any segregation. Based on the information from the municipality of the town and water and sewage authority, the dumping sites receive more than 107 m^3/day transported from various sites in the town through skip loaders, vacuum trucks, and donkey carts. The town municipality, private enterprises, and individuals are mainly responsible for collecting, transporting, and disposing of the solid waste. Besides, around 2380 people directly benefiting from the Urban Productive Safety Net Program (UPSP) have also been participating in the collection of solid waste in the town. On the other hand, liquid waste from different parts of the town is also discharged at the same site, Beke Jema area, which is adjacent to the solid waste dumping site.

Both disposal sites pose various environmental, socio-economic and health problems. According to the information obtained through interviews with the local people around waste dumping sites, up to 20 waste pickers can be seen at the dump sites daily. They come in search of plastic and metal wastes

such as PET bottles, nylon sacks, and tires, and metal scrap like aluminum and metal cans, and sell what they find.

In addition to social and health problems, the leachate from the open dumping site is causing water and land pollution as most of the water sources, like the Aleti stream, which is used for irrigation in Sosillo Kebele, is found downstream of the dumping site. Interview made with local people indicates that trees have dried as a result of this dumping waste in the locality repeatedly showing the prevalence of pollutants in the area. Besides, the site remains unfenced, making it a living place for both domestic and wild animals, including cattle, monkeys, and various scavengers. Hence, because the sites are very close to settlements and social services (Feynera School is located few meters away from it less than 50 meters), people are complaining of an unpleasant smell due to the degradation of organic waste components.

Figure 12: Solid and liquid waste disposal site at Beka Jema, June 2023

6. Outline of Project Alternatives

6.1. The no project alternative

The no project alternative, often known as the do nothing option, means that the project area will be left in its current condition and that all of the project's beneficial impacts will be ignored. In favor of maintaining the current sanitary conditions, it disregards the development and operation of public and community toilets as well as FSTP.

In other words, the do-nothing alternative would mean that land and water bodies found nearby of Nekemte town would continue to be polluted and loaded with untreated fecal matter. This option is mostly applicable in situations where the proposed project area is in ecologically or socially sensitive areas, the negative impacts will be significant, and no proper mitigation measures can be formulated to eliminate or minimize the impacts to manageable or acceptable levels. The implementation of the project area rounds through less ecologically sensitive areas, and little economic displacement will occur. Therefore, the no project option is the least viable alternative from both the socio-economic, health and partly environmental perspective.

6.2. Design Alternative

6.2.1. Selection of Fecal Sludge Treatment Technologies

Fecal sludge treatment technique typically consists of 3 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. The primary and sludge treatment methods that are most suitable for Nekemte Town were identified through a literature analysis, feasibility study and detailed study report assessment. This section gives an overview of the possible treatment technology alternatives, including their fundamental principles, advantages, and disadvantages from the perspectives of the environment, social, and the economy.

6.2.1.1. Technology for Primary Treatment (Solid–Liquid Separation)

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 primary treatment are: 1) Drying Bed (UDB), 2) Planted Drying Bed (PDB), 3) Settling and Thickening (S&T) Tank.

1) **Unplanted Drying Bed**: this is a simple, permeable bed that has numerous drainage layers as demonstrated in Figure 13. 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% 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.

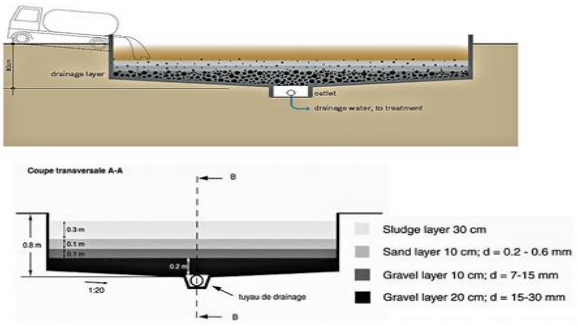


Figure 13: Schematic of an Unplanted Drying Bed

The percolate has to be collected for treatment or regulated reuse since bacteria are still present. Before adding new sludge, unplanted drying beds must be de-sludged. Although frequent desludging necessitates huge surface areas, personnel, or mechanical power, drying beds are very simple to build and maintain.

2) **Planted Drying Bed (PDB):** A planted drying bed is comparable to an unplanted drying bed as demonstrated in Figure 14, 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 4).

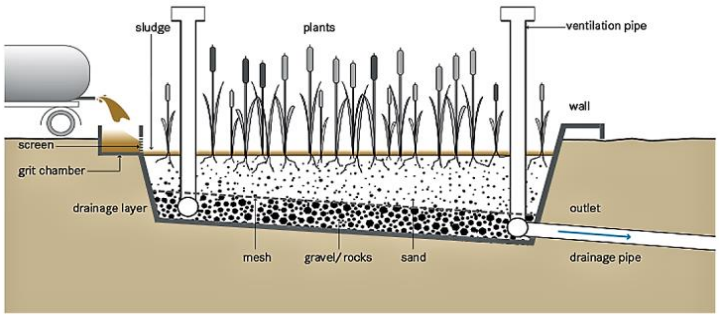


Figure 14: Schematic of a Planted Drying Bed

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.

3) **Settling and Thickening (S&T) Tank:** Settling-cum the thickening tank (ST 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 utilized for loading septage as illustrated in Figure 15.

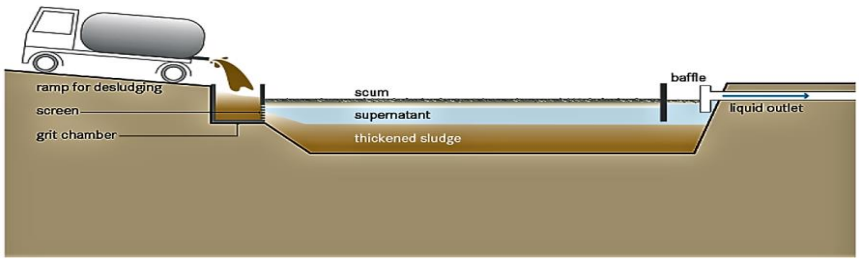


Figure 15: Schematic of a Thickening Pond

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 (see Table 4).

Table 4: Comparative analysis of Primary Treatment (Solid–Liquid Separation) technologies

Technology option	**Advantages**	**Disadvantages**
Unplanted Drying Bed	Relatively low capital costs; low operating costs	High land requirements
	Good dewatering efficiency, especially in dry & hot climate	Odors and flies are normally noticeable
	No energy requirements	Labor intensive removal
	Can be built & repaired with locally available materials	Limited stabilization & pathogen reduction
	Simple operation, only infrequent attention required	Leachate requires further treatment
	No experts, but trained community required	Requires expert design and construction supervision
Planted Drying Bed (PDB)	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 & 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
Settling and Thickening (S&T) Tank	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 materials	Odors and flies are normally noticeable
	Relatively low capital costs; low operating costs	Long storage times
	No electrical energy is required	Requires front-end loader for desludging, Requires expert design and construction supervision and Effluent and sludge require further treatment

6.2.1.2. 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 Nekemte town for ESIA (see Table 5). These factors have a significant impact on the decision-making process when choosing the best faecal sludge treatment technology alternative. The selection of faecal sludge treatment technology for Nekemte town also depends on the UWSSP-II sanitation goals, the and the minimum/indicative wastewater quality standard values set out within the UWSSP II ESMF/WBG EHSG as well as benefits to the environment and health, and the elimination of open defecation.

Table 5: Main Characteristics of the Sludge Dewatering Process

Characteristics	**UDB**	**PDB**	**S&T**
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	-	-	+
NB +: low favorability; ++: moderate favorability: +++: high favorability; -: no need			

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 UDP is determined to be the most appropriate option based on the decision matrix analysis for Nekemte Town FSTP as liquid-solid separation. The PDB comes after it. Consequently, for Nekemte Town FSTP,

UDP, 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. Furthermore, sludge drying beds in general less sophisticated compared to other alternatives, more flexible, and easier to operate, and use less energy during operation than mechanical systems, which would make them preferable dewatering option for Nekemte Town.

6.2.1.3. 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. This is the last step in the sludge treatment process before discharge. 1) Composting, and 2) solar drying are the methods employed for further sludge treatment.

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 as shown in Figure 16. The processing of source-separated human feces has made extensive use of this technique. 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. The survival of microorganisms throughout the composting process depends on properly regulated moisture and aeration conditions. Municipal solid waste has strong bulking qualities and is rich in organic content; whereas, feces have a high moisture and nutrition content.

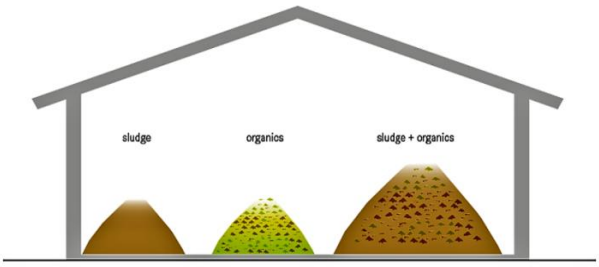


Figure 16: Schematic of the Co-compost

Stabilized organic matter that may be utilized as a soil conditioner is the final outcome of co-composting. Furthermore, it includes nutrients that can act as a long-term organic fertilizer and have positive impacts. A high temperature (50-70^{o}C) is maintained during co-composting for 3 weeks in order to destroy helminthes eggs and harmful bacteria. The co-composting procedure takes 10–12

weeks. Comparative analysis of Co-composting is given in Table 6. Only when a source of well-sorted biodegradable solid waste is available the co-composting technique could be used.

2) **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.

Figure 17: Schematic of solar drying

Table 6: Comparative Analysis of Sludge Treatment and Disposal Technologies

	Advantages	**Disadvantages**
Co-compost	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 helminthes 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	Compost is too bulky to be economically transported over long distances
	No electrical energy required	
Solar Drying	High efficiency for dewatering	Large space requirements
	Low energy requirements	Need mechanical means to turn sludge
	Low investment cost	Ventilate the greenhouses

6.2.1.4. Decision Matrix for Sludge Treatment Technologies Option

Based on the sludge treatment technical options, a decision matrix was prepared for WST with respect to land requirement, energy requirement, skill requirement, CAPEX, OPEX and groundwater level and discharge standard (Table 7).

Table 7: Decision matrix for sludge treatment technology

Constraint	Co-composting	Solar drying
Land requirement	+++	+++
Energy requirement	+	+
Groundwater level	+	++
CAPEX	+++	++
OPEX	+++	++
Skill requirement	+	++
Discharge standard	+++	+++
NB +: low favorability; ++: moderate favorability: +++: high favorability; -: no need		

Based to the decision matrix (Table 7), solar drying treatment is the best alternative sludge treatment technique that ESIA teams could provide based on the real conditions in Nekemte town in terms of the selected solid-liquid separation treatment plant, current sanitation level, and climate consideration. Furthermore, co-composting was strongly advised for further treatment of dried sludge by an ESIA consultancy team as a secure solution for disposing of dried sludge. It is because keeping the dried sludge enclosed in the landfill for over a year causes the pathogens to perish and eliminates the moisture still present in the dried sludge. Co-composting also aids in the inactivation of pathogens and produces a product that is useful as a soil conditioner.

6.2.1.5. 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. Therefore, a low-cost technique should be used (e.g., wetlands, waste stabilization ponds).

6.2.5.1 Waste Stabilization Ponds

The cheap capital and operating and maintenance expenses of waste stabilisation 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 through sedimentation and biodegradation under anaerobic, anoxic, and/or aerobic conditions (Figure 18).

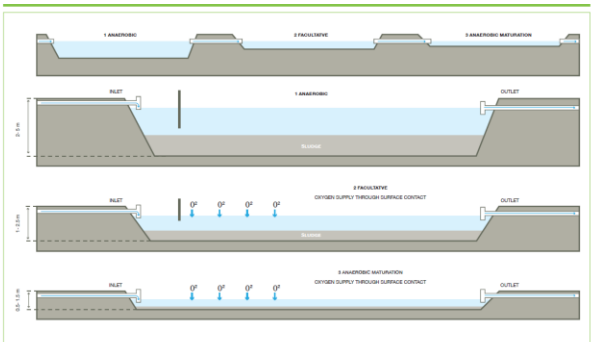


Figure 18: Typical scheme of a waste stabilization system: an anaerobic, facultative and maturation pond in series.

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 8, will dictate the number of ponds and the type of maintenance necessary.

6.2.5.2 Constructed Wetlands

In the treatment of wastewater, there are three types of constructed wetlands as illustrated in Figure 19. The treated water flows horizontally and above ground in free water surface wetlands (FWSW), whereas it flows horizontally and underground (5 to 15 cm below the surface) in subsurface flow wetlands (SSFW). A planted drying bed is what the vertical-flow constructed wetland (VFCW) does. Of course, the direction of the wastewater's flow channel is a key distinction between VFCW and FWSW/SSFW wetlands.

Table 8: 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 $gBOD_5m^{-2}$ 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)
		Low construction, O&M costs	Pretreatment of the effluent may be required to prevent clogging of the filter bed
			Not very tolerant to cold climates

In contrast to the other two systems, which constantly function under aerobic circumstances, this causes occasional aerobic-anaerobic situations in the VFCW. The horizontal-flow systems, on the other hand, are more susceptible to clogging, which may be brought on by a high SS content in the liquid to be treated. 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.

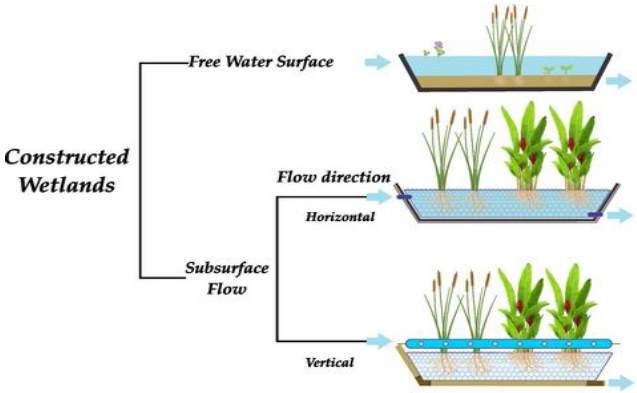


Figure 19: Scheme of Types of Constructed Wetland

6.2.5.3 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. The treatment is improved as a result of the longer contact time with the active biomass (sludge). 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.

Table 9: Comparative Analysis of Anaerobic Baffled Reactor (ABR)

Advantages	**Disadvantages**
Resistant to organic and hydraulic shock loads	Long start-up phase
No electrical energy is required	Requires expert design and construction
Low operating costs	Low reduction of pathogens and nutrients
Long service life	Effluent and sludge require further treatment and/or appropriate discharge
High reduction of BOD	Needs strategy for fecal sludge management (effluent quality rapidly deteriorates if sludge is not removed regularly)
Low sludge production; the sludge is stabilized	Needs water to flush
Moderate area requirement (can be built underground) and Simple to operate	Clear design guidelines are not available yet

6.2.1.6. Fecal Sludge Treatment Process Technologies Adopted for Nekemte 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 (DEWATS) was the most widely used technology in developing countries.

In reality, Nekemte 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. In view of this, the 3 various fecal sludge management options have been examined by CES Consulting Engineers and MS Consultancy PLC (CES and MS consultancy PLC) and reported in the feasibility study and detailed design of CWIS for Nekemte town.

Alternative 1: Reception and screening chamber-STT-Anaerobic Baffled Reactor (ABR)-Constructed Wetland-Maturation Pond, SDB-Extended Sludge Storage

Alternative 2: Reception and screening chamber-SDB-Constructed Wetland-Maturation Pond, Extended Sludge Storage

Alternative 3: Reception and screening chamber-STT-Anaerobic Baffled Reactor (ABR)-Facultative Ponds-Maturation Pond, SDB-Extended Sludge Storage.

Based on the outcome of the multi-criteria analysis, the consultant was proposed their top choice for properly treating the produced fecal sludge in Nekemte town is alternative 2 which is unplanted sludge drying bed and with constructed wetland without ARB. The sequence of the proposed fecal sludge treatment process was: Reception and screening chamber-SDB-Constructed Wetland-Maturation Pond and Extended Sludge Storage.

The ESIA consultancy team and designer consultant agreed on the suggested method for treating fecal sludge in Nekemte Town. 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 or providing health risks to people. Sludge and leachate that would fulfill the minimal or indicative wastewater quality standard values described in the UWSSPII, ESMF/WBG EHSG can also be treated using the suggested fecal sludge treatment approach.

6.3. Site Alternative Analysis

Site selection involves a variety of technical and non-technical issues such as environmental, social, and financial factors and criteria, all of which are important and need to be considered carefully and adequately. For this project during the feasibility and design study, the site selection analysis had been carried out based on a 3- stage assessment methodology as outlined in feasibility and design report. The ESIA consultant examined the sites from environmental, social and economic point of view and presented three site alternatives. During the site visit and data collection Nekemte town utility coordinator, safeguard experts and the local community involved.

Site alternative I: This site is located in Guto Gida Woreda in Negasa Kebele in Guftie village at a distance of 3.6km southwest from the Nekemte town center. The total area proposed is 6ha, but it is possible to access more plot of land for buffer zone since there is free adequate public land around it. This site is also free from any human settlement in 400m radius. It is an open space free from any natural or manmade intact forest except the two fichus vista tree and some bushes and shrubs (Figure 20). It is at least2.1km away from any water source. Regarding ownership of the proposed site it is an open public space but some small portion (about 1ha) of the site was owned by three local farmers. During site visit and FGD with the PAP and local community the ESIA consultant witnessed that local farmers were using as an open grazing and farm land. During the consultation the PAPs confirmed to leave the plot of land with land for land or cash compensation. The Nekemte town utility and Mayor office and Guto Gida Woreda concerned representatives confirmed to give either in cash or kind compensation based on the upcoming ARAP findings.

Even though it needs upgrading it has an earthen access road as compared to the other site alternatives. As compared to the other two alternatives this site is the nearest site to the town center. So it can make the transportation of construction materials and management cost during operation phase of the project relatively easier than the other two. During the tripartite consultation among the design consultant, the ESIA consultant the MOWE the design consultant confirmed, it was their first site alternative. Thus from an environmental, social and economic point of view the ESIA team also proposes this site as the first and preferred alternative than the other two sites.

Figure 20: Partial View of the Site Alternative I

Figure 21 also reveals the Google earth map of the first site alternative. The map reveals the location, existing physical and socioeconomic features in and around the proposed site and distance from the town.

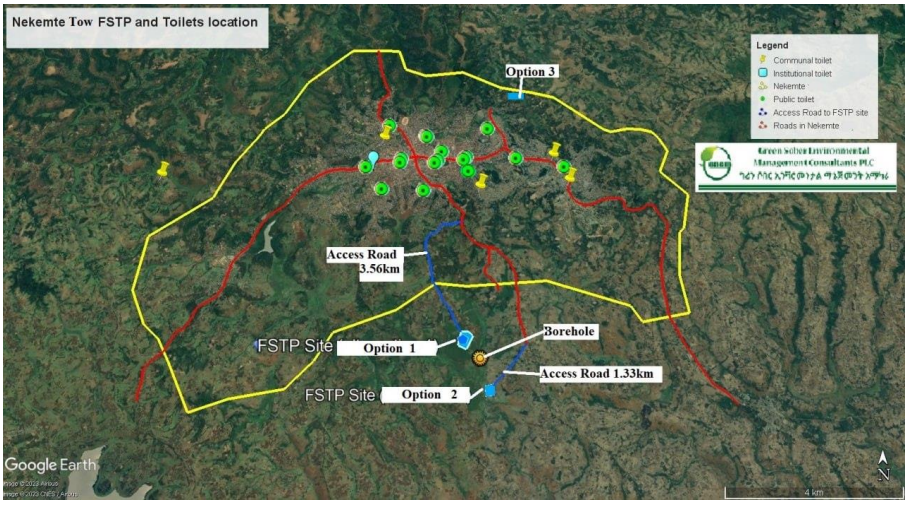


Figure 21: Google Earth Map of Site Alternative I and II

Site Alternative II:

Site alternative II is located in the same Woreda and Kebele as that of site alternative I. It is situated at 10.5 Km away from the town center along the River Tinfa. So it has high potential to contaminate River Tinfa both during construction, operation and decommissioning phase. The site is plat terrain open public grazing land free from any natural or manmade forest. The alternative II is close to three boreholes, which are functional water supply source of the Nekemte town. It has no any access road, so needs construction of a 10.5km access road.

Figure 22: Photo Taken during Site Alternative II Visit

On the other hand, site alternative II is more than 1Km away from any human settlement (Figure 22). Therefore, it can be taken as the second alternative site for the Nekemte FSTP construction.

Site Alternative III: the 3rd site alternative is located in the Nekemte town in Bullo Kebele in Chelelek Village in Chelelek catchment). It is around 5km away from the town center partially covered with natural and manmade forest. It has potential to contaminate River Chelelek. Further is can cause economic and physical displacement of more than 15 households. This site alternative also needs access road opening, since it has no any access. In addition the 400m buffer zone delineation can lead to displacement of more households. For this environmental, social and economic reasons site alternative III is the least preferred.

Figure 23: Photo Taken from Site Alternative III

7. Stakeholder Consultation

Public consultation is an essential component of ESIA. A successful ESIA equally addresses environmental and social concerns of the surrounding and the community. The ESIA team studying the impact of the sub-project in Nekemte has conducted public consultations (PC) with community members, project beneficiaries and interested stakeholders to present the subproject, its' likely impacts and to seek their opinions, questions, concerns and suggestions over the proposed subproject components. Various consultations were made regarding the FSTP from 6th of June to 13th 2023 with PAHs and stakeholders drawn from government offices and other NTWSSSE. Participants of the consultation were drawn from various groups of the affected communities, besides extensive consultation was held with cabinet members and other officials drawn from various concerned offices in the town. The PCs are conducted in the form of informal discussion, meeting and focus group discussion. The consultation processes were facilitated and led by the consultant team that consists of Environmentalist, GIS expert, sociologist and climatologist.

7.1. Community Consultation with PAHs About the FSTP

The land selected for FSTP construction is under use by 3 land right holders in Negassa Kebele around Tinfa area of Guto Gida district. The ESIA team was informed that NTWSSSE has received a legal title deed for the FSTP site from this district. During the visits made, especially on the 10th of June 2023, the ESIA study team had a semi-informal interview with some of the PAP about the site and the surrounding environment. It was confirmed during the visit that these 3 land right holders are actively engaged in crop production on the proposed FSTP site.

Figure 24: Community Consultation

Formal public consultation about the FSTP was conducted on the 12th of June 2023 at NTWSSSE meeting hall. The consultation was attended by over 20 participants drawn from the PAP, concerned officials of the Guto Gida district and other stakeholders. This consultation was co-chaired by the vice manager of NTWSSSE and team leader of the Consultants. The vice manager opened this consultation

by briefly explaining about the backgrounds of the project and other development works being executed by his office.

Then the team leader took the floor and introduced the ESIA team to the participants and further provided detailed description of the project. He indicated to them that the design was done and that this ESIA study team is in Nekemte to study the environmental and social impact of the proposed FTSP. He further indicated that those people who will lose their properties as a result of the project shall be duly compensated before the commencement of construction.

Then an employee of the NTWSSSE translated the message to local language (Afan Oromo) and that the site is selected based on the hydrological nature of the town. Up on completion, the project could help them in various ways such as availing organic fertilizer from the plant, construction of access road up to the FSTP site, the local community will get piped water from the new water supply that is being constructed in the vicinity, and finally that this is a very crucial project for Nekemte. He thanked Guto Gida district for offering the land and that they have received a title deed for this plot on which the FSTP is going to be constructed.
The vice manager then took the floor and explained about the FSTP project, the new water supply in the locality and the access road being constructed up to the site.

Another employee from Guto Gida Agriculture Office also noted that they will be happy if they get the bi-products of the treatment plant (such as compost...) for their agricultural activities. In addition, he indicated that jobs will be created and local youth will be benefitted from it. He further indicated that appropriate compensation has to be paid to the affected people. And this compensation can reduce the impact of the project on the local community. He noted that the district administration knows and is happy about the project and that is why they offered the land for the project.

The next speaker, a farmer from Negassa Kebele of Tinfa area told the audience that he heard about the project 2 or 3 days ago and toured the site with the ESIA study team. He said that he is happy about the project and it is to be constructed at the proposed site. Right after that he shared the information with concerned people at the Kebele. He further indicated that local people could benefit from this project and happy about it given that they get compensation for lost properties.

The meeting continued and more ideas were raised by various stakeholders. Some of the major issues were about the need to pay proper compensation, that job opportunities should primarily be given to

local youth, bi-poducts of the FSTP shall be availed to local farmers, infrastructures promised by the town administration (water, electricity and road) shall be provided to the local community and etc.

Finally, the vice manager of the NTWSSSE thanked the study team for coming to the site and provided a genuine information to the project affected people and to get first hand information about the project site. He promised that water will be provided to the residents of the FSTP area and that road is also an integral part of the project. He also promised that compensation shall also be paid following the existing regulations. He told farmers to continue their normal life until the commencement of the project. He told them that the project will generally benefit this community and promised to continue the discussion with this community.

Table 10: Summary of the Public Discussion

Issue raised by	Issues Raised	Responses given
Community	• The need to pay proper compensation before the commencement of construction • The community needs seedlings to plant more trees • The need to get the promised infrastructure (water, electricity and road)	• Representatives of the NTWSSSE promised that the project would benefit these farmers as the town will supply the promised infrastructures to the locality (such as road, water and electricity) • That the project would create job opportunities to the local people • Bi-products of the FSTP will be available to the local community • The project will not commence before proper compensation is paid to farmers. • And, another employee of the NTWSSSE added that the farmers that they can use the land until the commencement of the construction and that the compensation shall consider 15 times their annual production (as per the existing law). • Another employee from Guto Gida Agriculture Office also mentioned that the project shall not benefit one and harm the other segments of the community. And that farmers shall properly use the compensation money (they shall not waste it). • The team leader (of the consultants) also participated in the discussion and shared his views as summarized below
Representatives from the NTWSSSE		Summarized in the last column of the previous row
Consultants	• Proper compensation needs to be paid for all kinds of damaged properties before the commencement of the project • It is also indicated that the project will go ahead only after such compensation issues are addressed. The ESIA team is aware that 3 households will be affected directly by the construction of the FSTP and indicated that the PAHs can use the proposed location until the project commences (but shall not plant permanent trees until the site is cleared). • Replacement land has to be given to the PAP, if not proper compensation shall be paid following the existing legal frameworks. • Monetary compensation will be paid if the lost land area is less than one-tenth of the total area. But if it is above one-tenth, then farmers shall get replacement plots • The team saw the maize farm on the site (belongs to Itana Gilo's family and other PAHs) that needs to be compensated as per existing legal frameworks	

7.2. Stakeholder Consultation at Mayor's Office

As indicated in the body of this report, involvement of stakeholders in any ESIA is crucial. That is why the Nekemte ESIA team tried to engage as much stakeholders as possible to understand the

environment and social impact of the FSTP to be constructed in Tinfa Area of Negassa Kebele - Guto Gida District. The consultation took place on the 8th of June 2023 at the town administration building. It was chaired by the Mayor's office head.

Figure 25: Stakeholders Consultation

Participants came from almost all government offices and concerned stakeholders in the town. Some of the major points raised during the consultation are the following.

- First, an opening speech was delivered by Mayor office head, who explained the relevance of the project to the town administration and its residents. He also gave a direction to participants that leaders of sectorial offices in the town shall give all the relevant data to the team of consultants studying the ESIA.
- Ato Dhinsa from the NTWSSSE made a short presentation regarding the UWSSP-II project and the FSTP project to be constructed in the town. This was an eye opening to some of the officials coming from various sectorial offices as some of them have very limited information about the project.
- Representatives from almost all government offices thanked the consultant's team for coming to the town to see the project location in person defying the "over-exaggerated" media coverage of the security problems around Nekemte and its environs.
- Participants emphasized that there are many problems related to liquid waste disposal system in the town and that the project will be crucial to bring sanitation services in the town to a new level.
- Sanitation problems that emanated from the rapid urbanization the town is experiencing in recent years was thoroughly discussed by the participants
- Some participants raised sanitation problems in specific locations such as the town center, the market area,
- Some also indicated that the FSTP site shall not forcefully evict farmers and that proper compensation shall be paid to farmers who will lose properties (such as farm land...) as a result of the construction for the FSTP.
- Participants further mentioned the need to construct more public and communal toilets in the town to improve sanitation.

8. Census of the Project Affected Households

A visit made to the location revealed that there are no settlements on the locality and the construction of the FSTP will not cause any physical displacement. However, since the selected land is occupied by 3 land right holders who practice agriculture, it will cause economic displacement to the PAH. These households generally have 21 members (on average, 7 family members per HH). There are 5 very young children (<7 years old) in these three families and two of the HHs are headed by women (are widowed). Of the three HH heads, only one person attended a high-school education and the rest have an educational qualification of below that. The ESIA team also asked them if they got any training and that only one person received training in car driving (but he still practices agriculture). Hence, currently, three of the HHs mainly depends on agriculture to earn income for their families. The team also saw agricultural activities being practiced on the FSTP site and a small part of it covered with bushes. As stipulated in WB OP 4.12 any impacts on livelihoods associated with land acquisition are construed as involuntary resettlement. Thus, project affected households must be provided a compensation consummate with their properties and should be assisted to improve their livelihoods and standard of livings. To this end, this ESIA study has conducted household census on these 3 PAHs and section below presents findings of the census.

8.1. Demographic Features of PAHs

FSTP subproject will affect properties of three households found on the land proposed for the subproject in Negassa Kebele of Guto Gida District. During conducting the households' census all the three PAHs have participated and responded to the questionnaire prepared by the consultant team to assess demographic, educational, livelihoods and economic status of households whose land is required for the proposed FSTP subproject.

Based on the census of these three households, the total numbers of people living in these three households are 21 persons and the average household size is 7. From 21 persons living in the three households 23.8% (5) of them are children (younger than 7 years old) and 66.7% (two of the three) household heads are female headed households.

Since land acquisition for the FSTP will affect this agricultural land, it will have an immense impact on household economy and livelihoods of the peasant family as the households mainly depend on these plots to lead their peasantry lives. According to WB OP 4.12, PAHs must be provided with

adequate compensations commensurate with their properties and should be assisted to improve their livelihoods and standard of livings. Thus, before expropriation of the land for the subprojects, PAHs must be identified and provided with compensations commensurate with their lost properties associated with land acquisition.

8.2. Vulnerable Community Groups Affected by the Subproject

Not all members of PAHs are equally affected by the impacts of development interventions. Usually, women and other members of vulnerable groups such as children, PWDs, elderly and marginalized groups are disproportionately affected by projects because of their low voices and their limited ability to switch jobs, move to other places, and change livelihood. As presented above, 66.7% of (two of the three) PAHs are female headed households (widowed). It is obvious that such projects that take away agricultural lands from these vulnerable people will disproportionately affect their family as their ability to switch jobs, get for other sources of income or get another job is highly constrained. Table 11 presents the numbers and types of vulnerable group members which will be affected by the proposed FSTP subproject.

Table 11: Gender and vulnerability features of PAHs

No.	Demographic feature	Number	Percent
1	People in Vulnerable age brackets in the affected households		
	<7 year	5	23.8
	8-15	5	23.8
	Total	10	47.6
2	Marital status of HH head		
	Married	1	33.3
	Widow	2	66.7
	Total	3	100
4	Number of orphans	1	4.8

Source: (Green Sober Survey: 2023)

Moreover, according to Table 11, from the 10 members of the community (47.6%) fall in vulnerable age groups as their ages are below 15 (are children). Since these groups are mostly dependent on their families to get their basic and other needs, utmost care shall be given to households having such members during displacements. Here, since almost all households have either an elder member or a child or an orphan, all the three affected households need important attention during ARAP studies, during compensation and other phases of the project. The project can also benefit vulnerable but able-bodied people in working age group through prioritizing them in job opportunities during construction

and operation of the FSTP. The Nekemte town administration shall also consider them in ongoing support interventions such as in Productive safety-net programs.

8.3. Education Background and Occupational Status of PAHs

Educational status of PAHs are very important in order to assess their adaptive ability after losing properties and livelihood means associated with land acquisition for the FSTP construction in Nekemte. Out of the three PAHs household heads, 33.3 % (1 HH head) of them has attended elementary school while another household head is not able to read and write altogether. The remaining one household head has a high school education.

Regarding training, only one of the PAH heads had received car driving training. The remaining two HH heads indicated that they have not received any training other than the agricultural skills they received from their forefathers. Based on the above information, PAHs heads educational preparedness and their level of skills may not enable them to adapt and compete in employment and working opportunities outside of agriculture. Thus, payment of compensation should be done in a way that enables PAHs overcome skill related constraints. During FSTP subproject construction and operation phases, employment opportunities that could be created by FSTP subproject should consider these PAHs in the area.

8.4. Occupation and Income Generating activities of PAHs

WB OP 12.4 states that PAHs should be provided with compensation commensurate with property losses. In addition, it emphasized that they should be assisted to improve their livelihoods and standard of livings. In order to estimate the amount of property PAHs are losing due to FSTP related land acquisition and property loss, assessing PAHs types of occupation, sources and monthly of income and major employment opportunities in the area are helpful. This is also important to estimate the amount of compensation to be paid and further assistance that could be given to PAHs in relation to the FSTP subproject.

All of the three households are involved in agriculture and get their major income from this economic activity. Analyses results further show that these farmers claim that they get over 50,000 per month from this activity. Although respondents claim that they get an exaggerated income, the visit made to the site reveals that they are as poor as other farmers and estimation of compensation payment for PAHs should consider the nature of HHs occupation activities and the shortage of alternative

employment and income generation activities in the area once HHs loss their land and assets on it due to FSTP subprojects.

8.5. Properties of Households Affected by the Subprojects

The ESIA study team saw that the site selected for FSTP subproject is not a residential area and no household will be displaced by it. However, acquisition of land for the subproject in Negassa Kebele of Guto Gida District will inevitably cause loss of land and other properties associated on it. Hence, identifying owners of properties, enumerating types and amount of properties which will be lost due to subproject should be clearly known and recorded for estimation of compensation and preparation of resettlement action plan. Table 12 presents the size of land and other properties owned by PAHs over the land proposed for FSTP construction in the area. Number of cows and oxen are presented in the table because the construction of the FSTP will affect their grazing land.

Table 12: Properties owned by PAHs on proposed FSTP site

No	Property status of PAH's	Frequency	Percent	Remark
1	Forms of ownership			
	Agricultural Land Right holder and producer	3	100	
	Total	3	100	
2	Landholding size in hectare			
	0.5-1.5	1	33.3	(One HH claimed that it has 1 ha and the other 2 claimed that they have 2 ha each). All have title deeds
	1.5-2.5	2	66.7	
	Total	3	100	
3	Other properties			
	Cows	6		
	Oxen	7		

Source: (Green Sober Survey: 2023)

Based on the Table 12 above, all of the three households are land right holders practicing agricultural activities on the land selected for FSTP. One of these households indicated that their land area is one hectare while the remaining two have two hectares each. Besides land ownership, these households indicated that they own 6 cows and 7 oxen that use this land for grazing and associated purposes. Notwithstanding households' exaggeration, the landholding size of all 3 PAHs and their properties need to be accurately inventoried and commensurate and timely compensation payment must be made before the commencement of construction.

In conclusion, the household survey conducted in this ESIA finds that the three households will lose land and property associated with it due to land acquisition process for the proposed FSTP

construction. Moreover, most of these PAHs are farmers with poor educational backgrounds and have no skill other than traditional farming. In addition, the majority of (two of the three) PAHs are female headed households and there are significant numbers of PAHs can be categorized under vulnerable groups as there are widow, children, PWDs and elderly in the community. It is also apparent that land acquisition for the proposed FSTP will not causes uprooting of households but will lead into loss of farm land and properties associated with it that will undermine the livelihoods of property owners and their household members. Thus, project affected households must be provided a compensation consummate with their properties and should be assisted to improve their livelihoods and standard of livings.

9. Impact Identification, Analysis and Mitigation Measures

The impact level of such sanitation related projects on the environment depends on the nature of receiving environment and its assimilation capacity; 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, feedbacks 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.

9.1. Assessment Methodology

The impact assessment was done though a standardized structured impact assessment process. Identification of impacts were done first by collecting comprehensive list of key potential physical, biological, and socio-economic impacts related to the project.

Impact Identification: It is important to predict possible impact of the project on the environment and the surrounding society in line with what could potentially happen to resources and receptors as a consequence of the project and its associated activities. Sub-Sections under this topic mainly 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, construction and operation 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 (physical, biological and socio-economic). The Possible impact receptors in the surrounding were identified through surveying the existing environmental and socioeconomic condition through baseline studies and consultation with concerned parties.

Impact Description: Potential impacts of the proposed projects, their characteristics and the attributes of the receiving environment was 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 is addressed for every major impacts 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 13: Classification of Impact Evaluation

Classification	Description
Extent	Whether the impact will occur **on site**, in a limited area (**2km radius**); locally (**5km radius**); regionally (city wide, nationally or internationally).
Duration	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	**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 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 14.

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
- ***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 not felt. Shaded in Light green.

Table 14: Determination of Impact Severity

Impact Intensity		**Sensitivity of Receptor**			
		Very low (1)	Low (2)	Medium (3)	High (4)
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 15.

Table 15: Intensity Scale Gradation for Socio-environmental Impacts

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

Table 16: 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
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	6 – 12

Overall Impact Rating	Description of Impact	Significance
	• Widespread physical resettlement, affecting livelihoods	
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 increase 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 Nekemte town on the receiving environment.

9.2. Positive Environmental 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. Among others some of the impacts include, improved sanitation facilities, enhanced water quality, Improved public health, hygiene and household health status, infrastructure improvement, Skill and technology transfer, and creation of employment opportunities during the construction and implementation phase of the project. Specifically, the following positive impacts are anticipated during construction and operation phases of the project component:

9.2.1 Employment

Construction and operational phases of the project will provide a number of employment opportunities for various disciplines. In this employment opportunity both skilled and unskilled workforces will potentially participate. Mostly temporary jobs will be created at construction phase and permanent

jobs when the overall project completed and start operating. This job opportunity will be available for local residents, especially the PAHs, woman, and youths, in the project area.

Enhancement Measure

Unskilled and semi-skilled labor will be recruited preferentially from local communities, provided that they have the necessary experience, qualification, competence and desired experience. Wherever feasible, local people should be considered for job opportunities commensurate with their level of skills. In this process special considerations and priority has to be given for vulnerable groups of the society like women, the youth and the disabled.

Adequate occupational health and safety standards training program for artisans (builders, carpenters, plumbers) in the project area has to be facilitated by the project to ensure skills transfer and ensure the work environment is conducive. Information to create awareness about the proposed project activities will be provided to the PAPs targeting vulnerable (female headed HH, people with disability, elderly and others) and indigenous community groups.

9.2.2 Skill and Knowledge Transfer (Capacity Building)

Construction and operation of the FSTP is a new technology Nekemte town. It is expected that for smoother implementation of the proposed project, some degree of capacity building trainings will be given to participating workers (organized and un-organized) to facilitate the transfer of new technologies and new skills, mainly to the un-skilled workers. Thus during construction and operation local skilled and unskilled workers will encounter and get experience from the FSTP installation, operation, maintenance and management in the town. This might be done through on-the-job training as well as through exposure to modern practices, management and logistics procedures. Local sub-contractors and companies are also beneficiaries from the transfer of skills and will also build additional local capacity.

Enhancement Measures

During hiring labors people from the local community should be given priority provided that they can meet the criteria required for the job. Providing technical trainings for unskilled labors is also the other enhancement measure that will expand job opportunities for local community members. Particularly, both in hiring labors and organizing training, preferential treatment should be given to members of vulnerable groups such as women, female headed households and youths.

9.2.3 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 from within Nekemte and the neighboring areas. Local suppliers of construction materials and equipment in the project area will benefit financially. It will also create jobs in such related activities. This is a positive but short-term and reversible impact.

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. It is also important to work on local sourcing of construction materials that will boost the livelihoods of residents living in nearby areas.

9.2.4 Boosting the Local Economy

During construction phase of the project, relatively large number of workforce (unskilled and skilled) will be employed. The workforce will require and get most of their food and other necessities from the surrounding area and this will provide a market for the local agricultural producers, and craftsmen/women and other small businesses (local) shops. This will improve the income of petty traders in the locality. Wages will quickly increase household income and stimulate the local economy. Business opportunities especially for locals (as most of them will be involved in small trades such delivering food to site workers) will definitely improve. Thus the project will stimulate local economic activities by providing opportunities for provision of basic and other services to the contractors, and workers. It is also important to mention that the money (allocated for the construction) will be a new injection to the local and the national economy. The effect, in addition, could last long during operation as farmers will be able to produce more using the fertilizers they get from the FSTP and as they will get more services due to the plant.

Enhancement Measures

Provide adequate awareness about the business opportunity that that project has to the local community. Encourage vulnerable groups of the local community (women, youth) to participate on petty trade activities. It is also important to involve local actors such as local restaurants and local sub-contractors (as far as they have the capacity and willingness to participate) to maximize the positive economic impact of the project on the local economy.

9.2.5 Urban Service Infrastructure Improvement

The installation of the FSTP or in general improved sanitation system of the town will increase the service delivery and contribute a lot for the development and improved image of the town, and will play its part to attract more investors and tourists. The Modern waste management facilities to be constructed in Nekemte will definitely improve image of the town, induces development, play pivotal role in attracting tourists, enhance employment opportunity and helps improve the sanitation and hygiene level of the society.

Enhancement Measure

All future development plans must be undertaken within the framework of proactive government policy and strict planning and enforced environmental measures. Sustainability of the project assured if public/society at large participated actively in all stages of project development. Urban sanitation consists of the collection, storage/treatment, transportation, re-use or disposal of excreta, liquid and solid waste in ways that improve or sustain human health and decrease negative impacts on the environment. To achieve the desired purpose of urban sanitation, collaborative and integrated work of stakeholders duly required.

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

9.2.6 Improved Health Status of Households and Communities

The provision of adequate sanitation facilities in urban & rural areas positively impact health of users by greatly reducing the incidence of communicable enteric and infectious related diseases. Thus safe disposal of human excreta is one of a key measure to break the chain of transmission diseases. Visit made by the ESIA team clearly revealed that Nekemte town severely totally lacks sewage treatment facilities. The community is devoid of these critical infrastructures and is affected by the absence in many ways. So the construction of the FSTP will reduce and/or eliminate the indiscriminate disposal of human excreta and wastewater in the town. Enhanced sanitation facility of the town also contributes for the livelihood improvement directly or indirectly. The project has huge role to control and reduce waterborne, communicable diseases and outbreaks. Hence, the construction and proper use of the FSTP will play an important role in the improvement of the health, sanitation of the public in particular and the town's environment in general.

Enhancement Measures

Creating awareness for the general public on how to use and manage the Fecal Sludge treatment plant, is crucial here. It is important to educate users on the proper use; and monitoring the regular cleaning and maintenance of such developed infrastructures.

9.2.7 Using Sludge as Fertilizer

The use of composted sludge (decomposed sludge) as fertilizer has a potential to improve crop yield and enables a reduction in cost for nitrogen and phosphorus mineral fertilizers. Moreover, sludge application helps to reduce soil erosion and improves the soil quality as a plant growth medium and can help conserving soil organic matter, and stimulates biological activity in the soil (Stamatiadis et al. 1999). Recycling of sludge for agricultural purpose and soil amendment is an appealing solution for sustainable management of sludge. It is environmentally the best solution.

Enhancement Measures

Provide awareness to the general public about the potential benefit of fecal sludge as an alternative to chemical fertilizer. Encourage local people (especially vulnerable groups of the society) to participate in the preparation and use of compost. Provide the required training and awareness for the relevant users on how they can safely use sludge substances.

9.3. Negative Impacts and their Mitigation Measures

The pre-construction and construction phases of the project involve planning and design, resource mobilization, transportation of construction materials, site clearing, land labeling, compaction, construction of access roads. Potential adverse impacts are presented as follow:

9.3.1 Pre-construction, Planning and Design Phase

9.3.1.1 Land acquisition, Resettlement and Compensation Issues

As verified during site visits, the FSTP Plant site is currently being used by three land right holders (households) as a farming area. The PAP, during the consultation, indicated that the town has to compensate the people before the start of the project. In addition to the farming area, there are various kinds of natural vegetation, most of which are bushes, on the project site. The team also saw that there is no residential house on the site. The ESIA team strongly recommended that the compensation process has to be completed and paid to the PAP before the start of the project.

All of the likely displaced persons (economically), their livelihoods need to be thoroughly studied by the Abbreviated Resettlement Action Plan (ARAP). The ESIA team was told by the concerned town officials that the land owners will be adequately compensated as per the World Bank policy on involuntary resettlement & Ethiopian laws on compulsory land acquisition.

Intensity of Impacts	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)

Impact Significance

The likelihood of the impact occurring is **high** as the duration of the impact will generally be long-term. The extent of the impact will be on site. The **intensity of the impact** and the **sensitivity** of the receptor are **high** given the high potential to affect the poor local dwellers, children, elderly and female headed HHs. This results in **major** impact **significance**.

Mitigation Measures

- Create awareness to PAHs on the potential impacts of the project and issues related compensation
- ARAP need to be conducted to identify the extent of the impact of the FSTP prior to any civil work of the project and PAHs should directly involve in the entire ARAP study and make their own informed decisions;
- Compensate those affected according to the laid down policies in collaboration with Nekemte town Municipality. Tenable and commensurate compensation must be paid both in cash or in kind for the properties to be lost, damaged and transferred;
- Vulnerable community groups should get priority during compensation cost estimation, job opportunity, capacity building programs and post impact livelihood restoration plans;
- GRM shall be put in place to resolve all project related grievances; and
- Implement an institutional structure or a mechanism for monitoring and evaluating the compensation/resettlement process including the GRM.

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

9.3.2 Construction Phase

9.3.2.1 Loss of vegetation cover/ Vegetation Clearance

The ESIA team witnessed the existence of some plant species, especially shrubs species at the FSTP site. Land clearing and removal of the existing vegetation can be a cause for the limited alteration of landscape integrity, grasses, and vegetation in the project area. Thus whatever little vegetation may be affected by the proposed construction work, the **intensity the impact** and the **sensitivity** of the receptor are **medium**. This results in **moderate** impact **significance**.

Intensity of Impacts	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)

The vegetation clearance activity, especially in the FSTP sites, will lead to interference with habitats causing total loss or change and leading to the destruction of biodiversity.

Mitigation Measures

- Ensure replacement of 10 seedlings per each of the removed trees, followed by protection and watering of the seedlings until it reaches to at least 1.5 meters height.
- Identify and delineate the types of vegetation that must not be necessarily removed;
- Minimize the amount of destruction caused by machinery by promoting non mechanized methods of vegetation removal;
- Prior to undertaking vegetative clearance from environmentally sensitive areas the contractor shall seek approval from the relevant authorities and comply to the conditions provided;
- All areas planned for clearing of vegetation must be demarcated prior to the commencement of the construction;

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

9.3.2.2 Soil Erosion / Degradation, Land slide, Flooding, Erosion and Loss of Top Soil

Site preparation will involve clearing of strips of vegetation to allow for excavations to begin. Land clearing and removal of the existing vegetation can be a cause for the alteration of landscape integrity. Topsoil stripping during leveling and grading of the right of way (ROW) and the excavation of subsoil

during trenching will break up the soil structure. Also, construction equipment engaged in activities (fecal sludge treatment plant) that might cause light contaminations of soil due to leakage of fuels and lubricants from equipment. Moreover, soils excavated may be exposed to agents of erosion. 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. By considering the project footprint, receptor sensitivity is assessed to be low. The water drainage lines are towards to a local stream. Medium impact intensity is expected since the construction of FSTP will be done by registered qualified contractor that considers social and environmental issues. The duration of exposure of stockpiles shall be relatively short and assuming the rugged terrain around the proposed FSTP. The sensitivity of the impact occurrence is medium in this case. Thus, both **intensity** of the impact and ***sensitivity*** of the receptor are rated as moderate and this results moderate impact significance.

Intensity of Impacts	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

- Develop a Site Specific Environmental and Social management plan prior to construction activities;
- Store topsoil and subsoil removed from the site during site preparation properly for reuse
- The valuable top soil containing organic material, nutrients as well as seeds and the soil fauna should be excavated separately and piled in an adequate manner for re-use where applicable.
- Contour temporary and permanent access roads / lay down areas so as to minimize surface water runoff and erosion;
- Avoid using of more than 10 years old and properly unmaintained machineries which can most likely lead to oil, grease and fuel leakages.
- Ensure that all equipment's on duty are properly maintained and fully functioning to avoid oil and grease leakages;
- Plan emergency response measures in case of accidental oil spills;

- Excess soil must be removed from the site timely (in hourly or daily bases as applicable) manner and deposited at an approved site; abandoned quarries be used for the disposal of excessive quantities of excavated soil material;
- Protect adjacent area to the construction site from disturbance and wherever possible construction work will take place during the dry season;
- 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".

9.3.2.3 Air Quality and Noise Pollution (Dust Emissions)

Dust emission: Project site clearing, earth works like leveling, trenching, excavation of top soil and vehicle movement over un-paved areas will generate fugitive dust. Actually elevated level 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. Major dust sources will be vehicle movement over un-paved areas and transportation of raw materials and equipment within the work site. 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 road side 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 during construction phase of the project. Moreover, some welding fume 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; and the number of employs at a particular time. 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. Since the noise levels in the area are low or within the acceptable limit, the activities will therefore temporarily increase such levels. 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 site before the construction has 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 "low". The ***intensity*** of impact is assessed as ***low*** resulting into **minor** impact significance.

Intensity of Impacts	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

- Construction workers will be made aware of the permissible noise levels at the workplace and surrounding environment;
- Noise levels at construction sites should not exceed 75 dBA and 70 dBA during the day and night, respectively;
- Contractor has to ensure that all construction equipment is properly maintained and fully functional;
- During periods of off work time, equipment will be switched off whenever possible.
- Movement of haulage vehicles be limited to day time since the noise impact will be less felt;
- No construction activities will take place at night for sites where the closest residence is within less than 100 m from the project site;
- Trucks will be covered during haulage of construction materials to reduce on spillage of materials and Use spray water for dust suppression over dusty areas; and
- Workers be provided with the necessary PPE such as ear muffs, masks whenever needed and as found appropriate;

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

9.3.2.4 Alteration of Natural Drainage Pattern

Proposed FSTP site is located on a gently sloped area that drains into a local stream (Tinfa river). This may trigger some amount of surface runoff that ends up in a stream. Since there is no other drainage system between the local stream and the FSTP, there may not be a major alteration of natural drainage lines. However, 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. Hence, designing and constructing safe and efficient drainage line for the storm water is particularly important to maintain environmental safety of receiving water environment.

Moreover, the construction of the proposed project can result in changes on surface and sub-surface hydrology. Changing the natural soil characteristics of the project site from its present state to a more built state will lead to a change in the water regime at the project site. This is because 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

Particularly the FSTP site is located nearby of the natural drainage lines (Tinfa river). The construction phase of the project might disturb this natural drainage lines and conditions and the construction of the project might be disturbed. The impact associated with alteration of natural drainage line to the receptor sensitivity is considered to be "***low***". The ***intensity*** of impact is also assessed as ***low*** resulting into **minor** impact significance.

Intensity of Impacts	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

- Plan and work on integrated water shade management for the natural drainage lines;
- Flood mitigation strategies involve responses, both before and during a flood event, which include early warnings, the operation of flood control works, and emergency unblocking of blocked inlets and drains;
- Proper drainage channels shall be constructed within the construction site to allow for convenient and free flow of storm water. Drainage channels shall be installed in all areas that generate or receive surface water. The channels shall be designed with regard to maximum expected volumes;

- To prevent possible erosion and flood, collaborative work needed for the stabilization of gullies and drainage lines; and
- Integrated work of stakeholders to water shade management with careful planning and abatement of drainage lines are required.

9.3.2.5 Slope Failure due to Earthworks

The earth work activity on sloppy area might result in slope instability (although the likelihood of occurrence is medium, there is a history of land slide in the town, as it happened inside Wollega University Compound). Earthworks and river flow diversion in steep area could lead to slope instability, accelerated erosion and gully formation resulting increased sediment transport to surface waters or wetlands or gardens. Slope failure would affect downhill community property, land and aquatic environments. The chance of occurrence is medium; it is essential to consider the risk of this potential impact actually occurring to the construction sites.

Impact significance

The likelihood of the impact occurring is medium (as the locality's slope is not that much steep). Duration of the impact will be short-term and effects reversible. Hence, intensity of the impact is and sensitivity of the receptor are both **medium**. Impact significance is therefore **moderate**.

Intensity of Impacts	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

- Relatively very weak landform slopes should be protected using engineered structures (retaining walls), especially at the lower courses of the FSTP site.
- Protect the susceptible areas of the project by using temporary or permanent drainage works;
- Minimize the possible risk by undertaking all earthwork construction activities during the dry season;
- The contractors expected to use best available methods of construction technology to minimize the risk of blockages and constrictions during construction; and
- The eroded channels will be backfilled and restored to natural contours.

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

9.3.2.6 Traffic Congestion and Disruption of Private Communication Routes

Traffic congestion is anticipated from construction phase of the project. Heavy-duty trucks can obstruct or damage roads and increase the likelihood of accidents. The proposed FSTP is found in Negassa area in Guto Gida District, which is about about 3.5 to 4km away from asphalted highway road. Project activities could have adverse impacts on 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 to be "low". The ***intensity*** of impact is also assessed to be ***low*** resulting into **minor** impact significance.

Intensity of Impacts	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

- The Contractor should provide temporary road signs or notices to indicate ongoing works;
- Use appropriate traffic routes to reduce the impact in the neighborhood and any sensitive areas;
- Ensure that vehicles for the construction work are operated only by qualified drivers;
- All vehicles need to use only designated areas for parking, loading and unloading; and
- All of the drivers have to obey the speed limit of vehicles and strictly stick to these limits particularly in the residential areas.

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

9.3.2.7 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. Vehicles and trucks transporting construction materials to the site may cause risk of traffic-related accidents especially if proper signals and safe speed limits are not put in place or not adhered to. 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. Although some effects of the accidents for instance minor injuries may be reversible while some accident for example loss of human life are irreversible.

Intensity of Impacts	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)

Impact Significance

The duration of the risk will be short-term occurring only during the construction phase. 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 damages may be irreversible. The impact significance is thus assessed to be **Moderate**.

Mitigation Measures

- Develop Traffic Management Plan and incorporate proposed arrangements for traffic diversions with details of all necessary budget and signals;
- Restrictions on hours of driving (including night time restrictions where sensitive receptors such as wild animals are affected) and timing of vehicle movements will be emphasized to avoid busy periods in urban areas, particularly the start and end of school, market, and the working days;
- No drivers or personnel under the influence of alcohol or any drug abuse shall be allowed onsite;
- Travel speeds of construction vehicles along the road should be controlled by setting travel speeds and informing through signals; and
- Fencing or placing obstacles to trenches and ditches to avoid interference and accident of wild and domestic animals and children.

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

9.3.2.8 Water Pollution

The FSTP is located near natural drainage lines. Unless potential contaminants of the construction phase properly managed, water pollution could happen. Contaminants introduced by construction could migrate into key receptors of the area like Tinfa river and into the ground water. Hence,

mismanagement of construction wastes might affect these rivers. 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. For instance, oil and grease lubricants which are used for construction machineries contain hydrocarbons and heavy metals such as lead, chromium and cadmium which are known water pollutants.

Intensity of Impacts	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)

Impact Significance

The likelihood of the impact occurring is **high.** However, the extent of the impact remains local since the extent of the impact would be limited into 5km radius. The ***intensity*** of the impact is assessed to be ***medium*** where intensive sedimentation/flooding during the rainy season around Tinfa river bank. The ***sensitivity*** of the receptor is also **medium** given the close proximity of the aquatic environment. This results in an impact significance of **moderate**.

Mitigation Measures

- All construction equipment will be kept in good operating condition to avoid oil, grease or fuel leakages that might contaminate the water bodies;
- All routine maintenance of construction machinery and vehicles shall be carried out in a designated workshop with concrete hard standing surface and drainage to an oil interceptor;
- Stockpile areas for materials such as sand, gravel, stone, and topsoil as well as overburden dumps will be located away from water courses and will be surrounded by perimeter or cut-off drains with sediment and other pollutant traps located at drain exits;
- Fuel handling and oil spill measures must be implemented to prevent, control and address spill or leaks. Use trained personnel for fuel and oil handling;
- All hazardous wastes and empty containers of hazardous materials shall be stored in a designated area on site and regular removal and disposal has to be done in accordance with the national hazardous waste management regulation; and
- Construction has to be done mainly on the dry season to avoid sediment transport to the river;

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

9.3.2.9 Solid Wastes

Different types of solid wastes will be generated during construction phase. Some of the wastes are characterized as organic and others inorganic wastes. 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 wastes are not properly managed, they will lead to health and safety issues related to accidents. Therefore, this will have a major negative short and medium-term impact on solid waste collection in the area and the environment. Wastes from construction activities must be disposed-off at authorized places in compliance with government rules.

Intensity of Impacts	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)

Impact Significance

The likelihood of the impact occurring is **high**. The duration of the impact will generally be medium term if the water body is once polluted. 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 ***Low*** where intensive sedimentation/ flooding during the rainy season around river bank. The ***sensitivity*** of the receptor is also **low**. This results in an impact significance of **Minor**.

Mitigation Measures

- Prepare solid waste management plan and site prior to commencement of work including appropriate waste storage areas, collection and disposal schedule;
- Apply integrated solid waste management system in the project site;
- Materials from excavation of the ground and foundation works shall be reused for earthworks and landscaping;
- 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;

- The solid wastes shall be properly segregated and separated to encourage recycling of some useful resource; and
- The contractor and the client shall work hand in hand to facilitate sound solid waste management.

9.3.2.10 Hazardous Wastes

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. Careless disposal of used containers of oil, lubricants, paint, and other toxic substances may pose health hazard. Plastic containers are not biodegradable and can have long-term and cumulative effects on the environment. The storage and disposal of these waste substances have to be carefully performed and need to respect existing legal frameworks. Hazardous waste poses risks or would have major and irreversible effect on both human and environment if it is not handled, stored and disposed according to engineering best practice. Hazards waste mishandling and uncontrolled disposal would have major health impacts for on-site workers, inhabitants in the project's 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 project site is located around inhabited areas. The impact intensity is assigned ***low*** rating 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

- Develop mobile or temporary sanitary facilities in the construction site and in the vicinity of the project area which should be adequate at construction sites;
- Hazardous wastes require segregating hazardous waste from the non-hazardous waste and keep it in designated storage facilities at project site;

- Hazardous wastes such as paints, 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 before transportation;
- A hazardous waste label that has a "Hazardous Waste" mark on it must be placed on the container while still at the generation point;
- Prepare a hazardous waste management plan that will ensure proper collection, storage and transport to identified disposal site; and

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

9.3.2.11 Occupational Health and Safety (OHS) Risks

Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, to ensure fair treatment, remuneration and working conditions. 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 addition to this, excavation machinery and trenches may pose accident risk to workers either when equipment is operated by inexperienced workers or when the equipment is in poor mechanical condition. OHS risks might be aggravated from insufficient medical capability, neglect of safety equipment, precautions and procedures in the construction site. So according to the safety and health standards every, employee shall have sound knowledge of their susceptibility to harm or injury in the workplace. 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. While largely reversible, some impacts such as loss of human life and body injury are irreversible. The receptor *sensitivity* is considered **medium** given that such impacts may be irreversible once they occur. The impact *intensity* is considered to be **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

- Prepare site specific OHS management plan and recruit qualified OHS officer 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.
- Workers must follow safety standards and use protective equipment to minimize hazards while trenching and excavating;
- Appropriate signal will be used to warn staff and/ or visitors that are not involved in construction activities in dangerous places;
- Provide first aid kits and ensure availability of trained first aiders within the construction site;
- Ensure that the campsite is fenced from external human, pet and wild animal interference and accidents and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply;
- Ensure that its Code of Conduct is followed to regulate the performance and behavior of all workers.
- Prohibit the use of alcohol, or" Chat", which could adversely affect the ability of employees to perform the work safely
- Adequate OHS PPE gears such as nose, ear mask and clothing will be provided to the employees and good camp management shall be provided.

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

9.3.2.12 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 gatherings might result spread of communicable disease like sexually transmitted diseases (STDs) including HIV-AIDS. 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 school girls, widows and others for sexual intercourse. This can cause unwanted pregnancy, breaks families and heighten risk of contracting STDs. Illicit contact or sexual relationships can be short-term but have long-term and irreversible effects if HIV or Hepatitis-B were contracted. 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 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. Regarding HIV/AIDS duration of the impact will be short-term or long-term depending on whether HIV/AIDS is contracted or not. The extent of the impact will be local or national depending on the origin and final destination of the construction worker.

The likelihood of the impact occurring is medium if contractor 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

- Prepare and enforce a Code of Ethical Conduct (CEC); in the camp to encourage respect for the local community & to maintain cleanliness of the camp at all times. The code of ethical conduct of workers has to be translated in to local language and sensitized the workers on quarterly;
- All construction workers shall be orientated and sensitized about responsible sexual behavior in project communities.
- Prepare an HIV/AIDS awareness campaign plan to reduce risks of spreading of HIV/AIDS and other STDs as part of contractual obligation.

9.3.2.13 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 site survey and the stakeholder engagements held in the project sites the consultant team has not found any of these resources on the proposed location of the FSTP.

Consequently, impact on culture heritage is very low. The ***intensity*** of the impact is ***very low*** (as there is no such resource on the FSTP site). ***Sensitivity*** of the receptor is also rated ***very low*** because the implementation of the project brings no long-term and serious impact on such resources**.** Therefore, impact significance is ***negligible***.

		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

- 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.

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

9.3.2.14 Rise of Deviance and Conflicts due to Influx of Labor

The community living around the FSTP site is are predominantly farming communities and they view, even consenting romantic relationships (especially with young girls) as deviance. Besides, if priority is not given to unemployed people especially for youths during hiring manual labors, members of local community could develop resentment toward construction workers and the project. This could be a potential source of conflict. Due to an influx of labor may the project violet some social norms of the society and may result in incidences of deviance, conflict, child labour and Gender-Based Violence (GBV) 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.

		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)

Impact Significance

The probability of impact occurrence is medium. The ***sensitivity*** of receptors is assessed as **'**medium'. The impact intensity is assigned ***very low*** rating resulting in ***minor*** impact significance.

Mitigation Measures

- Unskilled and skilled (if available) labor should be hired from the local population as far as possible to minimize on influx of labourers from other places into the community;
- Effective communication and collaboration are key to addressing the challenges and opportunities presented by an influx of labor;
- Any new employee will be required to sign a code of behavior; and
- Awareness has to be given for the new comers about the importance of respecting the norms local community living in the project area.

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

9.3.3 Operation Phase

9.3.3.1 Air Emissions and Dust

Dust has the potential to cause significant nuisance to people living close to the site and may pose a risk to the health of those working on the site, or visiting the site. Dust can be a problem, especially during the warm summer period and during dry weather conditions. Given the scale and duration of operation of standby generators (emergency case only) and emissions from vacuum trucks, the comparatively small volumes of emission will be generated as a result. The impacts (contribution) 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 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)

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 new vehicles and giving proper service to the trucks on regular basis;
- Turn on generators only during power cut-offs period;

9.3.3.2 Air Pollution/ Odor

Different types of odors such as ammonia might be produced especially from the handling of the liquid waste when it is unloaded from the vacuum trucks. 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 Nekemte town is less but there are rural settlements near and around the selected waste treatment sites that the pungent odor may reach to them.

		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)

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**.

Mitigation Measures

- Plant indigenous trees at the perimeter of the project area with varying heights

- Ensure proper operation to render unfriendly emissions during discharge of treated leachates due to overloading of the systems or negligence of the operators;
- Odours generated by the facility can be controlled by use of suppressants and daily cleaning of the receiving areas;
- Making sure that emergency water containers installed (used to suppress dust) are full and work properly during water interruptions;
- Good site management of the operation must regularly ensure to avoid foul odours that would arise from improper functioning;
- Ferric chloride (FeCl3) which shall be added to control the generation of hydrogen sulfide (H2S) the main source of odor in the sludge digestion process;
- Regular maintenance (once per year) of FSTP stabilization ponds, removal of accumulated debris and other solids at the inlets and outlets;
- The volumetric BOD loading should lie between 100-400 g/m3 in order to maintain anaerobic conditions and at the same time control odour release; and
- Regular monitoring shall be undertaken to avoid accidental surface runoff intrusions from the manholes of the drainage network which can overburden the facilities and cause foul odors.

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

9.3.3.3 Pollution to Water Sources, Channels and Swampy Lands

There could be soil and groundwater pollution if the proposed FSTP facility does not work as intended. Inadequate operation could potentially damage aquatic life and the environment as a whole by having a negative effect on the local population and the water quality of ground and surface water for instance the water quality of Tinfa river which are the major sources of water for the people and the town. 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 area 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

- Establish scientifically selected, professionally designed and constructed FSTP strictly following national and international building code standards. (Since the design is done following scientific methods, except some modifications such as slight location changes, the construction shall strictly follow the design and mitigation measures and monitoring plans recommended in this ESIA).
- Standard working procedures of building code has to be followed to avoid errors of construction;
- Institute periodic testing of surface water, hot springs and groundwater at the downstream of the project site; and sampling and testing quarterly or yearly as needed; and taking appropriate measures when signals of contamination is detected;
- Develop standard monitoring procedure for the FSTP facility and surrounding environment.
- Adopt standardized operational management plan of FSTP
- Strict monitoring on chemical and biological loads entering the FSTP and swift adjustment of treatment process to cater for overloads in effluent quality;
- Incorporate the leachate drainage and collection networks as well as treatment mechanisms before moving to an offsite disposal area;
- Work and ensure that the FSTP effluent quality complies with the national effluent discharge limit and as well the indicative wastewater quality standard values set out within the UWSSP II ESMF;
- Protect the natural receptors technically through impermeable lower layer that prevents the leakage and infiltration of leachate from the facility;
- Ensure proper preventive and routine maintenance inspections of the FSTP

- Regularly monitor the quality of effluent discharged from the septic tanks and FSTP against the ESMF effluent quality standard values; and
- The dried-up sludge cake shall further be used as a raw material in the production of fuel products as briquettes or compost fertilizer.

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

9.3.3.4 Occupational Health and Safety Risks

Fecal sludge contains a variety of harmful pathogens including bacteria, viruses, and parasites which can cause serious infections and diseases. Untreated or improperly treated fecal sludge can lead to the spread of diseases and infections such as diarrhea, hepatitis, and parasitic infections. Workers' who would contact with 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. Some fecal sludge treatment processes involve the use of chemicals such as disinfectants or cleaning agents which can be harmful if not handled properly.

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.

		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)

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 and will have

done similar work and have knowledge on how to avoid such incidences. 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.

Mitigation Measures

- Hire qualified and trained OHS professional for regular monitoring and management FSTP;
- Use appropriate PPE such as cut resistant and high visibility protective clothing, gloves, safety boots (foot wares) and providing appropriate respiratory protection equipment and face masks;
- 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;
- Routine maintenance including the removal of garbage, screenings and grit; slashing around the embankments; and repair of the fence shall be done timely;
- Providing appropriate training and equipment, and implementing appropriate ergonomic practices are important to minimize ergonomic hazards;
- Provide accessible easy to reach first aid in and immediate medical care in case of injuries and accidents;
- Vaccinate all labor working force at the site properly and provide regular health examinations access;
- The FSTP should be fenced and signals put in place with security personnel to stop unauthorized people from accessing the site;
- Maintain important information of emergency resources (e.g., fire extinguishers, first aid kits, emergency contacts of doctor, police men) in easily available place; and
- Strict follow operation in accordance with manufacturer's instructions and Material Safety Data Sheets (MSDS) procedures to store all chemicals utilized in FSTP and storage must conform to compatibility restrictions.

Overall, to mitigate occupational health risks associated with fecal sludge treatment and to protect the health and safety of workers, provision of appropriate PPE and adequate training, implementation of safety procedures, and creating medical care access and support to the workers is equally important. The adoption of the aforesaid mitigation measures can reduce impact intensity to “very low” resulting in residual impact of “minor significance”.

9.3.3.5 Overflowing of Sludge into the Surrounding Residents

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 or nearby resident areas and can contaminate nearby soil and water sources, 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.

		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)

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. Continuous monitoring mechanisms shall be devised and put in place to protect both ground and surface water from contamination. The extent of the impact is local since the pollutants of surface and ground water may cover 5km radius. The ***sensitivity*** of the receptor is **medium** given that once, it is contaminated treatment measures would take some resource and time; resulting in **moderate** impact significance.

Mitigation Measures

- Implementing appropriate safety procedures, such as proper ventilation and regular monitoring of gas levels;
- Reduce the inflow of sludge into the treatment plant or storage facility.
- 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.

Overall, managing overflowing of fecal sludge requires careful planning and coordination to ensure that public health and environmental risks are minimized. It is important to consider multiple options for managing overflowing, and to select the most appropriate option based on local conditions and

available resources. The adoption of the aforesaid mitigation measures can reduce impact intensity and sensitivity of receptor to "low" resulting in residual impact of "minor significance".

9.3.3.6 Landscape and Land Use Impacts

Land use, scenic and visual quality: The construction of the FSTP will permanently changes the surrounding landscape scenery into a walled-in enclosure. During operation phase, water stored in abandoned borrow pits in FSTP form a breeding ground for vermin, mosquitoes or other disease-causing and transmitting vectors; hence, posing health risks to local communities and workers.

		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)

Impact Significance

Duration of the impact will be long-term and the extent of the impact will be on site. The intensity the impact given to the proposed facilities the impact is **low**. Sensitivity of the receptor is also rated **low** given that no such projects have ever been established so far in the project-affected areas. Therefore, significance of the impact is rated as **minor**.

9.3.4 Decommissioning Phase - Negative Impacts

Decommissioning process has to be planned and implemented carefully and systematically. To minimize potential environmental and social risks, decommissioning a fecal sludge treatment plant requires careful planning, engagement with local stakeholders, and adherence to applicable regulations and best practices. Some of the project activities in the decommissioning phase include proper cleaning, decontamination of the project site, dismantling of equipment and metallic structures, demolishing of concrete structure, appropriate disposal of hazardous materials, and transportation of recyclable and reusable materials for site restoration into its original or pre-project condition. In fact, engagement of local stakeholders and authorities also required to ensure that the decommissioning process is socially and environmentally friendly.

9.3.4.1 Pollution of Soil and Water Bodies

Decommissioning a fecal sludge treatment plant can result in the release of contaminants or pollutants into the surrounding environment, particularly if the plant 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 effect areas. Therefore, 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

- Conduct a site assessment to identify potential environmental and health risks associated with the plant.
- Develop a decommissioning plan that outlines the steps and working procedures;
- Engage local stakeholders including nearby residents, businesses, and community organizations;
- Conducting environmental quality assessment of the water body and the treated wastewater prior to the commencement of the decommissioning;
- Properly transporting all the hazardous wastes construction materials, chemical containers to a predetermined site for treatment, deposal or storage;
- Topsoil and subsoil removed for decommissioning will be stored properly and used for backfilling and reinstatement;
- Back-filling materials will be compacted to a level similar to the original surrounding soils to avoid subsidence as a consequence of rain water channeling;
- Restore the project site into its original or to a condition that is acceptable to local stakeholders and regulatory authorities. Apply site grading, replanting vegetation, or other measures to restore the site to its natural state;
- 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.

9.3.4.2 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. Certain tasks such as heavy lifting or awkward postures, can pose ergonomic hazards to workers, which can result in musculoskeletal disorders.

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, the workers will get adequate trainings, provided with safety protective equipment and will have done similar work and have knowledge on how to avoid such incidences. 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

- Recruiting a qualified OHS officer who will oversee OHS matters on site;
- 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;
- Implement ergonomic interventions, such as job rotation or use of assistive devices to reduce ergonomic hazards;
- Provide appropriate, adequate PPE, such as gloves, masks, and protective clothing, OHS personnel protective gear to the employees; and

- Implementing engineering controls, such as ventilation systems and barriers to reduce exposure to hazardous materials and physical hazards.

9.3.4.3 Socio-economic Impact

Decommissioning the fecal sludge treatment will halt the essential services the community was getting from this infrastructure. 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

- Based on their skill, knowledge, experience and interest, vulnerable community groups must be transferred to another secured job opportunity;
- Provide financial assistance or grants to affected workers or businesses. This can involve providing loans, grants, or other forms of financial support to help workers or businesses transition to new opportunities;
- Providing pension for those who want to retire as per the national law;
- Providing retraining programs in new industries or skills opportunities for workers who have been impacted by the process. 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 (ESMP)

An Environmental and Social Management Plan (ESMP) is a formal 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 for adverse impacts, 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 17: Summary of Environmental and Social Management Plan

Adverse E&S Impact	Mitigation measures	Responsibility	Duration	Budget(birr)
	Pre construction Phase			
Involuntary economic displacement - Land Acquisition & Property damage	Create awareness to PAHs on the potential impacts of the project and issues related compensation	NTWSSSE, Mayor & Land Admin Office	Once	AARAP
	ARAP need to be conducted to identify the extent of the impact of the FSTP prior to any civil work of the project and PAHs should directly involve in the entire ARAP study and make their own informed decisions;	NTWSSSE & Mayor office	Once	ARAP team
	Compensate those affected according to the laid down policies. Tenable and commensurate compensation must be paid both in cash or in kind for the properties to be lost, damaged and transferred;	Mayor office	Once	ARAP team
	Negotiate with each PAP independently, not with their representative, as it is being done currently, because negotiations are private and unique.	The town admin	Once	ARAP team
	The new plot of land to be given for the PAHs must have access to basic services at least proportionate to their original village;	NTWSSSE & Mayor office	Once	ARAP team
	Vulnerable community groups should get priority during compensation cost estimation, job opportunity, capacity building programs and post impact livelihood restoration plans;	NTWSSSE & Mayor office	Once	ARAP team
	GRM shall be put in place to resolve all project related grievances; and	NTWSSSE & Mayor office	Entire phase	ARAP team
	Implement an institutional structure or a mechanism for monitoring and evaluating the compensation/resettlement process including the GRM	NTWSSSE & Mayor office	Entire phase	ARAP team
	Construction phase			
Loss of Vegetation cover /Vegetation Clearance	Ensure replacement of equivalent seedlings per each of the removed trees, followed by protection and watering of the seedlings until it reaches to at least 1.5 meters height.	Contractor	Excavation time	100,000
	Identify and delineate the types of vegetation that must not be necessarily removed;	Contractor	Start of earth work	50,000
	Minimize the amount of destruction caused by machinery by promoting non mechanized methods of vegetation removal;	Contractor	Erath work	50,000
	Prior to undertaking vegetative clearance from environmentally sensitive areas the contractor shall seek approval from the relevant authorities and comply to the conditions provided;	Contractor	Earth work	25,000
	All areas planned for clearing of vegetation must be demarcated prior to the commencement of the construction;	Contractor	Before earth work	25,000

soil degradation, land slide, flooding, erosion and loss of top soil	Develop a Site Specific Environmental and Social management plan prior to construction activities; and Store topsoil and subsoil removed from the site during site preparation properly for reuse	Contractor	Construction phase	100,000
	The valuable top soil containing organic material, nutrients as well as seeds and the soil fauna should be excavated separately and piled in an adequate manner for re-use where applicable.	Contractor	Excavation phase	50,000
	Contour temporary and permanent access roads / lay down areas so as to minimize surface water runoff and erosion;	Contractor	Excavation	50,000
	Avoid using of more than 10 years old and properly unmaintained machineries which can most likely lead to oil, grease and fuel leakages.	Contractor	Contraction	100,000
	Ensure that all equipment's on duty are properly maintained and fully functioning to avoid oil and grease leakages;	Contractor	Contraction	100,000
	Plan emergency response measures in case of accidental oil spills	Contractor	Contraction	100,000
	Excess soil must be removed from the site timely (in hourly or daily bases as applicable) manner and deposited at an approved site; abandoned quarries be used for the disposal of excessive quantities of excavated soil material;	Contractor	Contraction	100,000
	Protect adjacent area to the construction site from disturbance and wherever possible construction work will take place during the dry season;	Contractor	Contraction	100,000
	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	Contractor	Contraction	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 rain water channelling.	Contractor	Contraction	100,000
Air Quality & Noise Pollution	Construction workers will be made aware of the permissible noise levels at the workplace and surrounding environment;	Contractor	Contraction	25,000
	Noise levels at construction sites should not exceed 75 dBA and 70 dBA during the day and night, respectively;	Contractor	Contraction	25,000
	Contractor has to ensure that all construction equipment is properly maintained and fully functional;	Contractor	Contraction	25,000
	During periods of off work time, equipment will be switched off whenever possible.	Contractor	Contraction	25,000
	Movement of haulage vehicles be limited to day time since the noise impact will be less felt;	Contractor	Contraction	25,000

	No construction activities will take place at night for sites where the closest residence is within less than 100 m from the project site;	Contractor	Contraction	25,000
	Trucks will be covered during haulage of construction materials to reduce on spillage of materials and Use spray water for dust suppression over dusty areas; and	Contractor	Contraction	25,000
	Workers be provided with the necessary PPE such as ear muffs, masks whenever needed and as found appropriate;	Contractor	Contraction	25,000
Alteration of Natural Drainage Pattern	Plan and work on integrated water shade management for the natural drainage lines;	Contractor	Contraction	50,000
	Proper drainage channels shall be constructed within the construction site to allow for convenient and free flow of storm water. Drainage channels shall be installed in all areas that generate or receive surface water. The channels shall be designed with regard to maximum expected volumes;	Contractor	Contraction	50,000
	To prevent possible erosion and flood, collaborative work needed for the stabilization of gullies and drainage lines; and	Contractor	Contraction	50,000
	Integrated work of stakeholders to water shade management with careful planning and abatement of drainage lines are required	Contractor	Contraction	50,000
Slope Failure due to Earthworks	Relatively very weak landform slopes should be protected using engineered structures (retaining walls), especially at the lower courses of the FSTP site;	Contractor	Contraction	50,000
	Protect the susceptible areas of the project by using temporary or permanent drainage works;	Contractor	Contraction	50,000
	Minimize the possible risk by undertaking all earthwork construction activities during the dry season;	Contractor	Contraction	50,000
	The contractors expected to use best available methods of construction technology to minimize the risk of blockages and constrictions during construction; and	Contractor	Contraction	50,000
	The eroded channels will be backfilled and restored to natural contours.	Contractor	Contraction	50,000
Traffic Congestion and Disruption of Private Communication Routes	The Contractor should provide temporary road signs or notices to indicate ongoing works;	Contractor	Contraction	50,000
	Use appropriate traffic routes to reduce the impact in the neighbourhood and any sensitive areas;	Contractor	Contraction	50,000
	Ensure that vehicles for the construction work are operated only by qualified drivers;	Contractor	Contraction	50,000
	All vehicles need to use only designated areas for parking, loading and	Contractor	Contraction	50,000

	unloading;			
	All of the drivers have to obey the speed limit of vehicles and strictly stick to these limits particularly in the residential areas.	Contractor	Contraction	50,000
Risk of Accidents	Develop Traffic Management Plan and incorporate proposed arrangements for traffic diversions with details of all necessary budget and signals;	Contractor	Contraction	25,000
	Restrictions on hours of driving (including night time restrictions where sensitive receptors such as wild animals are affected) and timing of vehicle movements will be emphasized to avoid busy periods in urban areas, particularly the start and end of school, market, and the working days;	Contractor	Contraction	25,000
	No drivers or personnel under the influence of alcohol or any drug abuse shall be allowed onsite;	Contractor	Contraction	25,000
	Travel speeds of construction vehicles along the road should be controlled by setting travel speeds and informing through signals; and	Contractor	Contraction	25,000
	Fencing or placing obstacles to trenches and ditches to avoid interference and accident of wild and domestic animals and children.	Contractor	Contraction	25,000
Water Pollution	All construction equipment will be kept in good operating condition to avoid oil, grease or fuel leakages that might contaminate the water bodies;	Contractor	Contraction	25,000
	All routine maintenance of construction machinery and vehicles shall be carried out in a designated workshop with concrete hard standing surface and drainage to an oil interceptor;	Contractor	Contraction	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 and will be surrounded by perimeter or cut-off drains with sediment and other pollutant traps located at drain exits;	Contractor	Contraction	25,000
	Fuel handling and oil spill measures must be implemented to prevent, control and address spill or leaks. Use trained personnel for fuel and oil handling;	Contractor	Contraction	25,000
	All hazardous wastes and empty containers of hazardous materials shall be stored in a designated area on site and regular removal and disposal has to be done in accordance with the national hazardous waste management regulation; and	Contractor	Contraction	25,000
	Construction has to be done mainly on the dry season to avoid sediment transport to the river;	Contractor	Contraction	25,000

Solid Wastes	Prepare solid waste management plan and site prior to commencement of work including appropriate waste storage areas, collection and disposal schedule;	Contractor	Construction	25,000
	Apply integrated solid waste management system in the project site;	Contractor	Contraction	25,000
	Materials from excavation of the ground and foundation works shall be reused for earthworks and landscaping;	Contractor	Contraction	25,000
	Solid waste collection bins shall be placed at strategic locations within the site as collection centres to facilitate separation and sorting of the various types of wastes;	Contractor	Contraction	25,000
	The solid wastes shall be properly segregated and separated to encourage recycling of some useful resource; and	Contractor	Contraction	25,000
	The contractor and the client shall work hand in hand to facilitate sound solid waste management.	Contractor	Contraction	25,000
Hazardous Wastes	The contractor has to develop mobile or temporary sanitary facilities in the construction site and in the vicinity of the project area which should be adequate at construction sites;	Contractor	Contraction	25,000
	Hazardous wastes require segregating hazardous waste from the non-hazardous waste and keep it in designated storage facilities at project site;	Contractor	Contraction	25,000
	Hazardous wastes such as paints, accessories and adhesives should be properly sealed, labelled, secured, kept inside a locked fenced area to prevent access by unauthorized personnel, and covered to prevent water accumulation before transportation;	Contractor	Contraction	25,000
	A hazardous waste label that has a “Hazardous Waste” mark on it must be placed on the container while still at the generation point;	Contractor	Contraction	25,000
	Prepare a hazardous waste management plan that will ensure proper collection, storage and transport to identified disposal site;	Contractor	Contraction	25,000
Occupational Health and Safety risks	Prepare site specific OHS management plan and recruit qualified OHS officer to oversee OHS matters on a daily basis;	Contractor	Contraction	25,000
	All construction workers will be oriented on safe work practices and guidelines (OHS) first and ensure that they adhere to them.	Contractor	Contraction	25,000
	Workers must follow safety standards and use protective equipment to minimize hazards while trenching and excavating;	Contractor	Contraction	25,000
	Appropriate signal will be used to warn staff and/ or visitors that are not involved in construction activities in dangerous places;	Contractor	Contraction	25,000
	Provide first aid kits and ensure availability of trained first aiders	Contractor	Contraction	25,000

	within the construction site;			
	Ensure that the campsite is fenced from external human, pet and wild animal interference and accidents and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, fire fighting and clean and safe water supply;	Contractor	Contraction	25,000
	Ensure that its Code of Conduct is followed to regulate the performance and behaviour of all workers.	Contractor	Contraction	25,000
	Prohibit the use of alcohol, or" Chat", which could adversely affect the ability of employees to perform the work safely	Contractor	Contraction	25,000
	Adequate PPE gears such as nose, ear mask and clothing will be provided to the employees and good camp management shall be provided.	Contractor	Contraction	25,000
Spread of Communicable Diseases	Prepare and enforce a Code of Ethical Conduct (CEC); in the camp to encourage respect for the local community & to maintain cleanliness of the camp at all times. The code of ethical conduct of workers has to be translated in to local language and sensitized the workers on quarterly;	Contractor	Contraction	25,000
	All construction workers shall be orientated and sensitized about responsible sexual behaviour in project communities.	Contractor	Contraction	25,000
	Prepare an HIV/AIDS awareness campaign plan to reduce risks of spreading of HIV/AIDS and other STDs as part of contractual obligation.	Contractor	Contraction	25,000
PCR	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.	Contractor	Contraction	100,000
Rise of Deviance and Conflicts due to influx of labour	Unskilled and skilled (if available) labour should be hired from the local population as far as possible to minimize on influx of labourers from other places into the community;	Contractor	Contraction	100,000
	Effective communication and collaboration are key to addressing the challenges and opportunities presented by an influx of labour;	Contractor	Contraction	100,000
	Any new employee will be required to sign a code of behaviour; and	Contractor	Contraction	100,000
	Awareness has to be given for the new comers about the importance of respecting the norms local community living in the project area.	Contractor	Contraction	100,000
	Operation Phase			
Air Emissions and Dust	Enforcing regulation of speed limit to a suitable speed (20 km/h) for all vehicles entering the village's boundaries;	TRAFIC office	Entire phase	100,000

	Watering dusty roads during operation;	NTWSSSE	Dry season	100,000
	Using new vehicles and giving proper service to the trucks on regular basis	NTWSSSE	Entire phase	100,000
	Turn on generators only during power cut-offs period	NTWSSSE	Entire phase	100,000
Air Pollution/ Odour	Plant indigenous trees at the perimeter of the project area with varying heights	NTWSSSE	Entire phase	100,000
	Ensure proper operation to render unfriendly emissions during discharge of treated leachates due to overloading of the systems or negligence of the operators;	NTWSSSE	Entire phase	100,000
	Odours generated by the facility can be controlled by use of suppressants and daily cleaning of the receiving areas;	NTWSSSE	Entire phase	100,000
	Making sure that emergency water containers installed (used to suppress dust) are full and work properly during water interruptions;	NTWSSSE	Entire phase	100,000
	Good site management of the operation must regularly ensure to avoid foul odours that would arise from improper functioning;	NTWSSSE	Entire phase	100,000
	Ferric chloride (FeCl3) which shall be added to control the generation of hydrogen sulfide (H_2S) the main source of odor in the sludge digestion process;	NTWSSSE	Entire phase	100,000
	Regular maintenance (once per year) of FSTP stabilization ponds, removal of accumulated debris and other solids at the inlets and outlets.	NTWSSSE	Entire phase	100,000
	The volumetric BOD loading should lie between 100-400 g/m3 in order to maintain anaerobic conditions and at the same time control odour release; and	NTWSSSE	Entire phase	100,000
	Regular monitoring shall be undertaken to avoid accidental surface runoff intrusions from the manholes of the drainage network which can overburden the facilities and cause foul odour.	NTWSSSE	Entire phase	100,000
Pollution to Water Sources, Channels and Swampy Lands	Establish scientifically selected, professionally designed and constructed FSTP strictly following national and international building code standards	NTWSSSE	Entire phase	100,000
	Standard working procedures of building code has to be followed to avoid errors of construction;	NTWSSSE	Entire phase	100,000
	Periodic testing of surface water, hot springs and groundwater at the downstream of the project site; and sampling and testing quarterly or yearly as needed; and taking appropriate measures when signals of contamination is detected;	NTWSSSE	Entire phase	100,000

	Adopt standardized operational management plan of FSTP;	NTWSSSE	Entire phase	100,000
	Develop standard monitoring procedure for the FSTP facility and surrounding environment;	NTWSSSE	Entire phase	100,000
	Strict monitoring on chemical and biological loads entering the FSTP and swift adjustment of treatment process to cater for overloads in effluent quality;	NTWSSSE	Entire phase	100,000
	Incorporate the leachate drainage and collection networks as well as treatment mechanisms before moving to an offsite disposal area;	NTWSSSE	Entire phase	100,000
	Protect the natural receptors technically through impermeable lower layer that prevents the leakage and infiltration of leachate from the facility;	NTWSSSE	Entire phase	100,000
	Ensure proper preventive and routine maintenance inspections of the FSTP;	NTWSSSE	Entire phase	100,000
	Regularly monitor the quality of effluent discharged from the FSTP against the ESMF effluent quality standard values;	NTWSSSE	Entire phase	100,000
	The dried-up sludge cake shall further be used as a raw material in the production of fuel products as briquettes or compost fertilizer.	NTWSSSE	Entire phase	100,000
Occupational Health and Safety Risks	Hire qualified and trained OHS and environmental health crew for regular monitoring and management FSTP;	NTWSSSE	Entire phase	100,000
	To reduce the occupational risks, FSTP Workers has to use appropriate PPE gears such as cut resistant and high visibility protective clothing, gloves, safety boots (foot wares) and providing appropriate respiratory protection equipment and face masks;	NTWSSSE	Entire phase	100,000
	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;	NTWSSSE	Entire phase	100,000
	Routine maintenance including the removal of garbage, screenings and grit; slashing around the embankments; and repair of the fence shall be done timely;	NTWSSSE	Entire phase	100,000
	Providing appropriate training and equipment, and implementing appropriate ergonomic practices are important to minimize ergonomic hazards;	NTWSSSE	Entire phase	100,000
	Provide accessible easy to reach first aid in and immediate medical care in case of injuries and accidents;	NTWSSSE	Entire phase	50,000
	Vaccinate all labour working force at the site properly and provide	NTWSSSE	Entire phase	50,000

	regular health examinations access;			
	The FSTP should be fenced and signals put in place with security personnel to stop unauthorized people from accessing the site;	NTWSSSE	Entire phase	50,000
	Exercise regular fumigation of the FSTP stores, administration rooms and similar places to minimize / kill disease vectors such as vermin, rodents and mosquitoes;	NTWSSSE	Entire phase	50,000
	Maintain important information of emergency resources (e.g., fire extinguishers, first aid kits, emergency contacts of doctor, police men) in easily available place;	NTWSSSE	Entire phase	50,000
	Strict follow operation in accordance with manufacturer's instructions and Material Safety Data Sheets (MSDS) procedures to store all chemicals utilized in FSTP and storage must conform to compatibility restrictions.	NTWSSSE	Entire phase	50,000
Overflowing of Sludge into the Surrounding Residents	Implementing appropriate safety procedures, such as proper ventilation and regular monitoring of gas levels;	NTWSSSE	Entire phase	50,000
	Reduce the inflow of sludge into the treatment plant or storage facility.	NTWSSSE	Entire phase	50,000
	If overflowing of faecal 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.	NTWSSSE	Entire phase	50,000
	Decommissioning Phase			
Pollution of Soil and Water bodies	Conduct a site assessment to identify potential environmental and health risks associated with the plant.	Contractor	Entire phase	500,000
	Develop a decommissioning plan that outlines the steps and working procedures;	Contractor	Entire phase	100,000
	Engage local stakeholders including nearby residents, businesses, and community organizations;	Contractor	Entire phase	100,000
	Conducting environmental quality assessment of the water body and the treated wastewater prior to the commencement of the decommissioning;	Contractor	Entire phase	100,000
	Properly transporting all the hazardous wastes construction materials, chemical containers to a predetermined site for treatment, deposal or storage;	Contractor	Entire phase	100,000
	Topsoil and subsoil removed for decommissioning will be stored properly and used for backfilling and reinstatement;	Contractor	Entire phase	100,000

	Back-filling materials will be compacted to a level similar to the original surrounding soils to avoid subsidence as a consequence of rain water channelling;	Contractor	Entire phase	100,000
	Restore the project site into its original or to a condition that is acceptable to local stakeholders and regulatory authorities. Apply site grading, replanting vegetation, or other measures to restore the site to its natural state;	Contractor	Entire phase	100,000
	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.	Contractor	Entire phase	100,000
Occupational Health and Safety and Air Pollution	Recruiting a qualified OHS officer who will oversee OHS matters on site;	Contractor	Entire phase	50,000
	Provide proper induction and training of the workers prior to decommissioning commencement.	Contractor	Entire phase	50,000
	Implement ergonomic interventions, such as job rotation or use of assistive devices to reduce ergonomic hazards;	Contractor	Entire phase	100,000
	Provide appropriate, adequate PPE, such as gloves, masks, and protective clothing; and	Contractor	Entire phase	100,000
	Implementing engineering controls, such as ventilation systems and barriers to reduce exposure to hazardous materials and physical hazards.	Contractor	Entire phase	100,000
Socio-economic Impact	Based on their skill, knowledge, experience and interest, vulnerable community groups must be transferred to another secured job opportunity	Contractor	Entire phase	100,000
	Provide financial assistance or grants to affected workers or businesses through facilitation of loans, grants, or other forms of financial support to help workers or businesses transition to new opportunities	Contractor	Entire phase	100,000
	Providing adequate pension for those who want to retire as per the national law	Contractor	Entire phase	100,000
	Providing retraining programs in new industries or skills opportunities for workers who have been impacted by the process. Supporting workers to start their own businesses	Contractor	Entire phase	100,000
Total				9,000,000

11. 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 and Social Monitoring and Evaluation

Environmental and social 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 measure 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 NTWSSSE 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 project management body for evaluation and curative actions. The following Table 19 below examines the extent to which the adverse impacts identified can be controlled through the adoption of mitigation measures.

Table 18: Environmental Monitoring Plan for Nekemte Town

Adverse environmental Impact	Mitigation measures	Monitoring Indicators	Method of Monitoring	Monitoring Institutions	Monitoring Frequency	Budget in birr
Pre-Construction and Construction phase						
Involuntary economic displacement-Land Acquisition & Property damage	Create awareness to PAHs on the potential impacts of the project and issues related compensation	Project documents, meeting minutes, photos and videos	Checking presence of the indicated documentations	MoWE, NTWSSE, Municipality & WB	One –Off (but the awareness creation has to continue even after the commencement of construction)	120,000
	ARAP need to be conducted to identify the extent of the impact of the FSTP prior to any civil work of the project and PAHs should directly involve in the entire ARAP study and make their own informed decisions;	ARAP document	Checking whether ARAP is present or not			
	Compensate those affected according to the laid down policies in collaboration with Nekemte town Municipality. Tenable and commensurate compensation must be paid both in cash or in kind for the properties to be lost, damaged and transferred;	Compensation documentations, PAP	Checking Compensation documentations, visiting PAP			
	The town administration shall negotiate with each PAP independently, not with their representative, as it is being done currently, because negotiations are private and unique.	Documents	Checking documents, interviewing PAP			
	The plot of land to be given must have access to basic services at least proportionate to their original village;	Presence of amenities in the resettlement areas	Visiting the localities, interviewing the PAP			
	Vulnerable community groups should get priority during compensation cost estimation, job opportunity, capacity building programs and post impact livelihood restoration plans;	Documentation which spells out that these groups of people get priority	Interviews and visits			
	GRM shall be put in place to resolve all project related grievances; and	Presence of GRM	Document checking		Throughout the project life	
	Implement an institutional structure or a mechanism for monitoring and evaluating the compensation/resettlement process including the GRM	Presence of institutional structure for GRM	Visit and document checking			
Loss of Vegetation cover /Vegetation Clearance	Ensure replacement of 10 seedlings per each of the removed trees, followed by protection and watering of the seedlings until it reaches to at least 1.5 meters height.	Area planted, trees planted	Observation & document verification	Municipality, NTWSSSE, City Environment Protection Office	Construction Phase	350,000
	Identify and delineate the types of vegetation that must not be necessarily removed;	Area affected			Throughout the construction phase	
	Minimize the amount of destruction caused by machinery by promoting non mechanized methods of vegetation removal;	Area affected				
	Prior to undertaking vegetative clearance from environmentally sensitive areas the contractor shall seek approval from the relevant authorities and comply to the conditions provided;	Area affected				
	All areas planned for clearing of vegetation must be demarcated prior to the commencement of the construction;	Area affected				
Soil Degradation, Land slide, Flooding,	Develop a Site Specific Environmental and Social management plan prior to construction activities; Store topsoil and subsoil removed from the site during site preparation properly for reuse	Presence of the document	Observation & document verification	Municipality, NTWSSSE and City Environment	One-off	300,000

Adverse environmental Impact	Mitigation measures	Monitoring Indicators	Method of Monitoring	Monitoring Institutions	Monitoring Frequency	Budget in birr
Erosion and Loss of Top Soil	The valuable top soil containing organic material, nutrients as well as seeds and the soil fauna should be excavated separately and piled in an adequate manner for re-use where applicable.	Area affected		Protection Office	Throughout the construction phase	
	Contour temporary and permanent access roads / lay down areas so as to minimize surface water runoff and erosion;	Observation & document verification				
	Avoid using of more than 10 years old and properly unmaintained machineries which can most likely lead to oil, grease and fuel leakages.					
	Ensure that all equipment's on duty are properly maintained and fully functioning to avoid oil and grease leakages;					
	Plan emergency response measures in case of accidental oil spills	Age of vehicles/machines				
	Excess soil must be removed from the site timely (in hourly or daily bases as applicable) manner and deposited at an approved site; abandoned quarries be used for the disposal of excessive quantities of excavated soil material;	Presence of the plan				
	Protect adjacent area to the construction site from disturbance and wherever possible construction work will take place during the dry season;	Area affected				
	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	Waste generation				
	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 rain water channelling.	Amount of soil removed				
Air Quality and Noise Pollution (Dust Emissions)	Construction workers will be made aware of the permissible noise levels at the workplace and surrounding environment;	Noise situation in the locality	Observation, documents and interviews	Municipality, NTWSSSE and City Environment Protection Office	Entire construction phase	460,000
	Noise levels at construction sites should not exceed 75 dBA and 70 dBA during the day and night, respectively;					
	Contractor has to ensure that all construction equipment is properly maintained and fully functional;	Frequency of maintenance of vehicles				
	During periods of off work time, equipment will be switched off whenever possible.	Tradition of switching off of vehicle machine engines				
	Movement of haulage vehicles be limited to day time since the noise impact will be less felt;	Time of haulage				
	No construction activities will take place at night for sites where the closest residence is within less than 100 m from the project site;	Frequency of maintenance				
	Trucks will be covered during haulage of construction materials to reduce on spillage of materials and Use spray water for dust suppression over dusty areas; and	Use of dust collectors or spray water systems during excavation				
	Workers be provided with the necessary PPE such as ear muffs, masks whenever needed and as found appropriate;	Use of PPE by workers				
Alteration of Natural	Plan and work on integrated water shade management for the natural drainage lines;	○ No of plans prepared and	Observation and document verification	Municipality, NTWSSSE and	Entire construction phase	200,000

Adverse environmental Impact	Mitigation measures	Monitoring Indicators	Method of Monitoring	Monitoring Institutions	Monitoring Frequency	Budget in birr
Drainage Pattern	Proper drainage channels shall be constructed within the construction site to allow for convenient and free flow of storm water. Drainage channels shall be installed in all areas that generate or receive surface water. The channels shall be designed with regard to maximum expected volumes;	executed o Amount of Constructed drainage channels Gullies stabilized		City Environment Protection Office	Pre and Entire construction phase	
	To prevent possible erosion and flood, collaborative work needed for the stabilization of gullies and drainage lines; and					
	Integrated work of stakeholders to water shade management with careful planning and abatement of drainage lines are required	No of integrated drainage management activities				
Slope Failure due to Earthworks	Relatively very weak landform slopes should be protected using engineered structures (retaining walls), especially at the lower courses of the FSTP site;	Protected sloppy areas	Observation and document verification	Municipality, NTWSSSE and City Environment Protection Office	Entire construction phase	150,000
	Protect the susceptible areas of the project by using temporary or permanent drainage works;	Protected susceptible areas				
	Minimize the possible risk by undertaking all earthwork construction activities during the dry season;	Risks mnimized				
	The contractors expected to use best available methods of construction technology to minimize the risk of blockages and constrictions	No of best construction technonologies used	Observation and documents			
	The eroded channels will be backfilled and restored to natural contours.	No of eroded channels backfilled	Observation and document verification			
Traffic Congestion and Disruption of Private Communication Routes	The Contractor should provide temporary road signs or notices to indicate on going works;	No of road signs erected	Observation and document verification	Municipality, NTWSSSE, EPA & Traffic Management Office	Entire construction phase	400,000
	Use appropriate traffic routes to reduce the impact in the neighbourhood and any sensitive areas;	Rerouted traffic on sensititve areas				
	Ensure that vehicles for the construction work are operated only by qualified drivers;	No of vehicles operated by qualified drivers	Checking driving licenses			
	All vehicles need to use only designated areas for parking, loading and unloading; and	Desinated areas prepared	Observation			
	All of the drivers have to obey the speed limit of vehicles and strictly stick to these limits particularly in the residential areas.	Speed limits disobeyd	Traffic fines issued, observation			
Risk of Accidents	Develop Traffic Management Plan and incorporate proposed arrangements for traffic diversions with details of all necessary budget and signals;	Traffic Management Plan prepared	Document verification		Pre-construction phase	300,000
	Restrictions on hours of driving (including night time restrictions where sensitive receptors such as wild animals are affected) and timing of vehicle movements will be emphasized to avoid busy periods in urban areas, particularly the start and end of school, market, and the working days;	Time restriction issued			Entire construction phase	
	No drivers or personnel under the influence of alcohol or any drug abuse shall be allowed onsite;	No of traffic accidents or fines as a result of driving under influence	Document verification and interviews			
	Travel speeds of construction vehicles along the road should be controlled by setting travel speeds and informing through signals; and	Travel speed limit issued				
	Fencing or placing obstacles to trenches and ditches to avoid interference and accident of wild and domestic animals and children.	Trenches or obstackles put in place	Document verification and Observation			

Adverse environmental Impact	Mitigation measures	Monitoring Indicators	Method of Monitoring	Monitoring Institutions	Monitoring Frequency	Budget in birr
Water Pollution	All construction equipment will be kept in good operating condition to avoid oil, grease or fuel leakages that might contaminate the water bodies;	Maintenance schedule,	Document verification and Observation	Municipality, NTWSSSE and City Environment Protection Office	Entire construction phase	240,000
	All routine maintenance of construction machinery and vehicles shall be carried out in a designated workshop with concrete hard standing surface and drainage to an oil interceptor;	Maintenance schedule,	Document verification and Observation			
	Stockpile areas for materials such as sand, gravel, stone, and topsoil as well as overburden dumps will be located away from water courses and will be surrounded by perimeter or cut-off drains with sediment and other pollutant traps located at drain exits;	Location of materials stockpiling	Observation			
	Fuel handling and oil spill measures must be implemented to prevent, control and address spill or leaks. Use trained personnel for fuel and oil handling;	Measures put in place to protect leakage	Document verification and Observation			
	All hazardous wastes and empty containers of hazardous materials shall be stored in a designated area on site and regular removal and disposal has to be done in accordance with the national hazardous waste management regulation;	Designated areas for storing hazardous materials	Document verification and Observation			
	Construction has to be done mainly on the dry season to avoid sediment transport to the river;	Timing of construction	Document verification and Observation			
Solid Wastes	Prepare solid waste management plan and site prior to commencement of work including appropriate waste storage areas, collection and disposal schedule;	Prepared integrated solid waste management plan and implementation	Document verification and Observation	Municipality, NTWSSSE and City Environment Protection Office	Pre-construction phase	300,000
	Apply integrated solid waste management system in the project site;				Entire construction phase	
	Materials from excavation of the ground and foundation works shall be reused for earthworks and landscaping;	Trend of reusing excavated materials	Observation and document verification			
	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;	Placement of solid waste bins				
	The solid wastes shall be properly segregated and separated to encourage recycling of some useful resource; and	Trend of segregating solid waste	Observation and document verification and interviews			
	The contractor and the client shall work hand in hand to facilitate sound solid waste management.	Presence of Integration between contractor and client in handling waste				
Hazardous Wastes	The contractor has to develop mobile or temporary sanitary facilities in the construction site and in the vicinity of the project area which should be adequate at construction sites;	Presence of mobile or temporary sanitary facilities	Observation and document verification	Municipality, NTWSSSE and City Environment Protection Office	Entire construction phase	160,000
	Hazardous wastes require segregating hazardous waste from the non-hazardous waste and keep it in designated storage facilities at project site;	Presence of segregated of hazardous waste				
	Hazardous wastes such as paints, accessories and adhesives should be properly sealed, labelled, secured, kept inside a locked fenced area to prevent access by unauthorized personnel, and covered to prevent water accumulation before transportation;	Presence of proper handling of hazardous wastes				
	A hazardous waste label that has a “Hazardous Waste” mark on it must be placed on the container while still at the generation point;	Labeling tradition of hazardous wastes				

Adverse environmental Impact	Mitigation measures	Monitoring Indicators	Method of Monitoring	Monitoring Institutions	Monitoring Frequency	Budget in birr
	Prepare a hazardous waste management plan that will ensure proper collection, storage and transport to identified disposal site; and	Prepared hazardous waste management plan				
Occupational Health and Safety (OHS) risks	Prepare site specific OHS management plan and recruit qualified OHS officer to oversee OHS matters on a daily basis;	Presence of site specific OHS management plan	Observation and document verification	Municipality, NTWSSSE and City Environment Protection Office	Pre-construction phase	400,000
	All construction workers will be oriented on safe work practices and guidelines (OHS) first and ensure that they adhere to them.	Orientation given on OHS	Interviews, Observation and document verification		Entire construction phase	
	Workers must follow safety standards and use protective equipment to minimize hazards while trenching and excavating;	Tradition of respecting safety standards				
	Appropriate signal will be used to warn staff and/ or visitors that are not involved in construction activities in dangerous places;	Signal installed	Observation and document verification			
	Provide first aid kits and ensure availability of trained first aiders within the construction site;	Provision of first aid kits				
	Ensure that the campsite is fenced from external human, pet and wild animal interference and accidents and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, fire fighting and clean and safe water supply;	Fenced off campsite				
	Ensure that its Code of Conduct is followed to regulate the performance and behaviour of all workers.	Presence of Code of Conduct			Pre and Entire construction	
	Prohibit the use of alcohol, or" Chat", which could adversely affect the ability of employees to perform the work safely	Prohibition of drug use in the work place			Entire construction phase	
	Adequate PPE gears such as nose, ear mask and clothing will be provided to the employees and good camp management shall be provided.	Presence of Adequate OHS personnel protective gears	Interviews, Observation and document verification			
Spread of Communicable Diseases (HIV/AIDs, STIs / STDs)	Prepare and enforce a Code of Ethical Conduct (CEC); in the camp to encourage respect for the local community & to maintain cleanliness of the camp at all times. The code of ethical conduct of workers has to be translated in to local language and sensitized the workers on quarterly;	Presence of Code of Ethical Conduct (CEC); in the camp	Interviews, Observation and document verification	Municipality, NTWSSSE and City Health Office	Pre and Entire construction phase	420,000
	All construction workers shall be orientated and sensitized about responsible sexual behaviour in project communities.	Programs arranged for sensitization about sexual behaviour	Observation and document verification		Entire construction phase	
	Prepare an HIV/AIDS awareness campaign plan to reduce risks of spreading of HIV/AIDS and other STDs as part of contractual obligation.	Campaign plan forHIV/AIDS awareness	Interviews, Observation and document verification			
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.	Chance Finds Procedure put in place	Observation and document verification	Municipality, NTWSSSE & City Environment Protection Office	Entire construction phase	100,000
Rise of Deviance and	Unskilled and skilled (if available) labour should be hired from the local population as far as possible to minimize on influx of labourers from other	Presence of employment policy	Document verification and interviews	Municipality,	Entire construction	200,000

Adverse environmental Impact	Mitigation measures	Monitoring Indicators	Method of Monitoring	Monitoring Institutions	Monitoring Frequency	Budget in birr
Conflicts due to influx of labor	places into the community;			NTWSSSE & Office of Labor & Social Affairs.	phase	
	Effective communication and collaboration are key to addressing the challenges and opportunities presented by an influx of labour;	Presence of Communication and collaboration strategies				
	Any new employee will be required to sign a code of behaviour;	Presence of code of behaviour to be signed				
	Awareness has to be given for the new comers about the importance of respecting the norms local community living in the project area.	Awareness campaigns on the importance of respecting the norms local community				
Operation Phase						
Air Emissions and Dust	Enforcing regulation of speed limit to a suitable speed (20 km/h) for all vehicles entering the village's boundaries;	Enforced speed limit regulation	Observation, Document verification and interviews	Municipality, NTWSSSE and Office of Environmental Protection	Entire operation phase	750,000
	Watering dusty roads during operation;	Trend of watering				
	Using new vehicles and giving proper service to the trucks on regular basis	Presense and usage of new vehicles				
	Turn on generators only during power cut-offs period	Timing of generator operation				
Air Pollution/ Odor	Plant indigenous trees at the perimeter of the project area with varying heights	No of indigenous trees planted	Observation, document verification and interviews	Municipality, NTWSSSE and Office of Environmental Protection Local EPA,	Entire operation phase	600,000
	Ensure proper operation to render unfriendly emissions during discharge of treated leachates due to overloading of the systems or negligence of the operators;	Presence of poper monitoring at the FSTP site				
	Odours generated by the facility can be controlled by use of suppressants and daily cleaning of the receiving areas;	Use of suppresants				
	Making sure that emergency water containers installed (used to suppress dust) are full and work properly during water interruptions;	Presence of emergency water containers				
	Good site management of the operation must regularly ensure to avoid foul odours that would arise from improper functioning;	Presence of poper monitoring				
	Ferric chloride (FeCl3) which shall be added to control the generation of hydrogen sulfide (H2S) the main source of odor in the sludge digestion process;	Use of Ferric chloride (FeCl3)	Amount/frequency of usage of Ferric chloride (FeCl3) used			
	Regular maintenance (once per year) of FSTP stabilization ponds, removal of accumulated debris and other solids at the inlets and outlets.	Presence of Maintenance schedule	Observation and document verification			
	The volumetric BOD loading should lie between 100-400 g/m3 in order to maintain anaerobic conditions and at the same time control odour release; and	Checking the volume of BOD				
	Regular monitoring shall be undertaken to avoid accidental surface runoff intrusions from the manholes of the drainage network which can overburden the facilities and cause foul odors.	Presence of Regular monitoring				

Adverse environmental Impact	Mitigation measures	Monitoring Indicators	Method of Monitoring	Monitoring Institutions	Monitoring Frequency	Budget in birr
Pollution to Water Sources, Channels and Swampy Lands	Establish scientifically selected, professionally designed and constructed FSTP strictly following national and international building code standards. (Since the design is done following scientific methods, except some modifications such as slight location changes, the construction shall strictly follow the design and mitigation measures and monitoring plans recommended in this ESIA).	Development of scientifically selected, professionally designed and constructed		Municipality, NTWSSSE and Office of Environmental Protection	Entire operation phase	540,000
	Standard working procedures of building code has to be followed to avoid errors of construction;	Checking of standard working procedures	Interviews, Observation and document verification			
	Periodic testing of surface water, hot spring & groundwater at the downstream of the project site; & sampling and testing quarterly/yearly as needed; & taking appropriate measures when signals of contamination is detected;	Checking if periodic testing of surface water is done				
	Adopt standardized operational management plan of FSTP;	Presence of standard management plan for FSTP				
	Develop standard monitoring procedure for the FSTP facility and surrounding environment;	Presence of standard monitoring procedure				
	Strict monitoring on chemical and biological loads entering the FSTP and swift adjustment of treatment process to cater for overloads in effluent quality;	Presence of strict monitoring on chemical and biological loads entering the FSTP				
	Incorporate the leachate drainage and collection networks as well as treatment mechanisms before moving to an offsite disposal area;	Incorporation of leachate drainage and collection networks				
	Protect the natural receptors technically through impermeable lower layer that prevents the leakage and infiltration of leachate from the facility;	Checking if impermeable lower layer is put in place				
	Ensure proper preventive and routine maintenance inspections of the FSTP;	Presence of maintenance inspections schedule				
	Regularly monitor the quality of effluent discharged from the FSTP against the ESMF effluent quality standard values;	Presence of regular monitoring plan				
	The dried-up sludge cake shall further be used as a raw material in the production of fuel products as briquettes or compost fertilizer.	Trend of using dried-up sludge cake				
Occupational Health and Safety Risks	Hire qualified and trained OHS professional for regular monitoring and management FSTP;	Availability of OHS professional	Observation and document verification	Municipality, NTWSSSE and Office of Environmental Protection	Entire operation phase	670,000
	Use appropriate PPE such as cut resistant and high visibility protective clothing, gloves, safety boots (foot wares) and providing appropriate respiratory protection equipment and face masks;	Checking of wrkers of the FSTP use appropriate PPE	Interviews, Observation and document verification			
	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;	Presence of EHS Plan including health and safety measures	Observation and document verification		Pre and Entire operation phase	

Adverse environmental Impact	Mitigation measures	Monitoring Indicators	Method of Monitoring	Monitoring Institutions	Monitoring Frequency	Budget in birr
	Routine maintenance including the removal of garbage, screenings and grit; slashing around the embankments; and repair of the fence shall be done timely;	Presence of Schedule of routine maintenance			Entire operation phase	
	Providing appropriate training and equipment, and implementing appropriate ergonomic practices are important to minimize ergonomic hazards;	Checking if appropriate training and equipment are provided				
	Provide accessible easy to reach first aid in and immediate medical care in case of injuries and accidents;	Accessibility of first aid				
	Vaccinate all labor working force at the site properly and provide regular health examinations access;	Checking if th work force is vaccinated	Interviews and document verification			
	The FSTP should be fenced and signals put in place with security personnel to stop unauthorized people from accessing the site;	Presence of fences	Observation			
	Maintain important information of emergency resources (e.g., fire extinguishers, first aid kits, emergency contacts of doctor, police men) in easily available place; and	Availability of emergency resources (e.g., fire extinguishers, first aid kits, emergency contacts of doctor, police men)	Interviews, observation and document verification			
	Strict follow operation in accordance with manufacturer's instructions and Material Safety Data Sheets (MSDS) procedures to store all chemicals utilized in FSTP and storage must conform to compatibility restrictions.	Checking if operation is being conducted in accordance with manufacturer's instructions	Observation and document verification			
Overflowing of Sludge into the Surrounding Residents	Implementing appropriate safety procedures, such as proper ventilation and regular monitoring of gas levels;	Checking if appropriate safety procedures	Observation and document verification			430,000
	Reduce the inflow of sludge into the treatment plant or storage facility.	Presence of temporary storage tanks /lagoons				
	If overflowing of faecal 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.	Presence of emergency				
Decommissioning Phase						
Pollution of Soil and Water bodies	Conduct a site assessment to identify potential environmental and health risks associated with the plant.	Presence of assessment result	Observation and document verification	Municipality, NTWSSSE and Office of Environmental Protection	During commissioning	400,000
	Develop a decommissioning plan that outlines the steps and working procedures;	Presence of decommissioning plan	Document verification		Proir and During commissioning	
	Engage local stakeholders including nearby residents, businesses, and community organizations;	Presence of plan to eengage local stakeholders				
	Conducting environmental quality assessment of the water body and the treated wastewater prior to the commencement of the decommissioning;	Checking if environmental quality assessment of the water body and the treated wastewater	Interviews and document verification			

Adverse environmental Impact	Mitigation measures	Monitoring Indicators	Method of Monitoring	Monitoring Institutions	Monitoring Frequency	Budget in birr
	Properly transporting all the hazardous wastes construction materials, chemical containers to a predetermined site for treatment, deposal or storage;	Checking if hazardous wastes safely transported to a pre determined disposal site	Observation			
	Topsoil and subsoil removed for decommissioning will be stored properly and used for backfilling and reinstatement;	Checking if top soil and subsoil removed stored properly and used for backfilling	Observation ad interviews			
	Back-filling materials will be compacted to a level similar to the original surrounding soils to avoid subsidence as a consequence of rain water channelling;	Checking if back-filling materials are appropriately compacted	Observation and interviews			
	Restore the project site into its original or to a condition that is acceptable to local stakeholders and regulatory authorities. Apply site grading, replanting vegetation, or other measures to restore the site to its natural state;	Checking if the project site is restored into its original	Observation and document verification			
	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.	Absence of potential environmental or health risks associated with the decommissioned plant	Observation and interviews No of soil samples taken and results of analysis			
Occupational Health and Safety and Air Pollution	Recruiting a qualified health and occupational safety officer who will oversee OHS matters on site;	Checking if qualified health and occupational safety officer who will oversee OHS matters on site are recruited	Observation and document verification	Municipality, NTWSSSE and Office of Environmental Protection	During commissioning	320,000
	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;	Checking if proper induction of the workers prior to decommissioning commencement is done	Observation and document verification			
	Implement ergonomic interventions, such as job rotation or use of assistive devices to reduce ergonomic hazards;	Checking if ergonomic interventions are done				
	Provide appropriate, adequate PPE, such as gloves, masks, and protective clothing, OHS personnel protective gear to the employees; and	Checking if appropriate, adequate PPE are provided	Observation and interviews			
	Implementing engineering controls, such as ventilation systems and barriers to reduce exposure to hazardous materials and physical hazards.	Checking if engineering controls, such as ventilation systems and barriers to reduce exposure to hazardous materials and physical hazards are installed				

Adverse environmental Impact	Mitigation measures	Monitoring Indicators	Method of Monitoring	Monitoring Institutions	Monitoring Frequency	Budget in birr
Socio-economic Impact	Based on their skill, knowledge, experience and interest, vulnerable community groups must be transferred to another secured job opportunity	Presence of a plan to transfer vulnerable workers to other jobs	Interviews, document verification	Municipality, NTWSSSE and Office of Environmental Protection ,	During commissioning	200,000
	Provide financial assistance or grants to affected workers or businesses. This can involve providing loans, grants, or other forms of financial support to help workers or businesses transition to new opportunities	Checking the provision of financial assistance or grants to affected workers or businesses				
	Providing adequate pension for those who want to retire as per the national law	Checking if adequate pension for those who want to retire is prepared/arranged				
	Providing retraining programs in new industries or skills opportunities for workers who have been impacted by the process. Supporting workers to start their own businesses	Presence of retraining programs in new industries or skills opportunities for workers who have been impacted by the process	Document verification and interviews			
	Total					**8,010,000**

The above ESMP table summarized the main possible negative impacts, nature of the receiving environment, possible mitigation measures, expected outcomes, monitoring indicators, monitoring plan, responsible institution for monitoring, time duration and cost estimations of 9,000,0000 (nine million). Even though it is very rough and subjective the overall monitoring cost estimated during pre-construction, construction and operation phase is about 8,010,000.00 (Eight Million and Ten Thousands) Birr. If we add the cost for implementing mitigation measures (which is 17,010,000), and the human resource development cost of 3,000,000 (three million) total cost for the ESMP will be around 20,010,000 (twenty million and ten thousand) Birr. This price estimation is not exhaustive due to very wide nature of the study and market dynamics. Thus, assuming the market dynamics and complexity of the study, the price estimation might have an error of ±10% of the current value.

11.2 Implementation Arrangement

During construction phase, NTWSSSE and the MoWE shall require contractors to comply with this ESMP and to recruit an environmental and occupational health and safety officer to effect the implementation of this ESMP. The contractor should have a designated environmental officer to oversee 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 implementation of ESMP and will, therefore, ensure that resources are duly provided. The project manager shall be responsible and ensure that E&S staff will be deployed and 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.

NTWSSSE has an environmentalist and social safeguards but since the technology is new to the area and does not have sufficient experience and capability for dealing either with implementation of environmental mitigation measures or monitoring of various environmental quality parameters. Hence, experts and operators will require training and expertise assistance to perform the ESMP environmental monitoring plan. The proposed training program for different staff with their field of training is given in the table 19 below in addition to on-the-job training by the environmental consultants

Table 19: programs for Capacity Building and associated costs

Target Group	Training title	Training content	Duration (Days)	Time	Trainer	Cost in birr
Top Management NTWSSSE/PMU monitoring Staff	Environmental management	Awareness on Environmental Management; Legal requirements; National environmental standards	3	2X/year	NTWSSSE MoWE Environmental consultant	600,000
NTWSSSE Staff, regional water and energy bureau), Health officers, EPA, and other relevant stakeholders	Environmental supervision, monitoring and reporting	Public health and safety of FSTP management; Community participation in environmental supervision monitoring; Risk assessment, response, and control; Awareness creation	3	2X/year	NTWSSSE MoWE Environmental consultant	350,000
On-site construction management staff; environmental and social safeguard staffs; village /group authorities	Implementation of mitigation measures	Overview of environmental monitoring; Requirements of environmental monitoring; Role and responsibilities of contractors; monitoring forms and guide how to fill in the forms and risk report; Preparation and submission of reports; Grievance handling and reporting ; GBV reporting	2-3	1x/year	NTWSSSE MoWE Environmental consultant	500,000.
Representatives of community and/or worker leaders	Environmental sanitation and safety	Environmental and Social safeguards; Safety and health issues ;Environmental Pollution risks and management ; Mitigation measures at construction sites; Procedures to deal with emergency situations	2	2X/Year	NTWSSSE MoWE Environmental consultant	200,000
Core Process head, FS Emptying Customer Service Team Leader, Head of Finance	Customer service management	Marketing (promotion), customer handling; record keeping and reporting; financial management	3	2X/Year		300,000
Core Process head, FS Emptying Customer Service Team Leader, Sludge Truck Drivers Sludge Emptying Crew	Safety measures for proper FS emptying	Training on risks, safety measures and good practices for FS sludge collection and conveyance	3	2X/Year	NTWSSSE MoWE Environmental consultant	300,000
Core Process FSTP Team Leader FSTP operators	Operation and maintenance Staff	Treatment plant operation principles; operation and maintenance procedures and treatment processes	3	2X/Year	NTWSSSE MoWE Environmental consultant	350,000
Utility Director, Core Process head, FS Emptying Customer Service, Team Leader FSTP Finance Team	Leadership and communication	Training on group coordination, team leading and Communication	3	2X/year	NTWSSSE MoWE Environmental consultant	400,000
Total estimated cost						**3,000,000**

11.3 Reporting

During construction, concise monthly monitoring reports should be compiled by the contractor. The report will 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 the Local EPA, NTWSSSE, the contractor and other concerned utility agencies as necessary. NTWSSSE's Environmentalist and Social Specialist and the supervising engineer will approve the contractor's monthly environmental and social monitoring report that will then be transmitted to Local EPA and NTWSSSE for final approval. NTWSSSE'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 office. The report will also be compiled and shared with the MoWE, WB and other relevant stakeholders at least on quarterly bases. Approval of the environmental monitoring report by the supervising engineer shall be a prerequisite for approval of the respective bill of Quantity (BoQ) items.

During operation phase, monitoring will mostly be relying on Local EPA and NTWSSSE's Environmental Management and Social Specialist for effective project execution. The role of NTWSSSE's is both implementing and internal monitoring. Local EPA monitoring reports should be shared with project office, regional EPA and MoWE for further remedial actions. Besides Local EPA has a mandate, or order NTWSSSE's to hire consultant, to conduct audit studies and disclose the findings to interested public bodies as a regulatory requirement.

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 office or by a Consultant hired by project office with a technical support from local 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 20.

Table 20: Grievance Resolution Committee

No	Institution/ individual representation	Role
1	Municipality representative	Chairperson
2	NTWSSSE 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 Redness Committee and recorded in a complaints log s(he) keeps 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.

Grievances should be lodged at any time, either directly to the Clerk of Works', Grievance Redness Committee (project office) or through the local council chairperson. 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 Redness 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 timeframe within which they must be accomplished has been described and the party responsible for implementing them will be recorded in the complaint log. Grievances will be resolved and status reported back to complainants within 5 days. If more time is required, this will be communicated clearly and in advance to the aggrieved person. For cases that are not resolved within the stipulated time, 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 the 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 or through the responsible organ. It is believed that most of possible grievances can be solved at this level.

12. Conclusions and Recommendations

12.1 Conclusions

Nekemte town, with technical support from the federal MoWE and financial support from the WB, planned to build FSTP in the town. 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 major negative impacts during construction and operation phases as follow; involuntary economic displacement that includes land expropriation, property damage, biodiversity disturbance, landscape and integrity change, water, air and noise pollution, social misdemeanor, among others. The negative impacts can cause damage to the biological, physical and social environment if they are not properly planed and managed as indicated in the mitigation measure or ESMP section of this report. The project 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's EPA, MoWE, and the WB in addition to the project office 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 landholders where the FSTP is going to be constructed should be given utmost attention from all stakeholders. It is also very much important to carefully consider the design alternatives and recommendations provided to reduce the negative impacts of the project on local water bodies.

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 be 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 FSTP constructions in Nekemte will outweigh the adverse effects. And, 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 NTWSSSE and the MoWE need to ensure that the ESIA studies of projects are completed before commencement of construction. The project supervision consultant once mobilized should also prepare 'Construction Supervision Plan' before the beginning of construction works and this plan should be part of the contract. In addition, the environmental management plans should be made part of contract documents of contractor so that ESMP compliance is ensured. The ESMP recommends environmental monitoring at the different phases of the project. The monitoring should be conducted to check the efficacy of mitigation measures. Moreover, the Environment and Safety Division should develop an environmental checklist for the daily environmental audit of the project activities. This should be filled up by the environmental expert of the contractor and should be verified by the town's EPA.

References

1. FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA, MINISTRY OF WATER, IRRIGATION AND ELECTRICITY. URBAN WATER SUPPLY & SANITATION PROJECT PHASE II. ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK Final. May 2020 Ethiopia
2. FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA. MINISTRY OF WATER, IRRIGATION AND ELECTRICITY. URBAN WATER SUPPLY AND SANITATION PROJECT-II. Revised Draft. Resettlement Policy Framework (RPF) November, 2016 Addis Ababa, Ethiopia
3. Donacho DO, Tucho GT, Soboksa NE, Faro MH, Hailu AB. Qualitative Analysis of Onsite Sanitation Challenges in an Urban Setting: The Case of Nekemte Town, Ethiopia. Environmental Health Insights. 2023;17. doi:10.1177/11786302231154421
4. https://visitethiopia.travel/destinations/Nekemte/#:~:text=Other%20attractions%20include%20the%20daily%20central%20market%2C%20the,and%20out-of-town%20Lake%20Boye%20with%20its%20resident%20hippos.
5. Environment, Health and Safety Guidelines, 2007
6. Environmental protection Authority of Ethiopia (1997).
7. Environmental Pollution Control, Proclamation No 300/2002, Negarit Gazeta
8. The Ethiopian Water Resources Management Proclamation (No. 197/2000)
9. Federal Democratic Republic of Ethiopia (FDRE) Constitution; Proclamation No. 1 /1995.
10. Environmental Impact Assessment Guideline, Addis Ababa, EPA /MEDAC (April 1996);
11. Federal Democratic Republic of Ethiopia HIV/AIDS Policy (1998)
12. Federal Democratic Republic of Ethiopia, Environmental policy 1997.
13. Federal Democratic Republic of Ethiopia, Public health proclamation (Proc. No. 200/2000)
14. Federal Democratic Republic of Ethiopia, Water Resources Management Policy (2001)
15. Federal Democratic Republic of Ethiopia: Environmental Impact Assessment Proclamation. Proclamation No 299/2002.
16. Federal Democratic Republic of Ethiopia: Environmental Pollution Control Proclamation. Proclamation No 300/2002.
17. Federal Democratic Republic of Ethiopia; National Policy on Women, 1993
18. Federal Environmental Protection Authority, Integrated Environmental and Social Impact Assessment Guidelines (2000).
19. Labor Proclamation No. 1156/2019
20. Feasibility Study and Design of Wastewater Management Report - Nekemte town – Final VOLUME I: MAIN REPORT 26/07/2022
21. Feasibility Study and Design of Wastewater Management Report - Nekemte town – Final Volume II – Hydraulic Analysis Report 26/07/2022
22. Feasibility Study and Design of Wastewater Management Report - Nekemte town – Final VOLUME III – PRELIMINARY ESIA REPORT 26/07/2022
23. Feasibility Study and Design of Wastewater Management Report - Nekemte town – Final VOLUME IV: DRAWING ALBUM 26/07/2022
24. Feasibility Study and Design of Wastewater Management Report - Nekemte town – Final VOLUME V: BUSINESS PLAN 26/07/2022
25. Second Urban Water Supply and Sanitation Project (UWSSP-II) A Guideline to Grievance Redress Mechanism (GRM) February, 2020

Annex I: Chance Find Procedure

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 II: Stakeholder Consultation Minutes

Marii projekti ijaarsa M/F fi "Fecal Sledge Treatment"

Bakka : Waajjira Kantiibaa

Guyyaa : 01/10/2015

Hirmaattota : Gaggeessitoota Sektaroota fi Qooda fudhattoota adda addaa Magaalaa Naqamtee!

Maqaa	Gita Hojii	Mallatto
1. Tarekegn Ulfina	CT, Culture & Tourism Head	
2. Shimelis Mitiku	" Expert	
3. Mengistu Guddu	Health Office	
4. Tigist Bojjee	Women & Children	
5. Soloman Bifila	Mayor office	
6. Fanta Gurmeessaa	EPA	
7. Abdena Amenu	Educat: office	
8. Tena Hika	Statistics	
9. Alemu Asana	Green Sober	
10. Edosa Wakuma	EEU	
11. Dr. Teshome Tefera	Sober	
12. Desta Kassa	"	
13. Lelissa Likassa	Second Urban	[illegible]
14. Yadeta Tesema	Water Supply Utility	[illegible]
15. Diriba Surra	Second Urban	
16. Dinaa Temesgen	"	
17. Waffaarii Gelalo	Land Administration (Mekanete)	

Walga'icha waajjira I/A/Waajjira Kantiibatti obbo Soloman Bifilaatiin banamee; itti aansuun obbo Yaadata Tesema I/A/Waajjira Bisaan Dhugaatii fi Dhangala'aa M/Naqamtee hasowinsa sagantaa ergamaa fi sodhaniii baadaa walgahiin afaan itti fufu kallatti ka'anii jiru.

Waajjiira bishaaniitti Suwissp' kaayyoo fi hojii SUWSS Nekemte City project raawwachaa akkaa jiru waal ga'ichaaf gabaabinaan ibsaniiru.

- Itti fufuun gareen Green Sober hojii hojjechuu gabuu fi karaa waa'ee guyyaa dhibbaa naannoo fi hawwaasaa projekti fiduu danda'uuf furmaata isaa ibsaniiru.

Itti fufuun gareen Sober: Rogaalee barbaadamu sekteroottaaf ibsameera.

Dhuma irratti obbo Soloman Bifila sekteroota: raga galmee akka gareen Green Soberiif akka kennan kallattii kahaniiru!

Hirmaatota irraa gaffiileen fi yaada ka'aniiru!

Nekemte city EPA - Koorannoo projeek-
ticha dhiyyachuu qaba jedhan
hojii hojjetama tureratti hirm-
aachu akka turani fi gaaffii
fula duratti akka nuuwaliin
hojjetan waada galaniiru

waajjira fayya irraa beenya
waliin walqabatee raakkina
akka hin uumamne akkeekachi-
saniiru.

- Dhaabbata/Waajjira fayyaa keessatti manni fincaanii maaliif nuuf hin ijaaramne?
- Solid manaGment bakka gubaatii gorbaa/muka/ otoo hojjetame gaarii dha.

Humne Ibsaa = Pirojektii kana milkeessuuf hojjetamoo keenya nu barbaachisa.

- Fagaa Barbaadamu hunda ni kenniina.

Waajjira Lafaa + Stoorii Lafaa keessa kan jiru hin jiru.
Bakka Ijaarsa mana fincaanii argachuun ammas ni ulfaata
haalatti qaama hundaan irratti hojjechuu.

* Bakka invest mentiin ummanni buffa-essi hojiin mana kiraa ni adda bahee kennamuu qaba.

⊕ Paandii fi Bilhaan Naannoo Ijaarsa sanitation fiibame jira
- Ummanni Naannoosana jiraatan mboome irra fayyadamuu qaba. Warkee fundhinsi prosaaloo fi Aanaa Guutoo Gidaa waliin taasifamu qaba.

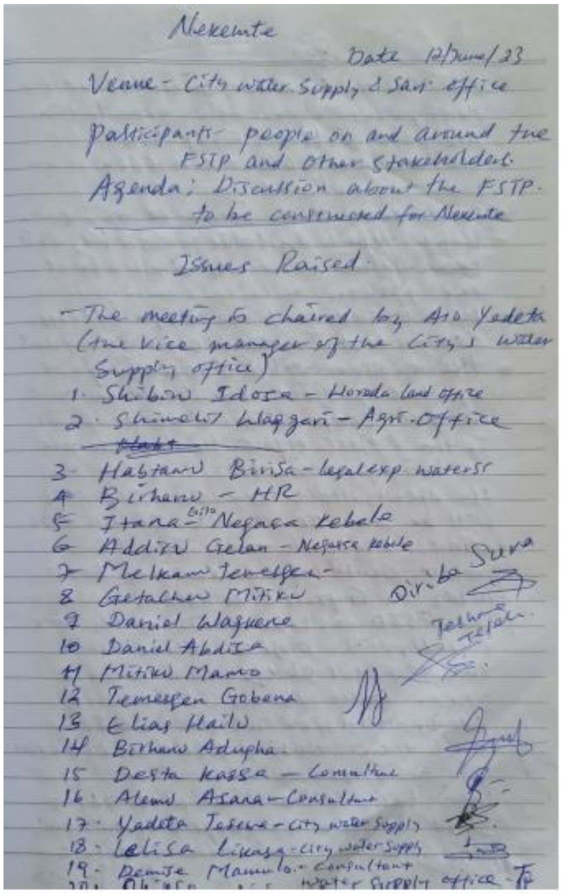
⊕ Buuchinsi magaala kaartaa bakka slige sanitation treatment plant fabaachuu qaba.

⊕ Fagaawwan barbaachisan seeteroonni hunda kennamuu qaba. lafa irra lafa jala qabeenya jiru beekisisuu qaba.

- Qeesonsi Qoraannoo gosgeessamu faamaan dhiyyeessamuu qaba.
- Yaada Wali galaa seeteronni hundi fagaa qaaccaan yeroo barbaadamutti dhiyyeessuun murteessaadha.
- Hojii Wali galaa kana waajjiraa kaatti booda fabaree hojjetamu qabna.

Yalata Tasema. Lene Hika
Amen Faattaa Garmuu
Siinaalii Haftii kkuu
Tigist Bojjee
Lelissa Likasso
Diriba Suraa

Annex III: Community Consultation Minutes



Nekemte

Date 12/June/23

Venue - City water Supply & San. office

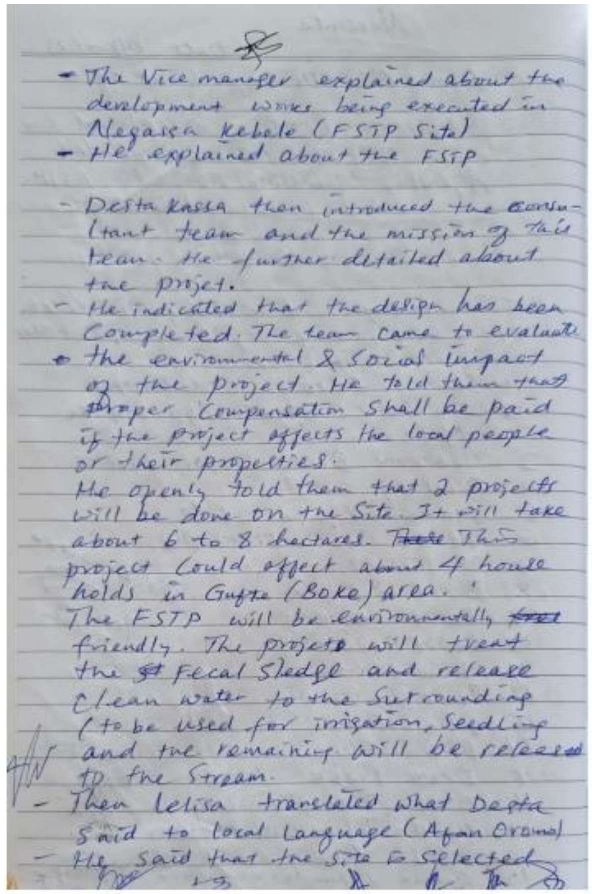
Participants - people on and around the FSTP and other stakeholders.

Agenda: Discussion about the FSTP to be constructed for Nekemte

Issues Raised

- The meeting is chaired by Ato Yadeta (the vice manager of the City's water Supply office)

1. Shibiru Idosa - Horada land office
2. Shimelis Waggari - Agri. Office
3. Habtamu Birisa - legal exp. water SS
4. Birhanu - HR
5. Itana - Gito Negasa kebele
6. Addisu Gelan - Negasa kebele
7. Melkam Tenessa -
8. Getachew Mitiku
9. Daniel Waquena
10. Daniel Abdisa
11. Mitiku Mamo
12. Temesgen Gobena
13. Elias Hailu
14. Birhanu Adupha
15. Desta Kassa - Consultant
16. Alemu Asana - Consultant
17. Yadeta Tesema - City water Supply
18. Lelisa Likasa - City water Supply
19. Demise Mamuto - Consultant
20. ... water Supply office



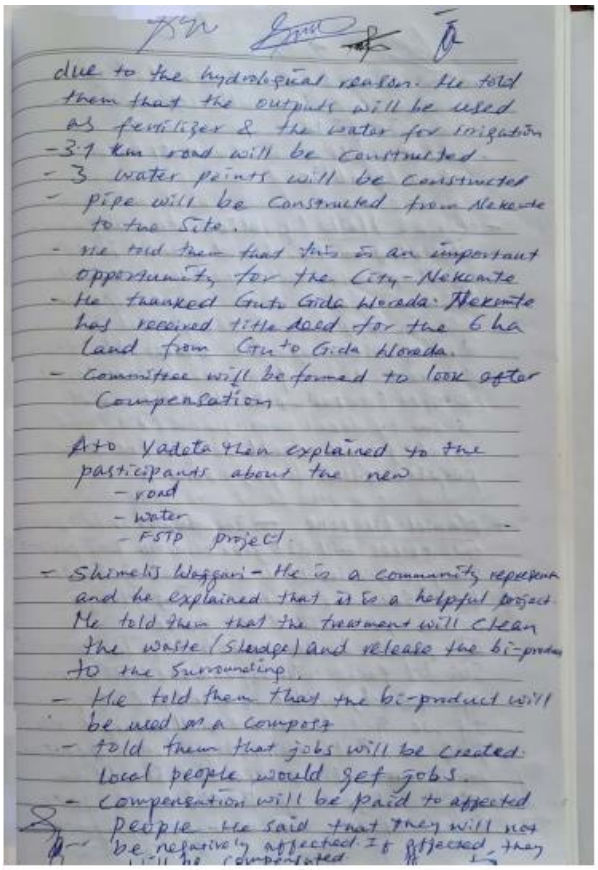
- The Vice manager explained about the development works being executed in Negasa kebele (FSTP Site)
- He explained about the FSTP

- Desta Kassa then introduced the consultant team and the mission of this team. He further detailed about the projet.
- He indicated that the design has been completed. The team came to evaluate the environmental & social impact of the project. He told them that proper Compensation shall be paid if the project affects the local people or their propelties.

He openly told them that 2 projects will be done on the Site. It will take about 6 to 8 hectares. ~~There~~ This project could affect about 4 house holds in Gufta (Boke) area.

The FSTP will be environmentally friendly. The projects will treat the Fecal Sledge and release Clean water to the Surrounding (to be used for irrigation, Seedling and the remaining will be released to the Stream.

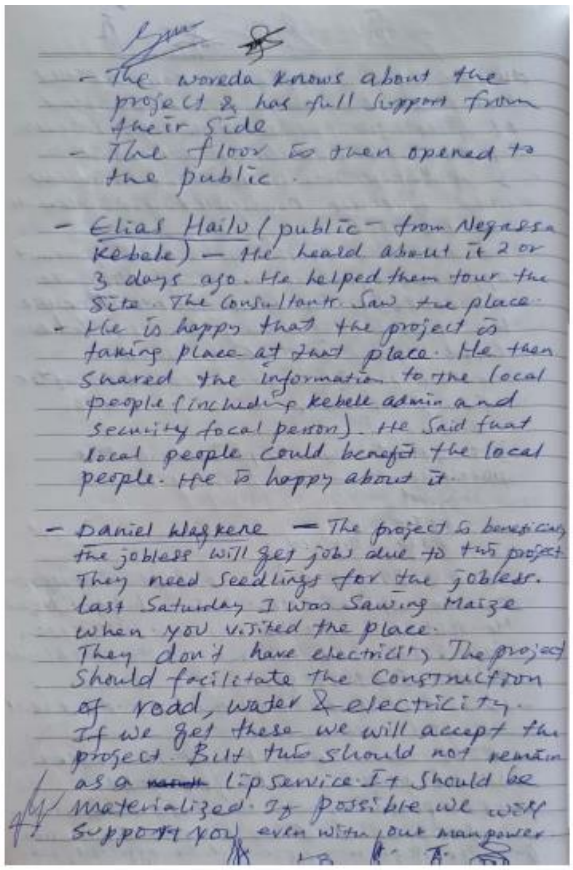
- Then Lelisa translated what Desta Said to local Language (Afan Oromo)
- He Said that the Site is Selected



due to the hydrological reason. He told them that the outputs will be used as fertilizer & the water for irrigation
- 3.7 km road will be constructed
- 3 water points will be constructed
- Pipe will be constructed from Nekemte to the site.
- He told them that this is an important opportunity for the City - Nekemte
- He thanked Guto Gida Woreda. Nekemte has received title deed for the 6 ha land from Guto Gida Woreda.
- Committee will be formed to look after Compensation.

Ato Yadeta then explained to the participants about the new
- road
- water
- FSTP project.

- Shimelis Woggari - He is a community representative and he explained that it is a helpful project. He told them that the treatment will clean the waste (sludge) and release the bi-product to the surrounding.
- He told them that the bi-product will be used as a compost
- told them that jobs will be created. local people would get jobs.
- Compensation will be paid to affected people. He said that they will not be negatively affected. If affected, they will be compensated



- The woreda knows about the project & has full support from their side
- The floor is then opened to the public.

- Elias Hailu (public - from Negessa Kebele) — He heard about it 2 or 3 days ago. He helped them tour the site. The consultant saw the place.
- He is happy that the project is taking place at that place. He then shared the information to the local people (including kebele admin and security focal person). He said that local people could benefit the local people. He is happy about it.

- Daniel Wagkene — The project is beneficial, the jobless will get jobs due to this project. They need seedlings for the jobless. last Saturday I was sowing maize when you visited the place. They don't have electricity. The project should facilitate the construction of road, water & electricity. If we get these we will accept the project. But this should not remain as a ~~words~~ lip service. It should be materialized. If possible we will support you even with our manpower.

Daniel Abdissa (Community) - We were hearing about the project But now we have first hand information. The project shall help the local people. The place doesn't have ~~no~~ road, it is difficult to access the place during raing season. The electricity is crossing the Site we haven't benefited from the electric power that is crossing our neighborhood. The water should also benefit us. We will be happy if we get the water from the borehole last time they designed water but we did not benefit from it we have to get benefit.

Itana Gilo - the road to the Site could affect us. Eucalyptus trees could be damaged - Need to be compensated Do we get replacement for the land? It is a Question

Melkamu Tenaegn - The locales could get opportunity as a result of this project. We should not be affected like the electric pole that crossed our neighborhood.

Mitiku Mamo - He blessed us first. He produces Maize. It is a productive He has cereals on the land He is aware what will happen to it.

Desta Kassa (Consultant) - replied to questions. He told them that proper compensation will be given to the people (both for the land and properties). Replacement land shall be given but if land is not available to be given to the public then it has to be compensated. If the land is less than 1/10 - compensation will be given. But if it is above that replacement shall be given (The land). The project will go ahead only after proper compensation is paid.
If the place has plants (like Eucalyptus, Coffee, Sugarcane, ---) it has to be compensated
There is a maize on the Site. We saw it - There are 4 people at the Site It belongs to Itana Gilo (or his family) The public can use the place until the site is cleared.

Lelisa (City water SS) - He said there is no land for replacement. The city can offer a compensation

Dhinsa (city water SS) - they can use the land until the project starts. the project calculates annual product multiplied by ~~Birr~~ 15 years as a compensation (in monetary terms)

Land

- Desta Kassa (Consultant) — They can plant perenial crops not permanent plants. They will be compensated based on what exists. They should not do permanent developments after this time.
If land replacement is not available then Nesemte can provide urban land. If the farmer prefers money as a compensation then they will be given the money.

(land office)
Shibiru Idosa — The benefit of the project is obvious. There will be many benefits that will follow the project. It will create jobs. The security problems were constraining performance of projects. But hopefully this may not happen to this project. The 6 ha project will not be that hard to execute. You need to benefit from the project in the form of irrigation and vegetable production.
The past compensation was given to farmers (10 times annual product.) Now it is 15 times. You can benefit from your land until the start of the project. There will be a committee and expert to estimate the compensation. We will see the regulation about compensation.

If land is taken then replacement could be given. If not product of a year multiplied by 15 years shall be given. It has to be handled as per the regulation.

Shimeli Wagari (Agri. office) -
The project will not benefit one and harm another person. We need to save the compensation money and use it for productive issues. It is up to the farmer to decide. You may prefer a replacement or the choose the monetary compensation.
About road, water, electricity - all need to benefit. The project will provide road.
Farmers can plant perenial crops cannot plant permanent plants.
We will continue with you (with the farmer) until the end.

- Yadeta (City water supply office) -
Local people were looking after the machines. The farmers were looking after the properties of our office. We trust you.

Desta Kasse - bi-products the water will be used for irrigation. The other bi-product shall be used as a compost. It shall benefit the local farmers (may be for free for few months / years)
- The water could be used for different purposes
- Jobs will be first offered to local people
- They shall ~~not~~ use the land until the start of the project.
- You can't do anything after the cut-off date of the compensation.
- The road could affect few people. They need to be compensated properly.
- You need to know about the compensation proclamation

Lelisa - We identified project even before the arrival of the Consultants
- Electricity - local electricity office that shows green light. Transformer is already promised 25 KVA will be supplied
- Water } will be provided.
- road }

Yadeta - Nekemte is selected and we are happy. These consultants are independent & the WB trusts them

We are also constructing toilets in the city. These consultants are studying these toilets.
Water will be provided
road is also part of the project
the same is true for electricity
- Compensation will be properly provided I know it is difficult but we will ensure that ~~fair compens~~ proper compensation will be paid
We gave example (Fincha).
We told them that they should continue their life until the start of project
- do not Sale land.
- generally you will benefit from the project.
- We will not start job if you are not compensated well.
- That is Why we openly discuss with you.
- We will continue discussion on the site at the process of the woreda (Anto Gida) & Nekemte Officials.

Name	Telephone	orgn.	Sign
1. Shibiru Idosa	0917290325	Leader of Land Admin	
2. Shimelis Waggari	0934089043	Agriculture Office	
3. Hailamu Birisa	0112853458	Water supply	
4 Daniel Abdissa	0925840592		
5. Daniel Wakeene	0935880384		
6. Addisu Galan	0925794270		
7. Itana Giloo	0921831215		
8. Malkamu Tamesgen	0962641094		
9 Getachoo Mitikku	0919540568		
10 Mitikku Mummoo	---		
11 Tamesgen Gabisa	0940597568		
12. Feliyaas Hayilu	0917889255		
13 Biranuu Alemyo	0949110460		
14 Leliso Likasa	0912134466	Project Coord.	
15. Dereissa Mamuda	0912203238	Consultant	
16. Yeadasa Tasamma	0917452850	Vice Utility	
17 Alemu Asane Dinka	0912108952	Consultant	
18. Teshome Tefera	0911453147	Consultant	
19. Dawa Temesgen	0911067426	SUWSSP	
20. Diriba Sura	0913491260	SUWSSP	