FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

MINISTRY OF WATER IRRIGATION AND ELECTRICITY

URBAN WASTEWATER MANAGEMENT STRATEGY

ADDIS ABABA

May, 2017

WATER SUPPLY AND
SANITATION DIRECTORATE

FORWARD

Excellency Dr.Engineer Sileshi Bekele,

MINISTER, MINISTRY OF WATER IRRIGATION AND ELECTRICITY

The Ministry of Water Irrigation and Electricity is pleased to present to the nation "Urban Wastewater Management Strategy " to address the prevailing environmental and social Change in the Water and Sanitation Sector National wide. This Strategy is necessary to address the likely impacts of the public health and environment change on potential water resources. To overcome these challenges at national level, the Ministry required a leading strategic and planned approach to formalize engagement of various stakeholders within the sector towards the full achievements of closed loop urban wastewater management system in a sustainable manner.

The Strategy is the refinement of work initiated within the Ministry and assistance from our development partners. A wide cross section of the Regional/BureauStakeholders, public and private sector agencies, universities, policy makers, national consultants and technical experts have contributed their valuable time and immense sourceto prepare this UWWMS strategy. This strategy and the MoH's IUSHS (2016) complement to each other and also fulfill the Ministry existing WRM Policy (2003).Moreover, the Strategy and its incoming SAP is prepared to align with thefederal urban development programs, environmental protection and public health safety strategies which is already inaction necessary for the long term vision of sustainable use and management of the natural resources.

My government recognizes the essential role of a resilient and sustainably managed wastewater system in the economic growth and sustainable development of urban citizens and is aware of the need to institute proper management mechanisms for the implementation of the National Water Resources Management Policy and this National Urban Wastewater Management Strategy. With assistance of The Ministry's staffs, the National Meteorological Service and Regional Water Bureaus, Cities/town administrations and Water Supply and Wastewater Enterprises, we will ensure that this UWWM Strategy and its incoming Plan shall be realized.

ADDIS ABABA, 2017

TABLE OF CONTENTS

ACRONYMS

AAWSA:	Addis Ababa Water and Sewerage Authority
CSA	Central Statistics Agency
DFID:	Department of Foreign and International Development (UK)
EPC:	Engineering, Procurement and Construction
EWRMP	Ethiopian Water Resource Management Policy
FMHACA:	Food, Medicine and He alth Care Administration and Control Authority
GTP:	Growth and Transformation Plan of Ethiopia (I and II)
ISO:	International Organization for Standardization
IUSHS	Integrated Urban Sanitation and Hygiene Strategy
WRM	Water Resource Manage ment
IWRM:	Integrated water Resource management
JMP:	Joint Monitoring Program
MDG:	Millennium Development Goal
MoUHD	Ministry of Urban Development and Housing
MoWIE:	Ministry of Water Irrigation and Electricity
MoWR:	Ministry of Water Reso urce
NGO:	Non-Governmental Organizations
OSS	On-site sewage system or septic system
SAP:	Strategic Action Plan on Municipal Wastewater
SDG:	Sustainable Development Goal
UADP:	Urban Areal Development Plan
UADP:	Urban Areal Development Plan
UAP:	Universal Access Plan
UN:	United Nations
UN-HABITAT:	The United Nations Human Settlements Programmer
UNICEF: (formerlyUnitedNationsInternationalChildren'sEmergencyFund)	United Nations Children's Fund
UWWM:	Urban Wastewater Management
UWWMS:	Urban Wastewater Management System
VIP Latrine:	Ventilated Improved Pit Latrine
WB:	World Bank Ethiopia
WHO:	The World Health Organization of the United Nations
WSSCC:	Water Supply and Sanitation Collaborative Council

1. INTRODUCTION

1.1. OVERVIEW

The UN General Assembly and the UN Human Rights Council have adopted resolutions that affirm that the human right to water and sanitation is legally binding. The right to water and sanitation is derived from existing human rights treaties and obligations a nd is implicit in the right to an adequate standard of living, the right to the highest attainable standard of physical and mental health and the right to life. The Federal constitution (1995) equally states in its Article 43 and 44 that citizens have the right to improved living standard under sustainableenvironment.

Ethiopia is determined working to reach a high income industrial economy by 2050. In order to meet this target, GTP II calls for the country to sustain an average real GDP growth rate of 11 percent per annum. However, despite the Federal Government unceasing effort, recent studies conducted by CSA's with "Mini Demographic and Health Survey (EMDHS-October, 2016) title indicated that only 14.8% of the population have access to flush toilet, ventilated improved pit latrine, traditional pit latrine with a slab, or composting toilet and does not share this facility with other households. It is reported that up to 60 percent of the current disease burden in Ethiopia is attributable to poor sanitation where as 15 percent of total deathare from diarrhea, mainly among the large population of children under five.

The reason for urban wastewater management strategy considered to have a higher priority is that the schemes are expected to serve large populations and generally tend to have lower per capita cost, produce greater social and environmental gains, and maximize the number of people with access to improved sanitation. Wastewater management is capital intensive for both investments and operation and maintenance costs. It tends to be two or three times more expensive than the costs of abstracting, treating and distributing tap water

The strategy will be formally reviewed on a five-yearly basis, with the first formal review scheduled for 2021. The Implementation strategic action plan will be reviewed annually, The current Ethiopian towns and cities are growing rapidly with economy and population number around 20%, however urban wastewater management system is a linear treatment system that is based on figured system operation majorly on disposal, open dry beds and small size conventional treatment. The traditional system needs to be transformed into a sustainable, closed-loop urban wastewater management system that is based on the conservation of water and natural resources.

The costs related to wastewater management are especially prohibitive in areas with lower population density, such as small towns and rural settlements. This is the case even in industrialized countries and poses higher constraints on low and middle income countries.

This Strategy sets out the broad plan for the management of wastewater in the national program to overcome the future challenge. In general terms,wastewater in this strategy refers to liquid wastes of a community and includes toilet wastes, grey water and trade waste. WWMS applies to urban level centralized and or decentralized wastewater collection, treatment and disposal systems as well as on -site wastewater systems. It also covers the wastewater residu als, or bio solids, generated from wastewater .

1.2.BACKGROUND

The current JMP indicated that access to improved drinking water has increased to 57% and access to improved sanitation has increased to 28%. On the basis of these estimates JMP (2015) considers that, Ethiopia has met the MDG target for drinking water, but has not met the MDG target for sanitation [1].

As the population, urbanization and economic activities rapidly increase – the pressure on the fresh water resources, increases. Steady increase in living standards, economic development and piped water supply means an increase in water consumptions. These lead to increasing volumes of wastewater and if untreated – increasing volumes of pollution. Pollution load into the environment has caused and con tinue to cause gradual but steady deterioration of water resources and the ability to provide safe drinking water to the population decreases. As a result, the basis of economic activities becomes threatened. With strong sustained growth in population and economy, these problems are expected to increase.

Foreseeing the problem, the MoWIE initiated the UWWM system strategy document preparation late 2014 within the framework of the EWRMP, 2003 and GTP II. In addition to this SDG program Goal 6(6.3) set to improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally by 2030.

Within this vision, the MoWIE initiated the UWWM system strategy preparation late 2014 within the framework of the Sanitation Policy 2003 and GTP II. In addition to this SDG program Goal 6(6.3) set to improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally by 2030.

Water, Sanitation and Hygiene (WASH) servi ces are provided with the primary purpose of satisfying vital needs, dignity and prevention of public health risks. Worldwide, more than half of the population of less developed countries does not have access to sanitation and more than 80% of the waste water generated is directly discharged into surface and ground water bodies.

1 Targeting Drinking Water for Achieving MDG, MoWIE, 2015

1.3. PURPOSE

The purpose of the UWWM 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 strategy is essential for several reasons: (1) protecting public health and the well-being of the communities; (2) protecting the water resources and the environment; and (3) in water-scarce cities for reuse purposes in order to reduce the pressure from the potable resources (4) to define UWWM system common goals and provide an outline of how they will be achieved among stakeholders. (5) to identify the challenges in meeting these goals and help perceive opportunities for improvement of UWWM services, (6) to develop a road map over the short to long term planning years, (7) to provide guidance for the development of the strategic plans/direction for the present and immediate future. (8) To design an institutional hub for a coordinated UWWM program outputs among the stakeholders. Even in cities and towns with abundant water, reuse of water and nutrients is essential for a sustainable use of these resources.

Both the MoWIE and the MoH strategiesi.e., this strategy and the IUSHS respectively complement to each other in giving due regard to the Ministry's (MoWIE) mandate expressed in Ethiopian Water Resources Management Policy. The strategy will enhance GTP II action plans by mobilizing the national and international funding resources towards a faster development of wastewater management system with priority given to those mega and major administrative center cities currently in need of infrastructure developments for cleaner and environmental acceptable domestic, institutional and industrial effluents.

1.4. SCOPE

This Strategy sets out the broad plan for the management of urban wastewater in the major towns, cities and Metropolis for over the next 10, 20 and 30 years.

The scope of the Strategic document is structured mainly to focus on establishment of responsible and sustainable wastewater management which could help the current critical challenges for all towns and cities at all categories. The scope includes:

a) Review wastewater management institutional structure
b) **Describes the current wastewater services**
c) **Sets out** the Vision, Mission and Goals and objective for the Strategy
d) **Identifies Key Issues** and Approaches for achieving the Vision, Mission and Goals

Draw system for safe collection, storage, treatment and disposal/re -use /recycling of waste at household, communal and institutional levels. Automated system shall be designed too for industrial waste product, waste and chemical /radioactive and other dangerous substances, health care institutions waste water,

Put in place proper wastewater management services in streets, market centers, public places(heritage, national centers, larges squares) and parks(natural and amusements), household levels and business areas,

How to select Tools for sanitation management

Ensure equitable service provision including youth, women, elders and people with disabilities and the poor,

To be able to identify the type and quantity of wastewater and wastewater residuals managed cities and towns, and how much wastewater is expected in the future

Identify potential finical resource flow Integrated wastewater management, funding and future planning.

Providing for cultural sustainability

Identify guiding Approaches to implement wastewater management system with integration of the IUSHS and others.

Develop wastewater Management information system requirements integrated with current Wash MIS

1.5. METHODOLOGY

Realizing the wastewater management problems be falling as outlined in the preceding section, the Ministry planned to draw an urban wastewater management strategy which addresses all sanitation chains for sustainable development. To transform the visions to a certain benefit, a formation of working group from different Directorates (Water Supply and Sanitation, Hydrology, Ground water, Research and Development and licensing water development administration) Water Sector Working Group Secretariat and National Consultants is established to prepare urban wastewater management strategy document. The team is composed from within the Ministry experts and it is in a aim to create a confidence and prepare a strategy truly envisage the problems, solutions and that develops asustainable urban management system compatible to the changing and growing city master plans for the coming 10, 20 and 30 years.

The team of experts have visited and collected existing cities wastewater management system to help the strategy document reflect the current critical issues in the urban sanitation. This strategy based on the assessment data collected from the major cities and analyzed using theSWOT model (strengths, weaknesses, opportunities and threats), indicated the gap in the wastewater sector. The Strategy document preparation is guided by the thematic areas such as institutional arrangement,

legalization and regulation, financial mechanism, monitoring and evaluation, operational management.

The first draft was produced in April 2015 and distributed to all directorates of the Ministry and the Regional Water Bureaus for comments. The second draft was produced based on the comments received and consequently an in house workshop comprising directorate Representatives was organized for further enrichment of the document before presenting it to the nationwide consultation workshop participants (NWCW). The two days NWCW has been conducted with the stakeholders from the Ministry staffs, region water Bureaus, Universities, Water Utilities, Water Utility Associations and Related Sector Ministries. Next to compiling and incorporating the comments and suggestion from the participants. The third draft final document is compiled and sent to the Ministry Staffs and Region Water Bureaus before and together with the new comments the document is again presented to MSF 7 participants in November 2015.

The fourth final draft was reshaped considering the comments from the MSF 7 participants and in August 2016 the revised draft final is sent to the Regional Water Bureau, WB, and DFID, UNICEF and the Water and Sanitation Directorate team for further qualification. The comments were utmost support and beneficial to bring this strategic document to be finalized and see it stood in its two feet.

Therefore this printed strategy document shall be used and circulated as a guide to prepare action plan for every cities and towns deemed to have a sustainable, affordable, efficient and effective Waste Water Management System supported by strong institutional arrangements and skills.

1.6. Time Frame

The Strategy aims to specify a short-term investment schedule that meets immediate needs and at the same time contributes to longer-term development goals. It shall have a three-tiered structure and the approach to action plan preparation to follow:

1. First scenario is expected to provide the best contribution to sector development over a longer, 20-year period. Physical goals shall give due consideration to financial and institutional opportunities and constraints to development.
2. The strategic plans shall be prepared best to be implemented in the coming 10 years given the long term goals and taking into account the various constraints to development.
3. Thirdly, specific projects have been selected from the plan for implementation during the first 5 years.

The UWWM strategy along with the norms set in the international guidelines is expected to create an enabling policy environment through which:

a) The strategy shall ensure equity, promote health, protect from disease, and protect the environment;
b) Through time, the role of governments transforms from service provider to initiator and facilitator of sustainable wastewater management;
c) Influential local authorities and communities, the private sector, regional and river basin agencies, and other partners can participate in planning and implementation of sustainable solutions; and

Technically and financially realistic, step wise approaches can be applied, with appropriate time and geographic scales.

2 VISION, MISSION AND GOAL

2.1 Vision

"Ethiopian cities and towns ensure sustainable, resilient, safer and health ier urban environment through improved wastewater management chain devoid of human contact by 2026 and beyond".

2.2 Mission

It is our goal to make our cities and towns be the nation's leading pet supply chain. The MoWIE will accomplish this by researching, sourcing and providing for our urban communities the best available variety of low-cost, high-quality wastewater management system delivery, and by exceeding customer service expectations in a way that will foster strong relationships with our stockholders way which is sustainable and consistent with social, economic, environmental and cultural wellbeing.

2.3 Goal

The ultimate Goal of this Strategy is,

A. Develop strong wastewater management institutions at major towns and cities in Regions,
B. Prepare a national WWMS plan and management structure aligned with sustainable development growth(SDG 2016-2030) for provision of appropriate wastewater services;
C. To protect the public from the potential harmful effects of wastewater through provision of a centralized, decentralized and onsite UWWM system under population category of cities and town;
D. To coordinate the national UWWM plan in protecting and maintaining safer environment by minimizing adverse environmental effects from wastewater discharge to the natural resources;
E. To support cities and town utilities work with the respected communities to provide for social and cultural sustainability
F. Develop sustainable management structure for wastewater collection, transportation and treatment actions
G. The Goals are identified in specific, measurable statements of what will be done to achieve the objectives within a particular time frame:

2.4 Objectives

Objective A: - Develop strong wastewater management institutions

1. Strengthen wastewater management system institutional structure
2. Accelerate the development of wastewater management system.

Objective B:- Master plan preparation

1. Initiate and conduct wastewater management master plan,
2. Conduct the national wastewater management base line data,
3. Draw development action plan for 36 towns,
4. Develop future development prioritization criteria,

Objective C:- Implementation Methods

1. Ensure provision of study and design guidelines, technical specification,
2. Develop feasibility study and detail design of wastewater management for 36 towns which have population greater than 50,000.
3. Construction of 10 major cities wastewater management system
4. Promoting simplified, cost effective and innovative wastewater management technologies
5. Ensure sustainable investment source of funds

Objective D: - Environment from wastewater discharge

1. Strengthen the legal and institutional framework at national and regional level
2. Develop regulation guidelines and enforcements
3. Establish management information system

Objectives E: - Social and cultural sustainability

1. Develop better human and institutional capacity
2. Prepare performance indicators (KPI) for the service provided

Objective F: - Wastewater Collection and Treatment

1 .Standardize the management infrastructure
2. Promote socially and economically acceptable wastewater management technologies
3. A system exists in place that ensures "sanitation markets"
4. Conduct performance indicators (KPI)
5. Establish coping mechanism.

Objective G: - Wastewater Collection Transportation and Treatment

1. Procure a national/international consultant to help standardize wastewater management structure
2. Support Regions and Utilities to jointly work with the respective MoH tiers

3. Coordinate various Directorates to work towards developing a system to use liquid waste as a resource:
4. Procure a national/international consultant to help develop monitoring tools (guideline and manuals)
5. Ensure that treatment plants shall be located away from any potential population growth.
6. Establish the system for the transfer of advanced wastewater treatment technologies

Objective H:- Reuse of Treated Effluent and Sludge

1. Procure a national or international consultant.
2. Develop a joint monitor system with respective line Ministries
3. Ensure that Utilities are working with local entrepreneur,
4. technical support to Regions and Utilities

Develop tools to use the sludge produced from the treatment process would be processed so it may be used as fertilizer, sand, land fill and soil conditioner. Care shall be taken to conform to the regulations of public health and environment protection norms.

3 EXISTING POLICIES AND IMPLEMENTATION TOOLS

3.1 The Current Practice at National Level

The issue of wastewater management was left to individual cities and towns, cities and at higher level involvement of the MoUHD from planning to implementation as attached to the local development program.

The existing overview of National level policies, Laws and strategy are briefly pointed out;

3.2 Integrated Water Resource Management

IWRM seeks, in an integrated and participatory way, to find the most optimal management solutions for the resource water in all dimensions and levels of use, and to promote public awareness. Therefore, for wastewater management, the current situation has to be analyzed, and the management has to be implemented in a cross-sectoral integrated way with the involvement of different points of view within different levels of scale.

A key aspect of the IWRM approach is to understand complex interactions among resources and stakeholders of the whole water chain. IWRM, besides resource conservation, in relation to wastewater treatment is also referred to as a public health securing function in several international conventions. Health aspects have significant importance in wastewater treatment.

Safe drinking water and hygienic sanitation facilities are a precondition for assuring public health and are also central to the human rights and personal dignity of every woman, man and child on earth

Wastewater management is part of the larger framework of Integrated W ater Resource Management (IWRM) and which emphasize a holistic approach, decentralized control, and respect for the Environment.

3.3 Constitution of Federal Democratic Republic of Ethiopia

The Constitution of Federal Democratic Republic of Ethiopia-1994has generated a conducive atmosphere to create and enhance public and environmental protection works under various Authorities and Ministries.

The most notable polices publicized and influenced the current trend are; outcomes within the country. Related articles outlined in the constitution are:

a) Article 43(1) &(2): the right to improved living standard and to sustainable development and to be constructed with respect to policies and projects without affecting their community,

b)Article 44/1: all persons the right to live in a clean and healthy environment,
c) Article 92/1: the government has the duty to support on the basis of equality citizens right.
d) Article 92/2: the design and implementation of development programs and projects should not damage or destroy the environment (FDRE, 1994).

3.4 National Level Transforming Policies

Ethiopian Water Resources Management Policy - Proclamation No. 197/2000,

The overall goal of this 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.

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.

Environment

Ministry of forest and climate change -stressed to ensure improved environmental sanitation to be placed highest on the federal regional agendas for achieving sustainable urban development.

Ministry of Health

The health policy of Ethiopia (MoH, 1993) - emphasized on environmental sanitation and it is listed as one of the top priority agenda in the primary healthcare service delivery.

Urban Development Policy

The policy document emphasizes that the urban administrations, the government and the people should give proper attention to environmental protection to avoid continuous suffocation and pollution to be followed with the expansion of cities. In addition to strictly implementing the national and regional environmental protection policy, rules and regulation, the urban administrations are expected to focus on environmental protection measures .

3.5 Regulation and Guideline

Ministry of Environment, Forest and Climate Change (formerly EPA)

The Environmental Pollution Control Proclamation No. 300/2002 concerns for the environment are addressed under Part 2 Article 3 and Part 2 Article 5.

Ethiopian MoH (FMHACA)

The Ethiopian Public Health Proclamation No. 200/2000 article 12 states that "no pe rson shall dispose solid, liquid or and other waste in a manner which contaminates the environment or affects the health of the society". The article number 13 of this proclamation is also states that "any city administration is responsible to provide public toilet and ensure its cleanliness".

Ministry of Health (Food, Medicine and Health Care Administration and Control Authority) Proclamation No. 661/2009 states that: a) Article 30: Waste Handling and Disposal and b) Article 31: Availability of Toilet facilities

National Strategy for Improved Hygiene and Sanitation

This National Strategy for Improved Hygiene and Sanitation has been developed to complement the existing health policy (MoH) and the National Water Sector Strategy[2] in placing greater emphasis on on-site' hygiene and sanitation.

Integrated Urban Sanitation and Hygiene Strategy

The strategy is prepared by the MoH jointly with sector Ministries and endorsed in September 2015. In terms of key components the strategy and its action plan will focus: a) Liquid waste service delivery: b) Solid waste service delivery: c) Promotional and behavior change:

Furthermore, the integrated urban sanitation and hygiene city master plan action plan preparation guideline for preparing city sanitation plans in phases based on its action plan document has set prioritizing of implementation a) Phase 1-category 1 towns by 2017, b) Phase 2-category 2 towns by 2020 and c) Phase 3-category 3 towns by 2025, etc. Also preparation of tailored ESIA guidelines relevant to sanitation facilities based on 8 towns WSSP UNICEF currently managing through DFID Funded program. As a result the strategy document has not shown clearly the status of mega and large cities waste water infrastructures and the challenges in the system.

[2]developed by the MoWRas it was named before 2014

3.6 Implementation challenges

Water sector policy

The guiding principles and issues are addressed on the policy, even though they are not properly treated or implemented practically. In addition the Proclamation No. 197/2000, article 11 and 13 and regulation article 11 – 13 prohibits the release of untreated waste into natural water bodies and the strategy also supports to have standards at each level and type of system. MoWIE under this National str ategy is expected to help to develop standards for different types and levels of sanitation systems including both on-site and off-site, non-water dependent and water dependent systems. This shall ensure application of standards in the design of future wastewater management projects to sustain the functioning of the systems in relation to availability of water.

Environmental Control Regulations

Despite the two existing regulations a) Environmental Pollution Control Proclamation No. 300/ 2002 and b) Regulation on Prevention of Industrial Pollution, Council of Ministers Regulation No. 159/ 20 08 (shall apply to factories) the following are needs to be readdressed:

a) the current practice and experience implicate that there are an impact of environmental pollution such as contamination of ground and surface water,
b) The effect of heavy metal on human health, and air pollution due to free disposal of wastewater in the urban community.

3.7. National Enabling Environment

Federal and Regional level support

The Federal and Regional government states play the role of creating an enabling environment to support the sanitation sector in taking final jurisdiction and responsibility in wastewater management by setting overall policy to perform the management functions where appropriate. Such as,

a) Develop and Assist stakeholders in exercising policies, regulations, legal authority, standards, manuals and other external limitations.
b) ensure that a transparent subsidy mechanism is in place
c) ensure that financial resources are allocated according to plans for the provision of sanitation in urban
d) enforce wastewater Management regulations

e) Ensure that appropriate technology options have been developed, as well as guidelines and training manuals are on place.
f) Planning, monitoring and financing mechanisms for different scale developments
g) Capacitating Skilled manpower and experience sharing
h) Introducing Standards, benchmarking and accountability
i) Capacity development and provide technical support on sanitation issues

Local Governance enabling Environment

Policies and regulation are properly practiced and implemented with a direct involvement of local government and reflected through following implementation components. Such as, a)Identify areas for the safe disposal and construction of wastewater system; b) Identify contractor, local artisan, service providers and organize and implement the contract)Quality control of sanitation facilities construction c)Plan and coordinate with stakeholders for the implementation of sanitation in the selected community and ensure stakeholders mobilization; d) Practice and develop Legislation and enforcement; e) Monitoring and promotion wastewater management system; f)Support to local services development, g) Community Consultation, h) Planning, setting service levels; i) Sanitation applications; j) Sharing the coordination of implementation

Obligations of Wastewater Disposing Bodies

All stakeholders, including factory, institutions and urban community shall respect their responsibility to save our natural resources. Stakeholdersat all level, shall ensure that regulations are respected the generation of liquid wastes is minimized or prevented; relevant standards are to be respected to dispose liquid wastes in an environmentally sound manner; and safety regulation operation and maintenance managements are met to international standard.

Regulatory tools and incentives system

Restrictive and enabling regulations are agreed procedures through which stakeholders are stimulated to treat their wastewater properly. Typically, a mix of regulatory and incentive instruments is most effective. Incentives are especially relevant because they have the largest influence on behavior of people or an industry. Positive incentives include subsidies, co -financing arrangements, and tax reductions to promote the construction of wastewater facilities. Negative financial incentives include tariffs, charges, and penalties to discourage the production of potentially polluting substances, to reduce water use, or generally to make polluting alternatives more expensive than clean alternatives.

Standards Related to Wastewater Management

The Ministry of Urban Development (Formerly MoUDC) has issued the following supportive technical documents:

a) Building Plumping (Sanitary) design guide EBSC 9, 1995 and now under improvement.

b) Waste Management Manual: With Respect to Urban Plans, Sanitary La ndfill Sites and Solid Waste Management Planning April, 2012

c) Urban Planning and Implementation Manual, 2011

The Manual is to serve as a guideline to recommend a UWWM strategies planning and implementation practice to put into effect policies, proclamations and regulations that are enacted to govern urban development. It provides the basics for urban plan preparation and implementation in a coordinated matter to the benefit of the urban community

d) Urban Storm Water Drainage Design Manual, August 2008,

Its purpose is to serve as a source of guidance and recommended procedures required for the design of urban drainage systems in a coherent way and it is intended primarily for use of urban storm water drainage planning and design engineers and designers at the Federal and Regional/Local levels.

e) Urban Transport Planning Manual, September, 2006

The objective of UTPTM manual is to provide a coordinating framework for the long-term UTPTM development of designated city or town by establishing: a) environmentally sensitive principal direction of growth, b) The legal, institutional arrangements, responsibilities and capacity needs foundation, c) for planning and development, d) The economic and resource basis for sustainable urban development.

f) Urban Areal Development Plan(UADP) Manual, September, 2006

The manual is intended to bring optimal UADP preparation and implementation approaches and procedures in one simplified document. The UADP has the following objectives a) to guide a long term development of a locali ty by providing tools such as building permit procedures; design guidelines and brief; b) To facilitate efficient and effective implementation of projects such as city center business, development, real estate projects, etc. by providing detailed land use and urban design proposals.

The Ethiopian Environment Authority (Now ELEC)

Integrated Environmental and Social Impact Assessment Guidelines Water Supply, 2004

The guideline focuses on rural and urban water supply projects for human needs. These guidelines highlight major issues and potential impacts that should be taken into account during the preparation and assessment phases. Though the guidelines is meant for water supply the same principles is expected to apply for the wastewater management.

Standards for Specified Industrial Sectors

The document describes Limit Values for Discharges (effluents) expected to be released from industries and manufacturing houses without harming the environment.

Policy Recommendation

The national water sector policy proc.no. 197/2000 recommendation clearly outlines that,

a) Ethiopia shall follow a multi-sectoral approach to wastewater management as a matter of urgency, incorporating principles of ecosystem based management from the watersheds into the nearby water bodies, connecting sectors that will reap immediate benefits from better wastewater management.
b) Successful and sustainable management of wastewater requires a cocktail of innovative approaches that engage the public and private sector at local, national and trans boundary scales. Planning processes should provide an enabling environment for innovation, including at the community level.
c) Innovative financing of appropriate wastewater infrastructure should incorporate design, construction, operation, maintenance, upgrading and/or decommissioning. Financing should take account of the fact that there are important livelihood opportunities in improving wastewater treatment processes.
d) In light of rapid global change, communities should plan wastewater management against future scenarios, not current situations
e) Solutions for smart wastewater management must be socially and culturally appropriate, as well as economically and environmentally viable into the future
f) Education and awareness must play a central role in wastew ater management and in reducing overall volumes and harmful content of wastewater produced, so that solutions are sustainable

4. Development Status of Wastewater Sector

4.1 Waste Collection, treatment capacity and Existing Sources

Collection and Treatment capacity

The recent in-house wastewater[3] service status assessment indicated that Addis Ababa and major cities of Ethiopia remain to be in the range of from Gondar 0. 07% to 7% to that of Addis Ababa.

The magnitude of the wastewater disposal problem is severe. Out of the total amount of wastewater produced in the cities the collection volume ranges for Addis Ababa city 24000 m3/day to 24m3/day in Dire Dawa.

Most vacuum trucks up to 60% of currently operational in most cities are owned by private companies.

DFID/UNICEF under One Wash Plus program supported eight towns tohave an integrated WSS project which comprises water supply and sanitation infrastructures(delivery of waste bins, collecting trucks, sludge drying beds and sanitary landfills).

4.2 Existing Wastewater Sources

Domestic wastewater

The major sources of domestic waste water are residential districts and predominantly public institutional facilities. Other important sources of waste water include commercial facilities and recreational areas which largely composed of black water, used to describe wastewater containing fecal matter and urine.

Industrial wastewater

The actual commercial or industrial enterprise that currently exists or potentially could exist on every other parcel in every city and towns shall be numerated and indicated during assessment, study and design stages. Consistent with referenced guidelines to be put into effect, a more generalized approach shall be used for the strategy level of analysis. The wastewater from industries varies so greatly in both flow and pollutio n strength. So, it is impossible to assign fixed values to their constituents. In general, industrial wastewaters may contain suspended, colloidal and dissolved (mineral and organic) solids.

[3] Data collected from respective city water Utilities by the MoWIE 201 6. MoWIE, 2015

Sludge Management

Sludge constitutes one of the areas of concern. It is therefore the intention of the MoWIE to implement controls to minimize water losses through sludge disposal and where feasible promote and optimize the water reclamation operations.

The Corporation also undertakes to monitor and record the impact of its sludge disposal on the environment and implement mitigation measures where the impact is deemed negative.

Landfill leach ate

Leach ate generation is a major problem for municipal solid waste (MSW) landfills and causes significant threat to surface water and groundwater. Leach ate can be defined as a liquid that passes through a landfill and has extracted dissolved and suspended matter from it. Leach ate results from precipitation entering the landfill from moisture that exists in the waste when it is composed.

Storm Water

Although the pollution load of storm water is generally lower than that of municipal wastewater, it may contain as much solids as domestic wastewater, depending on the debris and pollutants in the path of storm water run-off. During heavy storms, combined sewer overflows containing a mixture of storm water and sludge/ municipal wastewater can seriously contaminate the surroundings and the receiving water body or environment.

Wastewater from Agricultural activities

Agricultural wastewater generated from a variety of farm activities including animal feeding operations and the processing of agricultural products, can pollute surface and ground water if not properly managed.

Waste from mining and small scale entrepreneurs

Mining wastes include waste generated during the extraction, beneficiation, and processing of minerals, quarries such as stone, aggreg ate and selected material within the city/town boundary and mineral residues from various jewelry houses in the town.

Large volume of wastewater entering streams and rivers from t he numerous car washes and garages is a treat to the ground water resource an d attention will be given too during study and design stages.

5. STRATEGIC KEY ISSUES AND APPROACHES

5.1. Strategic Approaches

Planning

The short term planning direction is derived from the approved GTP II (2015/16 - 2020/21) core strategic direction and in line with the water sector policy released in 2001. This strategy shall be supported by a detailed plan of action in conformity with the direction set in section 3 objectives and goals of the GTP II for water sector[4]. (Goal1.4) for the specific cities and towns in different parts the Administrative Regions.

The strategy covers a three tired time frame, longer 20 years medium 10 years and short term planning of 5 years. The strategy is deemed to be revised following the completion the GTP II.

Integration with urban Areal development plan (UADP)

The current Ethiopian towns and cities are growing fast with economy and population number; due to these different infrastructures on development. The practice of preparing a detailed urban planning (includes infrastructure, roads, communication, water supply and sewer line) for area developments as planning tools implementation of master plan have long been in use in Ethiopia. Resent trends of introducing district plans 'detail plan' as a distinct component of a city master plan as also facilitated development of planed neighborhood in cities such as Addis Ababa.

In line with the trend of UADP or in general, it is imperative that any WWMS master plan to be established for cities/Town shall accommodate the integration of such public services throughout the implementation phase.

5.2. Alternative Management system

Different approaches to wastewater management are required for different urban areas with different population sizes and different stages of economic governance depending on capacity to manage wastewater and capacity for governance.

The strategy gives importance to stepped approach from decentralized to centralized systems for cities/town by considering their respective capacity (finance, human resource, etc.), existing development status, infrastructure, and natural environment and topography. Cost recovery principles in the course of planning, design and implementation supposed to be planned and analyzed.

[4] GTP II –for FDRE MoWIE GTP II Plan 2015-2020

Centralized strategy -Conventional

Publicly owned (collect and treat large volumes of wastewater for entire large communities, thus making use of large pipes, major excavations and manholes for access. Centralized systems often reuse/dispose far from the generation point. The system could be a separate or combined collection, treatment and disposal units.

Decentralized strategy

Onsite and neighborhood cluster treatment and reuse

Decentralized wastewater treatment disperses the resource closer to its source and minimizes surface discharges. Small-scale technologies that mimic natural membranes and filters and that utilize soils and smart localized controls.

Type I:

It is aimed for use of (condominium areas, universities, industries, and private and government institutions) serve more than a single household reaching up to 100 homes and more contrarily to the onsite systems; piping systems are needed for the cluster systems; applied in areas that are more densely populated or that have poor soil conditions and adverse topography.

Type II:

It is aimed for use of small towns. This system requires individual cesspool, vacuum truck, dry bed, disposal ground etc. Lagoons, constructed wetlands and stabilization ponds

All the system requires a minimum of this infrastructure such as Lagoons, constructed wetlands and stabilization ponds to dispose environmentally healthy effluent. The sanitation ladder in the urban context provides a useful instrument to assess the local status of sanitation in a community, municipality or region, pointing to optimal wastewater management strategies.

Type III:

It is aimed for use of for individual towns with decentralized onsite systems (condominium areas, universities, industries, and private and government institutions)

a. Treat wastewater of individual homes and buildings.
b. collect, treat and reuse/dispose treated wastewater at or near the generation point,
c. simple septic tank system
d. the Imhoff tank -primary treatment
e. Septage
f. use of vacuum trucks and dry beds

Approaches can also vary depending on the quality of standard required for end users or end-point disposal.

5.3 Situation Analysis (SWOT)

The existing situations at nationwide exhibits similar strengths, weakness, opportunities and limitations.

Strength

- The development of policies, strategies, and regulations at each sectors related to wastewater and sanitation issues.
- Start of wastewater recycling mechanisms in condominiums and universities.
- Increasing emptying and dry bed facilities and expansion of wastewater management system in some towns.

Weakness

- The absence of enforcement for implementation of regulation and standards exists.
- Overlooking safe guard effects during design, construction and operation phases,
- The overlapping of role and responsibility of operating organizations ,
- Limited allocation of recourses/funds for operational and maintenance use,
- Absence of sufficient infrastructure for wastewater management including free plots
- Low awareness on wastewater management at all levels
- Data Limitation and Inconsistency
- Lack of trained and skilled human Resources

Opportunities

- Recycling of wastewater for production of water, Biogas, sand and fertilizer this will lead to Job creation at different level.
- Make the environment clean and green by managing the pollutant scale and protect our fresh ground and surface water for next generation.
- Improve the infrastructure standards of the towns for Greenery and tourist attractiveness
- Allow local youths involvement to own the sanitation market for sustaining of an efficient market environment,

Limitations

- Limitation of resources on wastewater management
- Lack of commitment of implementation sectors and low priority
- Poor controlling, monitoring and evaluation mechanism
- Pollution of rivers, lacks and living environment which causes human health unsafe.

5.4 Strategic Key issues

The key issues identified to be basic challenges for the development of the wastewater management are,

1) **Prioritization**: Low priority given by government and actors when compared to water supply
2) **National Baseline data**: Lack of aggregated data on wastewater management status
3) **High investment cost**: The liquid waste management requires high invest ment (sewer line installation and absorption trench construction
4) **Lack of sanitation facilities**: sanitation facilities starting from household level to collection systems are key to hygienic attitude results to reduce many deaths, mostly of women and children.
5) **Infrastructure:** Wastewater management infrastructures (sewerage lines, vacuum tracks, public toilets, disposing sites, and treatment plants) not adequate.
6) **Ground and surface waters pollution**: due to poor liquid waste management systems in major cities
7) **Legal framework and unclear institutional responsibilities**; Inadequate
8) **Duplication of Roles**: among the implementers that create confusion among respected sectors and Poor coordination among different sector offices (Municipalities and water utilities)
9) **Institutional Setup:** There is no clear role & responsibility for urban sanitation development program that carries out the specified activities with an adequately organized institutional manpower in Ethiopia
10) **Qualified experts and knowledge** gap: both issues are key to improved use and application of appropriate technologies on liquid **waste management system**
11) **Guidelines:** There is no guidelines, standards, and manuals that helps to support the implementation
12) **Lack of access and monitoring** of wastewater services;
13) **Steady population growth:** High population growth(demand) and incompatible of service failure to mobilize the community and make them active participants in wastewater service provisions
14) **Community Attitude**, Practice and culture of the community towards liq uid waste management indicates:

    a. Lack of proper regulations, restrictions and verification during construction of on-site sanitation facilities;

    b. Illegal connection of yard drains to the nearby storm drainage system and poor construction of septic tanks

    c. Poor solid waste collection and urban drainage facilities, leading to an extra burden on the sludge collection and sewerage systems

Technology options: Almost nonexistence as the infrastructure developing is at infant stage. So the current technology pra ctice towards recycling is at the lowest stage.

5.5. Guide to select Appropriate System and Technology

The choice of a particular system of a specific project shall duly consider the following basic guides in the course of planning, study, design, construc tion and operation:

i. Economically affordable: investment, population density, technology efficiency, operation and maintenance, residual management, cost recovery etc.(Lagoons, constructed wetlands and stabilization ponds are inexpensive and common biological treatment options)
ii. Environmentally suitability: Environmental protection, resource conservation, water reuse, effluent for fertilizer, biogas production nutrient recycling, etc.
iii. Socially acceptable: Public health protection, government policy and reg ulations, human settlement, planning, etc. Sound approaches require, appreciation of local cultures, active participation of local peoples in development projects, more equitable income distribution, and the choice of appropriate technologies.

In addition the technology option encompasses current status of the existing sanitation, technical capacity, natural conditions, reliability and reapicability of the technology.

5.6 System Operation and Maintenance

The installation and operation of wastewater treatm ent systems ensures an environmentally friendly effluent quality meeting the determined border values. Maintenance for wastewater systems can either be preventive/predictive or corrective activity.

Effective maintenance programs shall be based on knowing what components make up the system, where they are located and the condition of the components. With that information, preventive/predictive maintenance can be planned and scheduled, rehabilitation needs identified, and long-term improvement programs plann ed and budgeted.

The MoWIE from time to time will issue a generic operation and maintenance manuals and guidelines for sustainable application of any WWMS. In order O & M to be effective and efficient, the following basic consideration will be practiced:

1) Ensure that each Utility has qualified technical & support staffs and equipment appropriate.
2) A practice of out sourcing to private sector entrepreneurships for a better service and job creation

3) Create and put into service locally applicable effluent disposal regulations at Utility level
4) Work with partners for Promotion and Strengthening public private partnership(PPP) systems

5.7 Monitoring and Evaluation

Monitoring and evaluation (M&E) is an extremely complex, multidiscip linary and skill-intensive endeavor. The Ministry shall develop a generic monitoring program that is capable of identifying deviations from the proposed action and any important unanticipated impacts onthe operation systems and environment of a specific WW MS program. The key monitoring tools are listed below,

a) Develop strong structure for Monitoring wastewater disposals by a accountable authority
b) Standard checklist is developed and put in use
c) Transparent system is developed and information are dissemina ted through established stakeholder forums
d) Develop a system to ensure the progress of the planned activities in terms of efficiency and budgeting
e) Regulatory standards enforcement is in place (low quality of effluent, illegal connection, unauthorized discharge, etc.)
f) develop key indicators and benchmarks to qualify the performances of the system

6. STRATEGIC ACTIONS

The Actions are structured in line with the Objectives set in the document.

Action A:- Develop strong wastewater management institutions at all level (2017 – 2019)

1. Conduct national assessment on the existing conditions of the wastewater management system (institutional structure) at all level. Priority is based on population and economic sizes;
2. Arrange appraisal consultation workshops involving stakeholders for endorsement.
3. Establish accountable wastewater management human resource structures at federal, regional and To wn in accordance with the service requirement.
4. Support will be provided to functional institutional setups
5. Monitor the established city/towns management systems in collaboration with the Regional Bureau to help and accelerate the development of wastewater management system.

Action B:- Sanitation Master Plan preparation (2017-2020)

1. Conduct wastewater management master plan for all Major cities and towns in conjunction with detail feasibility studies. The action will be integrated with other urban development plans.
2. Address a procurement method where by towns in the same geographic direction will be clustered as one group lot or so.
3. Draw development action plan for 36 towns and endorsed based on the outcome of the national assessment ;
4. Set a future development prioritization criteria based on the assessment result for scale up for all towns.
5. Implement the master plan preparation to be prepared in close consultation with all stakeholders.

Action C: - Implementation of centralized, decentralized and onsite UWWM system (2017-2025)

1. Review and enhance systems to reduce liquid waste load by improving house hold treatment creating disposal systems;
2. Continue existing system of permitting and inspection to support rehabilitation and enforce waste water system users to enhance enforcement of wastewater management prohibition against the unauthorized discharge.
3. Review from time to time technical and financial plans supposed to be incorporated in the yearly plan in line with GTP requirement for 36 towns which have population greater than 50,000 and to continue for the other towns accordingly.
4. Recruit national and international consultants for study and design works.

5. Monitor the ministry and regional counter parts have provided timely support and share information and documentation
6. The final report will be indorsed through appraisal workshop by panel of experts and regional stakeholders. Ensure provision of study and design guidelines, technical specification, and standard for wastewater management services.
7. Conduct the procurement for wastewater infrastructure construction, supply and installation for wastewater management works.
8. Monitor the regional water bureau's and cities/towns water and sewerage utilities are manage implementing the contract appropriately.
9. Ensure the service delivery efficiency of wastewater management infrastructures through periodic technical and financial supports where it is necessary to meet public health and environmental objectives, treatment shall be improved
10. Establish a system to manage EPC type contract for projects whose feasibility studies are completed.
11. Construction of 10 major cities wastewater management system is completed and the rest of the towns will be continued according the criteria sated.
12. Promoting simplified, cost effective and innovative wastewater manag ement technologies and services to build a cleaner environment and a better future
13. Ensure sustainable investment source of funds by involving donors, government and private, national and international (Soft loans).

ActionD:- protect the Environment from wastewater discharge (2017-2026)

1. Ensure that wastewater management structures at Federal/Regional and Utility level have given due regard to safeguard too.
2. Receive reports from the regions/ Utilities timely reports on fulfillment of safeguard compliances criteria's and regulations
3. Continue to work on integrated programs, services and facilities focusing on the environment, in collaboration with respective stakeholders at all level responsible for sanitation.
4. Provide support to strengthen the legal framework for improvement of the capacity of central/local governments sustain urban wastewater services through workshops and training accordingly.
5. Procure a national/international consultant to conduct assessment on sustainable evaluation of environmental and social aspect of WWMS.
6. Establish management information system for exchange of data at all stakeholders.

Action E:- social and cultural sustainability (2017-2026)

1. Promote socially and economically acceptable wastewater management technologies
2. A system exists in place that ensures "sanitation markets" are exercised and replicated considering social and cultural values with priority to gender, disadvantage and vulnerable groups,
3. Conduct performance indicators (KPI) for the service provided to ensure high quality of life for the public and sustainable city/town development.
4. Establish coping mechanism on the basis of awareness (availability, accessibility and effectiveness), always easily a ccessible by all the social groups, due to various reasons of their economic and legal status.

Action F: - Wastewater Collection Transportation and Treatment (2017-2026)

1. Procure a national/international consultant to help standardize wastewater management structure for collection, transportation and treatment according to the service level.
2. Support Regions and Utilities to jointly work with the respective MoH tiers on awareness creation in regard to (a)collaborative wastewatermanage (b) to regulate the waste at the sources using effective, affordable.
3. Coordinate various Directorates to work towards developing a system to use liquid waste as a resource: recovery of energy, biogas, materials of nutrient value, and water in an integrated resource recovery context;
4. Procure a national/international consultant to help develop monitoring tools (guideline and manuals) for performance of the liquid waste system and impacts on the receiving environment, and to be updated from time to time.
5. Ensure that treatment plants shall be located away from any potential population growth. Location selection shall be coordinated and approved with the concerned governmental agencies. Due consideration shall be given to interact with landowners and adjacent communities.
6. Establish the system for the transfer of advanced wastewater treatment technologies that shall be endorsed and encouraged. In addition, appropriate wastewater treatment technologies shall be selected with due consideration to operation and maintenance costs, skill requirement and energy savings, in addition to their efficiency in attaining and sustaining quality standards.

Action G: - Reuse of Treated Effluent and Sludge (2017-2026)

1. Procure a national or international consultant to help develop effluent categorizing and standardizing criteria for different reuses (irrigation, gardening, ground wa ter recharging, water supply …). The Manual and guideline to be updated accordingly.
2. Develop a joint monitor system with respective line Ministries on effluent quality and that user alerted to any emergency causing deterioration of the quality so that they will not use such water unless corrective measures are taken. and accumulation of heavy metals and salinity shall be monitored, managed and recommending mitigation methods
3. Ensure that Utilities are working with local entrepreneur, exer cising sanitation markets to use the sludge produced from the treatment process to be used as fertilizer, sand, land fill and soil conditioner to improve the liv ing standard.
4. Give technical support to Regions and Utilities to conform due regard is given to the regulations of public health and environment protection norms are observed when designed and implemented.

7. IMPLEMENTATION MODALITY

Whenever possible, other end uses of treated effluents; such as recycling, coo ling, power generation, etc. Shall be considered. The Ministry has a responsible government body mandated to implement, should strategically address the issues with different approaches and tools in order to respond to the demand of the urban community.

7.1. Strengthen Institutional Arrangement

A strong and clear institutional framework with accountable officials needed for delivery of efficient waste water management systems. The institutional arrangement of the wastewater sector will have to adjust continuously, because the institutional environment around the sub-sector can changes so much. Government should resuscitate structures and clarify accountabilities at all levels for effective coordination and management. So far, wastewater management is frequently low on the list of priorities. The wastewater sector can only prepare and manage its programs properly if all institutions are appropriately involved in the three main phases; planning, implementation (construction), and operation and maintenance link with cost recovery.

The main actors for urban wastewater management system are listed below in line with their respective role in the course of project development plan in integr ated manner.

Institutional Arrangements

No.	Project Cycle	Principal Bodies	Specific Roles
1	Planning	Federal MoWIE	Prepare a national/disaggregated plan including regions and towns in close consultation with stakeholders
		Regional Water Bureau	Assess the capacity of the cities/towns in the regions for endorsing and planning in order to address needs
		Water supply and wastewater services/Authorities	Identify their needs for proper planning
		City/Town Administrations	Endorse or support the requirement of the towns during planning
		Funding Agencies	Participate in the financial requirement during planning
2	Decision Making	Council of Ministers	Endorses the requirement of the development and financial at national level
		Regional State Councils	Endorses the requirement of the development and financial at regional level
		Regional Water Bureau	Identify the need and endorse cities / Towns for development requirement
		Bureau of Health	Make sure the proper implementation of regulation to alleviate environmental health problem
3	Implementation	Regional Water Bureau	Technical and financial support for sustainable implementation
		Regional Health Bureau	Create awareness to communities for reliable WWMS implementation
		Federal Environmental Protection	Control the polluters with strong enforcement.
		City/Town Administrations	Control and support city /town WWMS implementation of regulation and development. Provide house building permits that includes the latrine/septic tank construction plans or appropriate sanitation system
		Kebele/Woreda Community Organization	Participate and Control the proper implementation of UWWM and mobilizes community
		Households	Prepare UWWM infrastructures for reducing pollution
		Funding Agencies	Secure finance for implementation
		Private Enterprises	Participate in construction, consultation and supply.
4	Operation and Maintenance	Regional Water Bureau	Capacity building and technical support
		Regional Health Bureau	Create awareness to communities to have clean environment

No.	Project Cycle	Principal Bodies	Specific Roles
		Federal Ministry of Environmental Forestry and Climate Change	control routine effluent quality
		City/Town Administrations	Capacity building and technical support
		Community Organization	Manage the system operation and maintenance
		Households	Control household level O&M
		Funding Agencies	Support the finance in all aspect
		Private Enterprises	Participate in the practice of O&M
5	Monitoring and Evaluation	Regional Water Bureau	member of established committee for endorsing the different manuals, guidelines and procedures and develop reporting and follow up mechanisms
		Regional Health Bureau	member of established committee for endorsing the different manuals, guidelines and procedures
		Federal Environmental Protection	provide policy directions and guidance, preparation and dissemination of standard guidelines, manuals and procedures
		City/Town Administrations	control and check the implementation of regulation, standards and manuals
		Kebele/WoredaCommunity Organization	Controlling, monitoring and directly participating in UWWM
		Households	Follow the standards and regulation for the implementation of WWMS
		Donors	Capacitate the implementation of the controlling mechanisms
		Private Enterprises	Implement the standards and regulation of UWWM

7.2.Supporting the institutional Capacity

The MoWIE in its GTP II plan has clearly indicated, as core strategic direction (Build the sub-sector's implementation capacity), to embark on a comprehensive program of capacity building, training and recruitment aimed at improving institutional performance and staff capabilities in relation to: legislation; bala nced and adequate investment in the sector; appropriate technical standard of facilities; operation and maintenance (O&M); regulation capacity; and institutional capacity for sector planning and policy development Wastewater Treatment .

Strong Leadership ,Commitment and Support at National, Regional and Local Levels , political Commitment and executive leaders are required with solid knowledge of wastewater, approving and allocating required resources to the sector and acting as project champions and sponsors. Leaders should mobilize sanitation issues through advocacy and effective information and communication.

Separate responsibilities for each actor at all level should be the crucial thing to implement wastewater management tools.

Because of high investment costs of wastewater management every actors have to take conscious actions to have efficient system and regulations. Separate distribution of responsibility encourages promoting the issues, identifying the problems and take mitigation measures, continuous control and monitoring for implementation of appropriate structures for wastewater management is needed.

7.3.Develop Legislation and Regulation

Duties and responsibilities: Placing duties and responsibilities of users for wastewater services in relation to water conservation, protection of collection and distribution networks, and prevention of risk to public health and the environment needs consolidate wastewater services law into a single modern code for ease of management and

Administrative arrangements: strengthen administrative arrangements for planning the delivery of waste water services at national and local level. In addition, introducing a licensing system to regulate the operations of groups of wastewater services schemes shall be mandatory requirement.

Financial system: The development of financial systems of charging for pollution to encourage the adoption of good practices, or to provide incentives against over - production of potential pollutants and over-use of treatment facilities, must be considered

Standard and regulations: Enforcement of Standards & Regulations, in cases of violation of standards and regulation for compliance to sanitation standards and legal requirements (compliance of effluent with quality standards; compliance of sanitation facilities with technical and structural standards). Such as,

a. Regulation of domestic wastewater treatment systems
b. Industry Wastewater Regulations, instructional national standard for Management and treatment of wastewater
c. Adopting and implementing WHO/EU/US/China laws and regulations on waste and wastewater disposal

7.4 Prepare Standards, Guidelines and Code of practice

Standards and Guidelines

Standards: are mandatory requirements that must be followed. Under this strat egy Standards and guidelines for wastewater utilities and facilities regulatory program directed at ensuring public health and environmental protection.

Guidelines: are basic requirements to implement a system in smooth way, but they usually include standards that have been developed for the particular aspect of wastewater management and often include best practices (Emptying of wastes, structure standards, criteria and application of recycled water, management of septic tanks, standards of different types of toilets, pollution control regulations in industries and institutions UWWM systems).

The Ministry shall develop technical guidelines for proper (appropriate practice)

a) Design manual for UWWM facilities;
b) Standard designs and drawings;
c) Project management guidelines.
d) Materials and equipment guidelines;
e) Guidelines for Effluent Quality;
f) Operation and maintenance manual;
g) Monitoring and quality control guideline;
h) Service and payment setting guideline;
i) Business Model guideline.

Codes of Practice

A code of practice is a systematic collection of rules, standards and other information relating to the practices and procedures followed in an area and generally demonstrate best practice. The code of practice provides guidance on the design, operation and maintenance of wastewater management systems. The purpose of Code

is to ensure the safe disposal of sewage to safeguard public health and protect the environment. It will assist authorities, developers, system manufacturers, system designers, installers and operators to deal with various systems.

National Code of Practice for UWWM system in relation to quality, design and specifications shall encompass:

a. Sewage works network design;
b. Small Sewage Treatment Plants
c. Small On-site Sewage and Sludge Treatment
d. Private sewage systems such as septic tanks, portable toilets, etc .
e. Management practices pre/post implementation
f. Statutory requirements, regulations, and guidelines

The Code of shall be prepared with the Involvement of national advisors, design offices and universities giving due considerations to International Best Practices in Standards, Guidelines and Codes of Practice.

Public Education and Communication

Public education and communication include public awareness campaigns and educational programs designed to raise awareness about wastewater management issues and to implement good water conservation and protection practices. Increased public awareness can also to generate demand and public support for efforts to expand sanitation services.

The various mechanisms helpful to disseminate and raise the public awareness can be:

a) Wastewater management awareness is given to all stakeholders (from the MoWIE to town level utility staffs) with buildup management structure in place for sustainable development facilitation.
b) Community/utility services team is to provide education regarding public involvement, communication
c) Educate students, stakeholders, and the general public about the Water Quality, Transportation systems(trucks, pipes, etc.), Treatment area settlements attitudes
d) International Best Practices in UWWM in Public Education, Communication and Clearing Mechanisms;
e) Communication & outreach as a cross-cutting issue (What? Publication, policy briefs …how? Members e-list, Website, workshop, conferences, etc.)
f) Capacitate community representatives or social accountability committees on waste water management issues to transfer the gap to the community and government.

Gender Issues

Women's economic powerlessness in being able to prioritize household investments that can yield higher returns on household health outcomes has been noted by the Ethiopian government.

a) Significant job-creation opportunities for youth and women shall continue to be sponsored by the FDRE and other grant offices in various forms such as training to assist in the establishment of micro-enterprises.
b) More shall be given to effective planning in creating income-generating opportunities for women that have begun to create a flurry of activity in relation to public latrine management, waste management and beautification.
c) Income generating activities carried out by women shall be cost-reflective and often pose occupational-health risks such as managing the maintenance of public latrines, wastewater collection and disposal.
d) Implementation of cost reflective structures in the form of small entrepreneurs along with enforceable measures shall be given the utmost support to ensure the reduction of their occupational-health risks.

Involving Private sector and strengthen partnership

Proposed functions that can be outsourced to private sectors need proper assessment for identification of UWWM services that could be provided by public authorities. Costs for investments, operation and maintenance, however, often outstrip their capacities, as do present and future requirements for serving the unnerved. Therefore more flexible, Innovative and effective financial management mechanisms have to be considered such as micro-financing, revolving funds, and risk -sharing alternatives, providing tax free equipment's and municipal bonds. Public -private partnerships and public-public partnerships are important tools to assist local governments with initial financing and with on-going operations. Participation of private sectors scales up the sustainability of sanitation system by providing different business models on waste out puts.

PPP's participation can be realized in areas of design-build-operate-transfer (project study and design, construction provision of public service), cluster area (transportation (vacuum truck) and operation and Maintenance). Apart from these major involvements of the PPP's, small scale entrepreneurs may invest on recycling of liquid wastes for irrigation, biogas collection and distribution and ground water researching.

Strengthen Financial Mechanisms

The strategic planning stage shall give due considerations to specific sources of funds for projects either in the form of discharge and connection tariffs, grant finance, loans from government and multilateral agencies, commercial bank loans, revolving

funds and other incomes including revenue from reuse of wastewater and beatification tax. Involvement of the private sector in the financing and provision o f sanitation services should be encouraged where this would result in a more efficient and cost - effective level of service to consumers.

At all stage of UWWM system layout, there should be a link between water supply and the provision of wastewater collection, treatment and re -use with emphasis to local participation, integration, realistic planning (tailor -made) having stepwise approach to technology and financing (starting at modest levels, expanding if and when more resources become available).

To overcome the burden of heavy head capital -intensive investments involving conventional and engineered solutions, project planning and implementation should go step-by-step.

Partnerships between public and private sectors are potentially useful tools to assist Regional states Bureaus in financing and operating infrastructure for wastewater management.

Financing and cost recovery shall be appraised through the business plan outc omes leading to financing of wastewater investments, and how much financing should be provided for implementing the planned project or program.

> Users should receive an adequate service sensitive to their ability to pay and to their contributions to pollution: principles such as "water user pays, polluter pays and catchment solidarity" are prerequisites for achieving sustainability

This urban WWM strategy ensures sustainable financial resources mobilization based on the following mechanisms and principles:

a) The provision of service should be on the payment basis, this must be based on the community income and the amount of waste water they discharge
b) Those towns who have better income must be geared towards to cost recovery for both investment and operation and maintenance costs whereas allowing partial subsidy arrangements for emerging small towns; this approach shall be identified and needs specific study according to the capacity and infrastructure requirement of the towns to decide the tool or criteria for separating the financing/cost recovery mechanisms. The ministry will prepare the manuals to identify the cost recovery mechanisms.
c) tasks that are executed for waste water management should be with minimum cost and quality
d) By installing institutional system, law and regulation money could be collected through punishment and other. The collected money will be used for development of the sector.

e) Mainstreaming the sector with water supply service provision and tourism
f) By promoting those activities conducted under Climate resilient green economy and other related strategy's, funds can be collected from different international monitory organizations.

Establishing Monitoring System

The Ministry set parameters that, planning and operational monitoring should reflect the effectiveness of each control measure, provide a timely indication of performance, and be readily measured and provide opportunity for an appropriate response. Some of the basic monitoring guides but not limited to are:

a) Ensure qualified expertise are assigned;
b) Ensure utilities have established management information system for reliable and periodic reporting;
c) Develop comprehensive tool to asset management for wastewater utilities in an easy-to-use, no-cost package;
d) Establish controlling tools for pollutants and effluents
e) Conduct review mission involving major stakeholders;
f) Supervision tools such as a manuals and guidelines, and standards are practiced;
g) Work in coordination with sector Ministries to provide financial and technical assistance to small and rural communities to establish and improve wastewater treatment services, lower the risk of harm to public health, and protect the environment

8.STAKEHOLDER ROLES & RESPONSIBILITIES

There are a number of stakeholders with direct and indirect roles and responsibilities in urban wastewater management. Whilst not all encompassing, major stakeholders are listed and described below:

8.1.Ministry of water, Irrigation and Electricity

The Ministry of Water Irrigation And Electricity shall take the lead and:

a. Develop policies, regulations and strategy in related with wastewater management.
b. Plan and conduct Capacity building and cascading the training package to different stakeholders.
c. Arrange a joint review meeting and workshops at national and international level on wastewater management.
d. Involve in prioritization of towns utilities on development.
e. Establish Monitoring system linking the ministry, regions and towns/cities
f. Take the lead in Coordination of planning, implementation and M&E in UWWM system.
g. Take the initiative and Design programs/projects for pulling funds (resources).
h. Technical support on the operation of UWWM.
i. Develop Networking and partnership with private-public, donors and other stakeholders.
j. Promote new research output and support innovative ideas on efficient low energy technologies for waste water management.

8.2.Water utilities for secondary cities

For most utilities, the mandate of wastewater management is incorporated within proclamation of the water and sewerage service enterprise establishment, in practice water utilities share the responsibility with the municipalities of cities such as Gondar, Bahirdar, Jimma, Adama and Mekelle. However, Hawassa and Harare water Utilities still stick to the mandate stated in the proclamation and so continued to deliver the service with the equipment's and manpower they have at hand. Approving the design of domestic wastewater treatment systems via the Certificate of Approval process; Promoting provision of sewerage to not served areas; and

8.3.Ministry of health

The health sector has an important role to play in promoting sanitation. Creating demand and changing behaviors' are both areas where the health sector has a strong track record and rec ognized comparative advantage. However, there is a lack of consensus regarding institutional roles and responsibilities for sanitation in the countries, and the degree of health sector involvement in promoting safe sanitation varies significantly in urban areas. Improved collaboration between water and health

sectors is key to improving sanitation-related health outcomes. It shows that health systems have a critical role to play in promoting sanitation but that existing health sector involvement is frequently. It makes a series of recommendations for health sector stakeholders interested in accelerating progress on sanitation and securing related health gains.

8.4. Ministry of Urban Development and Housing

Develop policies, regulations and strategy in related with waste management, Ensures safe collection and disposal of waste through urban development bureaus, offices, municipalities and enterprises, Responsible to address development of the town, look on the financial allocation and utilization, and Coordinate the activities of various sector units under the town administration. Control and check the implementation of regulation of unhygienic condition of the service-giving sectors, prepare house building permits that includes the latrine/septic tank construction plans and standards. Support capacity building at the municipal and regional level;

8.5. Environmental Protection Authority

The Environment Protection Authority (EPA) is responsible for the protection of the own/City Administrative environment. The EPA's responsibilities for the management of domestic wastewater include:

a) Administration of the Environment Protection Act 1970;
b) Referral Agency (in the case of an application for offsite discharge);
c) Development of guidance documents providing information on specific aspects of best practice in relation to onsite wastewater treatment;
d) Declaration of State Environment Protection Policies (SEPP's) that set environmental objectives to be achieved;
e) Establishing standards for discharge to surface water and off-site;
f) Approval and regulation of systems discharging more than 5,000 liters per day .

8.6. City Administrations Water Utilities

The metropolitan city of Addis Ababa has well-structured wastewater management system in place. The staffing within the institution has equipped with better working environment any other secondary cities.

In Dire Dawa city Administration the WSS service enterprise has established the structure of wastewater management institution but the limited staffing capacity made the institution provide very limited service compared to the existing city generation demanded.

8.7.Municipalities/City Administrations

The role of the municipality/city administrations shall have a responsibili ty of:

a) A planning and implementing lead partner and where appropriate owner of the management;
b) Involve in providing budget for development of sanitation chain development and monitoring the operation
c) Management of bulk waste water disposal as well as regu lation of effluent disposed by providing trucks and disposal places to sustain urban sanitation.
d) Approving the design and type of septic tank systems which can be installed for the issue of a permit to install a septic tank system;
e) The publication and updating of the septic tank code of practice;
f) Monitor and conduct energy audit of the uwws management authority's mode of energy use from design to day to day operation identified opportunities for significant energy savings by looking at power intensive unit processes such as influent pumping, aeration, ultraviolet disinfection, and solids handling.
g) To ensure operation Authorities have continue:
    i. Complying with regulatory requirements to meet cu stomer, public health, and ecological demands
    ii. Providing reliable service at reasonable and predictable rates
    iii. Balancing repair and replacement needs with long-term debt, equipment condition, ongoing operations and maintenance costs, and revenue
    iv. Optimizing operations and maintenance to reduce costs and ensure longevity of assets.

The Municipality (or kebeles administration in smaller settlements) should be the key responsible institution for public sanitation facilities such as public latrines. These Municipalities should receive support from sectorial ministries such as the Ministry of Infrastructure and Urban Development and the Ministry of Health (for health aspects only)

8.8.Supporting efforts (Partnership)

There is no such recognized and formulated initiative to coordinate and network the issue of wastewater at the National and different implementer's level.

Establish a Global Partnership on Wastewater Management (GPWWM) to promote with partners a network of experts, institutions and Governments, incl uding from the private sector, along with supportive online information to facilitate the sharing of lessons learned, good practices and available and acceptable technologies between Governments and other stakeholders in relation to improved wastewater management.

9.STRATEGY DIRECTION

9.1 Core Directions

The Ministry, taking into accounts the current enabling environment, the institutional framework, waste water management practice, roles and responsibilities of UWWM stakeholders has framed the following core strategic direction to achieve the goals sated.

1) **Develop Legislative and Regulatory** Frameworks, Harmonized and Communicated. All laws and regulations related to wastewater based on gap analysis and regulations related to health and environmental protection should be harmonized and practiced.
2) **Conduct base line survey** to have adequate base line information for full cycle of sanitation chain from collection to disposal/ treatment for wastewater current status benchmarking and analyzing future performance.
3) **Conduct feasibility study of towns'** waste system for selection of appropriate wastewater management system.
4) **Develop master plans** of wastewater management systems for the major Cities and towns.
5) **Develop guidelines and standards** for the selection of wastewater development systems and implementation strategies which could facilitate decision-making.
6) **Establish a transparent and equitable** liquid waste tariff (connection/removal) and subsidy system which leads to cost recovery.
7) **Sensitize user payment obligation** for sustainable management. In different categories domestics on water bills (such as Lehulu system) and institutions and industries with separate modalities. In addition Illegal disposal and connection should have payment guidelines.
8) **Study possible wastewater management** technologies for every source of wastes to enable mass take up of sanitation improvement relating to the size of the area, topography, affordability and infrastructure available.
9) **Capacity building** of the institution with skilled manpower and facilities. For organized management staffs must be adequate and with the right combination of levels of expertise.
10) **Build community awareness** and Stimulate behavioral change on waste water management for participatory and safe sanitation practices.
11) **Improve sector monitoring**, evaluation, knowledge management and advoca cy on waste management practices.
12) **Develop wastewater management business** models for sustaining the system.
13) **Sustain financial and implementation mechanism** of wastewater development systems.

14) **Rehabilitate and expand** the existing **infrastructure** for efficient and proper uses.
15) **Experience sharing and adaptation** of technology of urban sanitation proper mechanism from different countries which pass the challenges of waste management for facilitating the development.
16) **Promote innovative mechanisms and research** from different level of application from national and international practices (fecal sludge managements, business models, affordable recycling technologies and technical skills).
17) **Technical Guidelines**: Develop technical guidelines for proper (appropriate practice) operations and maintenance of urban wastewater systems, including: The preparation of standard design guidelines for wastewater facilities; Materials use guidelines, technical standards, codes of practice, standard model designs and drawings and project management guidelines.
18) **Public-private partnership:** Encourage public-private partnership with regards tooperation and maintenance, investment on wastewater management design, build, operate and transfer modality, design and construction for small , medium and large scale wastewater management system at all chains of sanitation.
19) **Clustering of larger** cities**/towns with/and adjoining small towns** To ensure the benefits that can be accrued from economy of scale and sharing human and physical resources the application of **clustering of larger cities/towns with neighboring small towns** for wastewater management shall be put into effect in the areas of engineering, procurement, billing , laboratory services, training, human resources, project preparation, etc. This will result in better cost recovery, ability to get project funding, improved contract and KPI compliance, better UWWM practices, improved quality control, higher skills, bette r stores accountability, improved billing and revenue collection, better towns data storage, proper reporting, monitoring, etc.

9.2 Cities and Towns Development Category

There is different size of cities/towns existing in the country which needs different technical and technology options under different social, economic and environmental conditions. Within the town of similar size needs criteria to give priority depend on environmental factor like water supply service coverage, density of residential areas , permeability of sub-soil, pollution prone wastewaters sources and towns economic standard.

CSA in line with the MoUHD requirements categorized city and towns in to five divisions based on current population size: I) >1million; II) 100,000-1million; III) 50,000-100,000, IV) 20000-50000 and V) <20, 0000.

This Strategy taking into account the above national categorization has sorted out the city and towns into small, medium & large and Mega groups.

1) Small (category V) towns: basically uses pit latrines or on site sanitation facilities with progressive development to manage wastewater with low cost technology and disposal system.
   a. Assess their demand according to the town development status to develop appropriate sanitation chain.
   b. Introduce basic wastewater management systems to dispose safely
   c. Introduce low cost business models for waste management
   d. Disposal regulation manuals and guide lines should be in place
   e. Connect to neighboring large towns for vacuum truck service or introduce a separate small size vacuum truck (500-5000 lit)
2) Medium and large(category IV &III respectively) towns: when housing density, institutions and public service provider's increases pit latrines are no longer feasible, it needs to look for appropriate sludge disposal mechanism.
   a. Based on the demand, economic and development standards feasibility studies should be conducted for development of centralized and decentralized wastewater management system
   b. Town administration and municipalities shall introduce containment infrastructure (septic tank, cesspool, and improved sanitary facility)
   c. Effluent and system management manuals and guideline should be in place.
3) Mega (Secondary Category II and Metropolitan Category I) cities: Here a complete package of wastewater management system shall be in accordance with the direction of master plan. When there exists low income area section on -site sanitation shall be introduced, for industries and public services organization off -site sanitation should be considered.

10.MOVING AHEAD IN THE SHORT TERM

The Ministry (MoWIE), as indicated in its GTP II plan will move ahead to develop a)detail design and construction of sewage system for towns with category I &II;b)prepare feasibility study for Category II and;(c)capacity building and structure development for category IV and V within the utilities to manage wastewater.

The sector in line with other stakeholders shall continue to:

10.1.Institutional arrangement

a) Build **strong institutional arrangement** at the Ministry, Regional Bureau and towns/city level
b) Establish a Wastewater Management Directorate the MOWIE level for effective coordination and administration of the urban wastewater management system;
c) This strategy and the MoH strategy for integrated Urban Sanitation and Hygiene (IUSHS) will continue to complement each other to serve the urban towns and cities for a full scale implementation of sanitation and hygiene practices.

10.2.Political commitment

A political climate has to be created in which **high priority** is assigned to all the aspects of sustainable urban wastewater management, including the allocation of sufficient domestic resources and community mobilization.

10.3.Enabling environment

Ministry should **create the policy, legal, regulatory, institutional and financial frameworks** to support the delivery of services at all level in a transparent, participatory and decentralized manner.

10.4.Planning

a) Immediately **detailed action plan** in conformity with the direction set in objectives and goals of the GTP II for water sector.
b) In order to achieve the wastewater management strategy, take the lead in planning and developing wastewater management **master plan** with current situation of the country
c) Incorporating sustainability considerations into water and wastewater utility planning can produce substantial benefits;
d) With step by step approach all regional towns should be working strongly to come to the modern wastewater management system from vacuum track with dry bed management to sewer system;
e) The UWWM strategic action plan which looks into the planning, implementation, monitoring and evaluation of activities shall be in conformity with the IUSHS

10.5. Finance

a) work strongly in **securing finance** in the form of loan and grants from different banks and financing institution to support the current and future wastewater management projects and programs;
b) where Loans are part are of specific fund, cities and towns shall contribute portion of the project cost as matching fund through their annual capital budget fiscal plan,
c) Manual and guidelines shall be prepared and distributed to help select eligible cities and towns for immediate loan and grant funds support.

10.6. Standard guideline and regulation

a) support in **developing guideline and design manual** to Promote and encourage the contribution of private and public service delivery in replicable wastewater management technology
b) Developed standards needs to be **enforced by laws** and regulation

10.7. Capacity building and support

Continue **providing support** the utilities to:

1) Reduce lifecycle costs by operating more efficiently, pursuing cost -effective investment strategies and optimizing investment choices.
2) Optimize social, environmental, and economic benefits by selecting projects through a systematic process of setting sustainability goals and objectives that also support community priorities.
3) Increase community support through upfront dialogue with urban community members and active consideration of other community priorities as alternatives are considered.
4) Balance assessment of a range of traditional and non-traditional infrastructure alternatives using consistent criteria.
5) Increase fiscal sustainability by analyzing the full lifecycle costs of investments, developing low cost financing strategies, and ensuring that revenue needs are accurately assessed to support maintenance, renewal, and replacement of infrastructure while meeting all regulatory requir ements.
6) Provide sustainability benefits information for making replicable, consistent, and transparent decisions and for explaining decisions to board members, local elected officials, the public, and others.
7) Increase customer support through clear rate expectations"), increased system reliability, and increased responsiveness when disruptions occur.
8) Enhance the technical, financial, and managerial capacity of the utility.

REFERENCES

1) IELRC. 2011. Odisha Urban Sanitation Strategy. International Environm ental Law Research Centre.
2) Ministry of Health Policy 1993; Addis Ababa, Ethiopia: The Federal Democratic Republic of Ethiopia Ministry of Health.
3) Ministry of Health (2011 – 2015); National Sanitation and Hygiene Strategic Action plan Addis Ababa, Ethiopia: The Federal Democratic Republic of Ethiopia Ministry of Healthy.
4) Ministry of Environmental protection and Forestry (Environmental Policy); Proclamation 300/2002, Environmental Pollution Control; Addis Ababa, Ethiopia: The Federal Democratic Republic of E thiopia Ministry of Environmental protection and Forestry.
5) Ministry of Water, Irrigation and Energy Water Supply and sanitation policy 2001;
6) Ministry of Water Resource 2001; water sector strategy Addis Ababa, Ethiopia: The Federal Democratic Republic of E thiopia Ministry of Water Resources.
7) Ministry of Water and Energy 2011. Urban Sanitation Universal Access Plan part IV. Addis Ababa, Ethiopia: Ministry of Water and Energy
8) Strengthening Ethiopia's Urban Health Program (SEUHP) 2014; Draft Situational Analysis of Urban Sanitation and Waste Management:
9) DHV consultants BV 2002: National water supply and sanitation master plan. Addis Ababa, Ethiopia: The Federal Democratic Repu blic of Ethiopia Ministry of Water Resources.
10) UNEP/WHO/HABITAT/WSSCC 2004: guidelines on municipal wastewater management
11) CREW/UNEP/IDB/GEF:2010:International Best Practice – International Overview of Best Practices in Wastewater Management
12) Constitution of Ethiopia1994 : constitution of the federal democratic republic of Ethiopia

GLOSSARIES / DEFINITIONS

Combined Sewer Syster	A sewer system that carries wastewater and storm water in the same conduit;
Combined Sewer Overflov	Discharge of a mixture of storm water and domestic waste when the flow capacity of a sewer system is exceeded during rainstorms;
Domestic Wastewater:	Wastewater principally derived from households, business buildings, institutions, etc., which may or may not contain surface runoff, groundwater or storm water;
Dry Latrine	The term is used to describe both: Latrines from which water and urine are excluded in order to increase the rate at which excreta decomposes; Effluent: waste water, gas or other fluid, treated or untreated, discharged directly or indirectly into the environment;
Goals	Broad, qualitative statements of what the MoWIE hopes to achieve.
Groundwater:	Subsurface water in a saturation zone or aquifer that can be extracted through a well;
Hazardous Waste:	any unwanted material that is believed to be deleterious to human safety or health or the environment;
Industrial Wastewater:	Waste water that results from industrial processes and manufacturing. It may either be disposed of separately or become part of the sanitary or combined wastewater;
Latrine:	An installation used for defecation and urination.
Liquid wastes	The liquid part of the waste material. It includes effluents of industries, fertilizer and pesticide solutions from agricultural fields, leachate from landfills, urban runoff of untreated waste water and garbage, mining wastes etc.
Municipal Wastewate r:	A mixture of domestic wastewater, effluents from commercial and industrial establishments, urban runoff and effluent which originates from any other source and is discharged into a municipal wastewater system;
Off-Site Sanitation:	Normally a water based sewerage system, where the effluent is removed from the site by a

	conventional sewer network, to a place where it can be safely treated.
On-Site Sanitation:	On-Site Sanitation: A sanitation system that is contained within a householder‘s plot occupied by the dwelling and its immediate surroundings;
Pit Latrine:	Latrine with a pit for the accumulation and decomposition of excreta and from which liquid infiltrates into the surrounding soil;
Pour Flush Latrine:	A latrine that depends on small quantities of water poured to flush feces away from the point of defecation. The term is normally used for a latrine incorporating a water seal;
Primary Treatment:	The first stage of contaminant removal in a wastewater treatment plant through screening and settling processes, which can remove 40-50% of contaminants;
Sanitation:	Control of physical factors in the human environment that could harm development, health, or survival; The study a nd use of practical measures for the preservation of public health;
Secondary Treatment:	Second stage of wastewater treatment to reduce suspended solids through biological cleansing, to remove between 85 -95% of contaminants;
Separate Sewer System:	Sewer system having distinct drain pipes for collecting superficial water and separate sewers for wastewater;
Septic Tank:	A tank or container, normally with one inlet and one outlet, which retains wastewater and reduces its strength by settlement and anaerobic digestion of excreta;
Sewage	General name given to the mixture of water and excreta (urine and feces), although more technically it should be referred to as black water.
Sewerage	All the components of a system used for collecting, transporting and treating sewage (including pipes, pumps, tanks, etc.)
Sludge	The thick, viscous layer of materials that settles

	to the bottom of septic tanks, ponds, and other sewage systems. Sludge is comprised mostly of organics, but also sand, grit, metals, and various chemical compounds.
Storm water	Water that originates from rainfall and either soaks into the land surface or results in surface runoff.
Sullage	Is the wastewater that arises from domestic activities such as washing in bathrooms and kitchens, including water from food preparation and dishwashing; it does not contain human excreta.
Wastewater Disposal:	WASTEWATER: Sewage or water carrying wastes from homes, businesses and industries that is a mixture of water and dissolved or suspended solids; Collection and removal of wastewater deriving from industrial and urban settlements by means of a system of pipes and treatment plants;
Wastewater Management:	All of the institutional, financial, technical, legislative, participatory, and managerial aspects related to the problem of waste