SSIGL 25

NATIONAL GUIDELINES

For Small Scale Irrigation Development in Ethiopia

Environmental & Social Impact Assessment



November 2018

Addis Ababa

MINISTRY OF AGRICULTURE

National Guidelines for Small Scale Irrigation Development in Ethiopia

SSIGL 25: Environmental & Social Impact Assessment

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First Edition 2018

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Financed by Agricultural Growth Program (AGP)

DISCLAIMER

Ministry of Agriculture through the Consultant and core reviewers from all relevant stakeholders included the information to provide the contemporary approach about the subject matter. The information contained in the guidelines is obtained from sources believed tested and reliable and are augmented based on practical experiences. While it is believed that the guideline is enriched with professional advice, for it to be successful, needs services of competent professionals from all respective disciplines. It is believed, the guidelines presented herein are sound and to the expected standard. However, we hereby disclaim any liability, loss or risk taken by individuals, groups, or organization who does not act on the information contained herein as appropriate to the specific SSI site condition.

FORWARD

Ministry of Agriculture, based on the national strategic directions is striving to meet its commitments in which modernizing agriculture is on top of its highest priorities to sustain the rapid, broad-based and fair economic growth and development of the country. To date, major efforts have been made to remodel several important strategies and national guidelines by its major programs and projects.

While efforts have been made to create access to irrigation water and promoting sustainable irrigation development, several barriers are still hindering the implementation process and the performance of the schemes. The major technical constrains starts from poor planning and identification, study, design, construction, operation, and maintenance. One of the main reasons behind this outstanding challenge, in addition to the capacity limitations, is that SSIPs have been studied and designed using many ad-hoc procedures and technical guidelines developed by various local and international institutions.

Despite having several guidelines and manuals developed by different entities such as MoA (IDD)-1986, ESRDF-1997, MoWIE-2002 and JICA/OIDA-2014, still the irrigation professionals follow their own public sources and expertise to fill some important gaps. A number of disparities, constraints and outstanding issues in the study and design procedures, criteria and assumptions have been causing huge variations in all vital aspects of SSI study, design and implementation from region to region and among professionals within the same region and institutions due mainly to the lack of agreed standard technical guidelines. Hence, the SSI Directorate with AGP financial support, led by Generation consultant (GIRDC) and with active involvement of national and regional stakeholders and international development partners, these new and comprehensive national guidelines have been developed.

The SSID guidelines have been developed by addressing all key features in a comprehensive and participatory manner at all levels. The guidelines are believed to be responsive to the prevalent study and design contentious issues; and efforts have been made to make the guidelines simple, flexible and adaptable to almost all regional contexts including concerned partner institution interests. The outlines of the guidelines cover all aspects of irrigation development including project initiation, planning, organizations, site identification and prioritization, feasibility studies and detail designs, contract administration and management, scheme operation, maintenance and management.

Enforceability, standardization, social and environmental safeguard mechanisms are well mainstreamed in the guidelines, hence they shall be used as a guiding framework for engineers and other experts engaged in all SSI development phases. The views and actual procedures of all relevant diverse government bodies, research and higher learning institutions, private companies and development partners has been immensely and thoroughly considered to ensure that all stakeholders are aligned and can work together towards a common goal. Appropriately, the guidelines will be familiarized to the entire stakeholders working in the irrigation development. Besides, significant number of experts in the corresponding subject matter will be effectively trained nationwide; and the guidelines will be tested practically on actual new and developing projects for due consideration of possible improvement. Hence, hereinafter, all involved stakeholders including government & non-governmental organizations, development partners, enterprises, institutions, consultants and individuals in Ethiopia have to adhere to these comprehensive national guidelines in all cases and at all level whilst if any overlooked components are found, it should be documented and communicated to MOA to bring them up-to-date.

Therefore, I congratulate all parties involved in the success of this effort, and urge partners and stakeholders to show a similar level of engagement in the implementation and stick to the guidelines over the coming years.

H.E. Dr. Kaba Urgessa
State Minister, Ministry of Agriculture

SMALL SCALE IRRIGATION DEVELOPMENT VISION

Transforming agricultural production from its dependence on rain-fed practices by creating reliable irrigation system in which smallholder farmers have access to at least one option of water source to increase production and productivity as well as enhance resilience to climate change and thereby ensure food security, maintain increasing income and sustain economic growth.

ACKNOWLEDGEMENTS

The preparation of SSIGLs required extensive inputs from all stakeholders and development partners. Accordingly many professionals from government and development partners have contributed to the realization of the guidelines. To this end MOA would like to extend sincere acknowledgement to all institutions and individuals who have been involved in the review of these SSIGLs for their comprehensive participation, invaluable inputs and encouragement to the completion of the guidelines. There are just too many collaborators involved to name exhaustively and congratulate individually, as many experts from Federal, regional states and development partners have been involved in one way or another in the preparation of the guidelines. The contribution of all of them who actively involved in the development of these SSIGLs is gratefully acknowledged. The Ministry believes that their contributions will be truly appreciated by the users for many years to come.

The Ministry would like to extend its appreciation and gratitude to the following contributors:

- Agriculture Growth Program (AGP) of the MoA for financing the development and publication of the guidelines.
- The National Agriculture Water Management Platform (NAWMP) for overseeing, guidance and playing key supervisory and quality control roles in the overall preparation process and for the devotion of its members in reviewing and providing invaluable technical inputs to enrich the guidelines.
- Federal Government and Regional States organizations and their staff for their untiring effort in reviewing the guidelines and providing constructive suggestions, recommendations and comments.
- National and international development partners for their unreserved efforts in reviewing the guidelines and providing constructive comments which invaluably improved the quality of the guidelines.
- Small-scale and Micro Irrigation Support Project (SMIS) and its team for making all efforts to have quality GLs developed as envisioned by the Ministry.

The MOA would also like to extend its high gratitude and sincere thanks to AGP's multi development partners including the International Development Association (IDA)/World Bank, the Canada Department of Foreign Affairs, Trade and Development (DFATD), the United States Agency for International Development (USAID), the Netherlands, the European Commission (EC), the Spanish Agency for International Development (AECID), the Global Agriculture and Food Security Program (GAFSP), the Italy International Development Cooperation, the Food and Agriculture Organization (FAO) and the United Nations Development Program (UNDP).

Moreover, the Ministry would like to express its gratitude to Generation Integrated Rural Development Consultant (GIRDC) and its staff whose determined efforts to the development of these SSIGLs have been invaluable. GIRDC and its team drafted and finalized all the contents of the SSIGLs as per stakeholder suggestions, recommendations and concerns. The MoA recognizes the patience, diligence, tireless, extensive and selfless dedication of the GIRDC and its staff who made this assignment possible.

Finally, we owe courtesy to all national and International source materials cited and referred but unintentionally not cited.

Ministry of Agriculture

DEDICATIONS

The National Guidelines for Small Scale Irrigation Development are dedicated to Ethiopian smallholder farmers, agro-pastoralists, pastoralists, to equip them with appropriate irrigation technology as we envision them empowered and transformed.

.

LIST OF GUIDELINES

(ESIA Report Cover Page)

FDRE _____OR _____National Regional State, _____ Zone,
_____ Wereda, _____ Office
Telephone: _____, Fax: _____
Email: _____
_____, Ethiopia

Feasibility Study and Detail Design of _____
SSIP Project

Environmental and Social Impact Assessment (ESIA)
VOLUME ___: _____

DRAFT/FINAL REPORT

(THE CONSULTANT):

_____
_____
TELE: _____, FAX: _____ EMAIL: _____
_____, ETHIOPIA

(SUBMITTED TO):

FDRE _____OR _____NATIONAL REGIONAL STATE; ENVIRONMENT, FOREST AND CLIMATE CHANGE AUTHORITY (EFCCA),
TELE: _____, FAX: _____ EMAIL: _____
_____, ETHIOPIA

_____ Month, _____Year
_____ (Place)

(ESIA Report Inner Page)

Write the client's full name:

Write the small scale irrigation project name:

Environmental and Social Impact Assessment
Draft Final/Draft Feasibility Study Report
(Naming of the report should indicate one of the above; draft, draft final, draft feasibility, etc.)

_____ Month, _____Year

ESIA Study Team
List down names of experts' and their assignments in the project study below. Use *optimized number of experts with skills to undertake one or more of the assignments* as the project is a small scale irrigation project expected to be undertaken in a small area with limited budget.

ESIA multi-disciplinary team
Note that ESIA study team is a group of professionals or multi-disciplinary team with qualified professionals with abilities and discipline required in undertaking the environmental and social impact assessment, ESIA, specified under the project Terms of References of the project. The team is expected to have, but not limited to, the following team of experts.

1. *Environmental expert – Team leader and compiling the ESIA report*
2. *Sociologist or socio-economist or gender expert- deals with social issues assessment,*
3. *Hydrologist or Geologist or Hydro-geologist- deals with the geological aspects of the project site and also addresses the hydro-geological characteristics of the area,*
4. *Agronomist or Soil expert – deals with crops, agrochemicals and crop diseases, etc.,*
5. *Watershed or Soil and water conservation expert or Natural resource expert – deals with the watershed land use land cover, degradation, soil erosion, natural resources, etc.,*
6. *Irrigation Engineer – deals with the whole irrigation infrastructure of the SSIP, etc.*

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ACRONYMS

ADLI	Agriculture Development Led Industrialization
AGP	Agricultural Growth Program
CBD	Convention on Biological Diversity
CPA	Cooperative Promotion Agency
EA	Environmental Assessment
EFY	Ethiopian Fiscal Year
EIA	Environmental Impact Assessment
EMA	Ethiopian Mapping Agency
EMP	Environmental Management Plan/ Environmental Monitoring Plan
EPA	Environmental Protection Authority
EPC	Environmental Protection Council
EPE	Environmental Policy of Ethiopia
ESIA	Environmental and Social Impact assessment
ESMP	Environmental and Social Management Plan
ETo	Reference Evapotranspiration
FAO	Food and Agriculture Organization
FDRE	Federal Democratic Republic of Ethiopia
FTC	Farmers Training Center
GDP	Growth Domestic Product
GOE	Government of Ethiopia
GPS	Global Positioning System
ha	Hectare
HH	Household
IBC	Institute of Biodiversity Conservation
IFAD	International Fund for Agricultural Development
NCS	National Conservation Strategy
NGO	Non-governmental Organization
NH3	Ammonia
NO2	Nitrite
NO3	Nitrate
PLC	Private Limited Company

Qt	Quintal
RAP	Resettlement Action Plan
SAR	Sodium Absorption Ratio
SSID	Small Scale Irrigation Development
SSIGL	Small Scale Irrigation Guideline
SSIP	Small Scale Irrigation Project
SSIS	Small Scale Irrigation Scheme
SWC	Soil and Water Conservation
TDS	Total Dissolved Solids
TOR	Terms of Reference
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
UTM	Universal Traverse Mercator
WHO	World Health Organization

PREFACE

While irrigation development is at the top of the government's priority agendas as it is key to boost production and improve food security as well as to provide inputs for industrial development. Accordingly, irrigated land in different scales has been aggressively expanding from time to time. To this end, to enhance quality delivery of small-scale irrigation development planning, implementation and management, it has been decided to develop standard SSI guidelines that must be nationally applied. In September 2017 the Ministry of Agriculture (MoA) had entrusted Generation Integrated Rural Development Consultant (GIRDC) to prepare the National Small-scale Irrigation Development Guidelines (SSIGLs).

Preparation of the SSIGLs for enhancing development of irrigated agriculture is recognized as one of the many core initiatives of the MoA to improve its delivery system and achieve the targets in irrigated agriculture and fulfill its mission for improving agricultural productivity and production. The core objective of developing SSIGLs is to summarize present thinking, knowledge and practices to enable irrigation practitioners to properly plan, implement and manage community managed SSI schemes to develop the full irrigation potential in a sustainable manner.

As the SSIGLs are prepared based on national and international knowledge, experiences and practices, and describe current and recommended practice and set out the national standard guides and procedures for SSI development, they serve as a source of information and provide guidance. Hence, it is believed that the SSIGLs will contribute to ensuring the quality and timely delivery, operation and maintenance of SSI schemes in the country. The SSIGLs attempt to explain and illustrate the important concepts, considerations and procedures in SSI planning, implementation and management; and shall be used as a guiding framework for professionals engaged in SSI development. Illustrative examples from within the country have been added to enable the users understand the contents, methodologies presented in the SSIGLs.

The intended audiences of the SSIGLs are government organizations, NGOs, CSOs and the private sector involved in SSI development. Professionally, the SSIGLs will be beneficial for experienced and junior planners, experts, contractors, consultants, suppliers, investors, operators and managers of SSI schemes. The SSIGLs will also serve as a useful reference for academia and researchers involved and interested in SSI development. The SSIGLs will guide to ensure that; planning, implementation and management of SSI projects is formalized and set procedures and processes to be followed. As the SSIGLs provide information and guides they must be always fully considered and applied by adapting them to the local specific requirements.

In cognizance with the need for quality SSIGLs, the MoA has duly considered quality assurance and control during preparation of the guidelines. Accordingly, the outlines, contents and scope of the SSIGLs were thoroughly discussed, reviewed and modified by NAWMP members (senior professionals from public, national and international stakeholder) with key stakeholders in many consultative meetings and workshops. Moreover, at each milestone of SSIGL preparation, resource persons from all stakeholders reviewed and confirmed that SSIGLs have met the demands and expectations of users.

Moreover, the Ministry has mobilized resource persons from key Federal, National Regional States level stakeholders and international development partners for review, validation and endorsement of the SSIGLs.

Several hundreds of experienced professionals (who are very qualified experts in their respective fields) from government institutions, relevant private sector and international development partners have significantly contributed to the preparation of the SSIGLs. They have been involved in all aspects of the development of SSIGLs throughout the preparation process. The preparation process included a number of consultation meetings and workshops: (i) workshop to review inception report, (ii) workshop on findings of review of existing guidelines/manuals and proposed contents of the SSIGLs, (iii) meetings to review zero draft SSI GLs, (iv) review workshop on draft SSI GLs, (v) small group review meetings on thematic areas, (vi) small group consultation meetings on its final presentation of contents and layout, (vii) consultation mini-workshops in the National States on semi-final versions of the SSIGLs, and (viii) final write-shop for the appraisal and approval of the final versions of SSIGLs.

The deliberations, concerns, suggestions and comments received from professionals have been duly considered and incorporated by the GIRD Consultant in the final SSIGLs.

There are 34 separate guidelines which are categorized into the following five parts concurrent to SSI development phases:

Part-I. Project Initiation, Planning and Organization Guideline which deals with key considerations and procedures on planning and organization of SSI development projects.

Part-II. Site Identification and Prioritization Guideline which treats physical potential identification and prioritization of investment projects. It presents SSI site selection process and prioritization criteria.

Part-III. Feasibility Study and Detail Design Guidelines for SSID dealing with feasibility study and design concepts, approaches, considerations, requirements and procedures in the study and design of SSI systems.

Part-IV. Contract Administration and Construction Management Guidelines for SSI development presents the considerations, requirements, and procedures involved in construction of works, construction supervision and contract administration.

Part-V. SSI Scheme Management, Operation and Maintenance Guidelines which covers SSI Scheme management and operation.

Moreover, Tools for Small Scale Irrigation development are also prepared as part of SSIGLs.

It is strongly believed and expected that; the SSIGLs will be quickly applied by all stakeholders involved in SSI development and others as appropriate following the dissemination and familiarization process of the guidelines in order to ensure efficient, productive and sustainable irrigation development.

The SSIGLs are envisioned to be updated by incorporating new technologies and experiences including research findings. Therefore, any suggestions, concerns, recommendations and comments on the SSIGLs are highly appreciated and welcome for future updates as per the attached format below. Furthermore, despite efforts in making all types of editorial works, there may still errors, which similarly shall be handled in future undated versions.

UPDATING AND REVISIONS OF GUIDELINES

The GLs are intended as an up-to-date or a live document enabling revisions, to be updated periodically to incorporate improvements, when and where necessary; may be due to evolving demands, technological changes and changing policies, and regulatory frameworks. Planning, study and design of SSI development interventions is a dynamic process. Advancements in these aspects are necessary to cope up with the changing environment and advancing techniques. Also, based on observation feedbacks and experiences gained during application and implementation of the guidelines, there might be a need to update the requirements, provisions and procedures, as appropriate. Besides, day-by-day, water is becoming more and more valuable. Hence, for efficient water development, utilization and management will have to be designed, planned and constructed with a new set up of mind to keep pace with the changing needs of the time. It may, therefore, be necessary to take up the work of further revision of these GLs.

This current version of the GLs has particular reference to the prevailing conditions in Ethiopia and reflects the experience gained through activities within the sub-sector during subsequent years. This is the first version of the SSI development GLs. This version shall be used as a starting point for future update, revision and improvement. Future updating and revisions to the GLs are anticipated as part of the process of strengthening the standards for planning, study, design, construction, operation and management SSI development in the country.

Completion of the review and updating of the GLs shall be undertaken in close consultation with the federal and regional irrigation institutions and other stakeholders in the irrigation sub-sector including the contracting and consulting industry.

In summary, significant changes to criteria, procedures or any other relevant issues related to technological changes, new policies or revised laws should be incorporated into the GLs from their date of effectiveness. Other minor changes that will not significantly affect the whole nature of the GLs may be accumulated and made periodically. When changes are made and approved, new page(s) incorporating the revision, together with the revision date, will be issued and inserted into the relevant GL section.

All suggestions to improve the GLs should be made in accordance with the following procedures:

I. Users of the GLs must register on the MOA website: Website: www.moa.gov.et
II. Proposed changes should be outlined on the GLs Change Form and forwarded with a covering letter or email of its need and purpose to the Ministry.
III. Agreed changes will be approved by the Ministry on recommendation from the Small-scale Irrigation Directorate and/or other responsible government body.
IV. The release date of the new version will be notified to all registered users and authorities.

Users are kindly requested to present their concerns, suggestions, recommendations and comments for future updates including any omissions and/or obvious errors by completing the following revisions form and submitting it to the Ministry. The Ministry shall appraise such requests for revision and will determine if an update to the guide is justified and necessary; and when such updates will be published. Revisions may take the form of replacement or additional pages. Upon receipt, revision pages are to be incorporated in the GLs and all superseded pages removed.

Suggested Revisions Request Form (Official Letter or Email)

To: ----------
From: ----------
Date: ----------
Description of suggested updates/changes: Include GL code and title, section title and # (heading/subheading #), and page #.

GL Code and Title	Date	Sections/ Heading/Subheading/ Pages/Table/Figure	Explanation	Comments (proposed change)

Note that be specific and include suggested language if possible and include additional sheets for comments, reference materials, charts or graphics.

GLs Change Action

Suggested Change	Recommended Action	Authorized by	Date

Director for SSI Directorate**: _____Date: _____**

The following table helps to track initial issuance of the guidelines and subsequent Updates/Versions and Revisions (Registration of Amendments/Updates).

Revision Register

Version/Issue/Revision No	Reference/Revised Sections/Pages/topics	Description of revision (Comments)	Authorized by	Date

EXECUTIVE SUMMARY

General

An executive summary should provide a brief overview of the Environmental and Social Impact Assessment (ESIA) report in non-technical, simple language and in particular by highlighting the main findings and recommendations. It shall be with or without sub-headings. It is recommended to use main sub-headings of the ESIA report so that decision makers can easily understand the report in a very condensed manner rather than taking time to read the whole report. It helps them for deciding by reading the executive summary part of the report as it contains all essential sections in brief. Therefore try to include clear and brief report of each of the major sections of the ESIA study report.

Approach and Methodology

Write brief report of the general data collection methods, tools used for the assessment, consulted line institutions and project area community representative and others.

Objectives

The general and/or specific objectives of the project are written in brief without losing its standard (SMART) objective writing manner as presented in worked examples in the report.

Stakeholders Consultations

Include in brief:

- Number of consulted line sectors and project area and/or beneficiaries representatives participated in consultations.
- Identified consulted stakes views and consents and
- Present their recommendations for optimizing the project benefits and minimize or eliminate the project adverse possible impacts, etc.

Impacts

Positive Impacts

Describe briefly identified potential positive impacts of the project. Include number of expected project beneficiaries with their roles in food security enhancement and expected jobs creation opportunities, expected crop productivity, etc.

Adverse impacts

Describe and list down all identified potential possible adverse impacts of the project on the physical, biological and socio-economic environmental components of the project site and its surrounding areas which are under the direct and/or indirect impact zones of the project. The adverse impact can include impacts of the surrounding areas on the project, too.

Mitigation Measures

Describe recommended different remedial measures for minimizing and/or eliminating possible adverse impacts of the project. All the recommended measures shall be briefly described by avoiding redundancy here under the executive summary.

Environmental and Social Management and Monitoring Plans

The environmental and social management and monitoring plans focuses on follow up of the implementations of the recommended mitigation measures. Therefore, as you cannot describe all the recommended mitigation measures and the managing and monitoring parties, you describe the general ruling mitigation measures and management approaches. Be make sure that key roles, responsibilities and significant ruling mitigation measures should not be forgotten or left aside during the project design, construction and operation phases with accountability and institutional responsibilities.

Environmental and Social Budget

The executive summary section of the report is expected to contain environmental and social budget which is proposed for the implementation of the recommended environmental and social management and monitoring plans. Therefore, include the estimated budget for a year and for the first three to five years period of the small scale irrigation project in line with the Management Plan table.

Conclusions and Recommendations

As the small scale irrigation project issues goes with environmental and social aspects, conclusion on the balance between the adverse and beneficial impacts are expected. Therefore, come up with:

- Conclusions which clearly show the identified adverse impacts of the small scale irrigation project with the overall socio-economic benefits which the project beneficiaries, the area and the country as a whole gains.
- Environmental and social feasibilities of the project, and
- Recommendations on aspects with critical importance in fulfilling the project implementations.

1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE OF THE GUIDELINE

Irrigation development significantly contributes to poverty alleviation by enhancing food security. It improves beneficiaries' quality of life. On the other hand, irrigation activities can create potential environmental and social aspects such as depletion of water sources, soil erosion, runoff and leaching of chemicals, waterlogging and salinization (salt-buildup), increased incidences of waterborne and water related diseases, changes in the lifestyle of beneficiaries. As a result, irrigated agriculture should be given considerations so as to ensure economic, environmental and social sustainability of the proposed project area.

Environmental and Social Impact Assessment (ESIA) study deals with potential environmental and social aspects of project activities. It helps in managing unwise project activities and ensuring the project's economic feasibility, social acceptances and environmental sustainability of the planned development activities.

This *ESIA Procedural Guideline* is, therefore, a tool which assists environmental experts and expected multi-disciplinary team who undertakes ESIA study of the intended SSIP. The guideline is expected to contribute for the preparation of small scale irrigation project ESIA study report. The study has become an important environmental and social management tools with a ***purpose*** of giving decisions on *ecological, social, economic and technical impacts* of projects since 1960s. ESIA considers interactions between project activities and their environmental settings.

The ESIA study should pass through *pre-screening stage* where the promoter, respective environmental agency and sector office of the project area shall be contacted and hold consultation on how best to proceed with the ESIA study. Pre-screening saves time and fosters mutual understanding about the ESIA requirements (EPA, 2003). Based on its necessities (EPA, 2003), under this stage, the environmental expert and his/her multi-disciplinary ESIA study team should contact and hold consultations with project area key stakeholders (woreda or zone or regional environmental protection offices and other sectors) regarding the project and its ESIA study necessities and how to proceed the project study. The team should discuss on important issues which should be considered at the *pre-screening stage* of the project and create mutual understanding about the ESIA requirements with the stakeholders.

In writing the *background of the ESIA report*, the ESIA study team is expected to address the general aspects of the intended irrigation projects and expected benefits of small scale irrigation project (SSIP), the processes or stages s passed in deciding the ESIA study. Possible environmental and social adverse impacts related to unwise natural resource uses and other inputs uses and planned and target beneficiaries of the project shall be described. The background of the ESIA should address donor agencies agreement and their prerequisites with regard to ESIA study and development plan. It is also expected to address the government development goal and environmental and social requisites. Expectation from the ESIA as decision tool in harmonizing possible adverse impacts of the SSIP activities are also addressed in the background section. The study is expected to pass through **pre-screening**, **screening** and **scoping** stages.

2 OBJECTIVES AND METHDOLOGY OF ESIA STUDY

2.1 GENERAL OBJECTIVES OF ESIA

The general objective of _____(project name) Small Scale Irrigation Project (SSIP) ESIA study is to ensure environmental and social sustainability of the project area through eliminating or minimizing possible negative impacts of the project activities by using appropriate mitigation measures in the project design, construction and operation phases.

Worked example for a Typical SSIP

General objective

The general objective of a Typical Small Scale Irrigation Project ESIA study is to ensure environmental and social sustainability of the project area through eliminating or minimizing possible negative impacts of the project activities by using appropriate mitigation measures in the project design, construction and operation phases.

2.2 SPECIFIC OBJECTIVES

The specific objectives of a project shall address outcome of each specific activity to be undertaken in the ESIA study to reach at the project harmonized end results. For better understanding, see the following worked example and write as brief as possible in the SSIP environmental Impact Statement reports.

(Specific Objectives worked example)

The *specific objectives* of _____ (project name) small-scale irrigation project ESIA study are to:

- undertake the ESIA study in line with existing environmental policy, legislations and institutional frameworks of the country and funding agency (if any),
- identify & describe baseline physical, biological and socio-economic environmental conditions of the project command areas,
- identify and describe project alternatives for major activities including design, technology, construction techniques, operation and maintenance alternatives, etc.
- identify potential beneficial and adverse environmental and social impacts of the project activities during project design, construction and operation phases;
- recommend appropriate mitigation measures for the identified possible potential adverse environmental and social impacts of the SSIP activities on the physical, biological and socio-economic environments of the project area;
- identify and indicate different impacts significances evaluations,
- describe appropriate environmental and social management and monitoring plans,
- describe project reporting, and
- indicate appropriate project budget estimates for the implementations of the recommended mitigation measures, capacity building and others.

2.3 APPROACH AND METHODOLOGY

The overall approaches and methodologies used in carrying out the ESIA study is based on project TOR (Appendix-VI.10), the ESIA guideline of the country and the funding agency requirements. Generally, the approach and methodology of Environmental and Social Impact Assessment should include review of relevant and other documents, secondary data and information collection, possible primary data and information collection, c*ompiling* collected primary and secondary data, data analysis and use in report writing as briefly described below.

2.3.1 Review of other relevant documents

In addition to the country's strategies, policies, rules and regulations, and also the donating country or countries funding policy, the ESIA study team is expected to review:

- relevant documents pertinent to environmental protection activities,
- line sector development plan, and
- relevant academic literatures of the country or elsewhere, etc., as much as possible.

Finally, *compile brief of the review result of all sources and use* under this sub heading of the environmental and social assessment (ESIA) report.

2.3.2 Secondary data collection

Possible secondary data and information sources in the ESIA study are (data collection tools area annexed):

- Government organizations including the following Federal, regional, zone and woreda line sectors of the Ministry of Environment, Forest and Climate Change; Ministry of Water and Energy; Ministry of Agriculture and Natural Resources; Ministry of Mines; Ministry of Health; Ministry of Education; Ministry of Cultural and Tourism; Ministry of Finance and Economic Development; Ministry of Women's Affairs; CSA, Ethiopian Meteorological Agency (EMA), Researches; Universities, Ministry of Livestock and Fishery, etc. (use Appendix-10 data collection tools applicable for each),
- Grass root level including Kebele Agricultural Office, Kebele Health Posts and other institutions working or residing in the kebele (use annexed kebele or the lowest administration level data collection tool);
- Non-governmental organizations (NGOs) involved in any development activities in the project influence area should be contacted and available data obtained. In addition, their opinion/attitude towards the proposed development scheme should be assessed and utilized in the ESIA study,
- Private Sectors,
- Relevant data generated and/or collected by other sectoral studies such as socio-economy, soils and land suitability, agronomy, hydrology and hydrogeology are also collect to supplement the environmental and social data and understand the project areas so as to render the impact assessment as comprehensive as possible.
- Websites for collecting information from internet searches, etc.

Therefore, collect secondary data from such sources using annexed data collection formats.

2.3.3 Primary data collection

The main possible primary data and information sources in the ESIA study include the following:

- Field observation, sampling and analysis: The most important source of primary data is field observation of the project impact zones. The required data can be obtained by observations, sample collection and analysis in laboratory; for example for water quality, collection of specimens of unidentified plant species for identification in herbarium, etc. In addition, the environmentalist must work closely with the socio-economist, agronomist, irrigation engineer, soil and watershed expert and hydrologist or in general with the team of experts. The field observation is expressed to give first-hand impression of the project command area and enable in collecting primary baseline data and identify potential environmental and social aspects related to the project.
- Command area slope classification using GPs: The SSIP command area shall be classified by slopes as less than 5%, 5-8%, 8-12%, 13-15%, 15-20%, 20-30%, 30-60%, >60%, etc. so as to recommend on command area soil and water conservation measures as briefly described under chapter4, section 5.5.
- Consultation of key stakeholders: Officials and professionals working for government organizations at different levels, NGOs and members of the local community or community representatives can be consulted in order to obtain relevant information of the project area (use Appendix- VI.XI and VI.XII). You are expected to have minute which shall be stamped and be annexed to the ESIA report).
- Community Representatives Consultation: Official meetings can be arranged at which different interested and affected parties are informed about the project and provide their views or attitude on the SSIP project. They can also provide relevant information of the project area. The participants can include representatives of woreda sector offices and administrations, kebele council and different community groups like elders, women, and youth, etc. representatives (use Appendix-VI.11 & VI.13). You are expected to have minute which shall be stamped and be annexed to the ESIA report).

2.3.4 Data analysis

- Collected data and information from all sources shall be compiled, evaluated and used in ESIA report preparation. Therefore, the environmental personnel and the ESIA study team members are expected to:
- Compile and analyse collected primary and secondary data in tabular, graphical and narration manner; and
- Based on analysis; identify, determine and predict the level of impact significances using impact significance matrix approach in appropriate tables indicated under each section of the report.

2.3.5 Report writing

The ESIA report shall contain all essential components with minimum headings and sub headings indicated below. The detail is presented in Appendix-10. Referring to the EIA Guideline (EPA, 2004) of the country and others, the ESIA report should contain the following outlines as much as possible.

- Cover Page
- Verso Page
- ESIA Study Team
- List of Appendices
- List of Tables
- List of Figures
- Acronyms
- Executive Summary,
- Introduction (Background, Description of the Proposed Actions, ESIA Purposes, Approach and Methodology of the Study, Etc.),
- Policy, Legal and Administrative Frameworks,
- Biophysical and Socio-economic Baseline Conditions,
- Project Description
- Alternative Analysis,
- Impacts Identification and Analysis,
- Mitigation and enhancement measures
- Public Participation Consultations,
- Environmental and Social Management and Monitoring/ Auditing Plan,
- Environmental and Social Reporting and Disclosure
- Environmental and Social Budget
- Conclusions and Recommendations
- Reference
- Annexes

3 SCREENING AND SCOPING

3.1 SCREENING

Following the pre-screening stage, project ***screening or preliminary assessment stage*** should be considered. Under this stage, the level of ESIA study is decided based on EIA guideline (EPA, 2000 and Nov., 2003) regarding the project Schedule of Activities. In addition to the project schedules, sensitivity of the project site shall be considered as is can also lead to detail ESIA study. At this stage, the environmental expert and his/her multi-disciplinary ESIA study team should identify the area of the proposed SSIP to decide whether it needs full ESIA or not as it states that based on project site sensitivity or the project size with surface water fed irrigation projects covering 100 ha (EPA, Nov., 2003) or more requires full ESIA study.

The team is expected to use *screening format* for collecting information regarding water source, location, project features (e.g. size of water regulation structure (dam/weir), storage capacity, catchment area etc.) as well as basic information of to be affected environment by the intended SSIP. A screening is done with the aim of establishing whether the project will:

- Promote or reduce access to economic and natural resources, such as land, pasture, water, public services;
- Result in resettlement of individuals or families;
- Require acquisition of land (public, temporary or permanent) for its development;
- Result in temporary or permanent loss of perennial or annual crops or fruit trees;
- Affect household infrastructure such as the main residence, outside toilets, granaries, kitchens;
- Affect commercial premises such as shops, coffee houses;
- Affect institutional premises such as churches, mosques or schools;
- Affect physical cultural resources;
- Affect vulnerable people (elderly, poor, orphans, women headed households, widows or physically challenged).

Project screening during project identification shall be made at two levels; kebele and Woreda levels using screening formats (Appendix-II). The screening result can be Full ESIA or ESMP, RAP or PMP (IPMP). Accordingly;

- If possible impacts of the proposed SSIP on the natural, man-made as well as human environment and of its relative significance are also identified for deciding the status of **ESIA study** of the project and pass on to impact scoping and the study continues based on study manual.
- If the project is upgrading, rehabilitation or expansions, the study only refers preparation of Environmental and Social Management Plan (**ESMP**). Here each possible potential adverse impact of the upgrading or rehabilitation or expansion activities shall be identified and potential mitigation measures are recommended. Environmental Management Plan prepared as per standard format shown in **Table 9.1** and worked examples presented in **Table 9.2.** For more detail refer to Environmental Management Plan preparation guideline.
- If the screening result indicates displacement of residences, or resources of individuals, **Resettlement Action Plan (RAP)** study recommended to be undertaken by social expert and prepare another study report different from the ESIA. For brief indication, the RAP study principles and main objectives are presented in Appendix-4, and
- If the screening result indicates needs for **Integrated Pest Management Program (IPMP)**, another separate report shall be prepared by crop protectionist. The report shall address issues indicated in Appendix-5, annexed in this procedural manual.

3.2 SCOPING

After the project screening, project ***scoping*** should be made. It is the process of determining most potential issues in an ESIA study by identifying most critical environmental and social issues of the project activities which contribute to, or cause impacts to environmental resources and social receptors. This stage helps in determining major issues to be considered for decision-making (EPA, 2000) and developing *terms of reference* for the ESIA study. The key ESIA scoping activities include:

- Identififcation and consideration of issues in project immediate upstream or watershed,
- Identifing critical issues with respect to environmental policy, legal and institutional frameworks,
- Describing the project in which the project components are described,
- Identifying essential environmental issues withregard to the physical, biological and socio-economic environmental conditions.
- Idnetify issues to be considered in downstream of the project command areas.
- Descibing and identifying lists of interested and affected parties.
- Identifying different alternatives such as without project, alternative design, alternative layout, alternative technologies, etc.
- Determining appropriate time and expertise required for the detail study,
- Preparing plan for the detail subsequent detail EIA study.
- Undertake series of consultation meetings with local government stakeholders and other parties to provide project information collect baseline data and understand key stakeholder concerns.
- Undertake desktop analyses which include reviews of pertinent environmental and social data collected from external sources and previous studies of the project area.
- Identifying stakeholders, undertaking stakeholder interviews, public meetings and inform them project and the process,
- Provide stakeholders with opportunity to identify any issues and concerns associated with the project;
- Identify areas of likely impact and environmental issues that may require detail investigation,
- Determine the need for specialist baseline and impact assessment studies in response to initial stakeholder input.

Details of scoping, methodology, activities and reporting is annexed (Appendix-III).

Generally, scoping is general guide as to what is to be done and extent of environmental and social considerations needed during the detail ESIA study. At minimum, the *ESIA study team* (use applicable annexed appendixes data collection tools) should:-

- Develop questionnaires and checklists based on the project area baseline conditions and existing study needs,
- Review background information of the proposed SSIP activities,
- Review legal requirements of the country and funding agency (if any),
- Review operational information,
- Conduct initial or preliminary project site observation and collect essential data,
- Identify stakeholders' and inform them the project and its general requisites,
- Provide stakeholders with the opportunity to identify any issues and concerns associated with the project,
- Identify areas of likely environmental and social issues that may require further investigations,
- Determine specialists and extent of impact assessment studies based on preliminary assessment and initial stakeholders inputs,

- Prepare *scoping report* based on collected data, field observation/s and decide for the detail ESIA study (EPA, Nov. 2003) by describing the project, identified or expected alternatives, issues raised during initial assessment of the project area (IAPs) and stakeholders' consultations, etc. The scoping report can be used in the form of TOR, as it is the bases for the detail ESIA study.

The ESIA study processes are expected to show essential steps and procedures to be followed in the detail ESIA studies. The ESIA procedural guideline also shows possible environmental and social effects of the SSIP activities before decisions are taken. The guideline is, therefore, expected to indicate possible mitigation measures for identified adverse impacts so as to reduce or eliminate expected adverse impacts and recommend environmental and social management and monitoring plans of small scale irrigation development activities. It is supplemented by worked examples which help in harmonizing project environmental and social adverse impacts.

4 POLICY, LEGAL, INSTITUTIONAL AND ADMINISTRATIVE FRAMEWORKS

Environmental and Social Impact Assessment (ESIA) is supported by policy, legal and institutional frameworks of the country. Besides, some funding organizations additionally have their own funding policies, standards, etc. as these rules and regulations govern the funding activities. Therefore, the small scale irrigation project activities shall be undertaken within these policies and legal frameworks of the country and funding agencies. Therefore, the environmental expert must review issues related to irrigation development activities and briefly describe the legal bound of environmental and social aspects as per legal issues. Few of each category is presented below. But the environmental personnel must review additional materials on which agreement has been made. For example, for World Bank funded projects, the World Bank guideline, for African Development, refer the Bank's guideline, etc. Few of them are presented below.

4.1 POLICY FRAMEWORKS

Among the policies, proclamations and institutional frameworks issued by the government of Ethiopia, review and incorporate into the ESIA report under the heading "policy, legal and institutional frameworks". The ones outlined below are very relevant and thus, should be reviewed by the environmental expert in order to be governed by and included in ESIA study report of the small scale Irrigation Project.

- The Constitution of Ethiopia adopted in August 1995;
- The Environmental Policy of Ethiopia issued in April 1997;
- Water Resources Policy, 1998;
- Irrigation Policy, 2003;
- The Agricultural Development Led Industrialization (ADLI) strategy, 1993;
- Natural Resource Conservation Strategy, (1997 EFY);
- Other Sectoral Policies including National Biodiversity Policy, National Policy on HIV/AIDS and Public Health Policies; etc.

In addition, the Operational Policies of donor countries should be reviewed and included based on agreement between the parties.

Worked Examples for a Typical SSIP

Environmental Policy of Ethiopia*: The Environmental Policy of Ethiopia (EPE, 1997) provides a number of guiding principles that require strong adherence to sustainable development. Article 3.1(s) of the policy indicates need for "undertaking full environmental, social and economic impact assessments of irrigation schemes, that needs establishing programs of correcting projects negative environmental, social and economic impacts". In the same way, Article 3.4 of the policy indicates that "control of environmental health hazards is a necessary condition in the design, construction and use of irrigation systems. Article 4.9 of the policy also indicates about directives on Environmental and Social Impact Assessment (ESIA). It states as, "to create by a law an ESIA process which requires appropriate environmental impact statements and environmental audits for private and state development projects".*

Worked Examples for a Typical SSIP

Water Resource Management Policy*: The overall goal of the Ethiopian Federal Water Resource Management Policy of the 1998 is "to enhance and promote all national efforts towards efficient and optimum utilization of water resources of the country for socio-economic development on sustainable bases". The policy addresses environmental conservation and protection as an integral part of water resources planning and project development. One of the five general policy objectives is stated as "conserving, protecting and enhancing water resources and the overall aquatic environment on sustainable basis".*

4.2 LEGAL FRAMEWORKS

Many legal frameworks are proclaimed based on the policy to guide development activities of the country. Among many, the environmental personnel and the ESIA study team must review the following legal frameworks to the minimum.

- Environmental Protection Organs Establishment Proclamation (Proc. No. 295/2002)
- Environmental Impact Assessment Proclamation (Proc. No. 299/2002)
- Environmental Pollution Control Proclamation (Proc. No. 300/2002)
- Conservation, Development and Utilisation of Forests (Proclamation, No. 94/1994)
- Rural Land Administration and Land Use Proclamation (Proc. No. 456/2005),
- Proclamation No. 455/2005 (Expropriation Landholdings for Public Purposes and Payment of Compensation);
- Regulation No. 135/2007 (Expropriation Landholdings for Public Purposes and Payment of Compensation);
- Ethiopian Water Resources Management Proclamation (Proc. No. 197/2000)
- Proclamation (s) establishing relevant Regional Environmental Agencies, etc.

Worked Examples for a Typical SSIP

- ***Environmental Protection Organs Establishment Proclamation****: The Environmental Protection Authority, EPA, was established with Proclamation No.9/1995 and re-proclaimed under Proclamation No.295/2002 as an autonomous public institution of the Federal Government of Ethiopia that is entrusted with the protection and conservation of natural resources of the country. The proclamations stipulate need to establish a system that enables to foster coordinated but differentiated responsibilities among environmental protection agencies at Federal and Regional levels.*

- ***Environmental Impact Assessment Proclamation****: EPA Proclamation No. 299/2002 has made "Environmental Impact Assessment" to be a mandatory legal prerequisite for the implementation of major development projects, programs and plans. This proclamation is a proactive tool and a backbone to harmonize and integrate environmental, economic and social considerations into decision making process in a manner that promotes sustainable development of the country.*

- ***Environmental Pollution Control Proclamation****: Environmental Pollution Control Proclamation No.300/2002 is promulgated with a view to eliminate or, when not possible, mitigate pollution as an undesirable consequence of social and economic development activities. This proclamation is one of the basic legal documents to effective Environmental Assessment undertakings.*

4.3 INSTITUTIONAL FRAMEWORKS

The Proclamation for the Establishment of Environmental Protection Organs, No. 295/2002, issued a series of institutional mandates that extend powers and duties of the Federal Environmental Protection Authority (EPA) (currently, the Ministry of Forest, Environmental and Climate Change(Proclamation no.803/2005 EFY) and the Environmental Protection Council (EPC) beyond those defined in the enabling legislation down to lower administrative levels; at National level (Environmental Protection Council, Environmental Protection Authority and Inter-ministerial Commissions coordinating mechanisms), at Regional, Zone and Woreda Environmental Protection Agencies. Therefore, the environmental expert and the ESIA study team members are expected to review the mandates given by-law to these bodies and briefly describe in order to bind responsibilities with existing institutional responsibilities areas of the sectors.

4.4 ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES

The earlier Environmental Protection Authority of Ethiopia issued an EIA guideline with different series for addressing different sectors and activities. The main EIA documents which need be reviewed by the environmental expert and the team members are with respect to the project are listed below.

- Environmental Impact Assessment Guideline Document (issued in 2000),
- Environmental Impact Assessment Procedural Guideline Series (issued in 2003),
- Environmental Impact Assessment Guidelines on Irrigation (EPA, 2004), and
- Guideline to Prepare Environmental and Social Management Plan (issued as of November, 2004).

Worked Examples for a Typical SSIP

Environmental Impact Assessment Guideline*: The EIA Process as applicable to development projects was presented in detail in the 'Environmental Impact Assessment Procedural Guideline Series 1' of Nov. 2003. The guideline lists projects which require full ESIA study, among which irrigation projects with areas greater than 100 hectares or sensitive areas are indicated. The guideline also states that all projects located in environmentally sensitive areas should be treated as equivalent to schedule 1 activities as the nature of the project areas may include; land prone to erosion, land prone to desertification, areas which harbor protected or threatened or endangered species, areas with particular historic or archeological interests, primary forests, wetlands of national or international importance, National Parks and protected areas, important landscapes and religious important areas (EPA, 2000).*

4.5 WORLD BANK ENVIRONMENTAL AND SOCIAL SAFEGUARDS REQUIREMENTS

Based on the project site physical, social and cultural significances and the size of the intended Small Scale Irrigation Project (SSIP), it can be under EA category A based on the World Bank and schedule-1 based on the Government of Ethiopia environmental requirements. With regard to the World Bank safeguard requirements review and incorporate the following Bank's safeguards in the ESIA report:

- Environmental Assessment (OP/BP 4.01),
- Natural Habitats (OP/BP 4.04),
- Water Resources Management (OP/BP 4.07),

- Projects on international Waterways (OP 7.50),
- Dams Safety (OP/BP4.37),
- Gender and Development (OP4.20),
- Physical Cultural Resources (OP/BP 4.11),
- Involuntary Resettlement (OP/BP 4.12),
- Pest management (OP/BP 4.09),
- Underserved or Vulnerable People which is described as “Indigenous Peoples Policy” in the World Bank Safeguard Policy (OD 4.20 - OB/BP 4.10),
- IFAD safeguard policy (December, 2014),
- Forest Police (OP 4.36) safeguard requirements described in Proclamation, No. 94/1994 of Ethiopian, etc.

Worked examples for OP/BP 4.01, OP/BP 4.04 and OP/BP 4.11

- Environmental Assessment (OP/BP 4.01): The Bank requires environmental assessment for projects proposed for Bank financing to ensure that the projects are environmentally sound and sustainable, thus improve the decision making process.
- Natural Habitats (OP/BP 4.04): Promoting the conservation of natural habitats, protection, maintenance, and rehabilitation of natural habitats and their functions. The Bank supports and expects the borrower to apply a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development.
- Water Resources Management (OP/BP 4.07): Ensuring support for providing potable water, water supply and sewerage projects, flood control, and water for productive activities in a manner that is economically viable, environmentally sustainable, and socially equitable.
- IFAD’s Safe safeguard policy (December 2014): IFAD’s as a development institution, has been involved in addressing environmental and social issues for many years by focusing on Social, Environmental and Climate Assessment Procedures for Managing Risks and Create Opportunities during investing in rural peoples. The procedures were reviewed since April 2009 and established guiding principles and defined course of action in assessing environmental and social risks in projects by considering the following key measure areas.
  - *Enhance systematic integration of social, environmental and climate change considerations.*
  - *Emphasis and re-emphasis on commitment to principles of transparency and accountability, and support for resolution of complaints for alleged or suspected non-compliance with IFAD social and environmental policies and standards.*
  - *Emphasis on a precautionary approach to resettlement, physical and cultural resources, chance finds, safety of small dams and subprojects, and*
  - *Strengthening of social, environmental and climate risk classification of projects and the steps needed.*

  Notes:
  a. *Climate risk screening will be piloted in 2015 and fully implemented in 2016.*
  b. *In the event that cultural heritage is subsequently discovered, either during construction or operations.*

4.6 INTERNATIONAL MULTILATERAL ENVIRONMENTAL AGREEMENTS

Ethiopia is member and signed most of the following international environmental agreements. Based on possible impacts of small scale irrigation projects on the project area, select, review and incorporate briefly the agreement, legal implications, and measures, if found applicable, in the SSIP implementation. Few of the agreements are listed below.

- Convention on Biological Diversity (April 5, 1994);
- Cartagena Protocol on Bio-safety (May 24, 2000);
- Convention and Protection of the World Cultural and Natural Heritage (July 6, 1977);
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (April 5, 1989);
- United Nations Convention to Combat Desertification (June 27, 1997);
- United Nations Convention Framework on Climate Change (April 5, 1994);
- Vienna Convention on Protection of Ozone Layer (October 11, 1994);
- Montreal Protocol on Substances that Deplete Ozone Layer (October 11, 1994) and
- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (April 12, 2000).

Worked Examples

Convention on Biological Diversity (CBD)*: The value of biodiversity as a key component of the environment was recognized during the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. Ethiopia endorsed and signed the Convention on Biological Diversity (CBD) during the conference. Since then, the Environmental Protection Authority took the lead as a focal point of CBD until 2005 and handed over to Institute of Biodiversity Conservation (IBC). Based on future biological resources conservation directions of the IBC of Ethiopia, the ESIA study team should identify and recommend on implementations of in situ ecosystem conservation besides creating awareness on seed storage, by recommending conservation measures:*

- *Of existing wild and weedy relatives of cultivated crops species, if any in the proposed project site.*
- *Of indigenous and local animal species, both domestic and wild species, by enhancing on site conservation.*
- *of aquatic and terrestrial biodiversity of the proposed project area and*
- *on promotion and use of existing rich indigenous knowledge associated with the biodiversity conservation and sustainable utilization of the project area.*

5 DESCRIPTION OF THE PROJECT

The environmental expert and the ESIA study team should describe the small scale irrigation project based on data obtained from the irrigation engineer. After obtaining data, write short and brief summary report under the following sections of the ESIA report.

5.1 LOCATION AND ACCESSIBILITY

Briefly describe the project (use Appendix-VI.7) data collection tools applicable for each):

- Project location by Region, Zone, Woreda and Kebele/s of the project,
- Indicate the geographical location or coordinates in range as (from _____ to _____ ^{0}N, _____ to _____ ^{0}E) in UTM and an altitudinal range as from____ to _____ m.a.s.l or average altitude of _____ m.a.s.l.,
- Accessible roads taking to the project site by type (asphalt, gravel, dry weather road, or no accesses).
- Describe distance of the project site from each centre (from the country capital, regional capital, woreda centre and the kebele office, etc. as much as possible).
- Identify, if there exists any, inaccessible conditions, if there exists gorge, river crossing the project command area, etc. for example and think for the solution which you may include in mitigation measures.
- Describe advantage and/or disadvantage of the project to the area.
- Put project location map (Figure5.1), slope map (Figure5.2) and watershed (Figure5.3), showing the irrigation area, irrigation layouts (diversion site or water sources, main canal, primary, secondary and tertiary canals), road/s, villages, school/s, Farmers Training Centre (FTC), etc.,
- Write brief paragraph based on collected data.

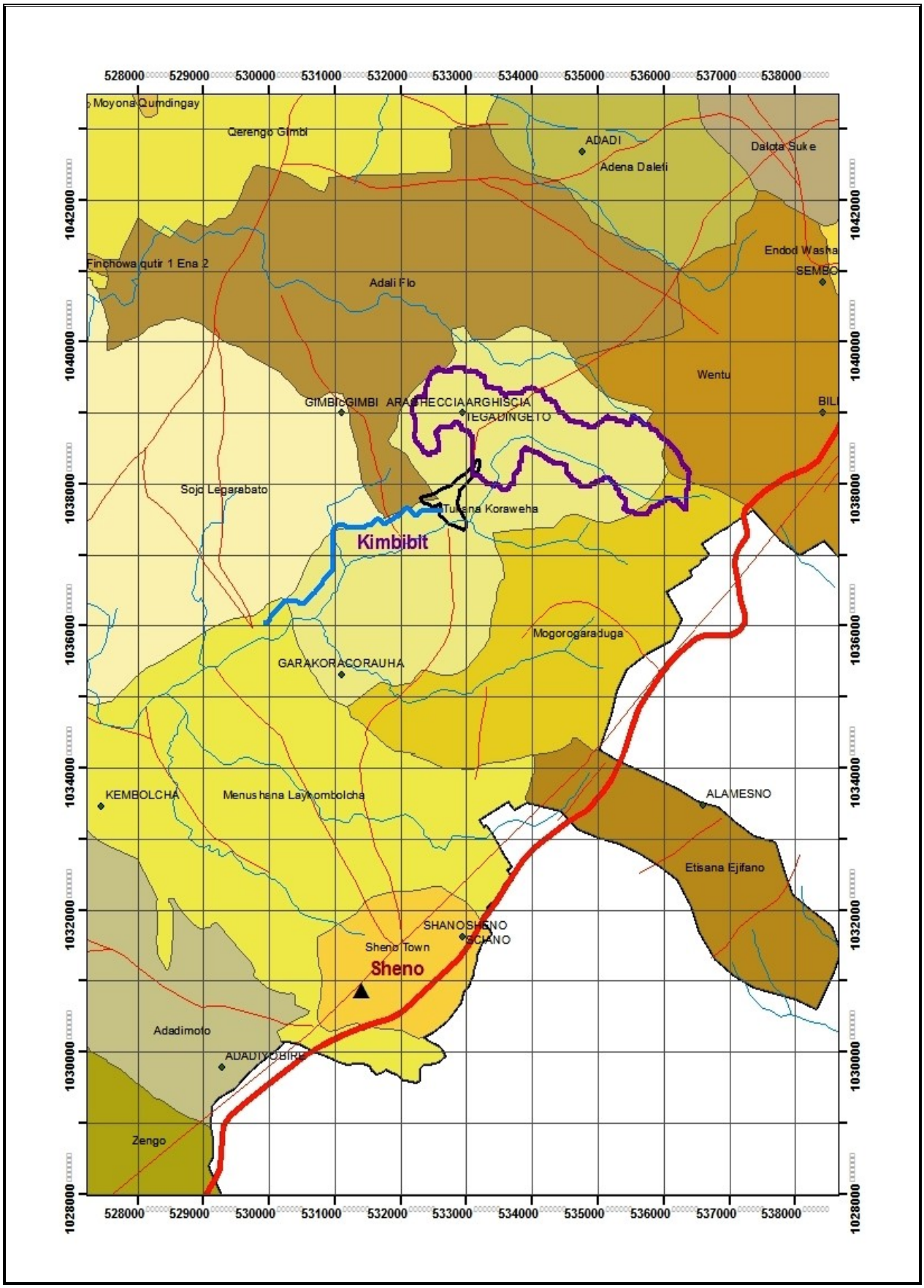

Figure 5-1: Typical location map of the small scale irrigation project area

5.2 HEAD WORK CHARACTERISTICS

Describe the headwork type, location and conditions of the small scale irrigation project. The data shall be obtained from the project *irrigation engineer using (format Appendix-VI.7)*.

- Type of weir or head work sites such as :
  - Surface water diversion,
  - Broad Crested Weir,
  - Diversion weir width of _____ m,
  - Ogee spillway height of ___ m, and
  - Abutment height of _____ m.
- Weir site location or coordinates; (___^{0}N, ___ ^{0}E) in UTM and altitude in _____ m.a.s.l. The diversion canal extension and direction west, east and preferably to the right or left of the river course shall be briefly discussed.

5.3 MICRO DAM CASES AND CHARACTERISTICS

The small scale irrigation development projects can involve micro dams, especially with dam height of less 15 m. Under the project description section, information and components of the dam are described in order to address impacts related to each in the impact assessment and mitigation measures recommendation section.

Issues which should be described at minimum with regard to the micro dam project, the following **information** must be presented micro dam location, off take and scheme layout; water source and options; micro dam project area of influence; command area (ha) characteristics and area of influence, population and households (HH) of the project area, number of households (HH) involved or to be involved in the scheme, type & purpose of irrigation infrastructure (weir, dam, inundation area, etc.), crops to be grown, estimated yields, agrochemicals to be used, application methods and amounts, ancillary infrastructure (access roads and accessibility, sheds, camps and offices, sanitation facilities, power supply). More than 90% of these issues were not addressed in the report.

Similarly, the **dam components** such as dam type (rock fill, concrete or earthen), height from crest to foundation, crest length, spillway weir, reservoir volume (m3) and inundation area, etc. must be described as impacts related to these components shall be accessed in the impact assessment and mitigation measures section.

5.4 PROJECT INFRASTRUCTURE

Although the project is small scale irrigation, it can have different infrastructure, such as camp, an office, canal networks, access roads, etc. Therefore, describe the project infrastructure and identify:

a. Camp and office with their possible areas (if possible),

- where to construct,
- other possible construction site in order to use the site for the intended irrigation,
- write down the area in hectare under infrastructure built up,
- what possible effects the infrastructure will have on your irrigation activities, and
- list down possible solutions or mitigation measures for possible solution, etc.

b. Canal networks: The main canal/s, secondary canals, tertiary canals,

- Indicate length and width (km x m) for each canal system and convert to hectare which the land loss by the canal networks.

c. Drainage canal/s: Drainage canals are required to accelerate removal of water during flood events, maintain groundwater levels so as to avoid waterlogging and drain surplus irrigation water. Therefore; know your project drainage network with their sizes;

- Indicate length and width (km x m) of each drainage canal networks and convert in to hectare.

d. Canal crossing culverts: Know number of culverts, site options, etc. and include the land loss by culvert construction.

e. Service roads: To properly implement construction and operation activities of a small scale irrigation project activity/s, service roads shall be constructed starting from the weir site, along canal networks including drainage canals. Therefore; in consultation with the project irrigation engineer:

- Identify the sizes of each service road in km and m and convert to hectare.

5.5 COMMAND AREA BY SLOPE DISTRIBUTION

Describe the project:

- Command gross and net areas.
- Command area by slopes (less than 5%, 5-8%, 8-12%, 13-15%, 15-20%, 20-30%, 30-60%, >60%, etc. use the table below for the slope summary). Understand that areas with less than 5% slope do not need on command area conservation measures. But those command areas above 5% need on command area conservations measures. For such areas, in consultation with the agronomist and also soil and water conservationist, recommend on command area physical or biological conservation measures, for example:
- Soil bunds with elephant grass strips for command areas with 5-12% slopes;
- Bench terraces with multipurpose trees which do not influence the intended irrigable crops on edges of terraces to protect terrace edges sliding shall be recommended later under the mitigation measures part. See figure 5.2 typical example.

Table 5-1: SSIP command area distribution by slope and SWC measures

Slope %	Total Area (ha)	SWC Structure Coverage (ha)	Conserved land area (ha)
0-5			
5-8			
8-12			
12-15			
Sum Total			
15-20			
20-30			
30-60			
> 60			
Total			

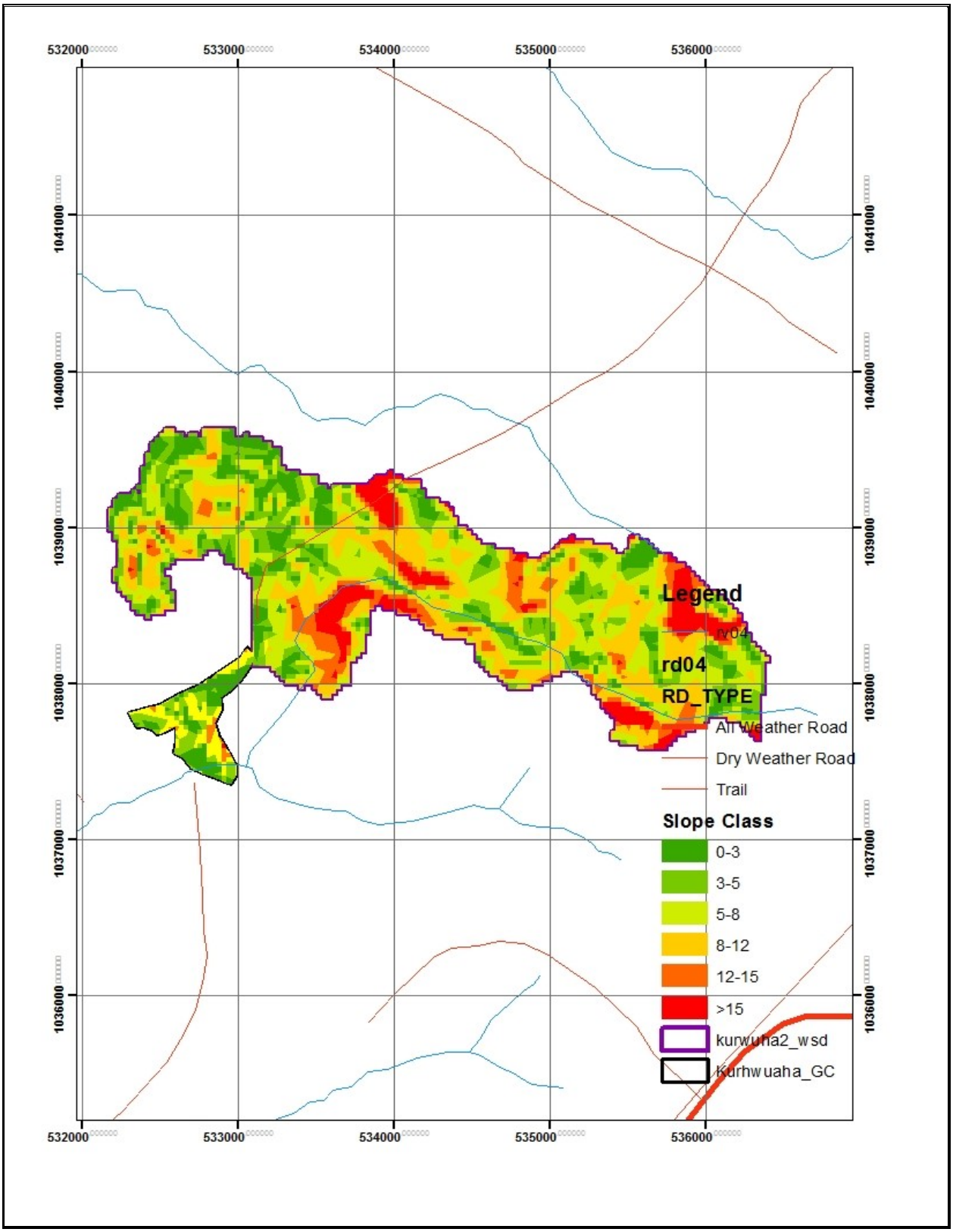

Figure 5-2: Typical slope map of the small scale irrigation project area

Worked Examples for a Typical SSIP

Based on slope classification of the project command area, the project net command area is estimated at 112.34 ha from which areas with normal slope range of 0-5% for irrigation is 73.90ha. Areas with slope of 5-8% is 1.93ha, with slope of 8-12% is 25.63 ha, 12-15% is 10.88 ha, 15-20% is 5.74ha and above 20% slope has an area of 6.23ha (see the table). Except for areas within the slope range of 0-5%, the rest areas are included with soil and water conservation measures such as soil bund and bench terraces with appropriate plantations.

- Soil bunds with elephant grass strips for command areas with 5-12% slopes. Elephant grass will be incorporated to feed livestock considering livestock and population pressure in the project area. As shown in the table above about 12.56 ha will be covered by soil band and strips of elephant grass and
- Bench terraces with 2-3 rows multi-purpose trees such as coffee and other vegetables on bottom edges of each terrace. The multi-purpose trees stabilize soils of the bench terraces besides crop production. Including areas with slopes more than 15% in the project gross command areas, about 2.97ha of the gross command area will be under bench terraces land management.

5.6 PROJECT CATCHMENT CHARACTERISTICS

In consultation with the project hydrologist and/or watershed management expert (if any) of the project, describe:

- The land use type (Figure5.3) of the project catchment area (you may have the catchment map as much as possible),
- Total area of the project catchment,
- The geographical locations (in UTM preferably) of the catchment as _____ ^{0}E to _____^{0}E easting and _____^{0}N to _____^{0}N northing; and
- The altitudinal range of _____ to _____ m.a.s.l.
- Identify any possible positive and/or negative effects of activities undertaken in the project catchment area.

In consultation with soil and water conservation expert, watershed management expert (if any), agronomist and others recommend on command area conservation measures.

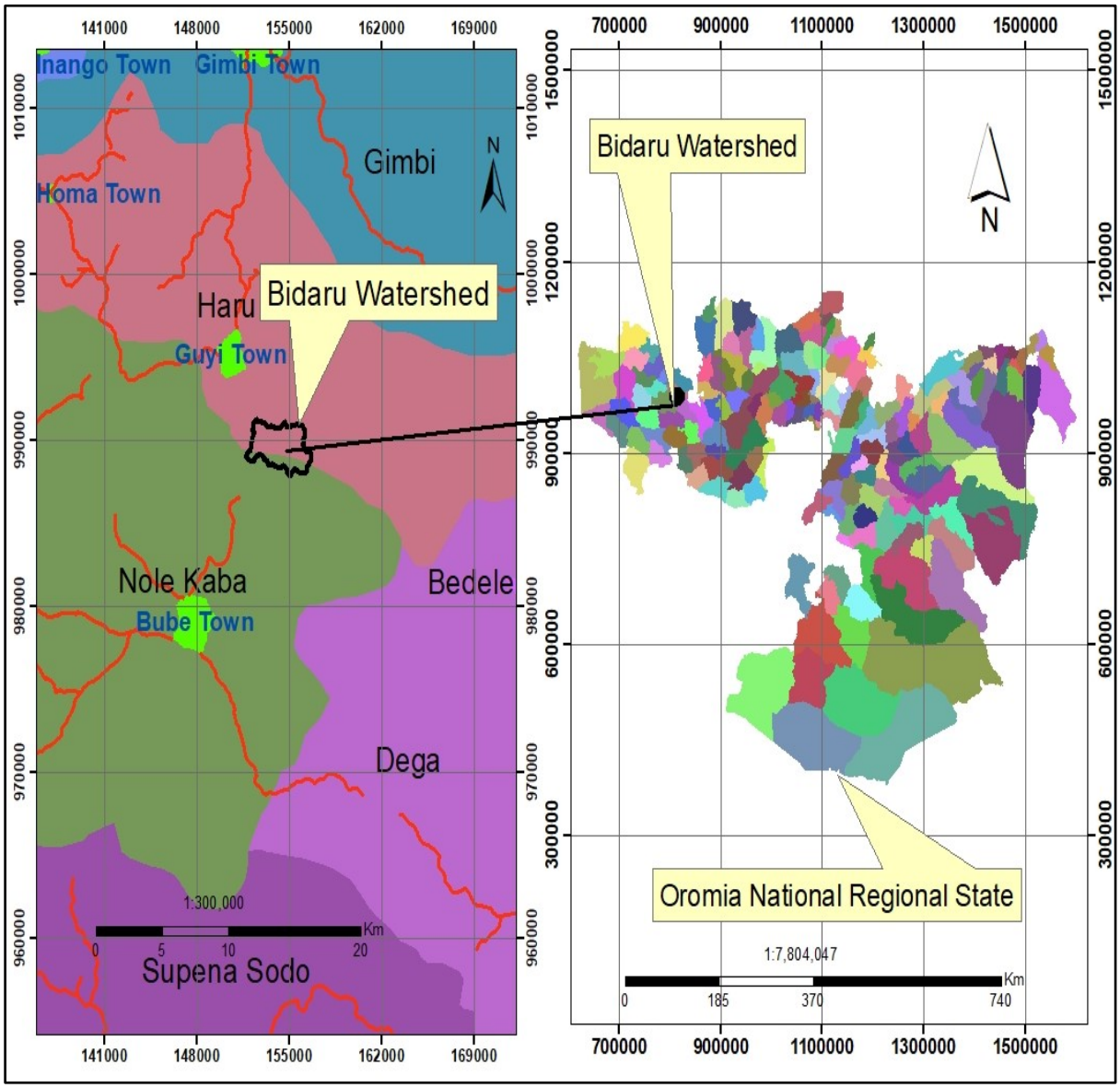

Figure 5-3: Typical watershed map of the small scale irrigation project area

5.7 PROJECT BENEFICIARIES AND AFFECTED PEOPLES

By understand that the exact direct beneficiaries will be decided based on existing irrigation land distribution rules and regulations of the country and probably project are region of which their record or data shall be obtained from the woreda line sector:

- Indicate number of beneficiary and affected households and population in males and females, and
- Estimate the total direct beneficiary populations of the SSI, and
- List number of project affected households.

6 BIO-PHYSICAL BASELINE ASSSEEMNT

The scale, extent and significance of potential impacts of an irrigation project mainly depends on the nature, scale and location of the project schemes and the baseline environmental and social conditions of the project areas. The baseline environmental conditions are classified into three major categories; the *physical, biological, socio-economic* environmental baselines. Under this section, an approach of how to collect data on the *physical and the biological* or the bio-physical baseline environmental conditions is presented. The baseline information are, but not limited to, on the topography, geology, climate and metrology, soil characteristics (physical and chemical), surface and ground water hydrology, the river's discharge, surface and ground water quality, land use land cover, morphology of the watershed; erosion and sedimentation, vegetation, wildlife and aquatic environmental resources will be dealt. The assessment approaches are presented below.

6.1 TOPOGRAPHY

The up and down topography with cut offs and slopes accelerates soil erosion hazard. Such topographic are with slopes easily expose to soil erosion. Therefore, describe the:

- overall topography of the project area and the describe that of the project command area as flatness or slope conditions that can affect the command area in aggravating soil erosion due to undulated or steep slope characteristics, and
- indicate the project command area slope distribution.

6.2 GEOLOGY

Geology influences water resources of an area and has effect on water quality, source of sediments, ground water resources and soil formations. As a result, geological investigation is very important factor in environmental and social impact assessment (ESIA) study of an irrigation development project. Therefore, in consultation with the *geologist* of the project;

- Describe briefly the geological characteristics of the project area.

6.3 CLIMATE AND METEOROLOGY

In consultations with the project hydrologist; describe the project area:

- Temperature, in mean maximum and mean minimum; highest and lowest temperature recorded months of the year,
- Mean relative humidity,
- Sunshine hour,
- Wind speed,
- Radiant and
- Evapotranspiration (ETo)
- Describe the rainfall (mm) of the project area as calculated mean total, annual precipitation and monthly distribution with highest rainfall and dry months (indicate data source). *For the details use Table6.1 and please take data from the project hydrologist*.

Table 6-1: Mean monthly maximum and minimum temperature of the project area

Month	Min Temp (°C)	Max Temp (°C)	Humidity (%)	Wind (km/day)	Sun (hours)	Rad (MJ/m²/day)	ETo (mm/day)
January							
February							
March							
April							
May							
June							
July							
August							
October							
October							
November							
December							
Average							

Source: _____, Month, Year.

Worked example for Rass SSIP

Temperature and Rainfall: The temperature data for the years 1979-2010 was collected and summarized as presented in the table for a Typical Small Scale Irrigation Project area. It is concluded from the table that the mean maximum and minimum temperatures of the project area are 28.6oC and 9.70C respectively. The mean relative humidity, sunshine, wind speed, radiant and the evapotranspiration (ETo) of the area were also found to be 56%, 7.5hrs, 101km/day, radiant of 20.2MJ/m2/day and 4.22mm/day respectively. The highest temperature was recorded in the Month of March which was 32.90C and the minimum temperature was recorded in the month of November with 8.0°C. Similarly, the calculated mean total annual precipitation of the area for the years 1979-2010 was 943.0 mm.

6.4 SOILS

Soil related problems in irrigation projects are classified into three; waterlogging, salt building on irrigated land and crops wilting or drying up as a result of change in soils characteristics. It depends on the area topography, soil types and chemical compositions. Having this in mind, describe the project command area. *Obtain data from the project soil study expert and write very short and clear in a paragraph or two*.

- Major soil types,
- Catchment area soil,
- Soils infiltration rates,
- Soil erosion conditions - which is possible indicators for environmental degradation,
- soil depth and Soil textures,
- Soil acidity or alkalinity based on pH laboratory result of the soil sample,
- Ground table level and water logging conditions,
- Obtain the samples analysis result and calculate the soils; SAR.
- Considering identified soil test parameters, produce soil suitability map as much as possible, etc.

Besides, do not forget to integrate indigenous knowledge whenever you may face laboratory access problems.

6.5 HYDROLOGY AND WATER RESOURCES

Diverting water for irrigation affects watersheds by altering rivers' flow regimes (patterns of flow volume) and affecting depth of water table (USAID, 2002). Without irrigation, rivers may experience large seasonal variations, flooding during the rainy season (flood regime) and carrying small water volumes during dry seasons (low-flow regime). The water can be from different sources. For the data collection use (Appendix-VI.6).

- Describe or list down major surface water sources such as rivers, springs, wetlands, lakes, etc. of the project area.
- Describe in depth the water source on which the intended small scale irrigation project is proposed and then in collaboration with the hydrologist of the project:
  - Estimate discharge in l/sec of the river.
  - Estimate total annual discharge,
  - Irrigation water requirement from the agronomist of the project,
  - Calculate the river water balance at diversion or weir site,
  - Evaluate downstream environmental release of the river at diversion site.
  - Assess any river or spring entering into the river at immediate downstream.
  - If possible, with hydrologist, identify the discharge of tributary water sources which enters into the river course below the diversion site and
  - Describe downstream river discharge with tributary and evaluate possible impacts on downstream water users. If there may be significant adverse impacts on downstream users, identify and recommend possible mitigation measures which should be incorporated in the management plan of the project.

Worked example for Rass SSIP

Eight major perennial rivers flow to Cheleleka wetland from east plateau. A Typical River is among the eight rivers of the watershed. In addition, there are twelve sprigs and four swamps of which two sprigs in the project kebele. A Typical River, Afina River and Neniche Spring with estimated discharge of 89 l/sec, 11 liter/sec and 49 liters/sec respectively are in X kebele. Either Afina River or Neniche spring joins Typical River from eastern direction immediately after the diversion site at about 200meters.

6.6 WATER QUALITY

Irrigation activities can affect downstream water quality by reducing the amount of water available to dilute contaminants and by potentially increasing agrochemical pollution (USAID, 2002). Excess nitrates in water sources can be toxic to aquatic life and children. Phosphates if carried in rainwater runoff to rivers, streams and lakes may stimulate rapid growth of aquatic vegetation and algae. If human excreta is used as fertilizer or deposited in irrigated fields, rainwater runoff may transport them into open water bodies where they may spread diseases such as cholera, hepatitis and worms. Irrigation activities can also create water quality problems on downstream users. The cause routs for the water quality problems are due to discharge of saline or contaminated irrigation water. Therefore, baseline river water quality is basically important in order to indicate and evaluate against the WHO (Appendix-VI.9) water quality standard for irrigation. Accordingly, recommend the irrigation water source sample taken about two liters from intake or weir site and analyze for the following physic-chemical parameters:

Turbidity (NTU), Total solids 105^0C (mg/l), Total Dissolved Solids 105^0C (mg/l), Electrical Conductivity (µS/cm), P^H, Ammonia (mg/l NH_3), Nitrite (mg/l NO_2), Nitrate (mg/l NO_3), Sodium (mg/l Na), Potassium (mg/l K), Total hardness (mg/l$CaCO_3$), Calcium (mg/l Ca), Magnesium (mg/l Mg), Total Iron (mg/l Fe), Fluoride (mg/l F), Chloride (mg/l Cl),

Carbonate (mg/l CO_3), Bicarbonate (mg/l HCO_3) and calculate SAR of the water sample (see Appendix-VI.9).

Understand that parameters EC and TDS for salinity, SAR with regard to infiltration, sodium percent, chloride for specific iron toxicity identification and nitrogen as nitrate, bicarbonate and pH for other miscellaneous effects are used. Indicate if the result is beyond or below the standard and its possible effects. Possible clarifications and justifications on each laboratory results based on their allowable standard shall be done. See the worked examples below.

Worked example for Rass SSIP

Total dissolved solids (TDS) *consist mainly of calcium, magnesium, sodium, bicarbonates, chlorides and sulfates. TDS affects adoptions of individual aquatic species, community structure, microbial and ecological processes such as rates of metabolism and nutrient cycling. The TDS analysis result of the sample is 208.00 mg/l indicating that there would not be any restriction on irrigation water use as the TDS analysis result falls much below the minimum recommended permissible concentration of 1000mg/l.*

Electrical conductivity (EC) *was identified for the river water samples. Conductivity is a function of dissolved (ionic sable) solids concentration. It indicates the range into which hardness and alkalinity values likely fall. In most cases for many surface waters Total Dissolved Solids (mg/l) is 2/3 of conductivity (µs/cm). The EC analysis result of the river water sample found to be 306.00µs/cm. Comparing these analytical result with the permissible limit range for degree of restriction on irrigation water using FAO guideline, 700-3000µs/cm, the result found below the minimum limit indicating that the river water does not have serious salinity problem as salinity is associated with total quantities of dissolved solids and electrical conductance.*

6.7 LAND USE AND LAND COVER

Land uses affect the quality of water entering an irrigation area, sediment content (for example from agriculture-induced erosion) and chemical composition from agricultural pollutants. Use of river water with large sediment load may result in canal clogging. The rural land use proclamation (Proc. No. 456/2005) stipulates rural land use and restrictions in order to ensure proper land use of various types such as slopes, gullies and wetlands, as well as utilization of rural lands for villages and social services. Therefore, collect and describe the land use land cover type of the Woreda, project kebele and command area, by using formats in Appendix-VI.2 and Appendix-VI.5 Collect:

- Woreda land use land cover from the Woreda Agriculture sector or Land Use and Land Administration sector. This data helps in understanding the overall land use characteristics of the woreda.
- Kebele/s land use land covers data from the project kebele office. This data helps in understanding the overall land use characteristics of the project kebele and
- Project command area land use land covers from available data and map or observation assessment which might made during site identification. This helps the environmental expert in identifying possible project impacts and recommend mitigation measures.
- Use the *land use land cover map* of the project prepared for the purpose and describe in addition to the secondary data using the land use land cover map which is expected the land use characteristics of the area such as vegetation, crops, villages, etc with basic map standard.

Note that the land use land cover data can be obtained using Google Earth and Arc GIS software. Compile collected data using like Table6.2 below and using map as presented in Figure 6.1.

Table 6-2: Land use / land cover of the project area

Land use type	Area (ha)					
	_____ Wereda	%	____ Kebele	%	___Project site	%
Cultivated land						
Cultivable land						
Grazing land						
Fallow land						
Forest land						
Shrubs lands /man-made/						
Wet lands and/or water bodies						
Others (village, construction areas)						
Total						

Source: _____, Month, ____, Year.

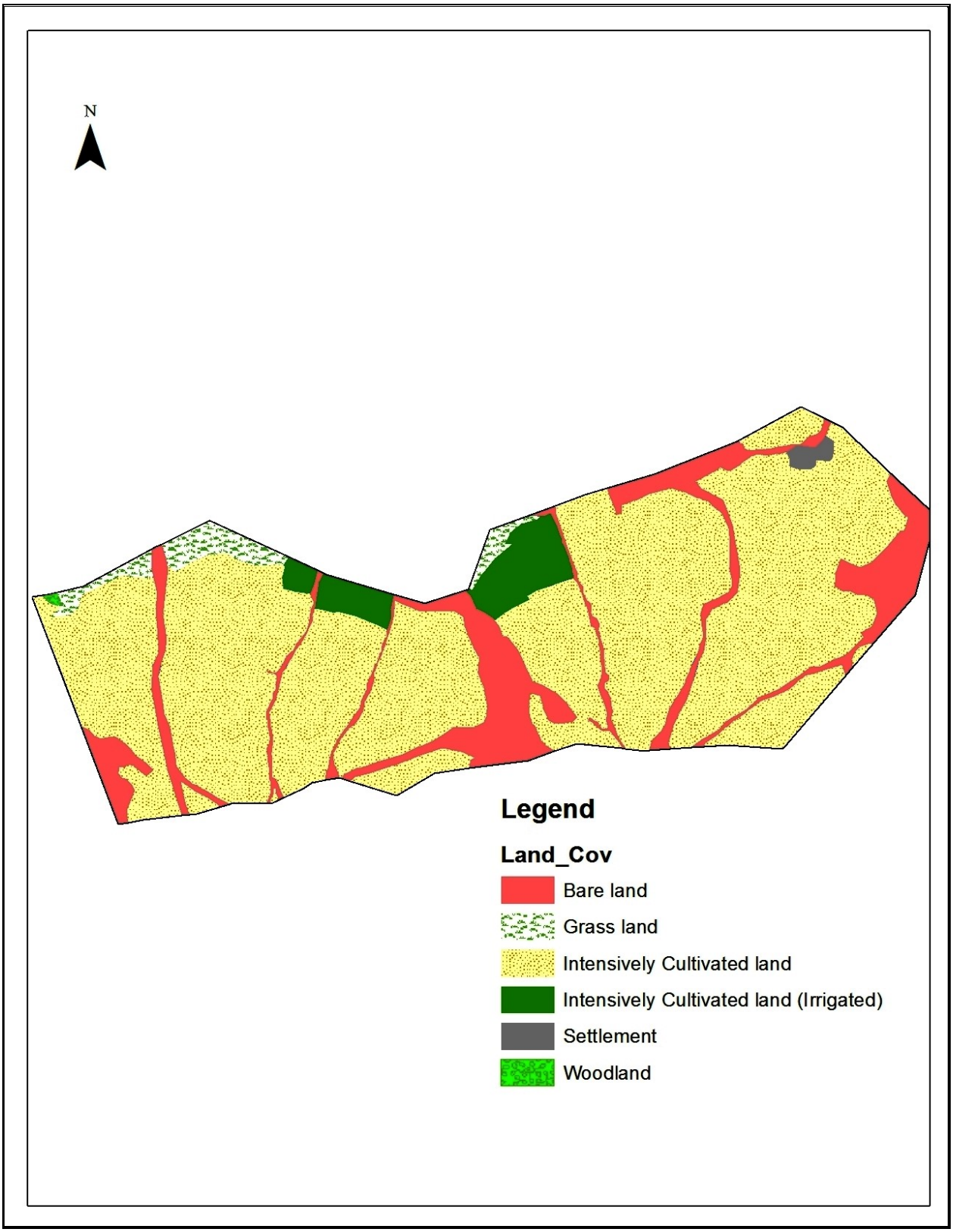

Figure 6-1: Typical land use land cover map

6.8 VEGETATION RESOURCES

Biological environmental resources are the natural features and resources of a project area. Understanding the baseline data of the biological resources help in understanding the resources that may be affected by the project, protection needs, and to enable in recommending management options in order to use sustainable uses of resources and conserve them from damage. To address the biological environmental conditions:

- Collect data and information of the following listed natural resources of the Woreda and the project command area using annexed data collection format (Appendix-VI.2 and Appendix-VI.8).
  - Vegetation types and their species of floristic composition,
  - Threatened/ endangered species flora of the area,
  - Species of plant with commercial importance,
  - Protected forest conservation areas including National Priority Forest Areas,
  - Habitats/ecosystems reserved for special interest such as conservation, scientific importance, recreational value etc.,
  - Dominant grasses, bush trees and weeds of the area,
  - Wetlands, etc.

After collecting the baseline data of the above existing natural resources:

- List them down by their scientific name or local names;
- Describe their major uses such as conservational, construction, recreational, economic, medicinal and other benefits (using annexed format);
- Evaluate the coverage of the resources in the proposed project kebele,
- Describe expected effects, such as deforestation and others on the resources and their opportunities with regard to the irrigation project and
- Identify possible mitigation measures which you may consider in the management plan of the project, etc.

Based on collected data and information, write clear and short paragraph regarding the resources and on possible impacts of the project on the identified vegetation resources and how to mitigate the resources that you may consider in the management plan of the project.

Worked example for Rass SSIP

*The **natural vegetation types**; forest land, wood land, bush land, and shrub land distribution of the district is very poor. The major forests of the district are Eddo forest, Wosha Soyama forest, Kachama forest, Aboye forest and Chuko forest. The area covered by these forest lands are 928ha, 211ha, 841ha, 912ha and 120ha respectively. The major tree species of the forests are Kerero (Pouteria altissima (Aningeria altissima), Dokima (Strychnos spinosa), Tikur Inchet (Prunus Africana), Bisana (Croton macrostachyus), Wanza (Cordia africana) and Warka (figure 4.2 below) which are naturally grown and Tid, Gravilia and Eucalyptus which are man-made. The tree species of the kebele are similar with above. The command area is much more covered with perennial crops vegetation.*

6.9 WILDLIFE RESOURCES

Wildlife resources data and information of the project area essential in an ESIA study. The environmental personnel must collect data and information of the major wildlife resources of the area. The data source can be Woreda Agriculture and Rural Development Office, Parks, and/or others who deal with the resources. As the target of the assessment is with regard to project site, data and information of the resources of the site shall be collected from immediate sectoral, office or the kebele.

Accordingly, collect data and information on:

- Wildlife/fauna diversity of the project area,
- Threatened/ endangered species of the wildlife species,
- Species of the wild animals with commercial importance,
- Habitats designated for wildlife conservation such as National Parks, Wildlife Sanctuaries, Wildlife Reserves and Controlled Hunting Areas,
- Breeding and feeding areas, and mobility of existing fauna including birds,
- Species with potential to become nuisances, vectors or dangerous like malaria mosquitoes, snail hosts of bilharzias, weeds, etc.
- Common bird species, and reptiles resources of the area and
- Identify species with scientific and research significances, etc.

Based on collected data and information, write clear and short paragraph regarding the resources and on possible impacts of the project on the wildlife resources and how to mitigate the resources that you may consider in the management plan of the project.

6.10 AQUATIC RESOURCES

Assessments of aquatic life are also expected in an ESIA study. Diverting water for irrigation can leave less water for downstream ecosystems that can have effects on wetlands and other aquatic lives. Discharge water from irrigated fields on the other hand may also contain more salt, less dissolved oxygen, more pollutants, and heavier silt load than the incoming flow. It also tends to be warmer than receiving rivers and streams. These changes can encourage weed growth and harm fish and bird populations of the water body intended to use for the irrigation activities. Therefore:

- Identify and collect data on major aquatic life such as fish, crocodiles and others using annexed format in the water resources intended for irrigation water use.
- Collect data and information from the project area community representative and woreda agriculture fishery expert.
- Identify and collect phytoplankton and zooplankton data in the aquatic environment,
- Identify possible impacts of the small scale irrigation project on the resources, and
- Recommend mitigation measures that should be considered in the management plan of the project.

Worked example for Rass SSIP

As the river is very small, no potential aquatic life such as fish and other animals found. Similarly, much cannot be said about phytoplankton and zooplankton of the aquatic environment of the water body.

7 SOCIO-ECONOMIC BASELINE ASSESEMENT

Similar with the bio-physical baseline environmental conditions, in this section, an approach on how to collect data of the socio-economic environmental baselines conditions is presented.

7.1 ADMINISTRATIVE STRUCTURES

Based on administrative structure of the country, identify and describe in a paragraph or two the administrative structure of the project area. For the purpose, collect data using annexed format:

- Indicate the project area by region, zone, woreda and kebele/s.
- Describe administering council of the woreda of the project area, and
- Describe responsible institution under which the environmental protection, management and monitoring is to be undertaken based on existing rules and regulations of the administrative levels of the intended project area.

Worked example for Rass SSIP

The project is situated in South Nations, Nationalities and Peoples Regional State, Sidama Zone, Wendogent District in X kebele. The project District is administered by a council. The council is structured with Executive, Judicity organs and the Police. The Rural Land Administration and Environmental Protection Office are structured under the council.

7.2 POPULATION AND ETHNIC GROUPS

Understanding population and ethnic compositions of the project beneficiaries are very important in identifying possible resource use project related resources use conflicts impacts and recommending mitigation measures. Some group of people like to clear vegetation cover completely wherever they settle while others leave by adapting to their needs. Therefore, collect data and information format shown in Table 6-3 below.

- Woreda, project kebele/s and project command area population and households data,
- Project beneficiary households, population and summarize using Table 6-3 below, &
- Identify ethnicity distribution data of the *Woreda,* from the woreda Culture and tourism, and of the kebele project command area from the kebele administration (Appendix-VI.3 and Appendix-VI.8).

Finally, write a paragraph or two briefly based on collected data regarding population and ethnicity conditions of the project area.

Table 7-1: Population and project beneficiaries

Place	Household heads			Population			Ethnic group distribution %				Average family size
	Male	Female	Total	Male	Female	Total	Amhara	Oromo	Gurage	etc	
Woreda											
Kebele											
Command area											
Beneficiaries											

Source: _____Woreda and _____Kebele, _____month ___ year.

Worked example for Rass SSIP

Wondogenet district has 83,315 males and 81,031 females a total of 164,346 peoples. Among these, about 9.6% of the district populations live in the proposed project kebele. Accordingly, the population data obtained from the project kebele indicates 1,644 males and 108 females' total of 1,752 households with 8,230 males and 7,750 females with a total of 15,982 populations.

Similarly, the project beneficiary households are estimated at 292males and 26 female households (H.H), a total of 318 households with estimated population of 1,908 peoples live in the left side project command area. The project beneficiaries' of the right command area are 124 males and 12 females a total of 136 households with estimated population of 816 peoples. Altogether, a total of 454 households with estimated population of 2,724 peoples are direct beneficiaries.

Regarding ethnicity, the kebele data indicates that about 95% of the populations are Sidama and the rest 5% is others (X kebele, January 2016).

7.3 LIVELIHOODS

Agriculture is the main economic bases and it is the major means of livelihoods and potential income generating sources of citizens of Ethiopia. The farming system is mixed that comprises crop and livestock productions. The potential income generating activities of the people is intensification of agricultural activities mainly cultivation of cash crops through irrigation schemes. Therefore, identify data and information of the livelihood baseline data of:

- Major livelihood bases of the communities of the project area,
- Possible impacts of the project on the on the livelihood resources of the beneficiaries
- Possible mitigation measures to bring harmony,

Finally, write brief and clear paragraph or two on this section assessment result.

7.4 RAIN-FED AGRICULTURAL PRACTICE

Ethiopia rural community practiced agriculture for long period of time using rain fall. The crop production is practiced during Meher and Belg seasons. For the purpose of the baseline rainfall agricultural production data, collect cultivated land (ha) and crop production (qt) data using annexed format for:

- major crops grown,
- minor crops grown,
- crops practiced and production during Meher season and
- crops practiced and production during Belg season.

Summarize the crops data using Table6.4 and write a brief paragraph on possible adverse or beneficial impacts related to rain-fed agriculture and mitigation measure for the adverse impact/s which you may consider under project impacts section. You indicate also crops data, production and productivity trends with existing farming practices.

Table 7-2: Major crops, area & production project Woreda and kebele

Seasonal crops	_____ E.F.Y		_____ E.F.Y		_____ E.F.Y	
	Area (ha)	Production (quintal)	Area (ha)	Production (quintal)	Area (ha)	Production (quintal)
Meher season major Crops						
Sub-total						
Woreda Belg season crops						
Sub-total						
Kebele major Meher Crops						
Sub-total						
Kebele Belg Season Crops						
Sub-total						
Total product						

Source: _____Wereda and _____ kebele, Month, year.

7.5 IRRIGATION AGRICULTURE

Irrigated agriculture is practiced using traditional schemes in most cases. In order to identify irrigation activities baseline data of the project area, collect crops and vegetables data for few years are essential so as to indicate trends of irrigation practices and productivity. Then collect data and summarize using Table 6.5:

- list major irrigated crops grown, cultivated areas (ha) and production (qt),

Table 7-3: Major irrigation crops, cultivated area & production for the last three years

Irrigated crops	_____ Year		_____ Year		_____ Year	
	Area (ha)	Production (quintal)	Area (ha)	Production (quintal)	Area (ha)	Production (quintal)
Woreda (if any)						
Total						
Project kebele/area						
Total						

Source: _____Wereda and _____ kebele, Month, year.

7.6 IMPROVED INPUTS

By using Appendix-VI.7 and Appendix-VI.8 data and information collection format:

- Collect data on improved seeds utilizations and using trend and

Write a paragraph on seeds types and utilization of the woreda and project area.

7.7 CROP PESTS AND DISEASES

By using the data collect format Appendix-VI.7 and Appendix-VI.8:

- Collect major crop pests and diseases data from the woreda agriculture office and the project kebele and

Write a brief paragraph based on collected data.

7.8 FERTILIZERS USE

By using the data collect format (Appendix-VI.7 and Appendix-VI.8) list down organic and chemical fertilizers under use.

- Collect data of agrochemicals commonly used in the woreda.
- Collect data of some consecutive years to show the use trend using Table4-6 below.
- Identify possible adverse or beneficial impacts related to irrigated agriculture and mitigation measure for the adverse impact/s which you may consider under project impacts section, and

Write a paragraph using collected data.

Table 7-4: Project kebele agrochemicals last three years use trend

Fertilizer	_____ Year		_____ Year		____ Year	
	Quantity (Qt)	Area(ha)	Quantity (Qt)	Area (ha)	Quantity (Qt)	Area (ha)
Woreda						
Project kebele						

Source: _____ kebele, Month, year.

7.9 LIVESTOCK

The life of our communities depends on mixed farming. The livestock sector can have positive and/or negative impact/s on the intended small scale irrigation development. Therefore, in collaboration with the livestock expert of the project, collect livestock data using annexed format. Using the format, collect data on:

- Livestock population by type,
- Major livestock diseases,
- Veterinary services availability,
- Grazing areas availability and related environmental issues, etc.
- Summarize livestock population and diseases using Table6-7 and
- Identify possible adverse impacts of the project on the livestock development of the woreda and the project area and recommend possible mitigation measures.

Write a paragraph or two on possible adverse or beneficial impacts of the intended project on the livestock population, diseases and grazing areas and recommend on expected adverse impact/s of the project which you may consider under project impacts and environmental management sections of the ESIA report.

Table 7-5: Livestock population of project woreda and kebele

Livestock		Woreda	Project kebele	Percent (%) distribution
Cattle	Cattle			
Equines	Horse			
	Mule			
	Donkey			
Small ruminants	Sheep			
	Goat			
Poultry	Poultry			
Beehives	Modern			
	Transitional			
	Traditional			
Average percent distribution				

Source: _____Wereda and _____ kebele, _____Month, _____year.

7.10 PUBLIC HEALTH

Irrigated agriculture contributes substantially to conditions that favor good health, food security, improved infrastructure and economic growth which enables greater purchasing power for drugs and access to health services. On the other hand, small scale irrigation development can exert significant negative impacts on peoples living in the project command area and its surroundings. Therefore, information on public health baseline conditions data is essential for identifying future health trends of the area.

7.10.1 Heath service and family planning coverage

Collect data on the project woreda health service and family planning coverage using annexed format on:

- Health service coverage,
- Family planning coverage,
- Maximum kms to get health services from the woreda or nearest health service center,
- Evaluate data with the national health service coverage standard and

Write a paragraph or two on collected data and health service conditions.

7.10.2 Health institutions

A health center is expected to service a maximum of 25,000 peoples and hospital for 100,000 peoples based on Ethiopia health coverage estimation criteria. Health institutions distribution determines health service delivery. Therefore to recommend on health services based on the Ministry of Health standard, health institutions data is essential. Therefore, collect health institutions data of the Woreda and project kebele using annexed format 15.3 on the following in order to comment on the institution coverage and needs (source: Woreda health office).

- Hospital, health center, health posts, clinics, laboratory center, rural drug shop, pharmacy, etc.
- Identify number of the institutions as private, governmental, NGOs,
- Identify any of the institutions present in the kebele of the project area,
- Identify ratio of people to number of hospital and health center based on the health center standard of the country.
- Summarize the health institutions data using Table6-8 below.

Table 7-6: Health institutions distribution

Health Institution	Project Woreda				Project kebele			
	Private	Gov.	NGO	Total	Private	Gov.	NGO	Total
Hospital								
Health Center								
Health posts								
Clinic								
Laboratory center								
Rural drug shop								
Pharmacy								

Source: _____Wereda and _____ kebele, _____Month, _____year.

Health Institutions Related Worked example for Rass SSIP

The table presents the health institutions distribution of the district. The main health institution providing health services for the populations of the district and the project area is the Hawassa Hospital, 5 health centers and 16 health posts.

The health centers give services for the 164,346 peoples of the district population. Since one health center is expected to service 25,000 people (standard for health center service set by the MoH of Ethiopia), the population ratio to health center is 1: 32,869 people indicating that the health service population ratio is unfair and it needs one more heath center and about two hospitals for the district.

Regarding health service coverage of the kebele, the existing health institution, one health center is fair to service the 15,982 populations of the kebele based on the 25,000 peoples per health center standard of the country.

7.10.3 Health Staffs

Human resources or staffing of a health institution is very important in promoting health cares. The population ratio based on WHO standard is 1:10,000 people for a physician and 1:5,000 for nurses of all types. To recommend on health staffs service delivery and know health personnel data, collect data using Appendix-VI.4 format on:

- Doctors (all categories), health officers, nurse (all categories), sanitarians (all), health extension workers, health assistants, lab technicians (all) and other, if any.
- Indicate number of the health institutions staffs in private, governmental, NGOs,
- Identify health staffs in health institutions of the kebele or project area (if any),
- Indicate and evaluate number of people to be served by the health staffs, especially physician and nurses of all types based on the WHO standard.
- Summarize the health staffs data using Table6-9 below.

Write clear short paragraph on health staffs with regard to health care and services of the project area and comment on health service delivery and needs.

Table 7-7: Health professionals

Types /description	Project Woreda			Project Kebele		
	Male	Female	Total	Male	Female	Total
Doctors (all categories)						
Health Officers						
Nurse (all categories)						
Sanitarians (all)						
Health extension workers						
Health Assistants						
Lab technicians (all)						

Source: _____Wereda, _____Month, _____year.

7.10.4 Prevalent diseases

The small scale irrigation project can exert negative impacts on peoples living in the project command area and its surroundings by aggravating prevalent disease cases including HIV/HIDs, waterborne and water related diseases, etc. More people can move to the project areas as a result of created job opportunities. Contamination of water bodies and sanitation problems can aggravate disease causing vectors breeding sites and conditions. These conditions can aggravate health problems of the area. Therefore, collect data on prevalent diseases using the annexed (Appendix-VI.4) format (source: Woreda health office).

- Collect top ten diseases data in number of patients using annexed format of the Woreda and of the project kebele (if any health services exists),
- Collect data on the number of patients treated of all other disease cases,
- Collect data on the number of patients treated of waterborne diseases,
- Collect data on the number of patients treated of water related diseases,
- Collect data on the number of peoples living with HIV/AIDS,
- Collect data on the trends of peoples living with HIV/AIDS,
- Evaluate causes of the diseases and how to control so that you may recommend in the environmental and social management section of the report.
- Summarize the top ten diseases and others using Table6-10 below.

Write a brief paragraph or two using collected data on the top ten diseases, waterborne diseases, water-related diseases, HIV/AIDS prevalence and trends. In addition, identify major adverse impacts of the small scale irrigation project development and recommend possible mitigation measures and include in the environmental and social management of the report.

Table 7-8: Ten top diseases of project woreda and kebele

Ser. no	Diagnosis	Project Woreda				Project kebele	
		_____ Year	%	_____ Year	%	_____ Year	%
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
	Top ten total						

Ser. no	Diagnosis	Project Woreda				Project kebele	
		_____ Year	%	_____ Year	%	_____ Year	%
	Others						
	Total						

Source: _____Wereda, _____Month, _____year.

7.11 WATER SUPPLY

Access to potable water supply (Ethiopian Water Resources Management Proclamation (Proc. No. 197/2000 and the W.B /OP 4.07) is an indicator of socio-economic development index of a nation. It is not only development indicator, but also vital for the survival of human beings, prevention of diseases and improvement of the health status of a society. Therefore, collect data and information using annexed (Appendix-VI.6) format on:

- Project woreda water supply coverage,
- Urban and rural water supply coverage of the project woreda,
- Status and access to water supply of the project area or kebele,
- Water supply sources by types (pipe, hand dug well, river, protected springs, deep wells, shallow wells, rain water, etc.) of the project woreda, etc., and
- Indicate the percent coverage of each water source is presented in Table6-11 below.

Write a brief paragraph or two on the water supply of the project area based on collected data from the woreda water resources office.

Table 7-9: Project Woreda and kebele water supply sources and coverage

Ser. no	Water supply sources	Project Woreda		Project kebele	
		Number	Coverage (%)	Number	Coverage (%)
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					

Source: _____Wereda and _____ kebele, _____Month, _____year.

Water supply related Worked example for Rass SSIP

Access to potable water supply is used as one indicator in socio-economic development index of a nation. Adequate water supply is not only vital for survival of human beings, but also contributes to both diseases prevention and improvement of the health status of a society. Data collected for the purpose on potable water coverage of Wondogenet district shows 60.3% coverage for the whole population. The urban and rural coverage is 77.24% and 43.4% respectively. The potable water coverage of the project kebele is 74.59%. The status and access to potable water supply of the proposed project kebele is generally good. The water supply sources includes pipe water supply from Aboye to Chuko town with an estimated budget of 3 million ETB. Moreover, the communities also use water from river, springs, shallow wells and rain water harvesting.

7.12 SETTLEMENT PATTERN AND DISPLACEMENT

Acquaintance of settlement pattern of community is very important in project identification and planning processes. The population density and settlement pattern has significant implications on socioeconomic impacts of an irrigation project particularly related to displacement which goes with compensations and conflicts. Therefore, as identification of the settlement patterns baseline conditions are essential for deciding possible impacts and mitigation measures including compensation (OP/BP 4.12, Proclamation and regulations of Ethiopia such as Rural Land Administration and Land Use Proclamation (Proc. No. 456/2005), Expropriation Landholdings for Public Purposes & Payment of Compensation (Proclamation, No. 455/2005 and Expropriation Landholdings for Public Purposes & Payment of Compensation (Regulation No. 135/2007 based on collect data and information of:

- Presence of settlements in the proposed irrigation project command area,
- Identify residences on the proposed small scale irrigation project canal networks,
- Evaluate the settlement and residences along the project canal networks,
- Identify possible impacts and recommend mitigation measures, etc.

Write a paragraph or two on the settlement & possible displacements based on collected data.

7.13 LAND TENURE AND LOSS / ACCESS TO ASSETS

Land tenure can be another problem in implementation of a small scale irrigation project. It depends on land ownership conditions of the project beneficiaries' as communities have use rights over their land. They have the right to be benefited from fruits, crops, trees, etc. grown on the land. Land and perennial resources loss leads to conflicts unless properly compensated or the land use right of the people is kept based on existing rules and regulations. Therefore, identify and collected data on:

- Land use right ownership conditions of the intended project command area.
- Perennial crops on the intended project area.
- Evaluate the ownership conditions future distribution issues.
- Identify access to resources and infrastructure.
- Identify possible impacts and recommend appropriate mitigation measures.

Write a paragraph or two on your assessment result.

7.14 INFRASTRUCTURE

As availability of social, agricultural support services and public infrastructures play significant roles in successful implementation and operation of the intended irrigation project baseline conditions, data and information on existing infrastructure are important for recommendations. Accordingly, collect data and information of the small scale irrigation project area:

- Agricultural support services and farmer training centers (FTC),
- Public infrastructures such as:
  - schools, health institutions, water supply schemes, access roads, credit services, electricity/energy supply sources, telephone services and others which promotes the development activities and

Write a paragraph or two on your assessment and recommend on inadequacy so as to get attentions in development plan of the area.

Worked example for A Typical SSIP

Availability of social, agricultural support services and public infrastructures are basic for successful implementation and operation of an irrigation project. Some of the social, agricultural support services and public infrastructures in the X kebele (project kebele) includes schools (kindergarten–1, level 1-4=1, level 1-8=1), a health center, health post and three clinics, water supply schemes (Spring on Spot – 2, hand dug wells -6 which are functional, pipe or water points-15 and a river), access road, credit services and a farmer training centers (FTC).

Regarding road access to the project command areas, there is no reliable bridge on a Typical River for the right side command area. The project right bank command area beneficiary communities currently use wooden bridges at two sites; in Harbitu development team of Chemo Ketena and below the project's Flume crossing site. Vehicles cannot pass to the right command area of the project and it was reported by the community representatives that it is also risky for animals to cross the river during heavy rainfalls. Therefore, bridge problem is one of the community problems of the right command area populations.

7.15 HISTORICAL, ARCHAEOLOGICAL, CULTURAL AND RELIGIOUS SITES

Physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significances should be protected (with regard to Ethiopian regulations and funding agencies (if any)). Similarly, at community level, a number of sacred and ritual sites possess religious and cultural importance which needs protection and mitigation measures to protect these physical cultural resources. Collect data and information on such natural and man-made resources of the project area using annexed format (Appendix-VI.3).

- Archaeological,
- Historical places,
- Architectural,
- Religious, sacred and ritual,
- Aesthetic,
- Palaces,
- Caves and
- Cultural significance sites

Worked example for a Typical SSIP

An historical stone was identified in Ato Kebede Bute and his family farm land which is protected by the family. Based on information obtained during group discussions, kebele level consultation and field observations, there are no archaeological, ritual or others found in and around the project command areas. Human graves were seen in the command area, especially around some homesteads. No other cultural, archeological, recreational and religious sites were reported and seen during the field observations in the project command area of X kebele.

7.16 GENDER ISSUES

Social and gender issues are addressed by Article 4.5 of the environmental policy (EPA, 1997) of Ethiopia. The aim of the policy is to ensure participation and decision making in environment and resource management. In the day to day activities, women are exposed to environment more than men. In this regard, data and information on roles and responsibilities of females and males emanating probably from social and cultural settings of the communities shall be collected, using annexed data collection format (Appendix-VI.1) as presented in Table 6.12, 6.13 and Table 6.14.

Table 7-10: Gender analysis based on activities assessment

Ser.	Description	Who does the work?	
		Women(x)	Men(x)
1.	**Reproductive Activities**		
	Cleaning		
	Fetching firewood / fuel		
	Fetching water		
	Preparing food		
	Childcare		
	Washing clothes and others		
2.	**Productive activities**		
	Land preparation		
	Cultivation and maintenance		
	Harvest/Post-harvest		
3.	**Community Support Activities**		
	Labour on communal projects		
	Meetings		
	Helping others in time of need		
	Other, etc.		

Source: Manual on gender analysis tools of Ethiopia, Cascape, 2015.

Table 7-11: Gender access and control on resources assessment

Ser.	Resource description	Access (x)		Control (x)		Remark
		women	men	women	Men	
	Land					
	Fertilizer					
	seed					
	Oxen					
	Sheep/goat					
	Chicken					
	Dairy cows					
	Agricultural equipment					
	Training					
	Credit					
	Water					
	Fuel wood					
	Others, etc.					

Source: Manual on gender analysis tools of Ethiopia, Cascape, 2015.

Table 7-12: Gender based decision-making or empowerment assessment

Expense	Who is responsible?			
	Men(x)	Women(x)	Joint (we decide together) (x)	Comment
Children education				
Clothing				
Health care				
Daily food items				
Inputs for the land				
Inputs for home garden				
Others, etc.				

Source: Manual on gender analysis tools of Ethiopia, Cascape, 2015.

Summarize collected data using Table6.15. Identify major causes for the inequalities which may be technological, shortage of resources, inadequate infrastructure services and facilities, etc. and write a brief summary of the assessment as shown in the worked example below.

Table 7-13: Gender related roles and responsibilities assessment

Ser.no	Gender related activities	Percent distribution		Workload distribution percent
		Males	Females	
1.				
2.				
3.				
4.				

Source: _____, month, year.

Worked example for a Typical SSIP

Efforts were made during the fieldwork activities to assess gender related major jobs practiced in X kebele. In this regard, roles and responsibilities of females and males emanating probably from social and cultural settings of the community was assessed by considering 13 major community workloads indicators. It was found that among the 13 indicators, 11 indicators or 78% were reported to be totally female's roles while the rest 3 indicator activities or 22% were that of males which is similar in most highland areas of the country. Women bear burdens of food preparation, cleaning, childcare, marketing, water fetching, firewood collection and helping males during farming and harvesting time. Beside these, traditional harmful practices such as polygamy which is very rare in the project area and circumcision practices are on females. Women also participate in different income generating activities through a micro enterprise. Therefore, one can conclude that the project area women are under more workloads and also have much contact with environmental resources which need attentions.

7.17 CONFLICTS OF INTERESTS AMONG COMMUNITIES

Most of the time conflicts exist between projects affected, benefited communities and laborers from other areas as a result of the small scale irrigation development project. As the intended project is small scale irrigation project which is commonly planned for the communities, the probability of such conflicts within local communities' on environmental resource uses is very low. To be sure for any of such conflicts, collect data and information on:

- Presences of project area communities conflicts,
- Identify main causes of the local communities conflicts,
- Identify and list existing or practiced formal and informal conflict resolution mechanisms,

- Identify major mitigation measures for the conflicts, if any, that you may consider important,

Write a paragraph on your assessment including solutions for any identified conflicts.

Worked example for a Typical SSIP

No environmental resource uses based significant conflicts that hinders the project implementation was identified in the proposed project kebele. Water use cases can be solved by water users committee which shall be strengthening for the project.

7.18 OTHER EXISTING OR PLANNED PROJECTS IN THE AREA

Projects can have effects on each other. If irrigation projects exist on a river course, there can be conflicts due to water abstraction and downstream releases. Therefore, presence or absence of such existing or planned projects at or near the intended small scale irrigation area should be identified to find possible solutions and solve conflicts through optimizing the project adverse impacts. Therefore, collect data and information on:

- Existing projects in upstream, downstream or near the intended project,
- Possible impacts of the project/s on the intended water source,
- Identify possible solutions or mitigation measures which you may recommend, etc.

Write a paragraph based on collected data and information.

Worked example for a Typical SSIP

No governmental or private development activities or projects identified and known to plan in the intended project command area other than a Typical Small Scale Irrigation project.

7.19 LESSONS TO BE TAKEN FROM SIMILAR PROJECTS

Lessons can be taken from similar irrigation projects in the area or elsewhere. The lessons can help in avoiding possible impacts and optimizing benefits of the planned small scale irrigation project by drawing lessons from their experiences. Therefore, collect data and information on:

- Project area community consultations and awareness about the project,
- Identify project area communities willingness of the project,
- Identify communities' experience in irrigation project management or exposure,
- Identify any project failure in the area or elsewhere they know,
- Identify major causes for project failures, from the community & project management body or review the project document , if possible, etc. of the project and

Write a paragraph based on collected data and information.

8 ANALYSIS OF PROJECT ALTERNATIVES

This chapter presents summary of main project alternatives for comparing with the do-nothing or no-action scenario to avoid the likely impacts on the environment. The primary purpose of conducting an ESIA is to ensure that the environmental and social effects of proposed activities are adequately and appropriately considered before decisions are taken. Evaluated information and supporting arguments enable decision makers to evaluate the overall impacts of a project proposal and its alternatives. Based on the EIA principles (EPA EIA Guideline, 2000) and EPA procedural guideline series 1 (EPA, 2003), project alternatives can refer to any of the following, but are not limited to. The alternatives are:

- alternative location or sitting diversions, micro dams its reservoirs, or pump sites,
- alternative site layouts,
- alternative designs,
- alternative technology,
- alternative processes or sources materials, and
- "no action" or "no-go". Few of the alternatives are briefly described below.

Sitting or locating head work or Diversions sites or Micro Dams and their Reservoirs, or Pump sites: Based on professional sitting judgment, the micro dams, diversions and pump sites are at appropriate sites as they are at relatively narrow, can accommodate water and easily provide for the intended development purposes. Therefore, the proposed micro dam sites, reservoir areas, diversion and pump sites are recommended sites.

Alternative site and layouts: Project site and layout alternative is selection options with least environmental and social impacts that excludes ecologically sensitive areas along main, primary, secondary and tertiary canal networks, access roads, command area and plots layout design based on the project scale.

Alternative Designs and Layouts: Design options can be considered as one of the best alternative in avoiding adverse environmental and social impacts of the development proposals such as micro dams, diversions and pump projects without compromising the objective of the projects. Technical, environmental and social issues are considered in comparing different designs.

Alternative Technology: Under the alternative technology, sprinkler irrigation or pressurized and furrow irrigation are focused. Sprinkler or spray irrigation applies water to the entire irrigated area via a pressurized pipe through single or multiple nozzles. Furrow irrigation is a small, evenly spaced, shallow channel installed down or across slopes of irrigation fields to irrigate parallel to row direction.

"**No action" or "no-go**" or without project scenario alternative. The 'without project scenario' would mean use of the site underutilization of existing resources. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interfering with the existing environmental and social conditions and avoiding any further adverse impacts associated with the project.

In collaboration with the project irrigation engineer and the ESIA study team, consider the best alternatives among the following by comparing their potential environmental and social impacts, capital and operational cost, suitability under local conditions, institutional needs, training and

monitoring requirements. For the selected alternative, write a paragraph or two which clearly shows reasons of selection and benefits. Few worked examples for surface and ground water small scale irrigation projects are presented below.

Worked Examples for a Typical Surface water SSIP

Without Project Scenario

The 'without project scenario' would mean use of the site underutilization of existing resources. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interfering with the existing environmental and social conditions and avoiding any further adverse impacts associated with the project. However, potential socio-economic benefits of the area and the country as a whole would be foregone and the existing economic and social problems of the area remain unalleviated. This means, without the proposed small scale irrigation development project, the area will continue with the prevailing economic marginalization, poverty and food insecurity. The without project scenario is generally mean against the development plan of the country.

Worked Example for Welenchiti Surface Irrigation Development

Designs and Layouts Alternative
Design options can be considered as one of the alternatives in avoiding serious environmental and social impacts of development proposals without compromising the objective of the proposed development project. The design study has already been carried out by considering economical best alignment and expecting design that may affect least the environment. Analyses of farm lay outs, drainages and other detail designs will be finalized giving emphasis to environmental and social matters in addition to sugarcane plantations area demarcation, suitable and acceptable soil conditions.

Worked Examples for Teru Ground Water SSIP

Alternative Designs and Layouts
Design options can be considered as one of the best alternative in avoiding adverse environmental and social impacts of the irrigation project without compromising objective of the project. Accordingly, as the site is flat area with almost less than one percent slope, attention shall be given on canal design and culverts construction for animals and human canal and cut-off drains crossing which were observed during the field observations. Technical, environmental and social issues should be considered in designing of plots layout design.

Worked Examples for Micro dam SSIP

Vegetation clearing
There are no areas with significant ecological value in expected micro dam reservoir and command areas. The pump project for irrigation purposes also can have vegetation clearing from canal alignment and command areas. There will be some permanent changes through canal construction. Vegetation along expected access routes can also be influenced.

Mitigation Measures
To minimize or eliminate the impacts:

- Minimize land-clearing areas and
- Avoid vegetation clearing by machinery along rights-of-ways.

9 IMPACT IDENTIFICATION AND ANALYSIS

9.1 IMPACT IDENTIFICATION

Expansion and intensification of agriculture using irrigation can have potential adverse impacts due to changes in quantity and quality of soil, changes in hydrological conditions owing to installation and operation of schemes.

With regard to small scale irrigation project activities, its potential environmental and social concerns are related to depletion of water sources, soil erosion due to over-application, runoff and leaching of chemicals, waterlogging and salinization of soil (salt-buildup), and minerals and nutrients in the irrigation return flow that drains from an irrigated area, increased incidence of waterborne and water-related diseases problems, changes in the lifestyle of local populations.

The impacts are based on assessment of its *sources, its pathways and the receiving environment or receptor*. The sources are the 'effects and releases' identified previously while the pathways and receptors will be known or evident from the assessment. Based on this, the appropriate impact criteria (such as national & international policies, standards, norms, levels) can be defined, against which the significance of the impacts can be measured.

The Small Scale Irrigation Projects fall under World Bank category A and/or B Environmental and Social Safe Guards which are schedule 1 and /or 2 based on EIA guideline of Ethiopia which needs EA. Such groups of projects need undertaking full ESIA study. The project is governed by the Environmental Assessment (OP/BP 4.01), Physical Cultural Resources (OP/BP 4.11) and Involuntary Resettlement (OP/BP 4.12), Indigenous Peoples Policy (OD 4.20 - OB/BP 4.10) and Forest Police (OP 4.36) of the World Bank Safeguard requirements. These polices shall be addressed in projects ESIA studies.

The major target of any development activities is to change the life of the people. But an intentionally, sometimes individuals or groups of community can be negatively affected. Therefore, to address such problems and recommend solutions or mitigation measures, social risks assessment (Appendix-II) must be done besides the physical environmental risks. To do so, identify the most likely social impacts of the small scale irrigation project on communities of the project area as they can either be benefited and/or affected by the project. Therefore, identify the *social risks* or impacts with respect to the project.

Assessing environmental and social impacts generally depend on the following aspects. Therefore, the ESIA study team shall:

1. *Characterize the baseline* – the existing conditions before the project is undertaken and any effects are generated. That why the baseline environmental and social conditions are assessed.
2. *Identify sources of impacts* and the impacts themselves that are generated by any aspect of the small scale irrigation project activities.
3. *Rate impacts before any mitigation* (for negative impacts) or enhancement (for positive impacts) is implemented;
4. *Suggest mitigation and enhancement measures* to address the impact, as much as possible which is an appropriate; and
5. *Rate impacts after mitigation to produce* a "residual" impact.

The impacts can be either *bio-physical (OP/BP 4.01) or social environmental impacts* which can result in physical or social risks. Identify impacts related to social risks as a result of the SSIP (use Appendix-II) for social risk assessment):

A. Impacts on the bio-physical environmental components

- Contamination of surface water body of the area which the community has been using by the irrigation activities and its inputs,
- Project area soil erosion, canal siltation, land slide, etc.
- Impacts of the environment on the project such as dissected gullies, degraded and ragged topography of the watershed .etc.,
- Biodiversity disturbances (forest clearing, wildlife disturbances,). Polices of the country and funding agencies (if any).

B. Impacts on the socio-economic environmental components

- The intended project socio-economic possible impacts can be, not limited to:
  - Displacement or involuntary resettlement of community members (OP/BP 4.12),
  - Land or houses or farms or perennial resources loss by the project (OP/BP 4.01),
  - Community and its livestock movement access restrictions to water sources and/or grazing areas by proposed irrigation farms and/or canal networks,
  - Waterborne diseases prevalence expansion due to easy access to non-potable water from canal networks and using for domestic purposes,
  - Communicable diseases such as sexually transmitted diseases (STDs), TB and others prevalence associated with movements of diseases affected peoples to and from the project areas, or schools, dense settlement with no adequate sanitation facilities and hygienic conditions, etc.;
  - Vector borne diseases prevalence as a result of unintentional disease vectors breading site or conditions habitat creation such as stagnant water formation in borrow pits left without rehabilitation, etc. during different project activities,
  - Disruption of traditional lifestyle which affects the community negatively or positively,
  - Possible damage of valuable historic, religious, cultural and/or archaeological resources of the area by the intended irrigation activities, etc. (OP/BP 4.11).
  - Occupational health and safety related social risks by the project activities,

After evaluating the most possible adverse impacts, different mitigation measures by project phases are listed under each adverse impact as listed in Table 9-1 below. Worked examples are presented with mitigation measures in different sections of the report.

Table 9-1: Possible adverse impacts of a small scale irrigation project

Ser. No	Possible adverse impacts	Approach of selecting possible adverse impacts
Bio-physical environment		Based on intended SSIP: Project site topography, Farming practices, Technology to be used, Irrigation experiences, Other possible factors in implementing the intended SSIP, etc., select possible impacts and list down mitigation measures for each selected most probable adverse impacts of the project.
1.	Soil erosion	
2.	Waterlogging and salination	
3.	Canal siltation	
4.	Surface and ground water pollution	
5.	Downstream River discharge reduction	
6.	Chemicals leaching	
7.	Increase in groundwater recharge	
8.	Rise in water table	
9.	Canal network clogging	
10.	Water resources depletion	
11.	Downstream water quality change	
12.	Dam reservoir water related diseases	

Ser. No	Possible adverse impacts	Approach of selecting possible adverse impacts
13.	Watershed degradation	
14.	Borehole and quarry site impacts, etc.	
15.	Vegetation clearing	
16.	Crop diseases	
17.	Eutrophication	
18.	Impacts on rare and endangered plants	
19.	Impacts on rare and endangered animals	
20.	Animals and population pressure, etc.	
Socio-economic environment		
21.	Land loss	
22.	Grazing land loss	
23.	Aggravating vector-borne diseases	
24.	Aggravating waterborne diseases	
25.	Movement access disruption	
26.	Resource use conflicts	
27.	Agrochemicals improper uses	
28.	Inadequate water supply, poor sanitation and hygiene	
29.	Access disruption by dam inundation	
30.	Inappropriate occupational health and safety, etc.	

9.2 IMPACT SIGNIFICANCE EVALUATION

Impact prediction utilizes a variety of prediction methods to assess the nature, magnitude and characteristics of residual impacts by taking into account the planned mitigation. Prediction methods vary considerably for each topic and will be described in relevant sections, but generally may include either of the following:

- *Numerical analysis and modeling*, using established empirical, statistical or experimental based models that have the necessary reliability and credibility,
- *Analogies and comparisons* with similar recorded effects, including extrapolations.
- *Overlays and sieve* mapping, combining graphic and numerical data in the GIS.
- Expert judgment, deduction and intuition, either individual or using a panel.

Evaluation of impacts significance is done against a framework of criteria and measures established for the purpose. Specific criteria are, for example, environmental standards and thresholds, protected and sensitive areas, valued ecological functions and components, and resource and land capabilities, etc. in evaluating environmental and social impacts, checklists, Battle Environmental evaluation or UNEP (2002) and other approaches can be used. In this procedural guideline UNEP (2002) evaluation and the matrix approaches are used.

9.2.1 Impact characterizations and evaluation

Different impact characterizations and evaluation can be used in evaluating extent of the impacts as presented in Table 9.2. This is the best applicable in our ESIA report.

Table 9-2: Potential impacts characterization and evaluation interactive matrix

N0	Potential Impacts	Characterization												Evaluation		
		Type		Duration		Area Extent		Probability of Occurrence			Magnitude			Significance		
		Beneficial	Adverse	Short term	Long term	Localized	Extensive	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
I.	**Impacts on Physical Environment**															
1.1	Excavated soil and dust impacts															
1.2	Water abstractions															
1.3	Downstream River discharge reduction															
1.4	Chemicals leaching															
1.5	Increase in groundwater recharge															
1.6	Water table rise															
1.7	Canal network clogging															
1.8	Water resources depletion															
1.9	Downstream water quality change, etc.															
2.	**Impacts on Biological Environment**															
2.1	Vegetation clearing															
2.2	Disturbs aquatic ecosystem															
2.3	Drainage paths chocking impact															
2.4	Invasion of harmful plants impacts															
2.5	Eutrophication															
2.6	Impacts on rare and endangered plants															
2.7	Impacts on rare and endangered animals															
2.8	Crop diseases, etc.															
3.	**Impacts on Social Environment**															
3.1	Employment opportunities															
3.2	Livelihood and food security															

N0	Potential Impacts	Characterization												Evaluation		
		Type		Duration		Area Extent		Probability of Occurrence			Magnitude			Significance		
		Beneficial	Adverse	Short term	Long term	Localized	Extensive	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
	enhancement															
3.3	Waterborne and water related diseases															
3.4	Communicable disease impacts															
3.5	Access Disruption															
3.6	Conflicts on resource use, etc.															
3.7	Land loss															
3.8	Resource use conflicts															
3.9	Grazing land loss, etc															

9.2.2 UNEP 2002 impact significance evaluation approach

The UNEP 2002 approach uses impact rating values shown in Table9.3 below. It uses expertise exposure and knowledge of evaluating impacts.

Table 9-3: UNEP impact rating values

Rating value	Beneficial Impacts	Rating value	Negative Impacts
+5	Highly significant positive change	-1	Slight negative change
+4	Major positive change	-2	Moderate negative change
+3	Significant positive change	-3	Significant negative change
+2	Moderate Positive change	-4	Major negative change
+1	Slight positive change	-5	Severe irreversible change

In using the UNEP 2002 approach, the environmental expert and the ESIA team:

- List down identified positive and negative impacts as shown in the worked examples,
- Use basic environmental and social impacts and your expert's judgment based on UNEP (2002) key references on environmental and social aspects, which include:
  - environmental standards, guidelines and objectives;
  - level of public concern (particularly over health and safety);
  - scientific and professional evidence for:
    - ✓ loss/disruption of valued resource stocks and ecological functions;
    - ✓ negative impacts on social value, quality of life and livelihood; and
    - ✓ foreclosure of land and resource use opportunities.
  - environmental loss and deterioration;
  - social impacts resulting directly or indirectly from environmental change ;
  - non-conformity with environmental standards, objectives and guidelines;
  - likelihood and acceptability of risk.

- Compare the impacts severity weight rate using arbitrary values ranging from +5 to -5 used in UNEP (2002) as described in Table9.3 below.
- Give impacts weight value for each , as much as possible in team, using:
  - consequence levels for natural environmental impacts (Appendix-VII),
  - consequence levels for socio-economic environmental impacts (Appendix-VIII),
- Assign the values for each in list of impacts in the table, in this case Table9.3;
- Undertake simple summation,
- Compare or relate the cumulative result with values in Table9.2, above, and
- Identify the cumulative impacts or severity from the table.

Worked Example
Impacts Significance Evaluations
Impact significance for a small scale irrigation project was undertaken for a project with beneficial and adverse impacts listed in Table7.4 below. Weight was given using the UNEP (2002) criteria for each identified possible positive and negative impacts based on their severity of the impacts. The highest the mean value means, the better the environment will perform with the project. The mean values for positive impacts was found +2.5 which is between moderate to significant positive change while for negative impacts was found -1.7 which falls nearly in moderate negative change. Summing up the two, the cumulative project impacts weight value becomes 0.8 indicating around one which is slight positive change. Therefore, it can be concluded that the small scale irrigation project can bring slight positive change to the area.

Table 9-4: Impact significance evaluation

Ser.	Impacts/Impact significance	Assigned rating value	Remark
	Beneficial impacts		
1.	Creates job opportunities	+3	
2.	Solves sludge collection problems & ensures customers satisfaction	+3	
3.	Minimizes sludge transporting distances, time expend on sludge transportation & promote efficient sludge collection.	+3	
4.	Lowers fuel consumptions & vehicles maintenance budget.	+3	
5.	Reduces or eliminates sludge overflow and pollution cases.	+2	
6.	Promotes renewable energy through biogas production.	+1	
	Sub-average result	**+2.5**	
	Negative impacts		
1.	Results in air pollution	-3.0	
2.	Results in water pollution	-2.0	
3.	Aggravates soils contamination	-1.0	
4.	Aggravates community health & workers safety	-2.0	
5.	Aggravates communicable diseases cases	-2.0	
6.	Creates impacts on archaeological, cultural or religious value places	-1.0	
7.	Polluting the area through flooding	-1.0	
	Sub-average result	**-1.7**	
	Commutative impacts	**0.8**	

9.3 IMPACT SIGNIFICANCE MATRIX APPROACH

Significance of an impact or its consequence or severity can be assessed as a combination of two main factors, *against the assessment criteria* (e.g. standards) previously defined. The following matrix is also used to rationalize the ***significance*** of an impact. This should enable impacts arising from very different causes, with different qualitative and quantitative characteristics, to be described in a common way. Clearly for any impact there is a degree of subjective judgment, depending on the subject, and some topic areas are more quantitative than others.

Sensitivity or Vulnerability of Receptors							
	5	V. High					
	4	High					
	3	Medium					
	2	Low					
	1	V. Low					
	Major; probably unacceptable		Trivial	Minor	Moderate	Major	Massive
	Moderate;		1	2	3	4	5
	Slight; unlikely to be an issue		Effects				
	None, insignificant						

Source: Battle Environmental Evaluation System.

Figure 9-1: Impact significance matrix

10 IMPACTS MITIGATION AND ENHANCEMENT MEASURES

10.1 IMPACTS MITIGATION

Mitigations are measures that have been incorporated into the project design which are required during construction and operational stages. Different impacts are amenable to different approaches, but in general, follow the preferred hierarchy of mitigation measures shown below.

- ***Modifying the source*** by avoidance or reduction, through design, location, selection of technology, operational and management procedures, etc.
- ***Modifying of the pathway*** by treatment or reduction, through applying technological or operational solutions, including barriers and 'end of pipe' treatment.
- ***Mitigating the impacts at the receptor*** by measures such as substitution, compensation, relocation.

In general, the mitigation measures depend on the nature of the impact and the project area baseline environmental and social conditions. Improper design and implementation of small scale irrigation project, SSIP, activities may have negative environmental and social impacts on proposed project areas. Table9-1 presents few of the general potential physical and social environmental adverse impacts of an irrigation project and mitigation measures for the sub-projects. Some of the impacts and possible mitigation measures can be similar with the intended project. But it cannot be the same as project location, water sources and baseline environmental and social conditions can be different. Therefore, the table in appendix shows typical examples which guide the environmental personnel and his ESIA study team in undertaking an irrigation development project ESIA study. Worked examples are presented below for:

- Physical Environmental Components (soil erosion; agrochemicals improper use, ground water use and wind erosion and
- Social Environmental Impacts or Risks (community resource uses conflicts, access disruption and land loss) impacts.

10.2 POTENTIAL POSITIVE IMPACTS

Irrigation projects help in increasing crop production, thereby improving the economic well-being and quality of life of the target population. It contributes substantially to conditions that favors good health, food security, improved infrastructure and economic growth which enables greater purchasing power for drugs and access to health services. Having this general understanding of an irrigation project, list down the possible benefits of the small scale irrigation project of which few of them can be:

- Employment opportunity,
- Livelihood enhancement,
- Ensuring food security,
- Promoting revenues,
- Infrastructure development and improve accessibility of the project area,
- Encourages agro-industry sectoral development, and
- Stabilizing local climate by keeping the irrigable land under vegetation or crops all the year round, this plays significant roles in cooling the local climate, etc.

Worked Examples for a Typical SSIP

Employment opportunities*: One of the main positive impacts of the small scale irrigation project is employment opportunities especially for casual workers, semi and skilled citizens during construction. The employment opportunities have both social and economic benefits. Other indirect sources of employment will also arise as the result of the envisaged project during construction phase.*

Enhances beneficiaries livelihood and food security*: A Typical small scale irrigation project creates opportunity in which the beneficiary community members can secure their own food, increase income and creates opportunities in fulfilling their own basic needs and life through using the scheme for more crop production. The production of the beneficiaries is expected to be tripled compared to the total estimated production of 8,258.79 quintals in the first year of the project to 19,344.40 quintals starting from the fifth year of the project.*

Ensures bridge construction on A Typical River*: A Typical small scale irrigation project right bank command area beneficiaries do not have reliable bridge on a Typical River so far. As presented in this report, the communities are using two wooden bridges which are unsafe and risky especially during rainy seasons. The project, therefore, contains bridge construction on a Typical River in that it ensures safe access road for the communities of the right command areas.*

Reduces Irrigation water Use conflicts*: Beneficiary community raised presences of conflicts on irrigation water uses during consultations. The conflict can exist as the tradional irrigation uses earthen canals that anyone can divert the water at any point wants easily. As the envisaged project uses manageable water distribution canal networks, the project reduces or eliminates the water use based conflicts that has been observed among user communities*

10.3 POTENTIAL ADVERSE IMPACTS AND MITIGATION MEASURES

Small Scale Irrigation Project (SSIP) can have possible potential adverse impacts which can vary based on the project area baseline conditions, irrigation development activities and resource utilizations. The most possible adverse impacts are listed in Table9-1 under chapter 6 based on theoretical and different ESIA reports of a small scale irrigation project. The environmental personnel and the ESIA study team can chose from the impacts and recommend most possible mitigation measures as can be seen from the following sections.

10.3.1 Physical environmental impacts & mitigation measures worked examples

Worked Examples for a Typical SSIP

Soil Erosion

The watershed of the project command area is under cultivation. The topography is rough with cut offs and slopes except near the right river bank. Therefore, soil erosion hazard is expected within most parts of the command areas. Due to irrigation land shortage, areas with slopes more than 5% are included in to the irrigation command areas. Such slopes are easily exposed to soil erosion unless supplemented by on-farmland soil and water conservation measures.

Mitigation measures

- *Use soil bunds on command areas with slopes of 5%-12% integrated with elephant grasses on bunds for soil stabilization which in turn helps in integrating livestock feeds and forage crops in cropping pattern considering livestock and population pressure of the project area,*

- *Use bench terraces on command areas with slopes of 12%-15% by incorporating 2-3 rows of multipurpose trees such as coffee and other vegetables along bottom edges of each bench terraces to stabilize the bench structure and*
- *Promote any wastelands conservation and area closures in the project command area micro-catchment on X River to maintain soil structure and control soil erosion and thus canal siltation.*

Worked Examples for a Typical SSIP

Agrochemicals Improper Use Impacts

Optimum applications of agrochemicals supply nutrients to plants which sustain maximum crop productivity and profitability. It minimizes environmental damages and social impacts from excess nutrients which can affect the natural balance of the micro-environment of the project area. Amount of pesticides is determined on crop type, kind of pest outbreak and type of pesticides to be used. In order to ensure that fertilizers should be applied after careful chemical analysis of the proposed project command area, soil nutrients conditions, the following measures are recommended.

Mitigation measures

- *Follow the agronomist's agrochemical use recommendation which shall be based on the project command area soil fertility status,*
- *Apply or use appropriate agrochemicals as per agronomist recommendations either at top, side dressing, basal dressing, etc.*
- *Apply agrochemicals as per recommendation based on the soil nutrients deficit identified by soil laboratory result. Apply at sowing time, during earthening, transplanting, and in proposed intervals indicated in agronomy report for each recommended crop types.*
- *As the project command area was under traditional irrigation, the soil is expected to have poor nutrients. Therefore, one of the following agrochemicals management practices (excessive use of external inputs, intensified use of local resources with few or/ no external inputs or integrated use of external inputs and local resources) are recommended during implementation period.*

Worked Example for Teru Ground Water Small Scale irrigation Project (MoWI, 2016)

Wind Erosion Impacts

Wind erosion damages soil by removing organic matter, plant nutrients, and by decreasing soil thickness. A study shows that 405,000–6,000,000 hectares of land were damaged by wind erosion all over the world between 1935 and 1976 (Hidlebaugh and Grunewald, 1977).

Blowing soil particles can damage plants, particularly young seedlings, by sand blasting. Seedlings may be cut off at ground level, requiring reseeding. Wind induced damage can also make plants more susceptible to damage by insects and diseases. In addition to these on-site problems, there can be detrimental soil deposition that can result in pile up of wind-blown soil that can result in sediment problems in canal systems. It is identified that, wind erosion is the main serious type of erosion problem of the project command area.

Mitigation measures

To control this type of erosion of the project area:

- *planting windbreaks and maintenance of soil cover around and at appropriate sites of the project command area,*
- *mulching agricultural land,*
- *leave crop stubble, plants' old root systems, etc. on the ground surface so as to increase surface roughness and hold soil in place and*
- *cover agricultural field by crops.*
- *plan budget for windbreak plantations nursery establishment, plantations and follow up.*

Worked Example for Teru Ground Water Small Scale irrigation Project (MoWI, 2016)

Well water quality deterioration

Irrigation development results in water quality deterioration. Contaminated drainage water may enter into the ground and leach salts, nutrients, herbicides and pesticides. Owing to drainage of surface and groundwater in the project area, this may be saline and polluted by agrochemicals. The quality of groundwater of the project command area can be deteriorated by saline and polluted water by agrochemicals which make it less fit for domestic and animals' water supply. It may lead to public health problems as polluted well water may result in waterborne and water related diseases. Therefore, to minimize such possible water quality problems, the following measures are recommended.

Mitigation measures

To control and protect such water quality deterioration problems:

- *minimize water use and apply only enough to meet crop-water demands through regular soil moisture monitoring,*
- *optimize agrochemicals utilization based on irrigation command area soil fertility,*
- *use appropriate dose and selective type of agrochemicals,*
- *ensure proper agrochemicals application monitoring, and*
- *conduct periodic water quality monitoring.*

10.3.2 Social risk impacts and mitigation measures worked examples

Worked Examples for a Typical SSIP

Access Disruption

The project involves construction of canal networks and drainages as for other irrigation projects. Canals will be kept full of water throughout the year to minimize seepage and the drainage canals can be full of water. Except for the field drainages, all canals will be wide that can hinder community and livestock movements unless appropriate crossing culverts are included in design and constructed.

Mitigation Measures

- *Consult irrigation beneficiaries and identify optimal number of canal crossing culverts and include bridge during construction.*

Worked Examples for a Typical SSIP

Conflicts on Resource Use

All inhabitants of the project area expect to have plots of irrigable lands. Some of them irrigable land and few of them may do not have within the project command area. In addition to normal water use problems, conflicts may exist with those community members that own farmlands in the command and those who do not have such irrigable lands. As a result, conflicts can exist on water uses and irrigable land distribution.

Mitigation measures

To avoid resource use based conflicts and promote community livelihood enhancements by:

- *Irrigation plots should be distributed based on existing rules and regulation and those who previously own shall be compensated,*
- *Any communal resource uses among beneficiaries shall be guided by committee composed of the project beneficiaries, and*
- *Promote community awareness on livelihood enhancement and harmonizing any negative effects of the planned development with the existing project area ecological, social and economic environmental conditions.*

Worked Examples for a Typical SSIP

Social Health Risk And Hazard

It is indicated in the baseline section that, the project command area is under settlement and the traditional canal passes in the concentrated residences. Although, the canal network is to be upgraded into modern it is unavoidable that that the canal passes in the residences. As the canal is open, it can have risk on children and animals.

Mitigation measures

To minimize such social and animal risks, it is recommended that:

- *canals in concentrated residence areas should be fenced to protect children and animals from entering into and be affected,*
- *beneficiaries should know, understand and be part of solutions for protecting the risks,*
- *construct a minimum of a bridge to the right command area of a Typical small scale irrigation project by changing the existing wooden bridge/s on a Typical River and*
- *promote community awareness on risk management and protection.*

11 PUBLIC CONSULTATION

There are a number of potential role players in an EIA. The main once are the proponent, consultant, interested and affected parties and the Competent Agency (EPA, 2000). Stakeholders and public consultations aim in ensuring the quality, comprehensiveness and effectiveness of the environmental and social assessment of a project and also considerations of interested and affected parties views and concerns. The approaches can be through focus group discussions, meetings of which minute and lists of participants should be annexed. Therefore, to have views and consents of the project stakeholders:

- Arrange or have appointment for stakeholders' representative consultation.
- Represent the consultative meetings participants from different community groups; from youth, women, elders, kebele council, NGOs and project beneficiaries together at kebele level.
- List community representatives' consultation participants' names, institutions and telephone using registration form (Appendix-VI.12).
- List stakeholders' consultation participants' names, institutions and telephone using registration form (Appendix-VI.13).
- Assign a rapporteur of the meeting,
- Introduce the consultative meeting Agenda (Appendix-VI.11),
- Introduce the project and its expected components,
- Take participants photographs as much as possible,
- Conduct consultation with the Woreda key sectors officials, if it is for woreda stakeholders or with the selected community representatives of the project beneficiary communities of the project kebele,
- Discuss on the project possible benefits and list them down,
- Discuss on the project possible threats or adverse impacts and list them down clearly,
- Discuss on possible mitigation measures which help in minimizing or optimizing possible project impacts and list one by one.
- Evaluate and summarize the existing or expected potential environmental and social issues that will likely arise with the proposed project implementation and gather important information on the project benefits, expected negative impacts, extent of expected negative impacts and recommend possible mitigation measures as much as possible.
- List down participants' views, attitudes towards the project and understanding including their recommendations regarding the small scale irrigation project.
- Have minute/s of consultations,
- Sign, stamped and annex minute and list of participants to the ESIA report.

12 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

12.1 GENERAL

Environmental and social management plan is the core of an ESIA report. It contains two major issues; *impact mitigation measures* and *their managements*. The purpose of *mitigation* is to identify measures that *safeguard* the environment and the community affected by the project. It seeks the best ways and means of avoiding, minimizing and remedying impacts. It aims at preventing adverse impacts from happening and keeps those do occur within an acceptable level. The process of translating the envisaged mitigation measures into an action is referred to as *impact management* and this takes place during project implementation and/ or operation.

The impacts severity depends on the project area environmental and social resources carrying capacities. The project management body is expected to work by aiming at harmonizing such activities in the carrying capacity of the project site environment through implementing recommended mitigation measures during the project design, construction and operation phases. The environmental expert is expected to implement the recommended environmental and social management activities with accountabilities. To undertake activities of this section:

- Distinguish and indicate activities of each phase i.e. design or pre-construction phase, construction phase and operation phase.
- Based on the project site environmental and social baseline conditions, project locations and activities nature; distinguish possible adverse impacts of the project (see chapter-9).
- Indicate clearly mitigation measures for each.
- Assign responsible body or bodies for each recommended mitigation measures based on careers in the project assignment, their institutional roles and responsibilities (Including enforcement & coordination) of their institutional establishment.
- Distinguish the impacts and their mitigation measures by project phases.
- Estimate budget for the implementation of the recommended mitigation measures.
- Summarize the activities stated as ESMP of the SSIP using Table 12-1 below.

Table 12-1: Environmental and Social Management Plan

Subproject activities for each phases of the subproject	Potential Environmental and Social Impacts	Proposed Mitigation Measure(s)	Institutional Responsibilities	When to implement? (schedule of mitigation plan implementation)	Cost Estimates
Pre-Construction Phase					
Construction Phase					
Operation and Maintenance Phase					

Source: AGP ESIA guideline, February 2012, Addis Ababa, Ethiopia.

12.2 TYPICAL EXAMPLES ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

For clear understanding of this section, see worked examples shown in Table12-2 from an ESIA report of a Typical small scale irrigation project (October, 2016) undertaken by AGP program in SNNPRS, Sidama Zone, Wendogenet Woreda, X kebele.

Table 12-2: Environmental and social management plan typical example

Ser.	Subproject activities for each phases of the subproject	Potential Environmental and Social Impacts	Proposed Mitigation Measure(s) (Incl. legislation & regulations)	Institutional Responsibilities (Incl. enforcement & coordination)	When to implement? (schedule of mitigation plan implementation)	Cost Estimates
Pre-Construction Phase or Design phase						
A. Bio-physical Environmental Component Management Plan (Pre-design phase)						
1.	Design drainage canal	Soil acidity	• Design drainage systems to leach salts down through soil profiles so as to effectively release excess water from irrigable land.	Irrigation design engineer	Design phase	Study budget
2.	Improper canal designing	Soil acidity	• Proper canal planning to sustain long-term scheme operation.	Irrigation design engineer	Design phase	Study budget
3.	Vegetation clearing	Vegetation clearing main canal	• Design main canal alignment that crosses vegetation or forest area to project command area by optimizing forest damage or re-routing the canal alignments.	Irrigation design engineer	Design phase	Study budget
B. Socio-economic Environmental Component Management Plan (Pre-design phase)						
4.	Canals design	Water borne and water related disease	• Design canals and drainages so as to allow water flowing with velocity capable to prevent vector breeding in canals.	Irrigation development office	Design phase	Study budget
5.	Canals design	Access Disruption	• Consult irrigation beneficiaries and identify optimal number of canal crossing culverts for human and animals and include during construction.	Irrigation design engineer	Design phase	Study budget
Construction Phase						
A. Bio-physical Environmental Component Management Plan (Construction phase)						
6.	Micro-irrigation system construction	Soil acidity	• Construct micro-irrigation system to use water more precisely and limit quantities to no more than crops needs to minimize waterlogging.	Contractor	Construction phase	Project budget

Ser.	Subproject activities for each phases of the subproject	Potential Environmental and Social Impacts	Proposed Mitigation Measure(s) (Incl. legislation & regulations)	Institutional Responsibilities (Incl. enforcement & coordination)	When to implement? (schedule of mitigation plan implementation)	Cost Estimates
7.	Soil excavation and disposal	Dust	• Construction site watering, • Limit vehicles speed. • Manage nuisance of road users. • Cover excavated soil and other materials securely with tarpaulins.	Contractor	Construction phase	Project budget
8.	Canals construction	Access Disruption	• Construct optimal number of canal crossing culverts for human and animals as per designed and agreed by the beneficiaries.	Contractor	Construction phase	Project budget
9.	Canals construction	Water borne and water related diseases	• Construct canals and drainages so as to allow water flowing with velocity capable to prevent vector breeding, etc.	Contractor	Construction phase	Project budget
10.	Over fertilization	Eutrophication	Use one of the following fertilizers management practices: • Appropriate use of external inputs, • Intensified use of local resources with few or/ no external inputs or • Integrated use of external inputs and local resources. The above mitigation measures shall be based on soil nutrient content result and the agronomist's recommendation.	• Irrigation agronomist & • Irrigation beneficiary farmers.	At the time of: • Sowing, • Earthening, • Transplanting • In proposed intervals as per agronomist recommendation.	Operation budget
11.	• Agrochemicals applications • Improper farming practices	• Aquatic ecology damage	• Avoid over irrigating. • Maintain crop water needs through proper watering and regular soil moisture keeping. • Optimize agrochemicals utilization based on the irrigation command area soil fertility and additional nutrient needs, • Use appropriate dose and selective type	• Irrigation engineer, • Water users committee, • Irrigation beneficiary farmers. • Environmentalist	Irrigation operation phase all the year round.	Operation budget

Ser.	Subproject activities for each phases of the subproject	Potential Environmental and Social Impacts	Proposed Mitigation Measure(s) (Incl. legislation & regulations)	Institutional Responsibilities (Incl. enforcement & coordination)	When to implement? (schedule of mitigation plan implementation)	Cost Estimates
			of agrochemicals. • Ensure proper agrochemicals application. • Conduct periodic downstream water quality monitoring. • Allow adequate downstream compensation flow to optimize water dilution & promote healthy ecological and natural system balance.			
12.	Command area clearing and farming	Impacts on rare and endangered plant species	• Identify and protect the rare and endangered ruminant plant species of the project command area, etc.	• Woreda natural resources section, • Project promoters	Operation phase	Operation budget
	B. Socio-economic Environmental Component Management Plan (Construction phase)					
13.	Canals construction	Water borne and water related diseases	• Construct canals and drainages so as to allow water flowing with velocity capable to prevent vector breeding.	Contractor	Construction phase	Project budget
14.	Canals construction	Access Disruption	• Construct optimal number of canal crossing culverts for human and animals as per designed and agreed by the beneficiaries.	Contractor	Construction phase	Project budget
15.	Soil excavation and disposal	Dust	• Construction site watering, • Limit vehicles speed. • Manage nuisance to other road users • Cover transported excavated soil and other materials securely with tarpaulins.	Contractor	Construction phase	Project budget
16.	Safety wears improper use	Occupational Health and Safety	• undertake awareness creation on occupational health and safety for the construction workers by the contractor • provide adequate facilities for treating	Contractor with line sector • Contractor	Construction phase	Project construction budget

Ser.	Subproject activities for each phases of the subproject	Potential Environmental and Social Impacts	Proposed Mitigation Measure(s) (Incl. legislation & regulations)	Institutional Responsibilities (Incl. enforcement & coordination)	When to implement? (schedule of mitigation plan implementation)	Cost Estimates
			emergency in the cases of dangerous occurrences • contractor shall have trained first aid worker & provide first aid kits with appropriate materials & medicines • Construction workers should wear appropriate safety materials such as footwear, dust masks, respirators, gloves, etc. and these should be provided by the contractor, etc.	• Contractor • Contractor		
Operation and Maintenance Phase						
A. Bio-physical Environmental Component Management Plan (Operation phase)						
17.	Farming activities	Canal siltation	• Promote planting appropriate grasses such as elephant grass and other animal fodders on upper side of the irrigation canal networks to protect eroded soil particles from entering into the canals. • Undertake regular de-silting and canal maintenance and • Promote any wastelands in command area conservation and area closures. • Promote the River's in X kebele micro-catchment conservation, etc.	Irrigation agronomist, Soil and water conservationist Irrigation beneficiary farmers.	Irrigation operation phase all the year round.	300,000.00
18.	River diversion	Reduced downstream river discharge	• Train water committee on efficient irrigation water use so as to save water for irrigating the project command areas • Release appropriate amount of the water source downstream compensation flow based on water sources entering the river	• Irrigation engineer, • Water users committee, • Irrigation beneficiary farmers.	Irrigation operation phase all the year round.	75,000.00

Ser.	Subproject activities for each phases of the subproject	Potential Environmental and Social Impacts	Proposed Mitigation Measure(s) (Incl. legislation & regulations)	Institutional Responsibilities (Incl. enforcement & coordination)	When to implement? (schedule of mitigation plan implementation)	Cost Estimates
			system after the diversion point. • Monitor seasonal discharges and downstream flow patterns of Typical River so as to reduce or eliminate downstream impacts.			
19.	Irrigation farm over watering	Soil acidity	Proper canal operation, maintenance and appropriate watering to sustain long-term development of the scheme.	• Irrigation engineer, • Water users committee,	Operation phase	Operation budget
20.	Poor canal operation and maintenance	Water shortage	Proper canal operation and timely maintenance	• Irrigation line sector & • Water users committee	Operation phase	Operation budget
21.	Under fertilization	Poor soil nutrients Under productivity	Apply appropriate fertilizers: • based on the soil nutrient content, • as per agronomist recommendations, • either by top dressing, side dressing, basal dressing, etc.	• Irrigation agronomist & • Irrigation beneficiary farmers.	At the time of: • Sowing, • Earthening, • Transplanting • Within proposed intervals	Operation budget
22.	Excavating construction materials, transporting	Construction materials quarry impacts	• The quarry site should be free of pond formation as it can create breeding grounds for disease causing vectors and results problems on human and animals.	• Project engineer, • Environmental personnel	Operation phase	Operation budget.
23.	Quarrying, safety issue training activities	Impact of non-implementation of occupational health and safety	• Provide pesticide safety training, notification of pesticide applications, use of personal protective equipment, restricted-entry intervals after pesticide application, decontamination supplies, and uses.	• Agronomist, • Crop protection expert, • Water users associations.	Operation phase	Operation budget.
24.	Quarrying, safety issue training activities	Impact of non-implementation of occupational health and safety	• Strengthen environmental monitoring and supervision by an environmental personnel,	• Environmental personnel	Operation phase	Operation budget.

Ser.	Subproject activities for each phases of the subproject	Potential Environmental and Social Impacts	Proposed Mitigation Measure(s) (Incl. legislation & regulations)	Institutional Responsibilities (Incl. enforcement & coordination)	When to implement? (schedule of mitigation plan implementation)	Cost Estimates
25.	Canals lining in residences and settlements	Social risk and health hazard	• Fencing and/or using closed canal and promote project beneficiaries awareness on risk management and protection, etc.	• Irrigation beneficiary farmers.	Operation phase	150,000.00
26.	Irrigation command area clearing and farming	Impacts on rare and endangered plant species	• Identify and protect the rare and endangered ruminant plant species of the project command area.	• Woreda natural resources section, • Project promoters	Operation phase	Operation budget
			• Protect and conserve rare and endangered plant species.	• Project beneficiaries	Operation phase	Operation budget
			• Collect seeds and develop on nurseries and plant the rare and endangered plant species.	• Woreda natural resources and • Project beneficiaries.	Operation phase	Operation budget
			• Project beneficiaries' awareness shall be created so as to ensure protection and conservation of the species.	• Project promoter.	Operation phase	Operation budget
27.	• Agrochemicals applications • Improper farming practices	• Aquatic ecology damage	• Avoid over irrigating. • Maintain crop water needs through proper watering and regular soil moisture keeping. • Optimize agrochemicals utilization based on the irrigation command area soil fertility and additional nutrient needs, • Use appropriate dose and selective type of agrochemicals. • Ensure proper agrochemicals use. • Conduct periodic downstream water quality monitoring. • Allow adequate downstream compensation flow to optimize water	• Irrigation engineer, • Water users committee, • Irrigation beneficiary farmers. • Environmentalist	Irrigation operation phase all the year round.	Operation budget

Ser.	Subproject activities for each phases of the subproject	Potential Environmental and Social Impacts	Proposed Mitigation Measure(s) (Incl. legislation & regulations)	Institutional Responsibilities (Incl. enforcement & coordination)	When to implement? (schedule of mitigation plan implementation)	Cost Estimates
			dilution and promote healthy ecological and natural system balance, etc.			
B. Socio-economic Environmental Component Management Plan (Operation phase)						
28.	• Canal distribution, • Irrigation infrastructure (road & camp)	Land loss	• Ensure proper and legal based irrigation land distribution. • Compensate other farmlands outside the irrigation command area for those farmers who may lose their lands within the command area.	• Irrigation development Office, • Land administration office, • Kebele administration & • Irrigation users	Operation phase	Operation budget
29.	Irrigation water distribution	Resource uses conflicts	• Train water users committee on irrigation water proper distribution and irrigation project resources handling. • Promote project beneficiaries awareness on communal resource uses, livelihood enhancement and harmonizing any negative effects of the irrigation project with the project area ecological, social and economic environmental conditions.	• Irrigation development Office, • Water users committee, • Kebele administration, • Irrigation beneficiary farmers.	Operation phase	See budget above for training.
30.	• Drinking from irrigation canal, • Stagnant water or pools formation	Waterborne and Water Related Health Impacts	• Promote efficient irrigation water use or watering and avoid stagnant water pools. • Avoid vector breeding sites. • Maintain draining canals to remove weeds, silt and irregularities so that vector breading is prevented. • Conduct regular canals monitoring, de-silting and drain possible vector breeding sites. • Promote waterborne and water related disease control and prevention.	• Irrigation engineer, • Water users committee, • Kebele administration, • Irrigation beneficiary farmers. • Health personnel	Operation phase all the year round.	Operation budget

Ser.	Subproject activities for each phases of the subproject	Potential Environmental and Social Impacts	Proposed Mitigation Measure(s) (Incl. legislation & regulations)	Institutional Responsibilities (Incl. enforcement & coordination)	When to implement? (schedule of mitigation plan implementation)	Cost Estimates
			• Provide safe water supply for the intended irrigation area communities to promote domestic uses and enable to keep personal hygiene. • Strengthen health and environmental sanitation awareness for the project beneficiaries.			
31.	Canals lining in residences and settlements	Social risk and health hazard	• Canals in concentrated residences should be fenced to protect children and animals from entering into and be affected.		Canals lining in residences and settlements	Social risk and health hazard
32.	Water diversion or intake	Reduced downstream river discharge	• Train water committee on efficient irrigation water use so as to save water for irrigating the project command areas • Release appropriate amount of the River downstream compensation flow based on water sources entering the river system after the diversion point. • Monitor seasonal discharges and downstream flow patterns of the River so as to reduce or eliminate downstream impacts.	• Irrigation engineer, • Water users committee, • Irrigation beneficiary farmers.	Irrigation operation phase all the year round.	75,000.00
	Sample budget total estimated					**375,000.00**

13 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

13.1 GENERAL APPROACH

Environmental and social monitoring is an important tool for its management. It aims at ensuring effectiveness of implementations of the recommended environmental and social mitigation measures. The monitoring activities are implemented at design, construction and operation phases of a project. The bases of environmental monitoring parameters are the recommended environmental and social mitigation measures listed in the environmental and social management plan including environmental audit. The monitoring is, therefore, expected to be conducted during project design or pre-construction, construction and operation phases as summarized in Table13.1 below.

Table 13-1: Environmental and social impacts monitoring plan format

Proposed Mitigation Measure	Monitoring objective	Parameters to be Monitored (Indicators)	Location	Measurements (Incl. methods & equipment)	Frequency of Measurement	Responsibilities (Incl. review and reporting)	Cost (equipment & individuals)
Pre-Construction Phase							
Construction Phase							
Operation and Maintenance Phase							
Total Cost for all Phases							

Source: AGP ESIA guideline, February 2012, Addis Ababa, Ethiopia.

Monitoring activities give responses for questions *what*, *why, where, who* and *how* the recommended mitigation measures implemented.

- Understand that the basis for the monitoring activities (1st column) is the *recommended mitigation measures*.
- Identify and write down *monitoring objective* for each monitoring activity,
- Distinguish and write down the *parameter/s to be monitored* for each recommended mitigation measures in each project phases,
- Indicate *monitoring indicators* based on the project conditions and contexts,
- Indicate *where* the monitoring activities are to be undertaken or implemented.
- Write down *how* you or the monitoring team ensures/s its implementations.
- Indicate *how* many times the monitoring activities should be done in a year or more in order to ensure proper implementation,
- Indicate *who* undertakes the monitoring activities, and
- Recommended financial needs for the implementation of the monitoring activities.

For understanding clearly, see the following worked examples (Table13.2) for a Typical SSIP, AGP program.

13.2 ENVIRONMENTAL AND SOCIAL MONITORING PLAN TYPICAL EXAMPLE

Table 13-2: Environmental and social impacts monitoring plan worked example

Proposed Mitigation Measure (for each impact and each activities)	Monitoring objective	Parameters to be Monitored	Indicators	Location	Measurements (Incl. methods & equipment)	Frequency of Measurement	Responsibilities (Incl. review and reporting)	Cost (equipment & individuals)
Pre-Construction Phase								
Design appropriate drainage systems to leach-out salts through soil profiles.	To protect soil acidity	Canal slopes	Drainage inclination	Tertiary canals & farm down-streams	Observation	During design	• Irrigation Engineer and • Client	Project budget
Design canals and drainages so as to allow water flowing with velocity capable to prevent vector breeding.	To protect waterborne and water related diseases	Canal slopes	Canal network inclination	In command area & canals end.	Observation	During design	• Irrigation Engineer and • Client	Project budget
Consult irrigation beneficiaries and identify optimal number of canal crossing culverts for human and animals and include during construction.	To create canal crossing access for human and animals	Designed number of culverts at essential crossings	Designed culverts	In command area & at weir site	Observation	During design	• Irrigation Engineer , • Beneficiaries	Project budget
Construction Phase								
Construct canals and drainages so as to allow water flowing with velocity capable to prevent vector breeding.	To avoid disease causing vector breeding	Canal construction as per designed	Proper water flowing	Canals	Observation	One to two months during construction	• Contractor, • Irrigation Engineer, • Technic committee	Construction Budget
Construct optimal number of canal crossing culverts for human and animals as per designed and agreed by the beneficiaries.	To ensure human and animals canals crossing	Number of canal crossings with settlements & paths	Constructed canal crossings	Command area	Observation	Within one to two months during construction	• Contractor, • Irrigation Engineer, • Technic committee	Construction Budget
Operation Phase								
Proper canal operation and	To control	Crop water	Crop growth	Command	Amount of	Irrigation	• Water users	Operation

Proposed Mitigation Measure (for each impact and each activities)	Monitoring objective	Parameters to be Monitored	Indicators	Location	Measurements (Incl. methods & equipment)	Frequency of Measurement	Responsibilities (Incl. review and reporting)	Cost (equipment & individuals)
timely maintenance.	water shortage	demand		area	water in canal system	period	committee & • Irrigation Engineer	Budget
Train water users committee on efficient irrigation water use so as to save water for irrigating the project command areas.	To avoid irrigation water shortage and conflict	Irrigation water availability & water use conflict absences	Regular water availability and peaceful irrigation water use	Irrigation command area & beneficiaries	Water use problems identification	Regularly	• Irrigation Engineer, • Technic committee, • Environmentalist,	60,000.00
Allow adequate downstream compensation flow to optimize water dilution and keeping healthy ecological and natural system balance.	To avoid downstream impacts	Amount of the River downstream release & other entering the river course	Pollutant loads and pollution statuses	Down stream	Water sampling and analysis results	Within every two-three years period	• Irrigation Engineer • Irrigation Environmental personnel	60,000.00
Total Cost for all Phases								**180,000.00**

Source: ESIA report of a Typical SSIP AGP program SNNPRS, Sidama Zone, Wendogenet Woreda, X kebele, October, 2016

14 ENVIRONMENTAL AND SOCIAL AUDIT

14.1 GENERAL

EIA procedural guideline series-1 (EPA, 2003) indicates that Environmental Assessment (EA) audits are conducted at various stages in ESIA process. It indicates that environmental and social audit is expected at the corresponding levels in project cycles and a step wise approval shall be done. The environmental and social audit is expected to be made in two or three years at minimum period to evaluate implementations of the recommended environmental and social mitigation measures indicated in the environmental and social management plan of the project.

14.2 ENVIRONMENTAL AND SOCIAL AUDIT TYPES

There are two main environmental audit types; Compliance audit and environmental risk audit. Briefs of both types are presented below.

14.2.1 Compliance auditing

Compliance auditing is probably the most common form of environmental auditing. It is a verification process whereby the industrial enterprise establishes the extent to which it is complying with environmental legislation, discharge and emission limit standards, environmental quality standards etc.

14.2.2 Environmental and social risk audit

Environmental and social risk audit involves taking professional judgment to assess the likelihood of an environmentally damaging occurrence and the consequences of the event. The audit relies heavily on observation and the skill and experience of the auditor to recognize both hazards and the potential consequences.

14.3 ENVIRONMENTAL AND SOCIAL AUDIT PROCESS

Environmental audit process is usually categorized into three stages; pre-audit activities, onsite audit activities and post audit reporting (EPA, 2006). We are going to discuss each of these steps in the following sections. A typical Environmental and Social Audit procedure and schedule is presented in Table14.1.

14.3.1 Pre-audit activities

The pre-audit activities of and environmental and social audit is planning of the audit itself. Planning is fundamental to the success and it is vital in having clear idea of what is to be achieved, how the audit is conducted and what the follow-up mechanism will be in minimizing time spent on audit activities and prepare audit team in operating at maximum productivity throughout the audit program.

14.3.2 Onsite audit activities

The execution of the audit in the industrial enterprises (i.e. onsite) involves among others an opening meeting, site tour/inspection, collection of information/evidence, evaluation and verifications, team meetings, preparation of findings and a close out meeting.

14.3.3 Post audit reporting

The final stage of the audit involves producing an audit report in which the audit findings, conclusions and recommendations are presented. The wording of the findings should not deviate from those agreed upon in the closing meeting. The lead auditor is responsible for the preparation, accuracy and completeness of the audit report. The audit report (Appendix-IX) should be dated and signed by the lead auditor.

Table 14-1: Environmental and social audit activities and schedule

S. No	Activities	Date	Remarks
1	**Pre-site activities**		
1.1	Selection of team members		
1.2	Preparation of working document by listing down the major adverse impacts with their mitigation measures shown in the EMP.		
2	**On-site activities**		
2.1	Opening meeting with the project proponent		
2.2	Conducting site investigations		
	Identifying the major adverse impacts status and implementation of the recommended major mitigation measures for the listed most possible adverse impacts of the SSIP activities.		
2.3	Data gathering / Collecting evidences		
	Interview, examining documents, taking photographs and photocopies of documents where necessary, etc.		
2.4	Verification		
	Ensuring gathered data by cross checking with other sources such as procedures and guidelines.		
2.5	Evaluation and site investigation closing		
	• Classifying and analyzing environmental and social audit findings. • Identifying major environmental and social problems or issues of the SSIP activities and indicate their significance. • Assessing non-compliance activities. • Checking effectiveness of corrective actions. • Identifying improvements. • Formulating recommendations. • Discussing findings with the project promoter. • Closing meeting.		
3	**Post-site activities**		
3.1	Draft audit report preparation.		
3.2	Submission of the report to project promoter for comment.		
3.3	Receive comments and finalizing the report		
3.3	Issue final audit report to project promoter.		

14.4 ENVIRONMENTAL AND SOCIAL AUDIT TYPICAL EXAMPLE

Table 14-2: Typical environmental audit observations and findings

Ser. no	Observations and Findings	Possible Causes			
		Management Problem	Technical Problem	Lack Awareness	Opportunity
A.	**Excavated soil and dust impacts**				
1.	Maximize re-use of all excavated soils and materials in the project construction works;	xx	xx		
2.	Dispose surplus materials only at designated sites and	xx	xx		
3.	Consider topsoil conservation for agricultural purposes or consider long-term soil stability against shrinking and swelling during soil disposal.	xx			
B.	**Agrochemicals Impacts**				
1.	Strictly follow the agronomist's agrochemical use recommendation which shall be based on soil fertility status,	xx		xx	
2.	Implement appropriate agrochemicals application methods as per agronomist recommendations either top, side dressing, basal dressing, etc.	xx		xx	
3.	Apply agrochemicals as per recommendation at the time of sowing, earthening, transplanting, and in proposed intervals indicated in agronomy report for proposed crop types.	xx			
4.	As the project command area was under traditional irrigation, the soil is expected to have poor nutrients. Therefore, one of the following agrochemicals management practices (excessive use of external inputs, intensified use of local resources with few or/ no external inputs or integrated use of external inputs and local resources) are recommended during implementation period.	xx		xx	
C.	**Soil Erosion**				
1.	Use soil bunds on command areas with slopes of 5%-12% integrated with elephant grasses on bunds for soil stabilization which in turn helps in integrating livestock feeds and forage crops in cropping pattern of the project considering livestock and population pressure in the project area,	xx			
2.	Use bench terraces on command areas with slopes of 12%-15% by incorporating 2-3 rows of multipurpose trees such as coffee and other vegetables along the bottom edge of each bench terraces to stabilize the bench structure and	xx			
3.	Promote any wastelands conservation and area closures in the project command area micro-catchment on X River in project kebeles to maintain soil structure and control soil erosion and thus canal siltation.				xx
D.	**Access Disruption**				
1.	Consult irrigation beneficiaries and identify optimal number of canal crossing culverts and include during construction.				xx
E.	**Conflicts on Resource Use**				
1.	Irrigation plots should be provided based on existing rules and regulation and those who previously own shall be compensated,	xx			

Ser. no	Observations and Findings	Possible Causes			
		Management Problem	Technical Problem	Lack Awareness	Opportunity
2.	Any communal resource uses among beneficiaries shall be guided by committee composed of the project beneficiaries, and				xx
3.	Promote community awareness on livelihood enhancement and harmonizing any negative effects of the planned development with the existing project area ecological, social and economic environmental conditions.				xx
F.	**Rare and endangered plant species impacts**				
1.	Identify and protect the rare and endangered ruminant plant species.	xx			
2.	Protect and conserve rare and endangered plant species.				xx
3.	Collect seeds and develop on nurseries and plant the rare and endangered plant species.	xx			
4.	Project beneficiaries' awareness shall be created so as to ensure protection and conservation of the species.		xx		
G.	**Poor Occupational Health and Safety Impacts**				
1.	Undertake awareness creation on occupational health and safety for the construction workers by the contractor;	xx			
2.	Provide adequate facilities for treating emergency in the cases of dangerous occurrences;	xx		xx	
3.	The contractor shall have trained first aid worker and provide first aid kits with appropriate materials and medicines;	xx		xx	
4.	Construction workers should wear appropriate safety materials such as footwear, dust masks, respirators, gloves, etc. and these should be provided by the contractor, etc.	xx		xx	

15 ENVIRONMENTAL AND SOCIAL REPORTING AND DISCLOSURE

15.1 GENERAL

Systems of reporting of the SSIP environmental and social management and monitoring activities are essential in following implementations of the recommended mitigation measures. The project environmental and social management body is expected to report the performances of planned environmental and social management in planned reporting timeframes. The report needs to have all necessary data related to the proposed environmental and social management and monitoring plan of the SSIP environmental and social planned activities. Undertaking internal and/or external environmental and social audit is also recommended as it is necessary to strengthen the Management and Monitoring plan performances of the project.

15.2 QUARTERLY INSPECTION REPORT

Site inspection activities and findings shall be reported quarterly including financial and physical activities performance reports of the project. Any unaddressed planned environmental and social activities must be considered and reported in the next reporting period until the aspect is solved as it allows in addressing environmental and social issues of the project so as to ensure environmental and social harmony and sustainability.

15.3 SSIP ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN PERFORMANCE REPORT

The project environmental and social management plan contains different activities that need implementations and follow up. Its report provides information of how the planned environmental and social activities of the project were adapted and performed. Development of these plans form basis for continued improvements of the aspects.

15.4 DATA BASE AND REPORTING

Establishing environmental and social data and information records of the project activities are the basis of ensuring the environmental and social performances of the SSIP. Recorded information shall be reviewed and evaluated to improve effectiveness of the implementations of the planned activities. Annual summary of the information shall be reported to appropriate regulatory body at different levels so that they can evaluate performances of the recommended environmental and social management plan, monitoring plan and achievements. Generally, the environmental and social management and monitoring activities findings are expected to be reported with other development activities of the SSIP progress reports.

Therefore, the environmental management body of the SSIP expected to:

- Plan environmental and social management and monitoring activities each year,
- Have records of achievements of the planned activities,
- Have proper documentation handling or archive so as to enable follow ups of the environmental and social management and monitoring of the SSIP project, etc.

16 ESIA IMPLEMENTATION BUDGET

The environmental and social management and monitoring activities are expected to be conducted by an environmental management body in which an environmental expert is expected which probably needs on job training or awareness in order to undertake effectively recommended mitigation and monitoring activities. The environmental and social management budget is expected to comprise:

- The environmental personnel allowances,
- Capacity building expenses of the environmental expert and project implementing committee,
- Environmental and social management plan implementation costs,
- Environmental and social monitoring plan implementation costs, and
- Summarize the budget using Table16-1 below.

Table 16-1: Estimated ESIA implementation budget format

Activities	Frequency	Sub topics	Investment	Annual	Total of Yearly Cost	Annual Operational Costs by year					*Total Budget*
						Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*	

To simplify the annual operational budget:

- List down all items with recommended budget in the environmental and social management plan, environmental and social monitoring plan, salary and others shown in the report,
- Categorize the budget needs under each sub topics, and indicate by sub-totals,
- Estimate budgets for each parameters under each category and indicate sub-total budget for the first consecutive five years,
- Indicate grand budget total for the first three–to-five consecutive years.

16.1 ENVIRONMENTAL AND SOCIAL BUDGET TYPICAL EXAMPLE

For clear understanding, of environmental and social budgeting, see the following worked examples for a Typical SSIP, SNNPRS, Sidama Zone, Wendogenet Woreda, X kebele, as presented in Table16-2.

Table 16-2: Environmental budget typical examples

No	Activities	Frequency	Investment	Annual	Total of Yearly Cost	Construction	Annual Operational Costs by year				
						yr1	Yr2	yr3	yr4	yr5	yr6-yr26
1	**Environmental and Social Impact Management Plan**		**-**	**-**	**-**	-	-	-	-	-	-
1.1	Train water committee on efficient irrigation water use	Irrigation operation phase all the year round	-	75,000	75,000	-	25,000	25,000	25,000	-	-
1.2	Awareness on risk management and protection	Operation phase	-	150,000	150,000	-	50,000	50,000	50,000	-	-
1.3	Promote project environmental personnel's capacity	Operation phase	-	60,000	60,000	-	-	30,000	30,000	-	-
	Sub Total		**-**	**185,000**	**185,000**	**-**	**75,000**	**105,000**	**105,000**	**-**	**-**
2	**Environmental and Social Monitoring Plan**		-	-	-	-	-	-	-	-	-
2.1	Irrigation plots to be provided based on existing rules and regulation	One to two months during construction	15,000	-	-	15,000	-	-	-	-	-
2.2	Train water users committee on efficient irrigation water use	Seasonally	-	60,000	60,000	-	5,000	5,000	5,000	5,000	100,000
2.3	Monitor seasonal discharges and downstream flow patterns	Seasonally	-	30,000	30,000	-	1,200	1,200	1,200	1,200	25,200
2.4	Allow adequate downstream compensation	Within every two-three years period	-	60,000	60,000	-	5,000	-	5,000	-	50,000
2.5	Promote community awareness on communal resource uses	One to two months during construction	30,000	-	-	30,000	-	-	-	-	-
2.6	Environmental and social audit	Every two to three years period	-	40,000	40,000	-	-	5,000	-	5,000	50,000
	Sub Total		**45,000**	**190,000**	**190,000**	**45,000**	**11,200**	**6,200**	**11,200**	**6,200**	**225,200**
	Total		**45,000**	**375,000**	**375,000**	**45,000**	**86,200**	**111,200**	**116,200**	**6,200**	**225,200**

Source: ESIA report of a typical SSIP AGP program SNNPRS, Sidama Zone, Wendogenet Woreda, X kebele, October, 2016

17 CONCLUSIONS AND RECOMMENDATIONS

17.1 CONCLUSIONS

Under this section of the ESIA report:

- Indicate what is concluded in attaining the objective of the study,
- Identify beneficial and adverse impacts,
- Put your evaluation for both beneficial and adverse impacts of the project based on ESIA principles,
- Identify state of environmental and social acceptance of the project.

17.2 RECOMMENDATIONS

The environmental expert and ESIA team is expected to recommend on issues that:-

- Help in minimizing possible adverse environmental and social impacts,
- Which seems helpful in enhancing potential benefits of the project and &
- Need attentions clearly.

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APPENDICES

APPENDIX I: To be Annexed Supporting Information

The following supporting information should be attached.

- List of contacted persons,
- Minute of Woreda Council or sectors or stakeholders meeting,
- List of participants of the Woreda Council or sectors meeting,
- Kebele Administration consultative meeting,
- List of participants of the kebele council meeting,
- Consultative meetings minutes with the community,
- List of participants of the community consultation meeting,
- Consultative meeting with water users focus group,
- Commitment letters from:
    - Woreda administration,
    - Woreda Water, Irrigation and Energy Office,
    - Woreda Agriculture and Pastoralist Development Office,
    - Woreda health office,
    - Project kebelle to the Woreda Water, Irrigation and Energy Authority for requesting the project,
    - Beneficiaries list (optional),
- ESIA study lead environmental expert professional license,
- Curriculum vitae of at least a lead environmental expert and a social worker,
- General ESIA screening format, (Appendix-II).

APPENDIX II: General Eligibility Screening format

(To be filled by kebele, Woreda and consultant environmentalist joint team)

Name of the Scheme: _____
Region: _____
Woreda: _____ Kebele: _____

Eligibility Screening Checklist

Will the Project/Scheme result in or involve:	Yes	No
Incorporates a Dam of more than 15 meters in height		
Loss of critical natural habitats, biodiversity and/or environmental services provided by a natural ecosystem – for example natural primary forests or significant areas of wetlands.		
Surface-water or groundwater-based development where it is believed that significant depletion due to climate change or overutilization has occurred.		
Risk of destruction and pollution as a result of climatic or geophysical hazards (storms, flooding, landslides, earthquakes).		
Conversion and loss of important nationally or internationally recognised physical cultural resources or a World Heritage Site.		
Significant social adverse impacts on indigenous and underserved groups.		
High probability to have physical resettlement or economic displacement.		
Development of a large-scale irrigation schemes >3000 ha.		
Loss of woodlot eucalyptus plantation or other perennial crops due to clearing of vegetation from land taken for irrigation infrastructure.		
Pollution of the project on the water source or river and effect on aquatic habitat and surrounding wetland due to construction activities near the river system incidents, leakages of fuel from storage tanks or vehicles and inappropriate disposal of wastes, spoil soil generated from excavations.		
Loss of cropland, annual and perennial crops due to Land take for construction of irrigation infrastructures (canal drainage) and ancillary development works.		
Loss of grassland shortage of livestock feed due to change for irrigated agriculture and construction activities.		
Loss/damage of existing soil and water conservation structures due to construction of irrigation infrastructure and development of the land for irrigation.		
Effect on public services such as road/s, other social infrastructures and sensitive receptors in the project command area due to construction of project canal networks across other project development activities.		
Expansion of HIV/AIDS, STD and other communicable diseases due to Influx of construction workers in to the project area.		
Occupational Health and Safety problems on workers due to construction activities exposing employees and public to health problem accidents (high noise, dust etc.).		
Construction traffic safety and accident due to Increased traffic contractors and other vehicles, and excavated trench pits dug for canal and other purposes.		
Erosion and gullies and damage of the command land and irrigation infrastructures and effect on project operation due to irrigation in steep slope command land, also poor land use in the non-suitable high slope gradient areas.		
Waterlogging and salinization due to excess water application, breaching of canals.		
Change in soil chemical properties such as pH, salinity, fertility over long period use of chemicals.		
Pollution of the project water resource/s, effect on aquatic habitat due to nutrient		

Will the Project/Scheme result in or involve:	Yes	No
and residual agrochemicals in drains		
Pollution of the project water resource/s, effect on aquatic habitat due contamination of oil and chemicals used for pump operation & maintenance		
Increase in waterborne and related diseases (malaria, diarrhea, etc.) due to stagnant water, use of contaminated irrigation water.		
Restriction in livestock movement, change from traditional livestock management as free livestock movement in the project command area prohibited		

Use the environmental and social risk indicators listed in the checklist below. You may add more factors in the checklist depending on preliminary field observation or general conditions of the project area.

Issues	Expectation "√"		Extent of the adverse impacts (show by "√")				
	Yes	No	None	Low	Medium	High	Unknown
Natural habitats disruption							
Water quality changes or contamination							
Natural hazards vulnerability, floods, soil erosion, of the site.							
Cultural property in the site							
Involuntary resettlement and number of house heads to be displaced							
Economic displacement							
Physical displacement							
Presence of funeral or burial grounds in command area							
Religious sites disruption							
Damage of valuable historic and archaeological resources							
Project area community water points disturbances.							
Existing traditional irrigation water users disruption							
Disruption of traditional lifestyles							
Induced population movements and natural resource exploitation activities							
Transmission of STDs or TB or other communicable diseases							
Creation of quarry sites or open borrow pits and social risks							
Social disruption during construction							
Dust and noise problems due to traffic and construction activities							
Accidents and safety risks							
Affected resources perennial crops, fences, homes, farm lands, etc. that need compensation, etc.							

Recommendation: (Mark by √)

- ☐ Scheme is not eligible and rejected
- ☐ Scheme is eligible and approved
- ☐ Approved without condition
- ☐ Full ESIA required

- ☐ Special plans should be prepared.
- ☐ ESMP
- ☐ RAP
- ☐ IPMP
- ☐ Others (specify):

If the recommendation is to prepare ESMP or RAP or PMP or others, environmental and social assessment (initial environmental and social examination) is required by the implementing agency/proponent, and reviewed by the regulatory body (EPLAUA). The screening shall be filled the project kebele natural resource expert and Woreda Environmentalist in collaboration with the consultant environmentalist, signed and sealed by the project kebele and Woreda EFCCA, and annexed to the report for the final review by Zone or Regional EFCCA.

1. Completed by: _____ (Kebele natural resource)
   Position_____
   Date: _____
   Signature_____
2. Supervised by; _____ (Woreda Environmentalist)
   Position_____
   Date: _____
   Signature_____
3. Reviewed by: _____ (Zone or Regional Environment)
   Position_____
   Date: _____
   Signature_____

APPENDIX III: Scoping

Scoping is identification and "narrowing down" of potential major environmental impacts on which a detail impact assessment will be conducted. It aims at identification of Environmental Assessment (EA) study boundaries, important issues of concerns and significant effects and factors to be considered. In most cases, scoping procedure is not being implemented in practice, and just an EIA report is produced at the end of the detail assessment phase. Nevertheless, if EPA or the project proponent becomes more stringent and requires such procedure, preparation and submission of scoping report shall be an obligatory matter. The study extents can be divided into three impact zones; immediate upstream, command area or under direct impact zone and downstream impact zone. With regard to impacts, there are two categories direct and indirect impact zones.

Scoping objectives

The key objectives for the Scoping Phase were to:

- Identify areas of likely impacts and environmental issues that may require further investigation, and
- Determine need for specialist baseline and impact assessment studies in response to identified likely impacts and environmental issues,
- Identify stakeholders and inform them of the Project and the process; and
- Provide stakeholders with the opportunity to identify any issues and concerns associated with the Project, etc.

Methodology

The methodology to be adopted for scoping can include:

- Review of relevant policy, guidelines documents and previous studies in the project area or in a similar environmental setting;
- Reconnaissance field visit in the project area particularly in the direct impact zones and collection of basic information through visual observations and interviews of local informants;
- Brief consultation and interviews with key stakeholders and members of the local community including the potential project affected people, and
- Reference to topographical and location maps of the study area.

ESIA Scoping Study

ESIA scoping study includes:

- Identififcation and consideration of issues in project immediate upstream or watershed,
- Identifing critical issues with respect to environmental policy, legal and institutional frameworks,
- Describing the project in which the project components are described,
- Identifying essential environmental issues withregard to the physical, biological and socio-economic environmental conditions.
- Idnetify issues to be considered in downstream of the project command areas.
- Descibing and identifying lists of interested and affected parties.
- Identifying different alternatives such as without project, alternative design, alternative layout, alternative technologies, etc.
- Determining appropriate time and expertise required for the detail study,
- Preparing plan for the detail subsequent detail EIA study.
- Undertake series of consultation meetings with local government stakeholders and other parties to provide project information, collect baseline data and understand key stakeholder concerns.
- Undertake desktop analyses which include reviews of pertinent environmental and social data collected from external sources and previous studies of the project area.
- Identifying stakeholders, undertaking stakeholder interviews, public meetings and inform them project and the process,
- Provide stakeholders with opportunity to identify any issues and concerns associated with the project;

- Identify areas of likely impact and environmental issues that may require detail investigation,
- Determine the need for specialist baseline and impact assessment studies in response to initial stakeholder input.

Scoping Report

Prepare scoping report comprising brief:

- Description of the project,
- All identified project alternatives and identifications,
- All issies raised by interested and affected parties and how these will be addressed and
- Descriptions of the public participation processes, etc.
- Others found important based on the assessment.

APPENDIX IV: Resettlement Action Plan (RAP) Issues and ESIA Study

The number of people likely to be physically or economically displaced by the SSIP activities will endeavor avoiding of schemes that have high probability of physical resettlement and economic displacement of communities. These schemes will not precede the first screening in the project selection process. But in the event that schemes that pass first screening are subsequently found to cause physical resettlement or economic displacement. In such cases a Resettlement Action Plan (RAP) will be prepared as a pre-condition to scheme financing and implementation. The RAP will be finalized as a supplementary document to the Environmental and Social Impact Assessment report. The RAP will provide a set of binding actions to be taken in order to avoid, mitigate and compensate the affected people as needed. In this chapter we are only to guide the study to a social worker, a Resettlement Action Plan (RAP), for any scheme that may result in physical resettlement and economic displacement.

RAP Principles

The principles of Involuntary Resettlement (RAP) as stipulated in these documents are primarily that:

- Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs;
- Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits.
- Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs.
- Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

RAP Objectives

The objectives of the RAP will be to:

- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs;
- To avoid forced eviction;
- To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected;
- To improve, or restore, the livelihoods and standards of living of displaced persons;
- To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

Detail of the RAP study and implementations shall follow an standard resettlement action plan study and shall be implemented accordingly.

APPENDIX V: Integrated Pest Management Program (IPMP)

1. Introduction

Integrated Pest Management (IPM) is the implementation of diverse methods of pest controls, paired with monitoring to reduce unnecessary pesticide applications. In IPM, pesticides are used in combination with other crop management approaches to minimize the effects of pests while supporting a profitable system that has negligible negative effects.

2. Fundamental principles

The fundamental principles expressed in the IPM Roadmap are to:

- improve the economic benefits related to the adoption of IPM practices,
- reduce potential human health risks from pests and the use of pest management practices, and
- reduce unreasonable adverse environmental effects from pests and the use of pest management practices.

3. IMP Benefits

There are several key benefits to this program for agricultural producers, the environment, pest management professionals and organizations and the general public. Some of these benefits include:

- Reduction in producer's economic risk by the promotion of low-cost and carefully targeted pest management practices,
- Reduction of environmental risk associated with pest management by encouraging the adoption of more ecologically benign control tactics,
- Augmentation of private research development efforts to develop lower-risk pest control tactics and expand the use of existing low-risk tactics to specialty markets,
- Reduction of risk to the public by promoting responsible pest management in public spaces including schools, recreational facilities, and playgrounds, and
- Assurance of safe, reliable, low-cost pest control through improved pest management

4. IPM Implementation

IPM is not a single pest control method. It is a series of pest management evaluations, decisions and controls. In practicing IPM, growers who are aware of potential for pest infestation follow a four-tiered approach. The four steps include:

4.1 Set Action Thresholds

Before taking any pest control action, IPM first sets an action threshold - a point at which pest populations or environmental conditions indicate that pest control action must be taken. Sighting a single pest does not always mean control is needed. The level at which pests will either become an economic threat is critical to guide future pest control decisions.

4.2 Monitor and Identify Pests

Not all insects, weeds, and other living organisms require control. Many organisms are innocuous, and some are even beneficial. IPM programs work to monitor for pests and identify them accurately, so that appropriate control decisions can be made in conjunction with action thresholds. This monitoring and identification removes the possibility that pesticides will be used when they are not really needed or that the wrong kind of pesticide will be used.

4.3 Prevention

As a first line of pest control, IPM programs work to manage the crop, lawn or indoor space to prevent pests from becoming a threat. In an agricultural crop, this may mean using cultural methods, such as rotating between different crops, selecting pest-resistant varieties, and planting pest-free rootstock. These control methods can be very effective and cost-efficient and present little to no risk to people or the environment.

4.4 Control

Once monitoring, identification, and action thresholds indicate that pest control is required, and preventive methods are no longer effective or available, IPM programs then evaluate the proper control method both for effectiveness and risk. Effective, less risky pest controls are chosen first, including highly targeted chemicals, such as pheromones to disrupt pest mating, or mechanical control, such as trapping or weeding. If further monitoring, identifications and action thresholds indicate that less *risky* controls are not working, then additional pest control methods would be employed, such as targeted spraying of pesticides. Broadcast spraying of non-specific pesticides is a last resort.

APPENDIX VI: Data Collection Tools

APPENDIX-VI.1-: Woreda Finance and Economy Office

1. Woreda and project kebele population.

Description	Population			Number of HHs			Average HH Size	Remark
	Male	Female	Total	Male	Female	Total		
Wereda total								
Urban								
Rural								
Project kebele								

2. Ethnic groups and their percentage share in the project area or Wereda. (See sample below in the table taken from CSA template. Note that sample ethnic groups are indicated in the table. Many more groups exist under each alphabetical group).

Ethnic Groups	Sexes			Gross total	Percent
	Male	Female	Total		
Affar					
Agew-Awi					
Alaba					
Amhara					
Argoba					
Bacha					
Berta					
Burji					
Chara					
Dasenech					
Dizi					
Gamo					
Guragie					
Hadiya					
Hareri					
Irob					
Kefficho					
Kusumie					
Mao					
Murle					
Nao					
Nyangatom					
Oromo					
Oida					
Qebena					
Qewama					
Shekecho					
Silte					
Somalie					
Tigrie					
Tsemay					

Ethnic Groups	Sexes			Gross total	Percent
	Male	Female	Total		
Upo					
Welaita					
Werji					
Yem					
Zeyese					
Zelmam					

Source: Classification source, CSA, 2007.

3. Collect the project area socio-economic profile. (Note that the profile contains all sector office reports which help in overcoming expected secondary data gaps).

APPENDIX-VI.2: Woreda agriculture Office SSIP related data collection format

1. Woreda and project kebele population.

Description	Population			Number of House heads			Average house hold size	Remark
	Male	Female	Total	Male	Female	Total		
Wereda total								
Urban								
Rural								
Project kebele								

2. Ethnic groups and their percentage share in the Wereda.
_____

3. Wereda land use /land cover/ area in hectare and percentage **(**use existing **format** if any).

Land use type	Area (ha)	%
Cultivated land	_____	_____
Cultivable land	_____	_____
Grazing land	_____	_____
Forestland	_____	_____
Bush & shrubs	_____	_____
Wetlands	_____	_____
Water bodies'	_____	_____
Building areas	_____	_____
Others	_____	_____
Total	_____	_____

4. Average landholding per household; _____hectares. (Male HH_____ ha, & Female HH ___ha).

5. Dominant crop types grown in the wereda.
   5.1 Major crops: _____
   _____
   5.2 Minor crops: _____
   _____
   5.3 Commercial crops: _____
   _____
   5.4 Major crop diseases in the wereda.
   _____
   _____

6. Agrochemicals use:
   6.1 Rate of fertilizer use by types: DAP: _____/ha Urea: _____/ha
   Pesticides = _____/ha.

   6.2 Amount of fertilizer and pesticides used for two consecutive Ethiopian Fiscal year in the woreda.
   - Year - 1: DAP _____ qt. Urea:_____ qt. Pesticides: _____
   - Year - 2: DAP _____ qt. Urea: _____qt. Pesticides:_____

7. Compost and other organic fertilizers uses. a/. Yes b/. No if use,

_____

8. Major soil and water conservation activities

7.1 List of major biological conservation activities of undertaken in the wereda.

Ser. no	Biological Conservation measures	Km /m2/hectare
1.	Area closure	
2.	Protected forest	
3.	Plantations	
4.	Conserved areas.	
5.		

7.2 List of major physical conservation measures activities undertaken in the wereda.

Ser. no	Physical Conservation measures	Km /m2/hectare
1.	Soil bund	
2.	Stone bund	
3.	Terraces construction	
4.	Bund stabilization	
5.	Cut of drain construction	
6.	Others, etc.	
7.		

9. Major rain fed crops production of the wereda in the previous one year.

S/n	Rain fed crops	Area (Ha)	Total production (qt)
1	**Cereals**		
1.1			
1.2			
1.3			
1.4			
1.5			
2	**Pulses**		
2.1			
2.2			
2.3			
2.4			
2.5			
3	**Oil Crops**		
3.1			
3.2			
3.3			
3.4			
3.5			
	Vegetables		
	Fruits		
	Coffee, chat and others		

10. Expected potential impacts of the proposed small scale irrigation project on the agricultural activities of the project wereda (if any).

9.1 Positive impacts of the SSIP.

_____
_____
_____

9.2 Negative Impacts of the SSIP.

_____
_____
_____

11. What should be done to eliminate or minimize expected negative impacts of the proposed small scale irrigation development project?

_____
_____
_____
_____
_____
_____

12. Any general or specific comment with regard to the SSIP and its impacts.

_____
_____
_____
_____
_____
_____

13. Major project area trees types and their uses (use "√").

Ser N	Names (List down major trees /shrubs using scientific or local names)	Wood uses										Food & Medicine			Fodder		Environmental						Other uses						
		Fire wood	Charcoal	Timber	Poles	Flooring	Plywood	Housing	Construction	Tools	Utensils	Fruits/Food	Edible oil/Gum	Medicine	Fodder/Forage	Bee forage	Shade	Ornamental	Mulch	Nitrogen fixation	Soil conservation	Wind break	Gum/resin/latex	Tanning/ Dye	Toxins for insects	Cosmetics/ Soap	Live fence/ Dry	Traditional uses	Tooth brushes

Responder's name: _____ Signature _____
Job title or position: _____
Address: Region: _____, Zone: _____, Wereda: _____ Town: _____ Tel. _____, Date: _____

APPENDIX-VI.3: Woreda Culture and tourism sector SSIP data collection format

1. List **sites** with significant cultural, religious, historical and archaeological importance in the **Woreda.**

   1.1. Cultural importance sites: _____
   _____
   1.2. Religious importance sites: _____
   _____
   1.3. Historical importance: _____
   _____
   1.4. Archaeological importance: _____
   _____

2. List sites with significant cultural, religious, historical and archaeological importance in the proposed **project kebele**/ (if any).

   2.1. Cultural importance sites: _____
   _____
   2.2. Religious importance sites: _____
   _____
   2.3. Historical importance: _____
   _____
   2.4. Archaeological importance: _____
   _____

3. What **positive or negative impacts** does the small scale irrigation project (SSIP) have on the cultural, religious, historical and archaeological importance kebele (if any)?

Sites with Significant importance	**Possible impacts**	
	List Positive Impacts (if any)	**List Negative Impacts (if any)**
Cultural sites		
Religious sites,		
Historical sites		
Archaeological sites		

4. Few of **gender indicative** activities that can address the project area men and women roles, responsibilities, access to resources and decision or empowerment are shown in tables below. Please indicate the activities which refer to men or women **best** in the project area. You can add more indicative parameters.

Table-1: Gender analysis based on activities assessment

Ser.	**Description**	**Who does the work?**	
		Women(x)	**Men(x)**
1.	**Reproductive Activities**		
	Cleaning		
	Fetching firewood / fuel		
	Fetching water		
	Preparing food		
	Childcare		
	Washing clothes and others		
2.	**Productive activities**		
	Land preparation		
	Cultivation and maintenance		

Ser.	Description	Who does the work?	
		Women(x)	Men(x)
	Harvest/Post-harvest		
3.	**Community Support Activities**		
	Labour on communal projects		
	Meetings		
	Helping others in time of need		
	Other, etc.		

Source: Manual on gender analysis tools of Ethiopia, Cascape, 2015.

Table-2: Gender access and control on resources assessment

Ser.	Resource description	Access (x)		Control (x)		Remark
		women	men	women	Men	
	Land					
	Fertilizer					
	seed					
	Oxen					
	Sheep/goat					
	Chicken					
	Chicken					
	Dairy cows					
	Agricultural equipment					
	Training					
	Credit					
	Water					
	Fuel wood					
	Others, etc.					

Source: Manual on gender analysis tools of Ethiopia, Cascape, 2015.

Table-3: Gender based decision-making or empowerment assessment

Expense	Who is responsible?			
	Men(x)	Women(x)	Joint (we decide together) (x)	Comment
Children education				
Clothing				
Health care				
Daily food items				
Inputs for the land				
Inputs for home garden				
Others, etc.				

Source: Manual on gender analysis tools of Ethiopia, Cascape, 2015.

5. Any general comment (if any). _____
_____
_____
_____
_____

Responder's name: _____ Signature _____
Position: _____
Address: Region: _____ Zone: _____
Woreda: _____ Town: _____
Tel. _____ Date: _____

APPENDIX-VI.4: Human health sector baseline data collection format for SSIP

Address of the **health** institution.

Region : _____

Zone : _____

Woreda : _____

Tel. : _____

1. Health service coverage of the Woreda ….. = _____ %

2. Family planning coverage of the Woreda…. = _____ %

3. How far in kilometers do populations of the Woreda go to get health services or treatments at an average in the Woreda? = _____ km.

4. Number of health service institutions of the Woreda.

Ser. no	Health services by type	Woreda				Remark (Project kebele total)
		Private	Gov.	NGO	Total	
1	Hospital					
2	Health center					
3	Health post					
4	Clinic					
5	Laboratory center					
6	Rural drug shop					
7	Pharmacy					

Source: _____

6. Present health institutions **ratio** to population of the Woreda service area.

_____

6. Number of health personnel working in the **Woreda and its Branches** (if any) health services as of 2008 E.C.

Ser. No	Health personnel	Woreda			Remark
		Male	Female	Total	
1.	Medical doctor				
2.	Nurse (of all categories)				
3.	Health officer				
4.	Sanitarians				
5.	Health assistant				
6.	Laboratory technicians				
7.	Health extension workers				
8.					
9.					

Source: _____

8. Top ten leading diseases in the Woreda and number of all cases for the latest one-to-two years (If there is no data for two years or more you may use data of the latest year).

Ser.no	Diagnosis	Number for treated patients by year/s		
		Male	Female	Total
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
	Total of **10 leading** cases			
	Total of all **other** cases			
	Overall total treated people			

9. HIV/AIDs prevalence and its impact until the latest Ethiopian Fiscal Year.
   9.1 Cumulative number of people living with HIV/AIDs in the Woreda.
   Male _____ Female _____ Total _____
   9.2 Trends of the disease prevalence in the Woreda.
   ☐ Decreasing ☐ Increasing ☐ Constant
   9.3 Affected population related to productivity by percent.

Ser.	Affected population	Male	%	Female	%	Total
1.	Productive age					
2.	Non-productive age					

   9.4 What are the causes for the prevalence of the disease?
   Male: _____
   _____
   _____
   Female: _____
   _____
   _____
   9.5 Comment on its future controlling mechanism based on existing situations.
   _____
   _____
   _____
   _____

10. Any general or specific comment.
   _____
   _____
   _____

Responder's name: _____ Signature _____
Job title or position: _____
Address: Region: _____ Zone: _____
Woreda: _____Town: _____
Tel. _____ Date: _____

APPENDIX-VI.5: Livestock & Fishery baseline data collection format for SSIP

1. Livestock population of the Woreda and project kebele.

Ser. No.	Livestock Type		Number of livestock			Major Livestock Diseases
			Woreda	Project Kebele	Project site/ sub kebele	
1.		Cattle				
2.	Small Ruminants	Sheep				
		Goats				
3.	Equines	Horses				
		Mule				
		Donkey				
4.		Camels				
5.		Poultry				
6.	Beehives	Traditional				
		Transitional				
		Modern				

Sources: _____

2. Main fodder source/s for the livestock.
   - ☐ Common grazing lands,
   - ☐ Tree legumes
   - ☐ Proper grazing land
   - ☐ Others (if any, specify)
   - ☐ Fallow plots,
   - ☐ Crop residues
   - ☐ Herbaceous legumes
3. Common diseases and current death rate trends. _____
   _____
4. Current livestock related major problems;
   - ☐ Breeding
   - ☐ Health problems
   - ☐ Market problem
   - ☐ Grazing land problems
   - ☐ Others (specify if exists) _____
     _____
5. Livestock extension works conditions and needs;
   - ☐ Capacity building
   - ☐ Animal fattening in:
     - ☐ Association/cooperative
     - ☐ Private
   - ☐ Others (specify if exists) _____
     _____
6. Veterinary services availability of the Woreda: _____
   _____
   _____
   _____
7. Expected potential **Positive and/or Negative impacts** of the project on the development of the livestock resources and the community /society development of the project kebele & the Woreda.
   7.1 Positive impacts on livestock development of the Woreda.
   _____
   _____
   _____

7.2 Negative impacts on livestock husbandry (if any).

_____
_____
_____

8. What should be done to minimize or eliminate expected negative impacts of the proposed project?

_____
_____
_____
_____

9. Any general additional comment.

_____
_____
_____
_____

Responder's name : _____ Signature _____
Job title and position : _____
Address: Region : _____ Town : _____
Zone : _____ Date : _____
Woreda : _____ Tel. : _____

APPENDIX-VI.6: Water resources and supply baseline data collection format

1. Potable water supply **coverage** of:
   1.1. Woreda water supply coverage…… = _____%
   1.2. Urban water supply coverage ……. = _____ %
   1.3. Rural water supply coverage ……. .= _____ %

2. The **sources, number** and **percent** coverage of potable water supply for the Woreda.

	Sources	**Number**	**Percent coverage**
☐	Springs ……	_____	= _____%
☐	River..……	_____	= _____ %
☐	Pipe ……	_____	= _____ %
☐	Hand dug well ……	_____	= _____ %
☐	Others (if any, specify)…..	_____	= _____ %

_____

3. The **sources, number** and **percent** coverage of potable water of ***project Kebele***.

	Sources	**Number**	**Percent coverage**
☐	Springs ……	_____	= _____%
☐	River..……	_____	= _____ %
☐	Pipe ……	_____	= _____ %
☐	Hand dug well ……	_____	= _____ %
☐	Others (if any, specify)…..	_____	= _____ %

_____

4. Water resources at the proposed small scale irrigation project site.
   4.1. Are there any water sources around the proposed SSIP site?
   A. Yes B. No
   4.2. If yes, is there any effect/s of the SSIP on the water resources?
   A. Yes B. No
   4.3. Any expected negative impact/s of the proposed SSIP on the water resources and supply of the area? If any, list briefly.

_____
_____

   4.4. What should be done to protect or control the expected impacts of the SSIP?

_____
_____

5. Any additional comment.

_____
_____
_____

Responder's name : _____ Signature _____
Job title or position : _____
Institution : _____
Address: Region : _____ Zone : _____
Woreda : _____ Town : _____
Telephone: _____ Date: _____

APPENDIX-VI.7: Project description baseline data collection format for SSIP

1. Project main features
   - Command area ..... _____ ha gross and _____ ha net area.
   - River water availability for irrigation... _____ m^3/annum or _____m^3/sec
   - Total water demand..... _____ m^3/annum or _____m^3/sec
2. Head work
   - Type head:..... _____
   - Weir site location……. E-_____, N-_____ , Altitude = _____masl.
   - Diversion weir width ..... _____m
   - Height of Ogee spillway..... _____m
   - Height of abutment ..... _____m
   - Canal head regulatory width.. _____m
     - Number of gates ..... _____
     - Size of gates……. Height..... = _____ m
       Width of each gate ..... = _____ m
3. Canals
   - Main canal..... _____ km length and _____ m width.
   - Secondary canal……. _____ km and _____ m width
   - Tertiary canal……. _____ km and _____ m width
4. Drainage canals : Drainage canals.....: _____ km and _____m width.
5. Others
   - Access roads..... = _____ km and _____ m width
   - Land for structures (camp &others). = _____ ha.
6. Project budget
   - Estimated investment cost..... = Birr _____
   - Estimated operation cost ..... = Birr _____

7. Command area slope distribution and soil and water conservation needs.

Slope %	Area (ha)	SWC Structure Required (ha)	Conserved land area (ha)
0-5			
5-8			
8-12			
12-15			
Sum Total			
15-20			
20-30			
>30			
Total			

Responder's name : _____ Signature _____
Telephone: _____ Date: _____

APPENDIX-VI.8: Project kebele baseline data collection format for SSIP

1. Project kebele population

Name	Population			Number of HHs			Average HH Size	Remark
	Male	Female	Total	Male	Female	Total		
Project kebele								

2. Kebele land use /land cover in hectares and percentage **(**use existing **format,** if any).

Land use type	Area (ha)	%
Cultivated land	_____	_____
Cultivable land	_____	_____
Grazing land	_____	_____
Forestland	_____	_____
Shrubs	_____	_____
Wetlands	_____	_____
Water bodies'	_____	_____
Building areas	_____	_____
Others	_____	_____
Total	_____	_____

3. Average landholding per household of the kebele _____ hectares.

4. Crops grown in the kebele.

   4.1 Major crops: _____
   _____

   4.2 Minor crops: _____
   _____

   4.3 Commercial crops: _____
   _____

5. Major crop diseases of the kebele.
   _____
   _____
   _____

6. Amount of fertilizer and pesticides used for two consecutive Ethiopian Fiscal years in the woreda.
   - Year - 1: DAP _____ qt. Urea:_____ qt. Pesticides: _____
   - Year - 2: DAP _____ qt. Urea: _____qt. Pesticides:_____

7. Presence of the animal husbandry and **health personnel their total number** in the kebele.
   _____
   _____

8. Animal **veterinary services** availability and **animal health personnel** in the kebele:
   _____
   _____

9. Livestock resources of the project kebele.

S.N.	Livestock Type		Number	Major Livestock Diseases
1.		Cattle		
2.	Small Ruminants	Sheep		
		Goats		
3.	Equines	Horses		
		Mule		
		Donkey		
4.		Camels		
5.		Poultry		
6.	Beehives	Traditional		
		Transitional		
		Modern		

Sources: _____

10. Major human diseases of the kebele.

_____

_____

11. Number of health service institutions of the kebele.

Ser. no	Number of health services by type	Number by ownership type				Remark (Project Area total)
		Private	Gov.	NGO	Total	
1.	Health Center					
2.	Health post					
3.	Clinic					
4.						

Source: _____

12. Number of health personnel working in the kebele (if any) health services for the last year.

Ser. No	Health personnel	Kebele			Remark
		Male	Female	Total	
1.	Medical doctor				
2.	Nurse (of all categories)				
3.	Health officer				
4.	Sanitarians				
5.	Health extension workers				
6.	Health assistant				
7.	Laboratory technicians				
8.					

Source: _____

13. Top ten leading diseases of the kebele and number of all cases for the latest one-to-two years (If there is no data for two years or more you may use data of the latest year).

Ser. no	Diagnosis	Number for treated patients by year/s
1		
2		
3		
4		
5		
6		

Ser. no	Diagnosis	Number for treated patients by year/s
7		
8		
9		
10		
	Total of **10 leading** cases	
	Total of all **other** cases	
	Overall total treated people	

14. Natural resources conditions of project kebele.

14.1 Major vegetation or plant species of the kebele.

Ser. no	Dominant tree types	Ser. no	Dominant tree species
1.		7.	
2.		8.	
3.		9.	
4.		10.	
5.		11.	
6.		12.	

14.2 Major wild animal species of the kebele.

Ser. no	Major or dominant wild animals species	Remark
1		
2		
3		
4		
5		
6		

15. List down area covered by different biological conservation measures in the kebele.

Ser. no	Biological Conservation measures	Km /m2/hectare
1.	Area closure	
2.	Protected forest	
3.	Plantations	
4.	Conserved areas	

16. List down area covered by physical conservation measures by type in the kebele.

Ser. no	Physical Conservation measures	Km /m2/hectare
1.	Soil bund	
2.	Stone bund	
3.	Terraces	
4.	Bund stabilization	
5.	Cut of drain	
6.	Others	

17. Number and type institutions in project kebele

Ser. no	Types of institutions	Number by ownership type				Remark (Project Area total)
		Private	Gov.	NGO	Total	
1.	Health Center					
2.	Health post					
3.	Clinic					
4.	Grade 1-4 School					
5.	Grade 5-8 School					
6.	Grade 9-10 School					
7.	Preparatory 11-12					
8.	FTC					
9.						
10.						
11.						
12.						
13.						

Source: _____

18. Few of the **gender indicative** activities that can address the project area men and women roles and responsibilities are shown in the table below. Please indicate the activities which refer to men or women best in project kebele.

Table-1: Gender analysis based on activities assessment

Ser.	Description	Who does the work?	
		Women(x)	Men(x)
1.	**Reproductive Activities**		
	Cleaning		
	Fetching firewood / fuel		
	Fetching water		
	Preparing food		
	Childcare		
	Washing clothes and others		
2.	**Productive activities**		
	Land preparation		
	Cultivation and maintenance		
	Harvest/Post-harvest		
3.	**Community Support Activities**		
	Labour on communal projects		
	Meetings		
	Helping others in time of need		
	Other, etc.		

Source: Manual on gender analysis tools of Ethiopia, Cascape, 2015.

Table-2: Gender access and control on resources assessment

Ser.	Resource description	Access (x)		Control (x)		Remark
		women	men	women	Men	
	Land					
	Fertilizer					
	seed					
	Oxen					
	Sheep/goat					

Ser.	Resource description	Access (x)		Control (x)		Remark
		women	men	women	Men	
	Chicken					
	Chicken					
	Dairy cows					
	Agricultural equipment					
	Training					
	Credit					
	Water					
	Fuel wood					
	Others, etc.					

Source: Manual on gender analysis tools of Ethiopia, Cascape, 2015.

Table-3: Gender based decision-making or empowerment assessment

Expense	Who is responsible?			Comment
	Men(x)	Women(x)	Joint (we decide together) (x)	
Children education				
Clothing				
Health care				
Daily food items				
Inputs for the land				
Inputs for home garden				
Others, etc.				

Source: Manual on gender analysis tools of Ethiopia, Cascape, 2015.

19. Any expected **positive impact/s** of the project on development activities of the kebele?
_____
_____

20. Any expected **negative impact/s** of the project on development activities of the kebele?
_____
_____

21. What should be done to overcome the negative impacts? _____
_____
_____

22. Any general comment you have.
_____
_____
_____

Responder's name: _____ Signature _____
Job title or position: _____
Institution: _____
Address: Region: _____ Zone : _____
Woreda: _____ Kebele : _____
Tel. _____ Date : _____

APPENDIX-VI.9: Permissible water quality concentration for irrigation

Description	Ethiopian Standard (mg/l)	WHO Maximum allowable concentration for irrigation (mg/l)	Sample result	Remark
Sample source				
Sample Collection Date				
Sample Submission Date				
Turbidity (NTU)	-	5.0		
Total solids 105^0C (mg/l)	-	-		
Total Dissolved Solids 105^0C (mg/l)	1000	1000.0		
Electrical Conductivity (µS/cm)	-	700 - 3000		
P^H	6-9	6.5 – 8.4		
Ammonia (mg/l NH_3)	0.2	-		
Nitrite (mg/l NO_2)	0.1	-		
Nitrate (mg/l NO_3)	10	45.0		
Sodium (mg/l Na)	-	230		
Potassium (mg/l K)	-	-		
Total hardness (mg/l$CaCO_3$)	-	500.0		
Calcium (mg/l Ca)	-	200.0		
Magnesium (mg/l Mg)	-	150.0		
Manganese	1.5 *	-		
Total Iron (mg/l Fe)	0.3	0.3		
Fluoride (mg/l F)	1.5	1.50		
Chloride (mg/l Cl)	250	250.0		
Carbonate (mg/l CO_3)	-	-		
Bicarbonate (mg/l HCO_3)	520	-		
SAR (calculated)	-	-		

Source: * FAO Irrigation and Drainage Paper, Rome, 1985.

SAR or Na hazards:
Below 2- no hazard, 2 to 10 as little hazards, 7 to 18 medium hazards, 11 to 26 high hazards and over 26 very high hazards (Fetter, 1994).

APPENDIX-VI.10: Sample Terms of Reference (TOR) for SSIP ESIA Study

1. **Objective and scope**

The objective of the TOR is to show basic ESIA activities, indicate major road map in order to ensure that the SSIP project ESIA study attains desired quality level. The scope of the TOR is limited to ESIA study of Small Scale Irrigation Projects (SSIP), considers expertise capacity levels, expected report standard, practical and appropriate to the project site expertise level as much as possible.

2. **Data Collection**

Basic data required for a Small Scale Irrigation Project (SSIP) scheme ESIA study has to be properly collected, analyzed and simulated using proper and practicable methodologies. The following major activities, but not limited to, are supposed to be considered to meet the ESIA study needs of the project.

3. **Major Environmental and Social Impact Assessment Activities**

Major activities to be accomplished in carrying out small scale irrigation project environmental and social impact assessment study includes, but not limited to:

- Review previous ESIA studies, relevant documents, policies, legal and institutional frameworks related to a SSIP and summarize governing standards and environmental issues.
- Conducting field observation in the direct and indirect project impact areas to have views of the biophysical and socio-economic features of the intended SSIP area.
- Conduct consultations' with representatives' of different segments (elders, youth, women, local administration or kebele) of the project area communities' on issues related to the SSIP benefits, negative impacts and possible mitigation measures for any adverse impacts they may consider.
- Undertake informal and/or formal focus group or stakeholders' consultations with experts of relevant sectors on issues related to the SSIP benefits, negative impacts and possible mitigation measures.
- Identify institutional responsibilities in implementing recommended mitigation measures of the ESIA study.
- Assess environmentally sensitive areas and valued resources that may need special protection in the proposed project area.
- Assess other existing or proposed development projects within the proposed project site that can be affected or affect the small scale irrigation project.
- Identify alternative site, or technology, design, or energy sources and others alternatives.
- Collect water sample/s of the intended irrigation water sources, analyze for the water quality baseline conditions and interpret the water quality based existing or recommended quality standards.
- Assess health and other social impacts to downstream users and ecological impacts due to expected reduced river flows and deterioration of water quality.
- Identify land losses due to intended SSIP water intake sources or head works, main canal, access/farm roads, etc. and its economic and social impacts as well as compensation or rehabilitation requirements for the adversely affected parties or resources.
- Assess the likely health impacts of the proposed schemes and analyze the increased risks of waterborne diseases (malaria, schistosomiasis, etc.), environmental health related issues, top ten leading diseases and malaria prevalence associated with irrigation development comparing with existing conditions of disease transmission.
- Assess soil types, salinity, social hazards, water logging situations, flooding and soil erosion in and around the SSIP command area, weir site and irrigation structures.
- Assess possible pollution of drainage water (if any) and possible effect of reduced base flows on increasing concentrations and determine dilution capacity of receiving water body.

- Assess types of agro-chemicals and their patterns of application and likely impacts from increased application.
- Assess impacts on flora and fauna and their endemic or threatened species at the proposed project site.
- Assess risks of proliferation of aquatic weeds, crop pests and disease.
- Assess the SSIP watershed condition of the area related to land degradation or soil erosion or deforestation etc.
- Assess how the project intervention will affect men and women (gender issues), potential risks for spreading of HIV and sexually transmitted diseases due to the large influx of workers.
- Assess any damaging risks on cultural property, works of art, sites of "outstanding value" from the historical, aesthetics, Scientific, cultural point of view.
- Assess any other adverse impacts on bio-physical and socio-economic environment of the project area not mentioned above.
- Predict positive potential impacts that improve the lives of the people in the study area.
- Predict any significant negative impacts associated with pre-construction, construction and operation phase of the SSIP project.
- Assess possible cumulative impacts of other existing or proposed development projects in the SSIP area, if any
- Identify and describe alternative environmental considerations to major activities including design, technology, construction techniques, operation and maintenance procedures, etc.
- Make visualize information on maps of suitable scale.
- Recommend feasible and cost-effective mitigation measures to prevent, reduce or compensate significant negative impacts to acceptable levels.
- Develop detailed environmental and social management plan.
- Develop comprehensive and detailed environmental and social monitoring plan.
- Produce draft final environmental and social impact assessment report with its full content.

APPENDIX-VI.11: Stakeholders' Consultation Agenda

Agenda

Public Consultation, Focus Group Discussion, and/or Stakeholder Consultations

The minute of the meeting shall be organized during the public consultation, focus group discussion and other stakeholders consultations have to be annexed in the study reports. The minute has to be signed by participants and should be stamped by organizing office. The contents of the minute shall cover the following points.

1. Title of the Meeting : ----------
2. Date and hour of the meeting : ----------
3. Meeting Place : ----------
4. Participants of the meeting : ----------
5. Objectives of the meeting : ----------
6. Agendas of the meeting :

    6.1 Awareness about the small scale irrigation project.
    6.2 The Soundness of the small scale irrigation project
    6.3 Positive impacts of the small scale irrigation project
    6.5 Negative impacts of the small scale irrigation project
    6.6 Suggested mitigation measures for identified negative impacts
    6.7 Overall opinion on the project.

Note:
The minute and list of participants' registration should be stamped by the Woreda and/or kebele where the consultation is conducted.

APPENDIX-VI.12: Consulted community representatives registration form

List of Consulted Community Representatives

Kebele _____ Meeting Place_____

Date _____

No	Name	Sex	Position	kebele	Signature

APPENDIX-VI.13: Consulted stakeholders registration form

List of Consulted Stakeholders

Town _____ Meeting Place_____

Date _____

No	Name	Sex	Position	Institution	Signature

APPENDIX VII: Categories and consequence levels for natural environmental impacts

Category	Ranking	Definition

Catastrophic	5	• Trans-boundary and/or national scale impact resulting in:
		  ○ long term and profound change and/or damage to the natural environment and its ecological processes; and/or
		  ○ increase in threat category for rare and endangered species of fauna and flora identified in national and global listings.
		• Natural habitat restoration time greater than 10 years and requiring large-scale and long term intervention.
		• Breach of environmental regulations and/or company policy and/or greater than 200% exceedance of international, national, industry and/or operator standard for an emission parameter.
		• Negative widespread national and international media coverage.
		• Significant long-term financial loss.

Major	4	• Regional to national scale impact resulting in:
		  ○ medium term change and/or damage to the natural environment and its ecological processes;
		  ○ reduction in regional habitat and species diversity; and/or
		  ○ direct loss of habitat for endemic, rare and endangered species of fauna and/or flora and for species" continued persistence and viability (i.e. availability of necessary resources) nationally and regionally (for species unable to disperse).
		• Natural habitat restoration time 5 to 10 years and requiring substantial intervention.
		• Breach of environmental regulations and company policy and/or 100% to 200% exceedance of international, national, industry and/or operator standard for an emission parameter.
		• Sustained adverse national media attention
		• Significant medium term financial loss

Moderate	3	• Local to regional scale impact resulting in:
		  ○ short term change and/or damage to the natural environment and its ecological processes;
		  ○ direct loss of habitat crucial for species" (including listed species) continued persistence and viability (i.e. availability of necessary resource) in the project area (for species unable to disperse);
		  ○ introduction of exotic species of fauna in invasive floral species replacing resident „natural communities" within the project area; and
		  ○ Environmental stress lowering reproductive rates of species within the project area.
		• Natural restoration time 2 to 5 years and requiring intervention.
		• Potential breach of environmental regulations and company policy and/or 50% to 100% exceedance of international, national, industry and/or operator standard for an emission parameter
		• Complaints from the public, authorities and possible local media attention
		• Medium term financial loss

Minor	2	• Local scale impact resulting in: ○ short term change and/or damage to the local natural environment and its ecological processes;

Category	Ranking	Definition
		○ short-term decrease in species diversity in selected biotopes/areas within the project area; and/or ○ increased mortality of fauna species due to direct impact from project activities. • Natural restoration within 2 years requiring minimal or no intervention. • 10% to 50% exceedance of international, national, industry and/or operator standard for an emission parameter. • Public perception/concern • Short term financial loss
Negligible	1	• Impact largely not discernible on a local scale being absorbed by the natural environment; areas adjacent to disturbed areas absorb exodus of species able to disperse • Restoration within 6 months without intervention. • Up to 10% exceedance of international, national, industry and/or operator standard for an emission parameter. • Public perception/concern. • Minimal financial loss.
None	0	• Impact absorbed by local natural environment with no discernible effects. • No restoration or intervention required. • No exceedance of international, national, industry and/or operator standard for an emission parameter. • No financial loss.
Positive	+	• Activity has net positive and beneficial effect resulting in environmental improvement. For example: ○ ecosystem health; ○ increase in magnitude or quality of habitat for rare and endangered species of fauna and flora as well as for those species known to naturally occur in the area; and ○ growth of „naturally occurring" populations of flora and fauna. • Positive feedback from stakeholders. • Potential financial gains.

Source: Leopold interaction matrix (modified after Leopold *et al*., 1971)

APPENDIX VIII: Categories and consequence levels for socio-economic

Category	Ranking	Definition
Catastrophic	5	• Emergency situation with harmful consequences to human health (e.g. fatalities). • Disastrous consequences on the livelihoods of individuals (e.g. curtailment of access to primary income source). • Calamitous consequences on those seeking to access community facilities and utilities (e.g. resettlement of large numbers (1,000s) of households). • Disastrous consequences on the national economy. • Breach of company social policy and/or legislation.
Major	4	• Major impacts on human health (e.g. serious injury). • Significant impact on the livelihoods of individuals (i.e. access to income source restricted over lengthy period of time). • Serious impact on access to community facilities and utilities (e.g. resettlement of large numbers (10s– 100s) of households). • Notable consequence on the economy, at a local, regional and/or national level (e.g. Virtually no local sourcing of supplies or personnel). • Breach of economy social policy and/or regulation.
Moderate	3	• Modest impact on human health and well-being (e.g. noise, light, odor, dust, injuries to individuals). • Moderate impact on individual livelihoods (e.g. restricted access to income source). • Medium impact on access to community facilities and utilities (e.g. access to utilities restricted for long periods (weeks) of time). • Moderate impact on the wider economy, at a local, regional and/or national scale (e.g. Only moderate levels of employment and supplies sources within Nigeria). • Potential breach of company social policy and/or legislation.
Minor	2	• Limited impact on human health and well-being (e.g. occasional dust, odors, traffic noise). • Some impact on the livelihoods of individuals (e.g. Isolated incidents related to ethnic tensions and some restrictions on access to income source). Natural restoration within 2 years requiring minimal or no intervention. • Some impact on access to community facilities and utilities (e.g. access to cultural centers restricted to a limited extent, i.e. (days). • Sparse impact on the wider economy, at a local, regional and national level (e.g. limited procurement).
Negligible	1	• Possible nuisance to human health and well-being (e.g. occasional unpleasant odors). • Very limited disruption caused to those earning their livings (e.g. no noticeable impact on heralding operations). • Inconvenience experienced in accessing community facilities and utilities (e.g. electricity supply disruption for short (hours) period of time). • Very limited impact on the wider economy at a local, regional and/or national scale (e.g. no discernable indirect and induced development).
None	0	• No impact on human health. • No impact on livelihoods. • No impact on community facilities/utilities.

Category	Ranking	Definition
		• No impact on the wider economy.
Limited Positive	+	• Some beneficial improvement to human health. • Some benefits to individual livelihoods (e.g. additional employment opportunities). • Limited improvements to community facilities/utilities (e.g. no discernible improvement). • Some impact on the wider economy (e.g. Limited local procurement).
Modest Positive	++	• Moderate beneficial improvement to human health. • Medium benefits to individual livelihoods (e.g. employment impacts). • Modest improvements to community infrastructures/utilities. • Moderate impact on the wider economy (e.g. some local sourcing of supplies).
Significant Positive	+++	• Major beneficial improvement to human health. • Large scale benefits to individual livelihoods (e.g. large scale employment). • Major improvements to community facilities/utilities. • Notable impact on the wider economy (e.g. extensive use of local procurement).

Source: Leopold interaction matrix (modified after Leopold *et al*., 1971)

APPENDIX IX: Audit Report Outline

The audit report should contain the audit findings with reference to supporting evidence. It should faithfully reflect both the tone and content of the audit. Reports should include (EPA Audit Guideline, 2006):

1. A content list
2. An executive summary indicating the principal findings
3. An introduction highlighting the scope and purpose of the audit and report
4. Details of the audit plan, identification of audit team members and auditee representatives, audit dates, and identification of the industrial enterprise audited.
5. Identification of the reference documents against which the audit was conducted (e.g IPPC regulations, EPCP e.t.c.)
6. An assessment of performance against previously agreed criteria highlighting strengths/weaknesses and identifying non-compliance.
7. Audit teams judgment of the extent of the auditee compliance with the legal requirements
8. A summary of the audit findings with reference to supporting evidences.
9. A list of action items and recommendations
10. Audit conclusions
11. An environmental management plan
12. the audit report distribution list

APPENDIX X: Proposed possible ESIA Report /Guideline Outline

Most possible ESIA report outlines descriptions, but not limited

Ser. No.	Outline Descriptions	Remark
	Cover page	
	Verso or second page	
	List of Tables	
	List of Figures	
	Acronyms	
	Executive Summary	
1.	**Introduction**	
1.1	Background/Overview	
1.2	Purpose of the ESIA study	
1.3	Objectives	
1.3.1	General Objective	
1.3.2	Specific Objectives	
2.	**Approach and Methodology**	
2.1	Screening	
2.2	Environmental scoping	
2.3	Review of relevant documents, policies and literatures	
2.4	Relevant sectors secondary data collection	
2.5	Field observation, primary data collection	
2.6	Undertaking stakeholders consultations	
2.7	Using essential data generated by other disciplines	
2.8	Data compilation and analysis	
2.9	Report writing	
3.	**Description of the Project**	
3.1	Project location of off take and scheme layout with – including map	
3.2	Water source and options	
3.3	Project area of influence	
3.4	Command area (ha) characteristics and area of influence	
3.5	Population and households (HH) of the project area	
3.6	Number of households (HH) involved or to be involved in the scheme	
3.7	Type & purpose of irrigation infrastructure (weir, dam, inundation area, etc.)	
3.8	Crops to be grown, estimated yields,	
3.9	Agrochemicals to be used, application methods and amounts,	
3.10	Ancillary infrastructure (access roads and accessibility, sheds, camps and offices, sanitation facilities)	
	For Dams (in addition to the above)	
3.11	Type – rock fill, concrete or earthen	
3.12	Height – from crest to foundation	
3.13	Crest length	
3.14	Spillway weir	
3.15	Reservoir volume (m3)	
3.16	Inundation area, etc.	
4.	**POLICY, LEGAL AND ADMINISTRATION FRAMEWORKS**	
4.1	**Constitution of the FDRE**	
4.2	**Sectoral Policies and Strategies**	

Ser. No.	Outline Descriptions	Remark
4.1.1	Conservation strategy of Ethiopia (CSE 1995)	
4.1.2	Agriculture and Rural Development Policy and Strategy	
4.2.3	Environmental Policy of Ethiopia (EPE 1997)	
4.2.4	Water Resource Management Policy	
4.2.5	Health Policy	
4.2.6	National policy HIV/AIDS	
4.1.7	Irrigation Policy	
4.1.8	Undertake stakeholders consultations	
4.1.9	PASDEP, Growth and Transformation Plan (GTP)	
4.1.10	IFAD safeguard Policies	
4.1.11	World Bank Safeguard Policies	
4.2	**Legal Frameworks**	
4.2.1	Constitution of the Federal Democratic Republic of Ethiopia (FDRE 1995)	
4.2.2	Environmental Protection Organs Establishment Proclamation No. 295/ 2002	
4.2.3	Environmental Impact Assessment (Proclamation No. 299/2002)	
4.2.4	Environmental Pollution Control (Proclamation No. 300/2002)	
4.2.5	Public Health (Proclamation No. 200/2000)	
4.2.6	Water Resource Management Proclamation (Proclamation No. 197/2000)	
4.2.7	Exploration of Land Holding for Public Purposes and Payment of Compensation (Proclamation No. 455/2005)	
4.2.8	Rural land administration and use proclamation (Proclamation No 456/2005)	
4.2.9	Environmental and Social Management Plan Guideline	
4.2.10	National Labor Proclamation (Proclamation No 377/2003)	
4.2.11	Biodiversity	
4.3	**Institutional Frameworks**	
4.3.1	Federal and Regional Administration	
4.3.2	Environmental Council	
4.3.3	Federal Environmental Protection Authority	
4.3.4	Sectoral Environmental units	
4.3.5	Oromia National Regional Environment, Forest and Climate Change Bureau	
4.3.6	Zone Water Resources Development and Supply Departments	
4.3.7	Woreda Water Resources Development and Supply Office	
4.4	**Environmental Guidelines and Standards**	
4.4.1	Environmental Impact Assessment (EIA) Study Guideline (EPA 2003)	
4.4.2	EIA Guideline on Irrigation (EPA 2004)	
4.4.3	Environmental Impact Assessment Guideline (ANRS 2014)	
4.4.4	Water quality standards	
4.4.5	World Bank Environmental and Social Safeguards Requirements	
4.5	International multilateral Environmental Agreements	
4.6	IFAD Safeguard Policies	
4.6.1	Indigenous people (2009)	
4.6.2	Improving access to land and tenure	
4.6.3	Policy on disclosure of documents (2010)	
5.	**DESCRIPTION OF THE BASELINE CONDITION**	
5.1	**Physical Environmental Baseline**	
5.1.1	Topography	
5.1.2	Geology	
5.1.3	Soils	
5.1.2	Climate and metrology	

Ser. No.	Outline Descriptions	Remark
5.1.5	Climate induced risks	
5.1.6	Hydrology and Water Resources	
5.1.7	Water Quality	
5.1.8	Land Use and Land Cover	
5.1.9	Climate change risks and communities' vulnerability	
5.2	**Biological Environmental Baseline**	
5.2.1	Vegetation Resources	
5.2.2	Wildlife Resources	
5.2.3	Aquatic Resources	
5.3	**Socio-economic Environmental Baseline**	
5.3.1	Administrative Structures	
5.3.2	Population and Ethnic Groups	
5.3.3	Rain-fed Agricultural Practice	
5.3.4	Irrigation Agriculture	
5.3.5	Improved varieties use trend (if any)	
5.3.6	Fertilizers Use	
5.3.7	Crop Pests and Diseases	
5.3.8	Livestock	
5.3.9	Public Health	
5.3.10	Water Supply	
5.3.11	Energy supply	
5.3.12	Settlement Pattern and Displacement	
5.3.13	Land Tenure and Loss / access to Assets	
5.3.14	Infrastructure	
5.3.15	Historical, Archaeological, Cultural and Religious Sites	
5.3.16	Gender Issues	
5.3.17	Conflicts of Interests among Communities	
5.3.18	Other Existing or Planned Projects in the Area	
5.3.19	Lessons to be taken from Similar Projects	
6.	**DESCRIPTION OF THE PROJECT AND ALTERNATIVES**	
6.1	Alternative location for development	
6.2	Alternative site layouts	
6.3	Alternative designs	
6.4	Alternative technologies (furrow or spring killer)	
6.5	Alternative processes or sources materials	
6.6	"No action" or "no-go" or the "without".	
7.	**POTENTIAL ENVIRONMENTAL IMPACTS**	
7.1	**Impacts on Physical Environment**	
7.1.1	Air pollution (Dust/Noise)	
7.1.2	Soil Erosion and Pollution	
7.1.3	Water logging and salinization problem	
7.1.4	Farmland loss and effect on households livelihood	
7.1.5	Dam reservoir area clearing	
7.1.6	Reservoir siltation	
7.1.7	Grazing land loss and effect on livestock feed	
7.1.8	Cut-off drains or gullies	
7.1.9	Affects existing soil and water conservation structures	
7.1.10	Risk of canal siltation and associated impacts	

Ser. No.	Outline Descriptions	Remark
7.1.11	Occupational Health and safety issues	
7.1.12	Restriction to livestock movement	
7.1.13	Access to public services & people movement disruption	
7.1.14	Conflict between user community	
7.2	**Impacts on the Biological Environment**	
7.2.1	Control of weed and alien invasive species	
7.2.2	Impacts on Homestead Vegetation	
7.3	**Impacts on Social Environment**	
7.3.1	Impacts on Infrastructures	
7.3.2	Impacts on Houses and Shops	
7.3.3	Occupational safety and health Hazards	
7.3.4	Traffic Congestion	
7.3.5	Health and Sanitary Issues	
7.3.6	Impacts on Horticulture and Grass Cultivation	
7.3.7	Impacts on Cultural and Religious Significance	
8.	**ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN**	
8.1	Overview	
8.2	Responsible institutions (existing and proposed)	
8.3	Capacity building awareness and training program	
9.	**ENVIRONMENTAL and social monitoring plan**	
9.1	Overview	
9.2	Responsible institutions	
9.3	Monitoring reports	
10.	**ENVIRONMENTAL REPORTING AND DISCLOSURE**	
10.1	Quarterly Inspection Report	
10.2	The SSIP Environmental and Social Management Plan Performance Report	
10.3	Data Base and Reporting	
11.	**ENVIRONMENTAL BUDGET**	
12.	**CONCLUSIONS AND RECOMMENDATION**	
12.1	Conclusion	
12.2	Recommendation	
	REFERENCES	
	ANNEXES	
	Annex-1. List of contacted persons	
	Annex -2. Minute of Woreda Council Sectors Meeting	
	Annex -3. List of Participants of the Woreda Council meeting	
	Annex -4. Kebele Administration Consultative Meeting	
	Annex -5. List of Participants of the Kebele Council meeting	
	Annex -6. Consultative Meetings Minutes with the Community	
	Annex -7. List of Participants of the community Consultation meeting	
	Annex -8. Consultative Meeting With Water Users Groups	
	Annex -9. Letter from Woreda Administration or Council	
	Annex -10. Letter from the Kebele Administration Office	

Ser. No.	Outline Descriptions	Remark
	Annex -11. Letter from Agriculture & Natural Resource Development Office	
	Annex -12. Letter from Water, Mine and Energy Office	
	Annex -13. Water quality laboratory results	
	Annex -14. Soil quality laboratory results	
	Annex -15. List of ESIA Study Team Members	
	Annex -16. Professional Competence license of Lead ESIA study expert	
	Annex -17. ESIA study Lead expert curriculum vitae	

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Prepared by

GIRDC