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**Expression of Interest**

1st Edition

December 2020

** 

**BoLLAD**

Amhara National Regional State Bureau of Irrigation and Low land Area Development - Participatory Agriculture and Climate Transformation Program

(PACT)

**Expression of Interest**

(by the consulting firm in response to the REOI issued by the procuring entity)

For

*Feasibility Study & Detail Design of Small-Scale Irrigation Projects*

*Candidates are to be prequalified for the lots comprised bellow*

* ***Lot-1 (Lebsi -2, Zuma & Afitsimi)***
* ***Lot-2*  (Shita Masonry Dam, Sikor & Aguate Wuha)**
* ***Lot-3*  (Taymen, Ateba-3 & Meshiha pump 1)**
* ***Lot-4 (*Tota Bahir, Aromba & Tere)**
* ***Lot-5* (Alifa Midir & Filwuha)**

Ref No:*ANRS/BoILLAD/PACT/REOI-1/2025*

**Issue date: May, 2025**

**Foreword**

This document has been prepared by Amhara National Regional State Bureau of Irrigation and Low land Area Development - Participatory Agriculture and Climate Transformation Program (PACT) and is based on the 1st edition of the IFAD-issued standard procurement document for expression of interest available at [www.ifad.org/project-procurement](http://www.ifad.org/project-procurement). This bidding document is to be used for the procurement of services using quality and cost based selection (QCBS) in projects financed by IFAD.

IFAD does not guarantee the completeness, accuracy or translation, if applicable, or any other aspect in connection with the content of this document.

**Instructions to Consultants[[1]](#footnote-1)**

**Reference Number: Ref No: *ANRS/BoILLAD/PACT/REOI-1/2025***

***Date: May 9, 2025***

***Feasibility Study & Detail Design of Small-Scale Irrigation Projects***

* ***Lot-1 (Lebsi -2, Zuma & Afitsimi)***
* ***Lot-2*  (Shita Masonry Dam, Sikor & Aguate Wuha)**
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1. The *ANRS Bureau of Agriculture*  received *financing* from the International Fund for Agricultural Development (“the Fund” or “IFAD”) towards the cost of Participatory Agriculture and Climate Transformation Program (“the client” or “procuring entity”), and intends to apply part of the proceeds for the recruitment of consulting services, for which this REOI is issued.

The use of any IFAD financing shall be subject to IFAD’s approval, pursuant to the terms and conditions of the financing agreement, as well as IFAD’s rules, policies and procedures. IFAD and its officials, agents and employees shall be held harmless from and against all suits, proceedings, claims, demands, losses and liability of any kind or nature brought by any party in connection with ANRS Participatory Agriculture and Climate Transformation Program (PACT)

1. The client now invites expressions of interest (EOIs) from legally constituted consulting firms (not individual consultants) (“consultants”) to provide Feasibility Study & Detail Design of Small-Scale Irrigation Projects (Lot-1, Lot-2, Lot-3, Lot-4 & Lot-5). More details on these consulting services are provided in the preliminary terms of reference (PTOR). The consultant may sub-contract selected activities provided that said services do will not exceed 20% of the total consultancy work.
2. Before preparing its EOIs, the consultant is advised to review the preliminary terms of referenceattached as **Annex 1**, which describe the assignment and **Annex 2** that details the evaluation of the technical qualifications.
3. The consultant shall not have any actual, potential or reasonably perceived conflict of interest. A consultant with an actual, potential or reasonably perceived conflict of interest shall be disqualified unless otherwise explicitly approved by the Fund. A consultant including their respective personnel and affiliates are considered to have a conflict of interest if they a) have a relationship that provides them with undue or undisclosed information about or influence over the selection process and the execution of the contract, b) participate in more than one EOI under this procurement action, c) have a business or family relationship with a member of the client’s board of directors or its personnel, the Fund or its personnel, or any other individual that was, has been or might reasonably be directly or indirectly involved in any part of (i) the preparation of this expression of interest, (ii) the selection process for this procurement, or (iii) execution of the contract. The consultant has an ongoing obligation to disclose any situation of actual, potential or reasonably perceived conflict of interest during preparation of the EOI, the selection process or the contract execution. Failure to properly disclose any of said situations may lead to appropriate actions, including the disqualification of the consultant, the termination of the contract and any other as appropriate under the IFAD Policy on Preventing Fraud and Corruption in its Projects and Operations[[2]](#footnote-2).
4. All consultants are required to comply with the Revised IFAD Policy on Preventing Fraud and Corruption in its Activities and Operations (hereinafter, “IFAD’s Anticorruption Policy”) in competing for, or in executing, the contract.
   1. If determined that a consultant or any of its personnel or agents, or its sub-consultants, sub-contractors, service providers, suppliers, sub-suppliers and/or any of their personnel or agents, has, directly or indirectly, engaged in any of the prohibited practices defined in IFAD’s Anticorruption Policy or integrity violations such as sexual harassment, exploitation and abuse as established in IFAD’s Policy to Preventing and Responding to Sexual Harassment, Sexual Exploitation and Abuse[[3]](#footnote-3) in competing for, or in executing, the contract, the EOI may be rejected or the contract may be terminated by the client.
   2. In accordance with IFAD’s Anticorruption Policy, the Fund has the right to sanction firms and individuals, including by declaring them ineligible, either indefinitely or for a stated period of time, to participate in any IFAD-financed and/or IFAD-managed activity or operation. The Fund also has the right to recognize debarments issued by other international financial institutions in accordance with its Anticorruption Policy.
   3. Consultants and any of their personnel and agents, and their sub-consultants, sub-contractors, service providers, suppliers, sub-suppliers and any of their personnel and agents are required to fully cooperate with any investigation conducted by the Fund, including by making personnel available for interviews and by providing full access to any and all accounts, premises, documents and records (including electronic records) relating to this selection process or the execution of the contract and to have such accounts, premises, records and documents audited and/or inspected by auditors and/or investigators appointed by the Fund.
   4. Consultants have the ongoing obligation to disclose in their EOI and later in writing as may become relevant: (i) any administrative sanctions, criminal convictions or temporary suspensions of themselves or any of their key personnel or agents for fraud and corruption, and (ii) any commissions or fees paid or to be paid to agents or other parties in connection with this selection process or the execution of the contract. As a minimum, consultants must disclose the name and contact details of the agent or other party and the reason, amount and currency of the commission or fee paid or to be paid. Failure to comply with these disclosure obligations may lead to rejection of the EOI or termination of the contract.
   5. Consultants are required to keep all records and documents, including electronic records, relating to this selection process available for a minimum of three (3) years after notification of completion of the process or, in case the consultant is awarded the contract, execution of the contract.
5. The Fund requires that all beneficiaries of IFAD funding or funds administered by IFAD, including the client, any consultants, implementing partners, service providers and suppliers, observe the highest standards of integrity during the procurement and execution of such contracts, and commit to combat money laundering and terrorism financing consistent with IFAD’s Anti-Money Laundering and Countering the Financing of Terrorism Policy.[[4]](#footnote-4)
6. **Procedure**: the selection process will be conducted using quality and cost-based selection (QCBS)as laid out in the IFAD Pprocurement Handbook that can be accessed via the IFAD website at [www.ifad.org/project-procurement](http://www.ifad.org/project-procurement). The client will evaluate the EOIs using the criteria provided in **Annex 2**. The shortlisted consultant(s) will be provided with the detailed TORs and asked to submit a detailed technical and financial offer. The evaluation will include a review and verification of qualifications and past performance, including a reference check, prior to the contract award.
7. Consultants may associate with other firms to enhance their qualifications but should indicate clearly whether the association is in the form of a joint venture and/or a sub-consultancy. In the case of a joint venture, all the partners in the joint venture shall be jointly and severally liable for the entire contract, if selected.
8. Any request for clarification on this EOI including the PTOR should be sent via e-mail to the address below no later than 16 May 2025 11:30 Ethiopian Time. The client will provide responses to all clarification requests by 21 May 2025 11:00 Ethiopian local Time.
9. **Submission Procedure:** please submit your expression of interest using the forms provided for this purpose. Your EOI should comprise one (1) original copy of each EOI form annexed to this document. EOIs shall be submitted to the address below no later than 26 May 2025 4:00 local time.
10. **Consultants must demonstrate the capacity to pre-qualify for the full scope of services across all five (5) lots."**

ANRS Irrigation and Low Land Areas Development Bureau

Nearby Wisdom Tower the Bahir-Dar University

Administrative Building

At the 3 Floor, Office No 38 of Bahir Dar City Administration, Water

and Sewerage Service Head Office Building,

Attention to Adane Alkadir: -Irrigation Scheme Construction

Input Supply Directorate Director

Telephone: +251-058 320-77-99/0582-20-08-53

[adanealkader@gmail.com](mailto:adanealkader@gmail.com)

Bahir-Dar

Ethiopia

Yours sincerely,

---------------------

*[Authorized Official]*

*[Name of Client / Procuring Entity]*

**Form EOI-1**

**EOI Submission Form**

*[Location, date]*

*[Authorized official]*

**Re: Consulting Services for *[insert assignment]***

**Ref: *[insert]***

We, the undersigned, declare that:

1. We are expressing our interest in providing the consulting services for the above-mentioned assignment and have no reservations to the REOI, the instructions to the consultants and any addenda thereto*.*
2. Our expression of interest is open for acceptance for a period of ninety (90) days.
3. Our firm, its associates, including any subcontractors or suppliers for any part of the contract, have not been declared ineligible by the Fund and have not been subject to sanctions or debarments under the laws or official regulations of the client’s country or not been subject to a debarment recognized under the Agreement for Mutual Enforcement of Debarment Decisions (the "Cross-Debarment Agreement")[[5]](#footnote-5), beyond those declared in paragraph 9 of this EOI submission form.
4. We acknowledge and accept the IFAD Revised Policy on Preventing Fraud and Corruption in its Activities and Operations. We certify that neither our firm nor any person acting for us or on our behalf has engaged in any prohibited practices as provided in ITC Clause 6. Further, we acknowledge and understand our obligation to report to [anticorruption@ifad.org](mailto:anticorruption@ifad.org) any allegation of prohibited practice that comes to our attention during the selection process or the contract execution.
5. No attempt has been made or will be made by us to induce any other consultant to submit or not to submit an EOI for the purpose of restricting competition.
6. We acknowledge and accept the IFAD Policy on Preventing and Responding to Sexual Harassment, Sexual Exploitation and Abuse. We certify that neither our firm nor any person acting for us or on our behalf has engaged in any sexual harassment, sexual exploitation or abuse. Further, we acknowledge and understand our obligation to report to [ethicsoffice@ifad.org](mailto:ethicsoffice@ifad.org) any allegation of sexual harassment, sexual exploitation and abuse that comes to our attention during the selection process or the contract execution.
7. The following commissions, gratuities, or fees have been paid or are to be paid with respect to the selection process: *[Insert complete name of each recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity.]*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name of Recipient | Address | Reason | Amount | Currency |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

(If none has been paid or is to be paid, indicate “none.”)

1. We declare that neither our consulting firm nor any of its directors, partners, proprietors, key personnel, agents, sub-consultants, sub-contractors, consortium and joint venture partners have any actual, potential or perceived conflict of interest as defined in ITC Clause 5 regarding this selection process or the execution of the contract. *[insert if needed: “other than the following:” and provide a detailed account of the actual, potential or perceived conflict].* We understand that we have an ongoing disclosure obligation on such actual, potential or perceived conflicts of interest and shall promptly inform the client and the Fund, should any such actual, potential or perceived conflicts of interest arise at any stage of the procurement process or contract execution.
2. The following criminal convictions, administrative sanctions (including debarments) and/or temporary suspensions have been imposed on our consulting firm and/or any of its directors, partners, proprietors, key personnel, agents, sub-consultants, sub-contractors, consortium and joint venture partners:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nature of the measure (i.e., criminal conviction, administrative sanction or temporary suspension) | Imposed by | Name of party convicted, sanctioned or suspended (and relationship to the consultant) | Grounds for the measure (i.e., fraud in procurement or corruption in contract execution) | Date and time (duration) of measure |
|  |  |  |  |  |
|  |  |  |  |  |

If no criminal convictions, administrative sanctions or temporary suspensions have been imposed, indicate “none”.

1. We acknowledge and understand that we shall promptly inform the client about any material change regarding the information provided in this EOI submission form.
2. We further understand that the failure to properly disclose any of information in connection with this EOI submission form may lead to appropriate actions, including our disqualification as consultant, the termination of the contract and any other as appropriate under the IFAD Policy on Preventing Fraud and Corruption in its Projects and Operations.
3. We understand that you are not bound to accept any EOI that you may receive.

|  |  |
| --- | --- |
| *[Authorized signatory]* |  |
| *[Name and title of signatory]* |  |
| *[Name and address of firm]* |  |

Form EOI-2   
Organization of the Consultant

**Re: Consulting Services for *[insert assignment]***

**Ref: *[insert]***

*[Provide a brief description of the background and organization of your firm/entity and of each associated firm for this assignment. Include the organization chart of your firm/entity. The EOI must demonstrate that the consultant has the organizational capability and to carry out the assignment. The qualifications document shall further demonstrate that the consultant has the capacity to field and provide experienced replacement personnel on short notice. Key staff CVs are not required at the shortlisting stage.]*

|  |  |
| --- | --- |
| Name of the firm |  |
| Date of establishment |  |
| Country of registration |  |
| Full address of the firm |  |
| Focal point: name, position, contact information (telephone, email): | Name: |
| Tel: |
| Email: |
| Number of branches in the country |  |
| Country(ies) of operations with number of branches in each country |  |
| Number of full-time employees |  |
| Number of part-time employees |  |
| Field(s)of expertise of the firm |  |
| Number of professional staff with experience related directly to the assignment |  |
| Subsidiary and associated companies (*wherever applicable*):  (details in the following format to be provided for all associates) –   * 1. Name of the company   2. Nature of business   3. Address of the company   4. Website of the company   5. Brief description of company (maximum of 120 words) |  |
| Any other information that the consultant would like to add: |  |

**Maximum 10 pages**

Form EOI-3

Experience of the Consultant

**Re: Consulting Services for** *[insert assignment]*

**Ref:** *[insert]*

*[Using the format below, provide information on each relevant assignment for which your firm, and each associate for this assignment, was legally contracted either individually as a corporate entity or as one of the major companies within an association, for carrying out consulting services similar to the ones requested under the preliminary terms of reference included in this EOI. The EOI must demonstrate that the consultant has a proven track record of successful experience in executing projects similar in substance, complexity, value, duration, and volume of services sought in this procurement.*

***Maximum 20 pages]***

|  |  |
| --- | --- |
| Assignment name: | Approx. value of the contract (in current US$): |
| Country: Location within country: | Duration of assignment (months): |
| Name of client: | Total No. of staff-months of the assignment: |
| Address, and contact details (including email address(es)): | Approx. value of the services provided by your firm under the contract (in current US$): |
| Start date (month/year): Completion date (month/year): | No. of professional staff-months provided by associated consultants: |
| Name of associated consultants, if any: | Name of proposed senior professional staff of your firm involved and functions performed (indicate most significant profiles such as project director/coordinator, team leader): |
| Narrative description of project: | |
| Description of actual services provided by your staff within the assignment: | |

Name of Firm: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ANNEX 1**

**PRELIMINARY TERMS OF REFERENCE**



**BoLLAD**



Amhara National Regional State Bureau of Irrigation and Low land Areas Development - Participatory Agriculture and Climate Transformation Program

(PACT)

***Terms of Reference (ToR)***

For

*Feasibility Study & Detail Design of Small Scale Irrigation Projects*

* ***Lot-1 (Lebsi -2, Zuma & Afitsimi)***
* ***Lot-2*  (Shita Masonry Dam, Sikor & Aguate Wuha)**
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**May, 2025**

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List of Abbreviations

|  |  |
| --- | --- |
| BoQ | Bill of Quantity |
| CN | Curve Number |
| CA | Conservation Agriculture |
| CSA | Climate Smart Agriculture |
| CV | Coefficient of Variation |
| CWT | Community Watershed Team |
| DAs | Development Agents |
| DPDR | Detail Project Design Report |
| ERA | Ethiopian Roads Authority |
| ESIA | Environmental and Social Impact Assessment |
| ESMF | Environmental and Social Management Framework |
| ESCIA | Environmental, Social & Climate Impact Assessment |
| ESCMP | Environmental, Social & Climate Monitoring Plan |
| FAO | Food & Agricultural Organization |
| FDS | Farmers Demonstration School |
| FC | Field Capacity |
| FFS | Farmers Field School |
| FGD | Focus Group Discussion |
| FHH | Female Headed Household |
| FMHH | Female in Male Headed Household |
| FLID | Farmer-led Irrigation Development |
| FPCU | Federal Program Coordination Unit |
| FPIC | Free Prior Informed Consent |
| FREG | Farmers Research & Extension Group |
| FS | Feasibility Study |
| FTC | Farmers Training Center |
| GBV | Gender Based Violence |
| GHG | Greenhouse Gases |
| GIS | Geographic Information System |
| IAs | Implementation Agencies |
| IAIPs | Integrated Agro-Industrial Parks |
| IFAD | International Fund for Agriculture Development |
| IGA | Income Generating Activity |
| IWUAs | Irrigation Water Users Associations |
| KII | Key Informant Interview |
| KPI | Key Performance Indicators |
| KWT | Kebele Watershed Team |
| LDIPs | Landscape Development Investment Plans |
| MFI | Marketing & Finance Institution |
| MHH | Male Headed Household |
| MoA | Ministry of Agriculture |
| MOU | Memorandum of Understanding |
| MSI | Micro-Scale Irrigation |
| MSIT | Micro-Scale Irrigation Technologies |
| MUS | Multiple-Use Water Systems |
| MWS | Multi Water System |
| NGO | Non-Government Organization |
| NRM | Natural Resource Management |
| NPSH | Net Positive Suction Head |
| O&M | Operations and Maintenance |
| OGL | Original Ground Level |
| PACT | Participatory Agriculture and Climate Transformation Programme |
| PASIDP | Participatory Small-Scale Irrigation Development Programme |
| PIDM | Participatory Irrigation Development Management |
| PD | Person Days |
| PH | Potential of H+ Activity |
| PIM | Program Implementation Manual |
| PRA | Participatory Rural Appraisal |
| PTC | Pastoralist Training Centre |
| PWD | Persons with Disabilities |
| PWP | Permanent Wilting Point |
| RAP | Resettlement Action Plan |
| RPF | Resettlement Policy Framework |
| RuSACCOs | Rural Saving & Credit Cooperatives |
| RUSLE | Revised Universal Soil Loss Equation |
| RTC | Rural Transformation Centre |
| SECAP | Social, Environmental and Climate Assessment Procedures |
| SECMPs | Social, Environmental and Climate Monitoring Plan |
| SGW | Shallow Ground Water |
| TC | Time of Concentration |
| ToR | Terms of Reference |
| WUA | Water Users Association |
| ZECU | Zero Energy Cooling Unit |

Introduction

Ethiopia's agricultural sector plays a crucial role in the country economy, providing livelihoods for the majority of its population. However, its heavy reliance on rain-fed agriculture, compounded by recurring droughts and erratic rainfall patterns, has significantly hindered agricultural productivity and food security. In response, the Ethiopian government, through the Ministry of Agriculture, has placed a strong emphasis on the development of irrigation infrastructure to harness available water resources more effectively and enhance resilience to climate variability.

The adoption of improved irrigation systems and climate-resilient agricultural practices is essential for enhancing the living conditions of farming families and achieving food security. Through the promotion of Micro-Scale Irrigation Technologies (MSIT) and the introduction of Farmer-Led Irrigation Development (FLID) principles, farmers are encouraged to invest in irrigation infrastructure, on-farm water resource development, and access to related services. These initiatives also involve the introduction of new technologies and best practices aimed at increasing water availability, promoting efficient water usage, and integrating energy-saving solutions.

The Participatory Agriculture and Climate Transformation (PACT) Program will focus on investing in climate-smart water and market-related infrastructure, as identified and prioritized in the Local Development Investment Plans (LDIPs) of selected Woredas and Kebeles. Climate-resilient infrastructure development will be implemented based on feasibility assessments of landscape development, contributing to both production and market outcomes in the program.

To effectively implement these activities, a comprehensive Feasibility Study and Detailed Design must be prepared, including a review of relevant documents on climate-resilient infrastructure development. The design report should clearly demonstrate the following key considerations: Alignment with the country's subsector objectives and priorities; reflect the preferences and demands of local communities and end users; acknowledge the skills and knowledge of farmers and beneficiaries; ensure active and full participation of communities throughout the cli mate-resilient infrastructure design process; incorporate inclusiveness, paying special attention to gender and disabilities; exhaustively explore alternative water technologies; apply a climate-resilient infrastructure development approach; avoid adverse social impacts without adequate compensation; ensure technical, environmental, and physical sustainability; and confirm that the project is economically and financially viable.

This approach will guarantee that the planned interventions not only meet the immediate needs of smallholder farmers but also contribute to long-term sustainability and resilience in Ethiopia’s agriculture sector.

1. Objective
   1. General Objective

The main objective of this TOR is to guide service assignment (Consultant) for conducting feasibility study, detailed designs and review design document of Climate Resilient Infrastructure development.

* 1. Specific Objectives

**The specific objectives of this TOR is to:**

* + - * Design of small and micro scale irrigation systems,
      * Design of Multiple-Use Water Systems,
      * Design of Rehabilitation/Extension or Upgrading of existing water infrastructures,
      * Design of access for market related infrastructures

1. Scope of The TOR

The scope of this TOR towards implementing feasibility study and detail design of climate resilient Infrastructure related projects are: -

* + - * To carry out detail design, bill of quantities and cost estimate for the climate resilient Infrastructure
      * For preparation of tender documents for construction.
      * To realize that the project designs are in favor of the desired social, economic, technical & environmental objectives set for the particular project.
      * In each study discipline, the community should participate according to the PIDM (Participatory Irrigation Development Management) approach introduced in the region

1. Feasibility Study and Detail Design
   1. Community Scheme/New/

The final Feasibility Study and Detail Project Design Report (FS & DPDR) shall include but not limited to the following subjects and discipline:

* Surveying and Topography;
* Climate and Hydrology;
* Geological & Geotechnical;
* Watershed Management;
* Soil Survey and Land Suitability;
* Irrigation Agronomy;
* Agribusiness;
* Sociological and Socio-Economic
* Detail Engineering Design;
* Environmental and social impact assessment (ESIA)
* Tender document; and
* Operation and maintenance manual;
  + 1. Detail Services for Community Scheme

The stakeholders in charge of the feasibility study and detail design of climate resilience community led small scale irrigation projects will be proposed to undertake the following services. The detail services include but not limited to the following activities.

* + - 1. Topographic Survey

Detail survey works both at the headwork site and irrigable area shall be conducted and a topographic map of the scheme area has to be prepared at a specified scale. Preparation of the topographic map of the headwork, conveyance structures, division structures & other structures at the specified scales. The topographical survey shall include Topographic surveys; Alignment surveys; and Structure site surveys.

1. **Topographic Surveys:** The topographic surveys shall cover the whole project area including source works/head works and the irrigation command area and as required to provide adequate information for detailed design.
2. **Alignment Survey:** Topographic surveys shall be carried out along the alignments of the proposed canals and embankments.
3. **Structure site survey:** The Consultant shall carry out detailed topographical survey at each hydraulic structure site to enable the preparation of an existing site layout drawing with 0.5 m contours, detailing the canal alignments and levels, and any other relevant local features such as irrigation structures, access roads, houses, property fences or boundaries and any other permanent reference marks.

Table 1 Summary of Key Activities for Surveying

| **NO** | **Key Points** | **Minimum Bench mark** |
| --- | --- | --- |
| 1 | BM (general) | BMs should be cast in concrete with dimensions of at least 30 cm x 30 cm x 60 cm (length x width x depth) |
| 2 | Head work BM | 4 –two in each side. |
| 3 | First BM Value | GPS value, Adindan Zone 36/37/38, UTM - explanation |
| 4 | Conveyance & Command area BM | 1BM /10 ha or sufficient BM based on topography, permanent/fixed |
| 5 | Headwork topo data | All natural & artificial feature at head work, river banks break lines minimum 200m U/S & D/S from the proposed weir axis, flood Mark, Geological Pits. |
| 6 | Headwork topo plot | Data collected & Plotted Scale1:500, 0.5m contour minimum 40 m radius in both direction, every feature & test pits plotted. Annotation- center, spacing max 300m, |
| 7 | Head work cross section | Plotted in Scale 1:100 V, 1:1000 H, maximum 3m chainage. Extend beyond the flood mark both side. |
| 8 | Longitudinal Profile of the stream around the Headwork site | Data collected & plotted min 200m U/S & D/S from the weir axis, Scale 1:100 for V & 1:1000 H or equivalent magnification |
| 9 | Proposed Main canal profile chainage | 20- 30 m chainage interval, plotted 1:1000 H, 1:100 V |
| Strip topo data collected 10/20m both side from center, plotted 1:1000 scale, 0.5m contour, geological pit |
| 10 | Command area | Major features (gully, traditional canals, electric lines, settlements, footpath, cattle crossings, big trees, symmetries etc.) |
| 11 |  | Plotted Scale1:1000, 1.0m minor & 5 m major contour interval unless it is very flat (0.25-0.5 min 1.5-2.5 index contour) |
| 12 |  | Geological pit locations |
| 13 |  | Soil pit location |
| 14 | Structures survey – Aqueducts, cross drainages, road crossings | Detail survey (cross-section and longitudinal profile) for gullies, streams, crossing, marshy areas, etc. u/s & D/S strip topo |
| 15 | Night storage | Detail topo & location |
| 16 | Main road cross |  |

* + - 1. Climate and Hydrology

The study shall examine appropriate data and provide the climatic conditions of the study area providing the details of:

* Review previous relevant study documents and clearly identify the gaps and short comings;
* Ascertain and thoroughly check the availability and quality of recent hydro meteorological data;
* Data available shall be described and presented in the form of tables, bar-diagrams, etc. including source, location and altitude of the station, drainage area, and distance from the site under consideration.
* Internal and external checking of the consistency of available data shall be made at specific control points and corrections made, if any.
* Short data gaps shall be filled by using either of the appropriate hydrological methods
* Compilation, processing and validation of hydrological, hydro-geological and meteorological data;
* Assess all watershed features pertinent to analysis and simulation of hydrological data;
* Assess and confirm the availability of lean flow and its dependability for irrigating the proposed land;
* Examine and confirm the quality of water and its suitability for irrigation;
* Fix hydrologic criteria for design flood for weir/barrage/cross-drainage structures etc;
* Carryout flood analysis in order to determine the design flood either based on available flow data or using universally accepted methodologies;
* Determine standard project storm, maximum probable storm, 25 yr. 50 yr., 100 yr, frequency storm etc. for various structures;
* Examine and describe the sediment yield of the watershed and the nature of bed load coming along the river so as to mitigate any adverse effect on the headwork and outlet structures;
* Analyse the ground water conditions of the project area;
* Determine runoff and drainage characteristics so as to define drainage characteristics;
* Propose suitable recommendations with regard to flow measurement and other data to be collected such as river gauging, rainfall gauging and irrigation canal water flow measurement;
* Carry out all other data considered necessary and relevant for the hydrological component
* Carry out the water balance of the river/stream basin to avoid water use conflict between U/S and D/S users;
* Perform water supply and demand analysis of the proposed irrigation project;
* Carry out discussion with existing water users on the U/S and D/S of the proposed irrigation project and confirming that their already established water use right will not be breached or jeopardized.
* Ensure the availability of lean flow and its dependability for irrigating the proposed land;
* Ensure the release of 10-15% of the lean flow to the ecology.
* The possible hydrological effects that will prevail on the project area and particular on the downstream area of the project shall be assessed and discussed.

Table 2 Summary of hydrology and climate data

| **No** | **Key Points** | **Minimum criteria’s in the catchment** |
| --- | --- | --- |
| **Catchment/ River Morphology** | | |
| 1 | Basin/Sub basin / description | Main & sub catchment Description |
| 2 | Geomorphology of the catchment & stream | Shape, size, slope and length, roughness (river bed and bank) of the main stream, formation, relative depth, narrow/flat, etc & influence |
| 3 | Catchment characteristics | Land use, land cover – Area (ha) & percent of coverage |
| 4 | Soil and geological condition of the catchment | Soil type & hydrological group, |
| 5 | Sediment study (at least from secondary data) | Indicative (Reference) |
| **Hydro- metrological data source, quality & analysis** | | |
| 6 | Source of climate & river flow data | Station, distance, altitude, recent, rational for selection |
| 7 | Number of Stations considered | For headwork and command |
| 8 | Representation of the selected stations | Distance, altitude |
| 9 | Optimal number of stations (if applicable) | allowable percentage of error <20% |
| 10 | River & Climatic data availability (years) -temperature, rainfall, humidity, wind speed and sunshine hours, evaporation | Data Type, No years (>20 Yrs) |
| 11 | Data quality | Screening, trend or discontinuity, reliability, adequacy & consistency - Outliers, % missed data |
| 12 | Missed data estimating and filling, especially rainfall & river data | Methods expected- Arithmetic mean – when CV <10%, Thiessen polygon, Isohyetal, Normal ratio (if no orographic variation), correlation method, Rainfall-runoff, absolute value of correlation, /R/≥ 0.8 , mass curve |
| 13 | Average Areal rainfall | Methods expected- Arithmetic, Thiessen polygon, Isohyetal, |
| 14 | Design rainfall estimation (mm, criteria, method) |  |
| **Hydrology of the Water Source, Demand and Water Availability** | | |
| 15 | Existing abstractions & predicted future demands upstream and downstream of proposed abstraction site (Why & when as much as possible) (litres per second) | Inventory of demand & allocation per month |
| 16 | Critical Month in water balance/budget | Peak demand month & amount |
| 17 | Monthly flow availability (availability Vs allowable) | Gauge station, no of years, minimum, mean, maximum |
| 18 | Mean annual discharge (l/s, criteria, method of computation) |  |
| 19 | Low flow/Base flow & method of measurement | When, No of measurements, verification, comparison of measured flow with gauge & other analysis, low flow curve & indices (Q95, and others), float location, |
| 20 | Recommended scheme design flow - | either base flow minus d/s demand & environmental flow (if sufficient flow is available), or dependable flow i.e. 80% of mean monthly flow for storage |
| 21 | Eco System service release |  |
| 22 | Design Flood Analysis for gauged catchment (criteria, method of estimation) | Flood frequency method, Gumbel’s method, log-normal method, Pearson type III or Vent Cho method, other empirical – decision rational among the results obtained |
| 23 | Design Flood Analysis for ungauged catchment (criteria, method of estimation) | Rational method, Empirical methods, envelope curves, SCS, flood mark & flood levels, Regional flood frequency, Catchment transfer from nearby similar characteristics catchment gauge.  At least 3 methods has to be used |
| 24 | Design flood effects on the hydrological regime (especially on flood plain) | Inundated area – farm or residence, map of inundation area, elevation |
| 25 | Return period for design flood (years) | Field drain-5, side ditches & pipe culverts-10, culvert <2 & <6m span-25, >6 -<15- 50, weir 50 years, Dam -100 years. |
| 26 | New zero elevation |  |
| 27 | Reservoir simulation |  |
| 28 | Design flood | One recommended value |
| 29 | Net possible/ allowable flow to be abstracted (liters per second) | One recommended value |

1. **Assessment of catchment water balance**

In assessing the adequacy of the proposed water source, account must be taken of the demands, both existing and planned, of other users drawing from upstream and downstream of the proposed abstraction site. Where appropriate, such demands should include flows necessary to support the aquatic ecosystem of the resource and of any wetlands downstream. It is not possible to define a precise distance downstream of the proposed abstraction site along which existing and possible future demands for water should be quantified; but the consultant has to make acceptable judgments and decisions based on available information.

Wherever a new scheme is planned whose water supply is to be obtained from a surface source, there will almost certainly be existing established demands for water upstream and downstream of the chosen abstraction point. A formal system of water rights may be in operation, or local people may have an agreement by traditional custom over the way in which water for irrigation is allocated. Therefore, base flow of the river and impacts of the diversion for irrigation both at upstream and downstream uses shall be assessed properly.

Therefore, information should be provided on water balance considering the minimum flow of the river, the current users (in the command area, downstream and upstream beneficiaries) of the given water resource for different purpose (irrigation, livestock, and domestic purpose, ecological function), the amount to be diverted, the deficiency resulted to the downstream users due to the diversion.

Future increases in demand on the source upstream of the proposed abstraction site, taken together with existing and any planned additional demands downstream, both net of downstream inflows, will give the equivalent demand at the abstraction point to be deducted from the supply when assessing the water available to the project. Where discharges at the abstraction site have been naturalized, the equivalent demand should also include existing demands upstream.

The assessment shall contain a detailed discussion of the hydrological analysis leading to an assessment of the available water resources and reviews of a methodology to determine the flow data series to better assess available surface water resources.

1. **Water Quality**

The study of water in natural and engineered systems. They focus on the movement, distribution, and quality of water resources like rivers, lakes, and groundwater.

**Role in Water Quality Report**:

* Assessing the physical and chemical characteristics of water (e.g., pH, turbidity, salinity).
* Evaluating how water interacts with soils, rocks, and human activities, which can impact its quality for irrigation.
* Studying water sources, flow patterns, and how contaminants or nutrients move through water bodies.

Table 3 Summary of irrigation water quality parameters

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Parameters** | **Unit** | **FAO Maximum**  **Guide Line**  **Value** |
|
| 1 | PH |  | 6 – 8.5 |
| 2 | Turbidity | [NTU] |  |
| 3 | E.C | [µS/cm] | 3 dS/m |
| 4 | TDS | [mg/L] | 2000 mg/l |
| 5 | Total solids at 105oC | [mg/L] |  |
| 6 | OH alkalinity | [mg/L as CO3] |  |
| 7 | CO3 alkalinity | [mg/L as CO3] | 0.1 me/l |
| 8 | HCO3 alkalinity | [mg/L as CO3] | 10 me/l |
| 9 | Total Alkalinity | [mg/L as CO3] |  |
| 10 | Ca Hardness | [mg/L as CO3] |  |
| 11 | Mg Hardness | [mg/L as CO3] |  |
| 12 | Total Hardness | [mg/L as CO3] |  |
| 13 | Ammonia (NH3) | [mg/L] |  |
| 14 | Ammonium (NH4+) | [mg/L] | 5 mg/l |
| 15 | Nitrate (NO3) | [mg/L] | 10 mg/l |
| 16 | Nitrite (NO2) | [mg/L] |  |
| 17 | Chloride (Cl-) | [mg/L] | 30 me/l |
| 18 | Fluoride (F-) | [mg/L] |  |
| 19 | Sulphate (SO4-2) | [mg/L] | 20 me/l |
| 20 | Boron ( B-3 ) | [mg/L] | 2 me/l |
| 21 | Sodium (Na+) | [mg/L] | 40 me/l |
| 22 | Potassium (K+) | [mg/L] | 2 mg/l |
| 23 | Calcium (Ca++) | [mg/L as CO3] | 20 me/l |
| 24 | Magnesium (Mg++) | [mg/L as CO3] | 5 me/l |
| 25 | Iron (Fe++) | [mg/L] |  |
| 26 | Manganese (Mn++) | [mg/L] |  |
| 27 | SAR | [me/l] | 15 me/l |

* + - 1. Geological and Geotechnical Investigation

Extensive geological and geotechnical investigations are to be conducted to confirm that, the site can be developed on the desired scale and at acceptable cost. The nature of soil and rock formations present, critical to foundation integrity, must be proved by subsurface exploration. Foundation competence must be determined by stability, load carrying capacity, deformability, and effective impermeability. All are to be assessed in relation to the type and size of structure proposed. The geological and geotechnical investigations are required for headwork and other structures foundation verification, embankment design (if any), canal design, borrow area etc.

Detailed Investigation Report on the foundation investigations of different structures/components of the project discussing the following points and additional points, if any, as relevant to the structure shall form an appendix of the Detailed Project Report. Summary of the investigations carried out, results, treatments, recommendations etc. shall be furnished under the chapter of the Detailed Project Design Report.

Generally, the consultant shall undertake the engineering geology and geotechnical investigations at the proposed sites in accordance with the references detailed below.

* Previous studies and relevant documents (geological reports and maps) if any will be thoroughly reviewed and the gaps and shortcomings shall be clearly identified;
* Visit to the proposed river diversion/dam sites of interventions and verify its suitability from geological and geomorphologic point of view through traverse downstream and upstream of river diversion sites;
* Conduct Geotechnical assessment for foundation structures, headwork site, main canal and appurtenant structures.
* Conduct suitable field and laboratory tests to determine the composition, compaction and integrity of existing embankments;
* Carry out bulk samples at 0.5m intervals to appropriate depth at structure and borrow locations for soil characterization testing at a suitable laboratory. In situ and field test techniques should be employed to supplement laboratory testing; Depth for head work and flume structures minimum 3m, canal minimum 1m, and other different structures minimum 2m.
* On purpose to acquire a complete documentation of geological conditions at the proposed site(s) selected detailed topographic map of scale 1:1000, with 0.5m contour intervals is of primary importance, cross sections along axis of river diversion, at 100m d/s and u/s, exploration of river diversion sites and investigations of construction materials and their suitability;
* Prepare details and location of the pits, along the river diversion axis and abutment, and in-situ tests conducted for foundation investigations including other locations;
* Present summary of the field investigations/observations, in-situ and laboratory tests data, evaluation of the design parameters and treatment proposed;
* Geology, engineering geology, and hydrogeology characteristics of the catchments are explained in brief and discussed.
* The drainage system, history, nature and relative age of the rivers studied and assessment on the catchment area related to the presence of soluble rocks, erodibility and degree of weathering with respect to sediment transport, identification of the possible sources for water quality problems and assessment on the presence of geological structure and their trend and extent are made.
* Weir or dam axis and abutment geomorphology, geology, hydrogeology and engineering geology are studied in detail and problems of stability, soil bearing capacity, instability, water tightness, such as presence of faults, fissured materials, and their permeability, slop and slip, etc… are addressed.
* Investigate foundation features of the recommended headwork site, canal route and retaining walls and determine the depths of bed rock/hard stratum.
* Carryout geological test pits at a minimum depth 3m or more if necessary at reasonable interval depending on the topographic features of headwork site along the cross section and longitudinal section of the proposed sites;
* Carryout a log profile to clearly indicate the material composition of the foundation material, foundation level and ground water condition;
* General engineering geological conditions of the main canal is investigated along the tentatively selected route and at its immediate vicinity by approximating the change from the headwork or from any well-known reference point, concerning its stability, permeability, workability etc., Moreover, major gully crossings are also studied at the assumed point of canal crossing and its vicinity. During the investigation, samples are taken for different tests if necessary;
* Identify any geological hazard in the project area which threatens sustainability;
* Finally, detailed analyses of all the data are carried out and a brief engineering geologic, hydro-geologic, geologic report is to be produced which includes location map of the site and construction material.
* Investigation for identification of locations of potential quarries for construction materials like rock, aggregates, sand, soils and water; and distance, quality, quantity and hauling distance including access route are to be examined;
* Estimation of quantity of material for each location, details of sample collection/testing of the materials, quality/suitability of the material, road maps showing the transport road up to the borrow area in relation to the construction site(s) shall be provided;
* Identifying the borrow areas; and preparation of location maps, road maps etc. showing the transport road up to the borrow area, relating the same to the construction site(s);
* Collection and evaluation of samples from borrow areas (rock, sand, soil and aggregate quarry sites) for its suitability for different types of materials shall be collected for laboratory tests;
* The depth of the pits/auger holes shall depend upon the availability of the soils and economic exploitation. The borrow area shall be located at near the working site as possible. Pits/auger holes’ minimum diameter of 15cm shall be taken in the proposed borrow area on 30 to 50m grid depending on the uniformity of soil depth & type and representative samples collected/tested for different types of strata/soil to determine their properties and delineate the soil zones;
* For assessment of quantities, drill holes shall be taken in consultation with geologist, if required;
* Required details of any other material as indicated in the earlier items shall be indicated.
  + - 1. Watershed Management Study

The consultant should undertake but not limited to the following:

* Delineate Major watershed, which contributes area or hydrological unit that is bounded by a ridge in which runoff emerges from any point within the closed boundary of ridge flows to an outlet. (This is to extract hydrology and climate data)
* Describe general description of the study area (area, location, elevation, and distance from woredas town…)
* Analyze the hydrology of major watershed (flood estimation, CN, TC…)
* Assess the biophysical features of the major watershed including map (land use/land cover, topography, drainage, morphology, soil, climate…)
* Analyze the result of land capability classification of major watershed for each land use type
* Assess the status of land degradation in the landscape-survey of spatial land use land cover, land degradation levels, trends, prioritization and mitigations.
* Assess soil erosion (type and cause of soil erosion & sedimentation, estimation of annual soil loss using RUSLE method for major watershed).
* Assess the socio economic situation of major watershed (population and demography, climate smart agricultural (CSA) practices (farming system, conservation agriculture (CA), crop production, irrigation, livestock production, existing soil and water conservation practices, soil health status/tests, forest management & traditional agro-forestry practices, etc.), land tenure system, rural energy situation, gender issues, infrastructure development, institutional situation)
* Describe major problem related to productivities, environment, climate and socio-economic problems of major watershed that are currently observed.
* Analyze the Existing opportunities in terms of bio-physical resources and socioeconomic conditions and development policy and strategies need to be identified in order to develop contextual watershed management options.
* Propose the development plan using GIS to improve livelihood of people through restore and enhance land productivity, support rehabilitation of degraded land and development of natural resources, providing opportunities for income generating and contribute to sustainable small-scale irrigation infrastructure services.
* Survey all Biophysical features of delineated major watershed and present the data in the form of map and table by using GIS and latest release high resolution images (land use/land cover, slope, soil) with shape file form.
* Prepare the major watershed base map for the existing features.
* Identify and assess in detail for delineated major watershed problems (environmental degradation, social, economic, ecological & climate risks/impacts, etc) through different methods (GIS, FGD, KII, observation, interview community and other tools)
* Prepare detail propose type of conservation measures for each land class and quantifying the required amount of each planned activities and; summarize in table form showing the quantity, norm, required Person Day (PD) and total cost to complete the work, and schedule of the work. This will help the necessary materials and labor needed on time, type and amount of tools and equipment for implementation.
* Describe Watershed Implementation, follow up and monitoring system (institutional arrangement, watershed committee, capacity building…)
* Assess major livelihoods and other alternative income generation activities, and their potential resources in the landscape.
* Assess farmers managed natural regeneration potentials for the purpose of land restoration and climate change impact mitigation.
* Conduct climate vulnerability (adaptive capacity, sensitivity & exposure) assessment and propose mitigation & adaptation measures.

**Assignments to the consultant regards to Gender equality and social inclusion, the consultant should undertake the following among others:**

* Assess economic opportunities of women (FMHH&FHH), youth and PWDs in livestock development (beekeeping, fattening, shoats, forage development and poultry,)
* Assess the status and needs of time and labor-saving technologies, like water harvesting technologies, bio-gas, improved stoves etc.
* Assess the existing energy sources, needs and constraints of the community for domestic tasks
* Assess job opportunities of women, youth and PWD in watershed and forage development.
* Examine job opportunities in the area of CA, nursery, alternative energy sources for different social groups.
* Assess the participation level of women, youth and PWD in physical and biological soil and water conservation activities
  + - 1. Soil Survey and Land Suitability

Each different soil type has to be inspected to a depth from the surface of 2 m by means of a pit. In areas of uniform soil, one pit should be dug every 30-50 ha. Where more than one soil occurs within the project command area the survey shall be sufficient to define the approximate boundaries and areas of the different soils. This will be augmented through field observation, laboratory test, and by information from farmers. The consultant shall give due consideration to the knowledge of local farmers in terms of soil variation, susceptibility to flooding and tillage characteristics. The consultant will provide detailed information on land classification and soil physical and chemical properties of the command area as a basis for confirming crop selection, irrigation designs, and agricultural input requirements. The details shall cover the following:

* Preparation of soil survey and land evaluation report for irrigation within the command area;
* Assess and evaluate existing land use pattern and serve as a basis for assessment of land and crop suitability for irrigation;
* Identify the various topographic forms, soil types and existing land use;
* Assess and identify physical and chemical properties of the soil in the command area;
* Soil auger hole and profile description must be done as per the standard procedures;
* Carryout an overall intensity of soil observations, pits, typically one per 10ha (one per 4 ha-30ha) depending on command area conditions;
* Perform Irrigated land and capability classification and/or land suitability evaluation for crops for sustainable development of irrigated agriculture;
* Soil and land suitability maps must be prepared and incorporated in the report at a scale of 1:1,000 with contours having an interval of 0.25 m; to an appropriate depth of 2m or the bed rock, whichever is shallower;
* In-situ soil physical parameters
* **Soil physical Characteristics**
* Effective Soil Depth; Soil texture, Structures, drainage characteristics, infiltration rate, porosity and hydraulic conductivity, soil moisture condition including field capacity (FC), permanent wilting point (PWP), bulk density and Depth of Soft Weathering Rock.
* **Soil Chemical Characteristics**
* Soil acidity and alkalinity; Electrical Conductivity;
* Cation Exchange Capacity and Base Saturation;
* Exchangeable Cautions;
* Organic Matter and Organic Carbon; total N; calcium carbonate by %
* Cationic Ratios Exchangeable Sodium Percentage,
* Available Phosphorus; Carbonates;
* Toxic elements; Salts

Procedures as proposed in the FAO guidelines for land evaluation will be used. FAO soils bulletin No32 (A frame work for land evaluation) and FAO bulletin No55 (A guideline for land evaluation for irrigated agriculture) will be followed.

Note that soil auger hole observation data, soil profile description, infiltration test, hydraulic conductivity tests and laboratory analytical data must be included in the appendices in electronic format.

* + - 1. Irrigation Agronomy

The Study starts with designing of data collection, analyzing and finally report writing; that includes: Desk review, preparing questionnaire for households, semi structured questionnaire for focus group discussion (FGD) and key informant interview (KII), use appropriate PRA tools and techniques, sampling and targeting, data collecting (primary and secondary), analysis and reporting.

* Assessment and description of the physical features of the project/ project area/ including information about agroecology, climate, location, location and accessibility of the project area water resource, topography, soil, and other features of the command area, about the land suitability for irrigation development;
* Identify the length of the growing period and cropping season of the project area
* Assessment and description of the present agricultural practices of the area; including, but not limited to, information about experience with irrigation practices (traditional, modern, etc). Source and type and methods of irrigation. Crop productivity, cropping pattern and calendar, farming practices, input use (organic and inorganic, improved seed crops and forage seed, agrochemicals) application rate per hectare, crop protection, post-harvest handling, Causes of post-harvest loss, and % of post-harvest loss by commodity.
* Assess and identify agricultural risk and mitigation practices.
* Experiences using climate-resilient crop production practices (conservation agriculture, organic fertilizer, drought-tolerant crops, etc).
* Forage development: forage resource availability/scarcity, availabilities of fodder banks experience,
* Extension service including digital agricultural extension and other relevant activities.
* Assess existing agricultural advisory services, extension services providers FTC/PTC, FFS/FBS (availability of FTC/PTC, office materials, land holding size).
* Assess the accessibility of Agro metrology advisory services
* Existing farm tools, mechanization, oxen, labor, and requirements for crop production per hectare.
* Irrigated area total yield, and yield per hectare by crop type and season for the past three to five years
* From the total productions % used for consumption and % used for market.
* Major production constraints should be clearly assessed and described so as to seek and propose appropriate solutions;
* Check the appropriateness of the selected commodity described in the Project Implementation manual (PIM) otherwise Select the most appropriate nutrient-dense, climate-resilient, and market-oriented commodity based on the community demand which will be suitable for the prevailing climate, soil, available water, and available labor in the new irrigation system,
* Carry out the estimation of crop water requirement through widely applicable methods; duty determination; computing net and gross irrigation requirement.
* Determine cropping patterns, cropping calendar, irrigation intervals, and irrigation frequencies considering hydrology, soil, climatic, actual cropping practice of individual farmers, and socioeconomic data;
* Propose recommendations as to the most appropriate type of inputs such as seeds, fertilizers (organic and inorganic), and chemicals and their levels of use taking into account the environmental factors;
* Propose recommendations as to the most appropriate and improved agronomic/crop management/ practices such as crop protection, optimum planting/sowing depth, and optimum plating, spacing, weeding frequency, threshing, storage and other relevant practices,
* Calculate the amount and cost of labour, animal, and machinery requirements of the farm, their distributions, and their scheduling;
* Propose recommendations on the type and model of the farm machinery and tools;
* Estimate the availability of labor, draught animals, machinery rental facilities, regional market areas, etc
* Determines the projected agricultural development costs of the area and likely returns from the project during its early and later phases;
* Estimate five to six years of crop yields based on any existing data from the study area; the factors taken into consideration for the projection should be described and justified.
* Identify the need for input supply, credit services, training, extension support, marketing facilities, and cropping facilities and estimate the cost for each service;
* Assess the agricultural marketing values of the selected crops and prepare crop budget of the crops at the final stage of the study;
* Assess the possibility of appropriate processing and storage techniques of the identified crops
* Base on the selected crops compute the amount of water required for irrigation of the selected method of irrigation as well as for at least two irrigation efficiencies;
* Determine the critical periods for irrigation each selected crop so that to ensure adequate water availability at these times;
* Calculate and determine the consumptive use of various potential crops and the irrigation requirements and prepare irrigation scheduling considering complex cropping at a farm level;
* Collect climatic data from appropriate stations and simulate the data from the study area;
* Investigate all major crop diseases, pests, weeds and suggest prevention and control strategies.
* Proposed digital agricultural extension services, agricultural advisory, extension. FTC/PTC, FFS/FBS materials and technologies for demonstrations
* Check the appropriateness of the selected livestock commodity described in the PIM otherwise Select the most appropriate commodities based on climate-resilient, market-oriented, and community preference and proposed interventions.

Proposed forage development interventions; forage type, varieties, fodder banks, appropriate equipment and machinery for forage processing

**Agricultural Development Plan Preparation**

Based on the existing collected data, and proposed recommendations, the consultant should recommend ADP preparation methodology and prepare ADP for five to six years for each landscape.

* Annex (survey questionnaires, TOR, minute, pictures and participants’ signatures, list of contact)

**Food and Nutrition**

* Availability of nutrition demonstration center (NDC) and of value addition houses (Sorting grading and packaging activities), local processing equipment, and nutrient-dense crops and livestock products
* Assess Indigenous and traditional Varieties that are neglected and underutilized crops
* Check the local and modern food processing technologies
* Assess the local practice of food preservation methods and techniques
* Assess the prevalence of food shortage due to drought and other natural and human-induced calamities
* Draw recommendations for causes of malnutrition, limitation of diversified production and consumption, etc on the existing identified gaps.
* **Nutritional Needs and Crop Selection:**
* **Crop diversity**: Ensure the irrigation system supports the production of a variety of crops, especially nutrient-dense crops (e.g., vegetables, legumes, fruits) that address the nutritional needs of the local population.
* **Food security**: The irrigation project should focus on crops that can reduce the risk of food insecurity, particularly in drought-prone areas.
* **Cash crops vs. staple crops**: Balance between staple crops (e.g., cereals) for food security and cash crops that can generate income to improve nutrition through access to markets.
* **Health and Nutrition Education:**
* Along with irrigation development, there could be programs that promote healthy food consumption, integrating nutrition education with agricultural development.
* Ensure communities are aware of the nutritional value of the crops grown and how they contribute to diet diversity.
* **Irrigation and Household Livelihoods:**
* Improved irrigation can enhance household income, enabling families to purchase a wider variety of nutritious foods.
* Irrigated agriculture helps farmers produce consistently throughout the year, avoiding the lean seasons that often lead to malnutrition.
* **Food Security Indicators:**
* Include food security and nutritional impact indicators in the feasibility study to track how irrigation interventions influence local diets, food availability, and malnutrition rates.
* Possible indicators could be the number of meals per day, dietary diversity score, and child stunting rates in the project area.

**Assignments to the consultant regards to Gender equality and social inclusion, the consultant should undertake the following among others:**

* Explore the specific constraints faced by women in crop production and home gardening
* Assess the status of women involvement in the decision making of crop selection, cropping calendar, cropping pattern and product marketing
* Examine the involvement of different social groups in irrigation agricultural practices
* Evaluate the productivity of women owned farmlands verses male owned farmlands
* Assess the participation of different social groups on FREG and seed demonstration
* Assess the participation of different social groups on different trainings, agricultural extension services, field days and technology demonstration.
* Assess the access to and use of different farm tools, NDS and postharvest technologies for women and PWDs
* Examine feeding habits and constraints of different social groups (PLW, PWDs, women, children, elderly people and other socially marginalized groups)

**Annex** (survey questionnaires, TOR, minute, pictures and participants’ signatures, list of contact)

* + - 1. Agribusiness and Marketing

The Study starts with designing data collection methods, analyzing and finally report writing that includes: Desk review, Preparing Questionnaire for households, semi structured Questionnaire for focus group discussion (FGD) and key informant interview (KII). Sampling and targeting, Data collecting (primary and secondary), Analysis and Reporting.

1. **Description of the project Area**

* Geographic location, topography, land use,
* Agro-ecology and climate conditions
* Demography including maps… (Age, sex, productive labor…)
* Economic Activities (crop production, livestock production, Non-farm activities and Livelihood)

1. **Legal framework, policy and strategies (agricultural marketing,** contract farming, illegal trade, marketing cooperatives, input distribution, seed multiplication and quarantine, quality control, …)
2. **Assessment of marketing Institutions:** (availability of MFI, RuSACCOs, input and marketing cooperatives, unions, establishment, legal certification, documents, membership status, capital, auditing, patronage dividend, facilities like storage, road access, electricity, office facilities, linkage primary cooperative to unions, marketing experiences, Integrated agro-processing parks, investors, trader, and agro dealers, challenges)
3. **Agricultural Input Marketing system**

* Existing Input suppliers
* Type of input fertilizer, improved seed (crop, forage and vegetable), forage, agrochemicals, technologies (farm tools, mechanization, postharvest technologies…), improved livestock breeds, concentrate animal feed… access and trend of demand and supply (the last 3-5 years), gap analysis, input price, problems in input supply system
* Labour availability (hired labour, family labour), cost of labour

1. **Financial services**

* Source and type of credit facilities available in the area, (Microfinance institutions, rural saving and credit cooperatives and unions, banks, insurances, own and informal money lenders…)
* Lending requirements of financial institutions
* Interest rate of each institutions
* Availability of interest free financial service
* Credit Distribution & Repayment, defaulters, gaps, Challenges of small scale farmers in accessing financial services

1. **Agricultural Product marketing**

* **Existing Agriculture Production**

(Data on agricultural production should be adopted in line with agronomy report)

* **Crop Production:**
* Identify major crops grown by cropping seasons (Meher, Beleg and irrigated)
* The data of cultivated area, total yield, and yield per hectare by crop type and season (belg, meher and Irrigated) for the past three to five years.
* From the total productions % used for consumption and % used for market.
* **Livestock Production**
* Type of livestock and livestock population (exotic and local breeds) production and productivity
* Forage development: forage resource availability/scarcity, availabilities of fodder banks experience,
* Livestock Production and productivity: Red meat, poultry, shoat
* Major crops and livestock Production vs marketable surplus, seasonality of supply
* Access to Market: local market, marketing day, distance from site, Marketing routs and outlets of Major crops, Marketing chains and Marketing actors (Potential buyers - wholesalers, retailers, institutions, agro-processor and exporter),
* Location and accessibility to integrated agro-processing parks (IAP), rural transformation centre (RTC)
* **Contract farming and Marketing Linkages** (marketing linkage experiences in the area, out growers, potential to contract farming…)
* Value addition trend, identifying bottlenecks, inefficiencies, and opportunities for value addition within the value chain.
* Percentage of commodity sold through cooperatives, Private traders…., reasons for not selling through their cooperatives

1. **Packaging, Handling, Storage and Transporting**

* Traditional packaging system,
* Local storage system in the area; Availability, standard, location and functionality of modern warehouses and Market sheds; if not functional - reason for non-functionality
* Interest on Market shed, cooperative warehouse
* Willingness of primary cooperatives and Cooperative Unions in co- financing market infrastructure recruitment and construction
* Check the availability of land for construction of warehouse and market shed
* Transportation System (Traditional and Modern),
* Accessibility of Road all weather and dry weather (average distance of the farm from road in km, Average distance from market center or cooperative office),
* Postharvest handling and postharvest loss of major crops,
* Major problems farmers and cooperatives faced regarding packaging, storage, handling and transporting…)

1. **Pricing**

* Pricing trend of major agricultural products in the area (three to five years, Evaluate the price fluctuations occurred for commodities farmers produced for the previous years, who determine the price of products (producer? broker? consumer? assembler...)
* Identify pricing and selling method

1. **Market Information**

* Means of market information dissemination in the area - neighbors, brokers, traders, mobile phone, digital platform, notice board from cooperative and trade office/
* Put the percentage share of farmers receiving most of their information about the market,

1. **Gender and Social Inclusion in Agricultural marketing**

* Cultural, social exclusion and inclusions of women, PWD, and youth in production and marketing,
* Female and youths’ participation in production, Marketing, value addition, transporting, storage females’ workload…)
* Decision on product selection, pricing and product selling

1. **Revenue and profitability of selected commodity**

* Revenue from sells
* Production and marketing costs,
* Marketing Margin of each actor and Profitability analysis

1. **IGA and Job creation**

* Assessing Jobless youth, Women and PWDs
* Assessing availability of off-farm and non-farm activities
* Assessing income generating activities
* Jobs created for private and organized groups/enterprises

1. **Business Development Support**

* Institutions engaged in BDS
* Business plan preparation, planning and scheduling Experiences
* Agri-preneurship experiences and opportunities (nursery, fruit tree development, apiculture, range land management, vermin-worm production, poultry, on farm processing, agricultural input production, mechanization….)
* Assess the availability of Integrated Agro Industrial Parks (IAIPs) around the selected landscape and potential Integrated Agro Industrial Parks (IAIPs) to be established, market linkage opportunities and challenges
* Interest of men and women agri-preneurs on matching grant windows
* Challenges that face agripreneurs

1. **Marketing Constraints, Agricultural Marketing Risks and mitigation**

* Prioritized Marketing risks and mitigation, seasonality and irregularity of supply, price fluctuations and inflations, sustainability, production, productivity, quality….)

1. **Agribusiness opportunities and propose Interventions**

* Institutions and market infrastructures,
* Platforms, business to Business relations, forums, promotions,
* Market Accessibility of the project area to established industrial zones/ parks and how to create market linkage with industrial zones/ parks and to other Potential markets,
* Show the value chain mapping and actors for the highest value crop of the area,
* Propose interventions to solve existing gaps and upgrade Agribusiness opportunities for the future

**Assignments to the consultant regards to Gender equality and social inclusion, the consultant should undertake the following among others**

* Assess the level of participation in membership and leadership of different social groups (Women, Youth and PWD) in COOP, ROSACCO and other local business institutions.
* Assess the availability and access to agricultural inputs, credit facilities, technologies and value addition of different social groups (Men, Women in MHH and FHH, male and female Youth and PWD).
* Assess the access to product and input market information channels, infrastructures, linkages for different social groups
* Assess and indicate the job and agri-prenurship opportunities of different social groups along the value chains
* Assess the participation and roles of different social groups along value chains
* Assess the types, potential and experience of time and labor-saving technologies, like information and communications technologies, processing machines and postharvest technologies,

**Annex** (survey questionnaires, ToR, minute, pictures and participants’ signatures, list of contact)

* + - 1. Socio-Economy, Financial & Economic Analysis

The socio economy study is to be conducted by the help of focus group discussion, consultative meetings, a sample household survey, PRA techniques and other data collection methods. If the irrigation projects cover a relatively lower area of land, all of the households could be identified by name and by their demographic characteristics whereas further detail study of the population and other socio economy study components could be made through a household sample survey and other data collection methods. The sample size will be determined based on the total number of households, the diversity of the socio economic conditions and the availability of local resources to be collected and organized. The survey and analysis will include but are unlikely to be limited to: -

**1) Establish Study Frameworks:** The Socio-economic Study shall prepare and present to the client for review and approval general and specific Objectives, approach and methodology, Project Rationale, data and information collection formats, data analysis tools as well as Scope and Limitation of the study.

**2) Identification of the Various Components of the Project Area: -** The various project places could be classified into temporary and permanent project area categories. Those project areas consist of the command area, headwork, camping & offices, material sites, working places and others. The study begins by clearly identifying those places into their categories and would conduct the study by giving emphasis for those project specific places. Apart from this the study would be made in comparison with the rest of the places such as kebele, wereda and region within which the project is located and at country level at large. The locations of Basin, woreda, and kebele, within which the project is found as well as the project locations for head work, command area and the various project component places would be provided with GPS aided reference data together with some description of the project areas.

**3) Identification of the Population of the Project Area and Investigation of Population Dynamics:** The number of population and households of the project areas classified into the number of male and female beneficiary households and population would be clearly identified. The population could be categorized into beneficiaries and those that could be affected by the project. The classification would be identified and analyzed by the study. In order to understand the impact of the present and future population growth on the resources and planned irrigation schemes, population dynamic will be investigated and family planning practice will be examined. The proportion of the economically active population will also be analyzed so as to assess the labor availability of the area of or the intended project. Population size, religion, ethnicity, age and sex composition (heterogeneity and/or homogeneity), Population spatial distribution, population projection, the respective demand for food, supporting capacity and other necessities in the project and the catchment area. Assess current settlement pattern, township, population movement or migration and Infant and child mortality situation in the area would also be investigated.

**4) Investigate the Availability of Accessibility of All Social Services and Possibility of the Contributions. It has for Future Development of the Irrigation Project:** The availability and accessibility of social services such as health, education, water supply, Financial institutions, Energy supply/ Mineral source, Communication (road, transport, telephone, other ICT services ... ) veterinary and other infrastructure and social services are to be investigated in order to assess the potentials/ constraints and possibility of the contribution it has for future development of irrigation project.

**5)** Identify and Analyze the Present and Projected Economic Systems, Input Demand, Supply and Consumption, Product Markets and Facilities, Primary &Secondary of the present and demand, supply and consumption; product markets and facilities; and credit services would be done. Few details are provided below.

**Economic Systems**: - In this line of study, the economic base of the beneficiary farmers would be studied. The list of activities that would be included in the study includes but not limited to : Economic source/ Major means of livelihoods/potential income generating activities; Farming System; Crop production (potential crops, area covered by potential crops , Current Irrigation Practices and Tradition, constraints of crop production); Livestock production (Major livestock type, size, major diseases ; Other economic activities &potentials (Potentials of apiculture, fish, forest &forest product etc.); Land Use Pattern (area under different use, cultivated/ cultivable, pasture, forest, bushes & shrubs land, rivers & lakes ... ) and Land Tenure and Size of Holdings. The analysis would very much be supported with relevant data which can represent the study area under consideration.

**Project Benefits: -**The study shall identify and analyze direct and an indirect benefits of the project. The study shall identify direct economic benefit of the project to the area including land holding of the household, agricultural yields and production of major and minor crops, family income from both crops and livestock's and farm income per area as a result of the proposed project. Non- economic benefits include upper watershed forestation, to reduce siltation problems of irrigation structures and thus lengthen the useful life of structures and reduce annual operation and maintenance costs. Besides, project development creates infrastructure benefits, welfare facilities and income and employment opportunities outside the project.

**Input Used: -** The type, quantity, availability and prices of input supply in comparison of demand and consumption requirements and credit services (existing &future) would be studied.

**Product Marketing and Facilities: -** The study of product marketing includes the followings: Proportion and quantity of marketable Agricultural products; Product marketing and agro processing; Communication (Transport, road ....); Storage; Marketing channels; Marketing size and structures; Marketing constraints. Actual and projected national/ regional and project data should be provided for the intended crops. Market potentials for project production should be identified and quantified to the extent possible such as own consumption, local and/or regional markets, national markets, international/export markets. Price analysis and fluctuations; prices of existing and proposed crops are required to be clearly stated and included. Besides, how demand &supply of crops &livestock are determined need to be studied.

**6) Identify Development Potentials, Constraints in Order to Involve all stakeholders in the Project Area for Sustainability of the Project:** The study shall Identify development potentials, constraints of the scheme in order to involve all stakeholders in the project area for sustainability of the project; Existing NGO's and area of cooperation with the community, suggestions with regard to additional government and private institutions and services that may be required for effective implementation and operation of the scheme would be conducted.

**7) Undertake Gender Analysis:** For sustainability of the schemes, the extent of Involvement of women in the development of the project and ways of maximizing their role and active participation will be examined.

**8) Social impact and mitigation measures**

Direct social positive and negative impacts will be assessed and measures to mitigate negative impacts will be recommended. In light of this the following area of impact will be considered: -

* Impacts related with the reservoir area, Dam and appurtenant structures.
* Impacts related with canal, road, drain etc. alignments
* Impacts related with irrigation command area
* Impacts in selection of borrow area and quarry sites
* Social impediment impact (Compensation requirements)
* Attractive beneficiary impact (upstream and downstream impacts)
* Impacts on agricultural yields, water points, settlements, perennials and others for c compensation requirements and land redistribution

Generally, assessments of the social implications of the project, including displacement, land reallocation, compensation, etc. would be undertaken. In this respect, the study should Identify the expected/existence of displacement and asset losses due to the intended project. The effect of displacement and asset losses if any, size and nature of land/asset that will be affected (settlement, grazing land, crop land, forest land, other social value such as recreational, holy place, aesthetic etc) need to be identified and quantified. If there is necessity of compensation payment or replacement of properties due to construction of the project, the study shall be conducted with the beneficiaries and the study and design team. The agreement and the consensus of the community shall be attached to the project document. Different option for compensation mechanisms should be sighted. Direct social positive and negative impacts will be assessed and measures to mitigate negative impacts will be recommended. In light of this, impacts on the headwork & appurtenant structures; canal, road, drain etc alignments; irrigation command area; borrow area and quarry sites, social impediments (Compensation requirements and land redistribution) current and projected upstream and downstream water users; agricultural yields, water points, settlements, perennials and others will be studied.

**Community Organization and Management Study**

* Assessment will be made on the irrigation organizational and management. Based on this and with the full participation of the beneficiaries, a Water Users Association (IWUA & WUA) shall be proposed and that will be responsible for the day to day operation & management of the irrigation system.
* The organization & management proposal of the (IWUA & WUA) should enable the irrigation system to sustainable operate based on cost effective operation and full participation of the beneficiaries. The recommendation will include procedures and techniques of the operation & maintenance fee collection form beneficiaries and the land distribution amongst the beneficiaries (as appropriate)
* Briefing the Woreda concerned bodies (Woreda administration, Woreda office of agriculture, cooperative agency, etc.) on the assignment of the study team and discuss on their participation and the roles they have to play in facilitating the study process and work closely with the study team;
* Conduct community consultation/sensitization to realize their full participation of the beneficiaries during the whole process of the feasibility study and detail design of the proposed project.
* Carry out the facilitation tasks to establish IWUA & WUA by beneficiaries and work together with the assigned committee during the study and design period.

1. Financial and Economic Analysis
2. Financial Analysis

The consultant shall conduct the financial and economic analysis covering the following aspects:

* Project description, importance of the Project to the side of the farmer, the area and the country as a whole
* Assess financial price of Inputs Outputs and equipment, tools and packaging materials, labor and oxen power, etc.
* Identify and Review all costs of the projects in detail (investment costs, replacement costs, all operational costs, maintenance costs, compensation, environmental costs, supervision and management costs, training costs…) with clear and an acceptable format. Disaggregated into foreign and local currency components.

Consider VAT (15%), contingency of 10% on the estimates shall be adopted to make allowance for changes in unit price and in item quantities and/specifications during construction.

* Identify revenues from each crop product and by-products of each season (wet season and irrigation for proposed project and without project cases.
* Prepare crop budgets for without the project case. Prepare crop budget for the proposed range of irrigated crops taking account of (a) input requirements including labor, (b) attainable yields and yield development, and (c) gross and net crop margin. Compare summary of yearly production cost and revenue under "without" and "with" project condition, consult the agronomist, for high value crop selection and production plan, check the cost data provided within the engineering and other sectoral studies and make use of them for the viability analysis.
* Put a proper opportunity cost of capital
* Justify implementation schedule of the project
* Enumerate benefits of the project( Valued existing and proposed crop production benefits, by products), with reality and tangible measures and proper data sources
* Carry out the financial Net Present Value (FNPV), financial internal rate of return (FIRR) and Benefit Cost Ratio (B/C) analysis in accordance with the agreed methodology and approach to determine the financial viability of irrigation project based on the engineering designs and agronomy development.
* Carry out sensitivity analysis with a major variables
* The full capacity utilization of irrigation land of the scheme, if the irrigable land was not fully utilized under traditional irrigation practices before, should be planed based of the project up to full development period in the first three consecutive years of the project lifetime.
* Contribution of the community, the government and the donor will be based of the donors’ agreement on project implementation agreement.
* Attach all spread sheet analysis result as an annex of the report, the spread sheet should be also submitted as a project document

1. Economic Analysis

* Do all the above necessary measures on financial analysis to the economic analysis steps too with correct conversion factor numeraire
* Show the purpose of economic analysis of a project like Irrigation Project is to measure the real contribution, which the project will make to the national income/national economy.
* Assess the comparison between with and without project as in the case of financial analysis, the economic analysis involves the comparison of economic outcome with project if any, has to be foregone when the project is established, net return attributable to the project will have to exclude such benefits without the project.
* Review economic analysis opportunity cost values (real values) of all items of cost and benefits have to be estimated.
* Ensure that transfer payments such as taxes, duties, subsides, loans, payment of interest and repayment of principal are excluded from the calculation of economic cost or benefit. This is done because these are considered as transfer payments and do not reduce or increase national income.
* Review life time of the of the project for which project period has to be carried out life time the economic life of such capital assets may be shorter because of technological obsolescence. Therefore, for diversion and Pump irrigation 20 years, micro earth dams 15 years and macro earth dams 30 years will be taken as appropriate for the economic analysis.
* Review economic crop budget **t**he selection of crops to be grown, determination of optimum yield for each crop to be achieved, yield build-up period from year 1 to the year when optimum yield is achieved, optimum level of uses of inputs at optimum yield level**,** pattern of uses of inputs from year 1 to the year when optimum yield is achieved and prices of outputs and inputs.
* Review project Cost (Economic),investment, operation and maintenance cost, replace cost an return to project
* Compute economic Internal rate of return, ENPV, Economic B/C-ratio and sensitivity analysis
* Annex spread sheet that indicates all steps for financial and economic analysis results.

**Assignments to the consultant regards to** Gender equality and social inclusion, the consultant should undertake the following among others

* Assess the broader social settings—family structure, participation of different social groups (Men, Women in MHH and FHH, male and female Youth and PWD and other marginalized groups) in local affairs, age structure, property inheritance, marital and divorce patterns
* Assess women’s decision-making power, women’s roles in families and society,
* Assess the status of joint (husband and wife) landholding certification, access and control over household resource and the use of land ownership certificate as collateral for future investments.
* Asses the average landholding size of men and women farmers
* Assess whether and how women are disadvantaged as property owners, tenants, or renters and how these disadvantages can be amended.
* Examine the livelihoods and economic activities of the project area
* Assess the employment status of youth’s (unemployed, under employed and under paid)
* Assess the participation of different social groups on different community consultation, awareness creation and trainings
* Assess the appropriate time and proximity for participation of women on different trainings and exposure visits at community levels
  + - 1. Environment, Social & Climate Safe Guard Study

The PACT Environmental and Social Management Framework (ESMF) provide guidelines for the environmental and social impact procedures. In general, the study of the ESIA should include but not limited to the following:

The description of the proposed project that covers all aspects and components of the project such as physical infrastructure, construction and operation activities, management aspects, community consultation & participation in project identification.

The location of the project, proximity of proposed project components to the sensitive resources and homesteads, population density per sq.km, catchment area, population size in the catchment area and submerged area, number of peasant association affected and population displaced, land ownership in the affected villages number of households to be displaced at project site; the extent to which surrounding urban/rural centers depend on the catchment area and command area.

* Conduct project screening based on the IFAD SECAP and GOE environmental policy and guidelines
* Conduct environmental and social data on the relevant sociological parameters and environmental characteristics of the study area including watershed, head work, command and downstream areas.
* Assess land use patterns, forest type, vegetation covers and status (degraded, partially degraded, protected, etc.) in the catchment, command area in the rest landscape.
* Ground water use assessment and quality (potable/non-potable) and fit for irrigation/industry/both.
* Assessment of climate risks related to livestock production and management systems in the landscape and proposal on the necessary solutions and recommendations.
* Ecology and ecological support systems; eg. Economic activities dependent on aquatic resources, fish breeding grounds in the river, terrestrial and avian fauna (breeding/feeding areas, migration routes, potential wildlife sanctuaries or protected areas).
* The consultants should follow the required legal process for an ESIA.
* The ESIA should indicate how the project is compatible with other relevant policies in the country relating to environment, social, health, gender, labor, climate change etc.
* The report should take into account existing risks, the degree of exposure and vulnerabilities of the target groups and their livelihoods, current climate variability and/or the potential future impacts of climate change.
* There should have adequate consideration for building on existing capacities, such as indigenous, community-based coping strategies and adaptive responses.
* Mitigating measures should appear adequate to both control all significant adverse impacts and enhance project benefits.
* In case of direct project impacts on land/property, the affected people/communities should have been properly identified and evaluated their needs free prior and informed consent (FPIC) processes conducted, and proper compensation mechanisms should have been set and settled.
* The public consultation processes (especially with the rural poor, indigenous peoples, women and other disadvantaged and vulnerable groups) should conduct in terms of national ESIA laws and consultation (to be prepared) guidelines and should submit minutes for the conducted consultations.
* The consultant should incorporate detail analysis report environmental procedure set for program SECAP/ESCIA/ESCMP in depth for approval of the report.
* Environmental, social and climate impact screening tiers at woerda and kebele level for project eligibility.
* Studies will be conducted on the environmental management methods (forest, soil, wildlife, conservation etc).
* Collect information on the inherent diseases in the area, public health facilities.
* Identification of major negative and positive environmental impacts of the project.
* Detail assessment of the bio-physical environment
* Detail assessment of effect of the project on downstream water users and the water requirement for human and livestock population.
* Together with hydrologist the environmental flow to the downstream (minimum 10-15 % of the lean flow) should be calculated and indicated with full justification in the ESIA report.
* Conduct project area climate change risks/impacts assessments, prioritization and deliverable solutions and recommendations by using recommended disaster risk assessment national IFAD tools
* Assessment of potential project physical displacement (resettlement) and other economic and social impacts/risks on the affected people. Recommendations are required on RAP, based up on the following guideline points on RAP in Resettlement Policy Framework (RPF) For the Implementation of IFAD-PACT Program in Ethiopia (PACT, 2023)
* If 1 to 199 persons are affected, an ARAP will be prepared; or if the scope of the impact is large, a RAP will be prepared
* If 200 or more persons are affected, a RAP will be developed; but if more than 200 people are affected, and if none of them are physically displaced and none of them lost 10 percent or more of their productive assets, then ARAP will be prepared.
* Assessment of potential land ownership and certification status, camping site site/IWUA office, storage/warehouse, nursery sites, in the landscape.
* The ESIA study lead environmental expert professional license of the organization/consultant and CV of each expert participated in the ESIA document preparation should be attached in the report
* Professionals’ requirement from the consultant team includes Environmental expert, Natural resource management expert, Climate and watershed, climate smart agriculture, Socio-economic expert,

Assignments to the consultant regards to Gender equality and social inclusion, the consultant should undertake the following among others

* Examine the rules, institutions, and players involved in customary, religious, and informal frameworks - particularly those regarding conflict management and compensation issues
* Assess the inclusion of privacy and sanitary needs of men and women during the design and construction related to SSI, like (warehouse and market shade)
* Identify climate change mitigation actions and strategies with a gender component as well as gender sensitive adaptation measure
* Assess specific activities that address gender, youth, PWDs and other social groups issues related to climate change
* Assess construction-related needs of infrastructure development like warehouse and market shade and others for persons with disability (e.g Ramp building and sanitary needs)
* Assess IGA needs of PWDs according to their impairment types
* Assess the availability and extent of IPM mechanisms and the involvement of different social groups in the process.
* Assess whether application of agro chemicals negatively affect different social groups differently.
* Assess the incidence and prevalence of GBV in the target community.
* Assess the prevalence of child labor in the target community.
  + - 1. Detailed Engineering Investigation and Design

1. **Design of Headwork**

* Previous studies and relevant documents if any will be thoroughly reviewed and the gaps and short comings shall be clearly identified;
* Carryout the selection of appropriate headwork site and associated structures to divert/store the water and convey it to the main canal by gravity considering the location of the command area, geology, hydrologic condition and economy;
* Select and fix the type, length, height of headwork structure considering the locally available construction material, the river morphology at the site, the magnitude of design flood, optimum command elevation, etc;
* Carry out detail hydraulic and structural designs for the headwork and other appurtenant structures (flood protection structures, retaining walls, intakes, under sluice and other gates) specifically Hydraulic design, to fix the overall dimensions and profiles of the structure, and Structural design, where the various sections are analysed for stresses under different loads and reinforcement or other structural details are worked out;
* The canal head regulator should be properly aligned to reduce silt entry into the canal to avoid backflow and formation of stagnant zones in the pocket.
* Discharge capacity of the under sluices is kept based on the followings: (i)Two times the maximum discharge in the off take canal; (ii) 20% of maximum flood discharge; or (iii) Maximum flow in dry season; whichever is appropriate.
* Layout, profiles and cross-sections of river diversion.

1. **Design of Irrigation Farm Infrastructures**

The consultant should undertake the following specific tasks:

* Preparation of canal & drain layout
* Delineation of irrigable land
* Detail design of canal & drain sections and profiles
* Detail design of protection (Revetment) works as required.
* Design canal and drain crossings (for cattle and machinery) at selected location.
* Design proper drainage system (irrigation water surplus and rainfall runoff and catchment drain)
* Detail design of canal & drainage structures
* Prepare general plans and drawings for all irrigation infrastructure and irrigation system designs to the standard quality;
* Prepare specifications and priced bill of quantities for the irrigation project
* Detail design of Night storage (if the discharge is not sufficient) to irrigate the available irrigation land;

1. **Pump System Design**

If Pump design is required in the irrigation system design, in the pump part the following points should be undertaken but not limited.

* Pump house site selection and pump house design
* Analysis of possible options on the number of pumps in relation to technical and economic points of view
* Design information such as elevation data including Maximum and Minimum water levels, Foot value level, Pump seat OGL, Delivery pool OGL, Main canal out let at delivery, delivery pool bed level, sump, delivery pool pipe outlet level etc shall be clearly shown
* Determination of Suction and Delivery heads and pipe sizes (diameters and thicknesses) & NPSH
* Head loss and power requirement calculations considering the irrigation demand and the required head
* Comparison of the suction head along with the other accompanying losses to the theoretical atmospheric pressure at the pumping site altitude
* Pump type selection
* Stilling basin site selection and Design to regulate the discharge from the delivery pipe.
* Summary of pumping unit
* Detail specification of the pumping unit including construction materials of different parts such as casing, shafts, suction and delivery pipes etc.

**Assignments to the consultant regards to Gender equality and social inclusion, the consultant should undertake the following among others:**

Ensure the participation of different social groups (Men, FMHH, FHH, Youth, PWDs and other marginalized groups) in community consultation during identification, feasibility study and design of infrastructure

* Assess the needs and preferences of different social groups (Men, Women in MHH and FHH, male and female Youth and PWD and other marginalized groups) regarding system layout, including types of distribution system, provision of social structures (foot path, washing basin, cattle trough, outlets for domestic water use, fishing ponds etc..) and water allocation options; and design the structures accordingly
* Assess the potential and experience of time and labor-saving technologies, like irrigation technologies and multi-purpose water infrastructures, that increase access to and use of clean and safe water to reduce labor burden for Men, Women in MHH and FHH, male and female Youth and PWD and other marginalized groups)
* Assess the existing capacity needs of men, women, youth and PWD on operation and maintenance of the infrastructure,

1. Operations and Maintenance (O&M) manual

An Operations and Maintenance (O&M) manual for irrigation projects is a comprehensive document that outlines the procedures and guidelines necessary to ensure the smooth operation, management, and upkeep of irrigation systems. It typically covers a wide range of topics, including the design and functionality of the system, operation procedures, maintenance schedules, safety protocols, and troubleshooting guidelines.

The contents of an O&M manual for irrigation projects may vary depending on the type of system (e.g., surface irrigation, drip irrigation, sprinkler systems), but generally, it includes:

1. **Introduction**

* Purpose of the manual
* Scope of the irrigation system
* Overview of the irrigation project (location, design, components)

1. **System Description**

* Detailed description of the irrigation system (type, components like pumps, pipelines, valves, sprinklers, filters, etc.)
* System layout or schematic diagrams
* Design specifications and capacities

1. **Operation Procedures**

* Guidelines for starting, operating, and stopping the system
* Scheduling and monitoring irrigation cycles
* Water management (e.g., scheduling, water use efficiency)
* Procedures for adjusting flow rates, pressure, and other system parameters
* Handling of automation systems, sensors, and controllers

1. **Maintenance Procedures**

* Regular and preventive maintenance tasks (inspection, cleaning, lubrication, testing, etc.)
* Maintenance schedules and frequency for each component
* Corrective maintenance (troubleshooting, repairs, replacements)
* Spare parts inventory management

1. **Safety Protocols**

* Personal protective equipment (PPE) requirements
* Safe operation of pumps, motors, and electrical components
* Emergency procedures (e.g., system failures, leaks, electrical hazards)
* First-aid procedures for injuries or accidents

1. **Water Quality Management**

* Procedures for monitoring water quality (e.g., pH, salinity, turbidity)
* Guidelines for dealing with issues like clogging or contamination
* Filter cleaning and maintenance procedures

1. **7. Troubleshooting**

* Common problems and solutions (e.g., pump failure, clogged pipes, leaks)
* System error codes (for automated systems) and what they mean
* Instructions for diagnosing and fixing malfunctions

1. **8. Record Keeping and Documentation**

* Daily, weekly, and monthly inspection logs
* Maintenance and repair records
* Water usage and irrigation efficiency reports

1. **9. Training and Capacity Building**

* Training programs for staff (operation, maintenance, safety)
* Guidelines for knowledge transfer and skill enhancement

1. **Drawings**

Table 4 Summary of Technical Drawing

|  | **Key Points** | **Minimum Requirements** |
| --- | --- | --- |
| 1 | Headwork Topo – with Legend | 1:500 scale, clear, weir location, BMs |
| 2 | Project system layout | 1:500 scale, clear, weir location, BMs, all features, Nomenclature |
| 3 | Longitude and River cross section | 1:100 V, 1:1000 H scale profile |
| 4 | Headwork plan, sections, gate details, Hatchings, dimensions, line types (hidden), - detail shape of earthen canal, lined canal, location of structures etc. | Different line weight, color and type, standard hatching |
| 5 | Main Canal profile, OGL. Design bed, Water level, Embankment level, Earthen canal excavation material (soft & hard rock) | Different line weight, color and type, standard hatching, canal cross section at different chainage |
| 6 | Structure drawings – (Aqueduct, standard drop with table, off take with table, drop box with table, crossings with table, MU structures) – plan with sections and detail | Plan, enough sections and details, standard hatching |

NB: - The consultant should submit detail cost breakdown analysis and priced bill of quantity according to current project site market.

Table 5 Key staff for Community schemes design

| **No.** | **Role** | **Specialization** | **Minimum Qualification** | **Experience** |
| --- | --- | --- | --- | --- |
| 1 | Team Leader | Irrigation Engineer/Hydraulic Engineer/water resource Engineer/Agricultural /soil and water Engineer | BSc /MSc. | A relevant post graduate qualification in Climate Resilient Infrastructure Development would be an additional asset and minimum of 10 years for BSc. Degree and 8 years MSc. |
| 2 | Engineering | Irrigation Engineer/hydraulic Engineer/Agricultural /soil and water Engineer | BSC/M.Sc | Minimum of 8 years for BSc. Degree and 6 years MSc. Degree working experience in Climate Resilient Infrastructure Development |
| 3 | Hydrologist | Hydrology/Civil Engineering /Water resource Engineer | B. Sc /M. Sc | At least 8 years in BSc. degree or 6 years in MSc. Previous experience in hydrology, planning, study design of small scale irrigation. |
| 4 | Socio-Economist /Agro economist | Economics, agricultural economics, development economics, sociology, or related fields | MA/M.Sc | At least 8/6 years’ experience in BSc. & 8 years of experience in MSc. experience in micro-level household surveys |

**Non-key Staff**

| **No.** | **Role** | **Specialization** | **Minimum Qualification** | **Experience** |
| --- | --- | --- | --- | --- |
| 1 | Irrigation Agronomy | Irrigation agronomist | B.Sc/Msc | At least 8/6 years of experience in Climate Resilient Infrastructure Development agronomy, agronomic practices, etc. |
| 2 | Watershed | Soil and water conservation engineers, natural resource management or related fields | B.sc/Msc | At least 8 years in BSc. degree or 6 years in MSc and direct field level experience in undertaking and managing soil and water conservation interventions. |
| 3 | Soil and Land suitability | Soil survey and study | B.sc/Msc | At least 8 years in BSc. degree or 6 years in MSc and direct field level experience in undertaking and managing Soil survey and land suitability. |
| 4 | Agri-business | Economics, agricultural economics, development economics, sociology, or related fields | MA/M.Sc | At least 8/6 years’ experience in BSc. & 8 years of experience in MSc. experience in micro-level household surveys |
| 5 | Environmental | Environmental science, Soil and water conservation/Natural source management and/or related fields. | B. Sc /M Sc. degree | At least 8/6 years’ experience in BSc. & 8 years of experience in MSc. degree. Direct experience in Climate Resilient Infrastructure Development |
| 6 | Geology | Geologist/Geotechnical Engineering and related fields | B. Sc /M. Sc | At least 8 years in BSc. degree or 6 years in MSc. degree direct field level experience in Climate Resilient Infrastructure Development |
| 7 | Marketing, cooperative and rural financial expert | Economics/Marketing or related field | B. Sc/M.Sc | At least 8 years in BSc. degree or 6 years in MSc. degree direct field level experience in put and product marketing |
| 8 | Survey Expert | Surveyor, or related fields | Diploma/Bsc | At least 8 years of experience in relevant areas, and demonstrated experience in survey of study and designing |
| 9 | AutoCAD expert | Drafting | Diploma /Bsc | At least 6 years of experience in relevant areas, and demonstrated experience in applying related softwares |

# 

Deliverables

Table 13 Deliverables for feasibility study and detail design of Climate Resilience Infrastructures

| **Phase** | **Deliverable** | **Description** |
| --- | --- | --- |
| **Feasibility Study** |  |  |
| **1. Inception Report** | Detailed work plan, methodology, and team roles. | Outlines how the study will be conducted, including timelines, objectives, and methods to assess the project's viability. |
| Preliminary findings. |
| Climate data, hydrological studies, and water availability. | Provides baseline information on environmental, social, and technical factors crucial for the irrigation scheme. |
| Soil surveys and land-use patterns. |
| Identification of key stakeholders. | Ensures the involvement of all relevant parties, including farmers, government agencies, and local communities. |
| Analysis of their roles, interests, and potential impacts. |
| Environmental assessment. | Identifies environmental and social risks, providing a mitigation plan to minimize negative impacts on ecosystems and communities. |
| Potential environmental and social impacts. |
| Proposed mitigation measures. |
| * + 1. **Draft Feasibility Report** | Water resource analysis (availability, quantity, quality). | Assesses the technical feasibility of irrigation, focusing on system performance, design options, and energy requirements. |
| Energy sources (solar, electric, etc.). |
| System design alternatives. |
| Cost-benefit analysis. | Evaluates the economic and financial viability of the project, determining if it is sustainable over the long term. |
| Capital and operational costs. |
| Projected revenues and returns. |
| Identification of potential project risks. | Identifies risks (e.g., financial, environmental, technical) and presents strategies to minimize them. |
| Risk mitigation strategies. |
| Review of legal framework. | Examines legal and institutional issues, ensuring compliance with national regulations and identifying responsible agencies. |
| Assessment of institutional arrangements. |
|  |
| **3. Final Detailed Design Report** | Final irrigation system design. | Presents the final design, with all technical specifications, maps, and layouts for the irrigation system.  Integrates all feasibility analyses, with conclusions on whether the project should proceed to the detailed design phase. |
| Detailed layout of canals, pipes, pumping stations, and other infrastructure. Comprehensive report summarizing all findings. Recommendations for moving forward with detailed design. |
| Hydrological and hydraulic analysis. | Provides detailed hydraulic data to ensure efficient water distribution within the irrigation scheme. |
| Canal and pipe sizing, flow rates, and head loss calculations. |
| Design of irrigation structures (e.g., head works, weirs, dams). | Offers structural design solutions for key components, ensuring they meet safety standards and are fit for purpose. |
| Structural stability analysis. |
| Specifications for electrical systems (pumps, motors). | Details the electromechanical components, including the power sources and control systems needed for irrigation. |
| Energy needs assessment (solar, electric). |
| Detailed soil testing results. | Identifies soil types and conditions, suggesting appropriate crops and irrigation methods for the area. |
| Recommendations for soil preparation and crop suitability. |
| Quantified list of materials and equipment required for construction. | Provides a comprehensive list of materials, labor, and equipment, along with cost estimates for the construction phase. |
| Detailed technical drawings for all structures. | Provides precise technical drawings for contractors, ensuring all specifications are clear and construction-ready. |
| CAD designs for construction teams. |
| Plan for the maintenance of irrigation systems. | Ensures the system's longevity, outlining routine maintenance tasks and who is responsible for carrying them out. |
| Scheduling and responsibilities for repairs and upkeep. |
| Mitigation and monitoring measures from ESIA. | Ensures the project continues to minimize environmental and social impacts during construction and operation phases. |
| Compliance with environmental regulations. |
| Consolidated report integrating all design components. | Final deliverable, including all designs, reports, drawings, and plans, prepared for implementation of the project. |
| Ready for tendering or construction phase. |

Table Schedule of Reports

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Type of Reports** | **Submission Date** | **No. of soft & hard copies** |
| 1 | Inception Report | 20 calendar days after commencement date (whether the bidder win one or more lots) | A soft copy in word and PDF formats with 2 hard copies |
| 3 | Draft Feasibility Study and Detail Design Report with Working Drawing | 90 calendar days after commencement date (whether the bidder win one or more lots) | A soft copy in word and PDF formats with 2 hard copies |
| 4 | Final Detail Design Report, Final working drawing, Tender Document and Climate Resilient Infrastructure Development Operation Manual (refer 4.1.1.2: Detailed Engineering Investigation and Design, No. 4) | 120 calendar days after commencement date (whether the bidder win one or more lots) | A soft copy in word and PDF formats with 7 hard copies |
| 5 | Progress Reports | Monthly | Hard copy |

**7. ADMINISTRATIVE AND OTHER ASPECTS**

**7.1.** Administrative issues

The firm should present a copy of registration, legal status including VAT registration, TIN and consultant registration certificate from public procurement agency (PPA).

Letter of Commitment by the consulting firm to execute the recruitment of the Field Staff/Enumerators according to the requirement in the TOR (free format).

**7.2. Expression of Interest content**

Interested consulting companies should submit their applications in response to the Request for Expression of Interest (REOI) consisting of the following documents/information to demonstrate their qualifications: Fill the forms of the REOI and share any requested document therein. This includes the profile of the firm, relevant experience for the assignments, staffing, and evidence of experience of delivering services with similar requirements to the TOR in the form of a copy of a contract, purchase order, or reference letter.

**7.3. Proposal Content (the second stage after shortlisting)**

**Technical Proposal: To submit a technical proposal for consideration to undertake the** **feasibility and detail design survey, all potential bidders must include all the following documents.**

a) The profile of the firm, relevant experience for the assignments, staffing (CV of each team member). Evidence on experience of delivering services with the similar requirements to the TOR in a form of a copy of a contract, purchase order, or reference letter.

b) Proposed methodology to perform the assessment

c) The work plan and schedule (activities) and resources (including number of person-day).

d) Mobilization plan for key and non-key experts.

The shortlisted Consultant technical proposal will be evaluated (second stage in response to the RFP) based on technical criteria to feature in the RFP. the following criteria listed in Table below:

|  |  |
| --- | --- |
| **Criteria** | **Weight** |
| **Organizational profile and relevant work experience/track record in relevant fields**: The firm has at least 10 years general experience. From this has conducted minimum 3 **feasibility and detail design Study**  of small-scale irrigation project in the past 5 years. | 10% |
| **Team composition (key experts)**: demonstrated expertise, technical skills, previous relevant experience | 50% |
| **Methodology**: Technical plan, approach, strategy, mobilization of resources, non-key experts, and work plan proposed for the assignment. | 40% |

**Financial proposal:** will obligatorily include the consulting fee and operational expenditures related to the assignment. The firm will provide a break-down of the budget by the activities mentioned in the Activities section above. A comprehensive, itemized total budget to carry out the assignment calculated in Ethiopian birr (ETB), inclusive of 15% VAT.

**7.4. Selection Process**

The consulting company will be selected in accordance with IFAD’s Procurement Handbook. The selection method is QCBS. A minimum of 3 and a maximum of 6 consultants will be shortlisted. The passing score for shortlisting is 70%.

In the second stage, the financial offer will be opened only if the provided technical offer will pass the minimum technical score of [70] points.

**7.5. Mode of payment**

The lump sum fee for this service which will be paid to the consultant:

i. 10% of payment will be effective upon the submission of the approved Inception Report.

ii. 50% of payment will be effective upon the submission and approval of the draft of the feasibility and detail design study report.

iii. 40% of payment will be effective upon the submission of the feasibility and detail design study final report and cleaned, verified, and quality checked datasets to PCMU.

The Consultant is expected to cover any travel expenses and subsistence allowances of the team while engaged in this assignment for the entire duration of the contract.

**8. Contact Details**

**All queries regarding the details in this TOR must be submitted in writing to the following address:**

ANRS Irrigation and Low Land Areas Development Bureau

Attention to Adane Alkadir: -Irrigation Scheme Construction Input Supply Directorate Director

Address: Nearby Wisdom Tower the Bahir-Dar University

Administrative Building

At the 3 Floor, Office No 38 of Bahir Dar City Administration, Water

and Sewerage Service Head Office Building,

e-mail: *adanealkader@gmail.com*

Telephone: +251-058 320-77-99/0582-20-08-53

*Bahir-Dar*

**ANNEX 2**

**Qualification and Evaluation Criteria**

|  |  |  |
| --- | --- | --- |
| **Item** | **Criteria** | **Points** |
| For specific experience, evidence shall include successful experience in the execution of **at least 3 projects** of a similar nature and scope of works during the **last 5 years**. | | |
| **A.** | **General experience** | **10** |
| i | General experience: Firm has been in existence for 10 years | 5 |
| ii | The firm core business relevant to the assignment | 5 |
| **B.** | **Specific experience** | **80** |
| i | Successful and documented experience in conducting services similar to those required under this TOR at least 3 contracts within the last 5 years | 60 |
| ii | The firm experience in similar conditions or environments (rural development, agriculture, irrigation etc. in Ethiopia) | 10 |
| iii | Strong capacity in software applications like ArcGIS, Civil 3D, Global Mapper, Arc Hydro Tools & Advanced Microsoft Excel | 10 |
| **C.** | **Turnover of the firm: Financial capacity** | **10** |
| i | Average Turnover of the firm in 2021, 2022 and 2023 not less than ETB 10 million (evidenced by the audited financial reports) | 10 |
|  | **Total Points** | **100** |
|  | **Minimum points required to pass** | **70 points** |

1. This document refers to legally constituted consulting firms as “consultant”. [↑](#footnote-ref-1)
2. The policy is accessible at [www.ifad.org/anticorruption\_policy](http://www.ifad.org/anticorruption_policy). [↑](#footnote-ref-2)
3. The policy is accessible at <https://www.ifad.org/en/document-detail/asset/40738506>. [↑](#footnote-ref-3)
4. The policy is accessible at <https://www.ifad.org/en/document-detail/asset/41942012>. [↑](#footnote-ref-4)
5. The Cross-Debarment Agreement was entered into by the World Bank Group, the Inter-American Development Bank, the African Development Bank, the Asian Development Bank and the European Bank for Reconstruction and Development, additional information may be located at: http://crossdebarment.org/. [↑](#footnote-ref-5)