

**MINISTRY OF ELECTRICITY, DAMS, IRRIGATION
& WATER RESOURCES (MEDIWR)**

THE REPUBLIC OF SOUTH SUDAN

**PROJECT FOR
IRRIGATION DEVELOPMENT MASTER PLAN
(IDMP)
IN THE REPUBLIC OF SOUTH SUDAN**

**FINAL REPORT
(ANNEXES, PART II)**

DECEMBER 2015

**JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)**

**SANYU CONSULTANTS INC.
ORIENTAL CONSULTANTS GLOBAL CO., LTD.
KOKUSAI KOGYO CO., LTD.**



THE REPUBLIC OF SOUTH SUDAN

MINISTRY OF ELECTRICITY, DAMS, IRRIGATION & WATER RESOURCES



WATER SECTOR

IRRIGATION DEVELOPMENT MASTER PLAN

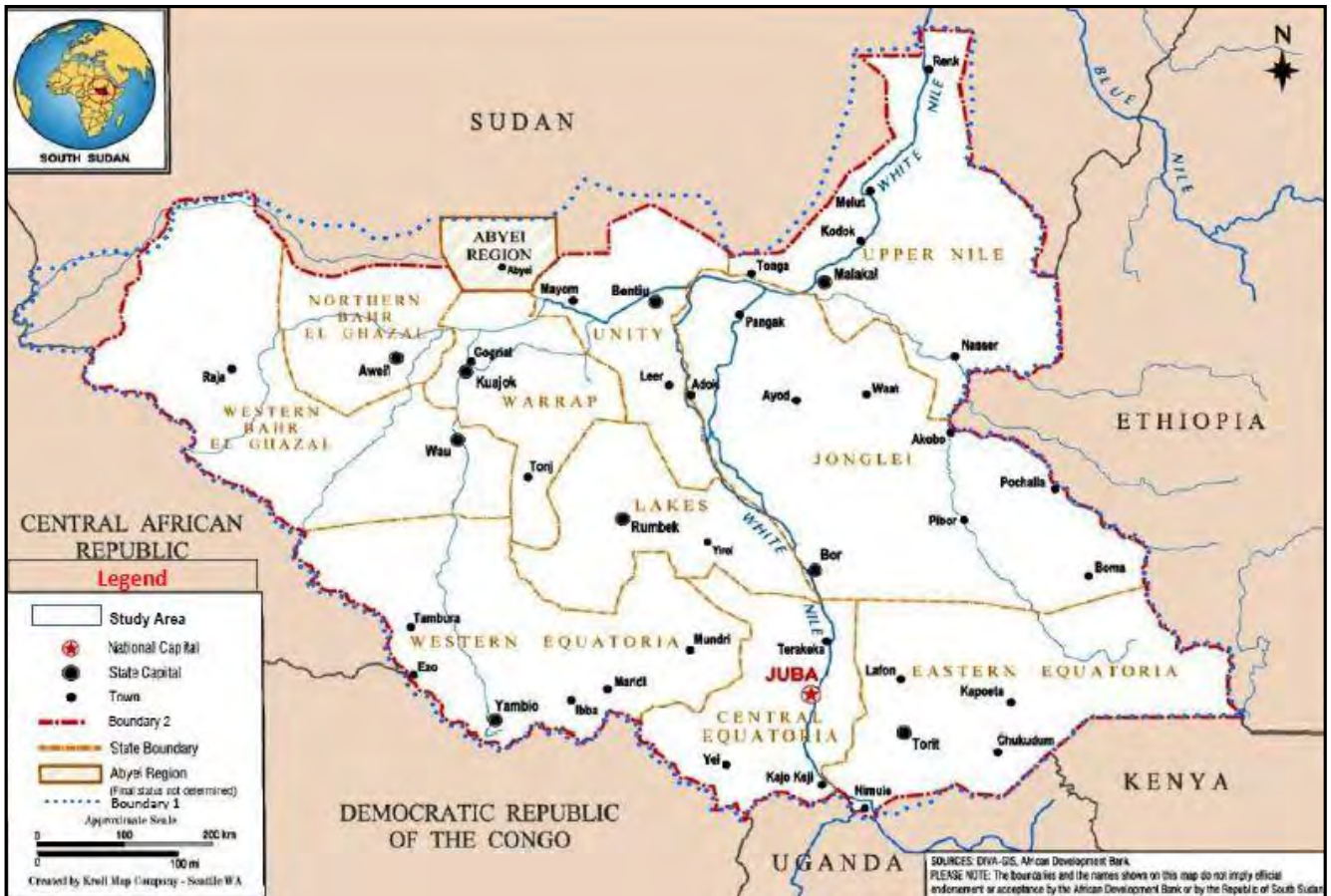
(FINAL REPORT)

***ANNEX 5: PRELIMINARY IRRIGATION DEVELOPMENT
GUIDELINES***

NOVEMBER 2015

THE PROJECT FOR IRRIGATION DEVELOPMENT MASTER PLAN IN THE REPUBLIC OF SOUTH SUDAN (RSS) LOCATION MAP

Map of the Republic of South Sudan



Location Map: Adopted from African Development Bank

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INTRODUCTION

Irrigation development potential and the candidate irrigation scheme areas have been identified in the Irrigation development Master Plan (IDMP). Comprehensive irrigation development by public institution, however, has not been implemented yet after the CPA era except for the minor rehabilitation of Aweil Irrigation Rice Scheme. Under such circumstance, it has been realized during IDMP process that guiding documents for irrigation development are essential. This is in order to facilitate efficient and effective investment in irrigation as well as sustainable operation and management of the irrigation schemes to be developed. Hence the formulation of irrigation development guidelines has been identified as one of the programmes under IDMP.

The preliminary irrigation development guidelines compiled here, are intended to provide basic instructions for initiating irrigation schemes development in South Sudan, and as a starting point for the future formulation of the full-scale irrigation development and management guidelines. These preliminary guidelines compiled here, have been prepared based on the experiences of the implementation planning process of the priority projects under IDMP, as well as a standard procedure of irrigation development. The preliminary guidelines are prepared under three (3) categories as presented in the table below:

Table 1.1 List of Guidelines

Stage	Guideline
Overview and overall process	Guideline 1: Institutional Arrangements for Irrigation Development and Management
	Guideline 2: Irrigation Development Process
Preparatory work	Guideline 3: Identification of Projects' Sites
	Guideline 4: Procurement of a Sub-contractor
Specific study topics for planning	Guideline 5: Environmental and Social Considerations
	Guideline 6: Economic and Financial Analyses
	Guideline 7: Land Acquisition for Irrigation Development
	Guideline 8: Design & Construction of Irrigation Infrastructure
	Guideline 9: Irrigation Schemes Management Establishment

GUIDELINE 1: Institutional Arrangement for Irrigation Development and Management discusses the key stakeholders in irrigation development and the division of their roles, particularly in the institutional set-up of the Republic of South Sudan. Also the classification of irrigation schemes categories and the mode of schemes management in the context of South Sudan are discussed.

GUIDELINE 2: Irrigation Development Process describes an outline of the process of irrigation development, namely planning, implementation and operation & maintenance. Among them the planning stage includes the identification of the projects' sites, feasibility study, design works and environmental and social considerations. Guideline 3 and the other ones under it are the detailed description of some specific topics of this planning stage.

GUIDELINE 3: Identification of Projects' Sites describes the process of identifying projects' sites based on the IDMP study experience. Due to the difficult accessibility to the rural areas, the remote sensing data was effectively utilized to identify the irrigation potential sites. But the community consultation at the sites is essential for the precise identification of the boundary of the projects' sites. These two steps are described here.

GUIDELINE 4: Procurement of a Sub-contractor provides the steps of the procurement for topographic survey and geological survey, which are always required for irrigation planning. Samples of required documents for the procurement such as notice of expression of interest (EOI), notification

letter, and tender documents, are attached.

GUIDELINE 5: Environmental and Social Considerations describes the general procedure of the environmental and social considerations including initial environmental examination (IEE) and environmental impact assessment (EIA), and also specific points for irrigation development are referred to. The results of the IEE for the priority projectsøplans are reflected into the guideline.

GUIDELINE 6: Economic and Financial Analysis explained the basic concept and methodology of the standards economic evaluation of the projects. With the application of the methodology for the context of South Sudan, the economic evaluation of the priority projectsøplans are demonstrated.

GUIDELINE 7: Land Acquisition for Irrigation Development refers to the evolving land policy and administration in South Sudan and suggests the practical procedure for land acquisition plan, taking into account the current situation of the rural areas, where most of the land has not been officially registered but recognized as community land.

GUIDELINE 8: Design & Construction of Irrigation Infrastructure introduces to the technical manuals of Institute of Irrigation and Drainage (IID). Due to absence of technical standard in South Sudan, these manuals have been provided to IDMP task team after obtaining permission for dissemination from IID. These manuals can be applied for the design work taking into account due consideration the situation of South Sudan. On the other hand, South Sudan Water Sector had developed 14 Technical guidelines for construction of some water and sanitation facilities, which can help in the establishment of some required water facilities that will be used in an integrated manner.

GUIDELINE 9: Irrigation Schemes Management Establishment describes the establishment of operation & maintenance (O&M) mechanism for the irrigation scheme in line with the Draft Water Bill, which will be the basis law for integrated water resources management. The text includes not only physical O&M but also financial management of the irrigation scheme.

The figure below shows in which stage of irrigation development each guideline should be used:

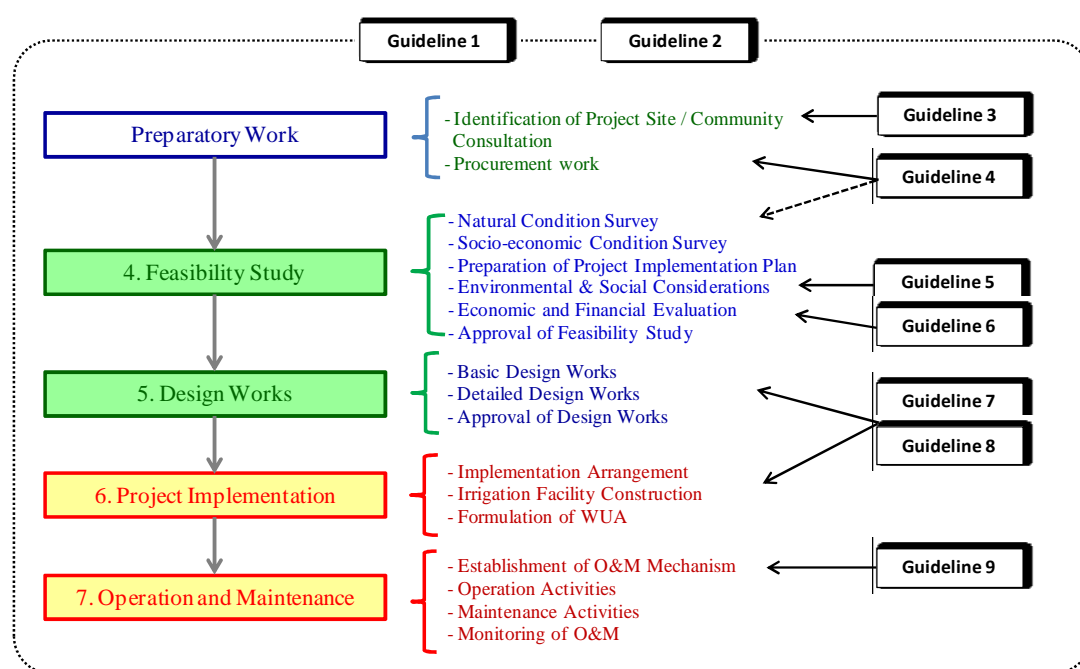


Figure 1.1 Irrigation Development Work Flow

The actual exercise on the priority project planning in the course of IDMP formulation is the backbone of these guidelines. The actual situation of South Sudan should be therefore reflected to the texts, but also the constraints of the above exercise limit the comprehensiveness of these guidelines, as well. Prompt implementation of the Irrigation Development Guidelines Formulation Programme (IDGFP) is expected to improve and update the guidelines from preliminary to full-scale.

EXECUTIVE SUMMARY OF ANNEX 5

List of Preliminary Irrigation Development Guidelines

- Guideline 1: Institutional Arrangements for Irrigation Development and Management
- Guideline 2: Irrigation Development Process
- Guideline 3: Identification of Projects/Sites
- Guideline 4: Procurement for Conducting Surveys
- Guideline 5: Environmental and Social Considerations
- Guideline 6: Economic and Financial Analyses
- Guideline 7: Land Acquisition for Irrigation Development
- Guideline 8: Design & Construction of Irrigation Infrastructure
- Guideline 9: Irrigation Schemes Management Establishment

GUIDELINE 1: INSTITUTIONAL ARRANGEMENTS FOR IRRIGATION DEVELOPMENT AND MANAGEMENT

(1) Main Actors in Irrigation Development

MEDIWR takes lead responsibility of irrigation development and management, including policy and strategy formulation; regulatory process; planning of projects; designing and implementation of schemes and farms; operation and maintenance; and monitoring and evaluation.

Key directorates of MEDIWR responsible for National Irrigation Development and Management are six (6), namely: The Directorate of Irrigation and Drainage (DID), Directorate of Planning and Programmes (DPP), Directorate of Water Resources Management (DWRM), Directorate of Power Engineering and Grid (DPEG) and the Directorate of Hydrology and Survey (DHS).

MAFCRD, MLFI, MTII, MoE, MWLCT, MGCSW, MTRB, MLHPP and the Land Commission, are also important stakeholders in irrigation development and management. For instance, at the planning stage, MAFCRD is required to develop water demand plan for crops, horticultures and fruits trees related to projects. MAFCRD takes responsibility for on-farm level irrigation O&M and management, including allocation of farm plots to farmers, preparation of cropping calendar and expansion of irrigation farming.

MLFI also plays an important role, planning and determining locations and water requirement for dipping and watering facilities for livestock; pastoralists/watering points; irrigated rangelands; and aquaculture related facilities, while MoE & MWLCT are the principal institutions for environmental protection and conservation, including watershed, wetlands, game reserves and parks.

The roles of the rest of the stakeholders are reflected in Table 1.2 of Guideline 1, the Institutional Arrangements for Irrigation Development and Management.

(2) Category of Irrigation Scheme

IDMP has five (5) kinds of irrigation programmes, namely 1) National Irrigation Schemes Development Programme (NISDP); 2) State Irrigation Schemes Development Programme (SISDP); 3) County Irrigation Schemes Development Programme (CISDP); 4) Community Irrigation Farms Development Programme (CIFDP); and 5) Private Sector Investment Promotion in Irrigation Development Programme (PSIPIDP).

NISDP is owned by the national government with large and upper medium scale command areas and

irrigation facilities; whereas SISDP is owned by the state government with relatively lower medium and upper small scale irrigable areas and facilities; CISDP is owned by the local government with relatively smaller scale irrigation areas and facilities; and CIFDP is owned by the communities with much smaller scale irrigation areas and facilities. NISDP is to be developed by the national government; SISDP can be developed by both the national government and the state government; CISDP can be developed by national, state and local governments together, while the CIFDP can be developed by national, state and local governments together with communities. More classification factors and other actors involved in the programmes and projects are defined as summarized in the table below.

Table 2.1 Categorization of Irrigation Schemes/Farms Development Programmes and Projects

Programme	Definition	Capital Investment (funding source)	Implementation (Construction)	Owner	O&M (Short-term) ^a	Responsible Organization of Land Allocation	Technical Assistance	Supervision of Scheme Management
National Irrigation Scheme Development Programme (NISDP)	- Large (500ha <) - Land property belongs to National	National/ Private Sector (Bank)/ International Development Bank/ DPs (grant)	National	National	National/ WUA	National/ Community	National/ DPs/ NGOs	National
State Irrigation Scheme Development Programme (SISDP)	- Medium (100ha < 500ha) - Inter-county irrigation scheme	State/ National/ Private Sector (Bank)/ International Development Bank/ DPs (grant)	National/ State	State	National/ State/ WUA	State/ Community	National/ DPs/ NGOs	National/ State
County Irrigation Scheme Development Programme (CISDP)	- Small (< 100ha) - Inter-community irrigation scheme	County/ State/ National/ Private Sector (Bank)/ DPs (grant)/ NGOs	National/ State/ County	County	National/ County/ WUA	County/ Community	National/ State/ DPs/ NGOs	National/ State/ County
Community Irrigation Farms Development Programme (CIFDP)	- Scale is undefined. - Land property belongs to community	Community/ County/ State/ National/ Private Sector (Bank)/ DPs (grant)/ NGOs	National/ State/ Community	Community	National/ Community/ WUA	Community	National/ State/ County/ DPs/ NGOs	Community/ County/ State/ National
Private Sector Investment Promotion in Irrigation Development Programme (PSIPIDP)	Undefined	Private Sector/ Government Support	Private Sector/ Government Support	Private Sector	National/ Private Sector/ WUA	National/ Community/ State	National/ State	Private Sector/ Government Support

Note: a/ Operation and maintenance of irrigation scheme could transfer to local government in the long-term, depending on their capability.

(3) Division of Roles in Irrigation Development and Management

To materialize successfully irrigation development and management on a nationwide scale, it is important to establish effective and practical institutional structure for the irrigation development and management. For this purpose, clearly defined roles and responsibilities of all stakeholders, including national, states and local level actors, is necessary.

MEDIWR in collaboration with MAFCRD & MLFI take primal responsibility of irrigation development for crop production; trees plantation; animal husbandry; and fish farming, from planning, designing, implementation and O&M. The line ministries, directorates and departments of MEDIWR, MAFCRD & MLFI at state and county levels, also play key roles in irrigation development planning; implementation; and M&E of irrigation programmes/projects, especially in terms of coordination and sensitisation among grassroots level stakeholders.

Community/farmer participation in planning, implementation, operation and maintenance in irrigation schemes/farms particularly on-farm level is key for successful irrigation development and management. In most cases, land belongs to communities, and the government cannot start any irrigation development procedures without permission and participation of communities. Following table shows role and responsibility for irrigation schemes/farms development programmes and

projects.

Table 2.2 Roles and Responsibilities of the Stakeholders in Programmes and Projects Implementation

Code	Type of programme/project	Responsibilities				
		National Government/DPs	State Government/DPs	County or LG/DPs	Community	Private Sector
01	National programme/project (Nationally planned and nationally implemented)	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Coordination • M&E 	<ul style="list-style-type: none"> • Coordination • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	/
02	National-State programme/project (Jointly planned and implemented by national and state governments)	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Coordination • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	/
03	State programme/project (Planned and implemented by state government)	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Coordination • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	/
04	State-County programme/project (Jointly planned and implemented by state and local governments)	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	/
05	County programme/project (Planned and implemented by local government)	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	/
06	County-Community programme/project (Jointly planned & implemented by local government & community)	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Initiative/Identification • Planning • Financing • Implementation • M&E 	/
07	Community programme/project (Planned and implemented by community)	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Initiative/Identification • Financing • Implementation • M&E 	/
08	Private sector project (Initiated and implemented by private sector)	<ul style="list-style-type: none"> • Coordination • Facilitation • Supervision • M&E 	<ul style="list-style-type: none"> • Coordination • Facilitation • Supervision • M&E 	<ul style="list-style-type: none"> • Coordination • Facilitation • Supervision • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E

Note: The table will be modified through further discussion among IDMP Task Team.

GUIDELINE 2: PROCESS OF IRRIGATION DEVELOPMENT AND MANAGEMENT

(1) Planning Process

a) Project Identification

In general, irrigation projects are identified through two (2) different ways, namely top-down approach and bottom-up approach. The former is undertaken by national or state governments, whereas the latter is conducted by community or local governments. Since comprehensive planning for irrigation development and management has just started in the Republic of South Sudan, the grassroots level has very limited idea about development and management of irrigation schemes/farms. Therefore, facilitative top-down approach is required at least at initial stages of the development and management.

For County Irrigation Schemes Development Program (CISDP) and Community Irrigation Farms

Development Program (CIFDP) under the IDMP, initial proponents of irrigation projects can be the local government and community; and they are the ones who identify potential irrigation sites in this regard. At present, however, the local government and community do not have enough knowledge and skills to undertake such a task; therefore, it is necessary to obtain assistance from national and state governments, DPs (donors and implementing partners, e.g. UN Systems, NGOs, etc).

b) Feasibility Study

The objective of feasibility study (FS) is to analyse viability of proposed projects, before making decision to implement. In irrigation development, there must be several alternatives, in terms of project site; irrigation method; crop selection; etc., to meet development goal of the projects. Feasibility study helps decision makers to identify efficient and effective alternatives through intensive survey and analysis.

Under the IDMP, five (5) kinds of irrigation schemes/farms will be developed based on the types of ownership. Accordingly, primal organizations who take responsibility for conducting feasibility study are different. Following table shows responsible organizations to undertake FS on each irrigation scheme/farm

Table 2.3 Responsible Organizations for the Feasibility Study

Irrigation Scheme	Responsible Organization of F/S
National Irrigation Scheme Development Programme (NISDP)	National Government (e.g. led by MEDIWR) with technical and financial support from DPs
State Irrigation Scheme Development Programme (SISDP)	State Government (e.g. led by SDWS) with technical and financial support from national government and DPs
County Irrigation Scheme Development Programme (CISDP)	Local Government (e.g. led by CDWS) with technical and financial support from national/state government and DPs
Community Irrigation Farms Development Programme (CIFDP)	Community with technical and financial support from national/state government or county and DPs
Private Sector Investment Promotion in Irrigation Development Programme (PSIPIDP)	Private Firms with facilitation from national, state and local governments

As stated earlier, at present, state governments, local governments and communities do not have enough capacities, such as required human and financial resources, to conduct feasibility study on their priority irrigation potential scheme/farm sites. Therefore, at initial stages of the irrigation development, it is recommended that the national government (MEDIWR) takes strong initiatives for carrying out FS; and solicits additional financial and technical assistance from DPs, to promote all types of irrigation programmes and projects.

Following diagram shows typical procedural approach pertaining to feasibility study.

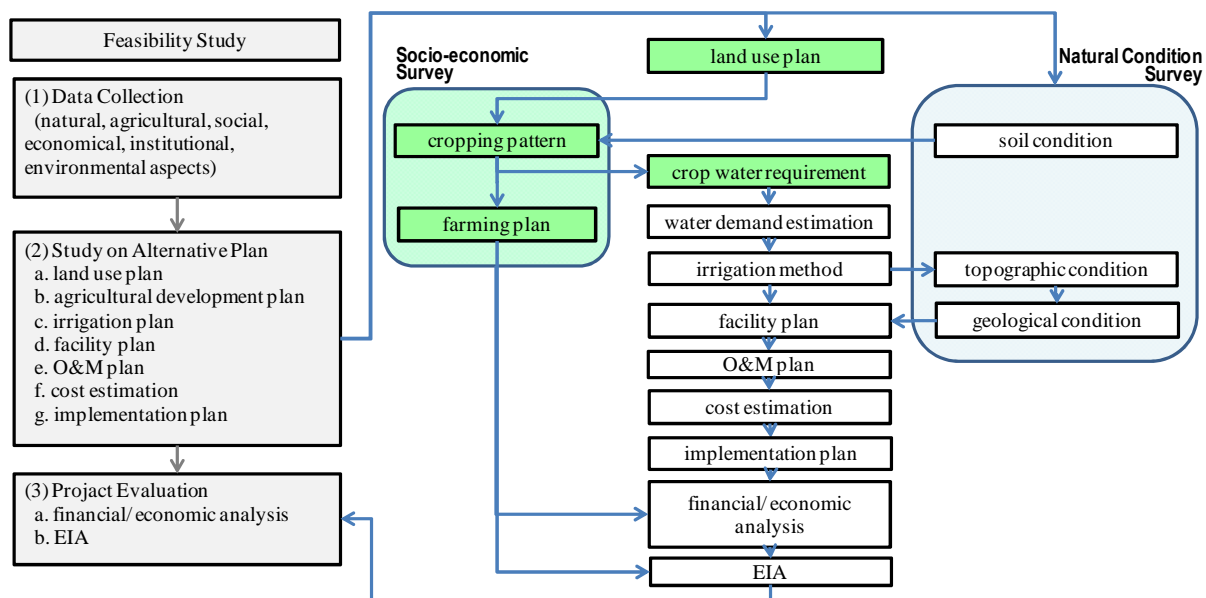


Figure 2.1 Procedure for Feasibility Study

c) Design Works

Primal organizations who take responsibility to conduct design work are different based on the ownership of the irrigation scheme. Following table shows main responsible organization to undertake design work on each irrigation scheme.

Table 2.4 Main Responsible Organizations for Design Works

Irrigation Scheme	Responsible Organization of Design Work
National Irrigation Scheme Development Programme (NISDP)	National Government (MEDIWR) with support from DPs
State Irrigation Scheme Development Programme (SISDP)	State Government (SDWS) with technical and financial support from national government and DPs
County Irrigation Scheme Development Programme (CISDP)	Local Government (CDWS) with technical and financial support from national/state government and DPs
Community Irrigation Farms Development Programme (CIFDP)	Community with technical and financial support from national/state government or county and DPs
Private Sector Investment Promotion in Irrigation Development Programme (PSIPIDP)	Private Firms with facilitation from national, state and local governments

At present, state governments, local governments and communities do not have enough capacities, such as the required human and financial resources, to conduct design works on their priority irrigation schemes/farms. Therefore, at initial stages of irrigation development, it is recommended that the national government (MEDIWR) takes strong initiatives for designing irrigation works; and solicits additional financial and technical assistance from DPs, to promote all types of irrigation programmes and projects.

For design works in each irrigation scheme/farm, several technical issues, including plot size, infrastructure lay-out and facilities for other uses, need to be decided. The FAO's irrigation development guideline recommended that the technical issues should be solved in a participatory manner. Therefore, once the draft designs are prepared, it is necessary to present and discuss them with the stakeholders at various stages, in order to arrive at a design that is acceptable to users.

(2) Implementation Process

a) Implementation and Management Arrangements

According to the Draft Water Bill of the Republic of South Sudan dated August 2014, water resource is managed by Water Resources Management Authority (WRMA) at national level, Basin Water Boards (BWB) at river basin level; Catchment or Sub-catchment Committee at catchment area level; and Water Users Association (WUA) at user or community level. However, these organizations are not yet established since the Draft Water Bill is not approved yet. Hence, while establishment of those organizations is still awaiting adoption and enactment of the Draft Bill, it is recommended to involve each stakeholder at national level, basin level, catchment area level and community level, when irrigation scheme is being developed in the meantime.

To manage irrigation schemes/farms, it is recommended to establish Irrigation Scheme Management Office at each irrigation site. This system is quite effective since all resources relating to O&M of the scheme are concentrated in the same place. MEDIWR takes an initiative to organize the Irrigation Scheme Management Office. However, the Scheme Management Office cannot be managed by officials from MEDIWR alone; hence collaboration with relevant stakeholders, especially with MAFCRD and state/local government is inevitable. At the time of design work (detail design stage of the irrigation development planning), it is recommended to establish the management office through intensive discussion on functions of the management office, debarcation of responsibility, staff allocation, budget allocation, etc.

b) Formulation of Water Users Association

According to the Draft Water Bill (August 2014), Basin Water Board (BWB) has a responsibility to coordinate and facilitate the formation and activities of Water Users Association (WUA). However, the Basin Water Board has not yet been established since the law is still under discussions. Therefore, for practical reason, it is recommended that the irrigation scheme management office, which will be established at each irrigation scheme, takes primal responsibility to form WUA, in collaboration with the state government, the local government and the communities/farmers concerned. Particularly, the role of State Directorates of Cooperatives and Rural/Community Development is important to support organizing communities/farmers to form WUAs. These Directorates have experiences in establishing community-based organizations, including cooperatives.

c) Irrigation Facility Construction

Construction works of the irrigation schemes can be outsourced to private construction companies and equipment suppliers. MEDIWR needs to find funding sources for outsourcing construction works. MEDIWR also need to prepare a scope of works for the construction works, but the preparation can be included in the design works contract. Facilitation of the procurement of construction companies and equipment suppliers is usually included in the design works. The procurement process may include preparation of tender documents, invitation to tendering, tender opening and evaluation, negotiation with the bid winner, and entering into contract with the construction companies and equipment suppliers.

(3) Operation and Maintenance Planning

a) Operation Activities

Operation plan includes basic operation plan at feasibility study stage and annual irrigation plan after

implementation of the project. Objective of the basic operation plan is to establish basic method of operation, such as selection of water distribution method and order of the water distribution among upstream/downstream or large-/small-scale farmers. Responsible organizations at this stage are the scheme management officials from MEDIWR and MAFCRD; and close collaboration between the two Ministries and the communities/farmers is necessary.

The annual operation plan includes preparation of cropping calendar, estimation of expected water demand and supply, and irrigation facility operation planning. After irrigation system being constructed, MAFCRD takes responsibility on developing annual cropping calendar, which is in turn utilized in estimation of crop water requirement or water demand by MEDIWR. Then, water distribution plan (including dam operation plan) is developed by MEDIWR in coordination with MFACRD.

b) Maintenance Activities

Division of roles in maintenance work is a key for successful and sustainable operation of irrigation system. Maintenance plan have to be developed based on clear commitment of all stakeholders, including financial, human resources and technical capacity. At the time of maintenance planning, technical and financial capabilities of stakeholders have to be discussed.

Maintenance works consist of routine maintenance, periodical maintenance and emergency maintenance works. The routine maintenance is a day-to-day maintenance work and WUA should actively participate in this activity at least for on-farm level structures. Periodical maintenance is works to be done at a certain interval, after harvest season or before planting season for example. Basically, WUA bear a responsibility for on-farm level maintenance, whereas the governments are obligated to maintain facilities such as intake facilities, main and secondary canals, and gate structures.

GUIDELINE 3: IDENTIFICATION OF PROJECT SITES

(1) Purpose of the Guideline

This guideline aims at describing the process of how to identify the projectsø sites. Identifying the boundary of the project site is the first step for the detail planning and implementation of the project. Irrigation Development Potential Assessment has been carried out and the target potential irrigation schemesø farmsø sites have been listed, using the irrigation development potential maps and information gathered from relevant offices of state ministries. The guideline organizes the use of these information and steps, to more clearly identify the sites

(2) Structure of the Guideline

The guideline for identification of an irrigation scheme/farm development programme/project site has been made based on the actual IDMP formulation process. There are two steps of identifying a project site, namely: (1) Identification by remote sensing (RS) data; and (2) Identification through community consultation. Following summarises each step:

1) Identification by Remote Sensing Data

Due to difficulty to access all the rural areas, high resolution maps using remote sensing data (satellite images) are useful. High resolution satellite imagery maps need to be developed by specialized expertise. Hence here the existence of high resolution maps is a pre-condition for the exercise of

identifying target project sites by remote sensing data. Useful high resolution maps are (1) Ortho photo imagery and (2) Land cover map. These maps have been developed in the 10% of the national land of South Sudan during IDMP.

Based on mainly the Land cover map, the potential or candidate irrigation scheme development area is identified. Following points are considered for the identification:

- Areas including irrigated crop land or rainfed crop land are selected with priority project areas.
- From the view point of water availability, areas located far from the river or other water sources, which are more than 10 km are excluded from the candidate areas.

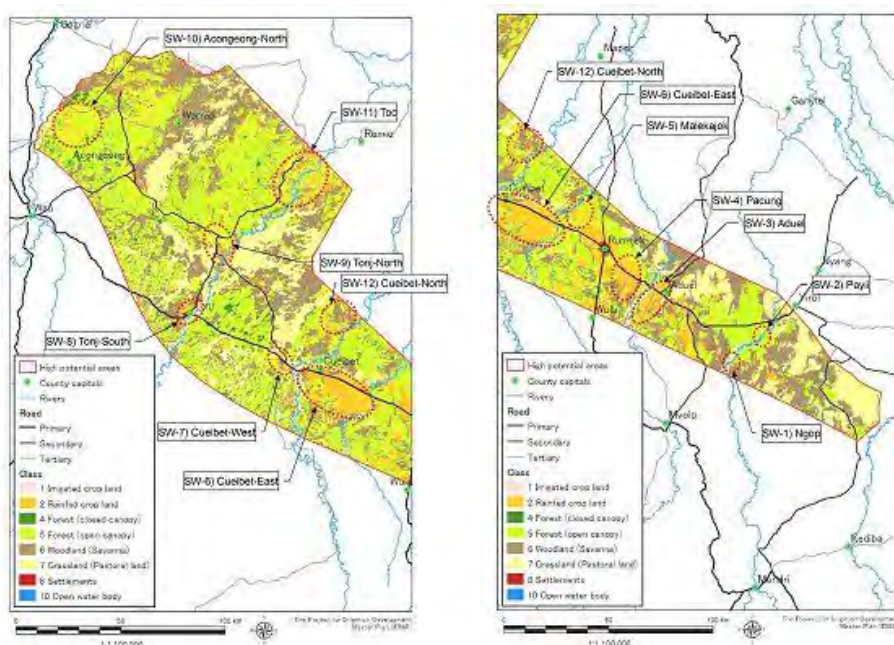


Figure 2.2 Identification of Candidate Project Site from Land Cover Map

Candidate areas selected are prioritized with scoring criteria. Criteria are based on water resources, land productivity and socio-economic. In addition to the above criteria, government plans are also considered as criteria of selection. Priority project areas are selected from the view point of areas with high irrigation potential (water resource, land productivity and socio-economic potential).

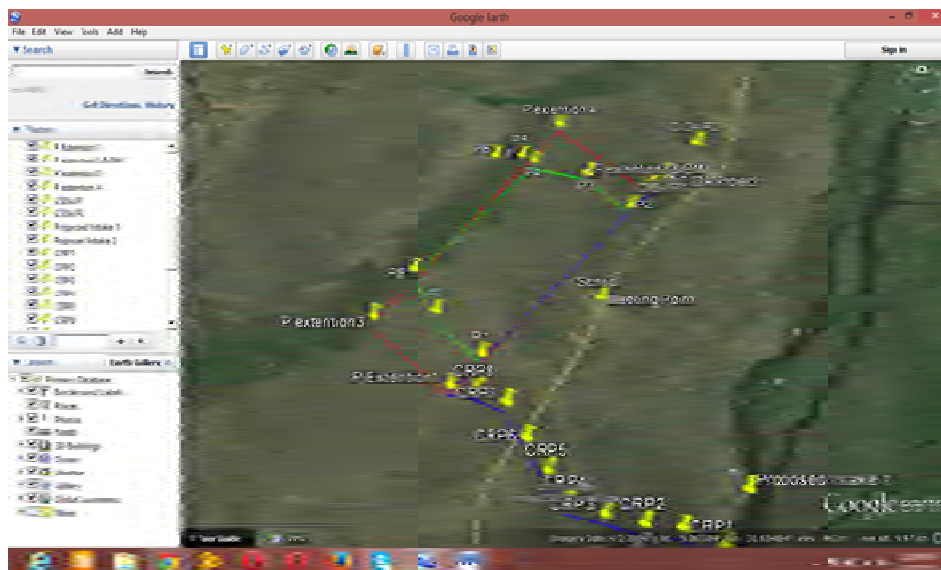
2) Identification through Community Consultation

RS analysis helps identify the target project site, but for exact identification of the project area/location, field survey is needed. The most important point is to know the interest of the community (local people or the inhabitants) who are holding the target project area. Without consulting with the community as well as traditional authorities, the project site cannot be eventually identified. The procedure will be a) field reconnaissance survey; b) community consultation; and c) natural and socio-economic survey.

a) Field Reconnaissance Survey

Field reconnaissance survey, to approach the communities in the target area, it has to go through State, County, Payam and finally Community. The approaches, procedures and techniques used include consultations with administrative officials at County; and Payam levels; community members;

community leaders; marks and taking points with GPS; direct observation; estimating the vegetation and land cover; and PRA methods including transect walk and interviews with relevant community members and other knowledgeable people about the areas.



b) Community Consultation

In RSS, communities are not familiar with Irrigation. Hence it is important to introduce and explain to each community what is irrigation all about. For this purpose, the project implementers have to hold sensitisation explanatory meetings. To arrange the meetings, the implementers have to meet traditional authorities for prior explanation and coordination with the community. It is very important to find a contact person in the community and know the structure of the community, so that we can know how the information is conveyed and who would be influential persons in the community.

c) Survey Work

After getting consensus with the traditional authorities and community members, natural condition survey, socio-economic survey and environmental survey will be carried out. These surveys would become possible with the permission from the traditional authorities. It needs to always explain the people within your sight about the purpose of the survey when you initiate the field operation. Not all of the community members are aware of the project and survey operation may give uncomfortable expression to the people even if they are aware of the project.

GUIDELINE 4: PROCUREMENT FOR CONDUCTING SURVEYS

(1) Purpose of the Guideline

The section aims at guiding fair, competitive, transparent and efficient public procurement as the irrigation planning process usually requires procurement for survey works. This guideline particularly describes the procedure for field survey works such as topographic survey and geological survey, which are essential survey work for irrigation scheme development.

(2) Structure of the Guideline

The guideline describes the procedure of procurement for survey works. The procedure goes through prequalification (PQ), tendering and contract. Prequalification starts with notice for PQ (or notice for

expression of interest (EOI); delivery, submission (receipt) and evaluation of PQ documents; and finally selection of tenderers/bidders.

Also the procedure of tendering is described as delivery of tender documents to the qualified firms; submission (receipt) of tenders, opening of tenders, examination and evaluation of tenders; and finally awarding of contract to the tenderer. To prepare tender documents, field reconnaissance survey is required to set the terms of reference (TOR) for instructing the tenderers for preparing their tender documents (including technical and financial proposal). In this regard, the guideline also explains the items to be identified by the field reconnaissance survey, particularly for topographic survey and geological survey. Sample forms of the procurement procedures are attached to the guideline, as well.

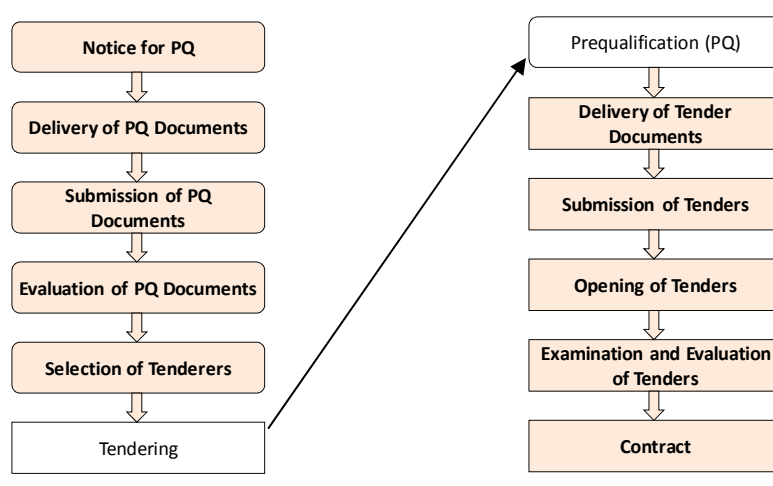


Figure 2.3 Process of Procurement (Prequalification to Tender)

GUIDELINE 5: ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

(1) Purposes of the Guideline

The Ministry of Environment (MOE) which is a leading government organization for environmental protection, developed the *ōNational Environmental Policyö* in 2012, and has just started to create its legal framework and actual procedures regarding how environmental and social issues could be considered. One of the principal tools for environmental management is an EIA system, which evaluates and justifies project implementation from the environmental viewpoints. However the EIA system has not been enacted and no specialized concrete standards or guidance have been provided.

Therefore, the IDMP-TT decided to include the essence of environmental and social considerations into the process of developing IDMP, and then to formulate a guideline for Environmental and Social Considerations for Irrigation Development (hereinafter called *ōESCIDö*) which addresses better ways to mitigate adverse environmental impacts likely caused by irrigation projects.

The principal purpose of the guideline is to encourage project proponents (mainly MEDIWR and MAFCRD and their line institutions in the states and counties; private entities; etc.), to appropriately consider environmental and social issues likely caused by their projects. It is focused on the requirement that projects must be approved under the RSS EIA system. In addition, it is also focused to meet international requirements for environmental and social considerations, especially if the project is implemented under international donors' assistance.

Specifically, the guideline aims:

- 1) To guide how to preliminarily investigate irrigation projects from environmental point of view, during the project planning and designing stages;
- 2) To guide the methods for environmental considerations in order to preliminarily identify environmental and social impacts likely to be produced by the irrigation projects; and
- 3) To address key environmental issues to be studied in an EIA study.

(2) Structure of the Guideline

Types of target projects handled in the ESCID are not only irrigation schemes/farms development but also relevant components such as access road, settlement plan, formulation of cooperative group.

Basic procedure of the ESCID can be divided into five (5) steps, which are described in the figure below.

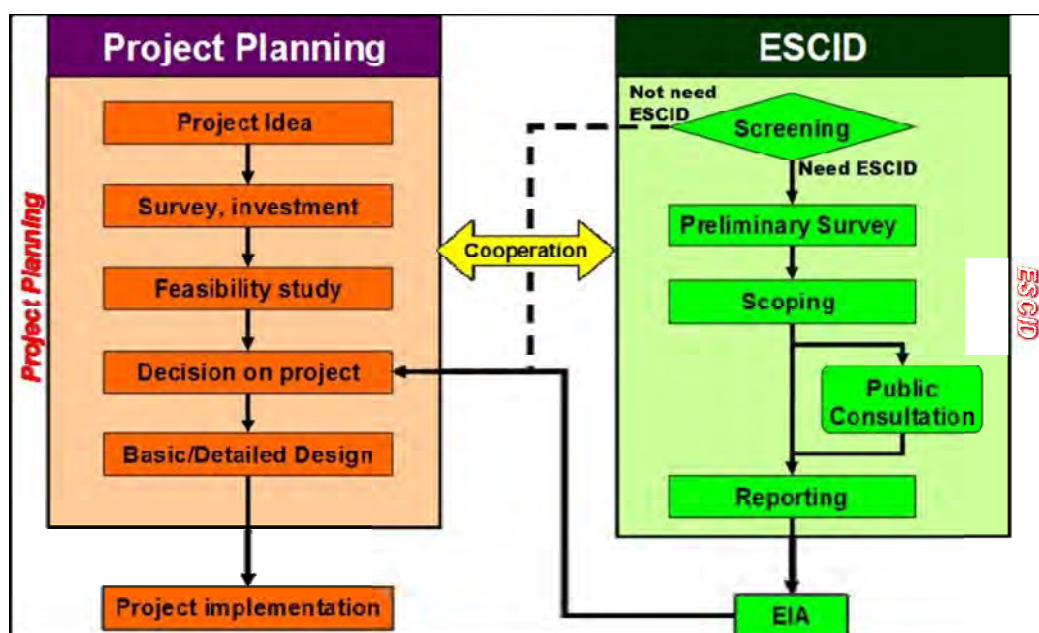


Figure 2.4 Outline of the ESCID Process

Source: IDMP Task Team

Step 1: Screening process aims to briefly determine whether or not further environmental and social considerations are necessary. The determination will be based on the environmental condition and possible impacts likely to be caused by a proposed project.

Step 2: Major purpose of preliminary survey is to find key environmental aspects which have not been clarified in the screening process. The results are used for the following **Scoping** process.

Step 3: Scoping indicates highlighted impacts and the impact levels, and also addresses the study method for a further EIA study. In addition, the results of scoping point out mitigation measures.

Step 4: Public Consultation emanate from the fact that ESCID encourages project proponents to conduct public consultation, in order to:

- Obtain consensus among the stakeholders;

- Collect useful opinions, suggestions, etc., from stakeholders including academia, civil society, NGOs, etc.; and
- Avoid any further conflicts, disputes or complaints.

Step 5: Reporting: Draft environmental regulation 2012 prepared by the MoE indicates that an environmental impact assessment shall be conducted in accordance with the scoping and the terms of reference developed during the scoping exercise by the developer or proponent. Therefore, output from the ESCID functions as the scoping exercise.

GUIDELINE 6: ECONOMIC AND FINANCIAL ANALYSES

(1) Purpose of the Guideline

a) Significance of Project and Its Economic Analysis

Economic analysis of projects will support decision making, in investing resources. When one must decide to execute a big investment in some activities toward the future, which connotes risks of damage predictable or unpredictable, one must be scared of possibility of losing own wealth and properties. Economic analysis will offer information on the most effective and efficient investment alternative by comparing cost and benefit in a certain manner and on the assumed risks being calculated.

A national government is investing their limited resources to contribute to improving living standard of the people of the country. The resources of the government include taxes levied from the people and the government distributes them into activities or projects for the sake of the nation. The investments by the government, therefore, must be effective, efficient, valid and accountable to the nation. The economic analysis will help to bring about a better allocation of resources in terms of economic efficiency.

In the guideline, we are to deal with the economic analysis of irrigation projects, costs of which are partially borne by the government. Its necessity, validity, function etc. from the country's viewpoint should be discussed for clearer understanding of the significance of the project and its economic analysis.

b) Necessity of Economic Analysis

Then, why is economic analysis necessary? There are two viewpoints to evaluate economic aspects of projects, which are national economic point of view and private economic point of view. From the viewpoint of national economy, it has to be judged that the government investment should contribute to the development of the national economy and the investment is effectively and efficiently utilized. This is the necessity of economic analysis.

As for the viewpoint of private economy (farm economy), increase of farm income by the project will be the crucial interest. The degree of income increase has to be compared with the project cost borne by the farmer/beneficiary. The analysis standing on the viewpoint of private entity is called financial analysis. Financial analysis is as important as economic analysis.

Analyses must include both aspects to justify the project, as a guideline of Asian Development Bank says, for a project to be economically viable, it must be financially sustainable, as well as economically efficient. If a project is not financially sustainable, economic benefits will not be realized. Financial analysis and economic analysis are therefore two sides of the same coin and

complementary (ADB, 1997).

(2) Structure of the Guideline

a) Contents of the Guideline

The guideline consists of basic discussions on benefits of irrigation projects (Chapter 1), estimation of project benefits (Chapter 2), decision criteria (Chapter 3) and economic and financial analyses (Chapter 4). A case study is also included (Chapter 5). Application of economic analysis method is based on OECD Method.

To carry out the case study, data collection in relevant offices, market survey, and farm economy survey were carried out. Having learned from the process of data collection, the case study was arranged not only to demonstrate practical estimation of costs and benefits, but also to explain availability of existing useful data and where to obtain such necessary data. Detail discussions about some topics and demonstrations of the formulae used in the text are noted as boxed items.

b) References

To formulate the guideline, existing manuals, guidelines or studies for economic analysis are fully utilized. The list of references is attached in Appendix A.1. In writing the text, some explanations of concepts or numbers used as examples are taken from these references with some modifications.

GUIDELINE 7: LAND ACQUISITION

(1) Purpose of the Guideline

The guideline for land acquisition is dealing with the issues of transforming a land into irrigated land with investment. People induced modification of natural environment of a landscape for production or any other purpose is generally understood as Land Use. In most of the cases, communities, together with the government, allocate the land for various purposes by taking account of traditions, existing land use policies or other similar guidelines, rules and regulations. The following describe the framework to prepare the guideline:

- Land Act, 2009 and Land Policy (draft), 2013; together with Local Government Act, 2009. These policies and acts are the references for preparing the guideline for land acquisition.
- For most of the country, the land is still governed/ managed by the community authority (Traditional Chief) under the customary law and, in most of the cases, without proper physical demarcation and registration. This fact is also taken into consideration in preparation of the guideline.
- Following classification of land (Public, Community and Private) and demarcation of roles by the governments stipulated in Land Act, 2009 will be the framework of the guideline to define the procedure according to the category of the land and role of the stakeholders.

(2) Structure of the Guideline

The guideline firstly confirms the structure of land administration and the procedure for land registration and cadastre based on the Land Act 2009 and on-going development in some counties.

Then some important points for the procedure of land acquisition are discussed referring to the Land Act 2009 and actual situation of land holding on the ground. Following are the presumable key points for future land acquisition at detail design and implementation stage:

- **Most of the land in the rural area is community land:** prior to any decision related to their lands, the project implementers have to consult with the communities concerned through land administration or traditional authorities. Most of the land in the rural area in RSS is held under community tenure and rights are administered by traditional authorities, e.g. the Traditional Authority has the rights for land allocation subject to the consultation with the community members. Therefore land acquisition on community lands should well follow the customary rights, laws and practices.

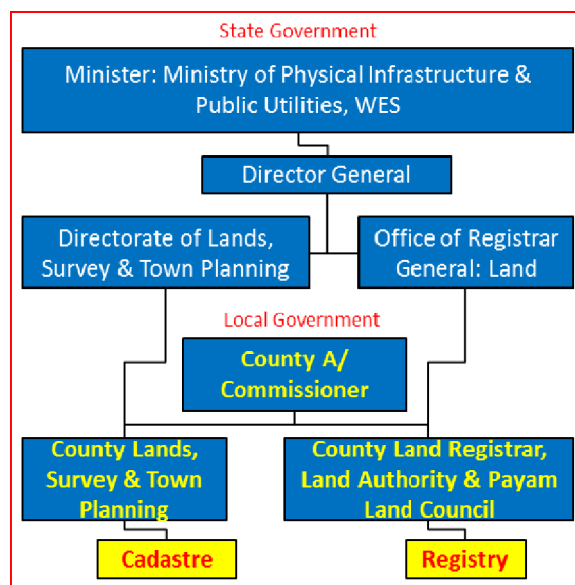


Figure 2.5 Structure of Land Administration in WES

- **Follow the customary rights whether it is registered or not for boundary setting:** as for boundary setting, follow the customary rights regardless whether it is registered or not at this moment. Customary rights are equally protected with freehold or leasehold by Land Act 2009 Section 8. So go with the customary rights based on indigenous knowledge. According to law, the community land should be registered or lawfully held or transferred. But the actual situation on the ground the community land is in many cases not registered or even its boundary is not clearly known but recognized through indigenous knowledge of the surrounding communities.
- **Irrigation Development can promote land registration in parallel with land acquisition:** at the planning stage, the layout of the irrigation scheme can follow the customary rights. However, at the implementation stage, i.e. detail design stage, the land should be registered in this occasion.
- **Alternatives of compensation: re-plotting land:** re-plotting method is to re-plot individual lands among the beneficiaries in a manner of maintaining the original size of individual lands or equally contribute a portion of their land to create a land for public use, i.e. land for irrigation facility. By this method, an efficient canal layout will become possible; and basically all the individual lands will be maintained in size. In other words, size of the acquisition for public use will be equally distributed among individual beneficiaries. This method has to be carefully examined and sensitization made over it with the communities since it may transfer one's land to another location as a new entitlement, a scenario that might bring a very sensitive undertaking by individuals within a community.
- **Community Land:** while developing irrigation in given area, some portion of land of that area is consumed by the irrigation facilities and rest become the irrigated land. Thus the ownership issues need to be examined by taking into account the followings:

• **Table 2.5 Issues on Land Tenure**

Land	Issue
Beneficiaries of the Irrigated Land Area	The beneficiaries might be new settler, farmer and pastoralist; one of them or combination of them either individual or farming group. In terms of their status of land ownership, they might be land

	owners or tenants. Thus, for new irrigation project, the land can be assigned to the individuals or groups under ownership or tenancy categories. However, it would be desirable that the land should be registered in the name of individual under the Private Land categories with Leasehold Tenure System.
Provision of Land for Irrigation Facility Development	It is obvious that some land area need to be used for the irrigation facility development, such as reservoir, intake, pump house, canal, access road, etc. Such land can be obtained from one of the land classes; namely Public, Community and Private land. Community land can be obtained by proper consultation with community chief through State and Local Government. For private land compensation mechanism, as mentioned in Land Act, 2009 and Transitional Constitution of RSS 2011, should be followed. All the land used for the facility development should be registered in the name of competent government in Public Land category under Freehold tenure system.

- **Public Land:** who to allocate the irrigation land as public land should refer to the Draft Land Policy 2013. The development of irrigation farmland under the public land can be a way of assisting vulnerable peoples of the society such as IDPs. The Policy states as one of the policy statements (Statement 2) on the Role of Security of Land Tenure in Reducing Poverty that "the policy encourages planners responsible for designing development initiatives for agriculture, water use and the use of other natural resources, to design them in ways that involve and directly benefit low-income land holders."

GUIDELINE 8: DESIGN & CONSTRUCTION

(1) Purpose of the Guideline

The guideline is to introduce technical manuals for design and construction of irrigation facilities. Due to lack of technical standards, the ones developed in Japan are introduced here as a reference. Japanese Institute of Irrigation and Drainage (JIID) develops several engineering design manuals, aiming at disseminating those to developing countries which want to establish technical standards or improve their design works. During IDMP formulation, JICA-TT provided JIID's engineering manuals to RSS-TT, after obtaining permission for dissemination from JIID. Followings are the list of available engineering manuals for irrigation and drainage developed by JIID.

- a) Canal Works
- b) Land Consolidation
- c) Small-scale Hydro-Power Generation
- d) Basics of Construction Management
- e) Fill Dam
- f) Headworks
- g) Upland Irrigation
- h) Drip Irrigation Planning Guide
- i) Pump Facilities
- j) Farm Land Conservation
- k) Drainage
- l) Groundwater
- m) Water Management (Case Study Edition)
- n) Water Management (Monitoring and Control System)

It should be noted, however, the engineering design manual was developed based on the natural and socio-economic conditions of Japan. The standards are introduced as an example and will of course be adjusted to the circumstances of South Sudan, in the course of full development of RSS irrigation development and management guidelines. Therefore in the meantime RSS-TT members have to use it

with careful consideration on South Sudan's own natural and socio-economic conditions.

(2) Structure of the Guideline

The guideline introduces to the contents of the following major manuals:

- Canal Works: This manual specifies general terms to be considered in the design and construction or rehabilitation of canals in the irrigation development project.
- Fill Dam: This manual specifies general terms to be considered in the design and construction of fill dam in the irrigation development project.
- Pump Facilities: This manual specifies general terms to be considered in the design and construction or rehabilitation of pump facilities in the irrigation development project.
- Basics of Construction Management: This manual specifies general terms to be considered in the construction management in the irrigation development project.

GUIDELINE 9: IRRIGATION SCHEME MANAGEMENT ESTABLISHMENT

(1) Establishment of O&M Mechanism

According to the Draft Water Bill of the Republic of South Sudan dated August 2014, water resources is managed by WRMA at national level, BWB at river basin level, Catchment or Sub-catchment Committee at catchment area level, and WUA at user or community level. It is necessary to confirm whether the management organizations will have been established at the time of intensively planning the irrigation projects. If these organizations are not yet established, in the meantime, it is recommended that each stakeholder should be involved, as earlier as from the planning stage till implementation stage of an irrigation scheme/farm development.

Based on the existing policy and institutional framework in relation to irrigation subsector; in addition to experiences in Aweil and other countries' irrigation schemes/farms, the scheme management office (SMO) requires, at least following function and staffs. However, relevant specialists and their numbers; in addition to the support staff, should be determined based on irrigation models and scale of the irrigation scheme. Also, an analogous arrangement could be worked out, in the case of watershed afforestation; fish farming; and irrigated rangeland and other associated projects for livestock.

Table 2.6 Required Function and Staff of Scheme Management Office

Department	Function	Required Staff
General Administration	<ul style="list-style-type: none"> • Overall management of the scheme • Coordination among stakeholders • Marketing • Procurement • Assets tracking • Keeping books of accounts for scheme operations • Irrigation fee collection • Administration of salaries, wages and other disbursements 	Manager Accountant Tariff Collector Cooperative Officer Messenger Guard Driver
Irrigation/Dam Operations & Maintenance	<ul style="list-style-type: none"> • Annual planning and monitoring of dam/pump operations, water distribution, etc. • Maintenance of dam/pump facilities, distribution network, etc. • Hydromet data recording, monitoring and reporting • Opening, closure and maintenance of water control and distribution gates • Supervision of canals maintenance • Safeguarding of supplies and the facilities 	Irrigation/Dam Engineer Electromechanical Eng. Planning/Budgeting specialist Irrigation Technician Pump Operator Irrigation Water Controller (Gate Operator)

		Facilities' Guard
Farm Level Operations	<ul style="list-style-type: none"> • Seed multiplication, observation trials for new rice varieties • Annual planning and monitoring of cropping plan and water requirement • Extension of irrigated agriculture • On-farm water management planning and supervision • Provision of outreach services to farmers • On-farm water management among farmers • Supervision of distribution and field canals maintenance 	Agronomist (cropping plan, water requirement estimation) Agricultural Engineer Extension Worker Extension Worker Tractor Operator
Processing Operations	<ul style="list-style-type: none"> • Collection, conservation, drying, milling, etc. • Storing with proper pesticide control 	Miller

MEDIWR takes an initiative to organize SMO in collaboration with MAFCRD. However, SMO cannot be managed by officials from MEDIWR and MAFCRD alone. Hence, collaboration with the other relevant stakeholders, especially MTII, MLFI & MTRB (where appropriate) and the line state/local government institutions is inevitable. At the time of design work (detail design stage of the irrigation development planning), it is recommended to discuss establishment of SMO intensively, on the functions and delineation of responsibilities, including staff and budget allocations.

Also, it is important to discuss demarcation with WUA. Ideal demarcation among stakeholders is as follows:

Table 2.7 Ideal Demarcation among Stakeholders

Stakeholders	Demarcation
1. National Government	<ul style="list-style-type: none"> • Taking initiative to establish SMO (MEDIWR in collaboration with MAFCRD) • Based on the report from SMO, taking necessary measures, to repair or rehabilitate the irrigation system (MEDIWR) • Assign relevant officials to SMO (mainly MEDIWR & MAFCRD; in addition to MLFI & MTII where appropriate)
2. State/Local Government	<ul style="list-style-type: none"> • Assign relevant officials to SMO • Supervising SMO's activities
3. Scheme Management Office (SMO)	<ul style="list-style-type: none"> • Coordinate and facilitate the formation and activities of WUA • Operation and maintenance of main irrigation facilities (dam, pump station, main and secondary canal, intake gate until on-farm) • Collection of irrigation service fee
4. WUA	<ul style="list-style-type: none"> • Operation and maintenance of tertiary (distribution) canals • On-farm level operation and maintenance, e.g., on-farm water management among farmers • Payment of irrigation service fee

1) Operation Plan

Operation plan includes basic operation plan at feasibility planning stage, and annual operation plan after commissioning or inauguration of the project. Objective of the basic operation plan is to establish basic method of operation, such as selection of water distribution method and order of the water distribution among upstream/downstream or large-/small-scale farmers. Before starting annual dam operation, it is necessary to establish basic operation rule of proposed irrigation dam. For example, on one hand, if the main objective of the dam is to supply supplemental water to peak cropping season, it is necessary to store water by the time of the peak season. On the other hand, if the main objective of dam is to supply irrigation water during dry season, it is necessary to store water until peak level by the end of rainy season.

The annual operation plan includes preparation of cropping calendar, estimation of expected water

demand and supply, and irrigation facility operation planning. After irrigation system being constructed, MAFCRD takes responsibility on developing annual cropping calendar, which in turn utilized by MEDIWR in estimation of crop water requirement or water demand. Then, water distribution plan (including dam operation plan) is developed by MEDIWR in collaboration with MAFCRD, based on water distribution method, irrigation water availability, and management capacity of gate operator(s).

Following table shows a typical operation activities and the responsible organization;

Table 2.8 Typical Operation Activities and Responsible Organization

Planning	Activity	Details	Timing	Responsible Organization
Basic Operation Planning (before construction)	Establishment of basic method of operation	Whether to adopt Flow Sharing (proportional delivery) Method or Time Sharing (rotation) Method. How to coordinate the intention of large-scale farmers and small-scale farmers, upstream farmers and downstream farmers.	at the FS stage, design work stage, at the start of every season or every two seasons	MEDIWR in collaboration with MAFCRD
Annual Irrigation Planning (after construction)	Preparation of cropping calendar	Develop cropping calendar by season (dry and rainy season), per month, taking into consideration planting pattern (gradual increase in planting season and gradual decrease in harvesting season)	at the start of every season or every two seasons	Scheme Management Office (MAFCRD Units)
	Estimation of expected water demand and supply	Estimation of crop water requirement, based on cropping calendar. Water demand is estimated by considering effective rainfall, runoff, evaporation, transpiration, percolation, and conveyance loss.	at the start of every season or every two seasons	Scheme Management Office (MEDIWR Units)
	Irrigation scheduling and facility operation planning	Water distribution plan (including dam operation and pump operation plans) is developed based on water distribution method, irrigation water availability, and management capacity of gate operator(s).	at the start of every season or every two seasons	Scheme Management Office (MEDIWR Units)

2) Maintenance Plan

Maintenance works consist of routine maintenance, periodical maintenance and emergency maintenance works. The routine maintenance is a day-to-day maintenance work including cleaning silt at flow measuring devices, removal of floating debris, minor repair of canal and structures and greasing or oiling of gates of facilities. WUA should actively participate in this activity at least for on-farm level structures.

Periodical maintenance is works to be done at a certain interval, after harvest season or before planting season for example. Basically, WUA bear a responsibility for on-farm level maintenance, whereas the governments are obligated to main facilities such as intake facilities, main and second canals, and gate structures. Emergency maintenance is an emergency works at the time of natural disasters which causes damages on irrigation structures. This type of maintenance requires large investment for long term and/or large scale of replacement, and main responsible organization should be the government except for on-farm level structures.

Following table shows ideal demarcation of each stakeholder in maintenance work.

Table 2.9 Typical Maintenance Activities and Responsible Organization

Maintenance Level	Description	Activities	Responsible Organization
Routine Maintenance	Day-to-day maintenance work.	<ul style="list-style-type: none"> - cleaning silt at flow measuring devices - removal of floating debris - minor repair of canal and structures - greasing or oiling of gates 	<ul style="list-style-type: none"> - Tertiary and On-farm structures: WUA/Community - Main and secondary facilities: County/State/National
Periodical Maintenance	Works to be done at a certain interval.	<ul style="list-style-type: none"> - strengthening of banks and structures - desilting - grass cutting - repair of damaged structures /a - repair of damaged equipment /b - painting of structures 	<ul style="list-style-type: none"> - Tertiary and On-farm Structures: WUA/Community - Main and secondary facilities: County/State/National
Emergency Maintenance /a	Emergency work	<ul style="list-style-type: none"> - repair of damaged structures caused by unforeseen disasters, including floods, heavy rainfall, earthquake, theft, etc. 	<ul style="list-style-type: none"> - Main and secondary facilities: County/State/National - Tertiary and On-farm Structures: WUA/Community

Note: a/ Diagnosis of damaged structures (e.g. dam embankment, gate, etc.) is outsourced to engineering firms.
 b/ Maintenance of equipment (pump, electric supply, etc.) is outsourced to suppliers and manufacturer.

GUIDELINE 1

INSTITUTIONAL ARRANGEMENT OF IRRIGATION DEVELOPMENT AND MANAGEMENT

GUIDELINE 1: INSTITUTIONAL ARRANGEMENTS FOR IRRIGATION DEVELOPMENT AND MANAGEMENT

1. MAIN ACTORS IN IRRIGATION DEVELOPMENT AND MANAGEMENT

1.1 Key Directorates of MEDIWR in relation to Irrigation Development and Management

MEDIWR takes primal responsibility in irrigation development and Management, including policy formulation; planning; designing; implementation; operation and maintenance; and monitoring and evaluation of irrigation schemes/farms/infrastructure, projects and programmes.

Key directorates of MEDIWR responsible for National Irrigation Development and Management are Six (6), namely: The Directorate of Irrigation and Drainage (DID), Directorate of Planning and Programmes (DPP), Directorate of Water Resources Management (DWRM), Directorate of Power Engineering and Grid (DPEG), and Directorate of Hydrology and Survey (DHS).

Their main functions in the irrigation development and management are summarized in Table 3.1.

Table 3.1 Key Directorate of MEDIWR in National Irrigation Development Programme

Organization	Stakeholders	Key Functions in Irrigation Development and management
MEDIWR	Directorate of Irrigation and Drainage (DID)	Construction, rehabilitation, maintenance and operation , water harvesting/storage facilities and flood control structures, establishment of Scheme Management Office (SMO), etc.
	Directorate of Planning and Programmes (DPP)	Coordinate staff training including State governments staff; Coordinate planning process, Monitoring and Evaluation of the programmes/projects implementation; Harmonize budgeting procedures for effective budget execution.
	Directorate of Water Resources Management (DWRM)	Establishment of institutional and legal framework; Integrated Water Resources Management approach; Pollution prevention and mitigation; Cooperative management of trans-boundary water resources.
	Directorate of Power Engineering and Grid (DPEG)	Construction, rehabilitation, maintenance and operation of power plant and grid.
	Directorate of Hydrology and Survey (DHS)	Water resources assessment, feasibility studies, establishment of centralized information network system and accumulation of long time historical hydromet and water use/abstraction data/information: installation, rehabilitation and functioning of hydromet information measurement stations: observation of real time and near real time water resources information/data (e.g for flood and drought forecasts): and production of nationwide high resolution maps

Adopted from: Main Functions of directorates MWRI
Strategic Plan 2012-2017, MWRI
Programme Profile of IDMP, National Irrigation Development Programme (NISDP)

1.2 Other Key Stakeholders in Irrigation Development and Management

In addition to MEDIWR there are other institutions such as MAFCRD, MLFI, MoE, MWLCT, MTII, etc. who jointly plan, implement, operate and administer irrigation schemes/farms. At the planning stage, MAFCRD is required to develop water demand plan for crops, horticultures and fruits trees related projects. MAFCRD also takes responsibility for on-farm level irrigation water management; allocation of farm plots to farmers; preparation of cropping calendar and associated farming areas; extension of irrigation farms; and O&M of irrigation facilities at on-farm level. In this regard, if the Scheme management Office (SMO) is established in each irrigation scheme, both MEDIWR and MAFCRD are required to assign proper staff to the SMO.

MLFI also plays an important role to determine water requirement sites for dipping and watering facilities for livestock, pastoralists watering points and aquaculture related facilities; while MoE is a primal ministry for environmental protection including watershed conservation. Table 1.2 shows identified stakeholders and their key functions in National Irrigation Development Programme (NISDP).

Table 3.2 Stakeholders in National Irrigation Development Programme

Organization	Stakeholders	Key Functions in Irrigation Development and management
FSC	Food Security Council	To ensure adequate food availability throughout South Sudan.
MAFCRD	Directorate of Agriculture Production and Extension Services (DAPES)	Promote development and adaptation of appropriate technology for irrigation farming; Establish and manage an effective agricultural extension service; On-farm level irrigation management, including allocation of farm plot to farmers, preparation of cropping calendar, estimation of crop water requirement, and instruction to farmers for O&M of irrigation facility at on-farm level.
	Directorate of Cooperatives (DC)	Provide guidance to establish cooperatives and to facilitate their functioning
	Directorate of Rural Development (DRD)	Provide technical assistance and training to State governments and other local governments to build their capacity to assume their responsibilities for irrigated agriculture.
	Directorate of Planning (DP)	Formulate plans for irrigated agriculture development.
	Directorate of States and Special Projects Coordination(DAPDC)	Coordination of External support, including ensuring of resources mobilization from donors, other sources of financing (loan from banks), partnership arrangements (e.g. with private sector), etc.
MoE	Ministry of Environment	To ensure conducting of EIAs of irrigation projects; so as to safeguard protected areas, including watersheds and wetlands conservation; Advice and support States and local governments in their responsibilities for environmental protection.
MWLCT	Directorate of Wildlife Conservation	Develop water demand plan for wildlife and other conservation purposes
MLHPP	Ministry of Lands, Housing and Physical Planning	Surveying and mapping of South Sudan and safe keeping maps and documents; Establish and oversee the operation of the Land Registry and use
LC	Land Commission	Establish and oversee the operation of the Land Registry and use.
NBS	National Bureau of Statistics	Provide socio-economic data/information for irrigation development plan and M&E.
MTRB	Ministry of Transport, Roads and Bridges	Construction of feeder roads, to connect schemes/Farms to markets and main roads to improve markets and other supplies accessibility.
MGCSW	Ministry of Gender, Child and Social welfare	To ensure participation and benefiting of vulnerable groups, resettlement of displaced persons, etc. by the projects.
MFEP	Ministry of Finance and Economic Planning	Budgetary arrangement for irrigation development; Supporting donor buying process for irrigation development.
MTII	Ministry of Trade, Industry and Investment	Initiate development of agro-industries based farming; Promotion of Public Private Partnership and private sector investment in irrigation development
MLFI	Directorate of Animal Production and Range Management (DAPRM)	Coordinate participation of livestock keepers in irrigation planning; Initiate plans for dipping and watering facilities for livestock
	Directorate of Livestock and	Provision of research results to inform farmers and

Organization	Stakeholders	Key Functions in Irrigation Development and management
	Fisheries Research Development (DLFRD)	pastoralists on health and productivity/production requirements of livestock and fisheries.
	Directorate of Extension and pastoralists Development (DEPD)	Coordinate participation of pastoralists in irrigation planning; initiate plans for pastoralists watering points
	Directorate of Fisheries and Aquaculture Development (DFAD)	Coordinate participation of fisher folks and aquaculture business entity in irrigation planning; initiate plans for fisheries and aquaculture related facilities
	Directorate of Planning, Statistics and Documentation (DPSD))	Collection and provision of necessary data/information for irrigation development plans and M&E.
WRMA	Water Resources Management Authority (WRMA)	Regulate the management; Development and use of water resources; Issue regulation on water resources allocation and the issuance of permits; Issue permits for inter-basin water transfer; Provide guidelines to BWB on the pricing strategy for charges to be levied under the Water Bill; Ensure collection, analysis and dissemination of data and information on water resources, etc.
BWB	Basin Water Boards (BWB)	Protecting water resources and increasing water availability, Receiving permit applications for water abstraction, for water use and recharge, determining, issuing and varying water permits and enforce the conditions of those permits; Receiving permit applications for the construction of works, and determining, issuing and enforcing the conditions of those permits; Enforcing regulations; Coordinate and facilitate the formation and activities of WUAs; Setting the level of charges to be levied under this Act in accordance with the pricing strategy and guidelines issued by the WRMA; Collecting water permit and water use charges; etc.
IB	Irrigation Boards (IB)	Protecting water resources and increasing irrigation water availability, Receiving permit applications for irrigation water users, for water use and recharge, determining, issuing and varying water permits and enforce the conditions of those permits; Receiving permit applications for the construction of irrigation and drainage facilities, and determining, issuing and enforcing the conditions of those permits; Enforcing regulations; Coordinate and facilitate the formation and activities of WUAs; Setting the level of charges to be levied under this Act in accordance with the pricing strategy and guidelines issued by the WRMA; Collecting irrigation fee for O&M of irrigation facilities; etc.
C/WC	Catchments/Watersheds Committees	To formulate catchment or sub-catchment integrated water resources management plans; To resolve water resources conflicts in the catchment or sub-catchment; To perform other functions delegated by the BWB.
WUA	Water Users Association (WUA)	Manage, distribute and conserve water from a source/facility used jointly by the members of the WUA; Resolve conflicts between members of the association; Collect water user fees on behalf of the BWB; Represent the special interests and values arising from water used for both public and private purposes.
SDWS	State Directorate of Water and Sanitation (SDWS)	Coordination between central government, counties and communities concerned, to formulate irrigation development plans, implementation and O&M of the projects; participation in M&E of the project.
SDALFF	State Directorate of Agriculture,	Coordination between central government, counties and

Organization	Stakeholders	Key Functions in Irrigation Development and management
(SLMALFF)	Livestock, Fisheries and Forestry (SDALFF)	communities concerned to formulate irrigation development plans, implementation and O&M of the projects; participation in M&E of the project.
SDC/RD (SLMC/RD)	State Directorate of Cooperatives, Rural/Community Development	Coordination between central government, counties and communities concerned to formulate irrigation development plans, implementation and O&M of the projects; participation in M&E of the projects.
SDLS (SLMLS)	State Directorate of Land and Survey	Coordination between central government, counties and communities concerned to formulate irrigation development plans, implementation and O&M of the projects; participation in M&E of the projects.
CDWS (LG)	County Department of Water and Sanitation (CDWS)	Coordination between central government, state and communities concerned to formulate irrigation development plans, implementation and O&M of the projects; participation in M&E of the projects.
CDALFF (LG)	County Department of Agriculture, Livestock, Fisheries and Forestry (CDALFF)	Coordination between central government, state and communities concerned to formulate irrigation development plans, implementation and O&M of the projects; participation in M&E of the projects.
CDC/RD	County Department of Cooperatives, Community/Rural Development	Coordination between central government, state and communities concerned to formulate irrigation development plans, implementation and O&M of the projects; participation in M&E of the projects.
At Community Level	Farmers/Pastoralists Union, Cooperatives Society, Fishing Folks, Civil Society	Participation and contribution in irrigation development planning, implementation and O&M of the projects; participation in M&E of the projects.

Source: Main Functions of directorates MWRI

Roles, Functions and Responsibilities of the National Ministries, Ministry of Cabinet Affairs, November 4th, 2013.
Programme Profile of IDMP, National Irrigation Development Programme (NISDP)

2. CATEGORY OF IRRIGATION SCHEME

2.1 Classification of Irrigation Scheme

Irrigation types and projects can be classified in various ways, namely based on the size of the scheme, degree of water control, level of technology or type of management. Both modern irrigation (full water control) and flood recession (little water control) can be found in some of the large and small schemes. Based on the scheme size or cultivable command area, irrigation systems are classified into four main categories adopted by FAO as follows;

- 1) Very large scale schemes: they are schemes having a cultivable commanded area of more than 10,000ha with full water control under the government management. Examples in the large river basins in Egypt, Sudan and Morocco. They are well designed systems.
- 2) Large scale schemes: They are projects having cultivable command area ranging from 1,000ha to 10,000ha with adequate water control. They are generally under the government or commercial management.
- 3) Medium scale schemes: They are having a cultivable command area ranging from 100ha to 1,000ha with full or partial water control. They are the government managed or under the government assisted cooperatives or private commercial estates.
- 4) Small scale schemes: They irrigate cultivable command areas up to 100ha, and are usually controlled by farmers' groups or single farmer. There are numerous in Kenya, Zimbabwe,

Madagascar, and Tanzania. Pumping from lakes is common in small scale projects.

From financial point of view, large irrigation schemes require high capital investment, whereas small irrigation schemes need relatively lower investment costs. According to FAO, as shown in Table 3.3, average development costs of large irrigation scheme (more than 10,000ha), medium scheme (2,000ha to 10,000ha) and small scheme (less than 2,000ha) are estimated at 16,000USD/ha, 9,000 USD/ha and 4,000 USD/ha respectively.

Table 3.3 Irrigation Projects and Their Development Costs

Type of Project	Command Area (ha)	Development Cost (USD/ha)
Large scale	More than 10,000	Average: 16,000 Range: 5,000-50,000
Medium scale	2000 to 10000	Average: 9,000 Range: 4,000-15,000
Small scale	Less than 2,000	Average: 4,000 Range: 1,000-6,500

Source FAO, 1995

2.2 Adopted Definition of Irrigation Schemes/Farms in RSS

IDMP has five (5) kinds of irrigation programmes, including 1) National Irrigation Schemes Development Programme (NISDP); 2) State Irrigation Schemes Development Programme (SISDP); 3) County Irrigation Schemes Development Programme (CISDP); 4) Community Irrigation Farms Development Programme (CIFDP); and 5) Private Sector Investment Promotion in Irrigation Development Programme (PSIPIDP).

NISDP is controlled by the national government with upper medium to large scale command areas and irrigation facilities; SISDP is controlled by the state government with relatively small to lower medium scale irrigable areas and facilities; CISDP is controlled by the local government with relatively smaller scale irrigation areas and facilities; and CIFDP is controlled by the communities with much smaller scale irrigation areas and facilities. NISDP is to be developed by the national government; SISDP can be developed by both the national government and the state government; CISDP can be developed by national, state and local governments together; and CIFDP can be developed by national, state and local governments together with communities. More classification factors and other actors involved in the programmes and projects are defined as summarized in Table 2.2.

Table 3.4 Categorization of Irrigation Schemes/Farms Development

Programme	Scheme/ Farm Size	Definition	Responsible Organization for Land Allocation	Ownership	Technical Assistance	Capital Investment, i.e. funding source for implementation	O&M (Short-term)/a	Supervision of Scheme/ Farm Management (short-medium term)/b
National Irrigation Scheme Development Programme (NISDP)	500ha or more	Large Scale	National/ Community	Land property acquired by National Government	National/ DPs	National/ Private Sector (Bank)/ International Development Bank/ DPs (grant)	National/ IB/ WUA	National

State Irrigation Scheme Development Programme (SISDP)	Up to about 500ha	Midium Scale	State/ Community	Land property aquired by State Government	National/ DPs	State/ National/ Private Sector (Bank)/ International Development Bank/ DPs (grant)	National/ IB/ State/ WUA	State/ National
County Irrigation Scheme Development Programme (CISDP)	Up to about 200ha	Small Scale	County/ Community	Land property aquired by Local Government	National/ State/ DPs	County/ State/ National/ Private Sector (Bank)/DPs (grant)/ NGOs	National/ County/ IB/ WUA	County/ State/ National
Community Irrigation Scheme Development Programme (CIDP)	Up to about 200ha	Small Scale	Community	Land property aquired by Community Group	National/ State/ County/ DPs/ NGOs	Community/ County/ State/ National/ Private Sector (Bank)/DPs (grant)/ NGOs	National/ State/ County/ Community/ IB/ WUA	Community/ County/ State/ National
Private Sector Investment Promotion in Irrigation Development Programme (PSIPIDP)	Undefined	Undefined	National/ State/ Community	Land property aquired by Private Sector Organization	Private Consultants/ Government Facilitation	Private Sector, Government Support and Community Contribution	Private Sector, WUA, IB, BW & C/SC	Private Sector/ Government Support

Note: a/ Operation and maintenance of irrigation schemes/farms could transfer to Irrigation Boards (IBs), Water Users Associations (WUAs), Farmers in midium to long-term, depending on their capabilities.

b/ Supervision of schemes/farm management could transfer to state's governments, local governments and community development committees in the long-term, depending on their capabilities.

3. DIVISION OF ROLES IN IRRIGATION DEVELOPMENT AND MANAGEMENT

To materialize successfully, irrigation development and management on a nationwide scale, it is important to establish effective and practical institutional structure for the irrigation development and management. For this purpose, clearly defined roles and responsibilities of all stakeholders, including national, states and local level actors, is necessary.

MEDIWR in collaboration with MAFCRD & MLFI takes primal responsibility of irrigation development for crop production; trees plantation; animal husbandry; and fish farming, from planning, designing, implementation, and O&M. For the O&M purpose, Scheme Management Office (SMO) takes significant role and its establishment and management support is also obligation of MEDIWR. The line ministries, directorates and departments of MEDIWR, MAFCRD & MLFI at state and county levels, also play key roles in irrigation development planning; implementation; and M&E of irrigation programmes/projects, especially in terms of coordination and sensitisation among grassroots stakeholders.

Community/farmer participation in planning, implementation, operation and maintenance in irrigation schemes/farms particularly on-farm level irrigation scheme is a key for successful implementation of the irrigation schemes/farms development programmes and projects. In some cases, land belongs to communities, and the government cannot start any irrigation development procedures without permission and participation of communities.

Table 3.1 shows role and responsibility for implementation of irrigation development programmes and

projects.

Table 3.5 Roles and Responsibilities of the Stakeholders in Programmes and Projects Implementation

Code	Type of programme/project	Roles and Responsible Organizations				
		National Government/DPs	State Government/DPs	County or LG/DPs	Community/DPs	Private Sector
01	National programme/project (Nationally planned and nationally implemented)	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Coordination • M&E 	<ul style="list-style-type: none"> • Coordination • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	
02	National-State programme/project (Jointly planned and implemented by national and state governments)	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Coordination • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	
03	State programme/project (Planned and implemented by state government)	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Coordination • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	
04	State-County programme/project (Jointly planned and implemented by state and local governments)	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	
05	County programme/project (Planned and implemented by local government)	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Contribution • Coordination • M&E 	
06	County-Community programme/project (Jointly planned & implemented by local government & community)	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E 	<ul style="list-style-type: none"> • Initiative • Identification • Planning • Financing • Implementation • M&E 	
07	Community programme/project (Planned and implemented by community)	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Technical support • Coordination • M&E 	<ul style="list-style-type: none"> • Initiative • Identification • Financing • Implementation • M&E 	
08	Private sector project (Initiated and implemented by private sector)	<ul style="list-style-type: none"> • Coordination • Facilitation • Supervision • M&E 	<ul style="list-style-type: none"> • Coordination • Facilitation • Supervision • M&E 	<ul style="list-style-type: none"> • Coordination • Facilitation • Supervision • M&E 	<ul style="list-style-type: none"> • Coordination • Contribution • M&E 	<ul style="list-style-type: none"> • Planning • Financing • Implementation • M&E

4. PRIVATE SECTOR INVOLVEMENT

4.1 Participatory Irrigation Management (PIM)

Traditionally, in most countries, irrigation water supply and maintenance of large and medium scale

irrigation scheme have been publicly managed and administrated. In some cases, the public sector even instructs farmers what crops to be cultivated. In Aweil Rice Irrigation Scheme, the Scheme is run under the tenancy system, and main role tenant farmers are to weed, irrigate and harvest. While most of the part of O&M is undertaken by the Scheme Management Office, the role of farmers in O&M of the irrigation facilities is little, only for controlling inlets and outlets of the fields.

Since 1980s, International finance organizations including the World Bank promotes farmer's involvement in irrigation management¹. The World Bank defines Participatory Irrigation Management (PIM) as the involvement of irrigation water users in all aspects of irrigation management and at all levels. "All aspects" include planning, designing, construction, operation and maintenance, financing, decision rules and monitoring and evaluation of the irrigation system, whereas "all levels" include primary, secondary and tertiary level of irrigation structures.

Table 3.6 Range of Institutional Arrangements for PIM

Activity	Full Agency Control	Agency O&M (User Input)	Shared Management	WUA Owned (Agency Regulation)	Full WUA Control	Irrigation Management Company Board
Regulation	Agency	Agency	Agency	Agency	WUA	Agency
Ownership of Structure & Assets	Agency	Agency	Agency	WUA	WUA	Private Company
O&M Responsibility	Agency	Agency	Both	WUA	WUA	Private Company
Collection of Water Charges	Agency	Agency	Both	WUA	WUA	Private Company
Unit of Representation	Agency	WUA	WUA	WUA	WUA	Company & User Committee
Country Class	Most Developing Countries	Srilanka, Thailand, Vietnam, Philippines	Andhra Pradesh, Turkey, Albania	Mexico, Dutch Water Boards, Japan	New-Zealand, Nepal (FMIS), Ground Water Irrigation	France, China, Australia, USA

Source: "Participatory Irrigation Management", J. Raymond Peter, Executive Director, International Network on Participatory Irrigation Management, Washington DC (INWEPF/SY/2004(06))

4.2 Irrigation Management Transfer (IMT)

Irrigation Management Transfer (IMT) is a more comprehensive variant of PIM. IMT is the full or partial transfer of responsibility and authority for the governance, management and financing of irrigation system from the government to water users' organizations. In some cases, even irrigation facilities are assigned to the WUAs.

In the Philippines,² the first IMT was entered into contract in 1998 under the World Bank funded project called the Second Irrigation Operations Support Project (IOSP II). At present, there are several types of operation and maintenance contracts in the Philippines in accordance with WUA's management capacity. As shown in table below, Type 3 is a full transfer contract under which WUA assumes complete management of the system and pays, through annual amortization, the construction or rehabilitation cost.

¹ "Privatization in Irrigation Agriculture, PIM, IMT and PPP", U Hoering, Briefing paper No.1 to the Background paper "Water for Food & Water for Profit. The World Bank's Policy in the agricultural water sector".

² The Philippine has 2 major types of irrigation scheme, including National Irrigation Scheme (NIS) and Communal Irrigation Scheme (CIS). The CISs are relatively small (<1000ha), the O&M is done by farmers themselves who also amortize the direct project cost. The NISs operated by the NIA are over 1000 ha with O&M administered by NIA and paid for by farmers as an irrigation service fee (ISF).

Table 3.7 Type of O&M Contract in the Philippines

Type	O&M Contract	Details
Type 1	Maintenance Contract	The IA (Irrigators Association) takes responsibility for cleaning canal and receives about P2,400 (US\$44) per month (2005)
Type 2	Maintenance plus ISF Collection	The IA gets a commission ranging from 2 to 15% of the collected amount of ISF (Irrigation Service fee).
Type 3	Total irrigation Management Transfer Contracts	The IA assumes complete management of the system and pays, through annual amortization, the construction or rehabilitation cost.

Source: Participatory Development and Management: A Cornerstone of Philippines Irrigation program, Bayani P. Ofrecio, 2005.

However, in the Republic of South Sudan, comprehensive irrigation development and management has just started through the IDMP, and establishment of organizational structure and capacity development of the government officials has just started at the national level. Technical and administrative capacity development at state, county and community level will be conducted afterward, especially during the implementation stages of IDMP. Therefore, IMT must be a future issue, after the communities/farmers have obtained enough experiences and capabilities on O&M of irrigation facilities.

However, when we consider current constraints on irrigation development and management, including sophisticated land holding system, capacity of the government in terms of financial and human resources, introduction of PIM must be necessary to promote irrigation development and management nationwide. In this regard, community/farmer participation in irrigation development and management from planning stage till operation and maintenance of irrigation facilities at least at on-farm level is required.

4.3 Public Private Partnership (PPP)

Public Private Partnership (PPP) is defined as; a government and private business venture which is funded and operated through a partnership of government and one or more private sector companies³. The PPP involves a contract/agreement between a public sector authority and a private party, in which the private party undertakes a public service or entrepreneurial endeavour and assumes substantial financial, technical and operational risks as per the revenues from the undertakings.

All the many different types of PPP contracts used in the water sector fall into following two (2) major categories, depending on whether payment for the service is tied to operational results⁴.

- If the private service provider is paid a fee by the public client that is not tied to operational results, the PPP contract is termed a public contract. A public contract can be either partial (a service contract for the provision of a specific service) or comprehensive (a management contract).
- If the private service provider is paid according to operational results, the PPP contract is termed a public service delegation (PSD). Under this heading come the five arrangements known as lease, concession, build-operate-transfer (BOT), and divestiture. A characteristic of PSD is that the service provider normally collects fees from the end user and not from the government.

³ Is a Asia's Irrigation Ready for PPP?, Arnaud Cauchois, SAER

⁴ Emerging Public-Private Partnerships In Irrigation Development and Management, water Sector Discussion Paper Series, No.10, The World Bank, May 2007.

Table 3.8 Main PPP Contractual Form

Category	Form	Description
Public Contract	Service Contract	Service contracts are task-specific, usually short term, sometimes renewable, and suitable for outsourcing system maintenance, meter reading, or fee collecting. The public client simply purchases a professional service outside instead of trying to perform it through its own organization.
	Management Contract	Management contracts transfer responsibility for running a government-owned business to a private operator, typically for a period of three to five years. The simplest contracts involve paying the nonpublic operator a fixed fee for performing managerial tasks. Although the operator is not responsible for overall operational results, contracts may introduce incentives for efficiency by defining performance targets and basing the fee in part on their fulfillment.
Public Service Delegation	Lease	The operator is responsible for operating and maintaining the business but not for financing the investment. The operator has a direct incentive to improve operating efficiency and increase sales because profits depend on sales and costs. Under a lease, the operator pays the contracting authority a fixed, contractual rent.
	Affermage	Affermage is a similar concept to Lease contract. The difference is; under the Lease, the operator pays a fixed contractual rent to the contracting authority. While under the Affermage, the rent depends on the revenues collected from customers by the operator. In other words, in the case of a lease a portion of the receipts going to the authority (owner of the assets) as a lease fee, and the remainder being retained by the operator. In the case of an affermage, the operator retaining the operator fee out of the receipts, and paying an additional surcharge, that is charged to customers, to the authority to go towards investments that the authority makes/ has made in the infrastructure. It is said that, in the former, the operator takes a risk on bill collection and on receipts covering its operating costs, whereas in the latter case, the contracting authority effectively bears some of the commercial risk.
	Concession	A concession gives the private operator full responsibility not only for operating and maintaining the assets but also for financing and managing investment over a long period of time (typically 25 to 30 years). However, final asset ownership rests with the government, and full use rights to all assets, including those created by the operator, revert to the government when the contract ends.
	Build-Operate-Transfer (BOT)	Under a build-operate-own (BOO) agreement, the assets remain indefinitely with the private partner.
	Build-Operate-Own (BOO)	Under a design-build-operate (DBO) agreement, the public and private sectors share responsibility for capital investments.
	Rehabilitate-Operate-Transfer (ROT)	Under a rehabilitate-operate-transfer (ROT) agreement, the contract designates responsibilities for plants that need extensive overhaul.
	Divestiture	Divestiture is another word for sale of assets to a private operator, that is, full privatization.

Adopted from: 1) "Emerging Public-Private Partnerships In Irrigation Development and Management", water Sector Discussion Paper Series, No.10, The World Bank, May 2007.

2) Website of Public Private Partnership in Infrastructure Resource Center (PPPIRC), www.worldbank.org/pppirc.

In the irrigation development, the World Bank suggested as; "shift toward a new public-private paradigm for irrigation, in which government progressively becomes more the facilitator and regulator and users and markets play a growing role in management and finance"⁵. According to the World Bank's report, private sector is quite active in investing small scale irrigation development. However, there has been little PPP investment in medium and large scale irrigation scheme.

The reason is quite simple, in spite of higher cost of investment for private sector, risks are quite high in medium and large scale irrigation scheme. However, risks to be considered for private sector investment in water sector are quite complicated as summarized below;⁶

⁵ "Prospects for Public-Private Partnership in Irrigation and Drainage", Salah Darghouth (ARD Consultant), The World Bank Water Week (March 2005)

⁶ "Emerging Public-Private Partnerships In Irrigation Development and Management", water Sector Discussion Paper Series,

- Country risk: risks related to the political and macroeconomic situation in the host country, including civil war, instable security situation, and possible changes in political decisions.
- Devaluation risk: this risk can be a serious in an economically weak country or in a country subject to considerable annual inflation. Unstable exchange rate of the South Sudan Pound is included in this risk category.
- Commercial risk: the risks result from uncertainties over whether participants in PPP arrangements can achieve the net financial flow on which their agreement to the partnership was based. Risks related to international market for the type of crops grown (for example, food staples or high-value added crops) can be included in the commercial risk.
- Social risk: the acceptability of new relationships and distribution of functions among institutions and stakeholders. If local people adhere traditional custom under the traditional governing system, or do not trust the government authority this might be happened. Complicated land acquisition issues are also included in this category.
- Farming risk: this risk includes pest and disease. However, this risk is remarkably low among the cases considered.
- Water supply risk: by comparison, this risk is much higher in the irrigation and drainage subsector than in water supply subsector because irrigation usually consumes the lion's share of available water resources. Reduction in water supply by unstable precipitation and/or silting in reservoirs are serious concern in some places.

Considering above risks in the Republic of South Sudan, it is recommended that, on one hand the government should make efforts to reduce risks listed above. On the other hand, it is better to promote PPP in small-scale irrigation scheme so that the private sector can shoulder relatively lower risks in their investment.

4.4 Role of the Government to Promote Private Sector Involvement for Irrigation Development and Management

1) Role of Government to Promote PIM/IMT

Important role of the government to facilitate the PMI and IMT is promotion of capacity building of WUAs, and rehabilitation of irrigation scheme so that WUA can take initiatives and contributions for O&M of irrigation scheme. In addition, followings are the required role of the government in PIM and IMT.

- Provide legal frameworks that specify clear roles and responsibilities among agencies, water user association and governments. Particularly, provide legal bases to WUA for undertaking O&M, contract works, collect irrigation fee, settle conflicts, and function under elaborate rules are required.
- Securing water rights also protects the WUA from infringements of its allocation and share of water to other powerful interest such as industries and municipalities.
- Improvement of service delivery including rehabilitation of the irrigation scheme, enhancement of extension services.

Capacity building of WUA in promoting PIM/IMT includes following 4 aspects; namely technical capacity, legal capacity, financial management capacity, and administrative capacity. For future promotion of PIM/IMT, it is necessary to take into consideration of these subjects in capacity building of WUA.

Table 3.9 Subjects for Capacity Building to Promote PIM/IMT

Capacity	Detail
Technical Capacity	O&M, Inventory and asset management, preparation of estimates, procurement, quality control, water management, crop water requirement, water scheduling and budgeting.
Legal Capacity	Awareness of the law and legal provisions and procedures, Dispute resolution.
Financial management Capacity	Accounting, audit and social audit, raising resources, levy and assessment etc.
Administrative Capacity	Conducting of meetings, recording proceedings, communication and negotiating skills, conflict resolution and conjunctive management with the irrigation agency/Government.

Source: Participatory Irrigation Management+, J. Raymond Peter, Executive Director, International Network on Participatory Irrigation Management, Washington DC (INWEPF/SY/2004(06))

2) Role of Government to Promote PPP

The PPP in irrigation scheme management is not a new concept in the RSS since the Northern Upper Nile Irrigation Schemes (NUNIS) includes both the private-government scheme and the public scheme. Out of 23 schemes, 9 schemes were operated by the private-government, ranging from 100 to 1,000ha each, accounting for over 50% of irrigated area. Under the private-government schemes, MEDIWR supplies irrigation water up to the major canal from where the private owner conveys and distributes to his tenant-farmers.

For example, after entering into management contract with the national government, a private firm rehabilitated the irrigation scheme in 2008, and started farming activities in 2009 and 2010. However, the management contract was terminated due to management problem of the firm. In this case, the private investor was domestic firm. To promote private investment further, it is necessary to attract foreign investors since private sector has not yet grown in the RSS. However, the foreign investors face lots of risks and the government is required to take necessary measures to mitigate the risks in investment.

Followings are necessary measures to promote PPP in irrigation development in the RSS, in addition to mitigation of the country risk and stabilization of macro-economy including mitigation of devaluation.

- Establishment of investment support and promotion system of irrigation development for private and foreign investors, including an incentive/attraction system for special types of investment intervention, e.g. scarce food security, labour intensive, cash generating and agro-industry supporting crops.
- Safeguarding of community interest while accommodating private sector investment, including land utilization restriction and pollution control. Also, protection of national interest while accommodating foreign investment.
- Enhancement of investor protection including protection of property right (e.g. seed variety), establishment of infrastructure guarantee system, and introduction of weather index-base crop insurance.
- Transparency of the regulatory system including impalement of a duplicative and opaque tax system e.g. in road transportation, amelioration of uneven tax exemption, etc.

- Improvement of underdeveloped economic infrastructure including road network and electricity supply.

To provide an enabling environment for private sector involvement in irrigated agriculture, Private Sector Irrigation Investment promotion programme (PSIIPP) will be implemented under the IDMP to ensure that policy, laws, regulations, standards and guidelines related to the private sector involvement. The investment in irrigation by the private sector will be guided by this programme.

GUIDELINE 2

IRRIGATION DEVELOPMENT PROCESS

GUIDELINE 2: IRRIGATION DEVELOPMENT PROCESS

1. PLANNING PROCESS

In general, irrigation projects are identified through 2 different ways; namely top-down approach and bottom-up approach. The former is undertaken by national or state governments, whereas the latter is conducted by community or local governments. Since comprehensive irrigation development has just started in the Republic of South Sudan, then majority of the people at grassroots level have no idea on irrigation schemes/farms development and management, the top-down approach is required at least at initial stages of the development.

1.1 Identification of Project through Top-down Approach

In the course of IDMP formulation, totally 48 potential areas for irrigation development were identified through intensive discussions and surveys among IDMP Task Team members. Procedure for the potential site identification which had been taken by the IDMP is shown in Annex 5 Guideline 3 Identification of Project Site.

A shortage of fundamental data for the irrigation development potential assessment is issues in the RSS due to the effect of the prolonged civil war. IDMP-TTs have, therefore, been conducting the assessment through the limited data of rainfall and river discharge, etc. with supplementing by remote sensing, GIS technology, etc.

The irrigation development potential assessment taken by the IDMP had 2 stages, including stage-1: rapid (low resolution) assessment at a nation-wide for the selection of high potential areas, and stage-2: detailed (high resolution) assessment at the selected high potential areas for the identifying priority and short-term project sites. A flow of relations between the Stage 1 and the Stage 2 for the irrigation development assessment is shown in the figure.

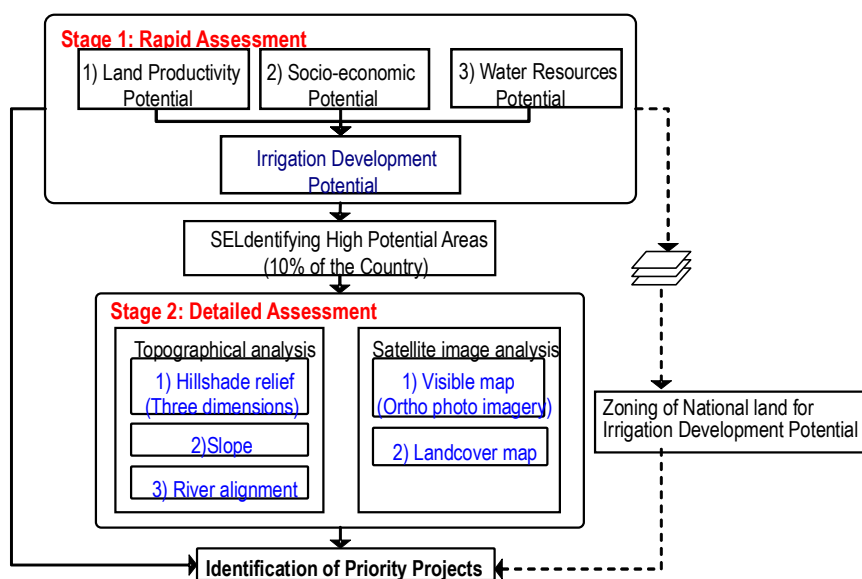


Figure 4.1. Flow of Irrigation Development Potential Assessment

1.2 Identification of Project through Bottom-up Approach

For County Irrigation Scheme Development Program (CISDP) and Community Irrigation Farms Development Program (CIFDP) in the IDMP, initial proponents of irrigation development project can be the local government and community. In this regard, the one who identify the irrigation sites will also be the local government and community. At present, however, the local government and community do not have enough skills and knowledge to identify potential irrigation sites. Therefore, it is necessary to obtain assistance from the national government, state governments, NGOs or DPs.

There are several guidelines for irrigation development through bottom-up approach, for example;

- The Comprehensive Guidelines for Irrigation Scheme Development under District Agricultural

Development Plan (Tanzania)ö, JICA, January 2010.

- öSocio-Economic and Gender Analysis (SEAGA) Sector Guidelineö, E. Jordans, FAO, 1998.

Following steps are typical procedure for, but are not limited to, formulating community-based irrigation scheme.

- a) Confirmation of irrigation development priority of the state government, the local government, and community.
- b) Quick site inspection of candidate irrigation schemes
 - Inform relevant persons of the state government, the local government (county) and community leaders for site inspection. The community leader includes Paramount Chief (County level), Head Chief (Payam level), Executive Chief (Boma level), Sub-chief (Community level)
 - Conduct interview survey to community stakeholders including community leaders and farmers (using interview sheet, collect information on community profile, farming situation, constraints and challenges, development needs, etc.)
 - Inspect the candidate irrigation areas (measure coordinate of the location by GPS, collect further data and to confirm result of interview survey)
 - Inspect water source of the schemes (measure water quality, flow of rainy season and dry season, situation during flood year and drought year)
 - Development of the quick site inspection reports
- c) Screening of the candidate irrigation schemes
 - Organizing screening meeting inviting relevant stakeholders
 - Setting selection criteria to identify priority project
- d) Assessment of the selected irrigation scheme
 - Collection of data and information regarding the irrigation scheme
 - Field survey for the selected irrigation scheme
 - Holding meeting with stakeholders
 - Interview survey to farmers (village resource map, etc)
 - Making agreement on the candidate irrigation scheme

In the case of Tanzania, community creates a need for irrigation development and submits to the district. The district engineer prepares the technical proposal and seeks for the fund from the local government authority (LGA). If the project cost is beyond the budget of the LGA, the community contributes and the district takes the request for irrigation development to the central government. Then the central Government mobilizes the fund for implementation and facilitates the process.

1.3 Feasibility Study

(1) Objective of Feasibility Study

Objective of feasibility study is to analyse viability of proposed projects before making decision to implement. In irrigation development, there must be several alternatives, in terms of project site, irrigation method, crop selection and etc., to meet development goal of the projects. Feasibility study helps decision makers to identify efficient and effective alternatives through intensive survey and analysis.

In the course of IDMP formulation, pre-feasibility study was conducted at three top priority areas for irrigation development. The pre-feasibility study is usually conducted to help sorting out relevant projects with relatively short period with minimum cost than the full-scale feasibility study. However, what we need to do in the feasibility study and pre-feasibility study is almost same. Differences between the feasibility analysis and the pre-feasibility analysis are just degree of accuracy. Therefore, in this section, procedure of full-scale feasibility study is discussed since this can be applied to the pre-feasibility analysis too.

(2) Responsible Organization of the Feasibility Study

Under the IDMP, five (5) kinds of irrigation schemes will be developed based on the types of ownership. Accordingly, primal organizations who take responsibility for conducting feasibility study are different. Following table shows responsible organization to undertake feasibility study on each irrigation scheme.

Table 4.1. Responsible Organization of the Feasibility Study

Irrigation Scheme	Responsible Organization of F/S
National Irrigation Scheme Development Programme (NISDP)	National Government (MEDIWR)
State Irrigation Scheme Development Programme (SISDP)	State Government (SDWS) with technical support from national government
County Irrigation Scheme Development Programme (CISDP)	Local Government (CDWS) with technical support from national and state government
Community Irrigation Farms Development Programme (CIFDP)	Community with technical support from national, state government
Private Sector Investment Promotion in Irrigation Development Programme (PSIPIDP)	Private Firms with technical support from national, state, local government

At present, however, state governments, local governments and communities do not have enough capacities, such as human and financial resources, to conduct feasibility study on their priority irrigation scheme. Therefore, at least initial stage of the irrigation development, it is recommended that the national government (MEDIWR) takes strong initiative to promote all types of irrigation programmes in addition to NISDP, with obtaining financial and technical assistance from NGOs and DPs.

(3) Outsourcing of the Study

Whole process or a part of process of the feasibility study can be outsourced to private engineering firms or consulting companies. For this purpose, MEDIWR or other responsible organizations need to find funding source for outsourcing feasibility study. MEDIWR or other responsible organizations also need to prepare a scope of works for the feasibility study on the priority irrigation schemes. Procurement process of private engineering firms or consulting companies may include preparation of tender documents, invitation to tendering, tender opening, evaluation of submitted proposals, negotiation with the bid winner, and entering into contract with the private firm.

After the contracting, main task of MEDIWR or other responsible organizations is supervision of the feasibility works, which includes monitoring of schedule management and quality management. Finally, MEDIWR or other responsible organizations should evaluate result of the feasibility study,

usually it is Final Report of the study, and issues approval if the result meets their requirement.

(4) Procedure of Feasibility Study

Following diagram shows typical procedures of feasibility study. The feasibility study starts from data collection related to natural, agricultural, social, economic, institutional, and environmental conditions. Field survey is also conducted to identify development needs of potential beneficiaries, and to obtain more realistic and practical information and data to use irrigation planning.

Under the IDMP formulation, a series of field recognisance survey was conducted to grasp more accurate field conditions, which in turn resulted in preparation of technical specifications for sub-contracting works including topographic survey and geological survey. Soil condition survey and socio-economic survey were directly conducted by the RSS-TT members during IDMP formulation. However, these surveys can also be done by sub-contracting works, depending on availability of financial and human resources. Following diagram shows typical procedure to the full-scale feasibility study.

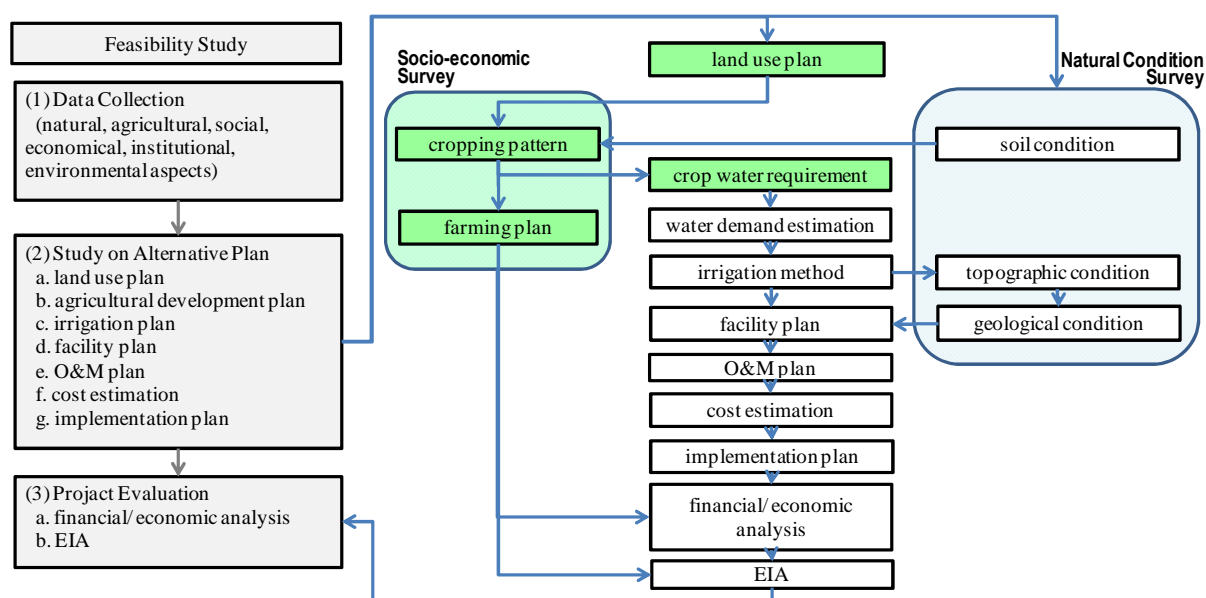


Figure 4.2. Procedure for Feasibility Study

(5) Data Collection

Necessary data for conducting feasibility study on irrigation development may include data and information on natural condition, agricultural condition, social and economic condition, institutional situation, and environmental condition.

Table 4.2 Recommended Data for Feasibility Study

Field	Data/ Information
Natural Condition	Meteorology and hydrology (precipitation, runoff discharge, recession curve, temperature, evapotranspiration etc.), Topography and geology (including GIS data at present)
Water Resources	Groundwater level, River maintenance flow and dam operation rule, profile of existing irrigation facilities, water right
Agricultural Condition	Soil condition, land use, land holding size, cultivable land area (planted and harvested), cropping pattern/calendar, crop yield, agricultural input (seed, fertilizers, pesticides, machinery, others), farm gate price
Social and Economic Condition	Population, household, family size, ethnicity, gender issue, profile of community, poverty indicators, average household income, structure of community, decision making, distance and scale of market, market price of agricultural products (wholesale and retail), labour cost,

Field	Data/ Information
	transportation means, post harvest facilities, land tyle
Institutional Condition	Institutional support, structure of local government, budget and staffing, extension and training institution, other government support, NGO and DPs activities
Environmental Condition	Game reserve, wetland, rare animal, wildlife, pastoralists migrating route, other socio-environmental issues to be considered

In addition, if pre-feasibility report is available, including outline or preliminary designs, preliminary cost estimates and/or basic cost estimating data for each project options, it should be collected and analyzed carefully. Aerial photo and topographic map, including Google earth software, is useful to grasp field image before field reconnaissance survey.

In the case of an existing project for rehabilitation and upgrading, copies of the original designs and layouts for the existing infrastructure would be required in addition to the above, together with details of construction history of the scheme, present O&M arrangements, existing land and water allocation, and organization and management structure of the scheme.

(6) Field Recognisance Survey

During the IDMP formulation, sub-contracting works including topographic survey, geological survey and soil mechanical investigation were conducted to obtain detail information and data to design irrigation faculties. Prior to the sub-contracting works, technical specifications have to be developed for smooth implementation of the works. The technical specifications shall be shown to tenderers as the technical guideline which describes objectives, scope of the works, criteria, tolerance and other technical requirements.

However, at the timing of the sub-contracting work, when we need to finalise technical specifications, some of the important items, including layout of irrigation facilities, alignment of irrigation canals, for example, could not finalized due to the lack of site information. Therefore, prior to finalizing technical specifications, field reconnaissance survey was necessarily conducted by IDMP-TT in order to obtain missing first-hand information of physical features, problems and issues as perceived by farmers.

Followings were the item to be identified though the field recognisance surveys.

a) General

- Location of project area (Name of village, boma, payam, county and state)
- River discharge station located adjacent to project area (Coordinates and elevation, Date of establishment and Period of measurement)
- Location of project area (Coordinates and elevation, Date of establishment and, Period of measurement)
- Benchmark located adjacent to project area (Coordinates and elevation, and Date of installation)
- Dangers of landmines, cluster monition and other explosives

b) Farm Field

- Boundary of field (Coordinates and elevation at vertexes of polygon, and Dimensions (length, width and area))
- Land covers (Irrigated crop land, rainfed crop land, forest (closed canopy), forest (open canopy), woodland (savanna), grass land (pastoral land), settlement, open water body)

- Cultivated crops and cropping pattern
 - Status of irrigation water utilization
 - Intention of farmers for irrigation development
 - Land ownership (public land & private land with owners' name and address)
 - General features of covering soil
- c) Canal
- Coordinates and elevation at following points should be surveyed: Beginning point of canal (B.P.), End point of canal (E.P.), Beginning of curve (B.C.), End of curve (E.C.), Intersection point with creek, road, etc. (I.P.), and Folding point of canal (F.P.)
 - Existing facilities on canal alignment: Coordinates and elevation, Type of facilities, Owner and contact address, and Solution / Countermeasures
 - General geological features: öRockyö or öSandyö or öSiltyö or etc.
- d) River
- Name of river
 - Survey area: Coordinates and elevation at vertexes of polygon, and Dimensions (length, width and area)
 - Location of headworks / barrage: Coordinates and elevation at both ends of facility
 - Location of intake: Coordinates and elevation at intake point
 - General geological features

(7) Natural Condition and Agricultural/Socio-economic Surveys

After the field recognisance survey, the IDMP-TT developed technical specification for tendering, and employed private firms to conduct following surveys. Objectives and scope of works are summarized below. Details of procurement for the surveys are shown in Guideline 4. Procurement for Survey.

- a) Topographic Survey
- The objective of the topographic survey is to identify the topographical conditions at the planned construction site of irrigation facilities and its adjoining area.
 - The scope of works covered by tendering document consists of the following components; (1) dam site survey, (2) canal route survey, (3) command area survey and (4) pump station survey.
 - Detail activities at site includes (1) Establishment of temporary benchmarks (TBM), (2) Longitudinal profile survey, (3) Cross-sectional survey, (4) Plane survey, and (5) Producing longitudinal profile, cross-section and contour map.
- b) Geological Survey
- The object of geological survey is to identify the geological feature and soil mechanical characteristics at the planned construction site of irrigation facilities and its adjoining area.

- The scope of the Works covered by tendering document consists of the following components; (1) geological survey and (2) soil mechanical investigation.
- Detail activities at site includes; (1) Drilling of boreholes, (2) Permeability test in boreholes, (3) Standard Penetration Test (SPT) in boreholes, and (4) A series of physical soil test, such as grain size analysis, specific gravity test and at terberg limits (liquid and plastic limits).

c) Soil Survey

- The object of soil survey is to grasp soil condition in irrigable area to select proper crop for future irrigation scheme in priority project areas. Considering natural condition (e.g. soil condition, temperature fluctuation, and precipitation), current farmers' capacity for farming and farmers' intention for future, crop selection and farming plan for priority project areas were finalized.
- Chemical analysis of soil samples taken at every surveyed point was conducted. Measured and estimated items are shown in table below.

Table 4.3 Measured and Estimated Items in Chemical Analysis

No.	Measured items	No.	Estimated items
1	Nitrite nitrogen (NO ₃ -N)	1	CEC (Cation exchange capacity)
2	Available phosphate (P ₂ O ₅)	2	Total Nitrogen
3	Exchangeable Potassium (K ₂ O)	3	Total Nitrogen amount per 10a
4	Exchangeable Calcium (CaO)	4	Carbon ratio
5	Exchangeable Magnesium (MgO)	5	C/N ratio
6	Exchangeable Manganese (Mn)	6	Base saturation ratio
7	Available Iron (Fe ₂ O ₃)	7	Base balance (Ca)
8	Humus soil rate	8	Base balance (Mg)
9	pH	9	Base balance (K)
10	EC (Electricity conductivity)	10	Base ratio(Ca/Mg)
		11	Base ratio (Mg/K)
		12	Base ratio (Ca/K)

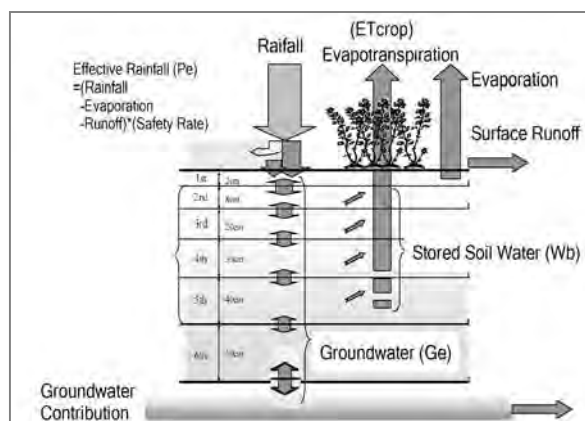
d) Agriculture and socio-economic survey

- Agriculture and Socio-Economic Survey aims to take necessary data for making the farming plan and evaluating the priority projects from the view points of socio-economic and marketing. Under the IDMP formulation, enumerators in pairs are going to hold two interviews a day, whose target will be 30 households in each priority project area.
- It is necessary for enough explanation to the interviewees before the Survey about the project planning in this time since the questions include private points, such as household income, expenditure, etc. Also, grasping the current situation of the target communities is indispensable for the planning of the priority projects. Hence, it is recommended that a preliminary workshop would be held in each site of the priority projects before commencement of the Agriculture and Socio-Economic Survey.
- The contents of the questionnaire are divided into the 14 items; 1) Background of household, 2) Land holding and land tenure, 3) Inventory of farm machinery and hiring cost of farming power, 4) Crop production and farming practices, 5) Income from other crops in home garden, livestock and other products, 6) Wages/ salary, leasing, business and other income, 7) Living expenses, 8) Present farming situation, 9) Selling of agriculture products, 10) Existing farmers' group and farmers' organization, 11) Irrigation service charge / activity of WUA or WG, 12) Loan, 13)

Agricultural services / agricultural activities, and 14) Gender/ roles and responsibilities.

(8) Estimation of Irrigation Water Requirement

Result of the soil survey is utilized in farming plan which includes selected crops under the ÷with project case÷, farm inputs such as seed, fertilizers, pesticides and farming tools and machineries. The farming plan also indicates cropping pattern in the command area, which includes range of possible crops and their planting dates. Then, the cropping pattern under the ÷with project case÷ will be utilized in estimation of crop water requirement in the command area.



The crop water requirement can be estimated by using following formula and relation of each element is shown in the figure.

$$WR = (ET_{Crop} - (P_e + G_e + W_b)) / E_p$$

Where; ET_{Crop} : Crop Water Requirement (mm/day),

E_p : Overall Irrigation Efficiency (losses),

P_e : Effective Rainfall (mm/day),

G_e : Groundwater Contribution (mm/month),

W_b : Stored Soil Water (mm/month)

To estimate the crop water requirement, FAO's computer programme CROPWAT in conjunction with the climate database CLIMWAT is available. According to FAO's guideline for irrigation planning¹, however, although CROPWAT is quick and easy way to use (since provided data are readily available or assumptions can be made on local planting and harvesting dates), decision making should be exercised to avoid duplication of effort, if local estimates is available, we should paid serious attention when these data are enough reliable.

The FAO guideline also recommended that, conversion from net water requirements to gross should be on the basis of empirical local data for efficiency of the types of irrigation systems under consideration, or from ÷FAO Irrigation and Drainage Paper 24²÷. Data needs for future refinement of the estimates should be identified, and will depend on the anticipated method of estimation envisaged.

(9) Formulation of Irrigation Development Plan

Based on the crop water requirement, the volume of water supply on an annual or seasonal basis can be determined. At this stage, various types of technical options, including water supply facilities and distribution networks, will be identified and compared. For example, diameter of irrigation pump is determined based on a peak of crop water requirement (m^3/sec), whereas total storage capacity of irrigation dam is determined based on annual total crop water requirement ($m^3/year$).

Regarding accuracy of facility design, as FAO's guideline mentioned, planning period of larger projects tend to longer so that the required degree of accuracy of the hydrometeorological and hydrogeological network is usually higher than for smaller projects. The required depth of analysis of

¹ ÷Guidelines for Planning Irrigation and Drainage Investment Project÷, International Commission on Irrigation and Drainage, W.P. Field - F.W. Collier, H.R. Wallington Ltd. - Institute of Hydrology, FAO/DFID/ICID-CIID.

² ÷FAO Irrigation and Drainage Paper No.24, crop water requirements÷

time-series data will also vary according to the scale of the project, and the existence of other irrigation or competing interests within the basin, within or across international borders.

In general, an irrigation development plan includes following individual plans.

- a) Institutional Set-up of the Irrigation Scheme Development (national scheme, role of stakeholders)
- b) Agricultural Plan (land use, cropping pattern with project)
- c) Irrigation and Drainage Plan (irrigation efficiency, water requirement)
- d) Facility Plan
- e) O&M Plan
- f) Cost Estimate
- g) Implementation Plan
- h) Environmental and Social Consideration
- i) Project Evaluation (Financial and Economic analysis)
- j) Conclusion and Recommendations

(10) Financial and Economic Analysis

- a) Basic policy of the analysis

The economical and financial feasibility of the project will be discussed by comparing incremental project benefits and project costs. The project benefits is estimated by comparing the δ with project case δ and the δ without project case δ . The irrigation project creates various sorts of impacts, including increase in production volume of agricultural products, creation of working opportunities for farm labors, stabilization of people's life in the dry area, and putting a brake on domestic displacement due to water shortage.

By implementing the Irrigation Project, stable supply of irrigation water, even in the dry season, will be materialized, which in turn results in increase in crop intensity and yield of production. As a result, volume of agricultural production in the project area will increase and farm income for individual household will also increase. Project evaluation in the feasibility study on the irrigation development mainly focuses on incremental agricultural benefit which can be expressed in monetary terms. Details of the economic and financial analysis are shown in the Guideline 6: Economic and Financial Analysis.

- b) Economic analysis applying EIRR

The purpose of feasibility study is to propose viable irrigation project, which is technically and economically feasible, by considering available water resources and current farming conditions in the project area. In general, the economic evaluation will be carried out by estimating economic internal rate of return (EIRR), net present value (NPV) and cost-benefit analysis (B/C).

The main economic benefit will be generated from increase in crop production. The production increase is materialized through increase in crop yield and expansion of planted area. On one hand, the former will be achieved through construction of irrigation facilities, appropriate water management plan by enhancing operation and management ability of the facilities, and preventing damages caused by water shortages. On the other hand, the latter includes expansion of planting area by applying additional irrigation water. Applicable benefits of the project are listed in table below.

Table 4,4 Applicable benefit of the project

Benefit	Indicators
Increase in Crop Production	Increase in crop yield by stabilization of irrigation supply
	Increase in crop intensity by improvement of irrigation efficiency
	Increase in planting area by improvement of irrigation efficiency
	Increase in farmers' income by crop diversification (introduction of cotton, tomato, maize and potatoes)

The benefits indicators in the above table could be obtained by analyzing planted area, production volume, production yield, and variety of crops. However, it is important to grasp current condition in the study area through review of past studies and reports developed by research institutes and other project donors, and field survey through subcontracting work, to evaluate viable impact on the study area. In addition, sensibility analysis will be conducted to assure the project feasibility under the different conditions.

c) Financial analysis applying FIRR

Financial analysis aims at evaluating financial viability of economic entities including farm household, agricultural cooperatives or irrigation scheme offices. To evaluate financial viability, several financial indicators including financial internal rate of return (FIRR), return on investment (ROI), and break-even point, are applied.

d) Analysis of quantitative impacts

The project benefits includes not only those economic impacts which can be express in monetary terms, but also those social impacts including activation of labor market, stabilization of agricultural production, improvement of living standards, mitigation of rural poverty, and social stabilization. The project will also be evaluated in consideration of those social impacts.

(11) Judgement of the Feasibility Study

As a conclusion of the feasibility study, the proposed project is justified in view of technical feasibility, financial feasibility and economical feasibility, in addition to social and environmental assessment. In case of financial evaluation, it can be said that the proposed project is financially feasible when FIRR is more than the interest rate of long term loan scheme which the enterprise is able to borrow money for capital investment.

Whereas for economic analysis, it can be said that the proposed project is economically feasible when EIRR is more than the opportunity cost of capital, or NPV is positive, or B/C is more than 1. The opportunity cost of capital is a technical term of economic analysis in the context of national economy, and is defined as the marginal profitability of capital in allocating a limited resource of a country. Calculating the opportunity cost of capital is actually very difficult, since all the possible projects have to be picked up with their IRR in the country. Also the opportunity cost of capital will be considered by sector as well. As a reference, it is said that the opportunity cost of capital of irrigation development project ranges between 10% and 12% in the world.

Financial and economic analysis is good at evaluating those projects, which generate tangible benefit. But there are so many intangible benefit/ impacts generated by watershed management project. For example, security of life and peace of people's mind, generated by implementation of disaster mitigation project, is difficult to assess in economic analysis. Therefore, even if the result of economic analysis is not feasible, there are such cases that the project is selected from view of Basic Human Needs (BHN), poverty reduction, peace building or reconstruction assistance.

1.4 Design Works

1.4.1 Engineering Manuals

Japanese Institute of Irrigation and Drainage (JIID) develops several engineering design manuals, aiming at disseminating those developing countries which want to establish technical standard or improve their design works. During IDMP formulation, JICA Study Team provided JIID's engineering manuals to RSS-TT, after obtaining permission for dissemination from JIID. Followings are the list of available engineering manuals for irrigation and drainage developed by JIID.

- a) Canal Works
- b) Land Consolidation
- c) Small-scale Hydro-Power Generation
- d) Basics of Construction Management
- e) Fill Dam
- f) Headworks
- g) Upland Irrigation
- h) Drip Irrigation Planning Guide
- i) Pump Facilities
- j) Farm Land Conservation
- k) Drainage
- l) Grand Water
- m) Water Management (Case Study Edition)
- n) Water Management (Monitoring and Control System)

It should be noted, however, the engineering design manual was developed based on the natural and socio-economic conditions of Japan, and RSS-TT members have to use it with careful consideration on South Sudan's own natural and socio-economic conditions. Outlines of selected design works are shown in the Guideline 8: Design & Construction.

1.4.2 Responsible Organization for Design Works

Primal organizations who take responsibility to conduct design work are different based on the ownership of the irrigation scheme. Following table shows main responsible organization to undertake design work on each irrigation scheme.

Table 4.5 Main Responsible Organization of the Design Works

Irrigation Scheme	Responsible Organization of Design Work
National Irrigation Scheme Development Programme (NISDP)	National Government (MEDIWR)
State Irrigation Scheme Development Programme (SISDP)	State Government (SDWS) with technical support from national government
County Irrigation Scheme Development Programme (CISDP)	Local Government (CDWS) with technical support from national and state government
Community Irrigation Farms Development Programme (CIFDP)	Community with technical support from national, state government
Private Sector Investment Promotion in Irrigation Development Programme (PSIPIDP)	Private Firms with technical support from national, state, local government

At present, however, state governments, local governments and communities do not have enough capacities, such as human and financial resources, to conduct design works on their priority irrigation scheme. Therefore, at least initial stage of the irrigation development, it is recommended that the national government (MEDIWR) takes strong initiative to promote all types of irrigation programmes in addition to NISDP, with obtaining financial and technical assistance from NGOs and DPs.

1.4.3 Outsourcing of Design Works

Whole process or a part of process of the design works can be outsourced to private engineering firms or consulting companies. For this purpose, MEDIWR need to find funding source for outsourcing design works. MEDIWR also need to prepare a scope of works for the design works of the irrigation scheme. Procurement process of private engineering firms may include preparation of tender documents, invitation to tendering, tender opening and evaluation, negotiation with the bid winner, and entering into contract with the private engineering firm.

After the contracting, main task of MEDIWR is supervision of the design works, which includes monitoring of schedule management and quality management. Finally, MEDIWR should evaluate result of the design works, and issues approval to the engineering firm if their result reaches MEDIWR's requirement level.

1.4.4 Participatory Approach in Design Works

For design works in each irrigation scheme, several technical issues, including plot size, infrastructure lay-out and facilities for other uses, need to be decided. The FAO's irrigation development guideline³ recommended that the technical issues should be solved through participatory manners. Therefore, once the draft designs are prepared, it is necessary to be presented and discussed with the stakeholders at various stages, in order to arrive at a design that is acceptable for users. According to the FAO's guideline, followings are issues to be discussed.

1) Size of Plots

Size of plot should be decided based on available family labour and potential income from the land. The FAO's irrigation development guideline recommended that, on one hand, calculation of an optimal plot size needs to take into consideration of actual division of labour, access to the income as well as competing demands for labour for other farm and household enterprises. Women and men farmers need to be consulted on their opinion on the optimal plot size.

On the other hand, at NIB (National Irrigation Board) schemes in Kenya, tenants were allocated 1.6 ha of land in 4 plots, which was decided based on the potential income from the land. Both approaches are reasonable way to decide size of farm-plot. It is important that individual farm-plots should be designed to increase flexibility of the system, including provision of different sizes to farmers, or possibilities for subdivision.

2) Infrastructure Layout

Canal lay-out, drains and feeder roads should be decided based on consultations with all stakeholders. All stakeholders including landowners as well as land users have to attend in stakeholder meetings on infrastructure lay-out, since some lands may need to be acquired for infrastructure development. All stakeholders should be informed of, and benefit from, the compensation mechanisms if their land or homesteads are grabbed due to acquisition by owner of the irrigation scheme.

1.5 Environmental and Social Considerations

To conduct environmental and social considerations for irrigation development (ESCID), a guideline was developed under the IDMP, and is set out in the Guideline 5. Followings are purpose of the

³ Guidelines for Planning Irrigation and Drainage Investment Project, International Commission on Irrigation and Drainage, W.P. Field - F.W. Collier, H.R. Wallington Ltd. - Institute of Hydrology, FAO/DFID/ICID-CIID.

guideline and a summary of procedures for ESCID. Detail procedures for environmental and social considerations are shown in the Guideline 5: Environmental and Social Consideration.

1) Purposes of the Guideline for ESCID

Environmental and Social Considerations is defined as "considering environmental impacts including air, water, soil, ecosystem, flora, and fauna, as well as social impacts including involuntary resettlement, respect for the human rights of indigenous people, and so on"⁴. Therefore Environmental and Social Considerations for Irrigation Development (ESCID) addresses specialized considerations in the field of irrigation development. The principle purpose of the guideline is to encourage project proponents (mainly MEDIWR, state governments, private entities, etc.) to appropriately consider environmental and social issues likely caused by their project. And then finally it is focused on the project to be approved under the RSS EIA system. In addition to approval under the RSS, it is also focused to meet international requirements for environmental and social considerations if the project is implemented under international donor's assistance.

The guideline aims;

- a) To guide how to preliminarily investigate irrigation projects from environmental viewpoints during the project planning and designing stages,
- b) To guide the methods for environmental considerations in order to preliminarily identify environmental and social impacts likely to be produced by the irrigation projects, and
- c) To address key environmental issues to be studied in an EIA study

2) Procedure of the Environmental and Social Considerations

Basic procedure of the ESCID can be divided into the five steps.

Step 1: Screening

The screening process aims to briefly determine the environmental condition and possible impacts likely caused by a proposed project in order to decide whether or not further environmental and social considerations are necessary. A screening check sheet is provided in order to easily screen a project from the environmental viewpoints.

STEP 2: Preliminary survey

The preliminary survey focuses on speeding up data collection. Concepts of the preliminary survey are;

- ✓ The major purpose is to find key environmental aspects which have not been clarified in the screening process.
- ✓ Key environmental aspects are used for identifying impacts, but details will be identified in the EIA study.
- ✓ Therefore survey methods shall be simple, quickly implemented and low-cost high-effective.
- ✓ Output of the survey will be referred to in the scoping process.

STEP 3: Scoping

⁴ Guidelines for Environmental and Social Considerations, JICA, 2010

Scoping is one of the major outputs from the ESCID. It indicates highlighted impacts and the impact levels, and also addresses the study method for a further EIA study and points out mitigation measures. For easy and quick assessment a simple evaluation criteria and matrix and check sheet are provided.

STEP 4: Public consultation

The ESCID encourages project proponents to conduct public consultation in order to obtain consensus among the stakeholder, to collect useful opinions, suggestions, etc. from stakeholders including academics, NGOs, etc., and to avoid any further conflicts, disputes or complaints.

STEP 5: Reporting

Finally the outputs from the above steps are compiled in an ESCID report, which addresses preparing terms of reference for further EIA study. Draft environmental regulation 2012 indicates in Section 6-(2) that an environmental impact assessment shall be conducted in accordance with the scoping and the terms of reference developed during the scoping exercise by the developer or proponent. Therefore, output from the ESCID functions as the scoping exercise. The contents of the report hence cover the requirements in the scoping process. The ESCID suggests the following contents of an ECID report.

- i) Executive summary;
- ii) Introduction;
- iii) Project background and description;
- iv) Policy, administrative and legal frameworks;
- v) Baseline or existing conditions based on existing data and preliminary survey;
- vi) Result of Evaluation of Alternatives;
- vii) Impact assessment
- viii) Environmental and social management and/or mitigation plans;
- ix) Environmental and social monitoring plans;
- x) Result of Public Consultation
- xi) Conclusions
- xii) Recommendations on terms of reference for an EIA study if necessary

2. IMPLEMENTATION PROCESS

2.1 Responsible Organization for Project Implementation

Primal organizations who take responsibility to conduct design work are different based on the ownership of the irrigation scheme. Following table shows main responsible organization to undertake project implementation on each irrigation scheme.

Table 4.6 Main Responsible Organization of the Project Implementation

Irrigation Scheme	Responsible Organization of Project Implementation
National Irrigation Scheme Development Programme (NISDP)	National Government (MEDIWR)
State Irrigation Scheme Development Programme (SISDP)	State Government (SDWS) with technical support from national government
County Irrigation Scheme Development Programme (CISDP)	Local Government (CDWS) with technical support from national and state government
Community Irrigation Farms Development Programme (CIFDP)	Community with technical support from national, state government
Private Sector Investment Promotion in Irrigation Development Programme (PSIPIDP)	Private Firms with technical support from national, state, local government

At present, however, state governments, local governments and communities do not have enough

capacities, such as human and financial resources, to conduct project implementation of their priority irrigation scheme. Therefore, at least initial stage of the irrigation development, it is recommended that the national government (MEDIWR) takes strong initiative to promote all types of irrigation programmes in addition to NISDP, with obtaining financial and technical assistance from NGOs and DPs.

2.2 Implementation Arrangement

(1) Establishment of Implementation Organization

According to the Draft Water Bill of the Republic of South Sudan dated on August 2014, water resource is managed by Water Resources Management Authority (WRMA) at national level, Basin Water Boards (BWB) at water basin level, Catchment or Sub-catchment Committee at catchment area level, and Water Users Association (WUA) at user or community level. However, these organizations are not yet established since the Draft Water Bill is not approved yet. It is recommended to establish these organizations, or at least involve each stakeholder at national level, basin level, catchment area level and community level, when irrigation scheme is developed.

To manage the irrigation scheme, it is recommended to establish Irrigation Scheme Management Office at each irrigation site. For example, Aweil Irrigation Rice Scheme (AIRS) is managed by the Scheme Management Office since 2012, and officials for operation and maintenance of the scheme are working together in the Office. The Scheme Management Office has 7 departments under the Management, including Administration Department, Irrigation Department, Agronomy Department, Farm Operation Department, Extension Department, Workshop Department and Rice Mill Department. The Scheme Management office also has rice milling facility and heavy equipment including backhoes, bulldozers and tractors, for operation and maintenance purpose. This system is quite effective since all resources relating to O&M of the scheme are concentrated in the same place. Ideal organizational structure is as follows. However, relevant engineer and its number should be determined based on irrigation method and scale of the irrigation scheme. Detail activities of the Scheme Management office are shown in the Guideline 9: Irrigation Scheme Management Establishment.

Table 4.7 Required Function and Staff of Scheme Management Office (SMO)

Function	Required Staff
1. General Management	Manager for overall management
2. Administration	Accountant, tariff estimation and collection
3. Irrigation Engineering	Irrigation Engineer (dam, pump, canal) Irrigation Planning specialist Operator (dam, pump, water distribution, gate keeper)
4. Agronomy	Agronomist (cropping plan, water requirement estimation) Extension Worker
5. Farm Operation	Tractor Operator
6. Workshop	Mechanical Engineer, Electric Engineer

MEDIWR takes an initiative to organize the Irrigation Scheme Management Office. However, the Scheme Management Office cannot be managed by officials from MEDIWR alone, and collaboration with relevant stakeholders especially MAFCRD and state governments are inevitable. At the time of design work (detail design stage of the irrigation development planning), it is recommended to establish the management office through intensive discussion on function of the management office, demarcation of responsibility, staff allocation, and budget allocation.

Also, it is important to discuss demarcation with WUA. Ideal demarcation among stakeholders is as follows;

Table 4.8 Ideal Demarcation among Stakeholders

Stakeholders	Demarcation
1. National Government	<ul style="list-style-type: none"> • Taking initiative to establish SMO (MEDIWR) • Based on the report from SMO, taking necessary measure to repair or rehabilitate the irrigation system (MEDIWR) • Assign relevant officials to SMO (MEDIWR, MAFCRD)
2. State Government	<ul style="list-style-type: none"> • Assign relevant officials to SMO • Supervising SMO's activities
3. Scheme Management Office (SMO)	<ul style="list-style-type: none"> • Coordinate and facilitate the formation and activities of WUA • Operation and maintenance of main irrigation facilities (dam, pump station, main and secondary canal, intake gate until on-farm) • Collection of irrigation service fee
4. WUA	<ul style="list-style-type: none"> • On-farm level operation and maintenance • Payment of irrigation service fee

(2) Resource Mobilization

Development of IDMP is a part of the Ministry's Strategic Plan 2012-2017, and implementation arrangement should be corresponding to the institutional framework of the Plan. Financial arrangement for implementing irrigation master plan will be through the exchequer based on budgetary provisions. However, this will be inadequate given the unfavourable conditions both at the national and global levels. Consequently, the Ministry will consider alternative strategies for resources mobilization which will include but not limited to:

- Proposals to current and potential development partners such as GIZ, UNICEF, USAID, Donor Trust Fund (MDTF) etc.
- Engaging the private sector organization through Public ó Private Partnerships (PPPs) strategies and mechanisms
- Enhanced networking and collaboration with non-state civil society organizations and communities
- Bilateral collaboration with countries in the region as well as internationally such as the UK, Japan, USG, etc.
- Establishment of community óbased water supply and sanitation systems in collaboration with the State governments, counties and local authorities

(3) Acquisition of Water Use Permission

According to Draft Water Bill, water users have to obtain water use permission. Basins Water Board has the responsibility to determine and issue water permits, based on WRMA's regulations on water resource allocation and the issuance of water use permission. In case of National Irrigation Scheme, the national government may submit the application for water use permission, instead of water users' associations or farmers groups, since the national government is the owner of irrigation scheme. The state government and the local government alike to submit application for water use permission in case of the State Irrigation Scheme and the County Irrigation Scheme.

(4) Acquisition of Construction Permission

According to Draft Water Bill, Basins Water Board has the responsibility to determine and issue construction permits, based on the WRMA's regulations on water resource allocation and the issuance of water use permission. Prior to construction of any works related to the irrigation scheme development, water users have to obtain the construction permission from BWB. In case of National

Irrigation Scheme, the national government may submit the application for construction permission, instead of water users associations or farmers groups, since the national government is the owner of irrigation scheme. Likewise, the state and local governments may submit application for construction permission in case of the State Irrigation Scheme and the County Irrigation Scheme, instead of water users associations or farmers groups.

(5) Acquisition of Land

According to the land Commission of the Republic of South Sudan, process of land acquisition for private sector is as follows;⁵

- ✓ By applying to the state Ministry of Infrastructure.
- ✓ Filling a land acquisition form either for residential or Business
- ✓ Government may negotiate land from a community to gazette for allotment
- ✓ Government may zone an area for investment or residential.

Where and how to get land title deeds

- ✓ Through the department of lands, state Ministry of Infrastructure.
- ✓ Title deeds are issued by persons who have been allotted plots by the land department, issued by land registry and approved by survey department in the state.

2.3 Formulation of Water Users Association

(1) Responsible Organization to establish WUA

According to the Draft Water Bill (August 2014), Basin Water Board has a responsibility to coordinate and facilitate the formation and activities of Water Users Association (WUA). However, the Basin Water Board has not yet been established since the law is still under discussions. Therefore, from practical reason, it is recommended that the irrigation scheme management office, which will be established at each irrigation scheme, takes primal responsibility to form WUA, in collaboration with the state government, the local government and the communities concerned. Particularly, role of State Directorate of Cooperatives, Rural/Community Development is important to support organizing the WUA, since it has experiences to establish community-based organizations including cooperatives.

At the time of establishing WUA, it is recommended to involve graduates of Irrigation Technology Centre (ITC), which is suggested to establish under the Human Resource and institutional Development for Irrigated Agriculture Programme (HRIDIAP) in the IDMP, aiming at providing technical trainings on irrigation development to the national and the state level officials.

Also, Amadi RDI is one of training institute to train grassroots level community organizers, and its graduates can be a helpful partner for establishing and enhancing farmers organizations. Amadi RDI is a national training institution to provide training courses on rural development and cooperative development, and around 30 community development officers and 30 cooperative officers are trained in annum. Recently, the institute receives a support from the Dutch government and start preparing one-year training course for the WASH sector, targeting on (1) water technicians, (2) irrigation technicians, (3) sanitation technicians, (4) community mobilizers, and (5) water analyst.

⁵ <http://www.goss.org/index.php/commissions/land-commission>

(2) Establishment of Water Users Association (WUA)

In relation to formulation of WUA, the Draft Water Bill stipulates basic procedures, including 1) objectives of WUA, 2) constitution and management, 3) approval and registration, and 4) powers of the Basin Water Board in relation to WUA. For objective to establish WUA, the Draft Water Bill indicated as follows.

A Water Users Association may be formed by the agreement of the majority of a group of permitted water users for one or a combination of the following purposes to-

- a) Manage, distribute and conserve water from a source/facility used jointly by the members of the water users association;
- b) Resolve conflicts between members of the association related to the joint use and management of a water resource;
- c) Collect water user fees on behalf of the Basin Water Board;
- d) Represent the special interests and values arising from water used for both public and private purposes, such as in an environmental or conservation area or irrigation purposes.

The Water Users Associations for the purpose of above shall comprise of any users of water from a common watercourse/source/catchment irrespective of the purpose of that use.

(3) Process to Formulate WUA⁶

In the course of IDMP formulation, RSS-TT members visited Tanzania and Ethiopia to learn good irrigation management practices of neighbour countries. Tanzania has a similar structure to manage water resources and has a lot of experiences to formulate WUA to promote farmers' participation in irrigation management. Followings are key notes to form WUA obtained through the study tour to Tanzania.

- ✓ The formation process and their functioning need to be as democratic as possible
- ✓ Stakeholders can only be involved fully and willingly if they understand the context, appreciate they are an essential part of the process, and are provided information on their anticipated roles and responsibilities as members.
- ✓ Integrated river basin management is a multidisciplinary process and therefore formation of WUA has to be promoted as a collaborative framework among all relevant stakeholders
- ✓ Representation is the main source of legitimacy in public participation and participation in management processes is the goal of IWRM

Also, formation process of WUA, which are obtained though the study tour to Tanzania, is as follows.

- a) Identification of water users
- b) Baseline data collection: Identification and analysis of stakeholders Participatory assessments for water resources and adoption of plans (collect spatial and time related data, collect data on institutions and structures), problem analysis and action planning.

⁶ Water Users Associations and Institutional arrangement in WRM, BODI YA MAJI YA BONDE LA PANGANI BASIN WATER BOARD, Abraham S. Yesaya, CDO-PBWO

- c) Mobilization: Awareness creation and mobilization
- d) Conduct social assessment workshop and initiate action plan for implementation
- e) Conducting training workshop about Policy issues, Water Bill, challenges facing IWRM
- f) Preparation of constitution by the Interim committee ready for being distributed for collection of comments
- g) Capacity building: Institutional and human capacity building through training and other interventions. Train to prepare WUA for its essential tasks as an independent self managing autonomous organization

(4) Constitution and Management

The Draft Water Bill mentioned constitution and management of WUA as follows;

- ✓ Users of irrigation water who are going to organise an association need to prepare a constitution or statute in the form set out in Attachment 1 in its mandate as approved by the Minister in consultation with WRMA. Such Constitution will be submitted to the Basin Water Board or Catchment/Sub-catchment Committee or Management of a scheme with an abstraction right for such purposes as in above sub-section (1), d)) for approval in accordance with the procedure as WRMA in consultation with the Minister may prescribe in regulations made under the Act.
- ✓ Upon request of a group of water users intending to establish a Water Users Association, the Basin Water Board shall provide assistance in formulating the Constitution.
- ✓ Members of the Water Users Association shall elect a Management Committee for each association which shall be the executive organ of the Association and shall be elected and have the powers as set out in the Constitution.

(5) Approval and Registration

According to the Draft Water Bill, the Basin Water Board or the Irrigation Scheme Management will approve the constitution or statute of the WUA. The the WUA will be registered in òWater Resisterö maintained in the Basin Water Board. Other descriptions related to the WUA registration are as follows;

- ✓ With effect from the date of registration in the Water Register, all water users within the area of an association as defined in the Constitution shall be required to become members of the association and shall be bound by the Constitution.
- ✓ The Basin Water Board shall cause membership of an association to be recorded on the water use permit of each member issued in accordance with Chapter 6 of the Water Bill and in the Water Register maintained by the Basin Water Board.
- ✓ The WUA shall have a provision/procedure to allow external (non-eligible members) users to the source of water (water facility).

For the time being, before establishing the Basin Water Board, the State government can be an entity for official registration of farmersøorganization. For instance, Aweil Rice FarmersøCooperative was registered under the Cooperative Act, 2011, by the Department of Cooperative Development, Northern Bahr El Ghazal State at Aweil City (certificate no. 6, March 2013).

(6) Powers of the Basin Water Board in Relation to WUA

The Draft Water Bill also stipulates about powers of the Basin Water Board in relation to WUA as follows;

- ✓ In any case where the Basin Water Board is satisfied that the Association does not perform its functions satisfactorily, it may give directions to the Association relating to the performance of its functions. The directions may relate to;
 - a) The division of roles/responsibilities and distribution of water amongst the members of an association;
 - b) The management, use and protection of any water source;
 - c) The drainage of the land where water is used;
 - d) Any other matter which the Basin Water Board considers necessary or desirable.

2.4 Irrigation Facility Construction

Construction works of the irrigation scheme can be outsourced to private construction companies and equipment suppliers. MEDIWR need to find funding source for outsourcing construction works. MEDIWR also need to prepare a scope of works for the construction works, but the preparation can be included in the subcontract of the design works. Facilitation of the procurement of construction companies and equipment suppliers is usually included in the design works. The procurement process may include preparation of tender documents, invitation to tendering, tender opening and evaluation, negotiation with the bid winner, and entering into contract with the construction companies and equipment suppliers.

After the contracting, main task of MEDIWR is supervision of the construction works, which includes monitoring of schedule management and quality management. Finally, MEDIWR should evaluate result of the construction works, and issues approval to the construction companies and equipment suppliers if their result reaches required level of MEDIWR.

3. OPERATION AND MAINTENANCE PROCESS

3.1 Operation Activities

Operation plan includes basic operation plan at feasibility planning stage, and annual irrigation plan after implementation of the project. Objective of the basic operation plan is to establish basic method of operation, such as selection of water distribution method and order of the water distribution among upstream/downstream or large-/small-scale farmers. Responsible organizations at this stage are the scheme management officials from MEDIWR and MAFCRD, and collaboration between both organizations and communities is necessary.

The annual operation plan includes preparation of cropping calendar, estimation of expected water demand and supply, and irrigation facility operation planning. After irrigation system being constructed, MAFCRD takes responsibility on developing annual cropping calendar, which in turn utilized in estimation of crop water requirement or water demand. Then, water distribution plan (including dam operation plan) is developed by MEDIWR, based on water distribution method, irrigation water availability, and management capacity of gate operator.

Following table shows typical operation activities and responsible organizations. Detail activities of

irrigation scheme operation are shown in the Guideline 9: Irrigation Scheme Management Establishment.

Table 4.9 Typical Operation Activities and Responsible Organization

Planning	Activity	Details	Timing	Responsible Organization
Basic Operation Planning (before construction)	Establishment of basic method of operation	Whether to adopt Flow Sharing (proportional delivery) Method or Time Sharing (rotation) Method. How to coordinate the intention of large-scale farmers and small-scale farmers, upstream farmers and downstream farmers.	at the F/S stage, design work stage, at the start of every season or every two seasons	MEDIWR/MAFCRD
Annual Irrigation Planning (after construction)	Preparation of cropping calendar	Develop cropping calendar by season (dry and rainy season), per month, taking into consideration of pattern of planting (gradual increase in planting season and gradual decrease in harvesting season)	at the start of every season or every two seasons	Scheme Management Office (MAFCRD)
	Estimation of expected water demand and supply	Estimation of crop water requirement, based on cropping calendar. Water demand is estimated by considering effective rainfall, runoff, evaporation, transpiration, percolation, and conveyance loss.	at the start of every season or every two seasons	Scheme Management Office (MAFCRD)
	Irrigation scheduling and facility operation planning	Water distribution plan (including dam operation plan) is developed based on water distribution method, irrigation water availability, and management capacity of gate operator.	at the start of every season or every two seasons	Scheme Management Office (MEDIWR)

3.2 Maintenance Activities

Division of role in maintenance work is a key for successful and sustainable operation of irrigation system. Maintenance plan have to be developed based on clear commitment of all stakeholders, in addition to financial, human resources and technical capacity of them. At the time of maintenance planning, technical and financial capabilities of stakeholders have to be discussed.

Maintenance works consist of routine maintenance, periodical maintenance and emergency maintenance works. The routine maintenance is a day-to-day maintenance work including cleaning silt at flow measuring devices, removal of floating debris, minor repair of canal and structures and greasing or oiling of gates of facilities. WUA should actively participate in this activity at least for on-farm level structure.

Periodical maintenance is works to be done at a certain interval, after harvest season or before planting season for example. Basically, WUA bear a responsibility for on-farm level maintenance, whereas the governments are obligated to main facilities such as intake facilities, main and second canals, and gate structures. Emergency maintenance is an emergency works at the time of natural disasters which causes damages on irrigation structures. This type of maintenance requires large investment for long term and/or large scale of replacement, and main responsible organization should be the government except on-farm level structures.

Following table shows typical maintenance activities and responsible organizations. Detail activities of irrigation scheme maintenance are shown in the Guideline 9: Irrigation Scheme Management Establishment.

Table 4.10 Typical Maintenance Activities and Responsible Organization

Maintenance Level	Description	Activities	Responsible Organization
Routine Maintenance	Day-to-day maintenance work.	<ul style="list-style-type: none"> - cleaning silt at flow measuring devices - removal of floating debris - minor repair of canal and structures - greasing or oiling of gates 	<ul style="list-style-type: none"> - On-farm: WUA/Community - Main facilities: County/State/National
Periodical Maintenance	Works to be done at a certain interval.	<ul style="list-style-type: none"> - strengthening of banks and structures - desilting - grass cutting - repair of damaged structures /a - repair of damaged equipment /b - painting of structures 	<ul style="list-style-type: none"> - On-farm: WUA/Community - Main facilities: County/State/National
Emergency Maintenance /a	Emergency work	- repair of damaged structure caused by unforeseen disasters, including floods, heavy rainfall, earthquake, theft, etc.	<ul style="list-style-type: none"> - Main facilities: County/State/National - On-farm: WUA/Community

Note: a/ Diagnosis of damaged structures (e.g. dam embankment, gate, etc.) is outsourced to engineering firms.

b/ Maintenance of equipment (pump, electric supply, etc.) is outsourced to suppliers and manufacturer.

APPENDIX-1: CONSTITUTION OF A WATER USERS ASSOCIATION

(Draft Water Bill, August 2014)

1. The Constitution of the Water Users Association

- a. There is hereby formed the Water Users Association (hereinafter referred to as the "Association")
- b. The Association, including its Management Committee, shall have the status of a legal person and in that capacity it shall be capable of suing and being sued.
- c. The liability of any venture of the Association shall be limited.
- d. The members of the Association shall be villagers, institutions, companies, committees and authorities or any person natural or legal, as may be permit holding users of water from sources located within the area of responsibility of the Association.

2. The objectives of the Association

- a. The objectives of the Association shall be to:- (delete those not applicable)
 - i. Manage, distribute and conserve water from a source used jointly by the members of the Association;
 - ii. To construct, rehabilitate operate and maintain any works for the purposes of management of the water resource in its area of responsibility;
 - iii. Resolve conflicts between members of the association related to the joint use of a water resource;
 - iv. Collect water user fees on behalf of the Basin Water Board;
 - v. Agree by consensus of its members equitable reductions in the quantities of water abstracted from the source under its responsibility in times of drought or other restrictions on resource availability;
 - vi. Do such other things as may be considered necessary by a majority of its members in order to manage the water resources in its area in a fair and equitable manner in accordance with the intent and provisions of the Water Act 2013.

3. Area of responsibility

The area of responsibility of the Association shall be, as shown on the attached map.

4. Proceedings and business of the Association

- a. An Annual General Meeting shall be held once each year. An Extra-Ordinary General Meeting of the Association may be called by five per centum of members giving two weeks notice to the Secretary in writing.
- b. One third of the full number of members containing no fewer than four from each of the upper and the lower area of the catchment or from each village present shall constitute a quorum.
- c. Voting can be exercised by a member or proxy in favour of another member provided the proxy form is in the hands of the Secretary prior to the meeting.
- d. A majority of votes at the Annual General Meeting shall decide the principles governing conservation, maintenance of works in the river in question and shall decide the assessments to be levied thereof and for expenses of the Association.

5. Management Committee

- a. A Management Committee shall be elected at the Annual General Meeting of the Association and shall consist of six elected members.
- b. The Committee so elected may sue and be sued in the name of the Association for moneys or otherwise, and shall have the powers to bind the Association by contract.
- c. The Committee shall collect and receive any moneys due to the Association and pay moneys owing to the Association from time to time and open and maintain a bank account through its authorized officers and submit such annual audited accounts to the Association at the Annual General Meeting.
- d. The Management Committee shall meet not less than once in each quarter of the year and the quorum of the Committee shall be two thirds of all members.
- e. The Management Committee shall also decide the extent, manner and time of levying the assessments laid down by the Annual General Meeting of the Association.
- f. The Management Committee shall appoint and employ such employees as maybe necessary to fulfill the purposes of the Association.

6. Defaults

- a. Any member of the Association making default in payment of any fees or moneys so assessed and after receiving notice from the Committee shall, if such amount be correct, be personally liable to the Association.

7. Liabilities

- a. The Association shall not be liable for any indebtedness other than that contracted by its Committee duly authorized in writing.

8. Rules

- a. Each member hereby undertakes with other members and each of them as follows:
 - i. To pay entrance fees on being elected to the Association, the amount set by General Meeting;
 - ii. To pay all assessments levied against him by the Association;
 - iii. That he will not draw from the source more water than the amount specified, save as authorized by the Committee and will observe rules made by the Association.

GUIDELINE 3

IDENTIFICATION OF PROJECTS' SITE

GUIDELINE 3: IDENTIFICATION OF PROJECTS' SITE

INTRODUCTION

This guideline discusses how to identify the project site for irrigation development. Here the identification procedure was suggested with two (2) steps. The first step is to approximately identify the target area for the project from the remote sensing data. Remote sensing data will help identify the potential areas for irrigation. As an implementer or investor, this targeting method will be useful prior to carry out the field visit.

The second step is to actually visit the site and communicate with the communities residing in the target area. This process is crucial, since the ownership of the land is not clear unless you communicate with them and without matching the interest of the community, the land cannot be put into investment. The exact area of the project site can eventually be decided by the field work but at the same time, community consultation is the most important process to get the agreement whether the project promoter or an investor can really work with the community in the target area. This guideline suggests briefly the steps of project area identification with the lessons learnt from the IDMP formulation process.

1. IDENTIFICATION USING REMOTE SENSING DATA

Due to difficulty to access to all the rural areas, resolution maps using remote sensing data are useful. High resolution maps need to be developed by specialized expertise. Hence here the existence of high resolution maps is a pre-condition for the exercise of identifying target project sites by remote sensing data. Useful high resolution maps are (1) Ortho photo imagery and (2) Land cover map.

1.1 Ortho photo imagery

Enhancing RapidEye satellite imagery like a photograph is to allow ease in visual interpretation process to capture field situation especially at the beginning of a field survey. The ortho photo imagery shows various detailed land conditions, such as extent of flood area along the rivers, river channels in the past or in rainy season, tree canopy size and density, extent of open burning, irrigated crop land in the past, etc. Although ortho photo imagery enables to acquire lots of information, it is a little difficult to tell what covers land surfaces instantly. It takes some time before you can distinguish land cover because the 190 RapidEye images were taken in different dates with differing atmospheric conditions and land conditions, which vary with the seasons.

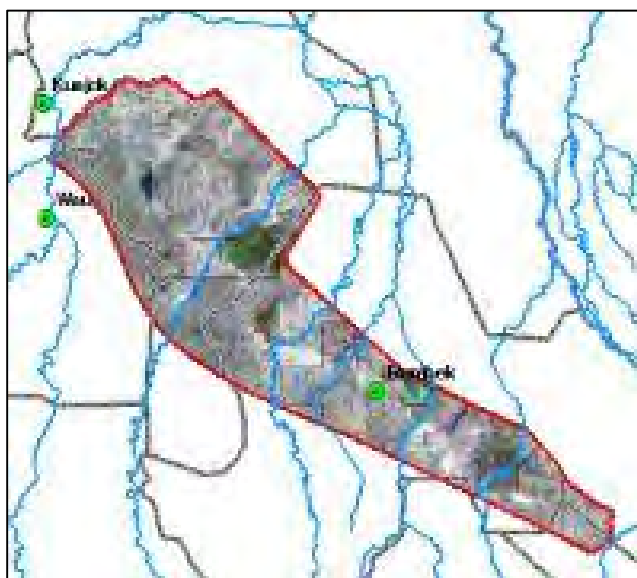


Figure 5.1 Created Map of Ortho Photo Imagery

1.2 Land cover map

Land cover map is created by interpreting the RapidEye images and the ALOS/AVNIR-2 images. Land cover data is one of the most important information for assessing land potential. Land cover map is

powerful to get what covers land surfaces instantly. IDMP Land cover classes and definitions in comparison with FAO land cover classes are shown in Table below.

Table 5.1 Land Cover / Land Use Classification

FAO landcover class		IDMP landcover class	
Class	Definitions	Class	Definitions / Notes
1	AG Agriculture in terrestrial and aquatic / regularly flooded land	1	Irrigated crop land Mainly only in Renk
		2	Rainfed crop land Existing cultivated land
		3	Orchard (planted fruit tree)
2	TCO Trees closed-to-sparse in terrestrial and aquatic regularly flooded land	4	Forest (closed canopy) Density: >60-70%
		5	Forest (open canopy) Density: between 60-70% and 10-20%
3	SCO Shrubs closed-to-sparse in terrestrial and aquatic regularly flooded land	6	Woodland (Savanna) Grassland with tree, Density: <10-20%
4	HCO Herbaceous in terrestrial and aquatic regularly flooded land	7	Grassland (Pastoral land) Grassland without tree or very sparse tree
5	URB Urban areas	8	Settlements Both urban and rural areas
6	BS Bare rocks and soil and / or other unconsolidated material(s)	9	Bare rocks / desert Lands with non or few vegetation and cannot be cultivated
7	WAT Seasonal / perennial, natural / artificial water bodies	10	Perennial wetlands / Open water body Lands under water through the year (cannot be accessed by land)
		11	Seasonal wetlands Lands is under water in wet season (can be accessed by land in dry season)

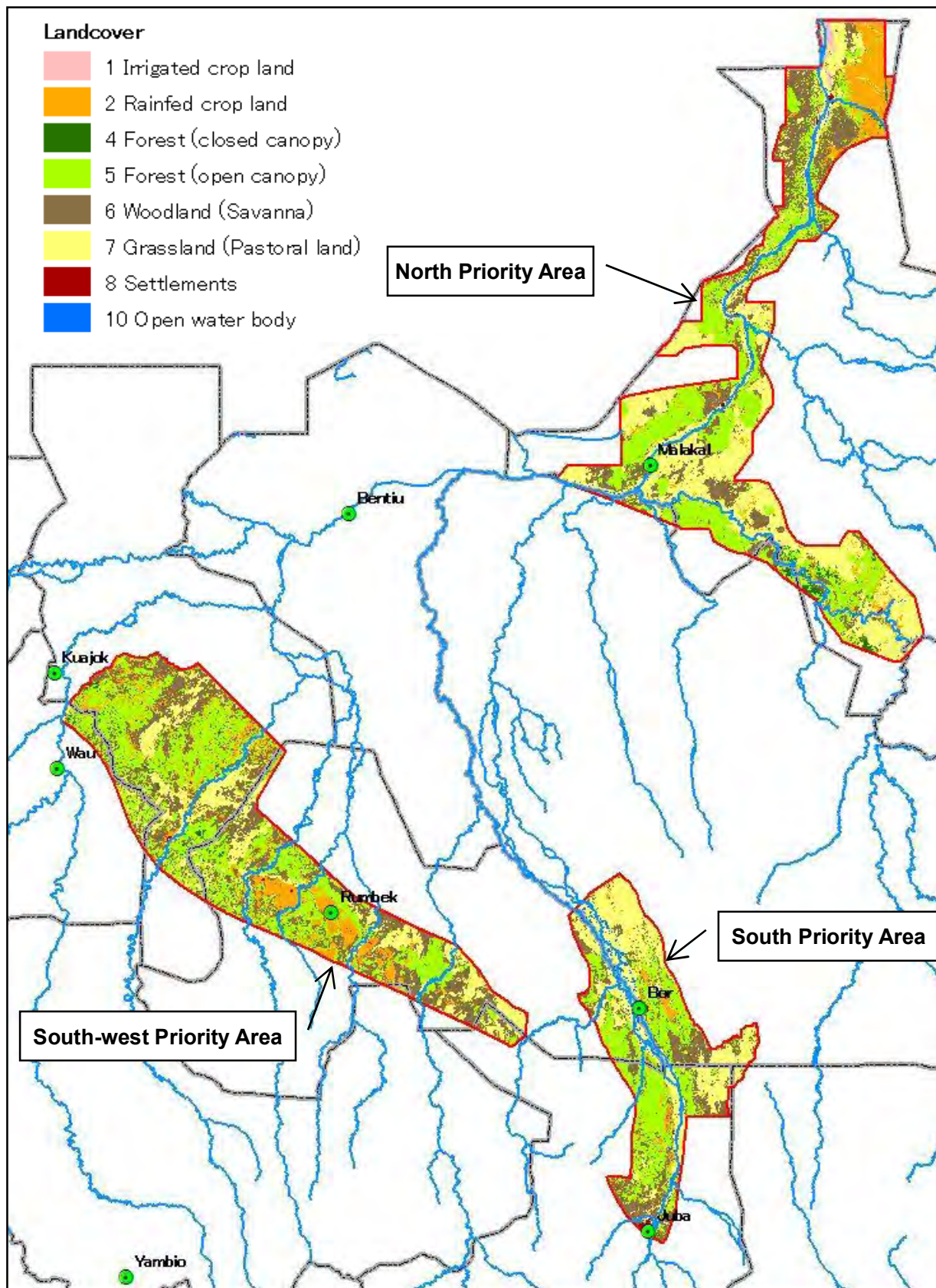


Figure 5.2 Created Land Cover Map

1.3 Identification of a Potential Project Area

Based on mainly the Land cover map, the potential or candidate irrigation scheme development area is identified. Following points are considered for the identification:

- Areas including ðIrrigated crop landð or ðRain-fed crop landð are selected with priority project areas.
- From the view point of water availability, areas located far from the river or other water sources, which are more than 10 km are excluded from the candidate areas.

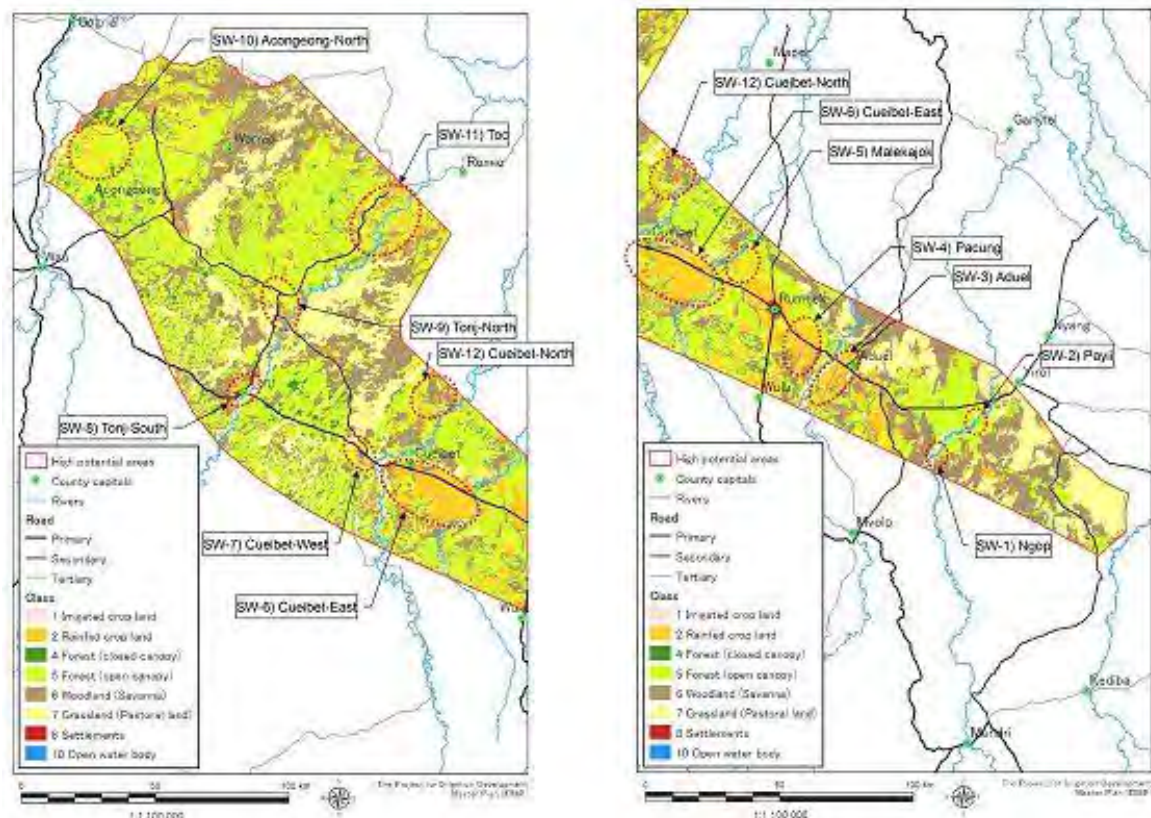


Figure 5.3 Identification of Candidate Project Site from Land Cover Map

1.4 Prioritization of Candidate Areas

Candidate areas selected are prioritized with scoring criteria. Criteria are based on water resources, land productivity and socio-economy. In addition to the above criteria, government plans are also considered as criteria of selection. Table below shows the scoring weight by item:

Priority project areas are selected from the view point of ðareas with high irrigation potential (water resource, land productivity and socio-economic potential)ð. This means irrigation schemes to be constructed in these areas will be effective.

Table 5.2 Criteria for Selection

Items			Score	
1. Technical (Water Resource and Land Productivity)	(1) Water Availability	Perennial river	5	
		Seasonal River* ¹	Jur	4
			Yei	3
			Naam, Tonj	2
			Gel	1
			Gulmam	0
	(2) Main Land Cover* ²	Irrigated Crop Land	5	
		Consolidated Rainfed Crop Land	4	
		Fragmented Rainfed Crop	3	
		Grass Land & Woodland	1	
		Others	0	
	(3) Irrigable size	More than 50 Feddan	5	
		Less than 50 Feddan	0	
2. Socio Economic	(1) Physical accessibility	Road	0 - 10 km	4
			More than 10 km	2
		County Capital* ³	0 - 5 km	2
			5 - 10 km	4
			More than 10 km	3
		Water point	0 - 10 km	4
	More than 10 km		2	
	(2) Schemes with national Impact (Food security, income generation etc)	High	5	
		Moderate	3	
		Low	2	
	(3) Conflict records over land use	Yes	0	
No		4		
3. Government Plan	(1) Proposed/Agreed schemes by RSS Gov (National, State, County)	Yes	4	
		No	0	
	(2) Previously proposed schemes by Sudan MP, IGAD, NBI etc	Yes	2	
		No	0	

*1: Score is settled based on annual discharge volume

*2: As for Rainfed Crop Land, Consolidated and Fragmented is judged based on the Land Cover Map.

*3: Since there has possibility to be occupied by residential area in future and become difficult to be farm lands, score of 0- 5km is lower than 5 - 10km .

2. IDENTIFICATION THROUGH COMMUNITY CONSULTATION

Remote Sensing analysis helps identify the target project site, but to exactly identify the project area, it needs the field survey. The most important point is to know the interest of the community people who are holding the target project area. Without consulting with the community as well as traditional authorities, the project site cannot be eventually identified. The procedure will be (1) Field reconnaissance survey, (2) Community consultation, and (3) Natural and Socio-economic survey.

2.1 Field Reconnaissance Survey

Field reconnaissance survey, to approach the communities in the target area, it has to go through State, County, Payam and finally Community.

In this regards, a letter from the Ministry of Electricity, Dams, irrigation and Water Resources was writing to the concern stakeholders to introduce the project and to request the stakeholders to facilitate the survey mission in their respective states.

A series of visits to a number of government offices at State, and County, meeting with the community, and field visits to the selected site are the basis of data and information gathering for the reconnaissance survey. Selection of the irrigable area is a community-led process involving local community representatives in order to better understand their needs and concerns and to instil a real sense of ownership in the beneficiary community of the irrigation project implementation process and its outcome.

The methods and techniques used include consultations with administrative officials at County and Payam levels, community members, and community leaders; marks and taking points with GPS; direct observation; estimating the vegetation and land cover; transect walk and interviews with relevant community members, and other knowledgeable people about the areas.

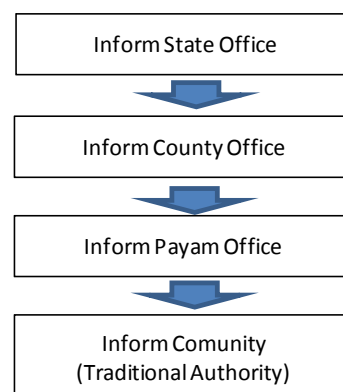


Figure 5.4 Steps to Reach the Community

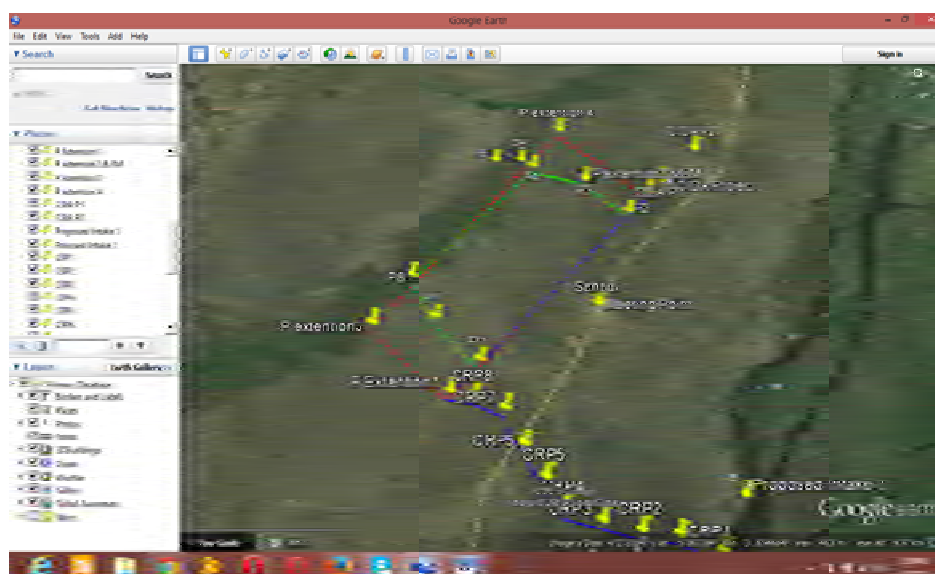


Figure 5.5 Site Identification by Reconnaissance Survey

2.2 Community Consultation

Communities are not familiar with the irrigation. Hence it is important to explain to them what irrigation all about. For this purpose, the project implementers have to hold explanatory meetings. To

arrange the meeting, the implementers have to meet traditional authorities for prior explanation and coordination with the community.

Basically this process should follow the reconnaissance survey. It starts by going through State, County and Payam; but it is often difficult to find the relevant traditional authority who can coordinate with the community members for the consultation. Then what we do is to find someone and then know from him the particular structure of the communities in the target areas. It is very important to find a contact person in the community and know the structure of the community, so that we can know how the information is conveyed and who would be influential persons in the community.

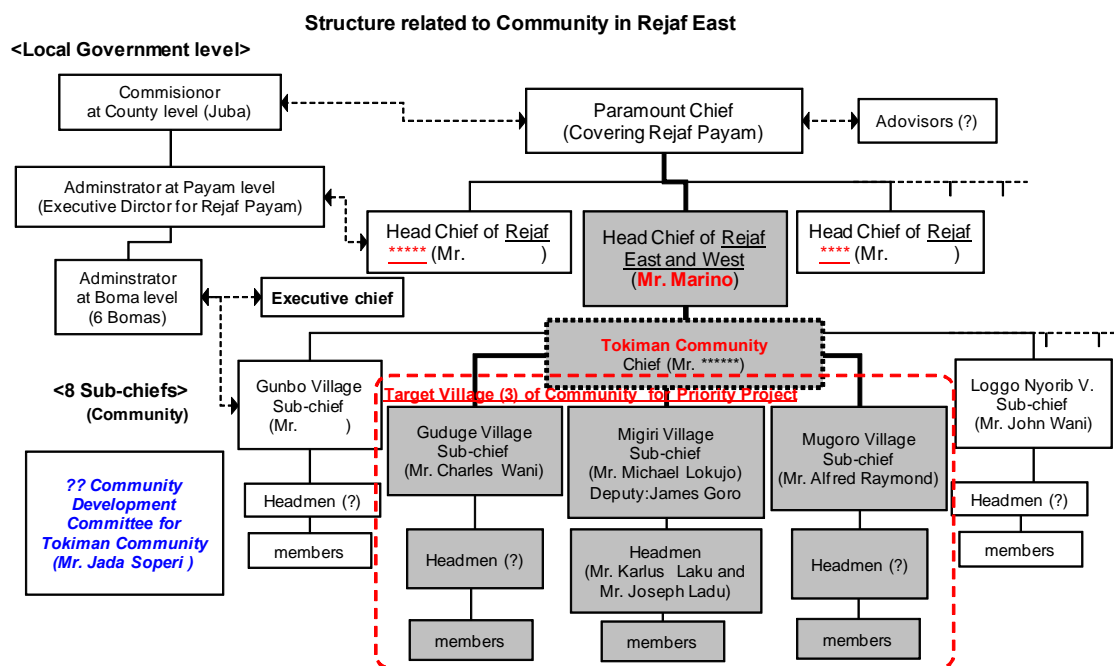


Figure 5.6 Sample of Community Structure

This community structure in the target area was built up and elaborated in the course of community consultation.

When the meeting with the community is arranged, the project implementers prepare the presentation materials. Attached hereunder is a sample presentation material for community consultation, to explain about what is irrigation development about. Following are the lessons for community consultation experiences from the priority projects plan:

- Get contact with traditional authorities in a group. Contact with one traditional authority e.g. sub-chief or chief may not efficiently convey the information to the community members. Furthermore, if the number of concerned communities is more than one, one sub-chief in charge of one community would not convey information to the others. It is important to get them as a group and understand the structure of the communities in the area, which differs from an area to the other.
- Traditional authority is not always resided in the rural area. In the per-urban areas, traditional authorities in the surrounding communities of the city, sometimes have residence in the city. You may find the key person not at the site but different place. Get information from local government offices and community members.
- Do not speak about irrigation only. Community members have various interests in development. Their priority is not necessarily agriculture. It can be health, housing, road, etc. It is better to

know what the interests of the community are and then position the irrigation within their priorities; and the project implementers can talk what they can. This kind of communication could help build trust.

- Take time to communicate with the communities. Land is the most important source of livelihood for most of the rural inhabitants. Therefore, the project dealing with land should be carefully and clearly explained to the people. Especially where people have been already farming, it is likely to take longer time to well communicate with the community members. Do take enough time to build trust with the community. The time of planning period should take into account the prolonging community consultation.



Figure 5.7 Holding of an Explanatory Meeting

2.3 Survey Work

After getting consensus with the traditional authorities and community members, natural condition survey, socio-economic survey and environmental survey will be carried out. These surveys would become possible with the permission from the traditional authorities. It needs to always explain the people within your sight about the purpose of the survey when you initiate the field operation. Not all of the community members are aware of the project and survey operation may give uncomfortable expression to the people even if they are aware of the project.

Feedback to the communities after the survey work and study have been completed would also be important. To inform the progress of the project process would also help build the consensus among the implementers and beneficiaries.

APPENDIX-1: THE EXPLANATORY MEETING FOR THE PRIORITY PROJECTS PLANNING OF IDMP

1. Introduction of the Explanatory Meeting

- 1) Opening Remarks
- 2) Introduction of Attendances

2. Objectives of the Explanatory Meeting

The Meeting aims;

- 1) To provide basic information of the Planning to the farmers/communities in the target areas,
- 2) To share basic needs of the farmers/communities with the Task Team.

3. Contents of the Explanatory Meeting

The Meeting includes;

- 1-1) Outline of the choices of the irrigation development plan,
- 1-2) Schedule of the priority projects planning, (Socio Economic, Topographic, Geographic Survey). Target/Candidate Households should be decided by communities (Total 30 household each priority projects).
- 2) Concerns and expectations for the priority project>>> Free talk

4. Expected Participants of the Meeting

- State focal point of IDMP (1)
- Paramount Chief and Advisors (4)
- Chief of Village (2)
- Sub-Chief (5)
- Headmen (21)
- Task Team members (6)

5. Schedule and Place of the Meeting

The Explanatory Meeting is planned to be held on a day at each project site during April 27 (Mon) - May 2 (Sat). April 22 (Wed) - 25 (Sat) is applied for the preparation of the meeting. The actual date of the Meeting is adjusted, considering a busy season for farmers.

Interview Sheet for Baseline Socio-economic Survey

Name and Title of Interviewee: Sub Chief. Alfred WaniInterview by: Wol Gordon TongDate: 14th April 2015

Q1: Key Information on the Community

A1:

Key Information	
Name of State	Central Equatoria State
Name of County:	Juba
Name of Payam:	Northern Bari
Name of Boma:	Jebel Ladu East
Name of Community:	Nyuwa
Population of the Community:	2, 026 people
Number of Household in the Community:	875
Number of HHs engaged in agriculture:	985 (the number of people)
Name of Tribe in the Community:	Bari

Q2: Organization Diagram of Community Management Structure

A2:

- 1- Sub Chief (Matot) is head of Nyuwa community in the village
- 2- Deputies by three Sub chiefs in village level
- 3- Head men are 11 in Nyuwa community in the village
- 4- Community Council are 25 members

Q2: Organization Diagram of Community Management Structure

A2:

- 5- Sub Chief (Matot) is head of Nyuwa community in the village
- 6- Deputies by three Sub chiefs in village level
- 7- Head men are 11 in Nyuwa community in the village
- 8- Community Council are 25 members

Q3: Means of the Livelihoods in the Community

A3:

Means of the Livelihoods	Yes or No	Ranking as per Propriety
Grazing	No	
Farming	<u>yes</u>	<u>1</u>
Fishery	Yes	<u>2</u>
Hunting	Yes	<u>3</u>
Remittance	No	
Full-time/Permanent Wage Labour	No	
Part-time/Temporally Wage Labour	Yes	<u>3</u>
Business owner	Yes	<u>4</u>

Q4: Average Farming Land per household (feddan/household)

A4:

The average per house hold one feddan/household)

Q5: Produced Agricultural Products

A5:

No	Crops	Cultivating? Yes or No	Ranking as per Production Volume	Production volume is enough for self-consumption? Yes or No
1	Sorghum	Yes	1	yes
2	Maize	Yes	2	No
3	Groundnut	Yes	2	Yes
4	Millet	No		No
5	Sesame	Yes	4	No
6	Cassava	Yes	5	No
7	Wheat	No		No
8	Rice	Yes		No
9	Vegetables (Tomato)	Yes	3	Yes
10	Vegetables (Okra)	Yes	3	Yes
11	Vegetables (Gutra)	Yes	3	Yes
12	Vegetables(Tomatoes)	Yes	3	Yes

Q6: Marketing Crops

A6:

Crops	Sell, Consume or Both	Priority for Selling or Consumption	Selling Price (SSP/kg)	Name of Market Place
Sorghum	Both	Consumption	120 SSP/50kg	Libiy Market
Maize	Both	Consumption	120 SSP/50kg	Libiy Market
Groundnut	Both	Consumption	150 SSP/50kg	Libiy Market
Sesame	Sell	Selling	250 SSP/50kg	Libiy Market
Millet				
Cassava	Consume	Consumption	Not for sell	
Wheat				
Rice				
Vegetables (Tomato)	Sell	Selling	100 SSP/B	Libiy Market
Vegetables (Okra)	Sell	Selling	50 SSP/B	Libiy Market
Vegetables (Gudra)	Sell	Selling	70 SSP/B	Libiy Market

Q7: Cropping pattern

A7:

Month			Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
No	Crops	Rain												
1	Sorghum		○	○	○	▲			□	□		×	×	×
					▲	△								
2	Maize		○	○	▲		□	□				×	×	×
3	Groundnut		○	○	○	▲	□	□	□			×	×	×
4	Millet													
5	Sesame		○	○	▲			□	□					×
6	Cassava		×	□		▲								
			□	○		○								
7	Wheat													
8	Rice													
9	Vegetables ()													
10	Vegetables ()													
11	Vegetables ()													

Heavy Rain:	<input type="checkbox"/>	Light Rain:	<input type="checkbox"/>
Land Preparation:	×	Seed sowing:	○
Weeding:	▲	Fertilizer application:	■
		Harvesting:	□
		Transplanting:	△

Q8: Livestock

A8:

Livestock	Yes or No?	Ranking As per Number
Cattle	No	
Goat	No	
Sheep	No	
Chicken	Yes	1
Others:()		

Q9: Does the community practice Shifting Cultivation? If yes, please explain the common methods in the Community.

A9:

1- Yes we shifting cultivation from place to another place because of stranger
--

Q10: Are there any farmers who practice irrigated farming? If yes, please explain the crop name and irrigation methods applied.

A10:

Yes they doing irrigated agriculture but they are doing hand irrigated agriculture near to the river
--

Q11: Please explain the situation on use of agricultural inputs: Fertilizers (kind of chemical, manure, etc.), Pesticides and Seeds.

A11:

No they didn't know the using of the agriculture inputs

Q12: What is the most significant constraint that affects the agricultural production? (e.g. flood, draught, Birds or other Animals, Insects, etc.)

A12:

1- Yes we have these all constraint (flood, Birds or other Animals, Insects, etc.)

Q13: Please explain what you know about irrigation/irrigated agriculture.

A13:

Yes we know the local way of irrigation by using hand irrigated agriculture but is difficult for us

Q14: What kind of crops do you want to produce, if irrigation scheme is installed for your community?

A14:

- 1- Cash Crops
- 2- And crops will propose by government

GUIDELINE 4

PROCUREMENT OF SUB-CONTRACT

GUIDELINE 4: PROCUREMENT OF SUB-CONTRACT

1. INTRODUCTION

Planning, Designing and implementation work require certain expertise including some special equipments, e.g. borehole drilling machines for geological survey. Therefore, there will be occasions of sub-contracting the work related to the irrigation development. This guideline explains the standard procedure of procurement of sub-contract (from Chapter 2 to Chapter 5). Then as example of field surveys namely topographic survey and geological survey, both of which are necessary ones for irrigation project, are displayed here in this guideline with the sample forms of required documents for the procurement (Chapter 6 and Chapter 7). The samples are all based on the actual ones used for the priority project plans of IDMP.

2. PRINCIPALS OF SUBCONTRACTING AGREEMENT

The following principals are generally specified: 3 Principles of Public Procurement

Fairness:

To make an appropriate arrangement in accordance with rules and regulations

Competition:

To procure affordable goods and services of high quality through competition between bidders as much as possible

Transparency:

To show rules and process of the procurement to the public

In addition to the above, Efficiency is also required in order to exert an effect of project rapidly.

3. SELECTION OF SUBCONTRACTOR

There are 3 types of method of selecting subcontractor under Japanese ODA , i.e. 1) Cost-Based Selection, 2) Quality and Cost Based Selection (QCBS) and 3) Direct (Negotiated) Contract.

The competitive tendering, one of the Cost-Based Selection, shall be applied to selecting subcontractor for topographic survey and geographical survey under IDMP, taking into account the contract amount which is expected to be more than 10 million JPY (equivalent to 1 hundred thousand US\$) respectively.

In the competitive tendering, the Contractor shall be selected from applicants, who have certain level of technical capability, based on the tender price.

In this regard, prequalification shall be conducted prior to the competitive tendering to confirm the capability of tenderer.

4. PREQUALIFICATION (PQ)

4.1 Objectives

Prequalification (PQ) shall be conducted not to limit the tenderers but to confirm the capability and resources of potential tenderers to perform the particular work satisfactorily.

The following may be taken into account for PQ:

- Experience and past performance under similar contracts,
- Potentialities to use necessary personnel, equipment and facilities, and
- Financial status

4.2 Procedure of PQ

(1) Notice for PQ (Public Announcement)

Notice for PQ shall be advertised in at least 1 newspaper of general circulation, and if any, in the official gazette.

Items to be included in the Notice for PQ are as follows:

- Name of the Project,
- Brief description of the Project,
- Name of the executing agency,
- Qualification required of tenderer,
- Date, time and place of the delivery of PQ documents, and
- Other relevant and important information, if any.

(2) Delivery of PQ Documents

PQ documents shall be delivered to all of applicants within 14 days after the public announcement of PQ.

PQ documents shall consist of the following items:

- Invitation to PQ
- Instruction to Applicants
 - a. Scope of works,
 - b. Conditions of PQ,
 - c. Required documents for PQ, etc.

(3) Submission of PQ Documents

PQ documents shall be submitted to the designated place specified in the Invitation to PQ within 14 days after the delivery of these.

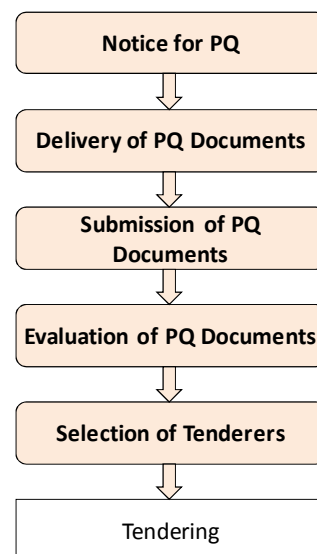
(4) Evaluation of PQ Documents

PQ documents submitted shall be evaluated in accordance with the Conditions of PQ, i.e. corporation nature, financial status, similar experiences, required equipment, number of qualified engineers, etc., specified in the Instruction of Applicants.

(5) Selection of Tenderers

The firms who have the capability and resources to perform the particular work satisfactory shall be selected as tenderers.

The results of PQ shall be noticed to all of applicants within 14 days after the submission of PQ documents.



5. TENDERING

After the selection of qualifying firms, tendering shall be conducted.

5.1 Tender Documents

Tender documents shall provide all information necessary to enable tenderers to prepare valid offers for the services to be procured. They shall generally include:

- 1) Invitation to Tender,
- 2) Instruction to Tenderers,
- 3) Form of Contract Agreement,
- 4) Condition of Contract,
- 5) Technical Specifications, and
- 6) Form of Tender

5.2 Procedure of Tendering

(1) Delivery of Tender Documents

The Invitation to Tender and other tender documents shall be delivered to the all of prequalified firms.

(2) Submission of Tenders

The tenders shall be submitted to the address specified in the Invitation to Tender hereof, and the tenders received after the designated deadline shall not be considered and shall be returned unopened.

(3) Opening of Tenders

The date, time and place of the tender (submitted documents) opening shall be noticed at the time of invitation.

All tenders shall be opened in the presence of tenderers or their representatives at the fixed time and place. The name of the tenderers and total amount of each tender shall be read aloud and recorded.

No tenderer shall be permitted to alter its tender after the tenders have been opened.

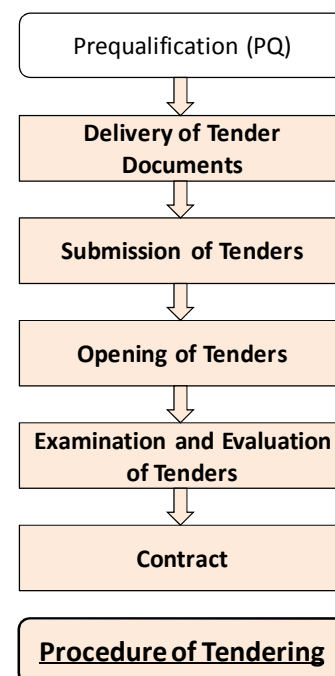
(4) Examination & Evaluation of Tenders

1) Examination of Tenders

The tender shall be examined carefully as follows:

- a. Computations are free of material errors,
- b. The tenders are substantially responsive to the Tender Documents,
- c. The required certificates have been provided,
- d. Documents have been properly signed, and
- e. The tenders are consistent with the Instruction to Tenders.

If the tender does not substantially conform to the instructions, or contains inadmissible reservations or is otherwise not substantially responsive to the Tender Documents, it shall be rejected.



2) Evaluation of Tenders

Tender evaluation shall be consistent with terms and conditions specified in the Tender Documents. Those tenders which substantially conform to the instruction specified in the Tender Documents, shall be judged solely on the basis of the submitted price, and the tenderer who offers the lowest price shall be designated as the successful tenderer.

3) Clarification or Alteration of Tender

No tenderer shall be permitted to alter its tender after the tenders have been opened.

Clarifications without changing the substance of the tender may be accepted.

4) Process to be Confidential

After the public opening of the tenders, information relating to the examination, clarification and evaluation of tenders and recommendations concerning award shall not be disclosed to tenderers or other persons not officially concerned with the process, until the award of contract is announced.

(5) Contract

1) Award of Contract

The contract shall be awarded to the tenderer who, in compliance with the conditions stipulated in the tender documents, offers the lowest price.

No tenderer shall be required, as a condition of the award, to bear responsibilities or undertake services not stipulated in the Tender Documents.

2) Signing of Contract

The Client shall notify the successful tenderer that his tender has been accepted, the Client shall send the tenderer the Forms of Contract provided in the Tender Documents, incorporating all arrangements between the parties.

Following documents shall be considered as the integral part of the Contract:

- a. Contract Agreement,
- b. Conditions of Contract,
- c. Tender of the successful tenderer,
- d. Technical Specifications,
- e. Work Schedule, and
- f. Instruction to Tenderer and such other documents intended to form the Contract

3) Notification of the Result of Tender

Upon the signing of contract with the successful tenderer, the Client shall promptly notify the other tenderers in writing that their tenders have been unsuccessful.

6. TOR PREPARATION: FIELD RECONNAISSANCE SURVEY

6.1 Introduction

Prior to prepare the implementation plans for the priority projects, IDMP-TT will conduct 1) Topographic Survey, and 2) Geological Survey & Soil Mechanical Investigation at priority project areas in order to grasp topographical and geological features and soil mechanical conditions. Those surveys and investigation will be conducted by subcontractor, and subcontractor will be selected by the tendering.

Technical specifications of tender documents is the guidance for the contracted survey works which describes objectives and scope of the works, criteria, tolerance, and other technical requirements to be satisfied. Technical specifications for those surveys and investigation have drafted at the stage of Expression of Interest (EOI) in the middle of 2014, but some of the important items, e.g. location of work site, scope of works (bill of quantities), etc., have not been finalized yet due to the lack of site information.

Therefore, prior to finalizing technical specifications, field reconnaissance survey (preliminary survey) shall be conducted by IDMP-TT in order to identify the general site conditions.

Table 6.1 Schedule for Survey and Investigation

	2014	2015					Remarks
	12	1	2	3	4	5	
1. Tendering							
Preparation of Tender Documents							Prepared by RSS & JICA-TT
Field Reconnaissance Survey		██					Conducted by RSS-TT
Finalizing of Tender Documents			██				Prepared by RSS & JICA-TT
Invitation to Tendering			██				Send to shortlisted
Preparation of Proposal				██			Prepared by tenderer
Evaluation of Proposal				██			Evaluated by RSS & JICA-TT
Contract				██			
2. Survey Works							
Mobilization							
Field Survey							Supervised by RSS-TT
Reporting							

6.2 Items to be identified during field reconnaissance survey

Items to be identified through the field reconnaissance survey are summarized as follows:

6.2.1 General

- (1) Location of project area
 - Name of Village, Boma, Payam, County and State
- (2) River discharge station located adjacent to project area
 - Coordinates and elevation
 - Date of establishment
 - Period of measurement
- (3) Meteorological station located adjacent to project area
 - Coordinates and elevation
 - Date of establishment
 - Period of measurement
- (4) Benchmark located adjacent to project area
 - Coordinates and elevation
 - Date of installation
- (5) Dangers of landmines, cluster monition and other explosives

6.2.2 Farm field

- (1) Boundary of field
 - Coordinates and elevation @ corners (vertexes of polygon)
 - *) *Each corner should be marked with paint or wooden peg.*
 - Dimensions (length, width and area)
- (2) Land covers (IDMP Land Cover Classification)

- Irrigated crop land
- Rainfed crop land
- Grassland (Pastoral land)
- Woodland (Savanna)
- Forest (Closed canopy)
- Forest (Open canopy)
- Settlement
- Open water body

IDMP Land Cover Class	Score *)	North Zone		Southwest Zone		South Zone		Total	
		Area (sq.km)	Percentage (%)	Area (sq.km)	Percentage (%)	Area (sq.km)	Percentage (%)	Area (sq.km)	Percentage (%)
1 Irrigated Crop Land	10	232	0.9	0	0.0	1	0.0	233	0.4
2 Rainfed Crop Land	10	2,299	8.7	2,903	11.6	544	4.1	5,746	8.9
4 Forest (Closed Canopy)	3	337	1.3	264	1.1	74	0.6	675	1.0
5 Forest (Open Canopy)	3	7,966	30.0	9,542	38.3	4,091	31.0	21,599	33.4
6 Woodland (Savanna)	5	5,280	19.9	7,586	30.4	2,843	21.5	15,709	24.3
7 Grassland (Pastoral Land)	8	9,952	37.5	4,587	18.4	5,188	39.3	19,726	30.5
8 Settlements	1	116	0.4	50	0.2	114	0.9	279	0.4
10 Open Water Body	1	348	1.3	8	0.0	340	2.6	697	1.1
Total		26,530	100.0	24,939	100.0	13,195	100.0	64,663	100.0
Notes			41.0		38.6		20.4		100.0
*) Score: Used at rapid assessment.									

- (3) Land ownership
 - Public land (property)
 - Private land (property)
 - * Owner's name and contact address
- (4) General features of covering soil

6.2.3 Canal

(1) Canal alignment

: Coordinates and elevation @ following points

- Beginning point of canal (B.P.)
- End point of canal (E.P.)
- Beginning of curve (B.C.)
- End of curve (E.C.)
- Intersection with creek, road, etc. (I.P.)
- Folding point of canal (F.P.)

(2) Existing facilities on canal alignment

- Coordinates and elevation
- Type
- Owner and contact address
- Solution / Countermeasures
 - : öDiversionö or öOverpassö or öUnderpassö or
 - öRelocationö or öRemoval/Demolitionö or etc.

(3) General geological features

- öRockyö or öSandyö or öSiltyö or etc.

6.2.4 River

(1) Name of river

(2) Survey area

- Coordinates and elevation @ corners (vertexes of polygon)
- Dimensions (length, width and area)

(3) Location of headworks / barrage

- Coordinates and elevation @ both ends of facility

(4) Location of intake

- Coordinates and elevation @ intake point

(5) General geological features

- öRockyö or öSandyö or öSiltyö or etc.

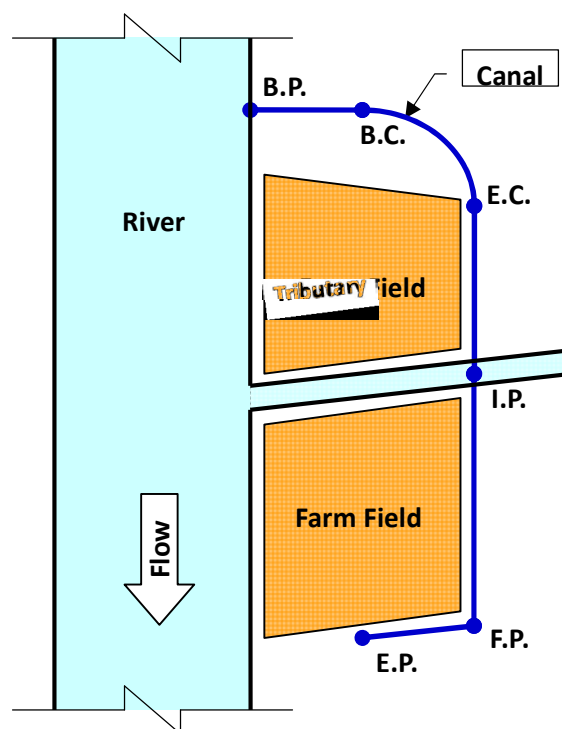


Figure 6.1 Outline of Farm Field and Canal

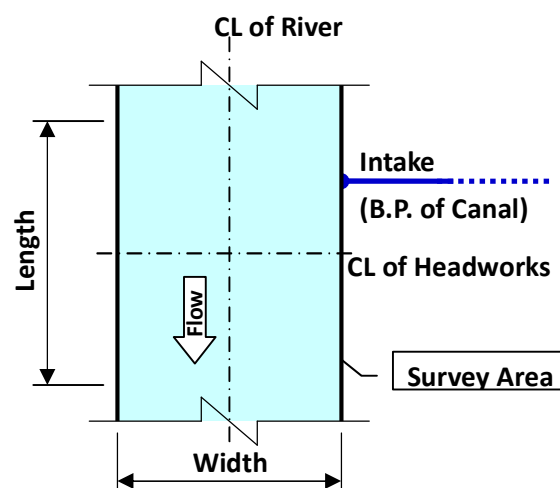
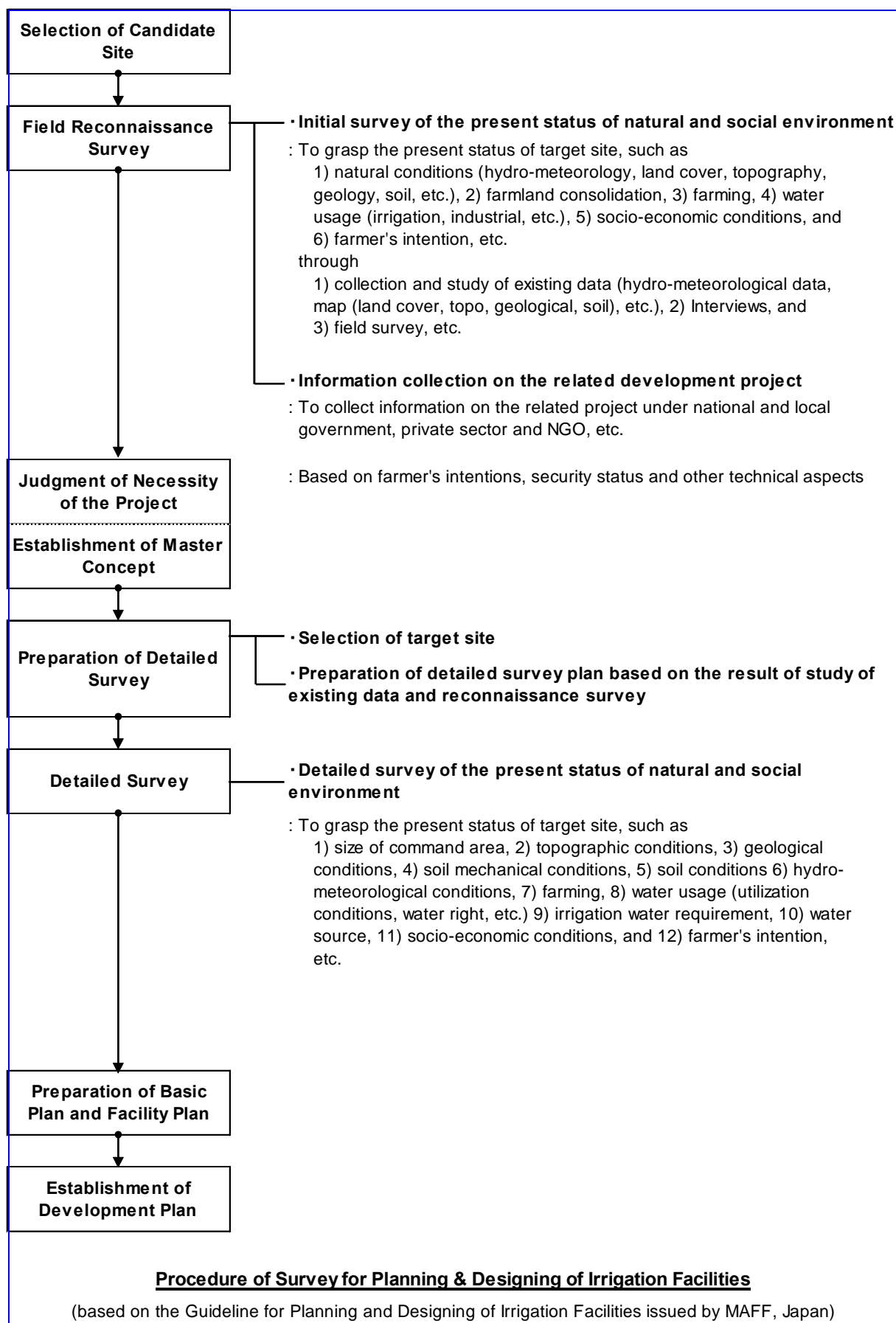
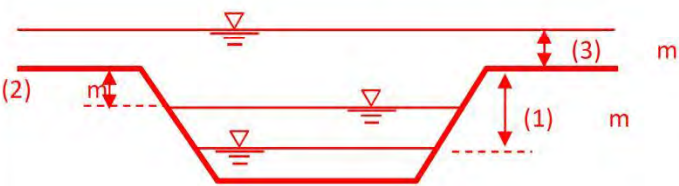


Figure 6.2 Outline of River and Canal



Checklist of Field Reconnaissance Survey

Items	Description	Remarks
I. General		
1. Name of Project Area		
2. Location	Boma:	
	Payam:	
	County:	
	State:	
3. Irrigation Command Area (ha.)		
4. Conditions of site (Land cover, topography, accessibility, etc.)		
5. Water Source		
6. Water Intake Method		
7. River Discharge Station (Existing)	Name	
	N (° - ' - ")	
	E (° - ' - ")	
	(Mobile network accessibility) <input type="checkbox"/> Zain <input type="checkbox"/> MTN <input type="checkbox"/> Vivacell <input type="checkbox"/> Others ()	
8. Rain Gauge Station (Existing)	Name	
	N (° - ' - ")	
	E (° - ' - ")	
	(Mobile network accessibility) <input type="checkbox"/> Zain <input type="checkbox"/> MTN <input type="checkbox"/> Vivacell <input type="checkbox"/> Others ()	
9. River Discharge Station (Newly Established)	Name	If necessary
	N (° - ' - ")	
	E (° - ' - ")	
	(Mobile network accessibility) <input type="checkbox"/> Zain <input type="checkbox"/> MTN <input type="checkbox"/> Vivacell <input type="checkbox"/> Others ()	
10. Rain Gauge Station (Newly Established)	Name	If necessary
	N (° - ' - ")	
	E (° - ' - ")	
	(Mobile network accessibility) <input type="checkbox"/> Zain <input type="checkbox"/> MTN <input type="checkbox"/> Vivacell <input type="checkbox"/> Others ()	
11. Location Map (Sketch: General Plan, etc.)		
 <p>(1) Water level in dry season Date: / /2015 *Measured at site</p> <p>(2) Maximum Water level in flood season (Normal & highest flood, *By interview)</p> <p>(3) In case field is under the water in rainy season (Normal & highest flood, *By</p>		

Checklist of Field Reconnaissance Survey

Items		Description	Remarks
II. Topographic Survey			
1. Bench Mark (Permanent, nearest)	Name		
	N (° - ' - ")		
	E (° - ' - ")		
2. Irrigable Land	Boundary-1	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-2	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-3	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-4	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-5	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-6	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-7	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-8	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-9	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-10	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-11	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-12	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-13	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-14	N (° - ' - ")	
		E (° - ' - ")	
	Boundary-15	N (° - ' - ")	
		E (° - ' - ")	
3. Land Cover of Irrigable Land			
4. Intake Point	N (° - ' - ")		
	E (° - ' - ")		

Checklist of Field Reconnaissance Survey

Items		Description	Remarks
5. Canal Alignment <u>Notes</u> B.P.: Beginning Point F.P.: Folding Point I.P.: Intersection E.P.: End Point	B.P.	N (° - ' - ") E (° - ' - ")	
	F.P.-1	N (° - ' - ") E (° - ' - ")	
	F.P.-2	N (° - ' - ") E (° - ' - ")	
	F.P.-3	N (° - ' - ") E (° - ' - ")	
	F.P.-4	N (° - ' - ") E (° - ' - ")	
	F.P.-5	N (° - ' - ") E (° - ' - ")	
	F.P.-6	N (° - ' - ") E (° - ' - ")	
	F.P.-7	N (° - ' - ") E (° - ' - ")	
	F.P.-8	N (° - ' - ") E (° - ' - ")	
	F.P.-9	N (° - ' - ") E (° - ' - ")	
	F.P.-10	N (° - ' - ") E (° - ' - ")	
	I.P.-1	N (° - ' - ") E (° - ' - ")	
	I.P.-2	N (° - ' - ") E (° - ' - ")	
	I.P.-3	N (° - ' - ") E (° - ' - ")	
	I.P.-4	N (° - ' - ") E (° - ' - ")	
	I.P.-5	N (° - ' - ") E (° - ' - ")	
	I.P.-6	N (° - ' - ") E (° - ' - ")	
	I.P.-7	N (° - ' - ") E (° - ' - ")	
	I.P.-8	N (° - ' - ") E (° - ' - ")	
	I.P.-9	N (° - ' - ") E (° - ' - ")	
	I.P.-10	N (° - ' - ") E (° - ' - ")	
	E.P.	N (° - ' - ") E (° - ' - ")	

Checklist of Field Reconnaissance Survey

Items		Description	Remarks
III. Geographical Survey & Soil investigation			
1. Drilling Point	B.P.	N (° - ' - ")	
		E (° - ' - ")	
	I.P.-1	N (° - ' - ")	
		E (° - ' - ")	
	I.P.-2	N (° - ' - ")	
		E (° - ' - ")	
	I.P.-3	N (° - ' - ")	
		E (° - ' - ")	
	I.P.-4	N (° - ' - ")	
		E (° - ' - ")	
	I.P.-5	N (° - ' - ")	
		E (° - ' - ")	
	I.P.-6	N (° - ' - ")	
		E (° - ' - ")	
	I.P.-7	N (° - ' - ")	
		E (° - ' - ")	
	I.P.-8	N (° - ' - ")	
		E (° - ' - ")	
	I.P.-9	N (° - ' - ")	
		E (° - ' - ")	
	I.P.-10	N (° - ' - ")	
		E (° - ' - ")	
Others-1	N (° - ' - ")		
	E (° - ' - ")		
Others-2	N (° - ' - ")		
	E (° - ' - ")		

IV. Memo

1. Notice for Expression of Interest

NOTICE FOR EXPRESSION OF INTEREST FOR GEOLOGICAL SURVEY AND SOIL INVESTIGATION ON

THE PROJECT FOR IRRIGATION DEVELOPMENT MASTER PLAN (IDMP) THE REPUBLIC OF SOUTH SUDAN

The Consultant for the Project of Irrigation Development Master Plan (IDMP), Sanyu Consultants Inc., announces the Expression of Interest (hereinafter referred to as "EOI") for the tender for the Geological Survey and Soil Investigation in Eastern Equatoria, Central Equatoria, Lakes, Warrap and Upper Nile States. Works at each site in a separate state will be considered as an independent lot. The formulation of the IDMP project is being supported by the government of Japan through Japan International Cooperation Agency (JICA), under the leadership of the Ministry of Electricity, Dams, Irrigation and Water Resources (MEDIWR). The scope of works shall consist of drilling of the following components at each site:

- (1) Drilling of holes/pits (the number of holes/pits will depend on the size of the area to be surveyed), depth varies from ten (10) to fifteen (15) meters,
- (2) Carryout permeability test at intervals of five (5) meters along the holes/pits,
- (3) Carryout Standard Penetration Test (SPT) along the holes/pits at intervals of one (1) meter, and
- (4) Carryout grain size analysis and specific gravity test of soil samples obtained from the designated depth of the holes/pits (the number of samples to be analyzed will depend on the size of the area to be surveyed).

The applicants shall be required:

- (1) To be a construction company or geological survey company or soil investigation company and/or combination, duly incorporated and registered under the Laws of South Sudan;
- (2) To be in sound financial conditions for the last three (3) consecutive fiscal years;
- (3) To have done at least two (2) similar works for geological survey and soil investigation with the total contract price not less than one hundred thousand US Dollars (US\$ 100,000) during the last five years;
- (4) To have at least the following equipment:
 - Two (2) sets of equipment/machinery having drilling capacity of over twenty (20) meters in depth with sixty six (66) to hundred fifty (150) millimeters diameter,
 - Two (2) sets of permeability test equipment,
 - Two (2) sets of Standard Penetration Test (SPT) equipment, and
 - One (1) set of laboratory test equipment for grain size analysis and specific gravity or demonstrate availability and access to same facilities.
- (5) To have at least seven (7) engineers and operators with experience at least five (5) years in similar works as stated below:
 - One (1) geologist,
 - One (1) soil mechanics engineer, and
 - Five (5) operators for drilling equipment

Please note that Joint Ventures are acceptable. EOI documents are to be obtained, prepared and submitted to the IDMP consultant office. The submission of the application shall not be later than 16:00 hour on the closing date, 12th August 2014, at the following address:

IDMP Consultant Office
 Opposite to Hamza Inn Hotel, Juba Town, South Sudan
 For more details, Contact:
 1) Engr. Jiben Jeremiah, Director General for Irrigation and Drainage and IDMP Task Team Leader, Ministry of Electricity, Dams, Irrigation and Water Resources
 Cellphone) +211-(0)926-006-001, E-mail) jackleenjiben@yahoo.co.uk
 2) Mr. Ywodo Andrew Oyor, Secretary of IDMP Consultant Office.
 Cellphone) +211-(0)914-888-404, E-mail) yorjago@yahoo.com
 Please note that in the event of unforeseen circumstances or the sudden changes of peace and order, the works may be postponed or canceled.

津村和光

Kazumitsu Tsumura
 Team Leader of the Consultant
 Sanyu Consultants Inc.



NOTICE FOR EXPRESSION OF INTEREST FOR TOPOGRAPHIC SURVEY ON

THE PROJECT FOR IRRIGATION DEVELOPMENT MASTER PLAN (IDMP) THE REPUBLIC OF SOUTH SUDAN

The Consultant for the Project of Irrigation Development Master Plan (IDMP), Sanyu Consultants Inc., announces the expression of interest (hereinafter referred to as EOI) for tender for the Topographic Survey in Eastern Equatoria, Central Equatoria, Lakes, Warrap and Upper Nile States. Works at each site in a separate state will be considered as an independent lot.

The formulation of the IDMP project is being supported by the government of Japan through Japan International Cooperation Agency (JICA), under the leadership of the Ministry of Electricity, Dams, Irrigation and Water Resources (MEDIWR). The scope of works shall consist of the following components at each site:

- (1) Establishment of temporary benchmarks (TBMs): The number of TBMs will depend on the size of the area to be surveyed.
- (2) Longitudinal profiles: The number and lengths will depend on the size of the area to be surveyed.
- (3) Cross-sections: The number and lengths will depend on the size of the area to be surveyed.
- (4) Plane survey at the potential pumping stations, barrages and along the alignment of canals (among others). The numbers, sizes, lengths, etc will depend on the size of the area to be surveyed.

The applicants shall be required:

- (1) To be a construction company or topographic/geodetic survey company and/or combination, duly incorporated and registered under the Laws of South Sudan;
- (2) To be in sound financial conditions for the last three (3) consecutive fiscal years;
- (3) To have done at least two (2) similar works for topographic survey with the total contract price not less than one hundred thousand US Dollars (US\$ 100,000) during the last five years;
- (4) To have at least the following instruments/equipment:
 - Two (2) sets of total station or equivalent,
 - Two (2) sets of global positioning system (GPS) receiver or equivalent, and
 - One (1) set of AutoCAD system (software and hardware).
- (5) To have at least seven (7) engineers and operators with experience at least five (5) years in similar works as stated below:
 - One (1) survey engineer,
 - Five (5) survey technicians, and
 - One (1) AutoCAD operator.

Please note that Joint Ventures are acceptable. EOI documents are to be obtained, prepared and submitted to the IDMP consultant office. The submission of the application shall not be later than 16:00 hour on the closing date, 12th August 2014, at the following address:

IDMP Consultant Office
 Opposite to Hamza Inn Hotel, Juba Town, South Sudan
 For more details, Contact:
 1) Engr. Jiben Jeremiah, Director General for Irrigation and Drainage, and IDMP Task Team Leader, Ministry of Electricity, Dams, Irrigation and Water Resources
 Cellphone) +211-(0)926-006-001, E-mail) jackleenjiben@yahoo.co.uk
 2) Mr. Ywodo Andrew Oyor, Secretary of IDMP Consultant Office.
 Cellphone) +211-(0)914-888-404, E-mail) yorjago@yahoo.com
 Please note that in the event of unforeseen circumstances or the sudden changes of peace and order, the tender may be postponed or canceled.

津村和光

Kazumitsu Tsumura
 Team Leader of the Consultant
 Sanyu Consultants Inc.



**EXPRESSION OF INTEREST DOCUMENTS
FOR
GEOLOGICAL SURVEY AND SOIL INVESTIGATION
ON
THE PROJECT FOR IRRIGATION DEVELOPMENT MASTER PLAN
(IDMP)
THE REPUBLIC OF SOUTH SUDAN**

CONTENTS

- **INVITATION FOR EXPRESSION OF INTEREST**
- **INSTRUCTION TO APPLICANTS**

July 2014

**MINISTRY OF ELECTRICITY, DAMS, IRRIGATION AND WATER
RESOURCES (MEDIWR)**

INVITATION FOR EXPRESSION OF INTEREST

Dear Sir/Madam,

The Ministry for IDMP invites companies to expression of interest (hereinafter referred to as %EOI+) for the tender for the Geological Survey and Soil Investigation in Eastern Equatoria, Central Equatoria, Lakes, Warrap and Upper Nile States. Works at each site in a separate state will be considered as an independent lot.

Companies interested in participating in the tendering are kindly requested to submit their applications for EOI and all accompanying documents, which shall be prepared in accordance with the attached EOI Document format (Instruction to Applicants) and shall be submitted in sealed envelopes to;

Office,

Address:

Contact person:

1)

2)

The submission of the application shall be not later than 16:00 hour on the closing date, 12th August 2014.

Applicants who are to be invited for the tendering will be informed in due time.

Please note that in the event of unforeseen circumstances or the sudden changes of peace and order, the tender may be postponed or canceled.

Yours respectfully,

Head of Irrigation Department
MEDIWR

INSTRUCTION TO APPLICANTS

TABLE OF CONTENTS

1. Scope of Work	1
2. Conditions of EOI	1
3. Required Documents for EOI	2
4. Notification to Applicants.....	3

ATTACHMENT

Form 1: Application Letter

Form 2: General Information of Applicant

Form 3: Financial Statement

Form 4: List of Similar Work Experiences

Form 5: Equipment List to be adopted for Work

INSTRUCTION TO APPLICANTS

1. Scope of Work

The scope of the work covered by the envisaged tendering (hereinafter referred to as "the Work") shall consist of the following components at each site:

- (1) Drilling of holes/pits (the number of holes/pits will depend on the size of the area to be surveyed), depth varies from ten (10) to fifteen (15) meters,
- (2) Carryout permeability test at intervals of five (5) meters along the holes/pits,
- (3) Carryout Standard Penetration Test (hereinafter referred to as %SPT+) along the holes/pits at intervals of one (1) meter, and
- (4) Carryout grain size analysis and specific gravity test of soil samples obtained from the designated depth of the holes/pits. The number of samples to be analyzed will depend on the size of the area to be surveyed.

The Work shall include temporary works, installation of the equipment and materials, transportation, reporting work, insurance and all other things required in and for the Work implementation in due conformity with the Tender Documents.

2. Conditions of EOI

Applicants for EOI of the tendering shall be required to satisfy the following conditions.

The applicants shall be required to observe the highest standard of ethics during the execution of the envisaged contract.

Joint Ventures among general civil contractors (hereinafter referred to as %Partners+) are acceptable.

The applicants shall satisfy the requirements stated below.

(1) Corporation nature

The applicants shall be a construction company or geological survey company or soil investigation company and/or combination, duly incorporated and registered under the Laws of South Sudan.

In case of Joint Venture, each Partner shall satisfy the requirements stated above.

(2) Financial status

The applicants shall be in sound financial conditions. The applicants shall submit business experience records, financial statements for the last three (3) consecutive fiscal years comprising balance sheets and profits and loss statements, and a certificate for the completed geological survey and soil investigation works and/or similar works for the last three (3) consecutive years.

In case of Joint Venture, each Partner shall satisfy the requirements stated above.

(3) Similar experiences in geological survey and soil investigation

The applicants shall have at least two (2) similar works for geological survey and soil

investigation with the total contract price not less than one hundred thousand US Dollars (US\$ 100,000) during the last five (5) years, regardless of prime contracting or sub-contracting.

In case of Joint Venture, all Partners combined shall satisfy the requirements stated above.

(4) Required Equipment

The applicants shall have at least the following instruments/equipment:

- Two (2) sets of equipment/machinery having drilling capacity of over twenty (20) meters in depth with sixty six (66) to hundred fifty (150) millimeters diameter,
- Two (2) sets of permeability test equipment,
- Two (2) sets of SPT equipment, and
- One (1) set of laboratory test equipment for grain size analysis and specific gravity or demonstrate availability and access to same facilities.

In case of Joint Venture, all Partners combined shall satisfy the requirements stated above.

(5) Number of qualified engineers

The applicants shall have at least seven (7) engineers and operators with experience at least five (5) years in similar works as stated below:

- One (1) geologist,
- One (1) soil mechanics engineer, and
- Five (5) operators for drilling equipment.

In case of Joint Venture, all Partners combined shall satisfy the requirements stated above.

3. Required Documents for EOI

The applicants shall be required to submit the following documents in duplicates, which shall be prepared in accordance with the attached formats and written in English.

The application and all accompanying documents shall be submitted by hand to the address specified in the Invitation for EOI.

- Application Letter(Form-1)
- General Information of Applicant(Form-2)
- Financial Statement(Form-3)
- List of Similar Work Experiences(Form-4)
- Equipment list to be adopted for work(Form-5)
- Company Brochure /profile

In case of Joint Venture, the following documents shall be additionally required:

Each Partner shall submit the following documents:

- Company Brochure /profile
- General Information of Applicant (Form-2)
- Financial Statements (Form-3)
- List of Similar Work Experience (Form-4)
- Equipment list to be adopted for work (Form-5)

Joint Venture shall submit the following documents

- Number and Names of Partners on Joint Venture
- Name of the Prime Partner Company
- Document for the minimum ratio of its paid capital by each Partner to total capital

4. Notification to Applicants

All applicants who satisfy the conditions of EOI shall be notified within fourteen (14) days after the deadline of submission of the application. Unsuccessful applicants also shall be notified in the same period.

Please note that in the event of unforeseen circumstances or the sudden changes of peace and order, the tender may be postponed or canceled.

(Letterhead of the Applicant)

APPLICATION LETTER

To: Sanyu Consultants Inc., the Consultant for IDMP
Re: GEOLOGICAL SURVEY AND SOIL INVESTIGATION
ON THE PROJECT FOR IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN

_____, 2014

Dear Sir/Madam,

We are pleased to apply for participation in the Expression of Interest (EOI) for the captioned works, and to submit the documents in duplicate for your review and acceptance, which are attached hereto.

We declare that the particulars contained therein are true and correct in every detail.

_____, 2014

Yours respectfully,

(Signature) _____

(Printed Name of Signer)

(Title of Signer)

(Name of Applicant)

(Address of Applicant)

Note: Name and position of person who may be contacted for further information if required are as follows;

Name :
Title :
Telephone No. :
e-mail address :

General Information of Applicant

1. Name (legal name)

2. Address of the Head Office

3. The Business License

(1) License Number : _____

(2) Date of Issue : _____

(3) Issued at : _____

4. Name of Company's Representative

5. Date of Establishment of the Company/Firm

(month and year) _____

6. Full Capital Amount

7. Number of Employees

(1) Civil Engineers
(incl.: Geologists and Soil Mechanics Engineers) _____

(2) Architects _____

(3) Mechanical and Electrical Engineers
(incl.: Operators for drilling equipment) _____

(4) Administrative Staff _____

(5) Others _____

TOTAL _____

8. Number of Qualified Employees

(1) Geologists with at least 5 years experience _____

(2) Soil Mechanics Engrs. with at least 5 years experience _____

(3) Operators for drilling equipment with at least 5 years experience _____

9. Annual Total Sales (last five (5) years)

FY 2009	_____	million US Dollars or SSP
FY 2010	_____	million US Dollars or SSP
FY 2011	_____	million US Dollars or SSP
FY 2012	_____	million US Dollars or SSP
FY 2013	_____	million US Dollars or SSP

(Signature) _____

(Printed Name of Signer)
(Title of Signer)
(Name of Applicant)
(Address of Applicant)

Financial Statement

(Unit: Thousand US Dollar or SSP)

Fiscal Year Item	2011	2012	2013
1. Gross sales			
2. Gross profit			
3. Operating profit			
4. Ordinary profit			
5. Net profit before tax			
6. Current assets			
7. Fixed assets			
8. Current liabilities			
9. Share holders equity			
10. Total of liabilities and share holders equity			

Remarks:

%Gross profit+ = %Gross sales+ . %Cost of sales+

%Operation profit+ = %Gross profit+ . %Selling and Administration cost+

%Ordinary profit+ = %Operating profit++ %Non-operating income+
. %Non-operating expense+

%Net profit before tax+= %Ordinary profit++ %Extraordinary income+
. %Extraordinary loss+

(Signature)

(Printed Name of Signer)
(Title of Signer)
(Name of Applicant)
(Address of Applicant)

List of Similar Work Experiences

Name of Project	Client	Country	Contract Amount (Million US\$ or SSP)	Source of Fund	Contract Period	Description of the Works

Notes:

Certificates for the completed work described above shall be attached.

(Signature) _____

(Printed Name of Signer)

(Title of Signer)

(Name of Applicant)

(Address of Applicant)

List of Equipment to be utilized for work

Item	Type and Name of Equipment	Detail Specification (including capacity)	Model Year	Number of Equipment	Remarks (used records/years)
Drilling Equipment/Machinery					
Permeability Test Equipment					
Standard Penetration Test (SPT) Equipment					
Laboratory Test Equipment for Grain Size Analysis and Specific Gravity					
Others					

(Signature) _____

(Printed Name of Signer)

(Title of Signer)

(Name of Applicant)

(Address of Applicant)

Checklist for Submission of Required Documents

Items	Applicant-A	Applicant-B	Applicant-C	Applicant-D	Applicant-E	Applicant-F	Remarks
Time and Date of Submission							Deadline: 16:00, Aug.12,'14
Application Letter (Form-1)							Must
General Information of Applicant (Form-2)							do.
Financial Statement (Form-3)							do.
List of Similar Work Experiences (Form-4)							do.
Equipment List to be adopted for work (Form-5)							do.
Company Brochure (if any)							If any
- In case of Joint Venture -							
Number and Names of partners							Must
Name of the Prime Partner Company							do.
Document for the minimum ration of its paid capital by each Partner to total capital							do.
Partner-1	General Information of Applicant (Form-2)						Must
	Financial Statement (Form-3)						do.
	List of Similar Work Experiences (Form-4)						do.
	Equipment List to be adopted for work (Form-5)						do.
	Company Brochure (if any)						If any
Partner-2	General Information of Applicant (Form-2)						Must
	Financial Statement (Form-3)						do.
	List of Similar Work Experiences (Form-4)						do.
	Equipment List to be adopted for work (Form-5)						do.
	Company Brochure (if any)						If any
Partner-3	General Information of Applicant (Form-2)						Must
	Financial Statement (Form-3)						do.
	List of Similar Work Experiences (Form-4)						do.
	Equipment List to be adopted for work (Form-5)						do.
	Company Brochure (if any)						If any
Judgment							
Remarks							

Evaluation of Expression of Interest (EOI) - Topographic Survey

Items	Applicant-			Remarks
I. Corporation Nature (Form-2)				
1. Name (legal name)				
2. Address of the Head Office				
3. The Business License				
(1) License Number				
(2) Date of Issue				
(3) Issued at				
4. Name of Company's Representative				
5. Date Establishment of the Company/Firm				
6. Full Capital Amount				
7. Numbers of Employees				
(1) Civil Engineers				
(2) Architects				
(3) Mechanical and Electrical Engineers				
(4) Administration Staff				
(5) Others				
8. Numbers of Qualified Employee				
(1) Survey Engineer				1 engineer w/ at least 5 years experiences.
(2) Survey Technician				5 technicians w/ at least 5 years experiences.
(3) AutoCAD Operator				1 operator w/ at least 5 years experiences.
9. Annual Total Sales				
(1) FY 2009				
(2) FY 2010				
(3) FY 2011				
(4) FY 2012				
(5) FY 2013				
II. Fiscal Status (Form-3)				
	2011	2012	2013	
1. Gross Sales				
2. Gross Profit				
3. Operating Profit				
4. Ordinary Profit				
5. Net Profit before tax				
6. Current Assets				
7. Fixed Assets				
8. Current Liabilities				
9. Share Holders' Equity				
10. Total of Liabilities and Share Holders' Equity				

Evaluation of Expression of Interest (EOI) - Topographic Survey

Items	Applicant-			Remarks
III. Similar Experiences (Form-4)				
Similar Project-1				
1. Name of Project				Contract price not less than US\$100,000
2. Client				
3. Country				
4. Contract Amount				
5. Source of Fund				
6. Contract Period				
7. Description of the Works				
Similar Project-2				
1. Name of Project				Contract price not less than US\$100,000
2. Client				
3. Country				
4. Contract Amount				
5. Source of Fund				
6. Contract Period				
7. Description of the Works				
IV. Required Equipment (Form-5)				
Total Station				
1. Type and Name of Equipment				At least 2 sets
2. Detail Specification				
3. Model Year				
4. Number of Equipment				
5. Used Records/Years				
GSP Receiver				
1. Type and Name of Equipment				At least 2 sets
2. Detail Specification				
3. Model Year				
4. Number of Equipment				
5. Used Records/Years				
AutoCAD				
1. Type and Name of Equipment				At least 1 set
2. Detail Specification				
3. Model Year				
4. Number of Equipment				
5. Used Records/Years				

4. Notification Letter for EOI (To Qualified and Disqualified)



THE REPUBLIC OF SOUTH SUDAN
THE PROJECT FOR IRRIGATION DEVELOPMNT MASTER PLAN (IDMP)
Ministry of Electricity, Dam, Irrigation and Water Resources and (MEDIWR)

October 10, 2014

Mr.
Project Manager
OOO Engineering Co. Ltd.

Subject: **Notification Letter of EOI for Geological Survey and Soil Investigation**

Dear Sir,

With reference to the Expression of Interest (EOI) for the tender for the Geological Survey and Soil Investigation in Eastern Equatoria, Central Equatoria, Lakes, Warrap and Upper Nile States on the Project for Irrigation Development Master Plan (IDMP), advertised in The Citizen and JUBA MONITOR daily Newspapers in Juba on July 25 and 31, 2014, the Consultant for the Project of IDMP and IDMP Task Team carefully assessed your EOI documents submitted before the deadline of August 12, 2014.

Accordingly, we are pleased to inform you that your submitted EOI documents have been shortlisted for the tender process which will be communicated to you in due time.

In this regard, however, we would like to bring to your attention that, you didn't submit some of the required documents which were stipulated in EOI DOCUMENTS. Therefore, for the success of your application, you are kindly requested to submit the below required documents at the tender stage in addition to the tender documents requirements.

1. Provide information for accessibility to the geotechnical investigation equipment (list of equipment to be adapted for the works),
2. Certificates of similar works done should be provided,
3. Financial statement from legal South Sudan institution is required, and
4. The company should be sound financially to meet the requirements in next stage.

In case of any inquiry you can contact:

- 1)
- 2)

Please note that in the event of unforeseen circumstances or the sudden changes of peace and order, the tender may be postponed or canceled.

Yours respectfully,

Head of Irrigation Department
MEDIWR



THE REPUBLIC OF SOUTH SUDAN
THE PROJECT FOR IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
Ministry of Electricity, Dam, Irrigation and Water Resources and (MEDIWR)

October 10, 2014

Dr.
Director
OOO Engineering Co. Ltd.

Subject: **Notification Letter of EOI for Geological Survey and Soil Investigation**

Dear Sir,

With reference to the Expression of Interest (EOI) for the tender for the Geological Survey and Soil Investigation in Eastern Equatoria, Central Equatoria, Lakes, Warrap and Upper Nile States on the Project for Irrigation Development Master Plan (IDMP), advertised in The Citizen and JUBA MONITOR daily Newspapers in Juba on July 25 and 31, 2014, the Consultant for the Project of IDMP and IDMP Task Team carefully assessed your EOI documents submitted before the deadline of August 12, 2014.

Accordingly, we are pleased to acknowledge your application and interest in carrying out Geological Survey and Soil Investigation for IDMP. However, we regret to inform you that you have not been shortlisted for the tender at this moment because you did not submit the following required documents stipulated in EOI DOCUMENTS.

1. List of similar works done (~~Form-4~~ ~~List of Similar Work Experiences~~), and
2. Required instruments/equipment that shall be owned or rent for the work (~~Form-5~~ ~~List of Equipment to be adopted for work~~).

Yours respectfully,

Head of Irrigation Department
MEDIWR

**THE PROJECT
FOR
IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN**

**TENDER DOCUMENTS
FOR
GEOLOGICAL SURVEY
AND SOIL MECHNICAL INVESTIGATION
IN WESTERN BAHR EL GHAZAL STATE
WAU**

CONTENTS

- INVITATION TO TENDER
- INSTRUCTION TO THE TENDERERS
- FORM OF CONTRACT AGREEMENT
- CONDITIONS OF CONTRACT
- TECHNICAL SPECIFICATIONS / LOCATION MAP
- FORM OF TENDER

MARCH 2015

**MINISTRY OF ELECTRICITY, DAMS, IRRIGATION AND WATER
RESOURCES (MEDIWR)**

**THE PROJECT
FOR
IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN**

**GEOLOGICAL SURVEY
AND SOIL MECHANICAL INVESTIGATION
IN WESTERN BAHR EL GHAZAL STATE
WAU**

INVITATION TO TENDER

INVITATION TO TENDER

Dear Sir/Madame,

The qualified companies, which have been shortlisted by the Consultant for the tender process in accordance with the result of the assessment of technical and financial capability of company through the evaluation of their Expression of Interest (hereinafter referred to as %EOI+) documents submitted in compliance with the Notice for EOI advertised in The Citizen, JUBA MONITOR and ALMAUGIF newspapers on the 25th and 31st of July, 2014, are invited to submit the tender for similar work of geological survey and soil mechanical investigation in **Western Bahr el Ghazal State, Wau** as follows:

- Amare & Families Consulting Engineers (SS) Co. Ltd.,
- Bright Star Engineering and Consulting Co. Ltd., and
- Sue for Construction & Water Engineering Co. Ltd.

The qualified companies interested in participating in the tendering are kindly requested to collect and prepare their applications for tender and with all required documents in accordance with the tender document format (INSTRUCTION TO THE TENDERERS) and shall be submitted in sealed envelopes (Envelope-A and B, refer to INSTRUCTION TO THE TENDERERS (page-4)) to;

Office,

Address:

Contact person:

1)

2)

Please note that the tender document format is prepared by the Consultant and can be obtained by companies after 14:00 South Sudan local time on the 9th of March, 2015 at the Consultant office described above. The submission of the application shall not be later than 14:00 South Sudan local time on the closing date 23rd of March, 2015.

Please note that field survey works, such as geological survey and soil mechanical investigation, etc., shall be conducted by survey companies which have a base of business activities in the area of field survey and which know how to protect themselves from dangers according to JICA security regulations. In case the qualified companies do not have a base of business activities in the area of field survey, the qualified companies shall subcontract a survey company which has a base of business activities in the area of field survey and shall take full responsibility for the all of subcontracted activities. Therefore, the Consultant will not take any responsibilities for transportation of equipment and personal from and to the survey site.

In addition, please note that in the event of unforeseen circumstances or the sudden changes of security situation and order, the tender may be postponed or canceled.

Yours respectfully,

Head of Irrigation Department
MEDIWR

**THE PROJECT
FOR
IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN**

**GEOLOGICAL SURVEY
AND SOIL MECHANICAL INVESTIGATION
IN WESTERN BAHR EL GHAZAL STATE
WAU**

INSTRUCTION TO THE TENDERERS

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Chapter 1: Introduction

1. Objective of the Works

The objective of the Works is to identify the geological feature and soil mechanical characteristics at the planned construction site of irrigation facilities and its adjoining area on the east of Wau Town, River Jur County, Western Bahr el Ghazal State, the Republic of South Sudan.

2. Scope of the Works

The scope of the Works covered by this tendering consists of the following components;

- (1) Drilling of boreholes,
- (2) Permeability test in boreholes,
- (3) Standard Penetration Test (SPT) in boreholes, and
- (4) A series of physical soil test, such as grain size analysis, specific gravity test and atterberg limits (liquid and plastic limits).

Details of the Works shall be stipulated in due conformity with the Technical Specifications of the Tender Documents.

3. Period of Execution of the Works

The Works shall be completed on or before the day of the 31st of May, 2015.

4. Qualification of Tenderers

Qualified tenderers shall be required to observe the highest standard of ethics during the execution of this contract. Joint Ventures among general civil contractors (hereinafter referred to as %Partner+) are acceptable.

Tenderers shall satisfy the requirements stated below.

(1) Corporation nature

Qualified tenderers shall be a construction company or geological survey company or soil mechanical investigation company and/or combination, duly incorporated and registered under the Laws of South Sudan.

In case of Joint Venture, each Partner shall satisfy the requirements stated above.

(2) Financial status

Qualified tenderer shall be in sound financial conditions. The applicants shall submit business experience records, financial statements for the last three (3) consecutive

fiscal years comprising balance sheets and profits and loss statements, and a certificate for the completed geological survey and soil mechanical investigation works and/or similar works for the last three (3) consecutive years.

In case of Joint Venture, each Partner shall satisfy the requirements stated above.

(3) Similar experience in geological survey and soil mechanical investigation

Qualified tenderers shall have at least two (2) similar work experiences for geological survey and soil mechanical investigation works with the total contract price not less than one hundred thousand US Dollars (US\$ 100,000) during the last five (5) years, regardless of prime contracting or sub-contracting.

In case of Joint Venture, at least one (1) Partner combined shall satisfy the requirements stated above.

(4) Required Equipment

Qualified tenderers shall have or prepare at least the following equipment;

- Two (2) sets of drilling rigs having a drilling capacity of over twenty (20) meters in depth with not less than sixty six (66) millimeters diameter,
- Two (2) sets of permeability test equipment,
- Two (2) sets of standard penetration test (SPT) equipment, and
- One (1) set of laboratory test equipment for a series of physical soil test, such as grain size analysis, specific gravity test and atterberg limits (liquid and plastic limits) or demonstrate availability and access to same facilities.

In case of Joint Venture, at least one (1) Partner combined shall satisfy the requirements stated above.

(5) Number of qualified engineers

Qualified tenderers shall have at least seven (7) experienced engineers and operators with experience more than five (5) years as stated below;

- One (1) geologist,
- One (1) soil mechanical engineer, and
- Five (5) operators for drilling rig.

In case of Joint Venture, at least one (1) Partner combined shall satisfy the requirements stated above.

5. Acquaintance with Local Conditions

- (1) The work site is located on the east of Wau Town, River Jur County, Western Bahr el Ghazal State.

- (2) The tenders shall have a base of business activities in the area of the Works and shall know how to protect themselves from dangers according to JICA security regulations. In case the tenders do not have a base of business activities in the area of the Works, the tenders shall subcontract a survey company who has a base of business activities in the area of the Works and shall take full responsibility for the all of subcontracted activities. Therefore, the Consultant will not take any responsibilities for transportation of equipment and personal from and to the survey site.
- (3) On-site orientation will not be held at the site of the Works. The tenderers are, however, advised to visit and to examine the work site and its surroundings and to obtain for themselves, on their own responsibilities and expenses, all information that may be necessary for preparing the tender, if any.
- (4) No claim whatsoever shall be made as a result of ignorance of local conditions on the part of the tenderers and such ignorance shall be the responsibility of the tenderers.

Chapter 2: Tender Documents

1. Composition of Tender Documents

The tender documents are composed of the followings;

- Invitation to Tender,
- Instruction to the Tenderers,
- Form of Contract Agreement,
- Conditions of Contract,
- Technical Specifications / Location Map, and
- Form of Tender

The documents are to be taken as mutually explanatory of one another. If an ambiguity or discrepancy is found in the documents, the interpretation shall be done in accordance with the above-mentioned sequence of the priority.

2. Responsibility of Tenderers

- (1) Tenderers shall examine carefully the Tender Documents to understand fully the content of the Works including the difficulties and restrictions affecting the execution and completion of the Works.
- (2) Tenderers shall be liable to any failure or negligence to obtain reliable and necessary information for successful execution or completion of the Works.

3. Clarification of Tender Documents

- (1) Any inquiries of the Tender Documents or any doubts as to interpretation shall be written in attached form in English and sent to the Consultant by hand and/or e-mail on or before 14:00 South Sudan local time on the 13th of March, 2015.
- (2) The Consultant shall respond in writing in English to the inquiry and/or doubt as to the interpretation stated above. The responses will be sent by hand and/or e-mail to all prospective tenderers who received the Tender Documents on or before 14:00 South Sudan local time on the 16th of March, 2015.
- (3) The responses shall constitute a part of the Tender Documents provided in Clause 1 of Chapter 2.

4. Addenda of Tender Documents

- (1) The Consultant may, for any reason, whether at his own initiative or in response to a clarification requested by prospective tenderers, modify the Tender Documents.
- (2) The Consultant will notify the addenda indicating the modification by e-mail to all prospective tenderers on or before 14:00 South Sudan local time on the 16th of March, 2015 in English, at least seven (7) calendar days before the day of tender opening.
- (3) The addenda shall constitute a part of the Tender Documents provided in Cause 1 of Chapter 2.

Chapter 3: Preparation and Submission of Tender

1. Preparation of Tender

- (1) The tender shall be prepared and submitted by filling out the forms and documents provided on the Forms of Tender. Each of the forms shall be completely filled in indelible ink or typewritten or computer printouts. No interlinings, erasures (or crossing out), addition, or alteration may be allowed. If the documents submitted by the tenderer do not meet the requirements mentioned above, the tenderer may be disqualified.
- (2) The tenderer shall submit the followings;

- 1) Power of Attorney (duly signed by the legal representative of the tenderers):
(Form-3)

[Envelope-A]

- 2) Photocopy of the company's registration based on legal legislation
- 3) Work Schedule (Form-4)
- 4) List of Similar Work Experiences (Form-5) with certificate of completion
- 5) List of Equipment to be adopted for work (Form-6) with certificate of ownership or hiring
- 6) General Information of Tenderer (Form-7)
- 7) Financial Statement (Form-8)
- 8) Company Brochure (if any)

In case of Joint Venture the following documents shall be additionally required;

Each partner firm shall submit the following documents;

- 2) Photocopy of the company's registration based on legal legislation
- 3) Work Schedule (Form-4)
- 4) List of Similar Work Experiences (Form-5) with certificate of completion
- 5) List of Equipment to be adopted for work (Form-6) with certificate of ownership or hiring
- 6) General Information of Tenderer (Form-7)
- 7) Financial Statement (Form-8)
- 8) Company Brochure (if any)

Joint Venture shall submit the following documents;

- A1) Number and Names of Partners on Joint Venture
- A2) Name of the Prime Partner firm
- A3) Document for the minimum ratio of its paid capital by each Partner to total capital

[Envelope-B]

- 9) Form of Tender (Form-1)
- 10) Tender Price Schedule (Form-2)

- (3) All entries in the tender including attachment shall be written in English. All units in the tender shall be in the metric system unless otherwise specified in the Technical Specifications.

(4) Incomplete, vague or conditional tenders will not be considered.

2. Tender Prices

(1) All prices including all taxes shall be quoted in US Dollars without exception.

(2) Tender prices shall be firm and final, and not subject to escalation.

3. Term of Validity of Tender

The tender shall remain valid and irrevocable for a period of thirty (30) days on and after the day of the tender opening.

4. Submission of Tender

(1) The tender shall be submitted to the address specified in the Invitation to Tender hereof, not later than the closing time for submission of tender specified in the same.

(2) The tender shall be submitted in person. The tenders through other means such as telex, telegraph, facsimile, e-mail or mail shall not be accepted.

(3) Any tender received after the closing time shall be returned unopened.

(4) Alternative tender shall not be allowed.

(5) The tenderer is neither allowed to modify nor withdraw his tender after the closing time.

Chapter 4: Opening of Tender

1. Introduction

(1) All the tenders shall be opened on the date, time and place specified in the Invitation

to Tender hereof, immediately after the closing time, in the presence of the Consultant and the tenderers.

- (2) At least one (1) authorized person with Power of Attorney of tenderer who submitted the tender documents shall attend the tender opening.

2. Tender Opening Procedures

- (1) All the participants in the tender opening shall register their signatures in an attendant list prepared by the Consultant before the tender opening.
- (2) The Consultant shall confirm the validity of each ~~Power of Attorney~~ of the tenderers. In case the document is incomplete or inappropriate, the tenderer shall forfeit his right to participate in the tender opening any further and the tender shall be returned unopened.
- (3) Envelope-A will be opened and availability of the documents in Envelope-A required in Clause 1 (2) of Chapter 3 shall be examined. In case the document is incomplete or inappropriate, the tenderer shall forfeit his right to participate in the tender opening any further and Envelope-B shall be returned unopened. The appropriateness of each document shall be examined carefully and thoroughly afterwards in the stage of tender evaluation.
- (4) Envelope-B will be opened and the tender price offered by each tenderer shall be read aloud and recorded. The tenderer who submits the lowest tender price within the ceiling price set forth by the Consultant shall be designated as the prioritized company for the contract.
- (5) In the event that all tender prices offered exceed the ceiling price, the tenderers are requested to submit the prices again immediately after the first tender opening. In this case, tenderers shall be requested to submit the Form of Tender (Form-1) only. The Form of Tender will be prepared by the Consultant and distributed to each of tenderers before the second tender. The representative of each of tenderer who attends the tender opening shall, therefore, be duly authorized by his firm or company to submit the tenders for these second offers, as provided in Clause 1 (2) of Chapter 4.
- (6) In the second tendering mentioned in (5) above, the tenderer who submits the lowest tender price within the ceiling price set forth by the Consultant shall be designated as the prioritized company for the contract.
- (7) If the tender prices in the second tendering are exceeding the ceiling price, the tenderer submitting the lowest price on the second tender will be asked to enter into

price negotiation in the stage of the tender evaluation for price reduction into the ceiling price.

- (8) In case the negotiation with the lowest tenderer mentioned in (7) above is not successful, the Consultant will invite the next lowest tenderer to enter into price negotiation. This procedure will be followed until the Consultant reaches agreement with a tenderer. When no tenderer reaches agreement in this procedure, re-tendering may be considered.
- (9) In case there are two or more tenders at the same price within the ceiling price, a prioritized tender shall be determined by drawing lots.

Chapter 5: Evaluation of Tender and Award of Contract

1. Evaluation of Tender

- (1) The Consultant will ascertain, examine and evaluate the tenders that;
 - 1) computations are free of material errors,
 - 2) the submitted documents are substantially responsive to the Tender Documents,
 - 3) documents have been properly signed, and
 - 4) the tenders are otherwise generally in order.
- (2) If a tender does not substantially conform to the Technical Specifications, or contains inadmissible reservation or otherwise not substantially responsive to the Tender Documents, it shall be rejected.
- (3) If the tender of the prioritized tenderer is incomplete, the Consultant will negotiate for the contract with the next lowest price tenderer and this procedure will be followed until the Consultant reaches agreement with a tenderer.

2. Clarification or Alteration of Tender

In the examination, evaluation and comparison of the tenders, the Consultant may, at his discretion, ask any tenderer for a clarification of his tender. All responses to the requests for clarification shall be in writing, and no change in the total price or the substance of the tender shall be offered or permitted.

3. Process to be Confidential

Information relating to the examination, clarification, and evaluation of tenders, and recommendations for the award of the Contract shall not be disclosed to tenderers or any other persons who are not officially concerned with such process until the notification of award defined in Clause 5 of Chapter 5.

4. Contact with the Consultant

- (1) Except for the clarification of the tender as provided in Clause 2 of this Chapter, no tenderer shall contact with the Consultant on any matter related to the tender, from the time of the tender opening to the time of the Contract awarding.
- (2) Any effort by a tenderer to influence the Consultant's processing of tendering or award decisions may result in the disqualification of the tenderer.

5. Notification of Award

- (1) The tenderer whose offer substantially conforms to the Technical Specifications and other conditions of the Tender Documents, and who offers the lowest price within the ceiling price, shall be designated as the successful tenderer.
- (2) After completion of evaluation of the tender, the Consultant shall issue a notification of award to the successful tenderer within the period of validity of tenders stated in Clause 3 of Chapter 3 hereof by hand and/or e-mail.

6. Signing of Contract

- (1) At the same time that the Consultant notifies the successful tenderer that his tender has been accepted, the Consultant will send the tenderer the Forms of Contract provided in the Tender Documents, incorporating all arrangements between the parties.
- (2) The following documents shall be considered as the integral part of the Contract;
 - 1) Contract Agreement,
 - 2) Conditions of Contract,
 - 3) Tender of the successful tenderer,
 - 4) Technical Specifications,
 - 5) Work Schedule, and

6) Instruction to Tenderer and such other documents intended to form the Contract

The documents of the Contract are to be taken as mutually explanatory of one another. If an ambiguity or discrepancy is found in the documents, the interpretation shall be done in accordance with the above-mentioned sequence of the priority. The successful tenderer shall submit the breakdown of unit price to the Consultant within three (3) days after the conclusion of the Contract.

The breakdown of unit price does not constitute a part of the Contract, but the Consultant is to use the breakdown as a reference material for the following purposes such as,

- (a) confirmation of the work amount for an interim payment, and
- (b) confirmation of the adjusted contract price in case of early termination.

7. Performance Security

The successful tenderer who receives the notification of award shall provide a performance security amounting to ten (10) % of the total contract price within fourteen (14) days after the date of award.

8. Notification of the Result of Tender

Upon the receiving the performance security from the successful tenderer, the Consultant shall promptly notify the other tenderers in writing that their tenders have been unsuccessful.

9. Notice to Commencement

The Contractor shall proceed the work within one (1) week after the issuance of Notice to Commencement by the Consultant.

Chapter 6: Common Conditions

1. Safety Procedure

The Contractor shall;

(1) Comply with all applicable safety regulations, especially security regulation of JICA (Japan International Cooperation Agency), as shown in below:

- 1) To confirm security of the survey area before work starts through the Administrative office of the area, and request security guard from the police

office of the area at his own expenses,

- 2) To use more than 2 vehicles for accessing to the survey area,
- 3) To drive more than 65km per hour to the survey area,
- 4) To carry the first-aid kit for the emergency,
- 5) To carry mobile phone for communicating all the time, and
- 6) To perform your work only daytime (7am to 6pm)

(2) Take the Landmine and ERW (Explosive Remnants of War) Awareness and Safety Training which is conducted by UNMAS (United Nations Mine Action Service) at his own expenses prior to commencement of the Work,

(3) Take care for the safety of all persons entitled to be on the Site,

(4) Use reasonable efforts to keep the Site and the Works clear of unnecessary obstruction so as to avoid danger to these persons, and

(5) Provide any temporary works (including roadways, footways, guard and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.

2. Quality Assurance

(1) The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract.

(2) Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

3. Protection of the Environment

The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other result of his operations.

**THE PROJECT
FOR
IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN**

**GEOGRAPHICAL SURVEY
AND SOIL MECHANICAL INVESTIGATION
IN WESTERN BAHR EL GHAZAL STATE
WAU**

FORM OF CONTRACT AGREEMENT

AGREEMENT
FOR
GEOLOGICAL SURVEY AND SOIL MECHANICAL INVESTIGATION
IN WESTERN BAHR EL GHAZAL STATE
WAU
ON
THE PROJECT FOR IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN

THIS AGREEMENT, made and entered into this **11th of January, 2015** by and between:

Ministry of Electricity, Dams, Irrigation and Water Resources, having its principal office at xxxx, Juba, South Sudan (hereinafter referred to as **the Employer**) of the one part

and

(name of the contractor), duly organized and existing under the laws of South Sudan, having its principal office of business at **(address of the contractor)** (hereinafter referred to as **the Contractor**) of the other part.

WHEREAS, the formulation of the Irrigation Development Master Plan (hereinafter referred to as **IDMP**) in the Republic of South Sudan (hereinafter referred to as **the Project**) has been on-going. The formulation of the IDMP project is implemented under the leadership of the Ministry of Electricity, Dams, Irrigation and Water Resources (hereinafter referred to as **MEDIWR**)

WHEREAS, the Employer requires that certain works to be carried out as mentioned hereinafter, viz.: the Geological Survey and Soil Mechanical Investigation in Western Bahr el Ghazal State, Wau on the project of IDMP (hereinafter referred to as **the Works**).

WHEREAS, the Contractor is willing to perform the Works on the terms and conditions as set forth in this Contract.

NOW THIS AGREEMENT WITNESS AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
 - a) The Conditions of Contract,
 - b) The Technical Specifications, and
 - c) The Bill of Quantities.
3. The Contractor hereby covenants with the Employer to commence the Works within the period stipulated in the Conditions of Contract and perform the technical investigations in conformity in all respects with the provision of the Agreement.
4. The Employer hereby covenants to pay the Contractor in consideration of the performance of the contract works quantities calculated in accordance with and at the times and in the manner prescribed in the Conditions of Contract.

IN WITNESS WHEREOF, this Agreement has been accepted by the parties hereto and signed by them in Juba, the Republic of South Sudan on the ****th of *****, 2015.**

FOR AND ON BEHALF OF THE EMPLOYER

Head of Irrigation Department
MEDIWR

FOR AND ON BEHALF OF THE CONTRACTOR

(Name)
(Title)
(Name of the Contractor)

**THE PROJECT
FOR
IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN**

**GEOLOGICAL SURVEY
AND SOIL MECHANICAL INVESTIGATION
IN WESTERN BAHR EL GHAZAL STATE
WAU**

CONDITIONS OF CONTRACT

CONDITIONS OF CONTRACT

Article 1 Contract Period and Quantities

The Contract Period shall start at the signing of this Agreement and end at the 31st of May, 2015. The Contractor shall begin work not later than ten (10) days after the date of signing of this Agreement. As the Contract period mentioned above cannot be changed under any circumstances, the Contractor must plan his work carefully and exert his maximum effort to complete the Works within the Contract period. If, however, any quantity should remain unexecuted after the date specified, this quantity may be deleted from this Agreement. The Contractor shall not then be entitled to any compensation whatsoever for this reduction of the quantity.

Article 2 Review and Examination

The services performed under this Agreement shall be of good standard as indicated by the Employer. The Employer shall have the right to reject inaccurate or substandard services. All rejected services shall be satisfactorily corrected and replaced without cost to the Employer within the period specified by the Employer.

Article 3 Unit Prices and Payments

The unit prices set up in the Bill of Quantities agreed by both parties shall not be changed in any case. The quantities shown in the Bill of Quantities are tentative and may fluctuate during the progress of the Works. If the quantities increase or decrease, the Contractor shall inform the Employer and shall get approval of the Employer whether or not to continue the Works. In case increasing or decreasing of the quantity is ordered by the Employer, payment will be increased or decreased depending on the increasing or decreasing on the ratio of the Works.

The payment Condition shall be as follows:

1st	Advance Payment	US\$ ***,***. (20%)
2nd	1 st Interim Payment (after the mobilization of required equipment and staff to the Site)	US\$ ***,***. (20%)
3rd	2 nd Interim Payment (after submission of the Draft Report)	US\$ ***,***. (30%)
4th	Final Payment (after completion of the Works)	US\$ ***,***. (30%)
		<hr/>
		Entire US\$ ***,***.

Advance Payment shall be made to the Contractor immediately after signing of this Agreement with the invoice issued by the Contractor.

The Contractor shall submit the invoice when the next stage payment is due. The Employer shall investigate, confirm, and approve the issued invoice within five (5) days after the date of receiving the invoice. Payment shall follow the approval within three (3) days.

Notwithstanding the above, the final payment shall be made within three (3) days from the date the Employer approves the bills prepared by the Contractor.

Article 4 Care of Works

All items of work for which payments have been made shall thereupon become the property of the Employer, but this provision shall not be construed as relieving the Contractor from the sole responsibility, prior to completion of this Agreement, for the care and protection of materials remaining in his possession for which payments have been made.

The Contractor is responsible for correcting all mistakes discovered during the performance of work.

Article 5 Risk Damages

5.1 Risk Damages

The Contractor will be considered as an independent entity under this Agreement, and he will obtain all necessary insurance to protect himself from liability arising out of this Agreement. The Contractor shall assume all risks of injury to persons or property in connection with the performance of work under this Agreement and shall indemnify and save harmless the Ministry of Electricity, Dams, Irrigation and Water Resources (MEDIWR), the Ministry of Agriculture, Forestry, Cooperatives and Rural Development (MAFCRD) and the Employer.

5.2 Records and Reports

The Contractor shall maintain an accurate record of, and shall report to the Employer in the manner and on the forms approved by the Employer, all causes of death, occupational diseases, or injury arising out of or in the course of employment incident to performance of work under this Agreement.

Article 6 Sub-Contract

The Contractor may, after written approval from the Employer, enter into sub-contract(s) covering part of the Works contemplated by this Agreement. The Employer's approval of a sub-contractor will not in any way relieve the Contractor from his absolute responsibility for the adequacy of the sub-contractor's work.

Article 7 Rights-of-Entry

The Employer shall be solely responsible for securing permission for entering into the area mentioned in this Agreement and obtaining rights-of-entry to the work sites from the concerned authorities. The Contractor shall assume all responsibility for and take all precautions to prevent damage to property entered by him.

Article 8 Termination

The Employer reserves the right to terminate this Agreement, but shall give a written notice to the Contractor at least fourteen (14) days prior to the termination. Upon receipt of notice of termination from the Employer, the Contractor shall cease the performance of services under this Agreement except as otherwise agreed in writing between the Employer and the Contractor.

In case of termination, the Contractor shall be entitled to receive payments due for his services performed up to the expiration of the notice period. The Contractor shall not be entitled to any loss of profit or any other form of compensation for the termination of this Agreement. Upon termination of this Agreement, the Contractor shall give the Employer all data compiled and preliminary conclusions reached up to the date of termination.

Article 9 Force Majeure

Should the Contractor's provision of services or the Employer's obligations under this Agreement be affected by Force Majeure which makes impossible to carry out such services and obligations, the Contractor should notify the Employer in writing within fourteen (14) days of the occurrence of Force Majeure may be granted.

Upon occurrence of such Force Majeure which has to be proved by the Contractor an extension of time corresponding to the suspension of work caused by such Force Majeure.

Article 10 Arbitration

The rules, laws and regulations applied in the Republic of South Sudan shall be considered complementary to the conditions of this Agreement.

Any dispute or difference arising out of this Agreement and/or the provisions of these rules, including those considered as such by only one of the parties, shall be finally settled under the arbitration law of the Republic of South Sudan.

Article 11 Personnel

The Contractor shall make every effort to provide at all times personnel of the highest standards, at all levels who will be totally dedicated to the execution of the services described in this Agreement.

The Contractor shall make every possible effort to protect the interests of the Employer in matters pertaining to this Agreement and he shall always act and behave in a way which does not harm the honor and reputation of his profession.

On written request by the Employer, explaining the reasons that call for termination of services of any of the Contractor's staff, the Contractor shall promptly replace any such staff as necessary without any additional cost to the Employer.

Article 12 Detail Work Schedule and Mobilization Plan

Immediately after signing of this Agreement, the Contractor shall submit the detailed work schedule and mobilization plan to the Employer.

All documents for detail work schedule, mobilization plan, etc., shall be deemed as a part of this Agreement.

Article 13 Correspondence

Any formal notice by the Employer to the Contractor or by the Contractor to the Employer under this Agreement shall be given by hand, and the receipt shall be acknowledged by signing in the chit books, if any.

All notices and communications between the Employer and the Contractor and vice-versa should be written in English.

Article 14 Penalty for Delay

In the event a delay of the Works occurred by the Contractor causes, the Contractor shall be liable to the Employer one (1) percent of the Contract Amount for each day of the delay.

Article 15 Income Tax and Other Duties

Under all phases of this Agreement, the Contractor shall be liable for its corporation tax, income tax, duties, contributions and other tasks or charge which may be levied both on the Contractor and its local staff according to the law and regulations of the Republic of South Sudan.

Article 16 Language

The English language shall be used in all written communication between the Employer and the Contractor with respect to this Agreement.

Article 17 Liaison and Support for Employer

The Contractor shall appoint one chief engineer to be in charge of executing the Works. He shall have good command of English and shall stay at the work site during the execution of the Contract work.

The Contractor and his staff shall assist the Employer at no cost to the Employer in conducting measurements and investigations for checking the Works executed by the Contractor.

Article 18 Completion of Works.

On completion of the Works, the Contractor shall remove all debris and unused materials from the sites, and restore the site as nearly as possible to its original condition.

Upon the completion of the field works, the Contractor shall explain all result of the Works carried out under this Agreement to the Employer for his

satisfaction on site. The Contractor shall re-perform and/or re-measure the Works which are not to the satisfaction of the Employer.

Article 19 Personal Information

The Contractor shall not, otherwise mutually agreed in writing, handle personal information about the Employer as well as JICA, MEDIWA and MAFCRD, beyond the scope necessary for the execution of this Agreement. The Contractor handling personal information shall take necessary and proper measures for the prevention of leakage, loss, or damage, and for other control of security of the personal data.

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IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN**

**GEOLOGICAL SURVEY
AND SOIL MECHANICAL INVESTIGATION
IN WESTERN BAHR EL GHAZAL STATE
WAU**

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

1. INTRODUCTION

1.1 Location of the Site

The location of the Works is on the east of Wau Town, River Jur County, Western Bahr el Ghazal State, the Republic of South Sudan, as shown in below:

Items	Coordinates	
	From	TO
Dam Site	7° 41 q24 +N 28° 04 q53 +E	7° 40 q48 +N 28° 05 q25 +E
Canal Route	7° 41 q08 +N 28° 05 q07 +E	7° 44 q42 +N 28° 01 q10 +E
Command Area	7° 41 q11 +N 28° 02 q03 +E	7° 44 q42 +N 28° 01 q10 +E
Pump Station	7° 40 q58 +N 28° 03 q01 +E	7° 41 q03 +N 28° 02 q46 +E

1.2 Object of the Works

The Works are composed of two (2) items viz; 1) geological survey and 2) soil mechanical investigation. The object of the Works is to identify the geological feature and soil mechanical characteristics at the planned construction site of irrigation facilities and its adjoining area on the east of Wau Town, River Jur County, Western Bahr el Ghazal State.

1.3 Scope of the Works

The Works to be carried out under this Agreement shall be as follows:

- (1) Borehole Drilling: 50m in length in total
 - 15m x 1 borehole (at the center of the dam)
 - 10m x 2 boreholes (at the right and the left abutment of the dam)
 - 5m x 3 boreholes (on the canal alignment)
- (2) Permeability Test: 10 tests in total
 - 4 tests x 1 borehole (at 0-5m, 5-9m, 9-12m and 12-15m, in 15m-borehole at the dam site)
 - 3 tests x 2 boreholes (at 0-4m, 4-7m and 7-10m, in 10m-borehole at the dam site)
- (3) Standard Penetration Test (SPT): 50 tests in total
 - 15 tests x 1 borehole (at 1 m interval in 15m-borehole at the dam site)
 - 10 tests x 2 boreholes (at 1 m interval in 10m-borehole at the dam site)

- 5 tests x 3 boreholes (at 1 m interval in 5m-borehole on the canal alignment)
- (4) Laboratory Test: by 9 samples (2 samples × 3 boreholes at the dam site, 1 sample × 3 boreholes on the canal alignment)
- Grain size analysis
 - Specific gravity
 - Atterberg Limits (Liquid and Plastic Limits)

2. Method of the Works

2.1 Borehole Drilling

Borehole drilling shall be performed by the use of hydraulically driven rotary drilling machines in the vertical direction and up to the depth shown in the chapter 1.3 or directed by the Employer. Diameter of the core tube shall be not less than 66 mm.

Water level in the boreholes shall be measured and recorded every time before commencement of day's drilling work. The last measurement shall be done on the day after the completion of the work to the borehole concerned.

Preliminary field log shall be prepared by Contractor. The field log shall contain the information mentioned below: type, make and model of the drilling machine, type and size of casing and rods, names of supervisor and operator, date and time of the work, depth of casing, results of in-situ testing or sampling, recovery ratios, visual description of soil and rock, groundwater level observation and other remarks.

Back filling of the borehole and cleaning, repair of borehole location are required.

2.2 Permeability Test

Permeability test shall be performed at the intervals shown in the chapter 1.3 to each borehole. Permeability test method shall be selected from the constant head method, the variable head method by injecting water or the rising head method by bailing water depending on the subsoil condition encountered.

2.3 Standard Penetration Test (SPT)

Standard penetration test (SPT) shall be performed at one (1) meter interval. The SPT shall be conducted in accordance with American Society for Testing Materials (ASTM) or equivalent standard.

The results of the test shall be recorded in the daily report of drilling in number of blows for each ten (10) centimeters of penetration and the total number to the thirty (30) centimeters of penetration.

In case of the drilling work meeting the weathered rock formation and the total number of penetration exceeding fifty (50) times in the three (3) times of continuous penetration tests, the subsequent penetration tests shall be canceled.

2.4 Sampling

All the drilled core must not be washed away but taken out of the core tube or the SPT sampler as much as possible and put and kept into/in the core box with the space separated at 1m interval. The core boxes shall be transported to the soil laboratory soon after the photos of those being taken.

2.5 Laboratory Test

The samples for soil tests shall be selected by the Employer from the core boxes. The laboratory testing method shall be in accordance with the ASTM or equivalent standard. The report in English shall contain testing equipment, method and results of laboratory tests which will be submitted to the Employer.

2.6 Report

The report shall be prepared in English, three (3) copies of the report will be required and the report shall contain the following information:

- (1) Borehole number and location,
- (2) Elevation of the ground level of the borehole,
- (3) Depth of the borehole,
- (4) Model name of drilling machine,
- (5) Date of drilling,
- (6) Geological and Geotechnical descriptions of boreholes i.e. drilled cores,
- (7) Results of the standard penetration tests,
- (8) Location map of boreholes,
- (9) Borehole logs with the scale of 1/100 in vertical,
- (10) Geotechnical soil profiles,
- (11) Summary of soil parameters,
- (12) Water level in the borehole,
- (13) Color photograph of the drilling scene, the drilled cores cased in the core boxes, depth inspection scene, SPT testing samples, laboratory test samples and testing scene, and
- (14) Certification from the laboratory

BILL OF QUANTITIES

(Unit: US\$)

ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
1. Geological Survey and Soil Mechanical Investigation					
101	Mobilization and Demobilization	L.S.	1		
102	Drilling (at the center of the dam, 15m x 1)	m	15		
103	Drilling (at the both abutments of the dam, 10m x 2)	m	20		
104	Drilling (on the canal alignment, 5m x 3)	m	15		
105	Permeability Test (in 15m-borehole)	Nos.	4		
106	Permeability Test (in 10m-boreholes)	Nos.	6		
107	Standard Penetration Test (SPT) (at 1m interval in 15m-borehole)	Nos.	15		
108	Standard Penetration Test (SPT) (at 1m interval in 10m boreholes)	Nos.	20		
109	Standard Penetration Test (SPT) (at 1m interval in 5m-boreholes)	Nos.	15		
110	Sampling (Core boxes for 15m borehole)	Nos.	3		
111	Sampling (Core boxes for 10m boreholes)	Nos.	4		
112	Sampling (Core boxes for 5m boreholes)	Nos.	3		
113	Laboratory Test	Nos.	9		
	Sub-total	-	-	-	-
2. Reporting (including drill logs)					
201	Factual Report (inclusive of colored photographs)	L.S.	1		
	Sub-total	-	-	-	-
3. Others					
	Sub-total	-	-	-	-
4. Total					
5. Contract Amount					

Notes:

1. All items in the Tender Price Schedule shall be quoted in US Dollar (US\$) and including all taxes imposed in the Republic of South Sudan.
2. Breakdown of Tender Price shall satisfy the requirements of Work Schedule. The breakdown will be required to be prepared and presented during tender negotiation.
3. Indirect costs for mobilization, temporary works, site office, overhead and profit as well as all other indirect cost items shall be distributed in the above breakdown items.

LOCATION MAP

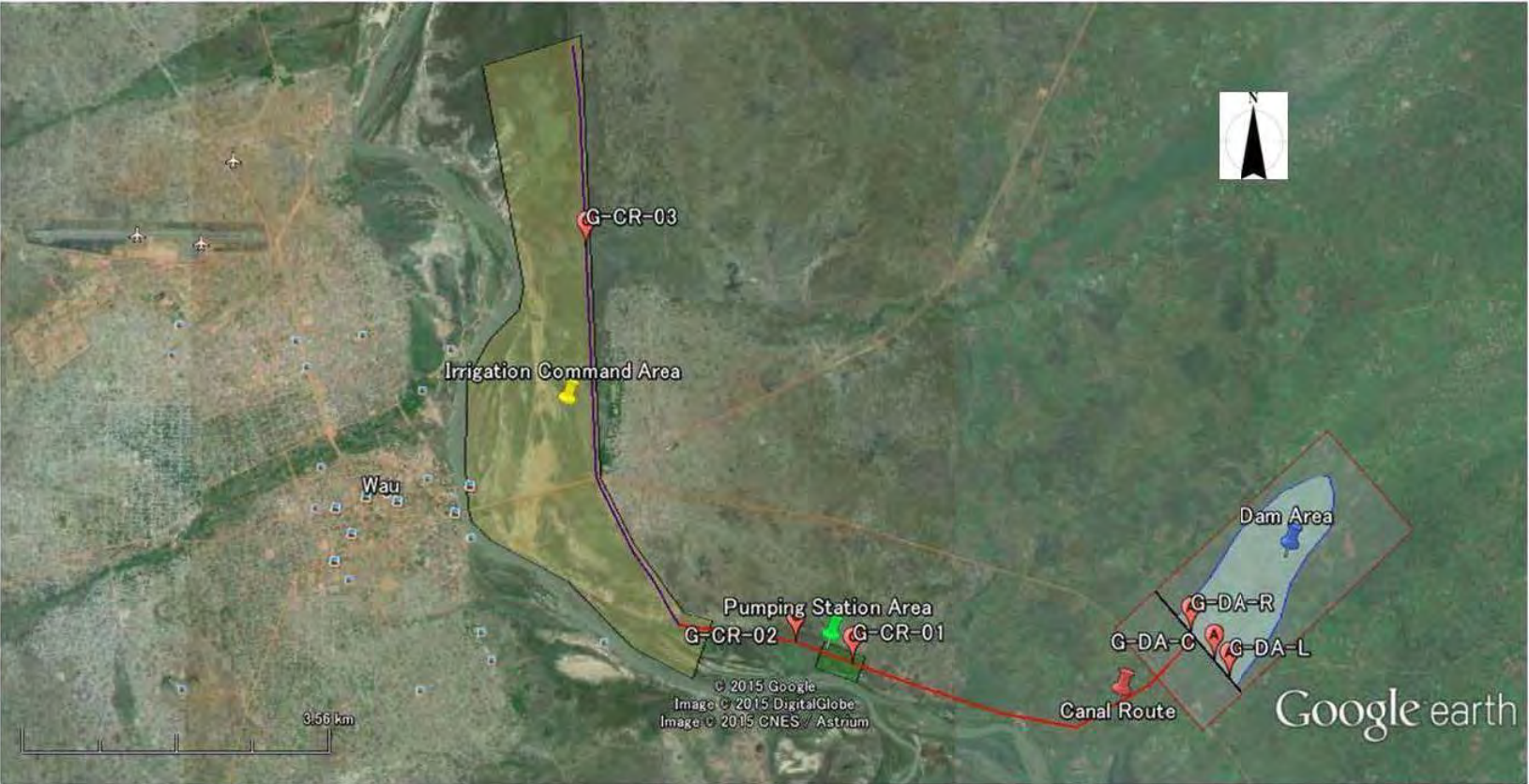


Fig.-1: Location Map of Survey Area - Overall View

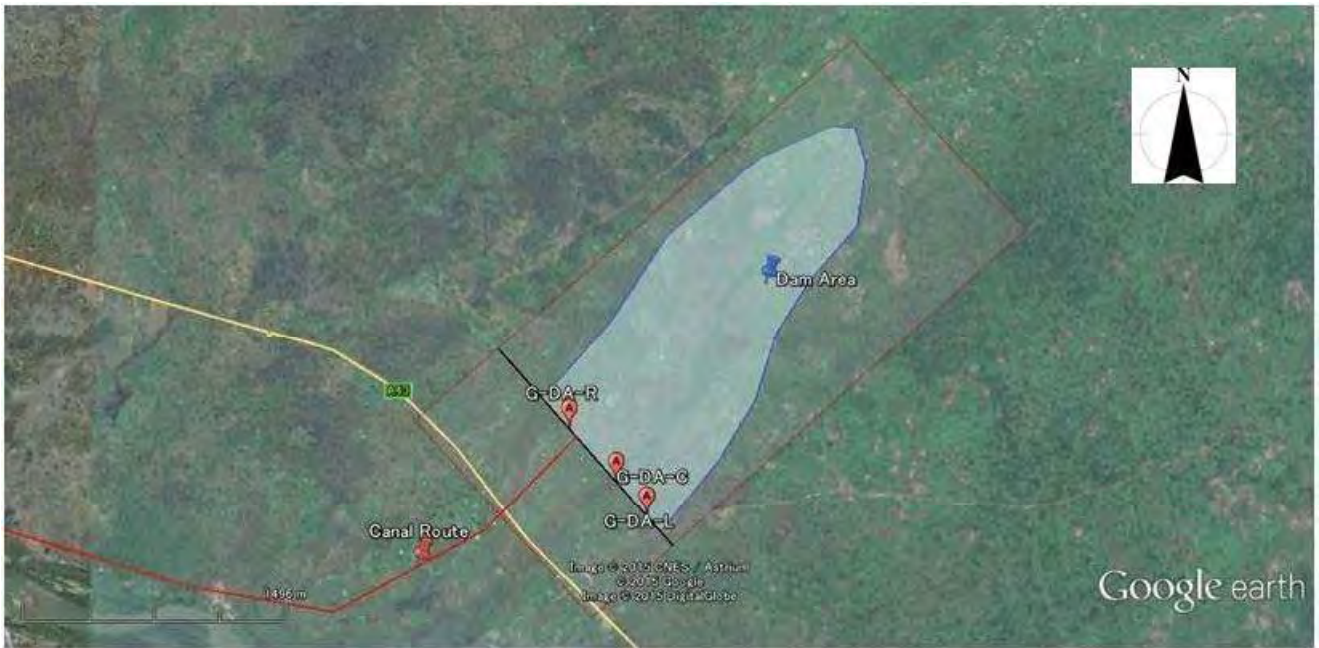


Fig.-2: Location Map & Reference Point of Survey Area - Dam Site



Fig.-3: Location Map & Reference Point of Survey Area – Canal (1/2)



Fig.-4: Location Map & Reference Point of Survey Area – Canal (2/2)

COORDINATES OF REFERENCE POINT

Table-1: Coordinates of Drilling Point - Dam Axis

No.	Coordinates (° - ' - ")		Remarks
	N	E	
G-DA-C	7-40-59.84	28-05-14.78	Dam Axis Center, EL.439m
G-DA-L	7-40-53.51	28-05-20.46	Left abutment, EL.444m
G-DA-R	7-41-09.63	28-05-06.02	Right abutment, EL.444m

Table-2: Coordinates of Drilling Point - Canal

No.	Coordinates (° - ' - ")		Remarks
	N	E	
G-CR-01	7-40-58.90	28-02-57.51	On dry area in pumping station
G-CR-02	7-41-06.31	28-02-35.68	On Swampy area
G-CR-03	7-43-28.70	28-01-15.33	do.

**THE PROJECT
FOR
IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN**

**GEOLOGICAL SURVEY
AND SOIL MECHANICAL INVESTIGATION
IN WESTERN BAHR EL GHAZAL STATE
WAU**

FORM OF TENDER

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Form of Tender (Form-1)

To: OOOOO
Head of Irrigation Department
MEDIWR

GEOLOGICAL SURVEY AND SOIL MECHANICAL INVESTIGATION
IN WESTERN BAHR EL GHAZAL STATE
WAU
ON
THE PROJECT FOR IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN

Dear Sir,

1. Having carefully examined all the Tender Documents for the execution of the above captioned work and agreeing to the provisions therein, we, the undersigned, offer to execute and complete the whole of the said Works for the required period of time and the tender items outlined in the Tender Documents for the sum of ***** thousand ***** hundred US Dollars.
(US\$ _____).
2. We undertake, if our tender is accepted, to commence the Works within seven (7) days upon receipt of the Consultant's notice to commence and to complete and deliver the whole of the Works comprised in the Contract within the time stated in the Contract Documents.
3. We agree to abide by this Tender for a period of thirty (30) calendar days from the opening date of the Tender and it shall remain binding upon us and may be accepted by you at any time before the expiration of the said period.
4. Unless and until a formal Agreement is prepared and executed this Tender, together with your written acceptance thereof, shall constitute a binding Contract between us.

For the Tenderer

Name : _____

Signature: _____

In the capacity of: _____ (Official Title)

Duly authorized to sign Tenders for and on behalf of

_____ (Company Name of the Tenderer)

Address: _____

Dated this **th of *****, 2015

Form of Tender Price Schedule (Form-2)

(Unit: US\$)

ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
1. Geological Survey and Soil Mechanical Investigation					
101	Mobilization and Demobilization	L.S.	1		
102	Drilling (at the center of the dam, 15m x 1)	m	15		
103	Drilling (at the both abutments of the dam, 10m x 2)	m	20		
104	Drilling (on the canal alignment, 5m x 3)	m	15		
105	Permeability Test (in 15m-borehole)	Nos.	4		
106	Permeability Test (in 10m-boreholes)	Nos.	6		
107	Standard Penetration Test (SPT) (at 1m interval in 15m-borehole)	Nos.	15		
108	Standard Penetration Test (SPT) (at 1m interval in 10m boreholes)	Nos.	20		
109	Standard Penetration Test (SPT) (at 1m interval in 5m-boreholes)	Nos.	15		
110	Sampling (Core boxes for 15m borehole)	Nos.	3		
111	Sampling (Core boxes for 10m boreholes)	Nos.	4		
112	Sampling (Core boxes for 5m boreholes)	Nos.	3		
113	Laboratory Test	Nos.	9		
	Sub-total	-	-	-	-
2. Reporting (including drill logs)					
201	Factual Report (inclusive of colored photographs)	L.S.	1		
	Sub-total	-	-	-	-
3. Others					
	Sub-total	-	-	-	-
4. Total					
5. Contract Amount					

Notes:

1. All items in the Tender Price Schedule shall be quoted in US Dollar (US\$) and including all taxes imposed in the Republic of South Sudan.
2. Breakdown of Tender Price shall satisfy the requirements of Work Schedule. The breakdown will be required to be prepared and presented during tender negotiation.
3. Indirect costs for mobilization, temporary works, site office, overhead and profit as well as all other indirect cost items shall be distributed in the above breakdown items.

Form of Power of Attorney (Form-3)

To: OOOOO
Head of Irrigation Department
MEDIWR

Date: **th of *****, 2015

Power of Attorney

KNOW ALL MEN BY THIS PRESENTS:

THAT, (Company Name of the Tender), a juridical person, duly organized and existing under the laws of (Name of the Country), having its registered office of business at (Address of the Tenderer), does hereby appoint and authorize (Name and Surname of the Attorney), (Title in the Company), whose signature appears below;

(Signature of Attorney)

(Name of Attorney)

(Title in the company)

(Company name of the Tenderer)

As our true and lawful attorney, with full power of authority concerning the Geological Survey and Soil Mechanical Investigation on the Project for Irrigation Development Master Plan (IDMP) in the Republic of South Sudan, to sign all the documents as will be required for the tendering and for contracting of the above captioned work, all in our name and on our behalf, hereby ratifying and confirming that the said attorney shall do pursuant to the power thereunder granted.

IN WITNESS WHEREOF, we have caused this present to be duly signed by our lawful representative on the **th of *****, 2015.

(Company name of Tenderer)

(Name of Tenderer; Statutory Authorized Representative in print)

(Title of the Representative)

(Signature of the representative)

Form of Work Schedule (Form-4)

Item	2015 March			2015 April			2015 May		
	10	20		10	20		10	20	
1. Mobilization									
2. Drilling Works - Drilling - Permeability Test - SPT - Sampling									
3. Laboratory Test									
4. Demobilization									
5. Reporting									

Notes

Work schedule shall be shown by bar chart.

List of Similar Work Experiences (Form-5)

Name of Project	Client	Country	Contract Price (US\$)	Source of Fund	Contract Period	Description of the Works

Notes:

Certificate of completion for all of works described above shall be attached.

(Signature) _____

(Printed Name of Signer)

(Title of Signer)

(Name of Tenderer)

(Address of Tenderer)

List of Equipment to be adopted for work (Form-6)

Item	Type and Name of Equipment	Detail Specification	Model year	Remarks (used records/years)
Drilling Rig				
Permeability Test Equipment				
Standard Penetration Test Equipment				
Laboratory Test Equipment - - -				
Others				

Notes:

Certificate of ownership or hiring for all of equipment described above shall be attached.

(Signature) _____

(Printed Name of Signer)

(Title of Signer)

(Name of Tenderer)

(Address of Tenderer)

General Information of Tenderer (Form-7)

1. Name (legal name)

2. Address of the Head Office

3. The Business License

(1) License Number : _____

(2) Date of Issue : _____

(3) Issued at : _____

4. Name of Company's Representative

5. Date Establishment of Applicants

_____ (month and year)

6. Full Paid-in Capital

7. Numbers of Employee

(1) Civil Engineering Staff _____
(incl.: Geologist and Soil Mechanical Engineer)

(2) Architect Engineering Staff _____

(3) Mechanical and Electrical Engineering Staff _____
(incl.: Operator for drilling rig)

(4) Administration Staff _____

(5) Others _____

TOTAL _____

8. Numbers of Qualified Employee

(1) Geologist with 5 years experience _____

(2) Soil Mechanical Engr. with 5 years experience _____

(3) Operator for drilling rig with 5 year experience _____

9. Annual Total Sales (during the last five (5) years)

FY 2010	_____	million US Dollars
FY 2011	_____	million US Dollars
FY 2012	_____	million US Dollars
FY 2013	_____	million US Dollars
FY 2014	_____	million US Dollars

(Signature) _____

(Printed Name of Signer)

(Title of Signer)

(Name of Tenderer)

(Address of Tenderer)

Financial Statement (Form-8)

(Unit: US\$)

Fiscal Year Item	2012	2013	2014
1. Gross sales			
2. Gross profit			
3. Operating profit			
4. Ordinary profit			
5. Net profit before tax			
6. Current assets			
7. Fixed assets			
8. Current liabilities			
9. Share holders equity			
10. Total of liabilities and share holders equity			

Remarks:

%Gross profit+ = %Gross sales+ . %Cost of sales+
 %Operation profit+ = %Gross profit+ . %Selling and Administration cost+
 %Ordinary profit+ = %Operating profit++ %Non-operating income+
 . %Non-operating expense+
 %Net profit before tax+= %Ordinary profit++ %Extraordinary income+
 . %Extraordinary loss+

(Signature) _____

(Printed Name of Signer)

(Title of Signer)

(Name of Tenderer)

(Address of Tenderer)

Form of Inquiries (Form-9)

Date: **th of ***, 2015

To: OOOOO
Head of Irrigation Department
MEDIWR

Re: Inquiries for the Geological Survey and Soil Mechanical Investigation in Western Bahr el Ghazal State, Wau on the Project for Irrigation Development Master Plan (IDMP)

Dear Sir,

With regard to the tender for the Geological Survey and Soil Mechanical Investigation in Western Bahr el Ghazal State, Wau on the Project for Irrigation Development Master Plan (IDMP) in the Republic of South Sudan, we hereby submit the attached inquiries for the Tender Documents thereof.

Your kind attention will be highly appreciated.

Yours sincerely,

Name of Company: _____

Signature: _____

Name in Block Letter: _____

Title: _____

Inquiries for the Geological Survey and Soil Mechanical Investigation
In Western Bahr el Ghazal State, Wau
On the Project for Irrigation Development Master Plan (IDMP)
The Republic of South Sudan

Document Name, Page, Chapter and Clause	Inquiries (from Tenderer)	Replies (from the Consultant)

**THE PROJECT
FOR
IRRIGATION DEVELOPMENT MASTER PLAN (IDMP)
THE REPUBLIC OF SOUTH SUDAN**

**TOPOGRAPHIC SURVEY
IN WESTERN BAHR EL GHAZAL STATE
WAU**

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

1. INTRODUCTION

1.1 Location of the Site

The location of the Works is on the east of Wau Town, River Jur County, Western Bahr el Ghazal State, the Republic of South Sudan, as shown in below:

Items	Coordinates	
	From	TO
Dam Site	7° 41 q24 +N 28° 04 q53 +E	7° 40 q48 +N 28° 05 q25 +E
Canal Route	7° 41 q08 +N 28° 05 q07 +E	7° 44 q42 +N 28° 01 q10 +E
Command Area	7° 41 q11 +N 28° 02 q03 +E	7° 44 q42 +N 28° 01 q10 +E
Pump Station	7° 40 q58 +N 28° 03 q01 +E	7° 41 q03 +N 28° 02 q46 +E

1.2 Object of the Works

The Works are composed of four (4) items viz; 1) dam site survey, 2) canal route survey, 3) command area survey and 4) pump station survey. The object of the Works is to identify the topographical conditions at the planned construction site of irrigation facilities and its adjoining area on the east of Wau Town, River Jur County, Western Bahr el Ghazal State.

1.3 Scope of the Works

The Works to be carried out under this Agreement shall be as follows:

(1) Dam Site Survey

- a. Establishment of Temporary Benchmark (TBM)
- b. Longitudinal Profile Survey
 - Survey line : Planned dam axis
 - Survey length : 1,500m x 1line
 - Standard scale : Vertical (V)=1/100, Horizontal (H)=1/1,000
- c. Cross-sectional Survey
 - Survey line : Cross-section to planned dam axis
 - Survey length : 100m x 15sections (at 11points at 150m intervals and at 4points instructed by the Employer, 1,500m in length in total)

- Standard scale : V=1/100, H=1/100

d. Plane Survey

- Coverage area : Planned reservoir area
- Survey area : 1,500m x 3,300m (4,950,000sq.m in area in total)
- Standard scale : H=1/4,000

(2) Canal Route Survey

a. Establishment of TBM

b. Longitudinal Profile Survey

- Survey line : Centerline of planned canal route
- Survey length : 6,500m x 1line (6,500m in length in total)
- Standard scale : V=1/100, H=1/1,000

c. Cross-sectional Survey

- Survey line : Cross-section to planned canal route
- Survey length : 200m x 50sections (at 34points at 200m intervals and at 16points instructed by the Employer, 10,000m in length in total)
- Standard scale : V=1/100, H=1/100

d. Plane Survey

- Coverage area : Planned structure area on planned canal route
- Survey Area : 200m x 200m x 2places (at places instructed by the Employer, 80,000sq.m in area in total)
- Standard scale : H=1/500

(3) Command Area Survey

a. Establishment of TBM

b. Longitudinal Profile Survey

- Survey line : Centerline of planned canal route in planned command area
- Survey length : 6,800m x 1line (6,800m in length in total)
- Standard scale : V=1/100, H=1/1,000

c. Cross-sectional Survey

- Survey line : Cross-section to planned canal route in planned command area
- Survey length : 50m x 20sections (at 15points at 500m intervals and at 5points instructed by the Employer, 1,000m in length in total)
- Standard scale : V=1/100, H=1/100

d. Plane Survey

- Coverage area : Planned command area

- Survey area : Approx. 6,500m x 2,000m (8,200,000sq.m in area in total)
- Standard scale : H=1/4,000

(4) Pumping Station Survey

a. Establishment of TBM

b. Cross-sectional Survey

- Survey line : Cross-section to Jur River and planned pumping station area
- Survey length : 500m x 3sections (at points instructed by the Employer, 1,500m in length in total)
- Standard scale : V=1/100, H=1/1,000

c. Plane Survey

- Survey area : Planned pumping station area
- Survey Area : 500m x 300m (150,000sq.m in area in total)
- Standard scale : H=1/1,000

2. Method of the Works

2.1 Method of the Survey Works

Survey method and survey instrument are subject to the approval by the Employer.

2.2 Tolerance

Tolerance of each survey shall be within the following figures, unless otherwise specified in other clauses of this technical specifications or instructed by the Employer.

(1) Distance of plan and profile survey : (Distance of survey length in mm) / 2,000

(2) Elevation of plan and profile survey : $20\text{mm} \times \sqrt{\text{Distance of survey length in km}}$

2.3 Benchmark (BM)

The Contractor shall submit elevation and location (coordinates) of national benchmark (BM), which is a point of reference for the leveling, for the Employer's approval prior to the commencement of survey works.

2.4 Monument of Temporary Benchmark (TBM)

The Contractor shall establish concrete monument or metal rivet on the surface of the

existing concrete structure or stable rock as the temporary benchmark (TBM) in each survey site. Dimensions, material and other specifications are subject to the approval of the Employer.

The Contractor shall measure elevation and coordinates of TBM based on the existing BM. The leveling shall be started from one existing BM and another existing BM. If the existing BM is not available at the other end, a loop back may be acceptable.

The Contractor shall take photograph of each TBM and indicate the location of TBM in the topographic map, which will be created by plane survey. The Contractor shall prepare the description of elevation and coordinates with sketch and photograph.

2.5 Longitudinal Profile Survey

Longitudinal profile survey shall be made based on BM or TBM. Elevation of survey points such as beginning point (BP), end point (EP), intersection point (IP) and other principal points, which will be established on the survey lines shall be measured. In addition, elevation at changing points of topographic feature and structures (channel, embankment, road, etc.) on the survey line shall be also measured.

2.6 Cross-sectional Survey

Cross-sectional survey shall be made at every survey points such as BP, EP, IP and other principal points on the survey lines and at points instructed by the Employer. In accordance with the elevation given by the longitudinal profile survey, the ground height and topographic feature on section shall be measured.

2.7 Plane Survey

Contour line shall be basically indicated at each 0.5m intervals together with spot elevations in the drawing. For the area with gentle slope, contour lines shall be indicated at 0.5m intervals in the drawing, but contour lines shall be indicated at 1.0m intervals for the area with steep slope such as river bank, etc. Survey area and other details shall be confirmed and instructed by the Employer at the site.

Based on the TBM, ground height at the existing structures such as channel, embankment, road etc., shall be measured and indicated in the drawings.

3. Office Works

3.1 Computation

The Contractor shall check the computation of the survey results carefully prior to submission to the Employer. All documents shall be reviewed by the Employer and shall be finalized in accordance with the Employer's comments, if any.

3.2 Drafting

The survey results shall be drawn on the appropriate size of photocopy papers

instructed by the Employer by AutoCAD. The existing structures, such as channel, embankment, road, etc., if any, shall be drawn on the topographic maps with spot elevation and map symbol. The Contractor shall check the drawings prior to submission to the Employer. All drawings shall be reviewed by the Employer and shall be finalized in accordance with the Employer's comments, if any.

3.3 Survey Results and Reports

After the finalizing, the Contractor shall submit the following documents and drawings to the Employer within the contract period specified in Article 1 of Conditions of Contract.

- (1) Description of BM and TBM with photograph

- (2) Two (2) sets of all maps / drawings created, including its digital files, by the results of
1) longitudinal profile survey, 2) cross-sectional survey and 3) plane survey.

- (3) Field books and computation notes, which format is subject to the approval of the Employer.

Surveyed maps / drawings shall be prepared in the appropriate size instructed by the Employer by AutoCAD and shall be printed on the good quality paper approved by the Employer.

BILL OF QUANTITIES

(Unit: US\$)

ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
1. Preparatory Works					
101	Mobilization and Demobilization	L.S.	1		
	Sub-total	-	-	-	
2. Dam Site Survey					
201	Establishment of Temporary Benchmark (TBM)	L.S.	1		
202	Longitudinal Profile Survey - Survey line: Planned dam axis - Survey length: 1,500m x 1line - Standard Scale: V=1/100, H=1/1,000	m	1,500		
203	Cross-sectional Survey - Survey line: Cross-section of planned dam axis - Survey length: 100m x 15sections (at 11points at 150m intervals and at 4points instructed by the Employer) - Standard scale: V=1/100, H=1/100	m	1,500		
204	Plane Survey - Coverage area: Planned reservoir area - Survey area: 1,500m x 3,300m - Standard scale: H=1/4,000	Sq.m	4,950,000		
	Sub-total	-	-	-	
3. Canal Route Survey					
301	Establishment of Temporary Benchmark (TBM)	L.S.	1		
302	Longitudinal Profile Survey - Survey line: Centerline of planned canal route - Survey length: 6,500m x 1line - Standard scale: V=1/100, H=1/1,000	m	6,500		
303	Cross-sectional Survey - Survey line: Cross-section to planned canal route - Survey length: 200m x 50sections (at 34points at 200m intervals and 16points instructed by the Employer) - Standard scale: V=1/100, H=1/100	m	10,000		
304	Plane Survey - Coverage area: Planned structure	Sq.m	80,000		

	area on planned canal route - Survey area: 200m x 200m x 2places (at places instructed by the Employer) - Standard scale: H=1/500				
	Sub-total	-	-	-	
4. Command Area Survey					
401	Establishment of Temporary Benchmark (TBM)	L.S.	1		
402	Longitudinal Profile Survey - Survey line: Centerline of planned canal route in planned command area - Survey length: 6,800m x 1line - Standard scale: V=1/100, H=1/1,000	m	6,800		
403	Cross-sectional Survey - Survey line: Cross-section to planned canal route in planned command area - Survey length: 50m x 20sections (at 15points at 500m intervals and at 5 points instructed by the Employer) - Standard scale: V=1/100, H=1/100	m	1,000		
404	Plane Survey - Coverage area: Planned command area - Survey area: Approx. 6,500m x 2,000m - Standard scale: H=1/4,000	Sq.m	8,200,000		
	Sub-total	-	-	-	
5. Pumping Station Survey					
501	Establishment of Temporary Benchmark (TBM)	L.S.	1		
502	Cross-sectional Survey - Survey line: Cross-section to Jur River and planned pumping station area - Survey length: 500m x 3sections (at points instructed by the Employer) - Standard scale: V=1/100, H=1/1,000	m	1,500		
503	Plane Survey - Coverage area: Planned pumping station area - Survey area: 500m x 300m - Standard scale: H=1/1,000	Sq.m	150,000		
	Sub-total	-	-	-	

6. Reporting (including drill logs)					
601	Factual Report (inclusive of colored photographs)	L.S.	1		
	Sub-total	-	-	-	
7. Others					
	Sub-total	-	-	-	
8. Total					
9. Contract Amount					

Notes:

1. All items in the Tender Price Schedule shall be quoted in US Dollar (US\$) and including all taxes imposed in the Republic of South Sudan.
2. Breakdown of Tender Price shall satisfy the requirements of Work Schedule. The breakdown will be required to be prepared and presented during tender negotiation.
3. Indirect costs for mobilization, temporary works, site office, overhead and profit as well as all other indirect cost items shall be distribute in the above breakdown items.

LOCATION MAP

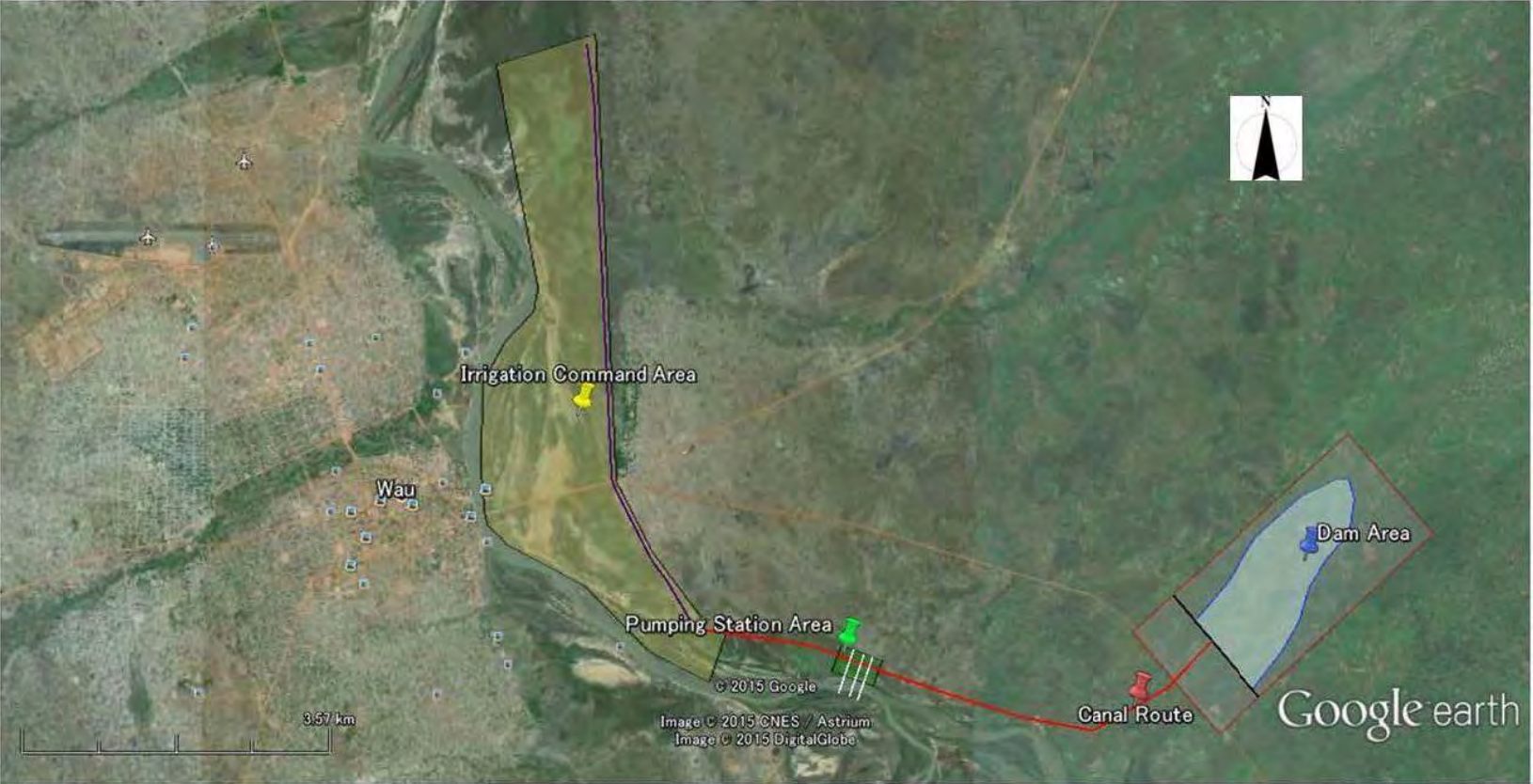


Fig.-1: Location Map of Survey Area - Overall View



Fig.-2: Location Map & Reference Point of Survey Area - Dam Site

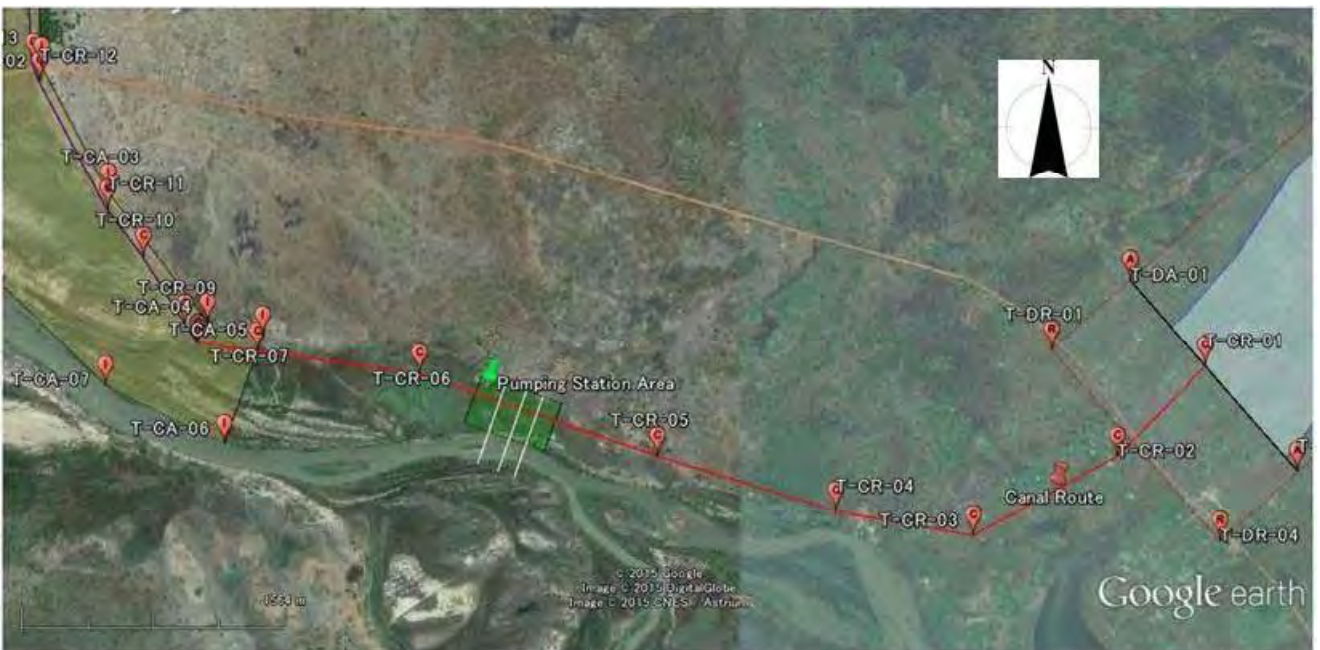


Fig.-3: Location Map & Reference Point of Survey Area - Upstream Canal



**Fig.-4: Location Map & Reference Point of Survey Area
- Downstream Canal & Irrigation Command Area**



Fig.-5: Location Map & Reference Point of Survey Area - Pumping Station

COORDINATES OF REFERENCE POINT

Table-1: Coordinates of Reference Point - Dam Axis

No.	Coordinates (° - ' - ")		Remarks
	N	E	
T-DA-01	7-41-24.45	28-04-52.74	Right abutment
T-DA-02	7-40-48.12	28-05-25.29	Left abutment

Table-2: Coordinates of Reference Point - Boundary of Dam Area

No.	Coordinates (° - ' - ")		Remarks
	N	E	
T-DR-01	7-41-11.20	28-04-37.46	
T-DR-02	7-42-21.97	28-05-59.18	
T-DR-03	7-41-46.58	28-06-31.29	
T-DR-04	7-40-34.86	28-05-10.32	

Table-3: Coordinates of Reference Point - Alignment of Upstream Canal

No.	Coordinates (° - ' - ")		Remarks
	N	E	
T-CR-01	7-41-08.16	28-05-07.33	Beginning Point (B.P.) of Canal
T-CR-02	7-40-50.91	28-04-50.32	
T-CR-03	7-40-35.90	28-04-22.31	
T-CR-04	4-40-40.55	28-03-55.62	
T-CR-05	7-40-50.96	28-03-20.94	
T-CR-06	7-41-06.65	28-02-34.67	
T-CR-07	7-41-10.90	28-02-03.14	
T-CR-08	7-41-12.45	28-01-51.52	

Table-4: Coordinates of Reference Point - Alignment of Downstream Canal

No.	Coordinates (° - ' - ")		Remarks
	N	E	
T-CR-09	7-41-16.22	28-01-49.02	
T-CR-10	7-41-29.05	28-01-40.97	
T-CR-11	7-41-38.06	28-01-34.02	
T-CR-12	7-42-02.53	28-01-20.79	
T-CR-13	7-42-05.92	28-01-19.53	
T-CR-14	7-44-04.40	28-01-13.52	
T-CR-15	7-44-22.12	28-01-12.75	
T-CR-16	7-44-42.20	28-01-10.00	End Point (E.P.) of Canal

Table-5: Coordinates of Reference Point - Boundary of Irrigation Command Area

No.	Coordinates (° - ' - ")		Remarks
	N	E	
T-CR-01	7-44-45.49	28-01-13.28	
T-CR-02	7-42-05.23	28-01-21.17	
T-CR-03	7-41-41.27	28-01-34.09	
T-CR-04	7-41-16.54	28-01-53.52	
T-CR-05	7-41-14.01	28-02-04.21	
T-CR-06	7-40-53.27	28-01-56.70	
T-CR-07	7-41-04.42	28-01-33.53	
T-CR-08	7-41-27.72	28-01-09.34	
T-CR-09	7-41-42.50	28-00-39.84	
T-CR-10	7-41-49.62	28-00-32.27	
T-CR-11	7-41-53.70	28-00-31.18	
T-CR-12	7-42-09.39	28-00-29.79	
T-CR-13	7-42-40.99	28-00-30.46	
T-CR-14	7-42-54.88	28-00-38.66	
T-CR-15	7-43-05.89	28-00-49.88	
T-CR-16	7-43-14.29	28-00-51.57	

Table-6: Coordinates of Reference Point - Boundary of Pumping Station

No.	Coordinates (° - ' - ")		Remarks
	N	E	
T-PS-01	7-41-06.42	28-02-46.93	
T-PS-02	7-41-00.88	28-03-02.29	
T-PS-03	7-40-51.92	28-02-58.97	
T-PS-04	7-40-57.20	28-02-43.47	

Table-7: Coordinates of Reference Point - Boundary of Pumping Station

No.	Coordinates (° - ' - ")		Remarks
	N	E	
T-PS-S11	7-41-02.17	28-02-58.72	Section-1 (Upstream side)
T-PS-S12	7-40-46.88	28-02-53.07	do.
T-PS-S21	7-41-03.33	28-02-55.51	Section-2 (Middle)
T-PS-S22	7-40-48.05	28-02-49.91	do.
T-PS-S31	7-41-04.78	28-02-51.48	Section-3 (Downstream side)
T-PS-S32	7-40-49.43	28-02-45.94	do.

GUIDELINE 5

ENVIRONMENTAL AND SOCIAL CONSIDERATION

GUIDELINE 5: ENVIRONMENTAL AND SOCIAL CONSIDERATION

1. INTRODUCTION

1.1 Background

It is expected that irrigation developments improve agricultural productivity. On the other hand, it is also a real danger that irrigation development has a risk to lead to environmental and social impacts which degrade the natural and social condition in the RSS. The MOE issued the "National Environmental Policy" and the "Environmental Protection and Management Bill". Those regulations address an environmental impact assessment (EIA) system which evaluates and judges project implementation from the environmental viewpoints. However the EIA system regulations have not been enacted and specialized concrete standards and guidance have not been promulgated.

Under this condition, The IDMP project contains formulation of a guideline for environmental and social considerations for irrigation development (hereinafter called "ESCID guideline") which addresses better ways to mitigate adverse environmental impacts likely to be caused.

1.2 Objectives

The principle objective of this guideline is to undertake considerations on environmental and social impacts for irrigation development from the beginning of project planning stage. The ESCID guideline aims:

- 1) To guide how to preliminarily investigate irrigation projects from environmental viewpoints during the project planning and design stage;
- 2) To guide the methods for environmental considerations in order to preliminarily identify environmental and social impacts likely to be affected by the irrigation project, and
- 3) To address key environmental issues to be studied in an EIA study.

Main users of the guideline are project proponents (mainly the MEDIWR, and also the MAFCRD, state governments, etc.), who are encouraged to appropriately consider environmental and social issues likely caused by their project.

Scope of project type is irrigation development and other relevant activities (see section 1.5 "Covered Project Types" for details). As mentioned above purposes, the ESCID guideline addresses key environmental issues for further an EIA study, hence the results of the assessment taken based on the guideline do not judge environmental approval. This process shall be under the legal framework in the RSS.

1.3 Structure of the Guideline

The ESCID guideline consists of the following chapters:

- Chapter 1: Purpose of establishing guideline
- Chapter 2: Basis of implementation for the environmental and social considerations
- Chapter 3: Procedure of taking environmental and social considerations
- Attachment: Templates for undertaking of the environmental and social considerations

It may have a chance to implement irrigation projects supported by the international donors such as

JICA, therefore the ESCID guideline is developed based on the requirements indicated in the following guideline, e.g.:

Table 7.1 Reference Guideline, e.g.

Name of Donors	Titles
JICA (Japan International Cooperation Agency)	Guidelines for Environmental and Social Considerations (2010)
World Bank	Safeguard Policies OP/BP 4.01 Environmental assessment (revised in 2011) OP/BP 4.04 Natural Habitats (2001) OP/BP 4.12 Involuntary Resettlement (2001), etc. General Environmental Guideline (1998)
ADB (Asian Development Bank)	Environmental Assessment Guidelines (2003) Safeguard Policy Statement (2009)

1.4 Definitions

Definitions are

- 1) "Environmental and Social Considerations" means considering environmental impacts including air, water, soil, ecosystem, flora, and fauna, as well as social impacts including involuntary resettlement, respect for the human rights of indigenous people, and so on. Therefore
- 2) "Environmental and Social Considerations for Irrigation Development" aims at specialized environmental and social matters which are to be considered in the irrigation developments.
- 3) "Irrigation Development" defines development of artificial applications of water to land to assist in the agricultural production. In addition to physical construction, soft components for assistance of institutional / community development, public awareness, e.g. in order to properly operate the irrigation systems that are developed
- 4) "Project proponents" include national / local government institutions and private sectors, which propose, develop, and/or own a project.
- 5) "Preliminary Survey" functions as a kind of baseline survey, which aims to provide further information to identify environmental impacts. Those impacts are first evaluated in the scoping process.
- 6) "Environmental impact assessment (EIA)" is undertaken based on the RSS legal system, which includes evaluating the environmental and social impacts likely caused by projects, analysing alternative plans, and preparing adequate mitigation measures and monitoring plans.
- 7) "Initial Environmental Examination (IEE)" also aims to evaluate the environmental and social impacts likely caused by projects, to analyse alternative plans, and to prepare adequate mitigation measures and monitoring plans. However its depth regarding survey boundary, methodology, etc. may be relatively small comparing with an EIA study. Therefore major methodologies are simple and quickly implemented based on secondary data collection including literature search, site observation, etc.
- 8) "Strategic Environmental Assessment (SEA)" is an assessment that is implemented at the policy, planning, and program levels, but not a project-level EIA.
- 9) "Screening" means deciding whether proposed projects are likely to have impacts that need to

be considered and further assessed according to the project description and site description.

- 10) "Scoping" means choosing alternatives for analysis, a range of significant and potentially significant impacts, and study methods for recommending further EIA study under the RSS legal framework.
- 11) "Stakeholder" means individuals or groups who have views about cooperation projects as well as affected individuals or groups and local NGOs.
- 12) "Projected Affected Peoples (PAPs)" are a part of the stakeholders. Generally, typical PAPs are those who are forced to be relocated or to release parts of their land. Persons who reside in the areas surrounding the project may be affected by direct / indirect impacts.

1.5 Concept

Based on setting principle and purposes indicated in the section "1.2 Objectives", the following concepts are considered in the process of developing the ESCID guideline.

- 1) The follow requirements in the RSS legal framework are related to environmental and social matters. As indicated above, outputs from the process of ESCID work shall address recommendations regarding preliminary environmental impact evaluation, study methods to further the EIA study in accordance with the RSS legal framework in relation to environmental protection and management. Therefore the ESCID guideline shall carefully review this framework to meet its requirements. In addition, if a project is developed under international donor's assistance, for example JICA, the donor strictly checks whether or not the project proponents will adequately consider environmental and social matters based on their guidelines. Therefore, the ESCID guideline shall also meet their requirements.
- 2) Used before or during a project planning and designing stage. One of the important functions of the ESCID is mitigating environmental and social risks which cause stagnation of and interference with project implementation. Hence ESCID shall be implemented during project planning before the project is decided so that the project can be designed with adequate mitigations. This concept is also one of the important concepts in an SEA.
- 3) Simple and easy to be used by any person through simple tools. It is possible that a project proponent who proposes and develops an irrigation project does not have sufficient experience or personnel to handle an ESCID. It may not be easy to dispatch experts for local government or private sector projects, community based small projects, etc. Therefore the ESCID guideline will be formulated with a simple process so that non-experts may handle an ESCID in parallel with their work.
- 4) Public Consultation Irrigation development, as well as other agricultural developments, may involve various stakeholders such as communities, local government, and concerned bodies. Some community groups can be adversely affected by an irrigation project, for instance changes to waterways due to an irrigation project may affect fishing activity. In addition, the main group affected by the environmental impacts is the community, but project benefits can also improve their lives. Since the ESCID's purpose is to support impact assessment and reflect environmental and social considerations into the planning stage of irrigation development, it is important to obtain a consensus and share information and opinion among stakeholders. This not only avoids social conflicts such as the above example, but also creates

effective planning through reflecting a wide variety of opinion from stakeholders. Public consultation is one of the most efficient tools to involve stakeholders. Therefore ESCID guides the design and implementation of public consultation.

1.6 Covered Project Types

Target project types handled in the ESCID are basically related to irrigation development. The major project components are described below:

- 1) Irrigation and/or drainage channels
- 2) Reservoirs / dams
- 3) Water pump stations
- 1) Land levelling

Also the following supplemental components will be contained in an irrigation project

- 1) Access and/or maintenance roads
- 2) Protection dykes
- 3) Settlement plan
- 4) Buildings and facilities
- 5) Installation of agricultural equipment

Capacity building, formulation of cooperative groups, etc.

1.7 Legal Framework in South Sudan in Relation to the Environment

1.7.1 National Environmental Policy

South Sudan National Environmental Policy, which covers a wide range of environmental problems, was established in 2012 and has been enacted.

The goal is to ensure the protection, conservation and sustainable use of the natural resources without compromising the tenets of inter-generational equity according to section 1.6. From the review of this environmental policy, the following are understood to be reflected in the IDMP; hence those shall also be included in the ESCID guideline.

Table 7.2 Key Guidance from the National Environmental Policy

Fields	Background and Key Guidance Related to the Water Sector / Irrigation
Forestry	Forest condition is closely affected by the existing hydrology, therefore irrigation projects must avoid degradation of forests, ex. cutting trees for the project site must be minimized.
Water Supply and Sanitation	Use of water resources by irrigation activities shall consider other purposes of water use. Also water discharged from agricultural land shall satisfy adequate water quality standards.
Agriculture	Irrigation development is closely related to agriculture, therefore the planning of irrigation projects shall consider the indirect impacts likely caused by agricultural works.
Livestock	Irrigation may change the existing hydrology, especially downstream. It is possible to affect grazing patterns and available water for cattle. So changes to water systems must be avoided or minimized.
Fishery	Irrigation may change the existing hydrology. It shall be planned so as to minimize change of conditions likely affecting fishery activities.
Wetlands, Rivers and Lakes	Wetlands as well as rivers and lakes are important areas to provide water resources, for areas that are suitable for irrigation development. On the other hand, those areas are also important for conservation of biodiversity and disaster prevention. Change of water bodies must minimize degradation of natural resources and function of disaster prevention facilities.

Adopted from: South Sudan National Environmental Policy, 2012

1.7.2 Other Laws / Regulations

As of September 2013, the South Sudan Environmental Protection and Management Bill has been under finalization. This Bill indicates the principles of EIA, it says to avoid any negative environmental impacts, and if impacts are likely to occur, an environmental impact assessment is required under these schedules / regulations.

Environmental regulations 2012, which supplements implementation of the above the Bill, has been drafted. Chapter I indicates the requirements for an environmental impact assessment. According to these regulations, the following shall be objectives of EIA:

EIA is established before a decision is made, so that the output the EIA can address the impacts, mitigations and monitoring methods.

EIS shall encourage information exchange, notification and consultations.

EIA shall ensure that environmental considerations are addressed and incorporated into the decision making process.

EIA anticipates and avoids / minimizes / offsets adverse impacts, it also protects the productivity and capacity of natural systems and ecological processes.

Finally EIA can promote development that is sustainable and optimizes resources use and management opportunities.

The regulations also direct that an EIA shall be conducted in accordance with scoping and the terms of reference developed during the scoping exercise by the developer or proponent.

In addition, the regulations specify types of projects which are required or do not require EIA as below:

Type A - Project requiring an EIA

Projects likely to have significant adverse environmental impacts and for which a comprehensive study is required to determine the scale, extent and significance of the impacts and to identify appropriate preventive measures.

Type B - Projects requiring Preliminary Environmental Assessment

For projects likely to have some adverse environmental impacts but that the magnitude of the impacts are not well-known, a preliminary environmental assessment is required to decide whether the project can proceed without a full environmental impact assessment.

Irrigation projects are classified in the Type A, as one type of water resources development projects under agriculture.

Therefore it is understood that the ESCID guideline shall respect those requirements, and that outputs from the ESCID shall address adequate indications for smooth and appropriate implementation of the EIA.

1.8 Principles in the Guideline

Aside from the RSS laws / regulations, international principles in the field of environmental and social considerations are also important to be incorporated in the ESCID because some irrigation

developments will be developed and implemented under international donor's assistance. The JICA Guideline¹ addresses principles to be reflected in the environmental and social considerations, and those requirements are also referenced in other international guidelines, such as the World Bank operation procedures.

Therefore the ESCID guideline is established in accordance with the JICA guideline. The following is summarised key guidance indicated in the JICA guideline. The concepts for establishing the ESCID guideline are addressed in Section 1.4 of this guideline.

1. Underlying Principles

- Conduct the EIA study in the earliest possible planning stage
- Examine alternatives for the project
- Harmonize with economic, financial, institutional, social and technical analyses

2. Examination of Measures

- Design a project minimizing / avoiding adverse impacts
- Establish environmental management and monitoring plans

3. Scope of Impacts to Be Assessed

- Scoping process covers the fields of pollution, natural and social environment and economy
- Not only direct impacts caused by a project but also indirect / cumulative impacts shall be assessed to a reasonable extent

4. Compliance with Laws, Standards and Plans

- Conform to laws, standards and plans in the host country (RSS)
- Prohibit a project in the designated areas for natural conservation, cultural heritages, etc.

5. Social Accessibility

- Public involvement and accountability
- Appropriate considerations for vulnerable social groups

6. Ecosystem and Biota

- Avoid significant conversion / degradation of critical natural habitats and forests
- Prohibit illegal tree cutting

7. Involuntary Resettlement

- Consensus building between PAPs
- Appropriate compensation to improve or fully restore PAPs standard of living, income opportunity, etc.
- Accessible grievance mechanism
- Provide a resettlement action plan

8. Indigenous Peoples

- Provide an indigenous peoples plan to respect their rights on land and resources in accordance with the spirit of relevant international declarations

9. Monitoring

- Implement environmental management / monitoring plans which are developed in the EIA
 - Sufficient information disclosure and public involvement
-

2. PROCESSES OF THE ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

2.1 Legitimacy

In the process of the ESCID, it is confirmed whether or not a proposed project complies with the laws

¹ Guideline for Environmental and Social Considerations, 2010

or standards related to the environment under the RSS. It also confirms that projects conform to those government and local community policies and plans on the environment. In addition, international treaties and conventions also need to be checked for whether or not the project meets their requirements.

As of September 2013, the only major international treaty / convention the RSS has ratified is the Ramsar Convention, while some other treaties / conventions have been ratified under the former Sudan government before independence. Some important treaties / conventions which are related to human rights such as for women and children have not been ratified. Although treaties / conventions are very important and highlighted in the international donors' guidelines as well as JICA, the ESCID encourages all project proponents to carefully consider them.

The following RSS laws / regulations, and international treaties / conventions contain major items to be considered.

RSS laws and regulations:

- South Sudan Constitution
- National Environmental Policy
- RSS Development Plan
- Water Policy
- Water Resources Management Policy
- Agricultural Sector Policy
- Land Policy

International treaties / conventions:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Convention on Biological Diversity (CBD)
- Ramsar Convention
- United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification (UNCCD)
- Convention on the Elimination of All Forms of Discrimination against Women (Women's rights)
- Convention on the Rights of the Child (Children's right)
- Convention on the Rights of Persons with Disabilities (Disabilities rights)

2.2 Alternatives

Examination of alternatives is expected to indicate the best or a better way to avoid or mitigate adverse impacts likely caused by a proposed project. Generally, a comparison of alternatives is undertaken in the project planning process in terms of cost/benefit. The ESCID guideline addresses the best or better options in the project planning from the environmental viewpoints. In the evaluation of alternatives, it is suggested to examine at least three scenarios including zero-option (do-nothing), which means that no project is implemented.

2.3 Impact Parameters to Be Assessed

Based on the JICA guideline as well as other international donor guidelines, the impacts to be assessed in an irrigation development are the impacts on human health and safety, as well as on the natural environment, air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna

and flora. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety.

The impacts which affect the environment and peoples are not only those directly caused by a proposed project but also indirect and cumulative impacts with other concerned projects. Those impacts are also assessed in the ESCID as far as it is rational.

2.4 Standards and Guidelines for Evaluating Impacts

According to the Environmental Policy, environmental standards on air quality, water quality, noise etc. are mandated to be established. Regarding water quality, which can be important in irrigation development, the draft Environmental Regulations, 2012 demands that minimum water quality standards for different uses shall be established. While all owners or operators of business enterprises, irrigation project schemes, sewerage systems, industrial production workshops or any other activities which discharge effluents, are required to report water quality and quantity on demand to the responsible authority. However, concrete standard criteria have not been established except for the drinking water standard which was developed based on the WHO guideline.

Therefore it is recommended to temporarily use reference standards in the ESCID. Examples of reference standards are:

(1) Water Quality

Parameters	South Sudan	Japan			WHO Guide line	World Bank ¹⁾²⁾	USEPA ³⁾
		Ambient Water	Agriculture Purposes	Effluent Water			
pH	6.0-8.5	6.0-8.5	6.0-7.5	5.8-8.6	6.0-8.5	6.0-9.0	6.5-8.5
COD (mg/L)		-	6	120 ⁴⁾	-	250	
BOD (mg/L)		8	-	120 ⁴⁾	8	50	
TSS (mg/L)	1,000	100	100	150 ⁴⁾	600	50	
DO (mg/L)		2 ⁵⁾	5	-	22		
Total Nitrogen (mg/L)		1 ⁵⁾	1	60 ⁴⁾			
Total Phosphorus (mg/L)		0.1		8 ⁴⁾		2	
Electric Conductivity (mS/cm)	1.5	-	0.3				
Chloride (mg/L)	200	200			250		250
Coliforms	400	5,000 ⁶⁾			ND	400	
Arsenic (mg/L)	0.05	0.01	0.05	0.1	0.01	0.1	0.05
Zinc (mg/L)	3	0.03	0.5	2	3	2	5
Copper (mg/L)	1.5	1	0.02	3	2	0.5	1.3
Cadmium (mg/L)	0.005	0.003		0.1	0.003	0.1	0.005
Lead (mg/L)	0.01	0.01		0.1	0.01	0.1	0.3
Mercury (mg/L)	0.006	0.0005		0.005	0.006	0.01	0.002

Notes:

1) General Environmental Guideline, 1998

2) Process wastewater, domestic sewage, and contaminated storm water discharged to surface waters, for general application

3) National Recommended Water Quality Criteria, 2002

4) Based on daily average

- 5) For industry, agricultural and fishery purposes
- 6) For fishery purposes in rivers

(2) Air Quality

Parameters		Japan		World Bank 1) 2)	USEPA 3)
		Ambient Air	Emission 4)		
SO2	Daily	0.04 ppm		125 mg/m ³	0.14 ppm
	Hourly	0.1 ppm		-	-
NO2	Daily	0.06 ppm	1,200 ppm	150 mg/m ³	0.053 ppm 5)
	Hourly	-		-	
CO	Daily	10 ppm			-
	Hourly	20 ppm 6)			35 ppm
SPM (dust)	Daily	0.1 mg/m ³	100 mg/m ³	70 mg/m ³	
	Hourly	0.2 mg/m ³		-	
Ozone	Daily	-			-
	Hourly	0.06 ppm			0.12 ppm
PM2.5	Daily	15 ug/m ³			15 ug/m ³
	Hourly	35 ug/m ³			65 ug/m ³

Note:

- 1) General Environmental Guideline, 1998
- 2) Ambient air conditions at property boundary, for general application
- 3) National Ambient Air Quality Standards, 2003
- 4) For diesel machinery
- 5) Based on annual average
- 6) Based on 8-hour average

(3) Noise

Unit: dBA

Parameters	Japan		World Bank		WHO	
	Day Time (06:00-22:00)	Night Time (22:00-06:00)	Day Time (07:00-22:00)	Night Time (22:00-07:00)	Day Time (06:00-22:00)	Night Time (22:00-06:00)
Sensitive zone	50	40			50	40
Residential zone	55	45	55	45	55	45
Commercial zone	60	50	70	70	65	55
Industrial zone	60	50	70	70	75	70

2.5 Public Consultation

The ESCID encourages project proponents to consult with stakeholders through means that induce broad public participation to a reasonable extent in an early stage. Public consultation will be undertaken in the manner of public hearings, group discussions, interview / questionnaire surveys, public announcements, etc. Major purposes of public consultation are to obtain consensus among stakeholders, and also meaningful opinions and ideas regarding environmental social mitigation are expected by enhancement of public consultation.

2.6 Review of the Guideline

RSS legal framework in relation to environmental and social considerations are currently being established as well as standards and guidelines related to air, water quality, and etc. Therefore the ESCID guideline will verify the status of the implementation of the guideline, and it will be reviewed and revised immediately after completely enacting the legal framework, especially processes related to the EIA system.

And also the guideline will be updated within two to five years by hearing the opinions of concerned people.

3. PROCEDURES AND METHODOLOGY OF THE ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

3.1 Basic Procedure

Basic procedure of the ESCID is divided into five steps.

STEP 1 Screening: Screening is the first step on environmental consideration works. It aims to briefly determine the environmental condition and possible impacts likely caused by a proposed project in order to decide whether or not further environmental and social considerations are necessary. If no or few impacts are expected, the ESCID is stopped. This step must be simple because sufficient information related to the environment as well as project design has not been cleared, and also a person who has little or no experience in the environmental field could be assigned. Therefore a screening check sheet is provided.

STEP 2 Preliminary Survey: If ESCID is necessary after the screening process, it is necessary to gather more information to evaluate the impacts and find better ways for consideration. Preliminary survey results provide information for the next process which is scoping.

STEP 3 Scoping: Results of scoping can be a major output from the ESCID; it is a source of information for recommending highlighted impacts and their impact levels, study method on a further EIA study, and also point mitigation measures. For easy and quick assessment, simple evaluation criteria and a matrix and check sheet are provided.

STEP 4 Public Consultation: The ESCID encourages project proponents to conduct public consultation in order to obtain consensus among the stakeholders, to collect useful opinions, suggestions, etc. from stakeholders including academics, NGOs, etc., and to avoid any further conflict, disputes or complaints.

STEP 5 Reporting: Finally outputs from the above steps are compiled in an ESCID report, which addresses preparing terms of reference for further EIA study.

The following figure describes the general procedure for ESCID compared with project planning.

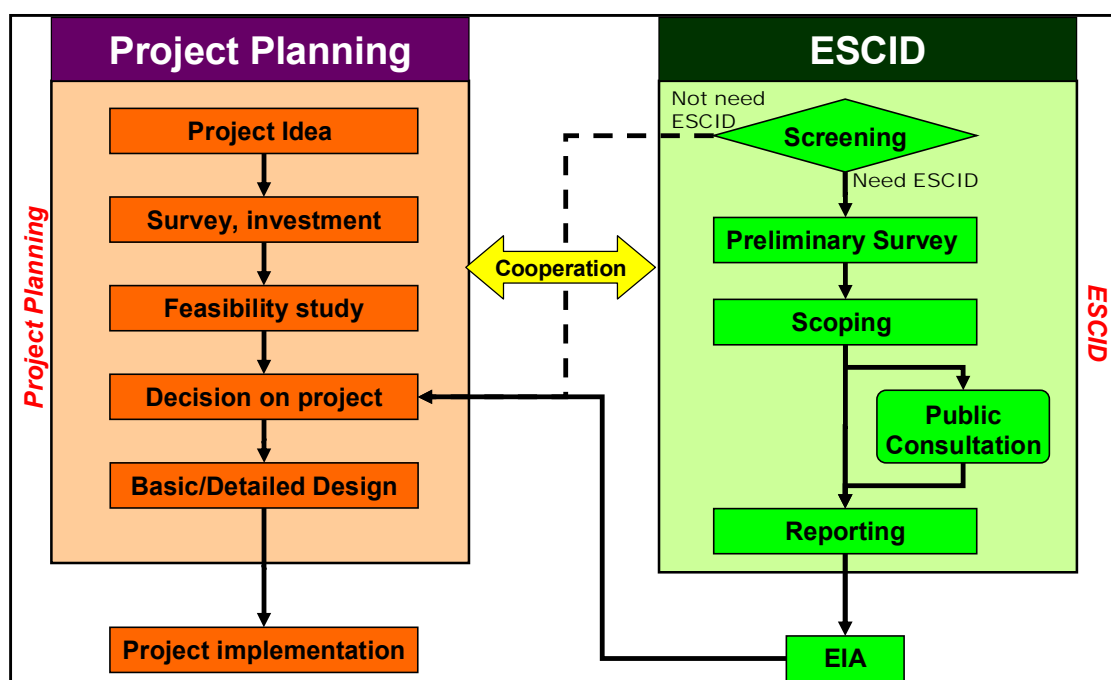


Figure 7.1 Basic Procedure of the ESCID

The ESCID will be undertaken in parallel with planning work for a proposed irrigation project, so that outputs from ESCID work can be timely reflected to the project planning.

Public hearings are normally held after scoping process, but timing of the consultation can be changed, and it is suggested to periodically disclose the processes of the proposed planning and impact evaluation to raise consensus among the stakeholders.

The major and final output from the ESCID is, as mentioned above, to address important impacts to be assessed in the further EIA study.

3.2 Environmental Parameters

Based on Section 2.3 “Impact Parameters to Be Assessed”, environmental and social parameters to be assessed in the ESCID are divided into three categories, 1) pollution, 2) natural environment and 3) social environment. Environmental Parameters and Key Points on Impact Evaluation are described in the table below:

Table 7.3 Environmental Parameters to be Assessed

Environmental Parameters		Key Points on Scoping
Pollution	Air Pollution	<ul style="list-style-type: none"> - Air pollutants in emission gas generated by construction equipment, vehicles, water pumps, etc. - Dust from unpaved roads, dry land
	Water Pollution	<ul style="list-style-type: none"> - Effluents or leachates from irrigation ponds, etc. - Utilization and disposal of fertilizers and agrochemicals
	Waste	<ul style="list-style-type: none"> - Construction waste such as waste soil - Agricultural waste
	Soil/Sediment Contamination	<ul style="list-style-type: none"> - Salinization of soil in irrigated lands - Soil pollution from irrigated lands by agrochemicals, heavy metals and other hazardous substances
	Noise and Vibration	<ul style="list-style-type: none"> - Noise or vibration generated by construction equipment, water pumps, etc.
	Odours	<ul style="list-style-type: none"> - Agricultural products, fertilize etc.
Natural Environment	Protected Areas	<ul style="list-style-type: none"> - Located in protected areas designated by RSS laws/regulations or international treaties and conventions
	Ecosystem	<p>Project site:</p> <ul style="list-style-type: none"> - Encompass primeval forests, tropical rain forests, ecologically valuable habitats - Encompass the protected habitats of endangered species designated by RSS laws or international treaties and conventions - Possibility that the amount of water used by the project will adversely affect aquatic environments, such as rivers - Possibility that installation of structures, such as intake weirs will block the movement of the migratory fish species
	Hydrology	<ul style="list-style-type: none"> - Hydrologic changes such as blocking or changing of water flow, increase / decrease of water level, stagnation of water, etc. - Change of groundwater condition such as change of groundwater level, depletion of groundwater, etc.
	Topography and Geology	<ul style="list-style-type: none"> - Possibility of causing large-scale alteration of the topographic features or geologic structures - Large scale dams / reservoirs
	Subsidence / Erosion	<ul style="list-style-type: none"> - Extraction of a large volume of groundwater causing subsidence - Hydrologic changes causing erosion
	Global Warming	<ul style="list-style-type: none"> - Generate GHG such as carbon dioxide, methane gas, etc.
	Landscape	<ul style="list-style-type: none"> - Existence of unique landscape, especially that is useful for the tourism sector
Social Environment	Resettlement	<ul style="list-style-type: none"> - Possibility of affected people to be involuntary relocated - Whether affected people consist of vulnerable groups such as the poor, minorities, disabled
	Living and Livelihood	<ul style="list-style-type: none"> - Existing economic condition downstream of the project site such as fisheries and water uses - Water rights or rights of common allotments among communities - Local or traditional culture possibly to be affected by inequitable distribution or usurpation of water rights
	Local Economy	<ul style="list-style-type: none"> - Generating loss of job opportunities by the project - Possibility of local resources to be used in the project such as labour, construction materials, etc. - Possibility to enhance or disturb local economy such as change or increase of agricultural production, etc. - Inadequate allotment of land, water etc. among farmers, fishermen, pastoralists, woodcutters, etc.
	Historical / Cultural Heritage	<ul style="list-style-type: none"> - Existence of local archaeological, historical, cultural, or religious heritage sites
	Land Use	<ul style="list-style-type: none"> - Possibility to cause large scale land use change - Possibility of other development plans such as industry or town development, also other agricultural related development
	Vulnerable Groups	<ul style="list-style-type: none"> - Existence of the poor, ethnic minorities, indigenous peoples - Existences of vulnerable social groups such as women, children, disabled
	Water Use / Rights	<ul style="list-style-type: none"> - Existing Water use condition

Environmental Parameters		Key Points on Scoping
		<ul style="list-style-type: none"> - Relevant rights - Past complaints / conflicts
	Social Infrastructure / Services	<ul style="list-style-type: none"> - Existence of life networks such as electric lines, water pipes, drainage systems - Existence of schools, religious facilities, medical offices, etc.
	Infectious Diseases	<ul style="list-style-type: none"> - Endemic diseases, water-borne or water-related diseases (e.g., schistosomiasis, malaria, filariasis), HIV/AIDS - Possibility to cause water degradation - Public health education - Accessibility to health offices

3.3 Screening

The screening process is the first step of ESCID; it aims to decide the necessity of further impact assessment. The ESCID guideline provides an easy but reasonable method for any person to conduct the screening process with a simple tool, the 'screening check sheet' (see ANNEX 2) to clarify necessary information.

Contents of the screening check sheet are

1. Proposed project description

- Project title
- Name and address of project proponent
- Location of project
- Project components
- Justification of proposed project
 - Objectives of project
 - Benefits
 - Reasonability, others

2. Legitimacy

- Consistency with the RSS laws / regulations, upper policies, strategies, programs, etc.
- Consistency with international treaties and conventions
- Necessary certification or official approval in addition to EIA
- Record of notification of the project

3. Possible adverse impacts

- Project location whether or not located in areas near sensitive areas
- Impacts related to pollution
- Impacts related to natural environment
- Impacts related to social environment

4. Conclusion

- Judgement on necessity of ESCID
- Necessary parameters to be surveyed in the subsequent preliminary survey

3.4 Preliminary Survey

It may be a fact that sufficient information related to environmental considerations is not available in the early planning stage in order to evaluate impacts and to recommend adequate study methods and mitigation measures. Therefore the ESCID suggests that the project proponent conducts a preliminary survey to collect data for consideration. Preliminary survey results provide that

information for the subsequent scoping process.

Since the major purpose of the ESCID is to address important impacts to be assessed in the further EIA study, it is not always necessary to completely identify environmental and social conditions. In other words, the EIA study can sufficiently identify those conditions.

Therefore it is suggested to design a preliminary survey with simple methods, that can be quickly implemented and at a reasonable cost.

Major survey methods suggested are:

- Secondary data collection, existing information, reports, etc.;
- Site reconnaissance, Visual observation;
- Hearings, interviews;
- Simple measurement, on-site measurement, and others.

The ESCID guideline prepares an 'Outline of Preliminary Survey (see ANNEX 3). This tool contains the following items:

- Survey items which can be chosen through the results of the screening process;
- Survey method;
- Survey locations
- Points to be examined, and
- Location map, survey members etc. as attachments.

3.5 Scoping

3.5.1 Alternatives

Examination of alternatives is expected to be a key term in order to decide project components and relevant activities. The ESCID addresses the best or better options in the project planning from the environmental viewpoints. Basic methods of setting alternatives may be as follows:

Alternatives set based on locations: example as below

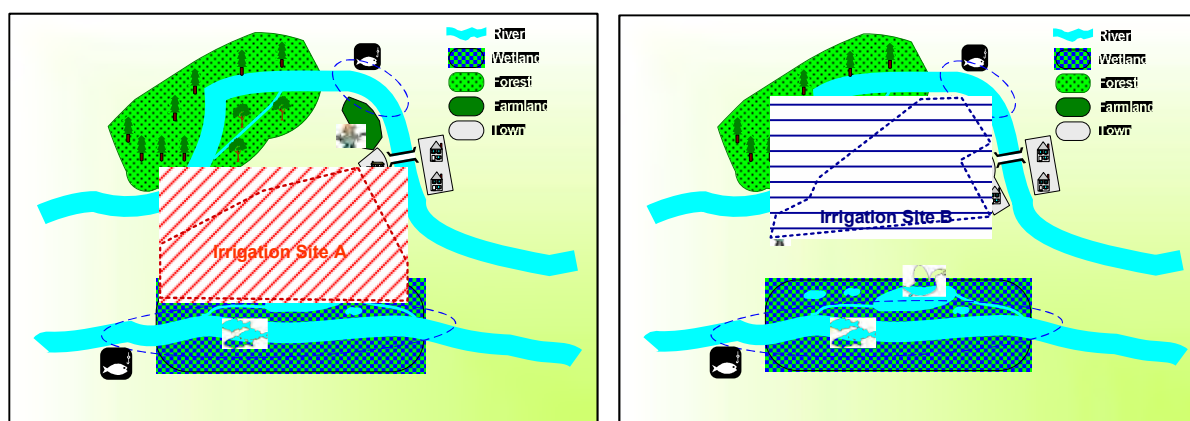


Figure 7.2 Example of Alternatives regarding Project Location

Alternatives set based on components: for example with / without dam construction

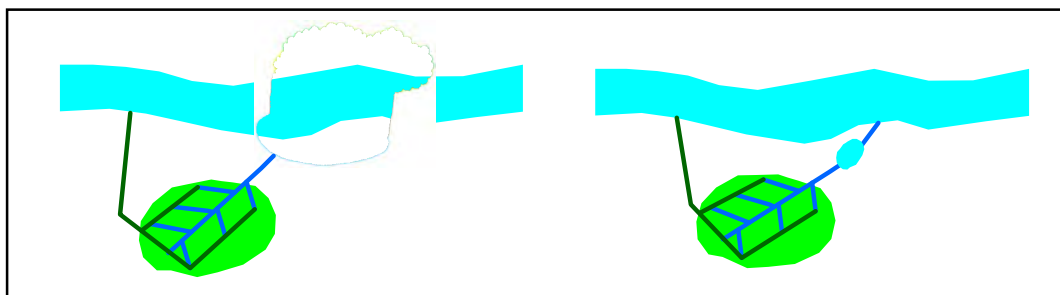


Figure 7.3 Example of Alternatives regarding Project Components

Alternatives set based on design: for example arrangement of irrigation / drainage channels.

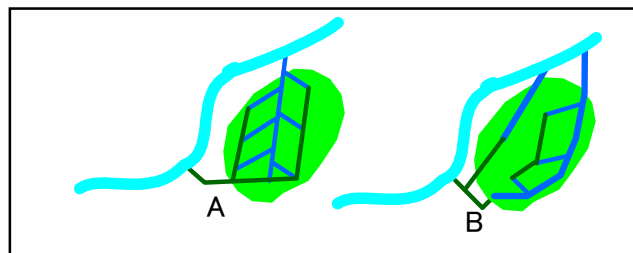


Figure 7.4 Example of Alternatives regarding Design (Irrigation / Drainage arrangement)

The ESCID guideline suggests evaluating the zero-option which means no project is implemented. In addition, recommendation points by ESCID are environmentally and socially specific; these are reflected to the project planning stage. The best alternative can be selected based on both recommendations by ESCID and cost-benefit analysis.

Due to the purpose of evaluation alternatives, this step shall be taken before scoping and in cooperation with project planning work in order for them to preliminarily design a project.

For evaluation of alternatives, a tool, the 'Evaluation Sheet for Alternatives' (see ANNEX 4) is prepared. Evaluation of alternatives is undertaken through evaluation of three categorised impacts (pollution, natural and social environments). The objective of this step is to identify better options among alternatives; therefore the importance is not to identify the absolute level of an impact, but to identify better options comparing among the alternatives. An example of an evaluation sheet for alternatives is below:

Evaluation				
Valuation Items		Alternative A	Alternative B	Zero option
Natural Environment	Average of a), b), c) ----- (1)	2.7	2.7	3.0
	a) Pollution	3	3	3
	b) Ecosystem	2	2	3
	c) Nature, disasters	3	3	3
	Reason			
Social Environment	Average of a), b), c) ----- (2)	2.3	2.7	3.0
	a) Land occupies, resettlement	2	3	3
	b) Social conflict	2	2	3
	c) Living condition	3	3	3
	Reason			
Economy, development	Average of a), b), c) ----- (3)	4.0	4.0	2.5
	a) Economy, development	4	4	2
	b) Consistency	4	4	3
	Reason			
Results				
		Alternative A	Alternative B	Zero option
Total score (1) + (2) + (3)		9.0	9.4	8.5
Ranking		2	1	3
Overall		Land occupation in dam site can be considerable impact.		

Figure 7.5 Example of Evaluation Sheet for Alternatives

Evaluation is judged by scoring method on each integrated evaluation items (see Table 7.4). And scoring and evaluation criteria are shown in Table 7.5.

Table 7.4 Evaluation Items

Score	Evaluation Items
Natural Environment	Pollution (Air pollution, Water pollution, Waste, Soil/Sediment contamination, Noise and vibration, Odour, Global warming)
	Biodiversity (Protected areas, Ecosystem)
	Nature, disasters (Hydrology, Topography and geology, Subsidence / Erosion, Landscape)
Social Environment	Land occupies resettlement (Resettlement, Landuse)
	Social conflict (Vulnerable groups, Water use / Rights)
	Living condition (Living and livelihood, Local economy, Historical / Cultural heritage, Social infrastructure / Services, Infectious diseases)
Economy, Development	Economy, development
	Consistency means consistency, legitimacy and harmonization with the RSS policies, etc.

Table 7.5 Scoring and Evaluation Criteria

Score	Evaluation Criteria
5	Exceptionally suitable
4	Suitable
3	Negligible/ Neutral
2	Not suggestible,
1	Avoiding

3.5.2 Evaluation Category

As indicated above, the scoping process aims to select alternatives for analysis, the level of significant and potentially significant impacts, and study methods for further EIA study.

In order to evaluate the impacts and to identify the level of impact, this guideline indicates the following six evaluation categories:

- 1) Types of Impact
- 2) Duration of impact
- 3) Extent of impact
- 4) Intensity of impact
- 5) Cumulative impact
- 6) Reversibility of impact

1) Types of Impact

Positive impact means the activities in the proposed project that can raise the quality of the environment, improve people's lives, etc. While negative impact means that the project degrades the environment or can raise social conflict.

Table 7.6 Types of Impact

Type of Impact	Mark
Positive	+
Negative	-

Examples

- Construction vehicles generate exhaust gas that contains pollutants.
 - ⇒ Negative impact on air quality
- Drainage channels control water discharge flow, which also controls floods.
 - ⇒ Positive impact on disaster

2) Duration of Impact

Duration means how long the expected impact continues. The impact which continues longer must generally cause significant damage. The impact which has a long duration can be irreversible.

Table 7.7 Criteria on Impact Evaluation (Duration)

Scale of Impact	Criteria of Impact Evaluation	Mark
Short	Impact likely occurs only while a project activity causing impact is carried out.	1
Medium	Impact may continue during construction phase for several years.	2
Long	Impact may continue for many years, probably more than 10 years.	3

Examples

- Operation of pump will generate noise; however the noise disappears after the operation.
 - ⇒ Negative short impact on noise disturbance
- Deforestation caused by land clearance takes many years for recovering by plantation. This situation may disturb the living conditions of fauna and flora.
 - ⇒ Negative long impact on ecosystem.

3) Extent of Impact

Area impacted may depend on the scale of intensity, and also it is related to physical distance.

Table 7.8 Criteria and Scoring of Impact Evaluation (Area)

Scale of Impact	Criteria of Impact Evaluation	Mark
Limited	Impact may occur in adjacent areas only. The areas can be visible from source of impact.	1
Medium	Impact can spread throughout the project area.	2
Wide spread	Impact can spread to wide areas, such as Boma / Payam.	3

Examples

- Noise disturbance caused by construction may not spread to a wider area.
 - ⇒ Negative limited impact on noise disturbance.
- Increase of agricultural production can enhance market activity that also improves the local economy.
 - ⇒ Positive wide spread impact on the economy.

4) Intensity of Impact

Intensity of impact is a key category which indicates a range of significant of impacts. It is closely related to the level of cumulative of impact, reversibility. A range of intensity is scored comparing with the concerned standards or guidelines. For instance, level of water pollution can be judged by standard criteria. The RSS is currently preparing a national standard, but except for drinking water it is incomplete, therefore it is suggested to temporarily use other standards.

Also public awareness regarding impacts is a key indicator for measuring intensity.

Table 7.9 Criteria and Scoring of Impact Evaluation (Intensity)

Scale of Impact	Criteria of Impact Evaluation	Mark
Small / Negligible	Impact level meets or slightly exceeds the concerned standards and guidelines. Few people are aware or care about it. Few physical changes in environmental or social conditions occur.	1
Medium	Impact level does not satisfy the concerned standards / guidelines; however those impacts can be avoided and/or mitigated by ordinary counter measures. Impacts do not drastically change the current conditions.	2
Large	It is difficult to mitigate adverse impacts. Highly sophisticated and costly technology may be necessary for mitigation. Serious conflicts or complaints can rise. Impact may be irreversible. Impacts may drastically change the current conditions.	3

Examples

- Water pollution caused by discharging from the construction site will exceed water quality standard criteria, however it can be minimised by a simple treatment device.
 - ⇒ Negative medium impact on water pollution

- ⇒ Inadequate and opaque process of settlement may lead to public complaints and generate conflict.
- ⇒ Negative big impact on social conflict.

5) Cumulative Impact

Level of cumulative impacts can be evaluated by determining whether or not the intensity of the impact can be accumulated by multiple project activities or by supplemental or other projects. That is why it is important to know of the existence of relevant projects.

Table 7.10 Criteria and Scoring of Impact Evaluation (Cumulative)

Scale of Impact	Criteria of Impact Evaluation	Mark
Non-cumulative	Impact is not expected to be accumulative. Or the impact may lead to only minor impacts which can be mitigated by ordinary counter measures.	1
Cumulative	Impacts can be accumulative and/or cause other possible significant impacts.	3

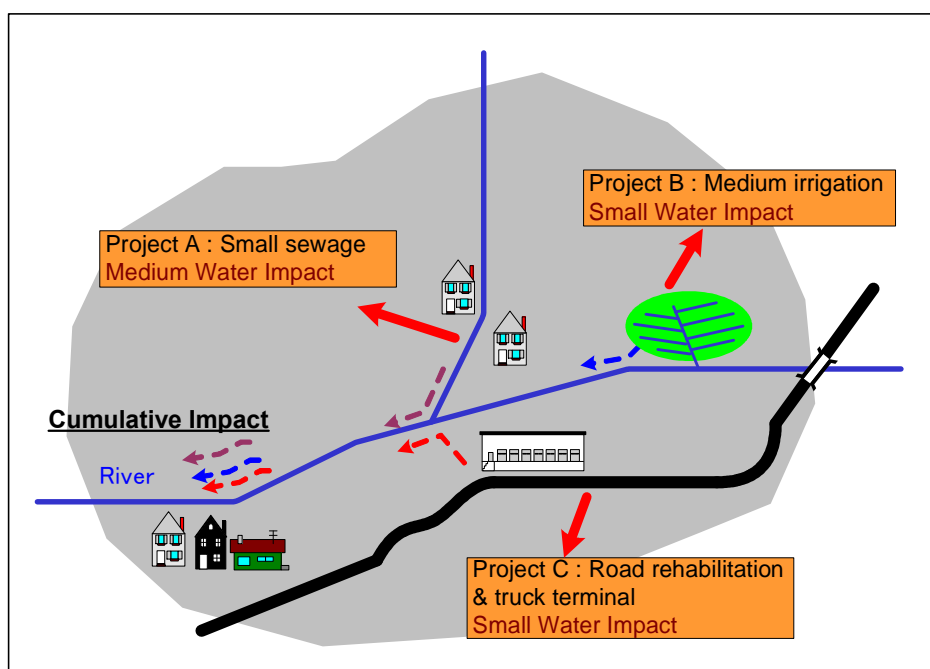


Figure 7.6 Example of Cumulative Impact

Examples

- Increase of agricultural activity may need chemical fertilizers, pesticides, etc. This can accelerate water contamination. Also those pollutants have a risk to generate health problems.
 - ⇒ Negative cumulative impact on water pollution and health.

6) Reversibility of Impact

“Reversible impact” means damage by the negative impact can be reversible by ordinary mitigation measures. Those impacts are basically short duration and low intensity.

Table 7.11 Criteria and Scoring of Impact Evaluation (Reversible)

Scale of Impact	Criteria of Impact Evaluation	Mark
Reversible	Impact can be reversed	1
Irreversible	Impact cannot be reversed	3

Examples

- Land clearance, deforestation, etc. deprive endangered wildlife of unique and/or limited habitats.
- ⇒ Negative irreversible impact on ecosystem.

3.5.3 Procedure of Scoping

For the scoping process, the guideline prepares 3 tools, 1) preliminary scoping check sheet, 2) scoping matrix, and 3) outline of scoping results. The relationship between these three tools is shown in the figure below:

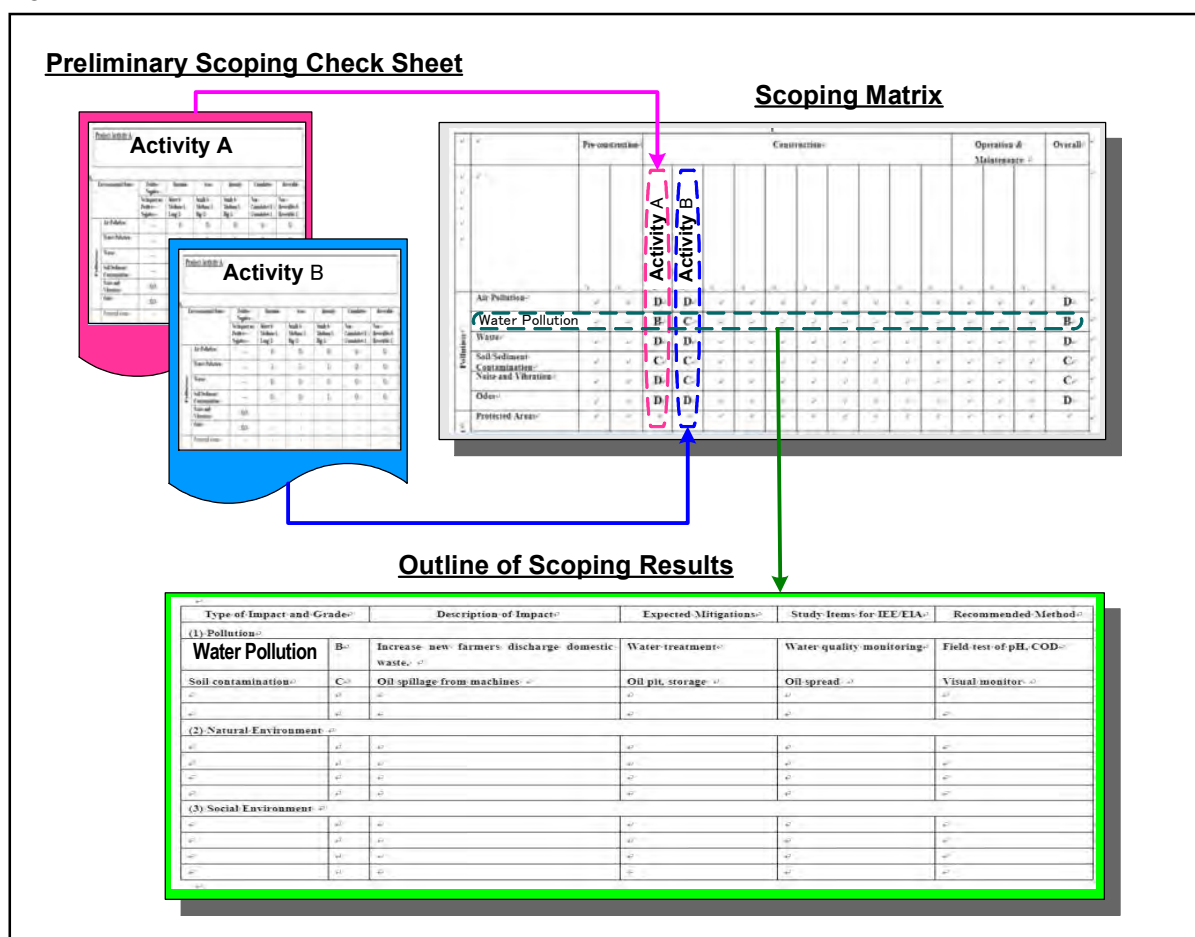


Figure 7.7 Relation Scoping Tools

(1) First Step

Preliminary scoping check sheet is prepared for each project activity. Project activities are listed by dividing them into the below three phases.

- 1) Pre-construction phase
- 2) Construction phase, and
- 3) Operation and maintenance (O&M) phase

Environmental parameters described in section 3.2 Environmental Parameters are evaluated based on the six categories as described in section 3.5.2 Evaluation Category; and then a preliminary scoping check sheet (ATTACHMENT 5) is completed as below:

Preliminary Scoping Check Sheet																											
Project Title: Irrigation Development in Wau																											
Project Activity: Pre-construction Land preparation																											
Environmental Items	Duration a)	Extent b)	Intensity c)	Cumulative d)	Reversible e)	Total Score (T) a)+b)+c)+d)+e)																					
	Short: 1 Medium: 2 Long: 3	Limited: 1 Medium: 2 Wide: 3	Small/Negligible: 1 Medium: 2 Big: 3	Non-Cumulative: 1 Cumulative: 3	Reversible: 1 Irreversible: 3	Rank																					
Indication: no: no impact, +: positive -: negative Rough indication for ranking: The score is rough value. Your judgement based on your experiences / knowledge will be reflected to the ranking.																											
<table border="1" style="width:100%; text-align:center;"> <tr> <td>-15</td><td>-12</td><td>-11</td><td>-7</td><td>-6</td><td>+6</td><td>+7</td><td>+11</td><td>+12</td><td>+15</td> </tr> <tr> <td colspan="2">-A</td><td colspan="2">-B or -C</td><td colspan="2">D or ±C</td><td colspan="2">+B or +C</td><td colspan="2">+A</td> </tr> </table>								-15	-12	-11	-7	-6	+6	+7	+11	+12	+15	-A		-B or -C		D or ±C		+B or +C		+A	
-15	-12	-11	-7	-6	+6	+7	+11	+12	+15																		
-A		-B or -C		D or ±C		+B or +C		+A																			
Pollution	Air Pollution	-1	-1	-1	-1	-1	-5/D																				
	Water Pollution	-1	-1	-1	-1	-1	-5/-C																				
	Waste	-1	-2	-1	-1	-1	-6/-C																				
	Soil/Sediment Contamination	no	no	no	no	no	/D																				
	Noise and Vibration	-1	-1	-1	-1	-1	-5/-C																				
	Odor	no	no	no	no	no	/D																				

Figure 7.8 Example of Preliminary Scoping Check Sheet

Total score of each evaluation item is calculated from six evaluation categories as described in the figure above.

(2) Second Step

Based on the first step using the preliminary scoping sheet, a certain impact caused by a project activity is evaluated according to the six categories; and then is scored by the following categories.

Table 7.12 Evaluation Category

Category	
A	Significant positive / negative impact is expected.
B	Moderate positive / negative impact is expected.
C	Some impact is expected, but its level is unknown.
D	No or negligible impact is expected.

Indication for ranking is given as below:

-15	-12	-11	-7	-6	+6	+7	+11	+12	+15
-A		-B or -C		D or ±C		+B or +C		+A	

The score is rough value. Therefore judgement based on the experiences / knowledge is reflected to the evaluation categories.

For instance in Figure 7.8, total score of air pollution was same -5 as noise / vibration. Those impacts might be caused by operation of equipment, e.g. Impact on air pollution was ranked as D meaning negligible, while impact on noise might have slightly higher risk to residents, etc.

according to the past experiences in similar projects. That is why, impact on noise was assumed as δ -C δ which means impact level is not negligible but unclear.

Those results output from the preliminary scoping check sheet are reflected into a scoping matrix. The scoping matrix summarises the level of each impact which is caused by each project activity. An example of the scoping matrix is shown in the Figure below. Overall evaluation on each impact is evaluated.

Environmental Parameters		Scoping Matrix													
		Pre-construction		Construction								Operation & Maintenance			
Remark		Land Clearance	Leveling of irrigation plot	Installation of irrigation / drainage canals and accessory structures (maintenance roads)	Construction of pump stations	Construction of protection dike (including construction of farm roads)	Construction of rice mills	Procurement of agricultural machinery	Construction of union headquarters office / storage facility	Operation of the irrigation district (practice of intensive agriculture)	Selection of settlers	Formulation of farmers organizations			
positive: +, negative: - A: Significant impact is expected, B: Moderate impact is expected, C: Level of impact unknown, D: No / negligible impact is expected															
Pollution	Air Pollution	-D		-B	-D	-C	-C	-C	-C			-D	-D	-D	-C
	Water Pollution	-B		-B	-B	-B	-B	-B	-B			-D	-D	-D	-B
	Waste														
	Soil/Sediment Contamination														
	Noise and Vibration	-D		-D	-D	-D	-D	-D	-D			-D	-D	-D	-D
	Odor														

Figure 7.9 Example of Scoping Matrix

(3) Third Step

The third step is to determine the environmental impact evaluation, those outputs guide adequate EIA methodology and items to be assessed, which will be undertaken after the ESCID works. The outline of the scoping results is summarised by using the tool 'outline of the scoping results'.

Outline of Scoping Results				
Type of Impact and Score	Outline of Impact	Expected Mitigations	Study Items for EIA	Recommended Method
(1) Pollution				
Water pollution	-C	Land leveling work may generate soil spreads, if the soil spreads in the river, water degradation may affect river condition. During construction, domestic waste by construction work and labors can pollute river water.	Construct temporal drainage and pit to avoid soil water directly discharge in river. Put waste water storage, install adequate toilet.	Water quality measuring of suspended solid, COD, etc. Field test, direct observation.
(2) Natural Environment				
Ecosystem	-B	Change of land use, cutting trees may degrade living condition of wildlife.	Minimize area of tree-cutting. Reforestation	Inventory of wildlife. Hearing with academics, communities, NGOs. Site observation.

Figure 7.10 Example of Scoping Matrix

3.6 Public Consultation

Public consultation is one of the most important tools in the planning and implementation of the development activities. It is also necessary to ascertain the public's views. Principles of public consultation are:

Dissemination of information: Sufficient information should be provided in accessible and culturally appropriate ways.

Information Solicitation: Find and list the views of the community, residents, interested groups, and input them into the ESCID.

Integration: Predict likely direct and indirect impacts, short and long-term resource use implications, evaluate their significance and risks, and guide appropriate mitigation and monitoring programs.

Coordination: Formulate effective public consultation regarding how individual members appreciate the benefits of the consultation, understand their roles, and cooperate with each other.

Engaging stakeholders in the process of public consultation: Involve stakeholders in the process in order to share / exchange information and ideas between the project side and the stakeholders presenting an opportunity for stakeholders to express their views and concerns. In addition, ensuring the opportunity to participate during the early preparation stage of ESCID and project design is important in order to identify and manage any potential conflict and to contribute to resolving issues before they lead to conflict.

Stakeholder analysis is the first step of public consultation; it is a tool to identify all parties that have direct and indirect interests in the project and its potential impacts. Failure in identifying the stakeholders or consulting with a lack of proper transparency in the decision making can lead to conflicts and unfair sharing of benefits. Those negative matters can cause delay of the project implementation.

Principally stakeholders can be divided into the following categories:

- Local communities
- Civil society
- Governments
- Private sectors
- NGOs
- Other institutions

Stakeholders listed for the public consultation are divided 2 groups:

Primary stakeholders: are those who are directly affected by the project. Generally, local communities, residents, etc. are classified into this group. It is important to note that the backgrounds and life styles are different among the stakeholders, so that intensity and type (either positive or negative) of impacts caused by a project may be different for each individual or entity. Therefore it is important to determine how the stakeholders' diverse interests would impact on or be impacted by the project outcome. One basic issue in the consultation is how different stakeholders will interact with each other in the project outcome.

Secondary stakeholders: are those who are indirectly affected by the project. They can be kind of organizations through which benefits are channelled to the primary stakeholders. Local government bodies, civil societies, private sectors, etc. who are active in / around the project site are principally included. Although their potential impacts may be actually secondary, it is possible that some of them could be primary stakeholders depending on their types of activities, sectors and their instructional capabilities to influence the decision-making process.

Selection of stakeholders is based on a range of legitimate interests such as:

- Who will be directly or indirectly, and positively or negatively affected?
- Who are the most vulnerable groups?
- Who might have an interest or feel that they are affected?
- Who supports or opposes the changes caused by the project?
- Whose opposition could be detrimental to the success of the project?
- Whose cooperation, expertise, or influence would be helpful to the success of the project?

There are many approaches for involving public consultation and information disclosures. Approaches may be categorized into three types, (i) information disclosures, (ii) soliciting input and (iii) consensus building. The following table presents approaches for implementation of public consultation.

Table 7.13 Approaches for Public Consultation

	Information Disclosures	Soliciting Input	Consensus Building
Approaches	Printed materials, displays and exhibits, advertising, open house	Community liaison officer, survey and questionnaires, interviews, small public meetings, public hearings	Advisory panel, problem solving techniques, consensus-building techniques, arbitration
Benefits	<ul style="list-style-type: none"> · Reach large audience · Minimum demand on the public · Can provide detailed information 	<ul style="list-style-type: none"> · Allows immediate response and feedback · Allows detailed and focused discussion · Shows sociological data and quantifies opinions, priorities and concerns · Allows direct communication and exchange of information and debate 	<ul style="list-style-type: none"> · Can address highly technical problems · Helps prioritize and reach consensus · Impartiality from an uninvolved party
Challenges	<ul style="list-style-type: none"> · Ability to handle specific interests is low · Excludes illiterates · Costs of preparation and staffing 	<ul style="list-style-type: none"> · Potential conflicts between projects and stakeholders · Requires specialists to deliver and analyse to avoid bias · Can be diverted by special interest groups 	<ul style="list-style-type: none"> · Difficult to include full range of views · May take a long time · Requires highly skilled mediators · Difficult to identify an acceptable neutral party

Source: Environmental Assessment Guidelines, ADB, 2003

3.7 Reporting

According to the draft environmental regulations 2012, Section 6-(2), an environmental impact assessment shall be conducted in accordance with the scoping and the terms of reference developed during the scoping exercise by the developer or proponent. Therefore output from the ESCID functions as the scoping exercise. The contents of the report, hence, cover the requirement in the scoping process. The ESCID suggests the following contents of ECID report, but it is not limited to the items in this list.

- i) Executive summary;
- ii) Introduction;
- iii) Project background and description;
- iv) Policy, administrative and legal frameworks;
- v) Baseline or existing conditions based on existing data and preliminary survey;

- vi) Result of Evaluation on Alternatives;
- vii) Impact assessment
- viii) Environmental and social management and/or mitigation plans;
- ix) Environmental and social monitoring plans;
- x) Result of Public Consultation
- xi) Conclusions
- xii) Recommendation on terms of reference of an EIA study if necessary

APPENDIX-1: ILLUSTRATIVE LIST OF SENSITIVE CHARACTERISTICS, AND AREAS

According to the JICA Guideline, appendix 3 "Illustrative List of Sensitive Sectors, Characteristics, and Areas" indicate a large scale irrigation development must be one of sensitive sectors which will likely have significant adverse impact; so that highest careful considerations are required. Aside from sensitive sectors, it also indicates sensitive characteristics, and areas as below. The ESCID guideline refers to this illustrative list.

1. Sensitive Characteristics

- Large-scale involuntary resettlement
- Large-scale groundwater pumping
- Large-scale land reclamation, land development, and land clearing
- Large-scale logging

2. Sensitive Areas

Projects in the following areas or their vicinity:

- National parks, nationally-designated protected areas (coastal areas, wetlands, areas for ethnic minorities or indigenous peoples and cultural heritage, etc. designated by national governments)
- Areas that are thought to require careful consideration by the country or locality

Natural Environment

- Primary forests or natural forests in tropical areas
- Habitats with important ecological value (coral reefs, mangrove wetlands, tidal flats, etc.)
- Habitats of rare species that require protection under domestic legislation, international treaties, etc.
- Areas in danger of large-scale salt accumulation or soil erosion
- Areas with a remarkable tendency towards desertification

Social Environment

- a) Areas with unique archeological, historical, or cultural value
- b) Areas inhabited by ethnic minorities, indigenous peoples, or nomadic peoples with traditional ways of life, and other areas with special social value

Justification on proposed project	Objectives of the Project:
	Benefit of the Project:
	Reasonability on Justification:
Relevant projects	

2. Legitimacy

Consistency with upper RSS policies / programs, etc.			
– South Sudan Constitution	Yes	No	
– National Environmental Policy	Yes	No	
– RSS Development Plan	Yes	No	
– Water Policy	Yes	No	
– Water Resource Management Policy	Yes	No	
– Agriculture Sector Policy	Yes	No	
– Land Policy			
Others			
Consistency with International Treaties			
–	Yes	No	
–	Yes	No	
Necessary certificate or official approval aside from IEE/EIA	Yes	No	Not clear
	If Yes, specify below		
Notification to stakeholder	Already with administrative body local residents NGOs Others ()	Not yet	

3. Possible adverse impacts

If expected mark in

Project location is inside / surrounding:	
Designated protected area	<input type="checkbox"/> National park <input type="checkbox"/> Game reserve <input type="checkbox"/> Forest reserve
	Specify:
Natural sensitive area	<input type="checkbox"/> Wetland <input type="checkbox"/> Dry tropical forest <input type="checkbox"/> Ecologically important habitats <input type="checkbox"/> Unique landscape <input type="checkbox"/> Lake, river <input type="checkbox"/> Groundwater recharge area <input type="checkbox"/> Mountain <input type="checkbox"/> Others
	Specify:
Social sensitive area	<input type="checkbox"/> Habitats of minorities, indigenous or nomadic people <input type="checkbox"/> Unique traditional culture <input type="checkbox"/> Important resources for vulnerable groups ² <input type="checkbox"/> Historical or religious zone <input type="checkbox"/>
	Specify:
Remarkable disaster	<input type="checkbox"/> Desertification area <input type="checkbox"/> Flood prone <input type="checkbox"/> Hill-top, steep area (> 30degree)
	Specify:

Pollution such as:	
	<input type="checkbox"/> Water pollution <input type="checkbox"/> Air pollution <input type="checkbox"/> Noise, vibration <input type="checkbox"/> Soil contamination <input type="checkbox"/> Offensive odor <input type="checkbox"/> Hazardous waste <input type="checkbox"/> Others
	Specify:

² ex. fishery, cattle, hunting, forestry

Natural environmental degradation such as:	
Wildlife, ecosystem	<input type="checkbox"/> Change of ecosystem <input type="checkbox"/> Alien species <input type="checkbox"/> Endangered, rare species <input type="checkbox"/> Wetland <input type="checkbox"/>
	Specify:
Land, soil	<input type="checkbox"/> Erosion <input type="checkbox"/> Salt damage <input type="checkbox"/> Land degradation <input type="checkbox"/> Desertification <input type="checkbox"/> Others
	Specify:
Disaster	<input type="checkbox"/> Flood <input type="checkbox"/> Land slide <input type="checkbox"/> Land subsidence <input type="checkbox"/> Desertification <input type="checkbox"/> Others
	Specify:

Social environmental degradation such as:	
Social, socio economy	<input type="checkbox"/> Involuntary resettlement <input type="checkbox"/> Change of lifestyle / culture <input type="checkbox"/> Change of land use <input type="checkbox"/> Local economy <input type="checkbox"/> Local conflict among communities <input type="checkbox"/> Income gap <input type="checkbox"/> Loss of job opportunity <input type="checkbox"/> Transportation
	Specify:
Rights	<input type="checkbox"/> Land right <input type="checkbox"/> Water right <input type="checkbox"/> Right of common <input type="checkbox"/> Others <input type="checkbox"/>
	Specify:
Human health, sanitation	<input type="checkbox"/> Endemic diseases <input type="checkbox"/> Infectious diseases inc. HIV/AIDS <input type="checkbox"/> Increase domestic waste <input type="checkbox"/>
	Specify:

4. Conclusion

Necessity of further environmental survey	Yes	No
If Yes, specify the parameters to be surveyed:		
Pollution		
<input type="checkbox"/> Air quality	<input type="checkbox"/> Water quality	<input type="checkbox"/> Waste
<input type="checkbox"/> Soil/sediment	<input type="checkbox"/> Noise/vibration	<input type="checkbox"/> Odor
<input type="checkbox"/> Others		
Natural Environment		
<input type="checkbox"/> Ecosystem, fauna/flora	<input type="checkbox"/> Hydrology	<input type="checkbox"/> Topography/geology
<input type="checkbox"/> Global warming	<input type="checkbox"/> Landscape	
<input type="checkbox"/> Others		
Social Environment		
<input type="checkbox"/> Resettlement	<input type="checkbox"/> Socio-economy	<input type="checkbox"/> Heritage
<input type="checkbox"/> Land use	<input type="checkbox"/> Infrastructure/services	<input type="checkbox"/> Public consultation
<input type="checkbox"/> Others		
Reason:		

Person who fills	
Name:	
Organization :	
Position :	
Signature	
Date	/ /

End

APPENDIX-3: OUTLINE OF PRELIMINARY SURVEY METHOD

Survey Items		Survey Methods	Survey Location	Points to be Examined
Pollution				
Natural Environment				
Social Environment				

Attachment

Location map

Estimated number of surveyors, their skills, e.g.

APPENDIX-4: EVALUATION SHEET FOR ALTERNATIVES**Project Title:** _____**Evaluation Method**

Evaluation method	<p>Evaluation criteria: 5: Exceptionally suitable, 4: Suitable, 3: Negligible/ Neutral 2: Not suggestible, 1: Suggest avoiding</p> <p>Evaluation items</p> <p>øPollutionø includes: øAir Pollutionø, øWater Pollutionø, øWasteø, øSoil/Sediment Contaminationø, øNoise and Vibrationø, øOdourø, øGlobal Warmingø</p> <p>øBiodiversityø includes: øProtected Areasø øEcosystemø</p> <p>øNature, disastersø includes: øHydrologyø, øTopography and Geologyø, øSubsidence / Erosionø, øLandscapeø</p> <p>øLand occupies resettlementø includes: øResettlementø. øLand Useø</p> <p>øSocial conflictø includes: øVulnerable Groupsø, øWater Use / Rightsø</p> <p>øLiving conditionø includes: øLiving and Livelihoodø, øLocal Economyø, øHistorical / Cultural Heritageø “Social Infrastructure / Servicesø, øInfectious Diseasesø</p> <p>øEconomy, developmentø means: contribution to economic improvement in the RSS</p> <p>øConsistencyø means: consistency / legitimacy / harmonization with the RSS policies</p>
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Project Summary

	Alternative A	Alternative B	Zero option
Project Summary		No project	

Evaluation

Valuation Items		Alternative A	Alternative B	Zero option
Natural Environment	Average of a), b), c) ----- (1)			
	a) Pollution			
	b) Biodiversity			
	c) Nature, disasters			
	Reason			
Social Environment	Average of a), b), c) ----- (2)			
	a) Land occupies, resettlement			
	b) Social conflict			
	c) Living condition			
	Reason			
Economy, development	Average of a), b), c) ----- (3)			
	a) Economy, development			
	b) Consistency			
	Reason			

Results

	Alternative A	Alternative B	Zero option
Total score (1) + (2) + (3)			
Ranking			
Overall			

APPENDIX-5: PRELIMINARY SCOPING CHECK SHEET

Project Title: _____

Project Activity: _____

Environmental Items	Duration a)	Extent b)	Intensity c)	Cumulative d)	Reversible e)	Total Score (T) a)+b)+c)+d)+e) / Rank																				
	Short: 1 Medium: 2 Long: 3	Limited: 1 Medium: 2 Wide: 3	Small/Negligible: 1 Medium: 2 Big: 3	Non-Cumulative: 1 Cumulative: 3	Reversible: 1 Irreversible: 3																					
Indication: no: no impact, +: positive -: negative Rough indication for ranking: The score is rough value. Your judgement based on your experiences / knowledge will be reflected to the ranking.																										
<table border="1" style="width: 100%; text-align: center;"> <tr> <td>-15</td><td>-12</td><td>-11</td><td>-7</td><td>-6</td><td>+6</td><td>+7</td><td>+11</td><td>+12</td><td>+15</td> </tr> <tr> <td colspan="2">-A</td><td colspan="2">-B or -C</td><td colspan="2">D or ±C</td><td colspan="2">+B or +C</td><td colspan="2">+A</td> </tr> </table>							-15	-12	-11	-7	-6	+6	+7	+11	+12	+15	-A		-B or -C		D or ±C		+B or +C		+A	
-15	-12	-11	-7	-6	+6	+7	+11	+12	+15																	
-A		-B or -C		D or ±C		+B or +C		+A																		
Pollution	Air Pollution					/																				
	Water Pollution					/																				
	Waste					/																				
	Soil/Sediment Contamination					/																				
	Noise and Vibration					/																				
	Odor					/																				
Natural Environment	Protected Areas					/																				
	Ecosystem					/																				
	Hydrology					/																				
	Topography and Geology					/																				
	Subsidence / Erosion					/																				
	Global Warming					/																				
	Landscape					/																				
Social Environment	Resettlement					/																				
	Living and Livelihood					/																				
	Local Economy					/																				
	Historical / Cultural Heritage					/																				
	Land Use					/																				
	Vulnerable Groups					/																				
	Local Conflict					/																				
	Water Use / Right					/																				
	Social Infrastructure / Services					/																				
	Infectious Diseases					/																				
Remark																										

APPENDIX-6: SCOPING MATRIX

Environmental Parameters		Pre-construction		Construction								Operation & Maintenance				Overall
Remark		positive: +, negative: - A: Significant impact is expected, B: Moderate impact is expected, C: Level of impact unknown, D: No / negligible impact is expected														
Pollution	Air Pollution															
	Water Pollution															
	Waste															
	Soil/Sediment Contamination															
	Noise and Vibration															
	Odor															
Natural Environment	Air Pollution															
	Water Pollution															
	Topography and Geology															
	Subsidence / Erosion															
	Global Warming															
	Landscape															

Scoping Matrix

Environmental Parameters	Pre-construction		Construction								Operation & Maintenance				Overall
Remark	positive: +, negative: - A: Significant impact is expected, B: Moderate impact is expected, C: Level of impact unknown, D: No / negligible impact is expected														
Social Environment	Resettlement														
	Living and Livelihood														
	Local Economy														
	Historical / Cultural Heritage														
	Land Use														
	Vulnerable Groups														
	Local Conflict														
	Water Use / Right														
	Social Infrastructure / Services														
	Gender, Right of Children, Disabilities														
Infectious Diseases															

APPENDIX-7: OUTLINE OF SCOPING RESULTS

Type of Impact and Score	Outline of Impact	Expected Mitigations	Study Items for EIA	Recommended Method
(1) Pollution				
(2) Natural Environment				
Ecosystem				
(3) Social Environment				