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Ministry of Settlement and Regional Infrastructure (MOSRI)

The Republic of Indonesia

**THE STUDY
ON
COMPREHENSIVE RECOVERY PROGRAM
OF
IRRIGATION AGRICULTURE**

VOLUME-2

ANNEX-I

**Guideline
for
Rehabilitation
of
Irrigation Facilities**

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Nippon Koei Co., Ltd.

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**THE STUDY
ON
COMPREHENSIVE RECOVERY PROGRAM
OF
IRRIGATION AGRICULTURE
IN
THE REPUBLIC OF INDONESIA**

Volume-2

**ANNEX-I
GUIDELINE FOR REHABILITATION OF IRRIGATION FACILITIES**

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1. Technical Guideline for Rehabilitation & Upgrading of Irrigation Network
(Ministry of Public Works / JICA. 1999)
2. Technical Specification for Rehabilitation & Upgrading of Irrigation Network
(Ministry of Public Works / JICA. 1999)
3. Guideline for Feasibility Study of Irrigation Development
(Ministry of Public Works / JICA. 1999)
4. Irrigation Design Standards, Design Criteria, KP-01 "Irrigation System Design"
(Ministry of Public Works. 1986)
5. Irrigation Design Standards, Design Criteria, KP-02 "Headworks"
(Ministry of Public Works. 1986)
6. Irrigation Design Standards, Design Criteria, KP-03 "Canals"
(Ministry of Public Works. 1986)

7. Irrigation Design Standards, Design Criteria, KP-04 “Structures”
(Ministry of Public Works. 1986)
8. Irrigation Design Standards, Design Criteria, KP-05 “Tertiary Units”
(Ministry of Public Works. 1986)
9. Irrigation Design Standards, Design Criteria, KP-06 “Structural Parameters”
(Ministry of Public Works. 1986)
10. Irrigation Design Standards, Design Criteria, KP-07 “Drawing Standards”
(Ministry of Public Works. 1986)
11. Irrigation Design Standards, Irrigation Structures, BI-01 “Typical Irrigation Structures”
(Ministry of Public Works. 1986)
12. Irrigation Design Standards, Irrigation Structures, BI-02 “Standardized Irrigation Structures” (Ministry of Public Works. 1986)
13. Irrigation Design Standards, Technical Specifications, PT-01 “Irrigation System Design”
(Ministry of Public Works. 1986)
14. Irrigation Design Standards, Technical Specifications, PT-03 “Geotechnical Investigations” (Ministry of Public Works. 1986)
15. Irrigation Design Standards, Technical Specifications, PT-04 “Hydraulic Model Testing”
(Ministry of Public Works. 1986)
16. Irrigation Design Standards, Technical Specifications, PT-02 “Topographical Survey”
(Ministry of Public Works. 1986)
17. JBIC Manual (Loan Handbook)
(Japan Bank for International Cooperation. 2002)
18. Asian Development Bank Guidelines (Loan Handbook)
(Asian Development Bank. 2002)

List of Abbreviations

ADB	Asian Development Bank
AMDAL	Environmental Impact Assessment (Analisa Mengenai Dampak Lingkungan)
APBN	National Government Budget (<i>Anggaran Belanja Pendapatan Nasional</i>)
Balai PSDA	Water Resources Management Services Center (<i>Balai Pengelolaan Sumber Daya Air</i>)
BAPPEDA	Regional Development Agency (<i>Badan Perencanaan dan Pembangunan Daerah</i>)
BMG	Meteorological and Geophysical Agency (<i>Badan Meteorologi dan Geofisika</i>)
BPTP	Center for Agriculture Technology Assessment (Balai Pengkajian Teknologi Pertanian)
DI	Irrigation Scheme (<i>Daerah Irigasi</i>)
Dinas PSDA	Water Resources Management Services Office (<i>Dinas Pengelolaan Sumber Daya Air</i>)
F/S	Feasibility Study
FWUA	Federation of Water Users' Association at secondary block level (<i>GP3A</i>)
MWUA	Federation of Water Users' Associations at apex scheme level
IFAD	International Fund for Agriculture Development (<i>IP3A</i>)
I/P	Implementation Program
ISF	Irrigation Service Fee (<i>Juran Pelayanan Air Irigasi; IPAIR</i>)
JICA	Japan International Cooperation Agency
JBIC	Japan Bank for International Cooperation
KIMPRASWIL	Ministry of Settlement and Regional Infrastructure (Departemen Pemukiman dan Prasarana Wilayah)
KIPP	Agricultural Extension Information Office (<i>Kantor Informasi dan Penyuluhan Pertanian</i>)
KT	Farmers' group (<i>Kelompok Tani</i>)
KUD	Village Unit Cooperative (<i>Koperasi Unit Desa</i>)
Mantri Tani	Agriculture Field Staff
MOSRI	Ministry of Settlement and Regional Infrastructure
O&M	Operation and Maintenance
PPL	Field Extension Worker (<i>Penyuluh Pertanian Lapangan</i>)
Pre-F/S	Pre-feasibility Study
UPJA	Agriculture Machinery and Equipment Rental Services
WB	World Bank
WMI	Water Management Institution (see "terminology" for the definition of the term)
WUA	Water Users' Association (<i>Pengempulan Petani Pemakai Air; P3A</i>)

Measurement Units

Extent

cm² = Square-centimeters (1.0 cm x 1.0 cm)
m² = Square-meters (1.0 m x 1.0 m)
Km² = Square-kilometers (1.0 Km x 1.0 Km)
ha. = Hectares (10,000 m²)
ac = Acres (4,046.8 m² or 0.40468 ha.)

Volume

cm³ = Cubic-centimeters
(1.0 cm x 1.0 cm x 1.0 cm)
m³ = Cubic-meters
(1.0 m x 1.0 m x 1.0 m or
1.0 K-lit.)
lit. = Liter (1,000 cm³)

Length

mm = Millimeters
cm = Centimeters (cm = 10 mm)
m = Meters (m = 100 cm)
Km = Kilometers (Km = 1,000 m)

Weight

gr. = Grams
Kg = Kilograms (1,000 gr.)
ton = Metric ton (1,000 Kg)

Currency

US\$ = United State Dollars
J¥ = Japanese Yen
Rp. = Indonesian Rupiah

Time

sec. = Seconds
min. = Minutes (60 sec.)
hr. = Hours (60 min.)

Introduction

INTRODUCTION

1. Assumptions

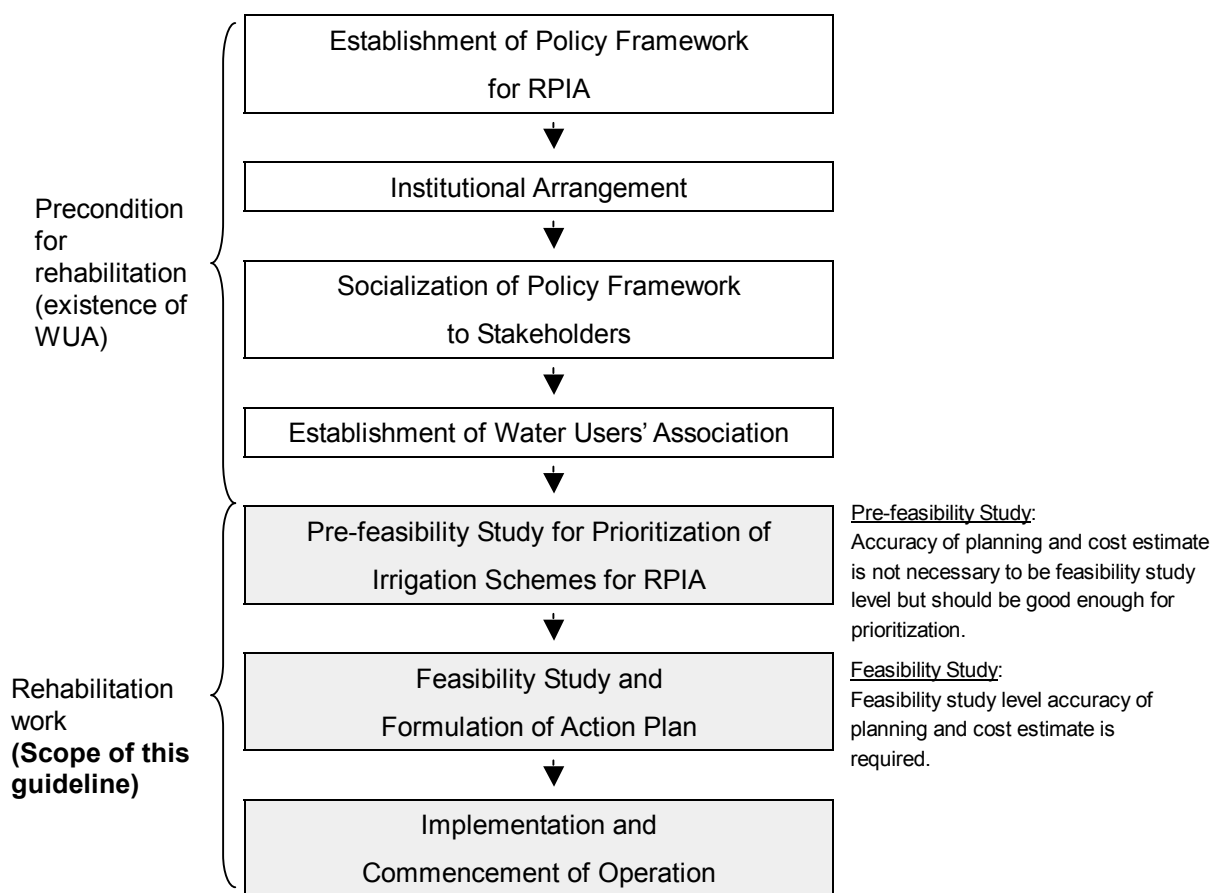
This is a technical guideline for “Rehabilitation of Irrigation Facilities”, which is the main focus in the Recovery Program of Irrigation Agriculture (the RPIA). The approaches and institutional frameworks for the RPIA shall be established by the Indonesian Authority in line with the irrigation management policy which is under modification aiming at adjustment to the spirit of draft Law on Water Resources that has been deliberating in the House of Representatives as of November 2003. Therefore, at the stage of the preparation of this guideline, the concrete concepts for the frameworks have not been established yet. Accordingly, the following assumptions have been applied to the preparation of this guideline:

- 1) The definition of “Irrigation Management” is a comprehensive activity covering from planning to design, construction, rehabilitation, upgrading, operation, maintenance and securing of irrigation system as well as quality conservation of irrigation water;
- 2) The basic concept of Irrigation Management is farmers’ participation in every stage of the abovementioned Irrigation Management activities through input of initial ideas, agreement of decision making and among others shouldering of responsibility for construction, operation and maintenance of tertiary irrigation system;
- 3) Irrigation Management is to be done on an irrigation scheme basis, not an administration unit basis;
- 4) Farmers are principally represented by the Chairman and Technical Director of Water Users’ Association (WUA) (P3A) established in every tertiary block of an irrigation scheme;
- 5) If WUAs have been organized into Federation of WUAs (FWUA) (GP3A) as commanded by one secondary canal of the irrigation scheme, the Chairman of FWUA acts as one of stakeholders on water users’ side. In case that FWUAs have been organized into Main Federation of WUAs (MFUA) (IP3A) as an apex scheme-level organization, the Chairman of MWUA is also considered as one of stakeholders on water users’ side;
- 6) Authority and responsibility of Irrigation Management among government institutions concerned are to be arranged as below;
 - Irrigation scheme with a command area of less than 1,000 ha and located within one District/Municipality under the jurisdiction of district/municipal government
 - Irrigation scheme commanding 1,000 ha and more and located in one Province as well as inter-Districts/Municipalities irrigation scheme with a command area of 500 - 1,000 ha and located in plural under the jurisdiction of provincial government
 - Irrigation scheme located in plural Provinces under the jurisdiction of central government

- 7) In performing Irrigation Management activities, budget allocation criteria as well as budget utilization mechanism and procedure should be followed once all relevant government regulations and ministerial decrees are adjusted to the spirit of Law on Water Resources;
- 8) Rehabilitation of irrigation systems as one of Irrigation Management activities should be conducted based on the abovementioned jurisdiction as well as the participatory irrigation management concept; and
- 9) Rehabilitation of irrigation systems should be conducted step-by-step starting from justification of irrigation system rehabilitation needs to implementation of rehabilitation works followed by monitoring and evaluation.

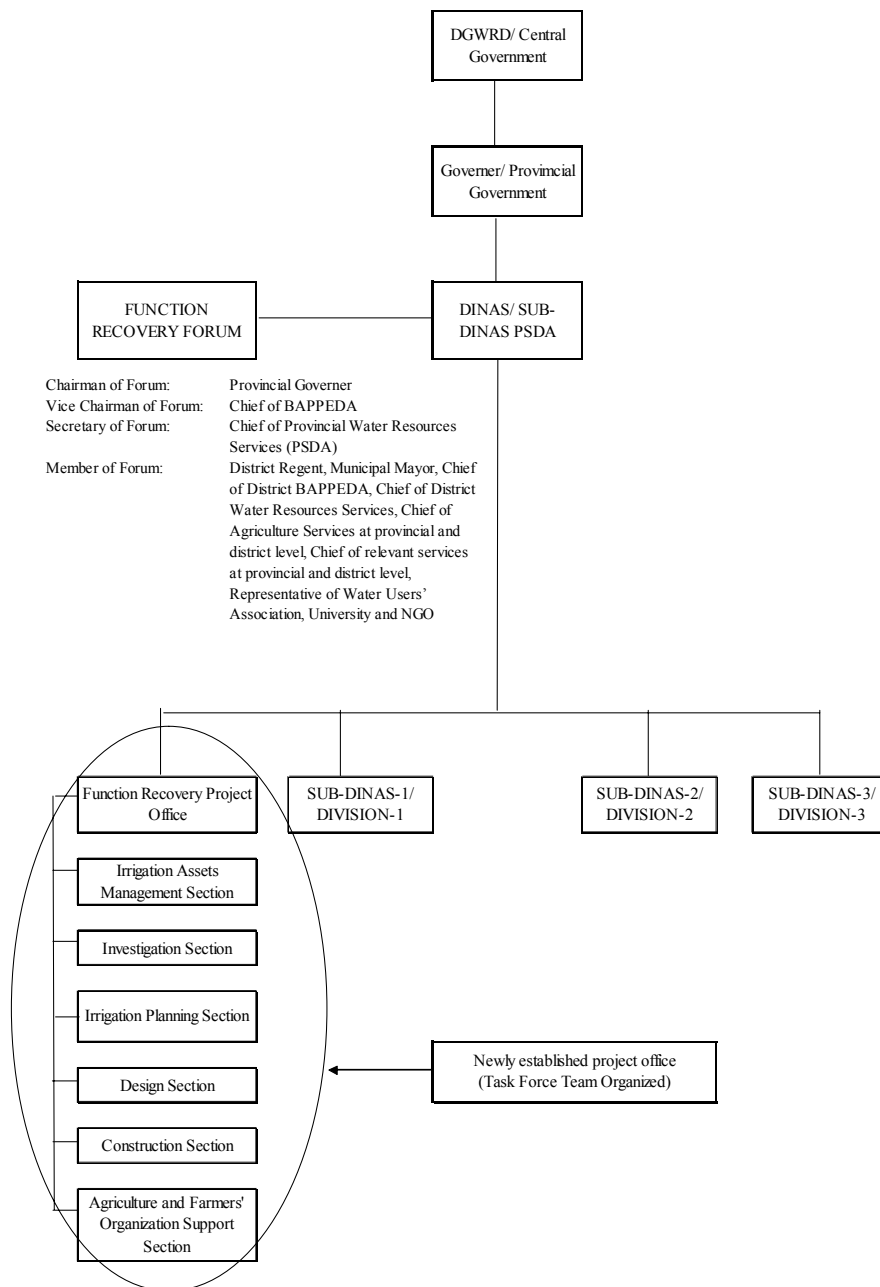
1.1 Stage-wise Approach

The stage-wise approach for the RPIA tentatively conceived for the preparation of this guideline is as follows. Within seven stages in total, this guideline handled last three stages, since first four stages were considered as precondition for starting rehabilitation works.



1.2 Institutional Arrangements

The institutional arrangements for RPIA tentatively conceived are as illustrated below.



1.3 Applied Laws and Regulations

This guideline has been prepared based on the policies and regulations described below:

- Law No. 22 (1999)
- Law No. 25 (1999)
- Draft of new Law on Water Resources (as of September 2003)

- Current Government Regulations and Ministerial Decrees related to irrigation management (subject to adjustment to the new Law on Water Resources once it is enacted)

2. Scope of the Guideline

2.1 Purpose and Objective of the Guideline

The guideline provides comprehensive coverage and necessary information on the various type and depth of studies needed for a successful rehabilitation project of irrigation and drainage development. The guideline shows procedure of the rehabilitation works from selection of priority irrigation schemes and planning to implementation of the project.

2.2 Main Users of the Guideline

This guideline was prepared for experts in central and local governments, and consultants who have about 10 years experience and basic knowledge of planning, design, and construction of irrigation and drainage development project.

2.3 Nationwide Usage of the Guideline

The contents and descriptions of this guideline are generally applicable to most cases of rehabilitation works in whole of Indonesia. However, this does not mean that the guideline can be applied uniformly in all cases.

2.4 Range of Description of the Guideline

To avoid overlap of description between a lot of existing guidelines and manuals, this guideline focuses only on,

- 1) specific method or procedures for *rehabilitation works* of irrigation facilities, and
- 2) descriptions which are not available in the other documents.

It means that common information or techniques for ordinary works should be obtained from reference documents, which are introduced as standards and criteria in the guideline (see Attachments for contents of reference documents introduced in the Guideline).

2.5 Style of the Guideline

To contribute easy understanding of a procedure of rehabilitation works, the guideline was prepared with a style of flow chart. In detail, it consists of 1) work flow, 2) methodology, 3) required input and expected output, and 4) reference standard and criteria of rehabilitation works. For directions for use of the guideline, see following section 4 (How to Use the Guideline).

3. Terminology

1. List of Irrigation Schemes

Original list of irrigation schemes in the province	List of all the irrigation schemes in the province (or district) of which area is larger than 1,000 ha.
Master list of irrigation schemes for rehabilitation	List showing candidates of irrigation schemes for field investigation.
List of irrigation schemes for Pre-F/S	List showing candidates of irrigation schemes for pre-feasibility study (Pre-F/S).
List of irrigation schemes for prioritization	List showing candidates of irrigation schemes for prioritization.

2. Task Force Team

Provincial task force team	Task force team for rehabilitation works at province level. In case of prioritization should be made at district level, it should be interpreted as district task force team.
Task force team	Task force team for rehabilitation works at irrigation scheme level.

3. Prioritized Group of Irrigation Schemes for Rehabilitation

Group I	First priority group of irrigation schemes for rehabilitation (study and implementation within short-term is recommended)
Group II	Second priority group of irrigation schemes for rehabilitation (study and implementation within middle-term is recommended)
Group III	Third priority group of irrigation schemes for rehabilitation (study and implementation within long-term is recommended)
Group IV	Group of irrigation schemes which is required to reformulate water resources development plan
Group V	Group of irrigation schemes which is required to accelerate WUAs establishment or institutional capacity building
Group VI	Group of irrigation schemes which should be developed by other category or method

4. Project Planning and Implementation

Pre-feasibility Study (Pre-F/S)	Study which is conducted for the purpose of prioritization of irrigation schemes for rehabilitation.
Feasibility Study (F/S)	Study which is conducted to analyze feasibility of project implementation.
Pre-F/S level EIRR	EIRR which is obtained through pre-F/S. The pre-F/S level EIRR is estimated based on limited data available in pre-F/S stage and pre-F/S level development plan. Pre-F/S level EIRR is used for prioritization of irrigation schemes.

F/S level EIRR	EIRR which is obtained thorough F/S. F/S level EIRR is used for economic evaluation and decision making for project implementation.
Subject Area (for rehabilitation)	Irrigation area which should be rehabilitated.

5. Institution

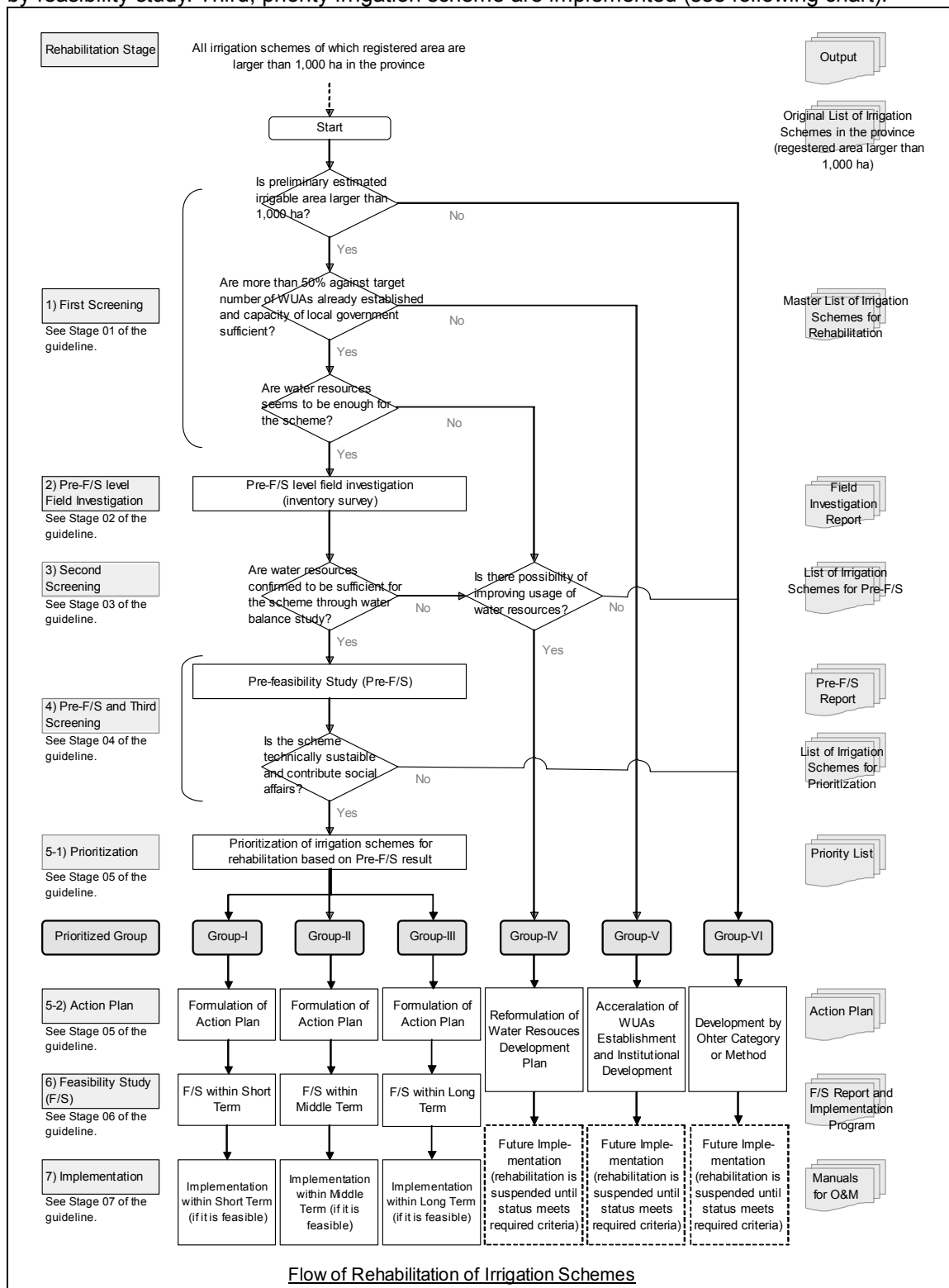
WMI (Water Management Institution)	Water resources (irrigation) management administration of provincial/district/municipal governments, WUA, FWUA and MWUA
Farmers' group	Group of farmers (<i>Kelompok Tani</i>)
Farmers' organizations	General term for organizations established by farmers, etc. (<i>Kelompok Tani, KUD, UPJA, etc.</i>)

6. Stratum (Level) of Rehabilitation Works

Stage	Highest level of rehabilitation works. The 'Stage' consists of several 'Task's.
Task	Second level of rehabilitation works. The 'Task' contains several 'Step's.
Step (see following "How to Use the Guideline for detail explanation)	Third and lowest level of rehabilitation works.
















4. Stage-wise Planning and Prioritization of Irrigation Schemes for Rehabilitation







In the Guideline, it is recommended to apply following procedure for recovery of irrigation schemes. First, priority schemes for rehabilitation are selected at province level by province-wide pre-feasibility study and prioritization. Second, feasibility of selected priority schemes are confirmed by feasibility study. Third, priority irrigation scheme are implemented (see following chart).



5. Full Participatory Approach

Recovery of irrigation system needs to be conducted by “Full Participatory Approach”. “Full Participatory Approach” recommended in the guideline is illustrated as follows.

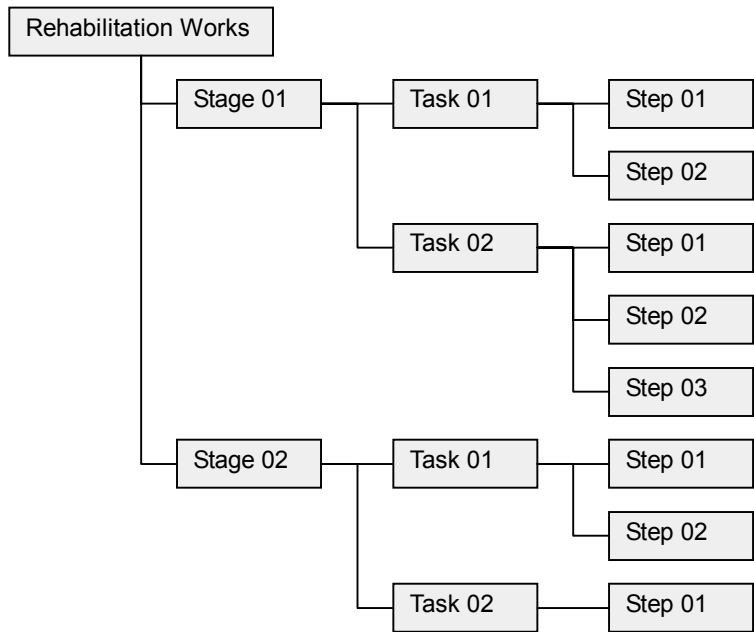
Stage	Recommended Participatory Approach
Stage 01 First Screening of Irrigation Schemes for Rehabilitation	 <u>Beginning of the Stage</u> Kick-off meeting on preparation of Master List of Irrigation Schemes for Rehabilitation
	 <u>Middle of the Stage</u> <i>(None)</i>
	 <u>End of the Stage</u> Wrap up meeting on Master List of Irrigation Schemes for Rehabilitation
Stage 02 Pre-F/S level Field Investigation	 <u>Beginning of the Stage</u> <i>(None)</i>
	 <u>Middle of the Stage</u> Collecting information from selected sample stakeholders
	 <u>End of the Stage</u> Socialization workshop on field investigation result
Stage 03 Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability	 <u>Beginning of the Stage</u> <i>(None)</i>
	 <u>Middle of the Stage</u> <i>(None)</i>
	 <u>End of the Stage</u> Socialization workshop on the List of Irrigation Schemes for Pre-F/S
Stage 04 Formulation of Pre-F/S level Rehabilitation Plan and Third Screening of Irrigation Schemes	 <u>Beginning of the Stage</u> <i>(None)</i>
	 <u>Middle of the Stage</u> Information collection on pre-F/S level WMI strengthening planning
	 <u>End of the Stage</u> Socialization workshop on the List of Irrigation Schemes for Pre-F/S
Stage 05 Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan	 <u>Beginning of the Stage</u> <i>(None)</i>
	 <u>Middle of the Stage</u> <i>(None)</i>
	 <u>End of the Stage</u> Socialization of Overall Action Plan

Stage 06 Formulation of F/S level Rehabilitation Plan and Preparation of Implementation Program	 <u>Beginning of the Stage</u> <i>(None)</i>
	 <u>Middle of the Stage</u> WMI strengthening planning by participatory approach
	 <u>End of the Stage</u> Socialization of F/S result
Stage 07 Implementation and Commencement of Operation	 <u>Beginning of the Stage</u> <i>(None)</i>
	 <u>Middle of the Stage</u> Implementation of WMI strengthening
	 <u>End of the Stage</u> Commencement of operation and maintenance

6. How to Use the Guideline

6.1 Structure of the Guideline

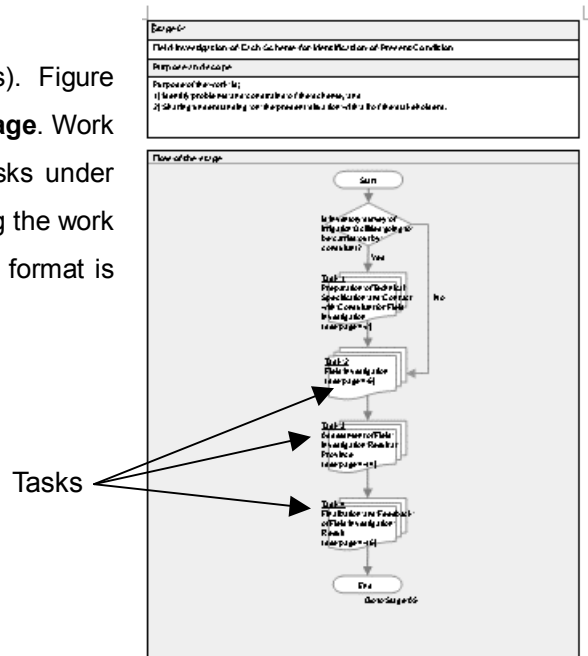
In the guideline, rehabilitation works was classified into three levels. In this guideline, these levels were named as **1) Stage (first level, general)**, **2) Task (second level)**, and **3) Step (third level, detail)**. To use the guideline efficiently, full understanding of this structure is essential. Conceptual structure of the guideline is shown in the right.



Conceptual Structure of the Guideline

1) Work Flow and Description of the **Stage**

The **Stage** consists of one or several Task(s). Figure shown right is a style to describe work of the **Stage**. Work flow of the **Stage** and relationship between Tasks under the **Stage** are given in this format. Before starting the work of the **Stage**, confirmation of works flow by this format is required.

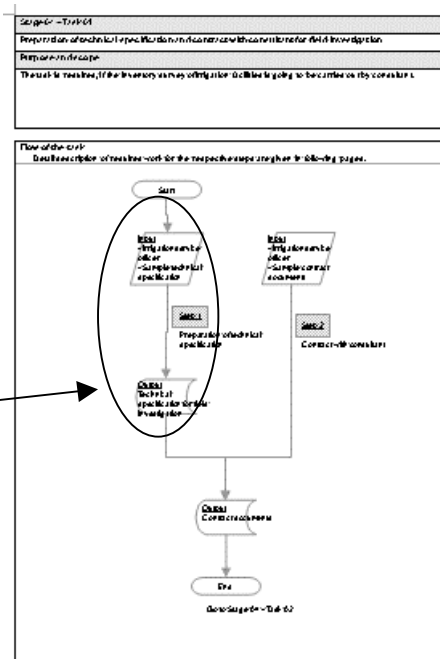


Format for Work Flow of the **Stage**

2) Work Flow and Description of the **Task**

The **Task** consists of one or several Step(s). Figure shown right is a style to describe work of the **Task**. Work flow of the **Task**, relationship between Steps under the **Task**, and required input and expected output of respective Step are given in this format. Before starting the work of the **Task**, confirmation of work flow of the **Task** by this format is essential.

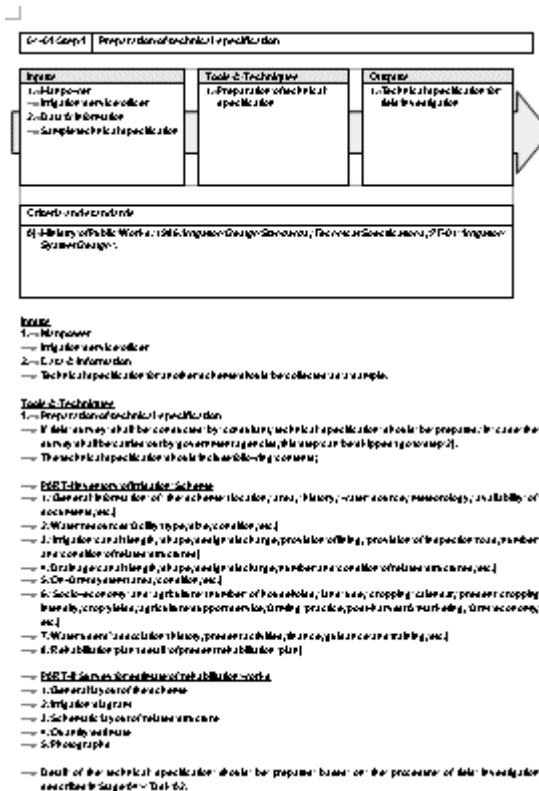
Step
(Input and output of the step)



Format for Work Flow of the **Task**

3) Detail Description of the **Step**

Figure shown right is a style to describe work of the **Step**. Detail description of the **Step**, such as, a) required inputs, 2) tools and techniques to be applied, 3) expected outputs, and 4) applicable criteria and standard are given in this format. Before starting the work of the **Step**, please confirm contents of the work by using this format.

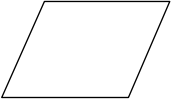
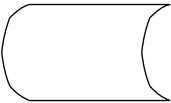
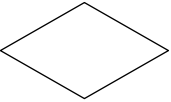


Format for Description of the **Step**

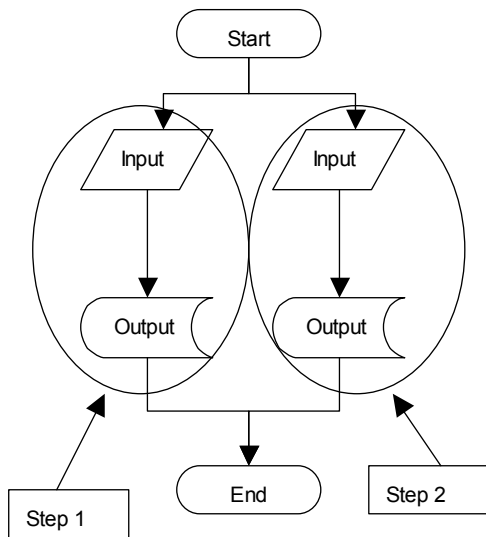
6.2 General Rule of the Flow Chart

Following is the general rule of the flow chart.

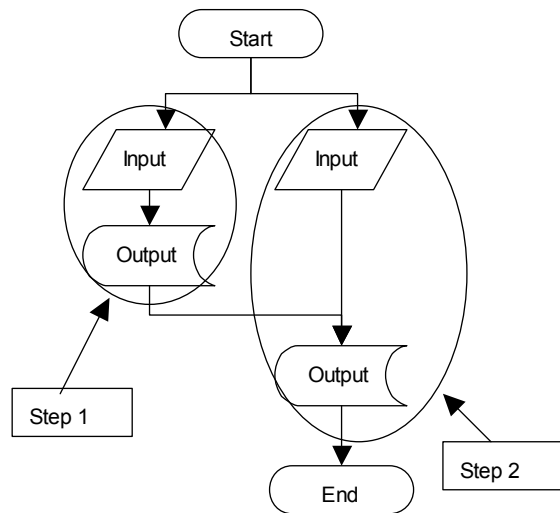
1) Shape of the object

Shape of the object	Meaning of the object
	Input of the work
	Output of the work
	Decision making (yes or no)

2) Parallel work and sequential work.



Parallel work
 Result of Step 2 can be obtained without using the result of Step 1.



Sequential work
 Result of Step 2 can be obtained only after getting the result of Step 1 (Step 2 requires output of Step 1)

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Instruction

Pre-feasibility study for prioritization of irrigation schemes should be conducted for province level prioritization of irrigation schemes for rehabilitation.

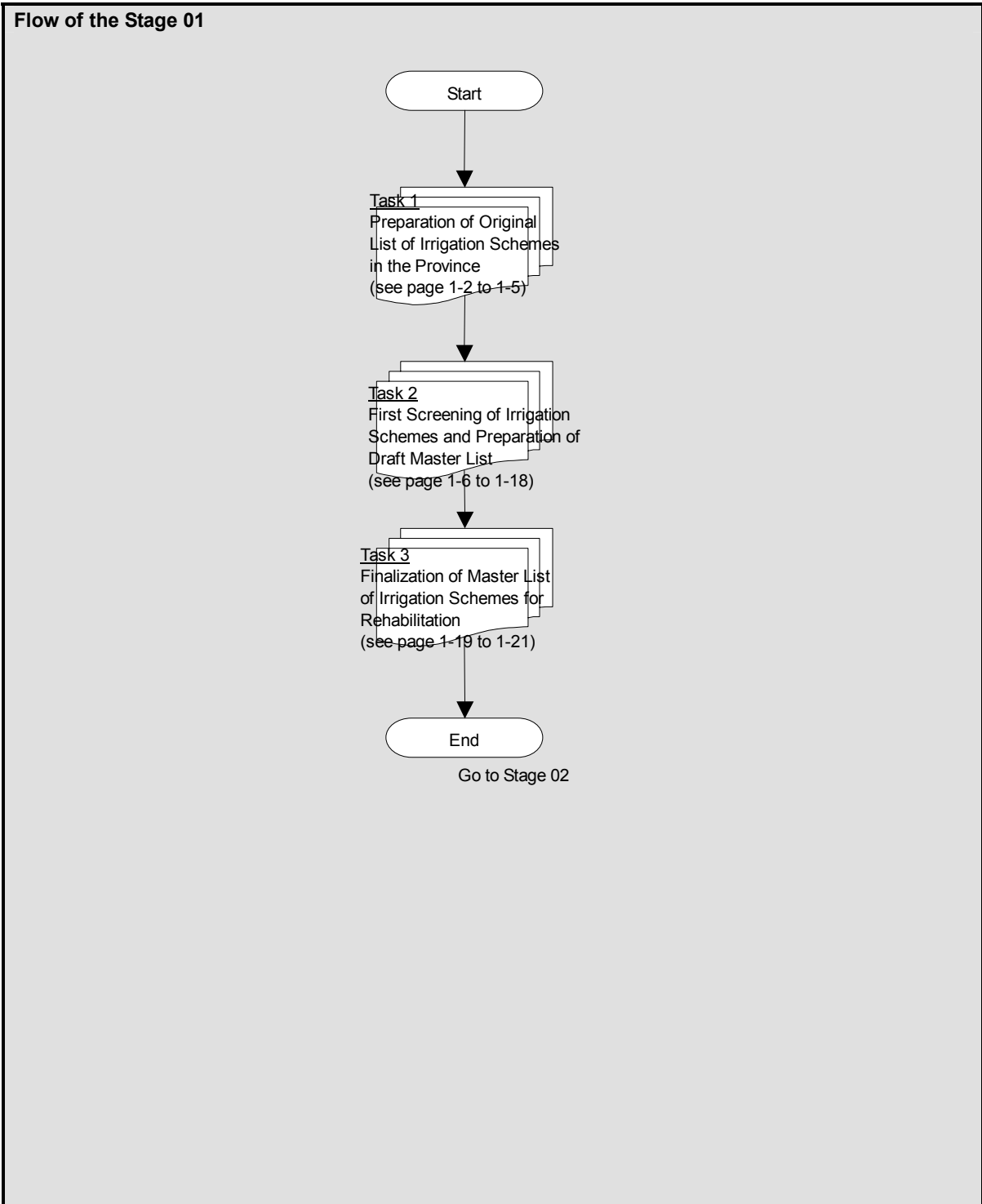
I. Pre-Feasibility Study for
Prioritization of
Irrigation Schemes

Stage 01
First Screening
of Irrigation Schemes
for Rehabilitation

Instruction

First screening of irrigation schemes for rehabilitation should be made on all irrigation schemes of which registered area are larger than 1,000 ha in the province. The result of first screening should be compiled as “Master List of Irrigation Schemes for Rehabilitation”.

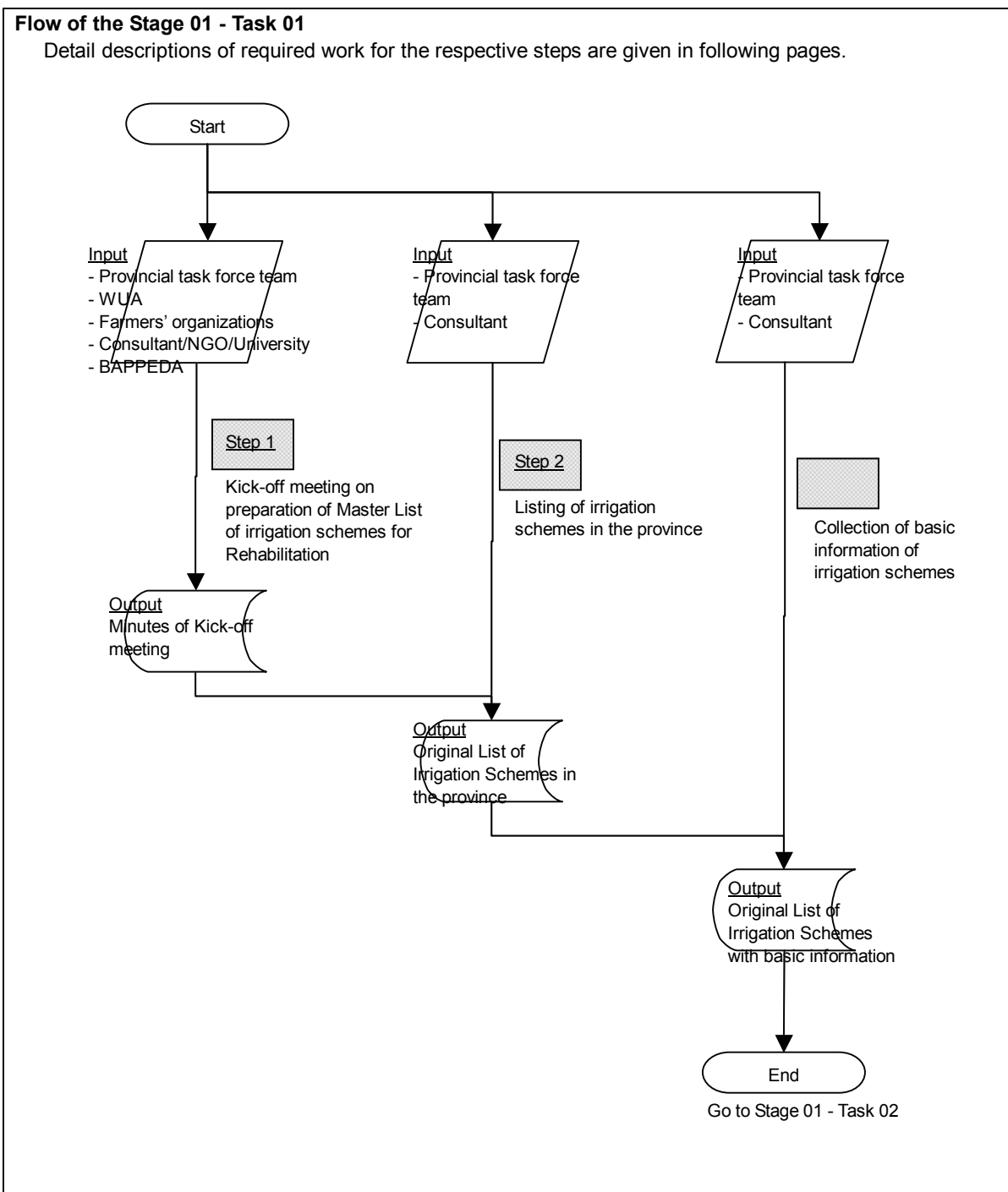
Stage 01 First screening of Irrigation Schemes for Rehabilitation
Purpose and scope
Scope of the work are to: 1) Prepare Original List of Irrigation Schemes (registered area is larger than 1,000 ha); 2) Select suitable irrigation schemes for further study from the above mentioned Original List; and 3) Compile the list derived from 2) as Master List of Irrigation Schemes for Rehabilitation.



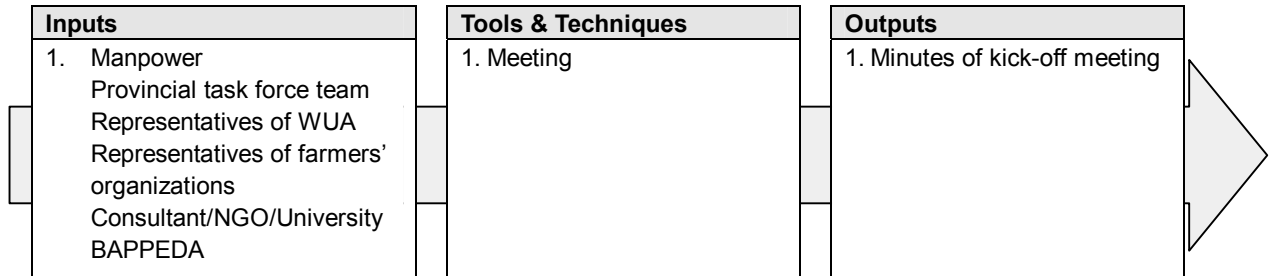
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 01. First Screening of Irrigation Schemes for Rehabilitation

Stage 01	First Screening of Irrigation Schemes for Rehabilitation
Task 01	Preparation of Original List of Irrigation Schemes in the Province
Purpose and scope	
Scope of the Task are to: 1) Prepare Original List of Irrigation Schemes in the province (all the irrigation schemes of which registered area are larger than 1,000 ha in the province); and 2) Collect basic information for selected irrigation schemes through above 1).	



Stage 01 - Task 01 Step 01	Kick-off meeting on preparation of Master List of Irrigation Schemes for Rehabilitation
---------------------------------------	--



Criteria, standards and references
None

Inputs

- 1. Manpower**
 Provincial task force team
 Representatives of WUA
 Representatives of farmers' organizations
 Consultant/NGO/University
 BAPPEDA

Tools & Techniques

- 1. Meeting**
 Kick-off meeting with above-mentioned stakeholders should be held to explain 1) purpose of the study, and 2) necessity of rehabilitation of irrigation facilities.

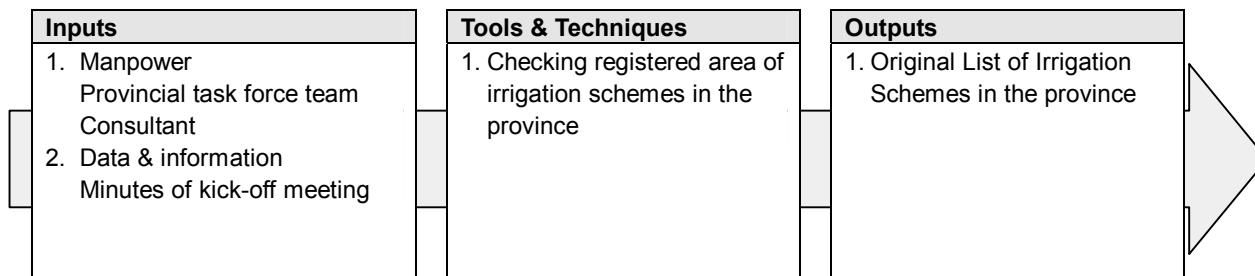
Outputs

- 1. Minutes of kick-off meeting**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 01. First Screening of Irrigation Schemes for Rehabilitation

Stage 01 - Task 01 Step 02	Listing of irrigation schemes in the province
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Criteria, standards and references

A) Database and inventory data books prepared by provincial government (O&M and monitoring section of Dinas or Balai PSDA)

Inputs

1. **Manpower**
Provincial task force team
Consultant

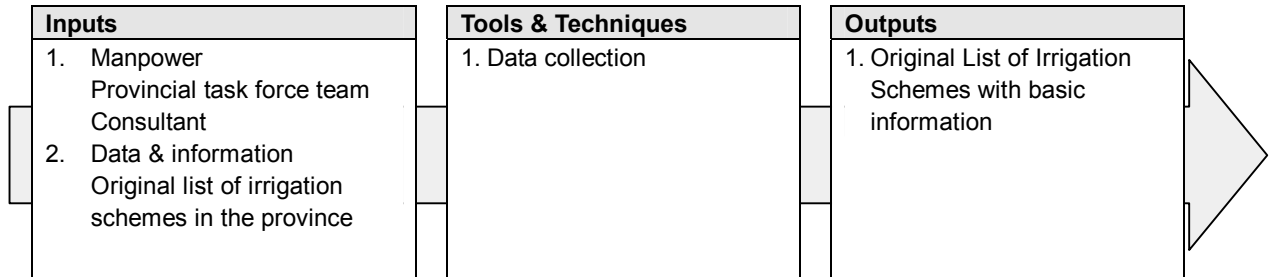
Tools & Techniques

1. **Checking registered area of the schemes in the province**
Irrigation schemes of which registered area is larger than 1,000 ha in the province should be listed.

Outputs

1. **Original List of Irrigation Schemes in the province**

Stage 01 - Task 01 Step 03	Collection of basic information of irrigation schemes
---------------------------------------	--



Criteria, standards and references
A) Database and data books prepared by Dinas or Balai PSDA.

Inputs

- 1. Manpower**
 - Provincial task force team
 - Consultant

Tools & Techniques

- 1. Data collection**

Following official registered information of irrigation schemes should be collected. The data may be available at Water Resources Management Services Office (Dinas PSDA) or Water Resources Management Service Center (Balai PSDA).

 - Official name of irrigation schemes,
 - Registration code No.,
 - Location (district and sub-district),
 - Completion year and latest rehabilitation year of the scheme,
 - Development plan (source of fund, agencies),
 - Technical level (Technical, Semi-technical, or Non-technical),
 - Registered area,
 - Potential area (Irrigated, Non-irrigated, Non-paddy, or Other land use), and
 - Non-potential area (Paddy, Non-paddy, or other land use),
 - Status of construction (completed or on-going),
 - Allocated budget for the irrigation scheme (by government or loan assistance),
 - Status of water users institutions.

Required basic information of the scheme may be available at Dinas PSDA, or Balai PSDA, or Irrigation schemes (Daerah Irigasi).

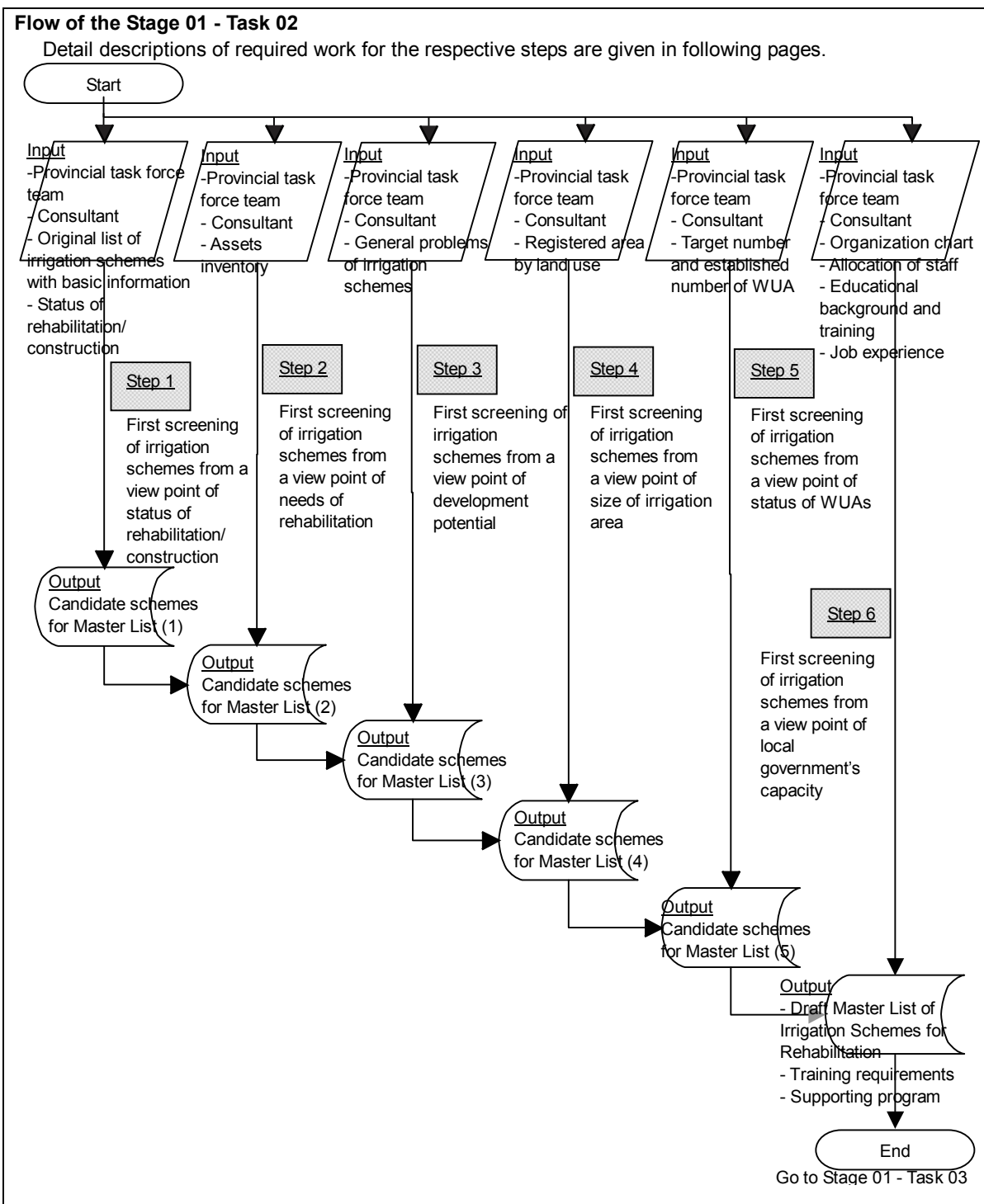
Outputs

- 1. Original List of Irrigation Schemes with basic information**

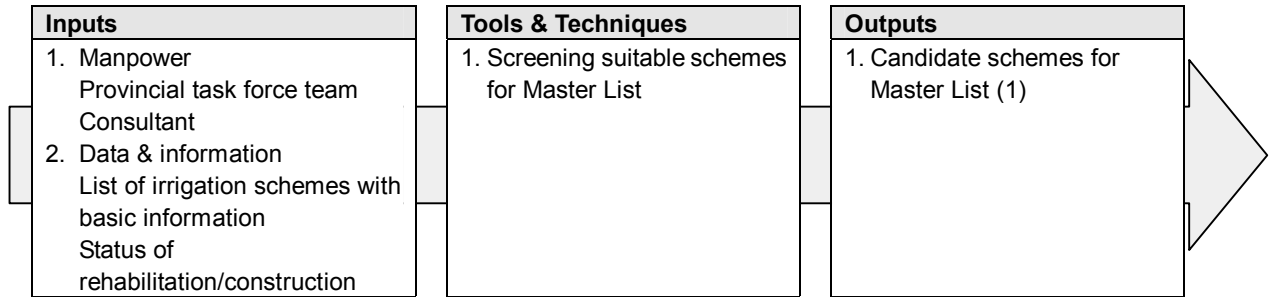
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 01. First Screening of Irrigation Schemes for Rehabilitation

Stage 01	First Screening of Irrigation Schemes for Rehabilitation
Task 02	First Screening of Irrigation Schemes and Preparation of Draft Master List
Purpose and scope	
Scope of the Task are to: 1) Carry out first screening of irrigation schemes listed in the Original List to select suitable irrigation schemes for further study; and 2) Compile result of 1) as draft Master List of Irrigation Schemes for Rehabilitation.	



Stage 01 - Task 02 Step 01	First screening of irrigation schemes from a view point of status of rehabilitation/construction
---------------------------------------	---



Criteria, standards and references
A) Database and data books prepared by PSDA

Inputs

1. Manpower

Provincial task force team
 Consultant

2. Data & information

Information on existing or on-going rehabilitation plan for the schemes should be collected. If budgeted allocation for all the irrigation area of scheme was made, it should be recognized that the rehabilitation works for the scheme was pledged.

Tools & Techniques

1. Screening suitable schemes for Master List

Irrigation schemes in following status should be classified into Group-VI (Development by other category or method) and excluded from Master List.

- 1) Construction/rehabilitation is on-going
- 2) Less than 5 years has past from completion of construction or last major rehabilitation
- 3) Implementation of rehabilitation was pledged

Rehabilitation plans in such scheme are to be suspended until status meets required criteria.

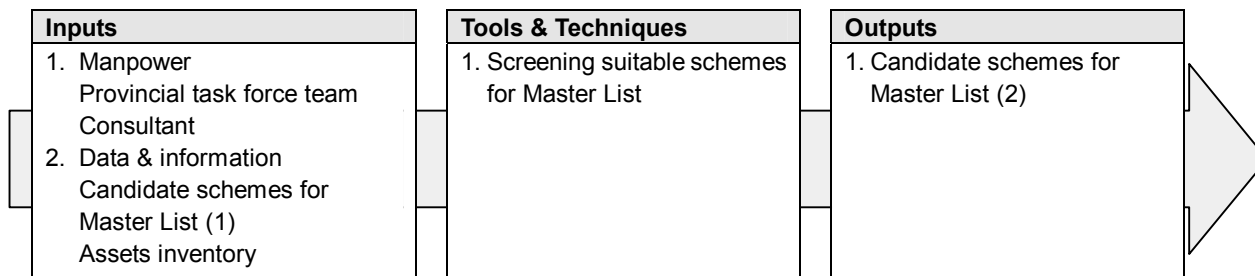
Outputs

1. Candidate schemes for Master List (1)

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 01. First Screening of Irrigation Schemes for Rehabilitation

Stage 01 - Task 02 Step 02	First screening of irrigation schemes from a view point of needs of rehabilitation
---------------------------------------	---



Criteria, standards and references
A) Assets inventory data prepared by Balai PSDA.

Inputs

- 1. Manpower**
 Provincial task force team
 Consultant
- 2. Data & information**
 Candidate schemes for Master List (1), which is obtained through step 01.
 Assets inventory

Tools & Techniques

- 1. Screening suitable schemes for Master List**
 Assets inventory data at Balai PSDA should be analyzed. Each irrigation scheme should be carefully analyzed, whether it has problem on irrigation facilities or not. General problems and constraints found in irrigation scheme in Indonesia is shown in Table 01-02-02-01. Sample of check list based on those general problems is presented in Sample 01-02-02-02. If it is judged that rehabilitation works for the scheme is not required, the scheme should be classified Group-VI (Development by other category or method) and excluded from Master List. Rehabilitation plans in such scheme are to be suspended until status meets required criteria.

Outputs

- 1. Candidate schemes for Master List (2)**

Table 01-02-02-01 General Problems and Constraints on Irrigation Facilities (1/5)

Problems and Constraints		Causes of Problems and Constraints
(1) Water Resource Facility		
Fill dam		
Dam body		
W-1	Settlement of dam crest and less free board against requirement	Insufficient compaction of dam body
W-2	Slope sliding at upstream and/or downstream of dam body	Insufficient compaction and/or design problem against seismic force of dam body
W-3	Leakage from dam body	Insufficient grouting of dam foundation
Spillway, Intake; Civil		
W-4	Insufficient free board of dam spillway during flood	Insufficient crest length of spillway
W-5	Problem(s) of collapse, leakage, and/or breakdown on dam spillway channel	Collision of foreign materials against spillway/intake
W-6	Collapse of excavated slope of dam spillway	Insufficient compaction of backfilling material of spillway/intake
W-7	Collapse of excavated slope at downstream of stilling basin of dam spillway	Insufficient slope protection works of stilling basin of dam spillway
Spillway, Intake; Gate and Metal Works		
W-8	Lower strength against design load of spillway/intake gate(s)	Deterioration of dam spillway/intake gate(s)
W-9	Problem(s) of leakage, deformation, breakdown, and/or deflection on dam spillway/intake gate(s)	Collision of foreign materials against spillway/intake gate(s)
W-10	Lower strength against design load due to rust, decay of steel materials of dam spillway/intake gate(s)	No over coating on dam spillway/intake gate(s) to prevent rust and decay
W-11	Physical operational problem on dam spillway/intake gate(s)	Improper design, installation and/or maintenance of dam spillway/intake gate(s); breakdown of hoist, stem, guide frame or leaf
W-12	Problem on management for dam spillway/intake gate(s) operation	Improper maintenance of dam spillway/intake gate(s)
W-13	Deflection of trash rack/screen	Collision of foreign materials against trash rack/screen and no repair after collision
Others		
W-14	Lower function of dam control house	Deterioration and/or insufficient maintenance of dam control house
W-15	Lower function of dam O&M equipment	Deterioration of dam O&M equipment

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 01. First Screening of Irrigation Schemes for Rehabilitation

Table 01-02-02-01 General Problems and Constraints on Irrigation Facilities (2/5)

Problems and Constraints		Causes of Problems and Constraints
Headworks/Intake		
Weir, flood way, scouring sluice; Civil		
W-16	Crack or damage on weir crest	Collision of foreign materials against weir crest, low quality of concrete/masonry
W-17	Leakage from foundation and/or settlement of weir	Insufficient length of weir apron, not enough foundation treatment
W-18	Incline, settlement, or deflection of pier of weir	Insufficient strength of weir foundation or not enough foundation treatment
W-19	Settlement or breakdown of apron of weir	Insufficient strength of weir foundation, not enough foundation treatment, or insufficient length of apron
W-20	Settlement or breakdown of stilling basin of weir	Insufficient strength of weir foundation, not enough foundation treatment, or insufficient length of stilling basin
W-21	Fallen down, inclined, or washed away of retaining wall of weir	Insufficient quality of concrete or masonry material, over acting earth pressure more than design
W-22	Washed away of ripraps or blocks after stilling basin	Insufficient weight of ripraps or blocks for stilling basin, insufficient length of protection works after stilling basin
Others		
W-23	Physical O&M problem due to overage facility	Deterioration of weir, no or insufficient rehabilitation due to budget problem
Flood way, Scouring Sluice; Gate and Metal works		
W-24	Leakage from flood or scouring sluice gate(s) of headworks	Improper construction of flood/scouring sluice gate of headworks, opening of space more than design due to outer load more than design
W-25	Lower strength against design load due to rust, decay of steel materials of flood/scouring sluice gate(s)	No over coating on flood/scouring sluice gate(s) to prevent rust and decay
W-26	Physical operational problem on flood/scouring sluice gate(s) of headworks	Improper design, installation and/or maintenance of flood/scouring sluice gate(s); breakdown of hoist, stem, guide frame or leaf
W-27	Problem on management for flood/scouring sluice gate(s) operation	Improper maintenance of flood or scouring sluice gate(s) of headworks (no greasing and anti-rust painting)
Intake/Free Intake		
Civil Works		
W-28	Insufficient diversion water due to river bed degradation	River bed degradation, no provision of weir in case free intake structure
W-29	Insufficient diversion water due to sedimentation in front of intake	Sedimentation in front of intake
W-30	Incline, settlement, or deflection of intake structure	Improper foundation treatment for structure
W-31	Inflow of bed loads into canal and decrease canal flow capacity	No provision of settling basin, no proper operation during flood

Table 01-02-02-01 General Problems and Constraints on Irrigation Facilities (3/5)

Problems and Constraints		Causes of Problems and Constraints
Gate, trash rack		
W-32	Leakage from intake gate(s)	Improper maintenance of intake gate(s)
W-33	Lower strength against design load due to rust, decay of steel materials of intake gate(s)	No over coating on intake gate(s) to prevent rust and decay
W-34	Physical operational problem on intake gate(s)	Improper design, installation and/or maintenance of intake gate(s); breakdown of hoist, stem, guide frame or leaf
W-35	Problem on management for intake gate(s) operation	Improper management or deterioration of intake gate(s)
W-36	Overage, Lower strength of intake gate(s)	Deterioration of intake gate(s), no or insufficient rehabilitation due to budget problem
W-37	Difficulty on O&M	No provision of inspection/access road, no provision of inspection bridge/deck
W-38	Difficulty on water distribution/ discharge measurement	No provision of water level gauge/measuring facility
(2) Irrigation Canal and Related Structure		
General		
C-1	Sedimentation or obstruction of water flow	No provision of settling basin(sediments), improper management of canal (sediments, water plant)
C-2	Leakage from canal	Improper regular maintenance of canal, settlement of canal then insufficient freeboard and overtopping
C-3	Collapse of canal	Improper maintenance; insufficient nos. of cross drain, berm width, or catch drain; and/or steep slope of canal
C-4	Impassable of inspection road along canal	Improper routine O&M works due to no or narrow wide of road, slope erosion by rainfall then in flow into canal
C-5	General O&M problems	No kilometer and hectometer post, no structure plate or mark on structures and no identification for repair/maintenance
C-6	Overage, Lower strength of canal	Deterioration of canal, no or insufficient rehabilitation due to budget problem
Lined canal		
C-7	Cracks or partial damage on lined canal	Improper regular maintenance or long leave of repair, insufficient provision of budget
C-8	Leakage from lined canal	Improper regular maintenance or long leave of repair, narrow wide of canal embankment
C-9	Deflection of lining toward inside of canal	No treatment against groundwater, unstable slope gradient against soil property, no repair in long time
Earth canal		
C-10	Difficulty on maintenance of earth canal	Fallen down and collapse of side slope, water plants or weed at inside of canal

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 01. First Screening of Irrigation Schemes for Rehabilitation

Table 01-02-02-01 General Problems and Constraints on Irrigation Facilities (4/5)

Problems and Constraints		Causes of Problems and Constraints
Related regulating structure (Check, Off-take, etc.)		
C-11	Lower function of regulating structure on canal	Deterioration of regulating structure on canal, especially gate and metal works
C-12	Settlement or damage (breakdown) of regulating structure on canal	Insufficient strength of foundation, improper maintenance of regulating structure on canal
C-13	Physical operation problem on regulating structure on canal	Deterioration, breakdown and/or insufficient maintenance of gate(s) for regulating structure on canal
C-14	No function of discharge measuring	Improper regular maintenance of measuring device
Related conveyance structure (Siphon, Aqueduct)		
C-15	Settlement/deflection on foundation of aqueduct	Insufficient strength of foundation of aqueduct or insufficient foundation treatment
C-16	Damage/breakout on superstructure of aqueduct	Deterioration, long leave of repair to damaged portion
C-17	Leakage from barrel of siphon	Improper regular maintenance of siphon in long time, change of design condition against to original design
C-18	Insufficient covering for siphon under below river bed	River bed degradation at crossing site, washed away of protection works
C-19	Clogging of barrel of siphon	Improper regular maintenance of siphon, no provision of trash rack, no provision of blow-off
Related crossing structure		
C-20	Clogging of road crossing(box/pipe culvert)	Improper regular maintenance, passing over-loaded traffic, no repair to damaged portion in long time
C-21	Settlement of foundation of bridge	Insufficient strength of foundation of bridge or insufficient foundation treatment for pier and abutment
C-22	Damage/breakout of superstructure of bridge	Long leave from repair, crossing over-loaded vehicles, too narrow wide of slab
Protective structure		
C-23	Clogging of barrel of cross drain	Improper regular maintenance, insufficient capacity of barrel area against design discharge
O&M		
C-24	Difficulty on O&M	No provision or damage of inspection road, difficulty on passing of inspection road due to damage, broken
C-25	Difficulty on water distribution	No provision of water level gauge/facility
(3) Drainage Canal and Related Structures		
D-1	Inundation of paddy field and poor drainage condition	Inundation of paddy fields during rainy season due to insufficient capacity of canal and back water from drainage canal
D-2	Collapse and damage of canal and difficult to supply irrigation water	Improper maintenance, no proper design of drainage canal
D-3	Difficulty on O&M and water management for irrigation	Physical operation problems due to insufficient number of canal and related structures

Table 01-02-02-01 General Problems and Constraints on Irrigation Facilities (5/5)

Problems and Constraints		Causes of Problems and Constraints
(4)	Terminal Facility and On-Farm	
E-1	Difficulty on O&M	Physical operation problems due to low density of irrigation and drainage canals at inside of tertiary block
E-2	Difficulty on agricultural activity	Physical operation problems during planting and harvesting
E-3	Difficulty on irrigation due to land condition	Physical operation problems of water management due to land level condition

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 01. First Screening of Irrigation Schemes
for Rehabilitation

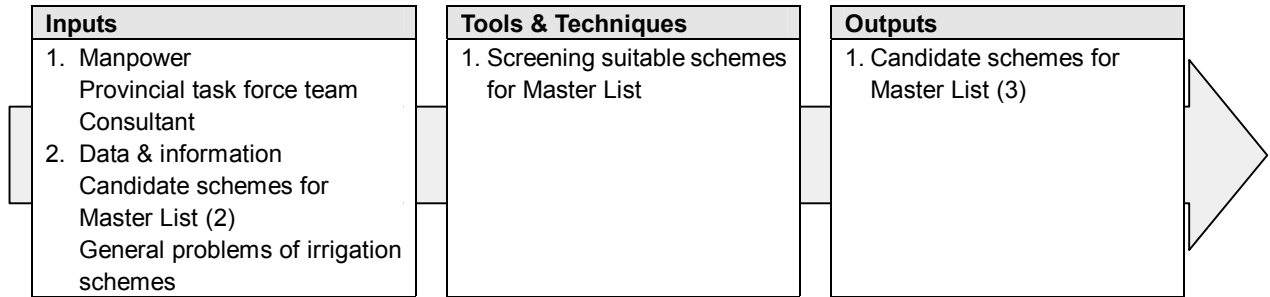
Sample 01-02-02-02 Check List for Screening of Irrigation Schemes for Rehabilitation

SAMPLE

1. Province : South Sulawesi
2. District : Bulukumba

Facility	No.	Problems and Constraints	Irrigation Schemes					
			Bayang 2	Bontomanai	Bettu	Bontonyeleng	*****	*****
Fill dam			(Mark with x in case phenomena are found)					
Dam body								
	W-1	Settlement of dam crest	x					
	W-2	Slope sliding	x					
	W-3	Leakage from dam body, foundation	x					
Spillway, Intake; Civil								
	W-4	Insufficient free board against design						
	W-5	Collapse, leakage, breakdown	x					
Spillway, Intake; Gate and Metal Works								
	W-6	Lower strength against design load	x					
	W-7	Physical operational problem						
Headworks/Intake								
Weir, flood way, scouring sluice; Civil								
	W-8	Incline, settlement, or deflection		x				
	W-9	Settlement or breakdown of stilling basin		x				x
	W-10	Broken of walls	x	x	x	x	x	x
	W-11	Overage (more than 50 years)	x		x	x	x	x
Flood way, Scouring Sluice; Gate and Metal works								
	W-12	Leakage from gate	x	x	x	x	x	x
	W-13	Lower strength against design load	x	x	x	x	x	x
	W-14	Overage (more than 30 years)	x		x	x	x	x
	W-15	Physical operational problem	x	x	x	x	x	x
Intake/Free Intake								
Civil								
	W-16	River bed degradation						
	W-17	Sedimentation in front of intake	x		x	x	x	
	W-18	Inflow of bed loads into canal	x	x	x	x	x	x
	W-19	No provision of settling basin	x	x	x	x	x	
Gate, trash rack								
	W-20	Lower strength	x	x				x
	W-21	Physical operational problem	x	x	x	x	x	x
	W-22	Overage (more than 30 years)	x					x
Irrigation Canal and Related Structure								
	C-1	Sedimentation at canal	x	x	x	x	x	x
	C-2	Leakage from canal & related structure	x	x	x	x	x	x
	C-3	Collapse of canal & related structure	x	x	x	x	x	x
	C-4	Exist of unlined canal	x	x	x	x	x	x
	C-4	No provision of inspection road	x	x	x	x	x	x
	C-6	Overage (more than 30 years)	x	x	x	x	x	x
Requirement for Field Investigation for Rehabilitation			Yes	Yes	Yes	Yes	Yes	Yes

Stage 01 - Task 02 Step 03	First screening of irrigation schemes from a view point of development potential
---------------------------------------	---



Criteria, standards and references
None

Inputs

- 1. Manpower**
 Provincial task force team
 Consultant
- 2. Data & information**
 Candidate schemes for Master List (2), which is obtained through step 02.
 General problems of irrigation schemes such as, 1) water availability, 2) changing of land use from paddy to other use, etc. should be collected.

Tools & Techniques

- 1. Screening suitable schemes for Master List**
 Irrigation schemes, of which potential for irrigation development is extremely low should be classified into Group-IV (Reformulation of water resources development plan) or Group-VI (Development by other category or method) and excluded from Master List. Example of low potential for development are;
 1) Water for the scheme is completely insufficient,
 2) Land use was completely changed from paddy to other use, etc.
 Rehabilitation plans in such scheme are to be suspended until status meets required criteria.

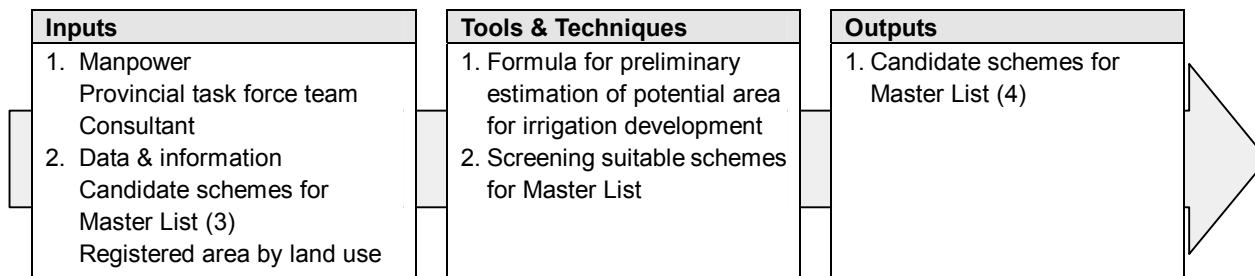
Outputs

- 1. Candidate schemes for Master List (3)**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 01. First Screening of Irrigation Schemes for Rehabilitation

Stage 01 - Task 02 Step 04	First screening of irrigation schemes from a view point of size of irrigation area
---------------------------------------	---



Criteria, standards and references
None

Inputs

- 1. Manpower**
 Provincial task force team
 Consultant
- 2. Data & information**
 Candidate schemes for Master List (2), which is obtained through step 02.
 Registered area (A_R) by land use, such as other land use (alih fungasi) in potential area (A_{pt}), and other land use in non-potential area (A_{npt}).

Tools & Techniques

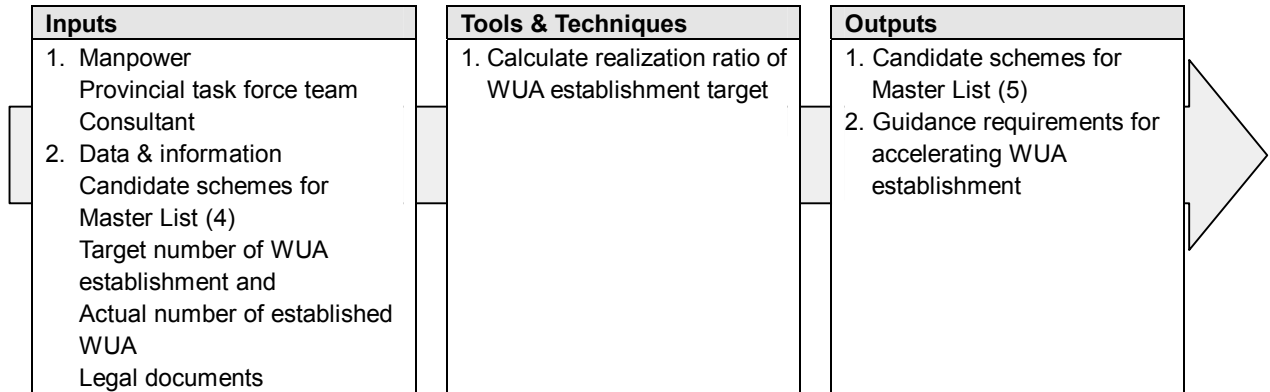
- 1. Formula for preliminary estimation of potential area for irrigation development**
 Following formula should be applied to estimate preliminary potential area for irrigation development.

$$A_i = A_R - (A_{pt} + A_{npt})$$
- 2. Screening suitable schemes for Master List**
 Irrigation schemes in following status should be classified into Group-VI (Development by other category or method) and excluded from Master List.
 - 1) Registered area is less than 1,000 ha, or
 - 2) Preliminary estimated potential area for irrigation development is less than 1,000 ha.
 Rehabilitation plans in such scheme are to be suspended until status meets required criteria.

Outputs

- 1. Candidate schemes for Master List (4)**

Stage 01 - Task 02 Step 05	First screening of irrigation schemes from a view point of status of WUA
---------------------------------------	---



Criteria, standards and references
A) Decree of Head of District on establishment of WUA, or B) Statutes of WUA and articles of WUA

Inputs

- 1. Manpower**
 Provincial task force team
 Consultant
- 2. Data & information**
 Target number of WUA establishment and actual number of established WUA
 Legal documents (certifying WUA establishment, either Decree of Head of District or Statutes of WUA, and articles of WUA)

Tools & Techniques

- 1. Calculate realization ratio of WUA establishment target**
 - Target number of WUA establishment (NT)
 - Actual number of established WUAs (NED)

Irrigation schemes with the ratio of $NED/NT > 50\%$ can be included in Master List as candidate schemes. In case of $NED/NT < 50\%$, irrigation schemes shall be classified into Group-V (Institutional capacity building) and excluded from Master List. Formulation of Pre-F/S level rehabilitation plans for such schemes are to be suspended until the realization ratio of WUA establishment target becomes 50% or more.

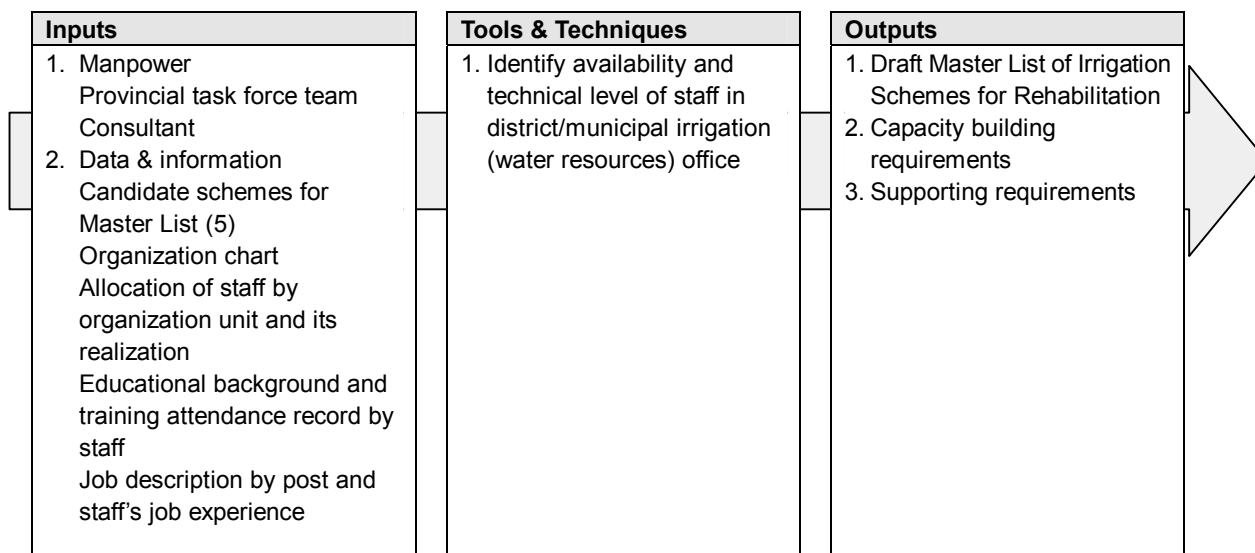
Outputs

- 1. Candidate schemes for Master List (5)**
- 2. Guidance requirements for accelerating WUA establishment**
 Requirements for providing farmers with guidance services aiming at acceleration of WUA establishment in irrigation schemes classified into Group-V.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 01. First Screening of Irrigation Schemes for Rehabilitation

Stage 01 - Task 02 Step 06	First screening of irrigation schemes from a view point of district/municipal government's capacity
---------------------------------------	--



Criteria, standards and references
A) Job description by post

Inputs

- 1. Manpower**
 Provincial task force team
 Consultant
- 2. Data & information**
 Candidate schemes for Master List (5)
 Organization chart of district/municipal irrigation (water resources) office
 Allocation of staff by organization unit and its realization
 Educational background and training attendance record by staff
 Job description by post and staff's job experience

Tools & Techniques

- 1. Identify availability and technical level of staff in district/municipal irrigation (water resources) office**
 Review the above input information collected from district/municipal irrigation (water resources) office. If the position of office chief is vacant, irrigation schemes shall be classified into Group-V (institutional capacity building) and excluded from the Master List.

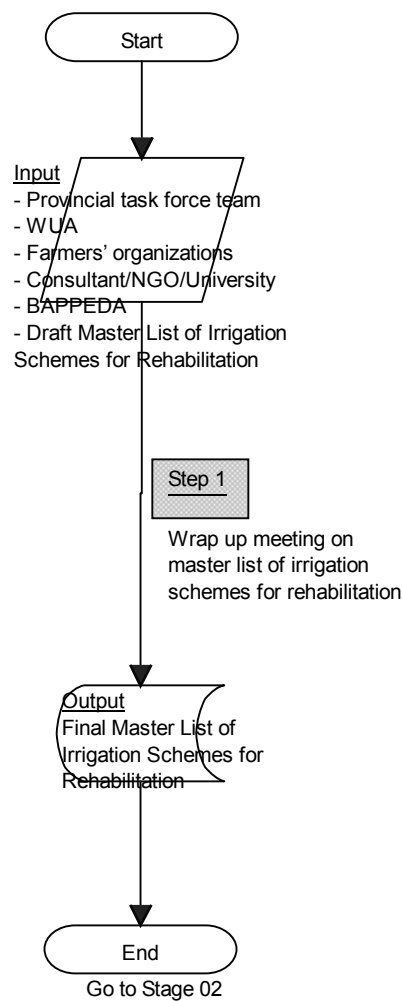
Outputs

- 1. Draft Master List of Irrigation Schemes for Rehabilitation**
- 2. Capacity building requirements**
 Requirements for increasing institutional capacity and improving staff capability of district/municipal irrigation (water resources) office in order to cope with revised irrigation management policy
- 3. Supporting requirements**
 Requirements for supporting district/municipal irrigation (water resources) office through technical assistance by Central and/or Provincial Government to meet capacity building requirements.

Stage 01	First Screening of Irrigation Schemes for Rehabilitation
Task 03	Finalization of Master List of Irrigation Schemes for Rehabilitation
Purpose and scope	
Purpose of the Task to prepare final Master List of Irrigation Schemes for Rehabilitation for further study.	

Flow of the Stage 01 - Task 03

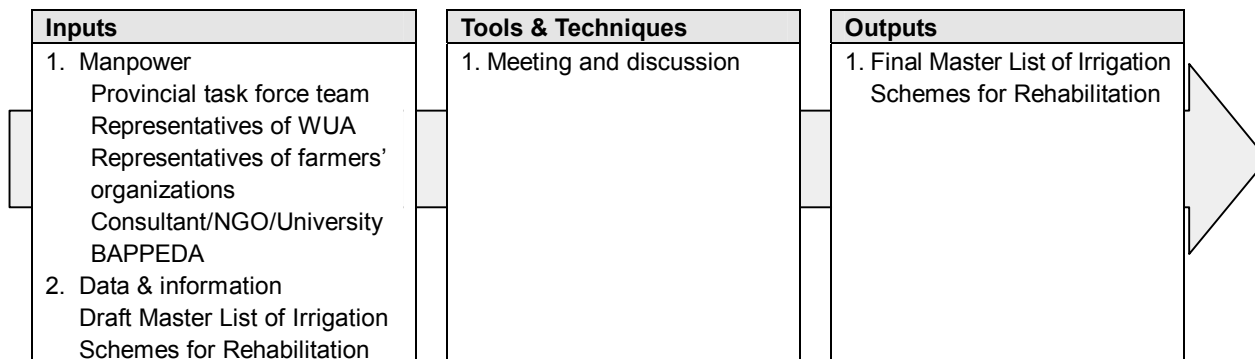
Detail descriptions of required work for the respective steps are given in following pages.



I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 01. First Screening of Irrigation Schemes for Rehabilitation

Stage 01 - Task 03 Step 01	Wrap up meeting on Master List of Irrigation Schemes for Rehabilitation
---------------------------------------	--



Criteria, standards and references
A) Draft Master List of Irrigation Schemes for Rehabilitation with supporting data

Inputs

- 1. Manpower**
 Provincial task force team
 Representatives of WUA
 Representatives of farmers' organizations
 Consultant/NGO/University
 BAPPEDA
- 2. Data & information**
 Draft Master List of Irrigation Schemes for Rehabilitation, which is obtained through Stage 01 - Task 02.

Tools & Techniques

- 1. Meeting and discussion**
 Meeting for finalizing the Master List should be held at provincial level.

Outputs

- 1. Final Master List of irrigation schemes for prioritization**
 The final Master List of Irrigation Schemes for Rehabilitation should be prepared. Sample form for the Master List is attached as Form 01-03-01-01.

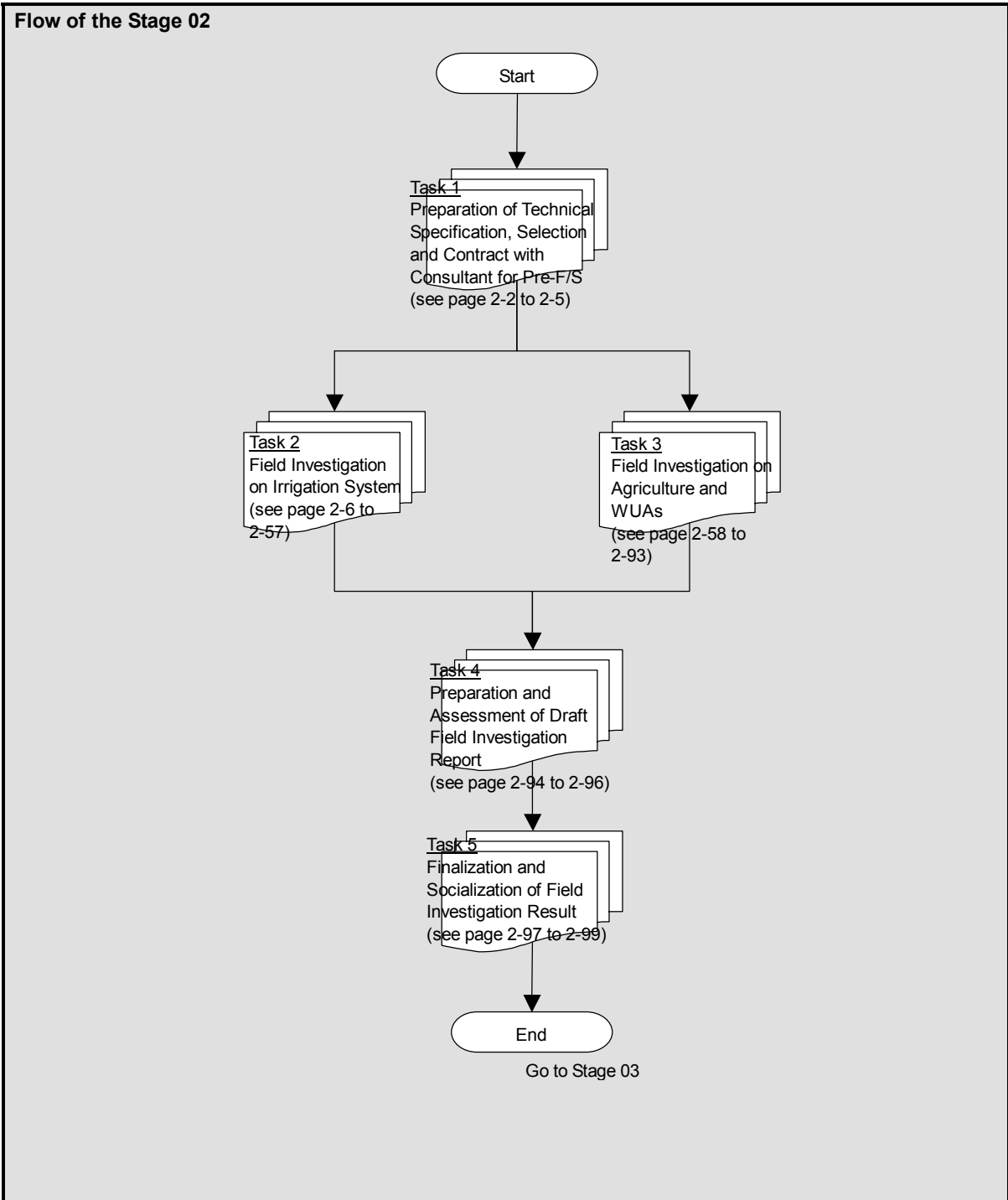
I. Pre-Feasibility Study for
Prioritization of
Irrigation Schemes

Stage 02
Pre-F/S Level
Field Investigation

Instruction

Pre-F/S level field investigation should be conducted on all the irrigation schemes listed in the “Master List of Irrigation Schemes for Rehabilitation”, which was prepared in Stage 01.

Stage 02 Pre-F/S Level Field Investigation
Purpose and scope
Scope of the work are to: 1) Identify problems and constrains of the scheme; and 2) Sharing understanding on the present situation with all of the stakeholders.



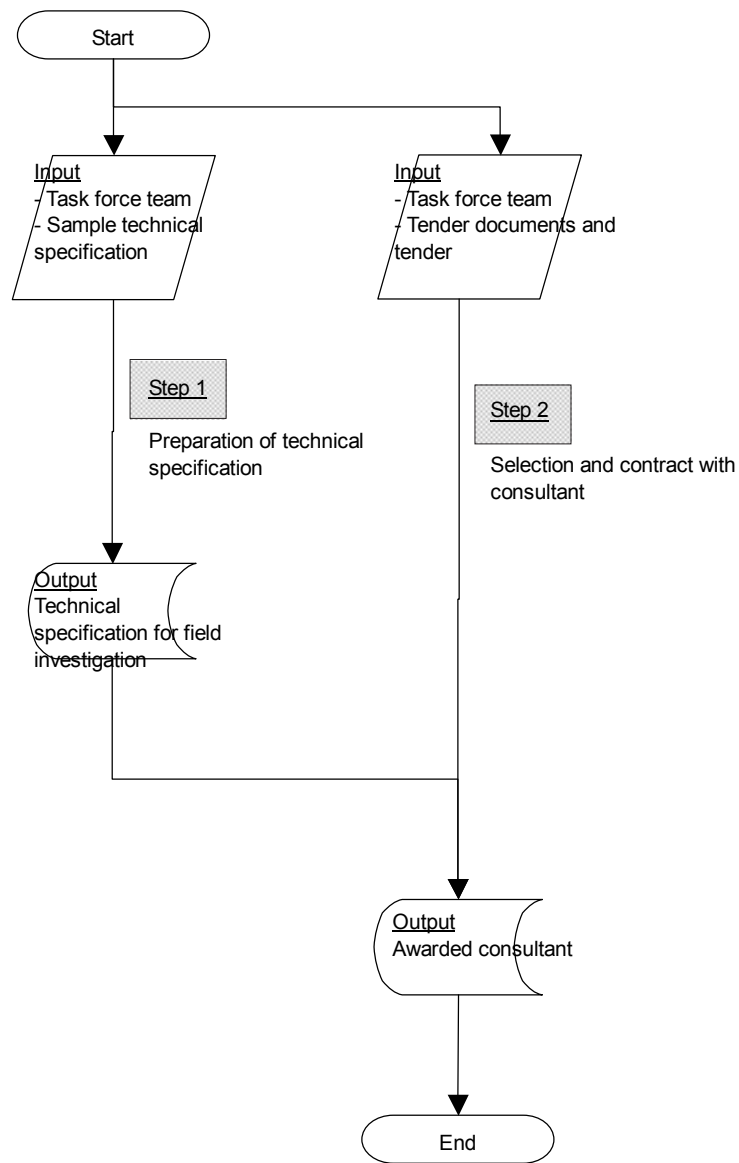
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

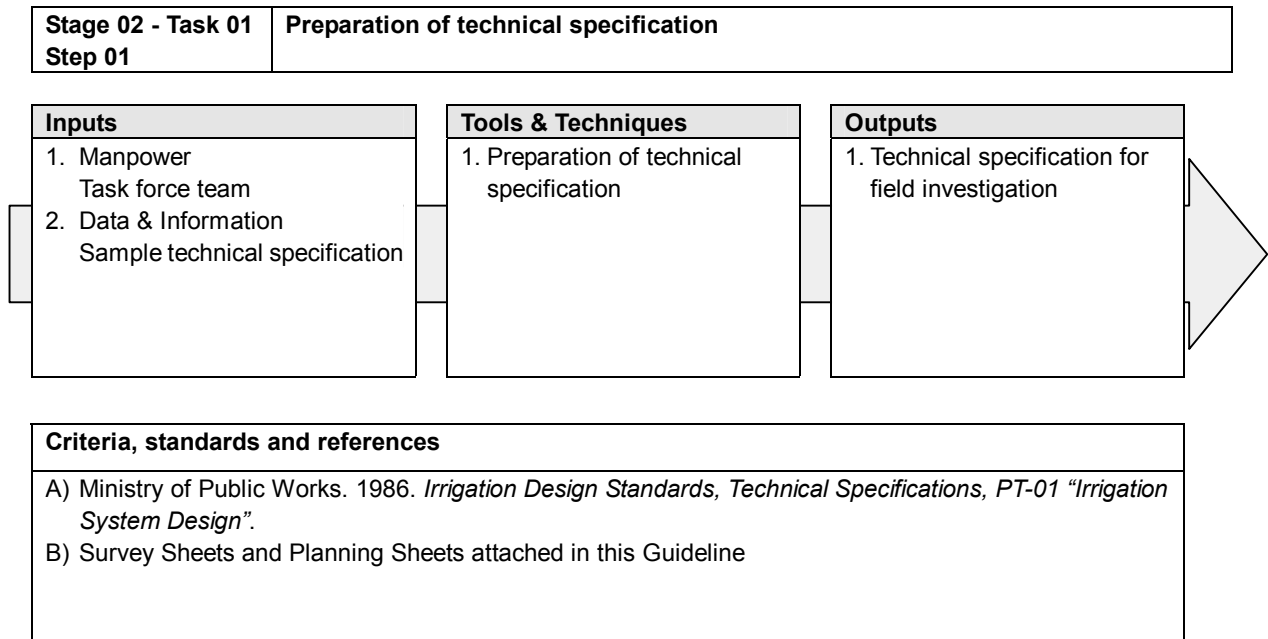
Stage 02. Pre-F/S Level Field Investigation

Stage 02	Pre-F/S Level Field Investigation
Task 01	Preparation of Technical Specification, Selection and Contract with Consultant for Pre-F/S
Purpose and scope	
Scope is the Task are to: 1) Prepare technical specification of consulting service for Pre-F/S; 2) Selection of consultant for Pre-F/S; and 3) Contract with awarded consultant.	

Flow of the Stage 02 - Task 01

Detail descriptions of required work for the respective steps are given in following pages.





Inputs

- 1. Manpower**
Task force team
- 2. Data & information**
Technical specification for another scheme and/or similar work should be collected as a sample.

Tools & Techniques

- 1. Preparation of technical specification**
 In case the survey should be carried out by government agencies, this step can be skipped (go to Stage 02 - Task 02).
 The technical specification should include following contents.
 - (1) Inventory survey on irrigation system (see Stage 02 - Task 02 for detail)

PART-I Inventory of Irrigation Scheme

 1. General information of the scheme (location, area, history, water source, meteorology, availability of documents, etc.)
 2. Water resources facility (type, size, condition, etc.)
 3. Irrigation canal (length, shape, design discharge, provision of lining, provision of inspection road, number and condition of related structures)
 4. Drainage canal (length, shape, design discharge, number and condition of related structures, etc.)
 5. On-farm system (area, condition, etc.)
 6. Rehabilitation plan (detail of present rehabilitation plan)

PART-II Survey for estimate of rehabilitation works

 1. General layout of the scheme
 2. Irrigation diagram
 3. Schematic layout of related structure
 4. Quantity estimate
 5. Photographs
 - (2) Inventory survey on agriculture (see Stage 02 - Task 03 for detail)

Socio-economy and agriculture (number of households, land use, cropping calendar, present cropping intensity, crop yields, agriculture support service, farming practice, post-harvest & marketing, farm economy, etc.)

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

(3) Inventory survey on WUAs (see Stage 02 - Task 03 for detail)
Water users' association (history, present activities, finance, guidance and training, etc.)

(4) Confirmation of water resources availability (see Stage 03 for detail)

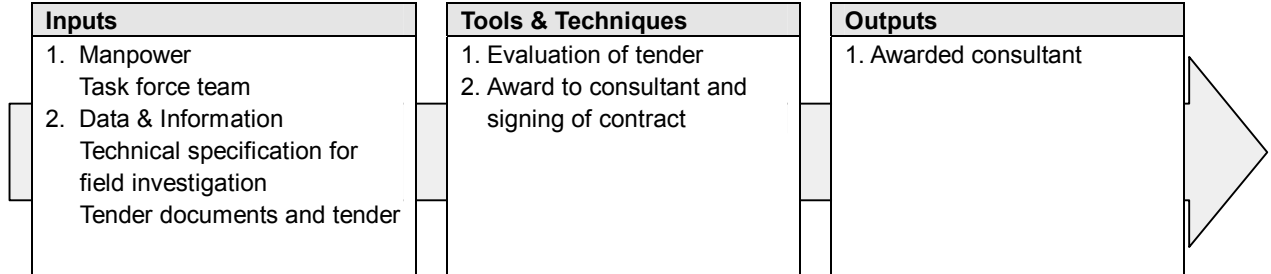
(5) Pre-F/S level rehabilitation plan (see Stage 04 for detail)

Survey Sheets and Planning Sheets attached in this Guideline should be included in the technical specification.

Outputs

1. Technical specification for field investigation

Stage 02 - Task 01 Step 02	Selection and contract with consultant
---------------------------------------	---



Criteria, standards and references
A) List of registered consultants for similar works

Inputs

- 1. Manpower**
Task force team
- 2. Data & information**
Tender documents and tender

Tools & Techniques

- 1. Evaluation of tender**
Evaluation of tender should be carried out in accordance with evaluation criteria authorized by Province.
- 2. Award to consultant and signing of contract**
Contract negotiation and contract signing with selected consultant are made and to commence the work under the contract.

Outputs

- 1. Awarded consultant**

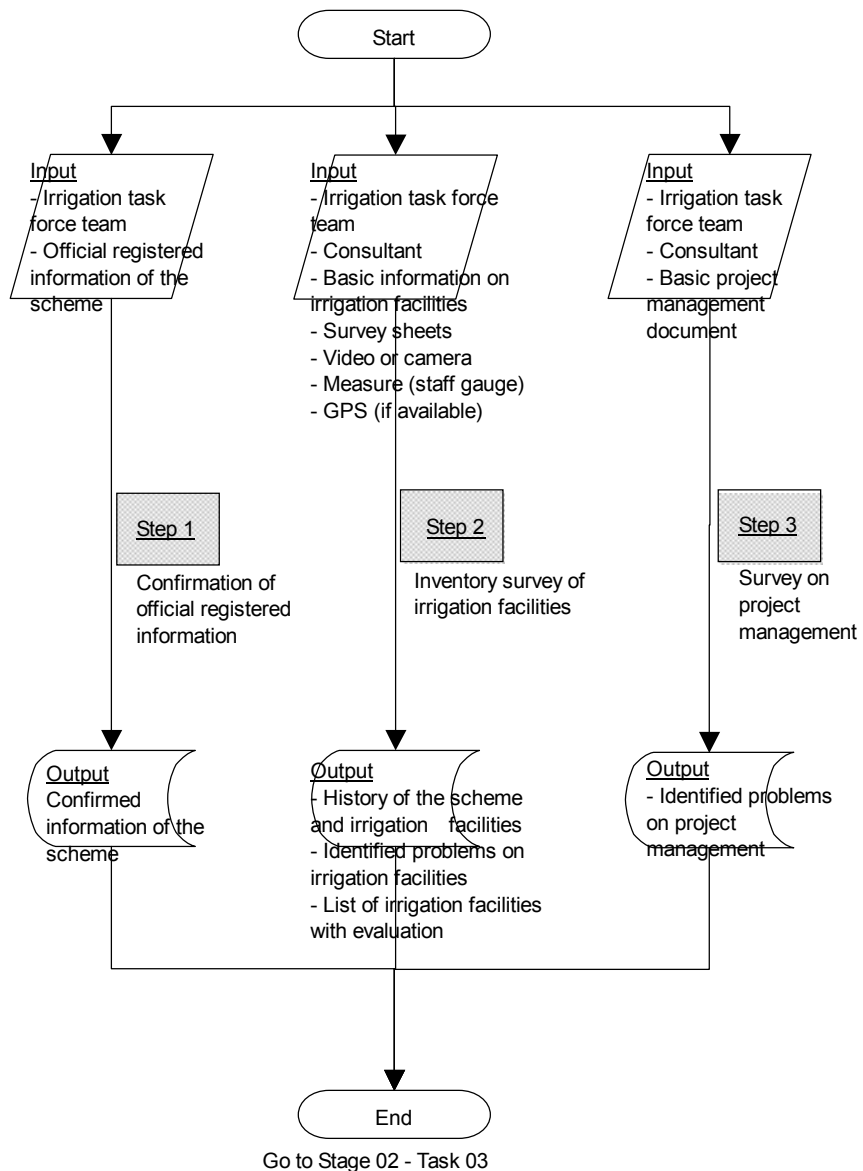
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

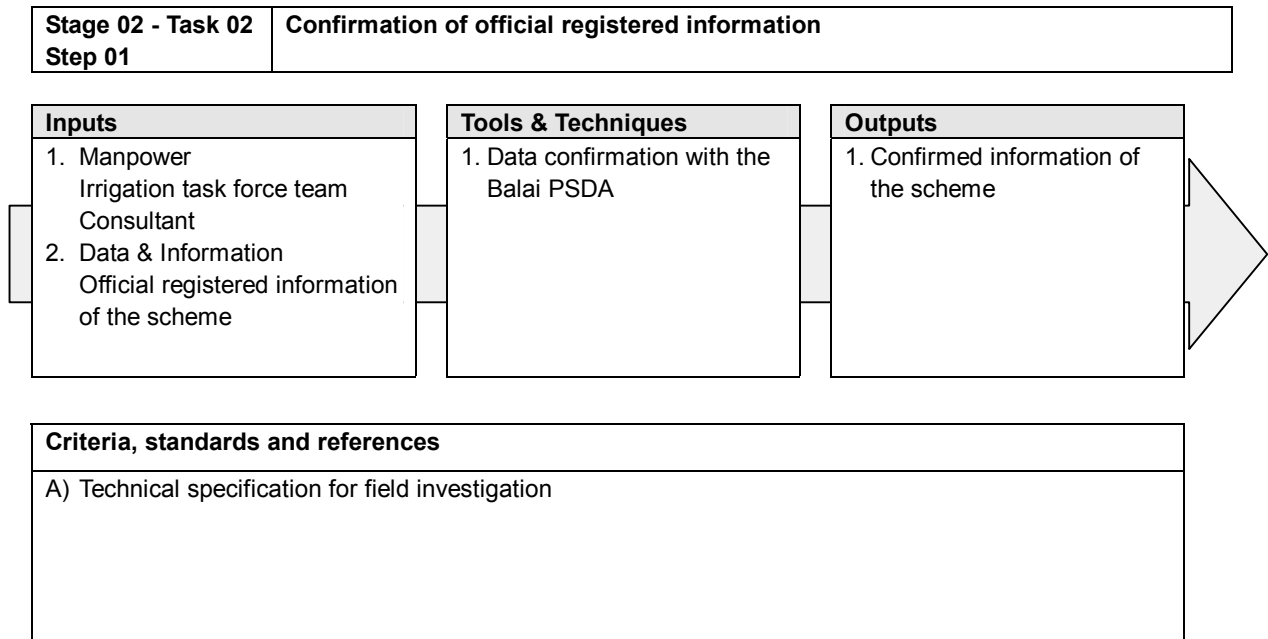
Stage 02. Pre-F/S Level Field Investigation

Stage 02	Pre-F/S Level Field Investigation
Task 02	Field Investigation on Irrigation System
Purpose and scope	
Scope of the Task are to: 1) Identify problems and constraints on present irrigation system; and 2) Evaluate necessity of rehabilitation of irrigation system.	

Flow of the Stage 02 - Task 02

Detail descriptions of required work for the respective steps are given in following pages.





Inputs

1. Manpower

- Irrigation task force team
- Consultant

2. Data & information

Official registered information of the scheme

Following official registered information of the scheme should be collected:

- Official name of irrigation scheme,
- Registration code No.,
- Technical level (Technical, Semi-technical, or Non-technical),
- Potential area (Irrigated, Non-irrigated, Non-paddy, Other land use), and
- Non-potential area (Paddy, Non-paddy, Other land use).

The data are available at MOSRI (Ministry of Settlement and Regional Infrastructure) office at Jakarta.

Tools & Techniques

1. Data confirmation with Balai PSDA

Collected information should be confirmed with Balai PSDA. If there is discrepancy, it should be informed to Dinas PSDA and finalize it.

Outputs

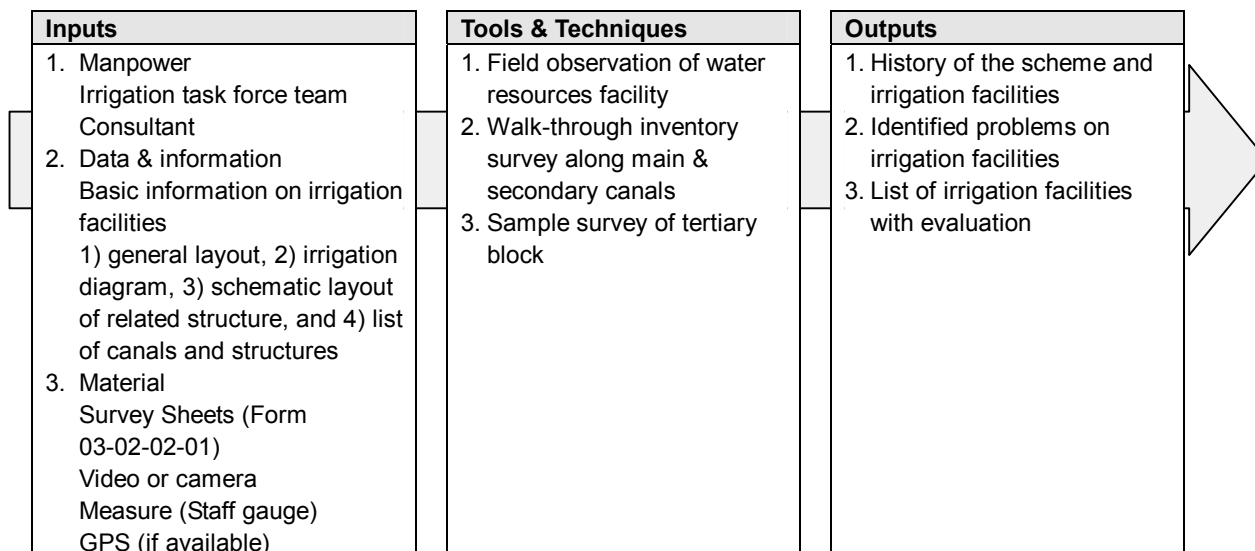
1. Confirmed official registered data

Confirmed official registered data should be used for field survey report.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Stage 02 - Task 02 Step 02	Inventory survey of irrigation facilities
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Criteria, standards and references

- A) Ministry of Public Works. 1999. *Technical Guideline for Rehabilitation & Upgrading of Irrigation Network*.
- B) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-05 "Tertiary Units"*.
- C) Survey Sheets (Form 02-02-02-01, 02-02-02-02, and 02-02-02-03)

Inputs

1. Manpower

- Irrigation task force team
- Consultant

2. Data & information

Before starting the field investigation, basic information of irrigation facilities should be collected from Dinas PSDA. The documents to be collected are,
1) general layout, 2) irrigation diagram, 3) schematic layout of related structure, and 4) list of canals and structures.

3. Material

- 1) Survey Sheets (Form 02-02-02-01)
- 2) Video or Camera and measure (staff gauge)
Problem of the facilities should be shot by video or camera.
- 3) Measure (staff gauge)
Identified problem should be measured and sketched.
- 4) GPS (if available)
GPS (Global Positioning System) is a powerful tool for inventory survey. Geographical coordinates can be taken by GPS and those coordinates should be entered in the survey sheets. This information will be very useful for the project management in the future.
- 5) Evaluation Guideline
Criteria, standards and references-A is useful for the survey.

Tools & Techniques

1. Field observation of water resources facility

Water resource facility of the project should be observed by irrigation expert. Present condition of the facility should be classified into evaluation categories A to D. Definition of the category is,

- A: Functioning well,
- B: Partially deteriorated,
- C: Not functioning well, and
- D: Serious condition for operation.

2. Walk-through inventory survey along main & secondary canals

All of the facilities on main & secondary canals (canals and related structures) should be surveyed by irrigation expert together with representatives of WUA concerned through walk-through survey. Evaluation of the facility should also be made. Distance/length of evaluation is recommended @1,000m both main and secondary canal and evaluation should be applied weighed method. Through the survey, request and proposal from WUAs on irrigation facilities and system should be noted.

3. Sample survey of tertiary block

Typical on-farm facilities should be observed by irrigation expert. Typical cross section, length, and density of irrigation canal, drainage canal, and inspection road should be measured. Evaluation of the facilities should also be made by comparing measured values and standard values introduced in criteria and standard-B. Through the survey, request and proposal from WUAs on irrigation facilities and system should be noted. Number of sample should be 1 block for 1,000ha of irrigation area.

Outputs

1. History of the scheme and irrigation facilities

Age of the project and irrigation facilities should be confirmed by irrigation expert. History of rehabilitation of the facilities should also be confirmed.

2. Identified problems and constraints on irrigation facilities

Identified problems and constraints on irrigation facilities should be described in the survey sheets. Addition to that, the result should be summarized by using Form 02-02-02-02.

3. List of irrigation facilities with evaluation

Evaluated irrigation facilities should be summarized by design discharge and evaluation. For irrigation canals and related structures, Form 02-02-02-03 should be used. Blank format of Form 02-02-02-03 and sample input of Form 02-02-02-03 are attached.

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PRESENT PROJECT CONDITIONS

Province :

Irrigation Scheme :

Kechamatan :

Registered Code :

Potential Irrigation Area (Ha) :

PART - I: INVENTORY OF IRRIGATION SCHEME

- 1.1 General
- 1.2 Structure of Water Source
- 1.3 Irrigation Canals
- 1.4 Drainage Canals
- 1.5 On-Farm
- 1.6 Rehabilitation Plan

PART - II: SURVEY FOR ESTIMATE OF REHABILITATION WORKS

- 2.1 General Layout
- 2.2 Irrigation Diagram
- 2.3 Schematic Layout of Related Structure
- 2.4 Survey Sheets
- 2.5 Quantity Estimate
- 2.6 Photographs

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

Instruction

No.	Survey Works	Instruction
1.	Preparatory works at Jakarta/Site	Study team has references of 3 provinces collected from respective provinces such as: - Inventory data executed recently. Sumatra: 2002, Java:2000, Sulawesi: 2001 - Some schematic layout and diagram of scheme are in hand of team. (To be utilized for survey)
2.	Greeting and request on cooperation of works	Greeting to DINAS office will be accompany with Team. Office location and Tel. No. should be informed as soon as possible when office is established.
3.	Data Collection	Prior to the site survey, following preparation should be made as first priority. 1) Collection of design reference or As-built drawings of each scheme 2) Copy of following data: project history, design reference 3) Preparation /confirmation and updating of; irrigation diagram, schematic layout of related structures, etc. 4) Numbering to structures for site survey work (Before survey, schematic layout and site exact site condition should be checked whether accuracy or not.
4.	Survey for estimate of rehabilitation work	Survey should be carried out by canal wise. <u>Structure:</u> 1) Number to structure on schematic layout shall be given. 2) In case, rehabilitation work is found, take picture showing reference structure number and kind of works. 3) Classification of rehabilitation shall be A: Good and no works are required. B: Minor works required (10-50%) C: Major rehabilitation required (more than 50% to be D: Totally replaced by new structure <u>Canal:</u> Following information should be indicated for rehabilitation: 1) Classification (A, B, C, D) 2) Length to be rehabilitated (lining & earthworks) 3) Estimate thickness of sedimentation is essential. To be surveyed thickness from canal bottom.
5.	Inspection Road	Data for length and wide are essential. Preparation of survey result shall be same as canal.
6.	Tertiary Block	Survey shall be carried out by random sampling method. Rate of sampling shall be 1 tertiary block/3000 ha.
7.	Estimate on work quantity	No detail reference is required. Should show item of rehabilitation work and its rough estimate.

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

Instruction

No.	Survey Works	Instruction
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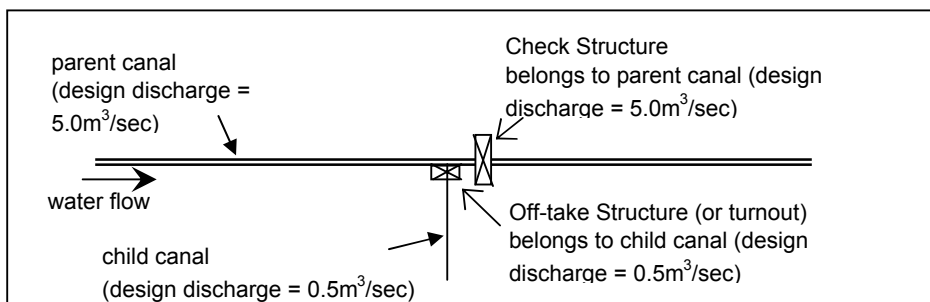
8. Format/sheet for preparation of Survey result Designate forms shall be given by Study Team

Rehabilitation Grade:

- RG1: Condition is good and no rehabilitation work is required.
- RG2: Repair is required. Quantity is estimated 10 to 50 % against total structure volume.
- RG3: Major repair is required. Quantity is estimated more than 50 % against total structure volume.
- RG4: Replacement and reconstruction are required due to no function of structure.

9. Definition of irrigation canal related structure

Name of typical structures	Description
1) Division (or check gate)	water level controlling structure on parent canal
2) Turnout (or off-take)	structure to divert water to child canal
3) Bridge	
4) Road crossing culvert	culvert on the canal (canal is crossing under the road)
5) Drainage culvert	culvert crossing the canal (drain is crossing under the canal)
6) Spillway	
7) Drop/Chute	
8) Aqueduct	
9) Siphon	



Classification of the structure for inventory survey

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

Instruction

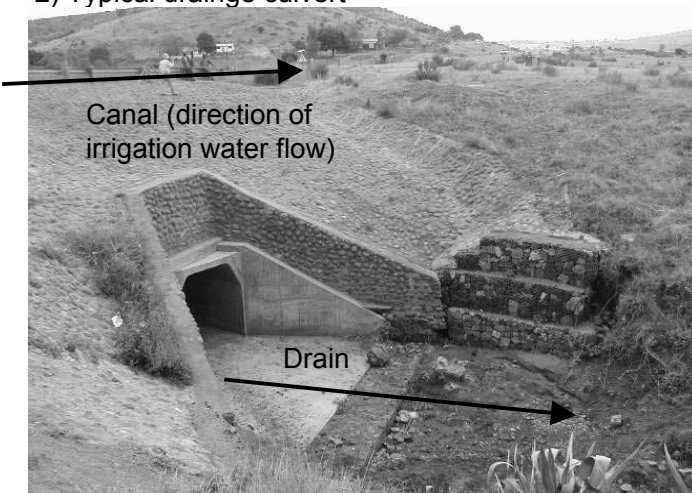
Definition of road crossing culvert and drainage culvert

1) Typical road crossing culvert



Road is overpassing canal. Culvert is provided on the canal with straight direction . The culvert conveys irrigation water.

2) Typical drainage culvert



Canal is overpassing drain. Culvert is provided under the canal with some angle. The culvert conveys drainage water.

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PRESENT PROJECT CONDITIONS

Sheet Number

I. General

- II-1 Structure of Water Source: Dam**
- II-2 Structure of Water Source: Headworks**
- II-3 Structure of Water Source: Free Intake**
- II-4 Structure of Water Source: Pumping Station**

III. Irrigation Canals

IV. Drainage Canals

V. On-Farm

VI. Rehabilitation Plan

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PRESENT PROJECT CONDITIONS

I. GENERAL

1. General

- 1.1 Name of Project : _____
- 1.2 Province : _____
- 1.3 District : _____
- 1.4 Sub-district : _____
- 1.5 Completion year of project : _____
- 1.6 Latest year of rehabilitation : _____

2. Project Area (ha)

- 2.1 (1) Potential area for irrigation : _____
 - Paddy field : _____
 - Irrigated paddy field : _____
 - Rainfed paddy field : _____
 - Non-paddy field : _____
 - Other land use : _____
- (2) Non-potential area for irrigation : _____
 - Rainfed paddy field : _____
 - Non-paddy field : _____
- (3) Total area ((1) + (2)) = (3) : _____

3. Number of beneficiaries for present condition : _____

4. Structure of Water Source (Please select one structure from below and mark with ○)
 Dam, Pumping Station, Headworks, Free Intake, Others

5. Water Resources

- 4.1 Name of river : _____
- 4.2 Catchment area (km²) : _____
- 4.3 Design flood discharge (m³/s) : _____
- 4.4 Minimum discharge at dry season(m³/s) : _____
- 4.5 Availability of discharge records (daily) : _____

6. Meteorology

- 5.1 Average annual rainfall (mm) : _____
- 5.2 Availability of daily rainfall record : _____

7. Do you have any data/document for project description ? Yes No

8. Brief Description of the Project

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities	
PRESENT PROJECT CONDITIONS	
II-1. Structure of Water Source: Dam	
1. Reservoir	
1.1 Type of Dam	: <u>Earthfill, Rockfill, Concrete</u>
1.2 Total storage capacity (million m ³)	: _____
1.3 Effective storage capacity (million m ³)	: _____
1.4 Allocation for irrigation (million m ³)	: _____
1.5 Full water level (EL. m)	: _____
1.6 Low (dead) water level (EL. m)	: _____
1.7 Effective water depth (m)	: _____
1.8 Year of construction	: _____
1.9 Latest year of rehabilitation	: _____
2. Dam Dimension	
2.1 Height of dam (m)	: _____
2.2 Length of dam (m)	: _____
2.3 Dam volume (m ³)	: _____
3. Intake Facility	
3.1 Max. intake discharge (m ³ /s)	: _____
3.2 Size of intake (wide x height x nos. of barrel) (m):	_____ (w) x _____ (h) x _____ (nos)
3.3 Gate size (m)	: _____ (w) x _____ (h) x _____ (nos)
3.4 Method of operation	: <u>Electric</u> <u>Manual</u>
4. Spillway	
4.1 Type of spillway	: <u>Side</u> , <u>Chute</u> , <u>Morning glory</u> , <u>Other</u>
4.2 With gate or not	: <u>With gate</u> <u>Without gate</u>
4.3 Type, size and number of gate	: _____ (w) x _____ (h) x _____ (nos)
4.4 Design flood discharge (m ³ /s)	: _____
5. Emergency Facility	
5.1 Type of facility	: <u>Valve</u> , <u>Gate</u> , <u>Others</u>
5.2 Method of operation	: <u>Electric</u> <u>Manual</u>
6. Existing Conditions	
6.1 Condition	: <u>1. Good</u> <u>2. Require rehabilitation</u>
6.2 Brief description in case 2 in above	: _____
6.3 Estimate cost for rehabilitation (Mil. Rp.)	: _____
7. Design Reference	
7.1 As built drawing	: <u>1. Available</u> <u>2. Not available</u>
7.2 Cost estimate	: <u>1. Available</u> <u>2. Not available</u>

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PRESENT PROJECT CONDITIONS

II-2. Structure of Water Source: Headworks (Barrage)

1. Weir
 - 1.1 Type of weir : Movable or Fixed
 - 1.2 Design flood discharge (m³) : _____
 - 1.3 With flood gate ? : (w) x (h) x (nos)
 - 1.4 With scouring sluice gate ? : (w) x (h) x (nos)
 - 1.5 Total length of dam : _____
 - 1.6 Length of movable weir portion (m) : _____
 - 1.7 Length of fixed weir portion (m) : _____
 - 1.8 Length of stilling basin (m) : _____
 - 1.9 Length of river bed protection (m) : _____
 - 1.10 Length of dike slope protection (m) : _____
 - 1.11 Method of gate operation : Electric Manual
 - 1.12 Year of construction : _____
 - 1.13 Latest year of rehabilitation : _____

2. Related Facility
 - 2.1 Fish ladder : 1. Provided 2. Not provided
 - 2.2 River maintenance flow gate/facility : 1. Provided 2. Not provided
 - 2.3 Settling basin : 1. Provided 2. Not provided
 - 2.4 Water level gauging facility : 1. Provided 2. Not provided

3. Intake Facility
 - 3.1 Side of intake : Left Right L & R
 - 3.2 Max. intake discharge (m³/s) : _____
 - 3.3 Size of intake (wide x height x nos. of barrel) (m): (w) x (h) x (nos)
 - 3.4 Gate size (m) : (w) x (h) x (nos)
 - 3.5 Method of operation : Electric Manual
 - 3.6 Measuring device : 1. Provided 2. Not provided
 - 3.7 Trash rack (screen) : 1. Provided 2. Not provided
 - 3.8 Stop log : 1. Provided 2. Not provided

4. Control System and Equipment
 - 4.1 Control method : Remote, Local, Both
 - 4.2 Kind of control equipment : _____

5. Existing Conditions
 - 5.1 Weir and civil works : 1. Good 2. Require rehabilitation
 - 5.2 Gate and/or control system : 1. Good 2. Require rehabilitation
 - 5.3 Estimate cost for rehabilitation (Mil. Rp.) : 1. Civil works:
: 2. Gate works:
: 3. Others:

6. Other Information (Kind of rhabilitation work, drawings)

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities	
PRESENT PROJECT CONDITIONS	
II-3. Structure of Water Source: Free Intake	
1. Intake Facility	
1.1 Side of intake	: <u>Left</u> <u>Right</u>
1.2 Max. intake discharge (m ³ /s)	: _____
1.3 Size of intake (wide x height x nos. of barrel) (m):	_____ (w) x _____ (h) x _____ (nos)
1.4 Gate size (m)	: _____ (w) x _____ (h) x _____ (nos)
1.5 Method of operation	: <u>Electric</u> <u>Manual</u>
1.6 Measuring device	: <u>1. Provided</u> <u>2. Not provided</u>
1.7 Trash rack (screen)	: <u>1. Provided</u> <u>2. Not provided</u>
1.8 Stop log	: <u>1. Provided</u> <u>2. Not provided</u>
1.9 Construction year	: _____
1.10 Latest year of rehabilitation	: _____
2. Related Facility	
2.1 Fish ladder	: <u>1. Provided</u> <u>2. Not provided</u>
2.2 River maintenance flow gate/facility	: <u>1. Provided</u> <u>2. Not provided</u>
2.3 Settling basin	: <u>1. Provided</u> <u>2. Not provided</u>
2.4 Water level gauging facility	: <u>1. Provided</u> <u>2. Not provided</u>
3. Control System and Equipment	
3.1 Control method	: <u>Remote, Local, Both</u>
3.2 Kind of control equipment	: _____
4. Existing Conditions	
4.1 Civil works	: <u>1. Good</u> <u>2. Require rehabilitation</u>
4.2 Gate and/or control system	: <u>1. Good</u> <u>2. Require rehabilitation</u>
4.3 Estimate cost for rehabilitation (Mil. Rp.)	: 1. Civil works: : 2. Gate works: : 3. Others:
5. Other Information (Kind of rehabilitation work): _____	
6. Design Reference	
6.1 As built drawing	: 1. Available 2. Not available
6.2 Cost estimate	: 1. Available 2. Not available

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PRESENT PROJECT CONDITIONS

II-4. Structure of Water Source: Pumping Station

1. Design Condition
 - 1.1 Size and number of pump : Size: (mm), (set)
 - 1.2 Direction of pump center : Vertical or Horizontal
 - 1.3 Type of pump : Axial Mixed flow Volute Other
 - 1.4 Prime mover : Diesel engine: (HP)
Electric motor: (kW)
 - 1.5 Rated discharge (min/m³/unit) : _____
 - 1.6 Total Head (m) : _____
 - 1.7 Year of completion : _____
 - 1.8 Latest year of rehabilitation : _____
2. Pumping Station, Civil and Building Works
 - 2.1 Size of pump house (m) : (w) x (l) x (h)
 - 2.2 Size of suction pond (m) : (w) x (l) x (h)
 - 2.3 Delivery conduit : Size, type, material:
 - 2.4 Size of outlet structure (m) : (w) x (l) x (h)
3. Control System and Equipment
 - 3.1 Overhead crane (ton) : _____
 - 3.2 Control panel : _____
 - 3.3 Transformer (kW) : _____
4. Existing Conditions
 - 4.1 Pumping equipment : 1. Good 2. Require rehabilitation
 - 4.2 Prime mover : 1. Good 2. Require rehabilitation
 - 4.3 Civil/building works : 1. Good 2. Require rehabilitation
 - 4.4 Others : 1. Good 2. Require rehabilitation
5. Kind of Rehabilitation Works
 - 5.1 Pumping equipment : _____
 - 5.2 Prime mover : _____
 - 5.3 Civil/building works : _____
 - 5.4 Others : _____
 - 5.5 Estimate cost (Mil. Rp.) : 1. Pumping equipment:
2. Prime mover:
3. Civil/building works:
4. Others:
6. Design Reference
 - 6.1 As built drawing : 1. Available 2. Not available
 - 6.2 Cost estimate : 1. Available 2. Not available

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PRESENT PROJECT CONDITIONS

III. Irrigation Canals (1/2)

1. Irrigation System: General

- 1.1 Irrigation area (ha) :
- 1.2 Number of irrigation canal (nos.) : Main: Secondary:
Tertiary: Others
- 1.3 Length of canal (km) : Main: Secondary:
Tertiary: Others
- 1.4 Canal Shape : T: trapezoidal, R: Rectangular, P: Pipe line, M: Others
- | | | | | |
|-----------------|---|---|---|---|
| Main canal | T | R | P | M |
| Secondary canal | T | R | P | M |
| Tertiary canal | T | R | P | M |
| Others | T | R | P | M |
- 1.5 Canal width and height (m) :
- | | | | | |
|-----------|------|-------|--------|-------|
| | Wide | | Height | |
| | Max. | Mini. | Max. | Mini. |
| Main | | | | |
| Secondary | | | | |
| Tertiary | | | | |
| Others | | | | |
- 1.6 Lining (km) :
- | | | | | |
|-----------|-------|------------|--------------|------------|
| | Canal | Lined (km) | Unlined (km) | Total (km) |
| Main | | | | |
| Secondary | | | | |
| Tertiary | | | | |
| Others | | | | |
- 1.7 Discharge (m³/s) :
- | | | | |
|-----------|------|-------|---------------------------|
| | Max. | Mini. | Water requirement: l/s/ha |
| Main | | | |
| Secondary | | | |
| Tertiary | | | |
| Others | | | |
- 1.8 Inspection road (km) :
- | | | | |
|-----------|-------|-----------|-------|
| | Paved | Non-paved | Total |
| Main | | | |
| Secondary | | | |
| Tertiary | | | |
| Others | | | |
- 1.9 Irrigation Diagram and Structure Diagram/List
- Irrigation diagram : Prepared Not prepared
 - Structure diagram/list : Prepared Not prepared

2. Related Structures (Refer to next page)

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PRESENT PROJECT CONDITIONS

IV. Drainage Canals

1. Drainage System: General

1.1 Drainage method	:	Gravity	Pump
1.2 Number of drainage canal (nos.)	:	Main:	Secondary:
		Tertiary:	Others:
1.3 Length of canal (km)	:	Main:	Secondary:
		Tertiary:	Others
1.4 Drainage canal shape	:	T: trapezoidal, R: rectang., N: Natural river, M: Others	
Main canal		T	R
Secondary canal		T	R
Tertiary canal		T	R
Others		T	R
1.5 Canal width and height (m)	:	Wide	
		Height	
		Max.	Mini.
Main			
Secondary			
Tertiary			
Others			
1.6 Discharge (m ³ /s)	:	Max.	Mini.
Main			
Secondary			
Tertiary			
Others			
1.7 Year of completion	:	_____	
1.8 Latest year of rehabilitation	:	_____	
1.9 Drainage Pumping Station	:	To use sheet II-4	

2. Related Structure

2.1 Number of structure	:	Main	Sec.	Tert.	Others
- Bridge	:				
- Road crossing culvert	:				
- Sluice	:				
-	:				
-	:				
Total	:				
2.2 Condition (to be rehabilitated)	:	Main	Sec.	Tert.	Others
- Bridge	:				
- Road crossing culvert	:				
- Sluice	:				
-	:				
-	:				
Total	:				

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PRESENT PROJECT CONDITIONS

V. On-Farm (1/2)

1. Area (ha)

1.1 Area by type of irrigation

- (1) Technical irrigation : _____
- (2) Semi-technical irrigation : _____
- (3) Simple irrigation : _____
- Total paddy area : _____

1.2 Condition of technical irrigation area

- (1) Development potential area : _____
 - 1) Not yet developed area : _____
 - 2) Developed but converted area : _____
 - 3) Developed area : _____
 - Irrigated area : _____
 - Not yet irrigated area : _____
- (2) No development potential area : _____
 - 1) Not yet developed area : _____
 - 2) Developed but converted area : _____
 - 3) Developed area : _____
- Total technical irrigation area : _____

1.3 Condition of semi-technical irrigation area

- (1) Development potential area : _____
 - 1) Not yet developed area : _____
 - 2) Developed but converted area : _____
 - 3) Developed area : _____
 - Irrigated area : _____
 - Not yet irrigated area : _____
- (2) No development potential area : _____
 - 1) Not yet developed area : _____
 - 2) Developed but converted area : _____
 - 3) Developed area : _____
- Total semi-technical irrigation area : _____

1.4 Condition of simple irrigation area

- (1) Development potential area : _____
 - 1) Not yet developed area : _____
 - 2) Developed but converted area : _____
 - 3) Developed area : _____
 - Irrigated area : _____
 - Not yet irrigated area : _____
- (2) No development potential area : _____
 - 1) Not yet developed area : _____
 - 2) Developed but converted area : _____
 - 3) Developed area : _____
- Total simple irrigation area : _____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities	
<div style="border: 1px solid black; padding: 5px; margin: 0 auto; width: 80%;">PRESENT PROJECT CONDITIONS</div>	
V. On-Farm (2/2)	
2. On-Farm Facility	
2.1 Irrigation canal and related structure	
(1) Tertiary canal (km)	: _____
(2) Farm ditch (km)	: _____
(3) Related st. of tertiary canal (nos.)	: _____
(4) Related st. of farm ditch (nos.)	: _____
Brief description of condition of on-farm:	

2.2 Drainage canal and related facility	
(1) Tertiary drain (km)	:
(2) Farm drain (km)	:
(3) Related st. of tertiary drain (nos)	:
(4) Related st. of farm ditch (nos)	:
3. Year	
3.1 Year of completion	: _____
3.2 Latest year of rehabilitation	: _____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PRESENT PROJECT CONDITIONS

VI. Rehabilitation Plan

1. Latest Year of Rehabilitation

- 1.1 Water resources facility : _____
- 1.2 Canal : _____
- 1.3 Others : _____

2. Rehabilitation Plan

- 2.1 Do you have any rehabilitation plan ? : 1. YES 2. NO
In case "YES", to continue 2.
In case "NO", to 3.

3. Rehabilitation Plan

- 3.1 Kind of rehabilitation : (1) Water source facility
a. Dam, b. Intake, c. Pump, d. Free Intake
: (2) Irrigation canals and related structures
a. Main, b. Secondary, c. Tertiary, d. On-farm
: (3) Drainage canal and related structures
a. Main, b. Secondary, c. Tertiary, d. On-farm
: (4) Others

- 3.2 Status of rehabilitation plan : 1. Under Design 2. On-going

3.3 Design and cost estimate for rehabilitation plan

- (1) Do you have design for above ? : 1. YES 2. NO
- (2) Do you have cost estimate for above ? : 1. YES 2. NO

- 3.4 Status of budget : 1. Apply 2. Approved

- 3.5 Amount of budget (Mil. Rp.) : _____

- 3.6 Implementation plan (latest) : Commencement year: _____
Completion year: _____

- 4. No rehabilitation work is planned. 1. YES

5. Comments for rehabilitation plan/works.

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Sheet Number

- II-I General Layout**
- II-II Irrigation Diagram**
- II-III Schematic Layout of Related Structures**
- II-IV Survey Sheet**
 - Dam**
 - Fixed Weir**
 - Movable Weir**
 - Free Intake**
 - Weir and Intake**
 - Irrigation Canals**
 - Irrigation Canal Related Structures**
 - Tertiary**
 - Drainage Canals**
 - Drainage Canals Related Structures**
 - Check Sheet Structure**
 - Check Sheet Structure Layout**
 - Photo Sheet**

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

II-I General Layout

(Insert general layout of the irrigation scheme in the following page.)

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

II-II Irrigation Diagram

(Insert irrigation diagram of the irrigation scheme in the following page.)

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

**II-III Schematic Layout of Related Structures
(Main & Secondary Canals)**

*(Insert schematic layout of related structures of the irrigation
scheme in the following page.)*

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

II-IV Survey Sheet

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Dam (Concrete Gravity and Fill-Type Dam)

Province : _____
 Name of Scheme : _____
 Name of Dam : _____
 Type of Dam : 1. Concrete Gravity, 2. Fill-Type
 Name of River : _____

Structure	Condition of Structure				Reference picture no.	Estimated Q'ty equivalent to concrete volume (m3)	Remarks
	A	B	C	D			
1. Foundation of Dam Body							
2. Dam Body, Upstream							
3. Dam Body, Downstream							
4. Spillway, Overflow Weir							
5. Spillway, Gate Works						Refer Detail	
6. Spillway, Driving Channel							
7. Spillway, Stilling Basin							
8. Protection works after Stilling Basin							
9. Intake Facility, Civil Works							
10. Intake Facility; Gate/Valve/Metal Works						Refer Detail	
11. Emergency/Outlet, Civil Works							
12. Emergency/Outlet, Metal Works						Refer Detail	
13. Others, if any							

Remarks: Condition of structure shall be classified into A, B, C, D.

A: Function well / no rehabilitation is needed.

B: Partially deteriorated, but functioning in a satisfactory range / minor rehabilitation is needed.

C: Not functioning well and affecting the operation / large scale of rehabilitation is needed.

D: Completely not functioning / replace and reconstruction is needed.

Date: _____

Prepared by: _____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Dam Facility (1/2)

I. General

Name of Scheme:	Name of Dam:
Kind of Dam Structure:	

II. Problems and Evaluation

1. Civil Works : Structure (Foundation, Spillway, Intake, Outlet, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

: Structure (Foundation, Spillway, Intake, Outlet, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

: Structure (Foundation, Spillway, Intake, Outlet, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

2. Metal Works : Structure (Spillway, Intake, Outlet, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

: Structure (Spillway, Intake, Outlet, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

: Structure (Spillway, Intake, Outlet, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

- A: Function well / no rehabilitation is needed.
- B: Partially deteriorated, but functioning in a satisfactory range / minor rehabilitation is needed.
- C: Not functioning well and affecting the operation / large scale of rehabilitation is needed.
- D: Completely not functioning / replace and reconstruction is needed.

III. Estimate of Work Quantity

-1. Earthworks (m3):	
-2. Concrete Works (m3):	
-3. Masonry Works (m3):	
-4. Metal works (ton)	
-5. Cement grouting for foundation (m)	
-6. Others	

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Dam Facility (2/2)

IV. Photographs & Sketch

Photograph (Upstream to downstream)	Sketch / Comment
-------------------------------------	------------------

Photograph (Upstream to downstream)	Sketch / Comment
-------------------------------------	------------------

Photograph (Upstream to downstream)	Sketch / Comment
-------------------------------------	------------------

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Headworks (Fixed Weir Type)

Province : _____
 Name of Scheme : _____
 Name of Headworks : _____
 Name of River : _____
 Settling Basin : Provided / Not provided _____

Structure	Condition of Structure				Reference picture no.	Estimated Q'ty equivalent to concrete volume (m3)	Remarks
	A	B	C	D			
1. Upstream Apron							
2. Fixed Weir							
3. Downstream Stilling Basin							
4. Scouring Sluice; Civil Works							
5. Scouring Sluice; Gate Works						Refer detail	
6. Left bank Retaining Wall							
7. Right Bank Retaining Wall							
8. Fish Ladder							
9. Intake Facility; Civil Works							
10. Intake Facility; Gate Works						Refer detail	
11. Driving Canal connecting to Main Canal/Settling Basin							
12. Settling Basin; Civil Works							
13. Settling Basin; Gate Works						Refer detail	
14. Others, if any							

Remarks: Condition of structure shall be classified into A, B, C, D.

Date: _____
 Prepared by: _____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Headworks (Movable Weir Type)

Province : _____
 Name of Scheme : _____
 Name of Headworks : _____
 Name of River : _____
 Settling Basin : Provided / Not provided _____

Structure	Condition of Structure				Reference picture no.	Estimated Q'ty equivalent to concrete volume (m3)	Remarks
	A	B	C	D			
1. Upstream Apron							
2. Movable Weir; Civil Works							
3. Movable Weir; Gate Works						Refer detail	
4. Downstream Stilling Basin							
5. Scouring Sluice; Civil Works							
6. Scouring Sluice; Gate Works						Refer detail	
7. Left bank Retaining Wall							
8. Right Bank Retaining Wall							
9. Fish Ladder							
10. Intake Facility; Civil Works							
11. Intake Facility; Gate Works						Refer detail	
12. Driving Canal connecting to Main Canal/SB							
13. Settling Basin; Civil Works							
14. Settling Basin; Gate Works						Refer detail	
15. Others, if any							

Remarks: Condition of structure shall be classified into A, B, C, D.

Date: _____

Prepared by: _____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Free Intake

Province : _____
 Name of Scheme : _____
 Name of Free Intake : _____
 Name of River : _____
 Settling Basin : Provided / Not provided

Structure	Condition of Structure				Reference picture no.	Estimated Q'ty equivalent to concrete volume (m3)	Remarks
	A	B	C	D			
1. Structure before intake gate							
2. Intake gate and box							
3. Retaining Wall							
4. Intake Gate						Refer detail	
5. Trash Rack / Screen						Refer detail	
6. Driving Canal connecting to Main Canal/SB							
7. Settling Basin; Civil Works							
8. Settling Basin; Gate Works						Refer detail	
9. Others, if any							

Remarks: Condition of structure shall be classified into A, B, C, D.

Date: _____
 Prepared by: _____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Weir and Intake Facility (1/2)

I. General

Name of Scheme:	Name of Weir/Intake:
Kind of Intake Facility : Fixed Weir, Movable Weir, Free Intake	

II. Problems and Evaluation

1. Civil Works : Structure (Weir, Pier, Retaining Wall, Scouring Sluice, Settling Basin, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

: Structure (Weir, Pier, Retaining Wall, Scouring Sluice, Settling Basin, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

: Structure (Weir, Pier, Retaining Wall, Scouring Sluice, Settling Basin, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

2. Metal Works : Structure (Flood gate, Scouring sluice gate, Intake gate, Settling basin gate, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

: Structure (Flood gate, Scouring sluice gate, Intake gate, Settling basin gate, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

: Structure (Flood gate, Scouring sluice gate, Intake gate, Settling basin gate, Others)

A. None	
B. Some	
C. Serious	
D. Replace	

- A: Function well / no rehabilitation is needed.
- B: Partially deteriorated, but functioning in a satisfactory range / minor rehabilitation is needed.
- C: Not functioning well and affecting the operation / large scale of rehabilitation is needed.
- D: Completely not functioning / replace and reconstruction is needed.

III. Estimate of Work Quantity

-1. Earthworks (m3):	
-2. Concrete Works (m3):	
-3. Masonry Works (m3):	
-4. Metal works (ton)	
-5. Others	

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Weir and Intake Facility (1/2)

IV. Photographs & Sketch

Photograph (Upstream to downstream)	Sketch / Comment
-------------------------------------	------------------

Photograph (Upstream to downstream)	Sketch / Comment
-------------------------------------	------------------

Photograph (Upstream to downstream)	Sketch / Comment
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Form 02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Irrigation Canals

Province : _____
 Name of Scheme : _____
 Name of Canal : _____
 Length of Canal : _____

(This survey sheets shall be applied for Main and Secondary Canals) (Sheet No. of)

Sta. No. (m)	Canal Type (1:slope; m)	Canal Size B x H (m)	Concrete Lining			Embankment/ Earthwork		Sediment (t = m)	Inspection Road	Reference picture No.
			Left	Bottom	Right	Left	Right			
0										
100										
200										
300										
400										
500										
600										
700										
800										
900										
1,000										
1,100										
1,200										
1,300										
1,400										
1,500										
1,600										
1,700										
1,800										
1,900										
2,000										

(m: side slope of trapezoidal section)

(Canal Type: 1, Trapezoidal section, 2. Rectangular Section, 3. Conduit/Pipe Culvert)

Remarks: Condition of canal shall be classified into A, B, C, D.

Date: _____

Prepared by: _____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Irrigation Canal Related Structures

Province : _____
 Name of Scheme : _____
 Name of Canal : _____
 Length of Canal : _____

(This survey sheets shall be applied for Main and Secondary Canals) (Sheet No. of)

Serial no. of structure on schematic layout	Kind of structure	Condition of Structure				Reference picture no.	Estimated Q'ty equivalent to concrete volume (m3)	Remarks
		A	B	C	D			
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
19.								
20.								
21.								
22.								
23.								
24.								
25.								
26.								
27.								
28.								
29.								
30.								

Remarks: Condition of structure shall be classified into A, B, C, D.

Date: _____

Prepared by: _____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Steel Gate for Tertiary Works
(by Sampling Method of Tertiary Block)

Province : _____
 Name of Scheme : _____
 Name of Tertiary Block : _____
 Area of Tertiary Block (ha) : _____
 Number of Sampling : 1 tertiary block per 3,000 ha

Structure	Dimension	Condition of Canal				Condition of Structure			
		A	B	C	D	A	B	C	D
1. Irrigation Canal									
1.1 Canal Works									
(1) Number of canal	Nos.								
(2) Lined (m)									
(3) Un-lined (m)									
(4) Total (m)									
1.2 Structure Works									
(1) Number of structure									
2. Inspection Road		Condition of Inspection Road							
	Condition	A	B	C	D				
(1) Number of road	Nos.								
(2) Length (m)									

Remarks: Condition of structure shall be classified into A, B, C, D.

Date: _____
 Prepared by: _____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Drainage Canal Related Structure

Province : _____
 Name of Scheme : _____
 Name of Drainage Canal : _____ (1. Main, 2. Secondary, 3. Others)
 Length of Drainage Canal : _____
 (This survey sheets shall be applied for Main and Secondary Drainage Canals) (Sheet No. of)

Serial no. of structure on drainage schematic layout	Kind of structure	Condition of Structure				Reference picture no.	Estimated Q'ty equivalent to concrete volume (m3)	Remarks
		A	B	C	D			
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
19.								
20.								
21.								
22.								
23.								
24.								
25.								
26.								
27.								
28.								
29.								
30.								

Remarks: Condition of structure shall be classified into A, B, C, D.

Date: _____

Prepared by: _____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Canal and Inspection Road (1/2)

I. General

Name of Scheme:	Kind of Canal: Main Secondary
Name of Canal:	Length of Canal:

II. Canal Dimension

2.1 Design Condition	1. Design discharge (m ³ /s):	_____
	2. Shape of canal: Trapezoidal Rectangular	_____
	3. Lining Concrete Masonry Non-lining (earth)	_____
2.2 Canal Dimension (m)	1. Bottom width:	_____
	2. Canal height:	_____
	3. Side slope (1 : m):	_____
	4. Design water depth:	_____
2.3 Inspection Road (m)	1. Total wide:	_____
	2. Effective wide:	_____
	3. Pavement (Concrete, Gravel, Non):	_____

III. Problems and Evaluation

3.1 Discharge during dry season	A. As design	B. approx. 75 %	C. 75-50 %	D. Less than 50 %
3.2 Sedimentation against canal height	A. Less than 10 %	B. 10 - 25 %	C. 25 - 50 %	D. More than 50 %
3.3 Leakage	A. Not found	B. Found but within allowable range	C. Serious	
	C. Serious	D. More than allowable range / reconstruction is needed.		
3.4 Canal shape and lining	A. Function Well	B: Within function	C. Not function well / serious condition	
	D: Collapsed and completely not functioning			
3.5 Inspection road	A. Function Well	B: Within function	C. Not function well / less than 20 km/hr	
	D: Damaged and completely not functioning			

IV. Estimate Existing Condition expressed in Length (km)

1 Discharge	A.	_____	2. Sedimentation	A.	_____
	B.	_____		B.	_____
	C.	_____		C.	_____
	D.	_____		D.	_____
3. Leakage	A.	_____	4. Canal shape	A.	_____
	B.	_____		B.	_____
	C.	_____		C.	_____
	D.	_____		D.	_____
5. Inspection Road	A.	_____			
	B.	_____			
	C.	_____			
	D.	_____			

V. Estimate of Work Quantity

-1. Removal of sediment soil(m ³):	_____
-2. Concrete Lining Works (m ³):	_____
-3. Repair of Inspection Road (m ²):	_____
-4. Others:	_____

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Canal and Inspection Road (2/2)

VI. Photographs & Sketch

Photograph (Upstream to downstream)	Sketch / Comment
-------------------------------------	------------------

Photograph (Upstream to downstream)	Sketch / Comment
-------------------------------------	------------------

Photograph (Upstream to downstream)	Sketch / Comment
-------------------------------------	------------------

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Survey Sheet for Irrigation Canal related Structure

I. General

Name of Scheme:	Name of Canal:
Kind of Structure:	Serial Number of Structure:

II. Structure Dimension

2.1 Civil Works

Structure Type:	Concrete / Masonry / Others ()		
Dimension (m):	Width:	Height:	Length:
	Nos. of barrel:	(w) x	(h) x (n: barrel)

2.2 Gate

Gate Type:	Manual / Electric /Others		
Dimension (m):	(w) x	(h) x	(n)

III. Problems and Evaluation

1. Civil Works	A. None	
	B. Some	
	C. Serious	
	D. Replace	
2. Gate Works	A. None	
	B. Some	
	C. Serious	
	D. Replace	

A: Function well / no rehabilitation is needed.

B: Partially deteriorated, but functioning in a satisfactory range / minor rehabilitation is needed.

C: Not functioning well and affecting the operation / large scale of rehabilitation is needed.

D: Completely not functioning / replace and reconstruction is needed.

IV. Photographs & Sketch

Photograph	Sketch / Comment

V. Estimate of Work Quantity

-1. Earthworks (m3):
-2. Concrete Works (m3):
-3. Masonry Works (m3):
-4. Others:

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Schematic Layout and Survey Result

(Sheet No. of)

Name of Scheme: _____ Canal Grade: 1. Main 2. Secondary
 Name of Canal: _____ Length of Canal (km): _____

BP of Canal Km 0

* Q'ty: Estimate quantity equivalent to concrete

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

Serial No.	Structure	Condition	Q'ty
KM from BP		Picture No.	

- Condition: A: Well functioning / no rehabilitation is needed.
 B: Functioning in a satisfactory range / minor rehabilitation is needed.
 C: Not functioning well and affecting operation / large scale of rehabilitation is needed.
 D: Completely not functioning / replace and reconstruction is needed.

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

II-VI Photographs

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Photographs: Intake to On-Farm (1/3)

I. General

Name of Scheme:	
Object of Photographs:	

II. Photographs & Sketch

Photograph <i>1st photo</i> Overview of water resources facility from downstream. The photo should present 1)weir or dam body, 2)scoring sluice gate or spillway, and 3)intake.	Structure:
	Description:
	Date:

Photograph <i>2nd photo</i> Overview of water resources facility from upstream. The photo should present 1)weir or dam body, 2)scoring sluice gate or spillway, and 3)intake.	Structure:
	Description:
	Date:

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Photographs: Intake to On-Farm (2/3)

I. General

Name of Scheme:	
Object of Photographs:	

II. Photographs & Sketch

Photograph	Structure:
	Description:
	Date:

Photograph	Structure:
	Description:
	Date:

Form 02-02-02-01 Survey Sheet for Inventory Survey of Irrigation Facilities

PART-II ESTIMATE OF REHABILITATION WORKS

Photographs: Intake to On-Farm (3/3)

I. General

Name of Scheme:	
Object of Photographs:	

II. Photographs & Sketch

Photograph	Structure:
	Description:
	Date:

Photograph	Structure:
	Description:
	Date:

**Form 02-02-02-02 (1/2) Survey Sheet for Irrigation Survey
Summary of Identified Problems and Constraints**

1. Province
2. District
3. Scheme

Facility	No.	Problems and Constraints	Evaluation (Mark with x in case phenomena are found)
Water Resources Facility			
Fill dam			
Dam body			
	W-1	Settlement of dam crest and less free board against requirement	
	W-2	Slope sliding at upstream and/or downstream of dam body	
	W-3	Leakage from dam body	
Spillway, Intake; Civil			
	W-4	Insufficient free board of dam spillway during flood	
	W-5	Problem(s) of collapse, leakage, and/or breakdown on dam spillway channel	
	W-6	Collapse of excavated slope of dam spillway	
	W-7	Collapse of excavated slope at downstream of stilling basin of dam spillway	
Spillway, Intake; Gate and Metal Works			
	W-8	Lower strength against design load of spillway/intake gate(s)	
	W-9	Problem(s) of leakage, deformation, breakdown, and/or deflection on dam spillway/intake gate(s)	
	W-10	Lower strength against design load due to rust, decay of steel materials of dam spillway/intake gate(s)	
	W-11	Physical operational problem on dam spillway/intake gate(s)	
	W-12	Problem on management for dam spillway/intake gate(s) operation	
	W-13	Deflection of trash rack/screen	
Others			
	W-14	Lower function of dam control house	
	W-15	Lower function of dam O&M equipment	
Headworks/Intake			
Weir, flood way, scouring sluice; Civil			
	W-16	Crack or damage on weir crest	
	W-17	Leakage from foundation and/or settlement of weir	
	W-18	Incline, settlement, or deflection of pier of weir	
	W-19	Settlement or breakdown of apron of weir	
	W-20	Settlement or breakdown of stilling basin of weir	
	W-21	Fallen down, inclined, or washed away of retaining wall of weir	
	W-22	Washed away of ripraps or blocks after stilling basin	
Others			
	W-23	Physical O&M problem due to overage facility	
Flood way, Scouring Sluice; Gate and Metal works			
	W-24	Leakage from flood or scouring sluice gate(s) of headworks	
	W-25	Lower strength against design load due to rust, decay of steel materials of flood/scouring sluice gate(s)	
	W-26	Physical operational problem on flood/scouring sluice gate(s) of headworks	
	W-27	Problem on management for flood/scouring sluice gate(s) operation	
Intake/Free Intake			
Civil			
	W-28	Insufficient diversion water due to river bed degradation	
	W-29	Insufficient diversion water due to sedimentation in front of intake	
	W-30	Incline, settlement, or deflection of intake structure	
	W-31	Inflow of bed loads into canal and decrease canal flow capacity	
Gate, trash rack			
	W-32	Leakage from intake gate(s)	
	W-33	Lower strength against design load due to rust, decay of steel materials of intake gate(s)	
	W-34	Physical operational problem on intake gate(s)	
	W-35	Problem on management for intake gate(s) operation	
	W-36	Overage, Lower strength of intake gate(s)	
O&M			
	W-37	Difficulty on O&M	
	W-38	Difficulty on water distribution/discharge measurement	

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

**Form 02-02-02 (2/2) Survey Sheet for Irrigation Survey
Summary of Identified Problems and Constraints**

1. Province
2. District
3. Scheme

Facility	No.	Problems and Constraints	Evaluation (Mark with x in case phenomena are found)
Canal and Related Structure			
General			
	C-1	Sedimentation or obstruction of water flow	
	C-2	Leakage from canal	
	C-3	Collapse of canal	
	C-4	Impassable of inspection road along canal	
	C-5	General O&M problems	
	C-6	Overage, lower strength of canal	
Lined canal			
	C-7	Cracks or partial damage on lined canal	
	C-8	Leakage from lined canal	
	C-9	Deflection of lining toward inside of canal	
Earth canal			
	C-10	Difficulty on maintenance of earth canal	
Related regulating structure (Check, Off-take, etc.)			
	C-11	Lower function of regulating structure on canal	
	C-12	Settlement or damage (breakdown) of regulating structure on canal	
	C-13	Physical operation problem on regulating structure on canal	
	C-14	No function of discharge measuring	
Related conveyance structure (Siphon, Aqueduct)			
	C-15	Settlement/deflection on foundation of aqueduct	
	C-16	Damage/breakout on superstructure of aqueduct	
	C-17	Leakage from barrel of siphon	
	C-18	Insufficient covering for siphon under below river bed	
	C-19	Clogging of barrel of siphon	
Related crossing structure			
	C-20	Clogging of road crossing(box/pipe culvert)	
	C-21	Settlement of foundation of bridge	
	C-22	Damage/breakout of superstructure of bridge	
Protective structure			
	C-23	Clogging of barrel of cross drain	
O&M			
	C-24	Difficulty on O&M	
	C-25	Difficulty on water distribution	

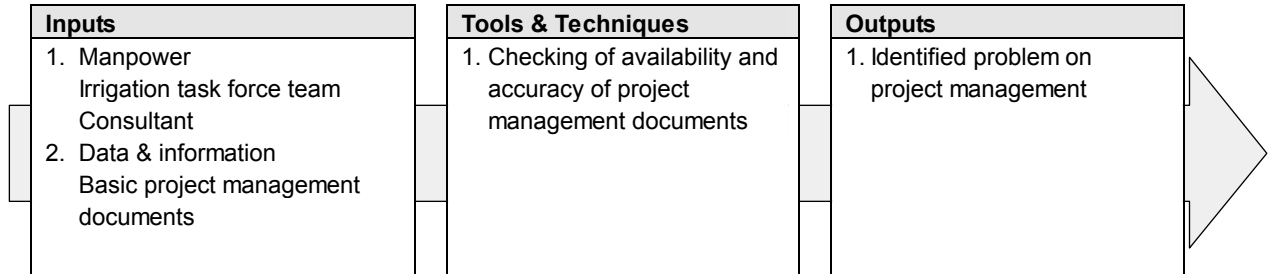
**Form 02-02-02-03 Survey Sheet for Irrigation Survey: Summary Result of Present Condition on Irrigation System
(Length of Canal and Number of Related Structure by Design Discharge and Present Condition)**

Registration Code: _____ Province: _____ Name of the Project: _____ Technical Level: _____
 Development Area: ha Completion Year: _____ Age of the Project: _____

Class of Canal	Structure	Design Discharge Present Condition	Length of Canal (km) or Number of Related Structure (nos.) by Design Discharge (m3/s) and Present Condition of Facility (A to D)																																															
			0.0 - 0.5 (m3/sec)				0.5 - 1.0 (m3/sec)				1.0 - 1.5 (m3/sec)				1.5 - 2.0 (m3/sec)				2.0 - 4.0 (m3/sec)				4.0 - 6.0 (m3/sec)				6.0 - 8.0 (m3/sec)				8.0 - 10.0 (m3/sec)				10.0 - 15.0 (m3/sec)															
			A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D								
Main	Canal Case-1	New Construction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Canal Case-2	Lined																																																
		Unlined	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Canal Case-3	Lined																																																
		Unlined	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Structure	Division																																																
		Turnout																																																
		Bridge																																																
		Road crossing (Culvert)																																																
		Drainage Crossing																																																
		Spillway																																																
		Drop/Chute																																																
		Aqueduct																																																
Siphon																																																		
Others																																																		
Secondary	Canal Case-1	New Construction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
	Canal Case-4	Lined																																																
		Unlined	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
	Canal Case-5	Lined																																																
		Unlined	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
	Structure	Division																																																
		Turnout																																																
		Bridge																																																
		Road crossing (Culvert)																																																
		Drainage Crossing																																																
		Spillway																																																
		Drop/Chute																																																
		Aqueduct																																																
Siphon																																																		
Others																																																		

Note: Canal Case-1. No canal (new construction)
 Canal Case-2. Main Canal without existing inspection road
 Canal Case-3. Main Canal with existing inspection road
 Canal Case-4. Secondary Canal without existing inspection road
 Canal Case-5. Secondary Canal with existing inspection road

Stage 02 - Task 02 Step 03	Survey on project management
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Criteria, standards and references

A) Reference documents such as 1) general layout, 2) irrigation diagram, 3) schematic layout of related structure, and 4) list of canals and structures, etc.

Inputs

1. Manpower

Irrigation task force team
 Consultant

2. Data & information

Basic project management documents, such as, Design reports, completion report, general layout of the scheme, Irrigation diagram, Schematic layout of related structure, Inventory of irrigation facilities, and O&M manual

Tools & Techniques

1. Checking of availability and accuracy of project management documents

Collected documents should be checked by irrigation survey service officer and consultant. If there is a discrepancy or non-updated information, it should be noted in the survey sheets.

Outputs

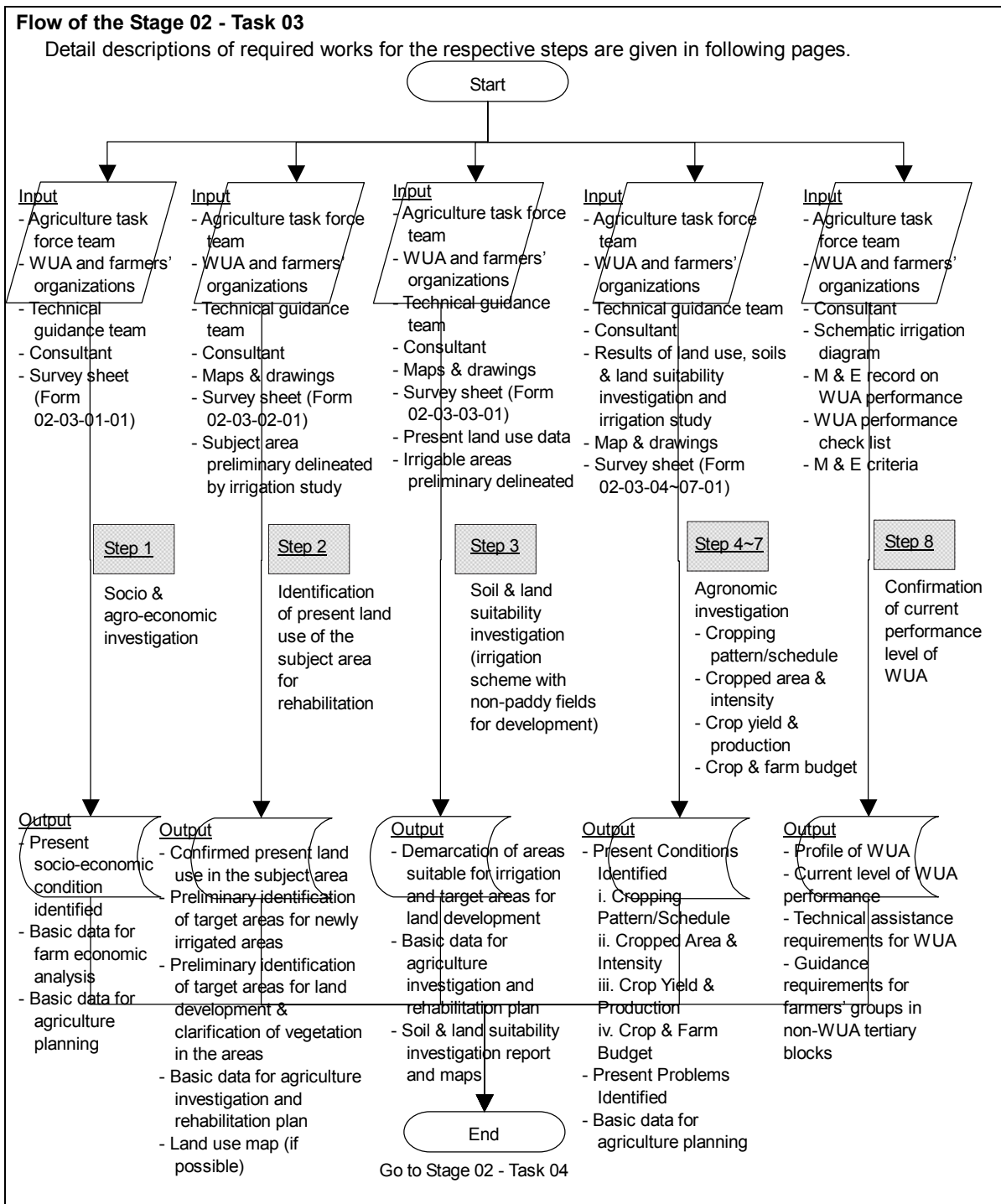
1. Identified problems on project management

Identified problems and constraints on project management should be described in survey sheets.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

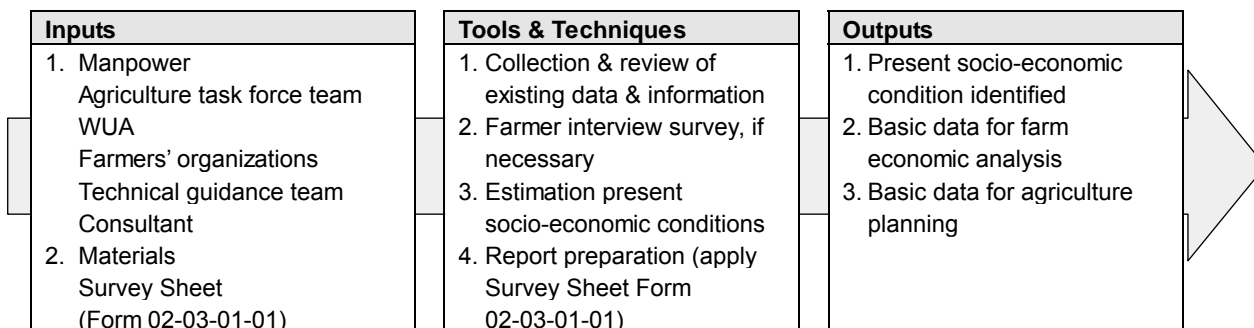
Stage 02	Pre-F/S Level Field Investigation
Task 03	Field Investigation on Agriculture and WUA
Purpose and scope	
Investigation on present agriculture and agro-economic conditions to identify base features and problems for agriculture planning and project evaluation. Investigation on present statuses, activities and problems of WUA.	



I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Stage 02 - Task 03 Step 01	Socio & agro-economic investigation
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Criteria, standards and references

- A) Survey Sheet Form 02-03-01-01
- B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

- 1. Manpower**
 Agriculture task force team
 Representatives of WUA in the irrigation scheme
 Representatives of farmers' organizations in the irrigation scheme
 Technical guidance team Provincial officer, etc.
 Consultant
- 2. Materials**
 Survey Sheet Form 02-03-01-01.

Tools & Techniques

- 1. Collection & review of existing data & information**
 - Collection of secondary data on socio-economic conditions (family members, land holding size, land tenure status, family labor forces etc.) in the irrigation scheme (ex. data recorded by Mantri Tani Statistik, village survey results).
 - Review of the data collected for their validity.
- 2. Farmer interview survey (if necessary)**
 - Farmer interview survey carried out by the investigation team, in case no reliable information on crop budgets and farm budgets available.
 - Subject area/farmer: farmers in areas with sufficient irrigation water supply, areas with insufficient irrigation water supply and in rainfed paddy fields.
 - No. of sample: 25 samples selected randomly in each area classified into different water shortage category.
- 3. Estimation present socio-economic conditions**
 - Estimation of present socio-economic conditions in irrigated areas based on the results of the activities above.
 - Average figures should be applied for estimation.
- 4. Report preparation**
 Results of the investigation should be reported by applying the Survey Sheet Form 02-03-01-01. The Sheet should be signed by the representative of individual institutions participated in the joint investigation.

Outputs

- 1. Present socio-economic condition identified**
 Present socio-economic conditions as a basis for farm economic analysis.
- 2. Basic data for agriculture planning**
 Present socio-economic conditions as a basis for agriculture planning

Form 02-03-01-01 Survey Sheet for Agriculture Survey: Socio-economy

1. Land Holding

Holding Size	Sub-district		Sub-district		Sub-district		Sub-district		DI	
	No.	%	No.	%	No.	%	No.	%	No.	%
a. ≤ 0.10 ha										
b. $\geq 0.10 \sim < 0.25$										
c. $\geq 0.25 \sim < 0.50$										
d. $\geq 0.50 \sim < 1.00$										
e. $\geq 1.00 \sim < 1.50$										
f. $\geq 1.50 \sim < 2.50$										
g. ≥ 2.50										
Total		100		100		100		100		100

Data Source: _____

2. Land Tenure Ship

Classification	Sub-district		Sub-district		Sub-district		Sub-district		DI	
	No.	%	No.	%	No.	%	No.	%	No.	%
a. Owner										
b. Tenant farmer										
c. Owner cum tenant										
d. Landless (waged farmer)										
Total		100		100		100		100		100

Data Source: _____

3. Family Labor Forces

Population by Age Group	Sub-district		Sub-district		Sub-district		Sub-district		Overall	
	Population	Population	Population	Population	Population	Population	Population	Population	Population	Population
a. Age Group										
15 ~ 64										
≥ 65										
Estimated Labor Forces										
b. No. of Household/Sub-district										
c. Estimated Family Labor Forces/Household			-		-		-			

Note: Labor forces= population of age 15~64 x 1.0 + population age \geq x 0.5

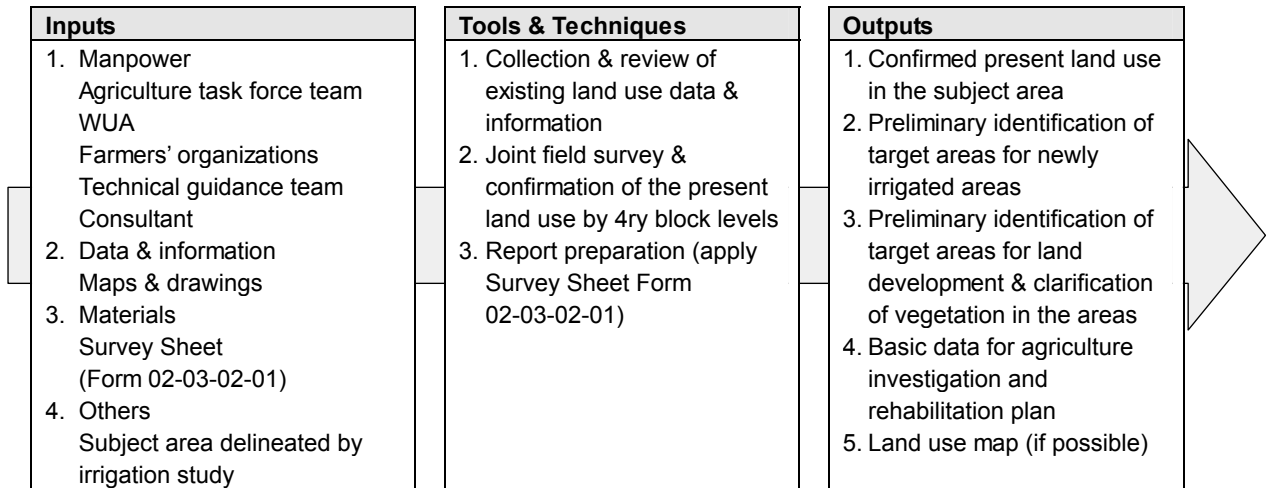
Data Source: _____

Instructions To Fill-in

- Socio-economic problems or constraints for irrigated agriculture in the target scheme to be indicated in the following box.
- Data sources to be specified.

Problems/Remarks

Stage 02 - Task 03 Step 02	Identification of the present land use of the subject area for rehabilitation
---------------------------------------	--



Criteria, standards and references

- A) Land use categories to be applied:
 i) Irrigated paddy field; ii) Rainfed paddy field, iii) Upland field, iv) Tree crops land, v) Fish pond, vi) Uncultivated land (vegetation to be clarified , vi) Uncultivable land (as per Survey Sheet Form 02-03-02-01)
- B) Classification of vegetation in uncultivated land: Apply criteria adopted in Land Development Guideline of MOSRI
- C) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development.*

Inputs

1. Manpower

- Agriculture task force team
- Representatives of WUA in the irrigation scheme
- Representatives of farmers' organizations in the irrigation scheme
- Technical guidance team Provincial officer, etc.
- Consultant

2. Data & information

- Maps & drawings of the irrigation scheme {scheme layout map, scheme diagram, tertiary design drawings, topographic maps (if any) & other relevant maps drawings}
- Tertiary block inventory list (showing block name, area, etc)

3. Materials

Survey Sheet Form 02-03-02-01.

4. Others

Subject area preliminary delineated through the irrigation study in Stage 02 - Task 02 - Step 02.
 (The subject area for the investigation to be predetermined in Stage 02 - Task 02 - Step 02 jointly by the stake holders.)

Tools & Techniques

1. Collection & review of existing land use data & information

- Existing land use data prepared by the agriculture agencies/PPLs/Mantri Tani, irrigation agencies & water users institutions (inventory or statistic data by irrigation scheme, tertiary block, quaternary block, village etc.).
- Other relevant information on the present land use (ex. existing survey & study report on the irrigation scheme etc.).
- Joint review of the available existing data & information collected in the above activities.

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

2. Joint field survey & confirmation of the present land use by quaternary block levels

- Joint field survey by the agriculture agencies/PPLs/Mantri Tani, irrigation agencies & water users institutions to identify the present land use in the subject area.
- Survey & confirmation of the present land use in the entire subject area by quaternary block level.

3. Report preparation

- Results of the field confirmation should be reported by applying the Survey Sheet; Form 02-03-02-01. The Sheet should be signed by the representative of individual institutions participated in the joint survey.
- Preparation of land use map (if base map available).

Outputs

1. Confirmed present land use in the subject area

Present land use of the subject area agreed by the stakeholders is determined and become a base figure for the related investigations and agriculture planning.

2. Identification of target areas for newly irrigated areas (rainfed paddy field)

Agreed target areas for newly irrigated areas from rainfed field are preliminary identified for further investigation (water resources & irrigation study).

3. Identification of target areas for land development & clarification of vegetation in the areas

Agreed target areas for land development are preliminary identified for further investigation (soil & land suitability & irrigation/land development study).

4. Basic data for agriculture investigation and rehabilitation plan

Present land use as a basic data for agriculture investigation and rehabilitation plan is determined.

Form 02-03-02-01 Survey Sheet for Agriculture Survey: Present Land Use

Irrigation Scheme: _____

Present Land Use in the Subject Area (Irrigable areas both in potential & non-potential areas)

Land Use Category		Area (ha)	Major Crops Cultivated/Vegetation
Paddy Field	Irrigated		-
	Rainfed		-
	Sub-total		-
Non-paddy Field	Upland Field		
	Tree Crops Land		Major Crop:
			Major Crop:
			Major Crop:
	Sub-total		
	Uncultivated Land		Vegetation:
			Vegetation:
			Vegetation:
		Vegetation:	
Sub-total			
Sub-total		-	
Fish Pond			
Total			-

Data Source: _____

Agreed & Confirmed by

_____	_____	_____
Agriculture Services Office	Irrigation Services Office	Water Users Institution
Name:	Name:	Name:
Position:	Position:	Position:
Date:	Date:	Date:

Instructions To Fill-in

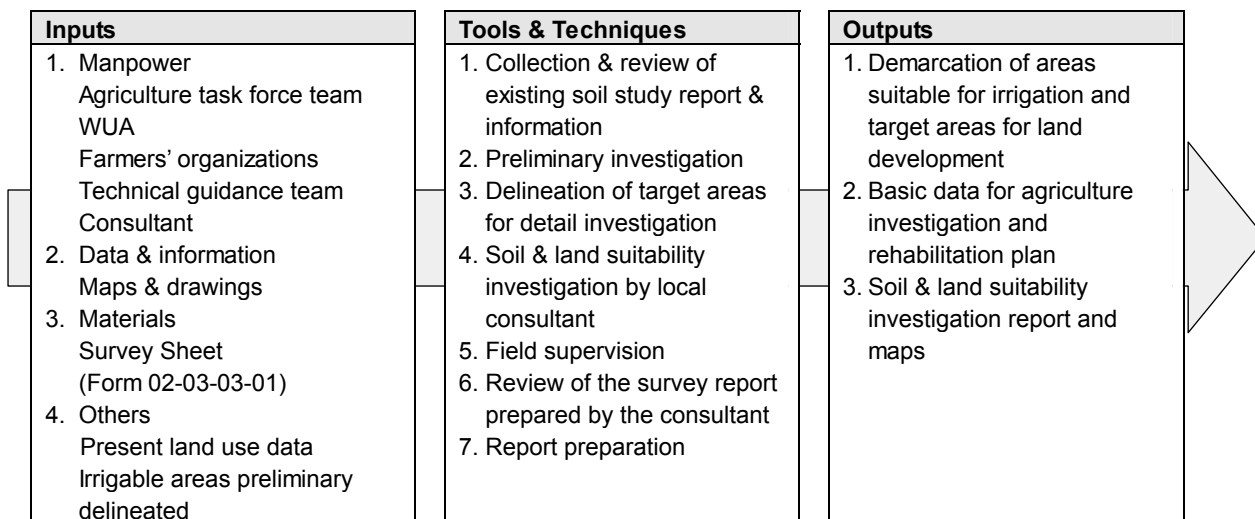
- Present land use of irrigable area defined by the irrigation study for rehabilitation plan (irrigable areas both in the current potential area for irrigation and non-potential area for irrigation)
- Specify major tree crops planted and planted areas in tree crops land.
- Indicate areas by type of vegetations in uncultivated land
- Land use problems or constraints in the DI to be indicated in the following box.
- Data sources to be shown.

Problems/Remarks

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Stage 02 - Task 03 Step 03	Soil & land suitability investigation (irrigation scheme with non-paddy fields for development)
---------------------------------------	--



Criteria, standards and references

- A) Soil & land suitability investigation by local consultant
Guidelines prepared by Pusat Penelitian Tanah dan Agroklimat, Bogor or BPTP, province.
- B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

- 1. Manpower**
Agriculture task force team
Representatives of WUA in the irrigation scheme
Representatives of farmers' organizations in the irrigation scheme
Technical guidance team Provincial officer, Soil expert from BPTP, etc.
Consultant
- 2. Data & information**
Maps & drawings of the irrigation scheme {scheme layout map, scheme diagram, tertiary design drawings, topographic maps (if any) & other relevant maps drawings}.
- 3. Materials**
Survey Sheet Form 02-03-03-01.
- 4. Others**
 - Present land use data obtained in Stage 02 - Task 03 - Step 02.
 - Irrigable areas preliminary delineated through the irrigation study (in Stage 02 - Task 02 - Step 02).

Tools & Techniques

- 1. Collection & review of existing data & information**
 - Existing soil study report & information.
 - Other relevant information on soil & land suitability.
 - Joint review of the available existing data & information collected in the above activities.
- 2. Preliminary investigation**
 - Demarcation of the target areas for the preliminary investigation: preliminary demarcated target areas for land development in Stage 02 - Task 03 - Step 02 (Identification of the present land use).
 - Preliminary investigation by the investigation team.

- 3. Delineation of target areas for detail investigation**
 - Confirmation of irrigable areas (areas can be irrigated under the irrigation plan).
 - Delineation of areas distributed with problem soils for the detail investigation.
 - Problem soils: stony soil, sandy soil, peat soil, acid sulphate soil, acid podzolic soil.
 - Delineation of target areas distributed with problem soils for detail investigation
- 4. Soil & land suitability investigation by local consultant (if required)**

Preparation of technical specification for the detail investigation by a local consultant.
- 5. Field supervision**

Field supervision of performances of the local consultant
- 6. Review of the survey report prepared by the consultant**

Review of the Survey Report by the Investigation Team (especially by BPTP soil expert).
- 7. Report preparation**
 - Delineation of target areas for land development based on the land suitability for irrigation.
 - Report preparation by applying the Survey Sheet (Form 02-03-03-01).

Outputs

- 1. Demarcation of areas suitable for irrigation and target areas for land development**

Demarcation of areas suitable for irrigation and target areas for land development based on the land suitability for irrigation.
- 2. Basic data for agriculture investigation and rehabilitation plan**

Soil and land suitability information for land development works and agriculture planning.
- 3. Soil & land suitability investigation report and maps**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Form 02-03-03-01 Survey Sheet for Agriculture Survey: Soil & Land Suitability (Irrigation Scheme with non-paddy field)

Irrigation Scheme: _____

Land suitability classification for irrigation of non-paddy fields in the irrigable areas in the DI

Land Use Category	Unit	Land Suitability Classes for Irrigated Paddy / Palawija					
		S1	S2	S3	Class S Sub-total	NS	Total
Upland Field	Area (ha) (%)						
Tree Crops Land							
Major Crop:	Area (ha) (%)						
Major Crop:	Area (ha) (%)						
Major Crop:	Area (ha) (%)						
Sub-total	Area (ha) (%)						
Uncultivated Land							
Vegetation:	Area (ha) (%)						
Vegetation:	Area (ha) (%)						
Vegetation:	Area (ha) (%)						
Sub-total	Area (ha) (%)						
Total	Area (ha) (%)						

Data Source: _____

Agreed & Confirmed by

Agriculture Services Office

Name:

Position:

Date:

Irrigation Services Office

Name:

Position:

Date:

Water Users Institution

Name:

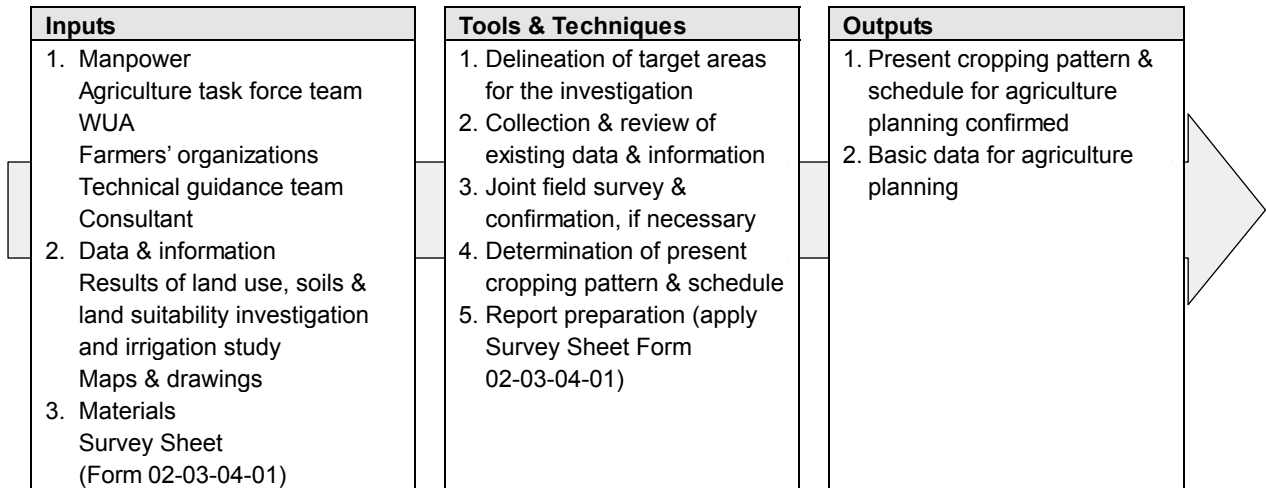
Position:

Date:

Instructions To Fill-in

- Land suitability assessment for irrigation: target area is non-paddy fields in irrigable areas defined by the irrigation study for rehabilitation plan.
- Assessment to be made separately for irrigated paddy and palawija.
- Results of preliminary investigation by the investigation team and the detail investigation by Consultant to be presented by applying this Form.

Stage 02 - Task 03 Step 04	Investigation on the present cropping pattern & schedule
---------------------------------------	---



Criteria, standards and references
<p>A) Survey Sheet Form 02-03-04-01</p> <p>B) Ministry of Public Works/JICA. 1999. <i>Guidelines for Feasibility Study of Irrigation Development</i>.</p>

Inputs

1. Manpower

- Agriculture task force team
- Representatives of WUA in the irrigation scheme
- Representatives of farmers' organizations in the irrigation scheme
- Technical guidance team Provincial officer, etc.
- Consultant

2. Data & information

- Present land use confirmed in Step 02.
- Areas demarcated as suitable for irrigation and target areas for land development (Step 03)
- Planned irrigation area preliminary delineated in Stage 02 - Task 02 - Step 02.
- Maps & drawings of the irrigation scheme {scheme layout map, scheme diagram, tertiary design drawings, topographic maps (if any) & other relevant maps drawings}.

3. Materials

- Survey sheet Form 02-03-04-01.

Tools & Techniques

1. Delineation of target areas for the investigation

Delineation of target areas for the investigation on cropping pattern and schedule based on the results of Stage 02 - Task 03 - Step 02 & 03 and Stage 02 - Task 02 - Step 02 (present land use, soil & land suitability and irrigation area).

2. Collection & review of existing data & information

- Existing monitoring data for the latest 5 years on prevailing cropping pattern and cropping schedule in the irrigation scheme prepared by the irrigation agencies ,agriculture agencies/PPLs/Mantri Tani & water users institutions (inventory or statistic data by irrigation scheme, tertiary block, quaternary block, village etc.).
- Other relevant information on the subject.
- Joint review of the available existing data & information collected in the above activities.

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

3. Joint field survey & confirmation (if necessary)

Joint field survey and confirmation by the guidance team to investigate contradiction and uncertainty of the data collected.

4. Determination of present cropping pattern & schedule

- Determination of the present cropping patterns & schedules representing irrigation scheme by the guidance team (under the normal climatic and water resources conditions).
- The present cropping patterns & schedules thus determined to be applied as basis for agriculture planning.

5. Report preparation

Results of the investigation should be reported by applying the Survey Sheet Form 02-03-04-01. The Sheet should be signed by the representative of individual institutions participated in the joint investigation.

Outputs

1. Present cropping pattern & schedule for agriculture planning confirmed

Present cropping pattern & schedule are estimated and confirmed.

2. Basic data for agriculture planning

Present cropping pattern & schedule as a basis for agriculture and irrigation planning are determined.

Form 02-03-04-01 Survey Sheet for Agriculture Survey: Present Cropping Pattern & Schedule

Irrigation Scheme: _____

1. Irrigated Paddy Field													
Crop/Season	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Major Crops
Paddy													
- Wet Season													
- Dry Season I													
- Dry Season II													
Palawija/Others													
- Wet Season													
- Dry Season I													
- Dry Season II													
- ()													

2. Rainfed Paddy Field													
Crop/Season	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Major Crops
Paddy													
- Wet Season													
Palawija/Others													
- Dry Season													

3. Upland Field: Palawija & Others													
Crop/Season	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Major Crops
- Wet Season													
- Dry Season													

Data Source: _____

Agreed & Confirmed by		
_____	_____	_____
Agriculture Services Office	Irrigation Services Office	Water Users Institution
Name:	Name:	Name:
Position:	Position:	Position:
Date:	Date:	Date:

Instructions To Fill-in

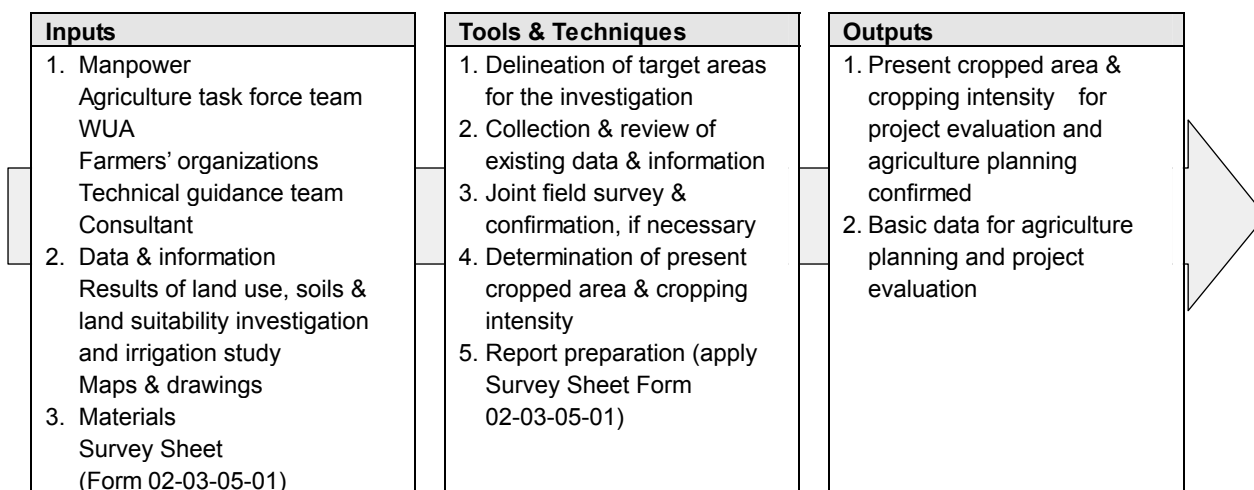
- Indicate prevailing cropping schedule in normal years in the target irrigation scheme
- Specify paddy variety and name of major palawija & other crops
- Paddy/vegetables --- from transplanting to harvest; palawija --- from sowing to harvest

Problems/Remarks (Problems or constraints on cropping pattern & schedule in the DI to be indicated)

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Stage 02 - Task 03 Step 05	Investigation on the present cropped area and intensity
---------------------------------------	--



Criteria, standards and references

- A) Survey Sheet Form 02-03-05-01
 B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

1. Manpower

- Agriculture task force team
- Representatives of WUA in the irrigation scheme
- Representatives of farmers' organizations in the irrigation scheme
- Technical guidance team Provincial officer, etc.
- Consultant

2. Data & information

- Present land use confirmed in Step 02.
- Areas demarcated as suitable for irrigation and target areas for land development (Step 03)
- Planned irrigation area preliminary delineated in Stage 02 - Task 02 - Step 02.
- Maps & drawings of the irrigation scheme {scheme layout map, scheme diagram, tertiary design drawings, topographic maps (if any) & other relevant maps drawings}.

3. Materials

- Survey sheet Form 02-03-05-01.

Tools & Techniques

1. Delineation of target areas for the investigation

- As stated in Stage 02 - Task 03 - Step 05.

2. Collection & review of existing data & information

- Existing monitoring data for the latest 5 years on cropped area and cropping intensity in each cropping season schedule in irrigated area in the irrigation area prepared by the irrigation agencies, agriculture agencies/PPLs/Mantan & water users institutions (inventory or statistic data by irrigation scheme, tertiary block, quaternary block, village etc.).
- Similar data on non-irrigated area in the irrigation area prepared by the agriculture agencies/PPLs/Mantan & water users institutions (inventory or statistic data by irrigation area, tertiary block, quaternary block, village etc.).
- Other relevant information on the subject

- Joint review of the available existing data & information collected in the above activities.
- 3. Joint field survey & confirmation (if necessary)**
Joint field survey and confirmation by the guidance team to investigate contradiction and uncertainty of the data collected.
- 4. Determination of present cropped area & cropping intensity**
 - Determination of the present seasonal cropped area and cropping intensity in irrigated area in the irrigation area by the guidance team (under the normal climatic and water resources conditions).
 - Determination of the present figures can be made by averaging the past 5 years records if no abnormal seasons occurred in the past.
 - When abnormal seasons occurred in the past, data on such seasons to be excluded in average calculation.
 - When the destruction of irrigation main facilities occurred in 3 years ago, for example, and cropped area decreased since then, data before the destruction should not be included in average calculation.
 - Determination of the present seasonal cropped area and cropping intensity in non-irrigated area, similarly.
 - The present cropped area and cropping intensity thus determined become basic figures for project evaluation.
- 5. Report preparation**
 - Results of the investigation should be reported by applying the Survey Sheet Form 02-03-05-01. The Sheet should be signed by the representative of individual institutions participated in the joint investigation.

Outputs

- 1. Present cropping pattern & schedule for agriculture planning confirmed**
Present cropped area and cropping intensity are estimated and confirmed.
- 2. Basic data for agriculture planning**
Present cropped area and cropping intensity as a basis for agriculture planning and project evaluation are determined.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Form 02-03-05-01 Survey Sheet for Agriculture Survey: Present Cropped Area & Cropping Intensity - 1/2

1. Irrigated Paddy Field										
Crop Year	Irrigated Paddy Field (ha)	Crop	Cropped Area (ha) & Cropping Intensity (CI, %)							
			Wet Season		Dry Season I		Dry Season II		Annual	
			Area	CI	Area	CI	Area	CI	Area	CI
		Paddy								
		()								
		()								
		()								
		Total								
		Paddy								
		()								
		()								
		()								
		Total								
		Paddy								
		()								
		()								
		()								
		Total								
		Paddy								
		()								
		()								
		()								
		Total								
Average of 5 Years		Paddy								
		()								
		()								
		()								
		Total								
Present Conditions Assumed		Paddy								
		()								
		()								
		()								
		Total								

Data Source: _____

Form 02-03-05-01 Survey Sheet for Agriculture Survey: Present Cropped Area & Cropping Intensity - 2/2

2. Rainfed Paddy Field

Rainfed Paddy Field (ha)	Crop	Cropped Area (ha) & Cropping Intensity (CI, %)							
		Wet Season		Dry Season I		Dry Season II		Annual	
		Area	CP	Area	CP	Area	CP	Area	CP
	Paddy								
	()								
	()								
	()								
	Total								

Data Source: _____

3. Upland Field

Upland Field (ha)	Crop	Cropped Area (ha) & Cropping Intensity (CI, %)							
		Wet Season		Dry Season I		Dry Season II		Annual	
		Area	CI	Area	CI	Area	CI	Area	CI
	Paddy								
	()								
	()								
	Total								

Data Source: _____

Agreed & Confirmed by

Agriculture Services Office

Name:

Position:

Date:

Irrigation Services Office

Name:

Position:

Date:

Water Users Institution

Name:

Position:

Date:

Instructions To Fill-in

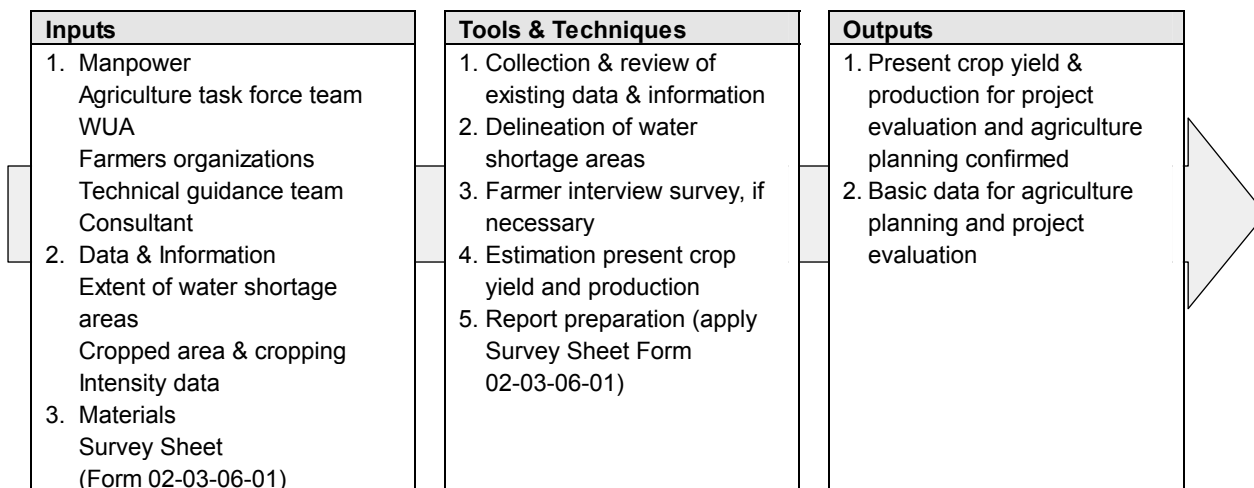
- Present conditions in irrigated field to be assumed based on the current conditions of irrigation system and based on currently irrigable areas in a normal year
- Data sources to be specified.
- Problems or constraints related with cropped area & cropping intensity in the DI to be indicated in the following box.

Problems/Remarks

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Stage 02 - Task 03 Step 06	Investigation on the present crop yield and production
---------------------------------------	---



Criteria, standards and references

- A) Survey Sheet Form 02-03-06-01
- B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

1. Manpower

- Agriculture task force team
- Representatives of WUA in the irrigation scheme
- Representatives of farmers organizations in the irrigation scheme
- Technical guidance team Provincial officer, etc.
- Consultant

2. Data & information

- Extent and location of water shortage areas in the irrigation scheme and degree of water shortage in each shortage area.
- Cropped area & cropping Intensity data obtained in Step 04

3. Materials

- Survey sheet Form 03-03-06-01.

Tools & Techniques

1. Collection & review of existing data & information

- Existing statistics or secondary data for the latest 5 years on prevailing or average crop yields in each cropping season in irrigated area in the irrigation area prepared by the agriculture agencies/PPLs/Mantan, irrigation agencies & water users institutions (crop cutting data by irrigation area, tertiary block, quaternary block, village etc.).
- Similar data on non-irrigated area in the irrigation area prepared by the agriculture agencies/PPLs/Mantan & water users institutions (crop cutting data by irrigation area, tertiary block, quaternary block, village etc.).
- Other relevant information on the subject such as yield differences due to irrigation water availability.
- Joint review of the available existing data & information collected in the above activities.

2. Delineation of water shortage areas

- Review of water shortage areas identified in Step 05 and cropping intensity data obtained in Step 05.
- Joint field survey and confirmation of water shortage areas and their degree of water shortage.
- Confirmation of water shortage areas by the Investigation Team.

3. Farmer interview survey (if necessary)

- Farmer interview survey carried out by the farmers water users institutions, in case no reliable information on crop yields are available.
- Subject area: area with sufficient irrigation water supply & with insufficient irrigation water supply.
- No. of sample: 25 to 50 samples selected randomly in each area classified into different water shortage category.
- Similar farmer interview survey in rainfed paddy fields if the area account for more than 30% of the subject area for rehabilitation and is larger than 1,000 ha.

4. Estimation present crop yield and production

- Estimation of present crop yield and production in irrigated areas based on the results of the activities mentioned above.
- Weighted average yield should be applied for estimation of the present yield levels in the irrigation area
- Estimation of present crop production based on crop yields and cropped area estimated through Step 05.

5. Report preparation

Results of the investigation should be reported by applying the Survey Sheet Form 02-03-06-01. The Sheet should be signed by the representative of individual institutions participated in the joint investigation.

Outputs

1. Present crop yield & production for project evaluation and agriculture

Present crop yield and production are estimated and confirmed.

2. Basic data for agriculture planning

Present crop yield and production as a basis for agriculture planning and project evaluation are determined.

Form 02-03-06-01 Survey Sheet for Agriculture Survey: Present Crop Yield & Production - 1/2

1. Irrigated Paddy Field				
Cropping Season	Crop	Cropped Area (ha)	Yield (t/ha)	Production (t)
Wet Season	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Sub-total			
Dry Season I	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Sub-total			
Dry Season II	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Sub-total			
Annual	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Total			
Data Source: _____				

2. Rainfed Paddy Field				
Cropping Season	Crop	Cropped Area (ha)	Yield (t/ha)	Production (t)
Wet Season	Paddy			
	Palawija ()			
	Palawija ()			
	Sub-total			
Dry Season	Palawija ()			
	Palawija ()			
	Sub-total			
Annual	Paddy			
	Palawija ()			
	Palawija ()			
	Total			
Data Source: _____				

Form 02-03-06-01 Survey Sheet for Agriculture Survey: Present Crop Yield & Production - 2/2

3. Upland Field

Cropping Season	Crop	Cropped Area (ha)	Yield (t/ha)	Production (t)
Wet Season	Palawija ()			
	Palawija ()			
	Sub-total			
Dry Season	Palawija ()			
	Palawija ()			
	Sub-total			
Annual	Palawija ()			
	Palawija ()			
	Sub-total			

Data Source: _____

Agreed & Confirmed by

_____	_____	_____
Agriculture Services Office	Irrigation Services Office	Water Users Institution
Name:	Name:	Name:
Position:	Position:	Position:
Date:	Date:	Date:

Instructions To Fill-in

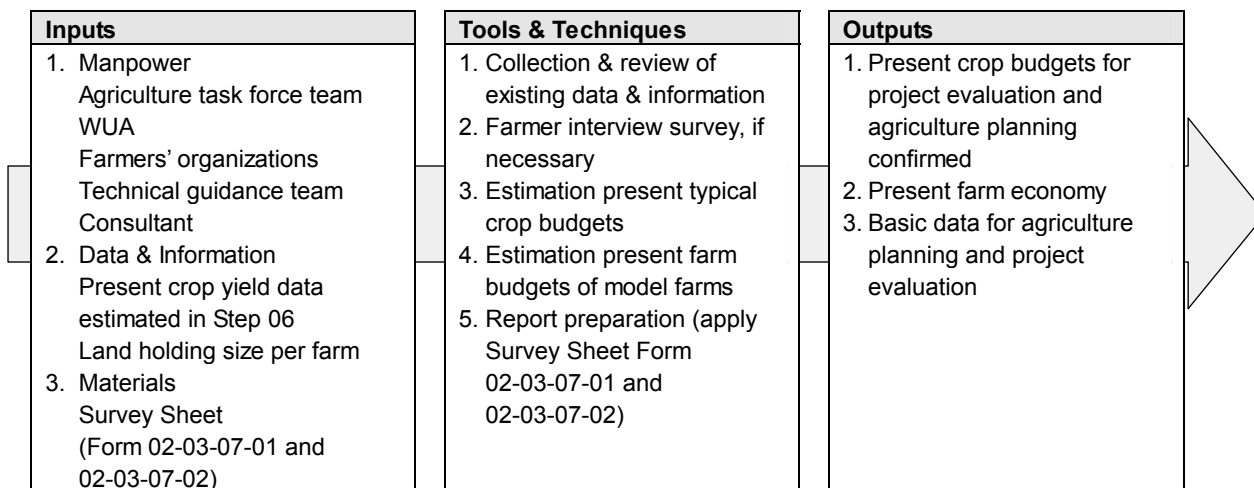
- Cropped areas to be consistent with the areas indicated in Sheet 03-03-05-01
- Cropped area in irrigated paddy field to be consistent with the present conditions assumed in Sheet 03-03-05-01
- Yields should be average yields estimated in the target scheme.
- Paddy yield & production should be in GKG (gabah kering giling).
- Data sources to be specified.
- Problems or constraints related with cropped yield & production and post-harvest & marketing in the DI to be indicated in the following box.

Problems/Remarks

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Stage 02 - Task 03 Step 07	Investigation on the present crop budget and farm budget
---------------------------------------	---



Criteria, standards and references

- A) Survey Sheet Form 02-03-07-01 and 02-03-07-02
- B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

- 1. Manpower**
Agriculture task force team
Representatives of WUA in the irrigation scheme
Representatives of farmers' organizations in the irrigation scheme
Technical guidance team
Consultant
- 2. Data & information**
 - Present prevailing crop yields estimated in Step 03.
 - Land holding size per farm household (socio-economic data obtained in Step 01)
- 3. Materials**
Survey sheet Form 02-03-07-01 and 02-03-07-02.

Tools & Techniques

- 1. Collection & review of existing data & information**
 - Collection of secondary data on crop budgets and farm budgets in and around the irrigation area (ex. data recorded by Mantri Tani Statistik & PPLs, village survey results).
 - Review of the data collected for their validity
- 2. Farmer interview survey (if necessary)**
 - Farmer interview survey carried out by the Investigation Team, in case no reliable information on crop budgets and farm budgets are available.
 - Subject area/farmer: farmers in areas with sufficient irrigation water supply, areas with insufficient irrigation water supply and in rainfed paddy fields
 - No. of sample: 25 samples selected randomly in each area classified into different water shortage category.
- 3. Estimation present typical crop budgets**
 - Estimation of present crop budgets in irrigated areas based on the results of the activities mentioned above.
 - Average figures should be applied for estimation.

4. Estimation present typical farm budgets

Determination on model farms/typical farms in the irrigation area for farm budget analysis based on the information on land holding size and land tenure status.

Estimation of present farm budgets of the model farms based on the results of the farmer interview survey and typical crop budgets.

5. Report preparation

Results of the investigation should be reported by applying the Survey Sheet; Form 02-03-07-01. The Sheet should be signed by the representative of individual institutions participated in the joint investigation.

Outputs

1. Present crop budgets for project evaluation and agriculture planning confirmed

Present crop budgets and model farm budgets as a basis for project evaluation and agriculture planning are estimated and confirmed.

2. Basic data for agriculture planning

Present crop budgets and model farm budgets as a basis for project evaluation and agriculture planning are determined.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Form 02-03-07-01 Survey Sheet for Agriculture Survey: Present Crop Budget - 1/2

1. Crop Budget per Ha: Irrigated Paddy									
Items	Unit	Unit Price (Rp000)	Irrigated Paddy						
			Wet Season		Dry Season I		Dry Season II		
			Q'ty	Value	Q'ty	Value	Q'ty	Value	
1. Gross Return									
Unit Yield	(t/ha)								
Unit Price	(Rp.000/t)								
Gross Return	(Rp.000)								
2. Production cost									
2-1. Farm Inputs									
Seed	(kg/ha)								
Fertilizers									
- Urea	(kg/ha)								
- SP36	(kg/ha)								
- KCl	(kg/ha)								
- ZA	(kg/ha)								
-									
-									
Agro chemicals									
- Insecticide (liquid)	(lit/ha)								
- Insecticide (powder)	(kg/ha)								
- Rodenticide	(kg/ha)								
- Herbicide	(kg/ha)								
-									
-									
2-2. Labor Requirement									
Hired Labor	(man-day)								
Family Labor	(man-day)								
Total	(man-day)								
2-3. Contracted Works (labor)									
- Planting/Transplanting	(Rp/ha)								
- Harvesting	(Rp/ha)								
2-4. Land Preparation									
By Machinery	(Rp/ha)								
By Draft Animal	(Rp/ha)								
2-5. Field Transportation	(Rp/ha)								
2-6. Other Expenses	(Rp/ha)								
3. Net Return per Ha	Rp.000								

Data Source: _____

Instructions To Fill-in

a. Crop budgets on the average yields estimated in Sheet 03-03-06-01

b. If no reliable data available, farmer interview survey should be carried out as stated in Stage 03-Task 03-Step 01.

c. Average or prevailing crop budgets in the target scheme should be indicated.

Form 02-03-07-01 Survey Sheet for Agriculture Survey: Present Crop Budget - 2/2

2. Crop Budget per Ha: Rainfed Paddy, Palawija & Other Crops								
Items	Unit	Unit Price (Rp000)	Rainfed Paddy		Palawija			
			Q'ty	Value	Q'ty	Value	Q'ty	Value
1. Gross Return								
Unit Yield	(t/ha)							
Unit Price	(Rp.000/t)							
Gross Return	(Rp.000)							
2. Production cost								
2-1. Farm Inputs								
Seed	(kg/ha)							
Fertilizers								
- Urea	(kg/ha)							
- SP36	(kg/ha)							
- KCl	(kg/ha)							
- ZA	(kg/ha)							
-								
Agro chemicals								
- Insecticide (liquid)	(lit/ha)							
- Insecticide (powder)	(kg/ha)							
- Rodenticide	(kg/ha)							
- Herbicide	(kg/ha)							
-								
2-2. Labor Requirement								
Hired Labor	(man-day)							
Family Labor	(man-day)							
Total	(man-day)							
2-3. Contracted Works								
- Planting/Transplanting	(Rp/ha)							
- Harvesting (labor)	(Rp/ha)							
2-4. Land Preparation								
By Machinery	(Rp/ha)							
By Draft Animal	(Rp/ha)							
2-5. Field Transportation	(Rp/ha)							
2-6. Other Expenses	(Rp/ha)							
3. Net Return per Ha	Rp.000							

Data Source: _____

Agreed & Confirmed by		
_____	_____	_____
Agriculture Services Office	Irrigation Services Office	Water Users Institution
Name:	Name:	Name:
Position:	Position:	Position:
Date:	Date:	Date:

Problems/Remarks

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Form 02-03-07-02 Survey Sheet for Agriculture Survey: Present Farm Budget - 1/3

1. Farm Budget: Model/Typical Farm Household in Irrigated Areas

(1) Land Holding

	In DI	Outside of DI
Irrigated Paddy Field	_____ ha	_____ ha
Rainfed Paddy Field	_____ ha	_____ ha
Upland Field	_____ ha	_____ ha
Tree Crops Planted Area	_____ ha	_____ ha
Total	_____ ha	_____ ha

(2) Farm Income

a. From Farm Land in DI

Items	Irrigated Paddy		Palawija ()	Palawija ()	Other Crops ()
	Wet	Dry			
Cropped Area (ha)					
Yield (t/ha)					
Production (t)					
Unit Price (Rp.000)					
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

b. From Farm Land Outside of DI

Items	Commodity				Total
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

c. Livestock Income

Items	Livestock				Total
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

d. Total Net Farm Income (Rp.000; a + b + c) _____

(3) Non-farm Income

Monthly Income (Rp.000) _____ Annual Income (Rp.000) _____

(4) Family Annual Income { d + (3) } = _____

(5) Family Annual Expenditures

Items	Foods	()	()	()
Monthly Expenditures (Rp.000)				
Annual Expenditures (Rp.000)				
Total Annual Expenditures (Rp.000)				

(6) Net Reserve {Rp.000; (4) - (5)} = _____

Data Source: _____

Form 02-03-07-02 Survey Sheet for Agriculture Survey: Present Farm Budget - 2/3

2. Farm Budget: Model/Typical Farm Household in Rainfed Paddy Areas

(1) Land Holding

	In DI	Outside of DI
Rainfed Paddy Field	_____ ha	_____ ha
Upland Field	_____ ha	_____ ha
Tree Crops Planted Area	_____ ha	_____ ha
Total	_____ ha	_____ ha

(2) Farm Income

a. From Farm Land in DI

Items	Paddy	Palawija	Palawija	Palawija	Other Crops
	()	()	()	()	()
Cropped Area (ha)					
Yield (t/ha)					
Production (t)					
Unit Price (Rp.000)					
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

b. From Farm Land Outside of DI

Items	Commodity				Total
	()	()	()	()	
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

c. Livestock Income

Items	Livestock				Total
	()	()	()	()	
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

d. Total Net Farm Income (Rp.000; a + b + c) _____

(3) Non-farm Income

Monthly Income (Rp.000) _____ Annual Income (Rp.000) _____

(4) Family Annual Income { d + (3) } = _____

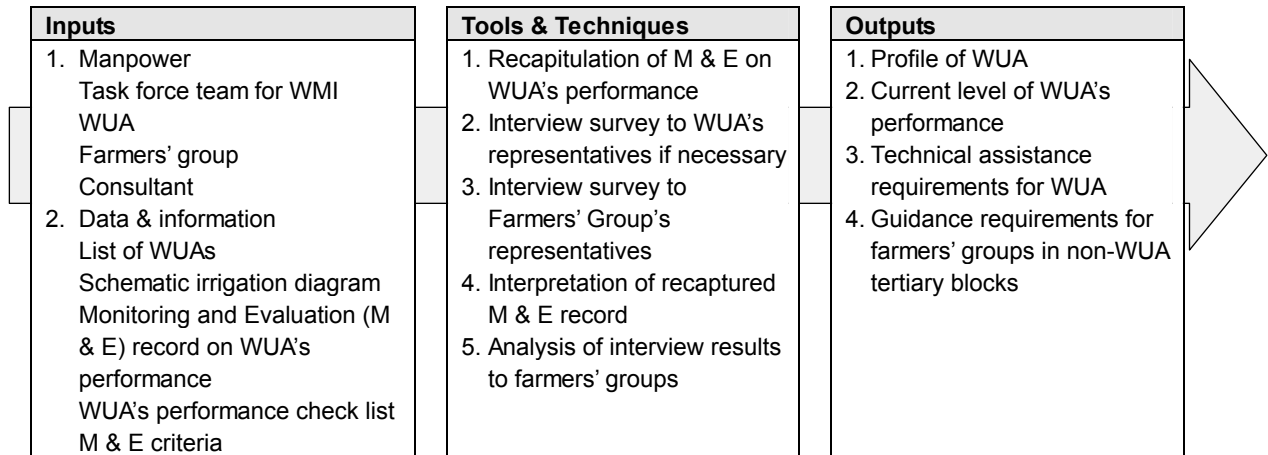
(5) Family Annual Expenditures

Items	Foods	()	()	()
Monthly Expenditures (Rp.000)				
Annual Expenditures (Rp.000)				
Total Annual Expenditures (Rp.000)				

(6) Net Reserve {Rp.000; (4) - (5)} = _____

Data Source: _____

Stage 02 - Task 03 Step 08	Confirmation of current performance level of WUA
---------------------------------------	---



Criteria, standards and references

A) Weighted score shown in Table 02-03-08-02

Inputs

1. Manpower

Task force team for WMI
WUA (Chairman/Technical Director of all WUA in the irrigation scheme)
Farmers' groups (Chairman of all Farmers' Groups receiving irrigation water to their non-WUA tertiary blocks of the irrigation scheme)
Consultant

2. Data & information

List of WUAs
Schematic irrigation diagram
Monitoring and Evaluation (M & E) record on WUA's performance
(*Laporan Monitoring & Evaluasi Kinerja Daerah Irigasi*)
WUA's performance check list (attached Form 02-03-08-01)
M & E criteria (attached Table 02-03-08-02).

Tools & Techniques

1. Recapitulation of M & E on WUA's performance

Recapture WUA's performance by referring to the latest M & E record collected from district/municipal irrigation (water resources) office and fill up the Recapitulation Form (attached Form 02-03-08-03).

2. Interview survey to WUA's representatives if necessary

In case that the latest M & E record was made by district/municipal irrigation (water resources) office more than three years ago, interview survey to representatives of all WUAs in the irrigation scheme shall be made by using the WUA's performance checking list (attached Form 02-03-08-01). By applying M & E criteria (attached Table 02-03-08-02) to interview results, the latest M & E record shall be updated. The Recapitulation Form (attached Form 02-03-08-03) shall be filled up with updated data.

3. Interview survey to farmers' group's representatives

In case that any tertiary blocks without WUA remain in the irrigation scheme, interview survey to representatives of farmers' group shall be made by using Survey Sheet (attached Form 02-03-08-04) aiming at clarification of reasons why farmers have not established WUA. Interview results shall be arranged by

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

using Data Arrangement Form (attached Form 02-03-08-05) for data analysis.

4. Interpretation of recaptured M & E record

Interpret recaptured M & E record aiming at Identification of technical assistance needs for improving WUA's capacity, capability and/or activities by focusing on low scored items of M & E record.

5. Analysis of interview results to farmers' groups

Analyze interview results to farmers' groups and Identify needs for guidance to accelerate WUA establishment in non-WUA tertiary blocks to which irrigation water can be technically distributed,

Outputs

1. Profile of WUA

Name, location (village, sub-district and district), representatives' (chairman and technical director) names of WUA, total area and irrigated area, name of tertiary block, name of irrigation service office/branch in charge of operation and maintenance of the irrigation system, legal status (number and date of decree by Head of District/Municipality, number and date of amendment by Head of Sub-district)

2. Current level of WUA's performance

Current WUA's performance shall be classified into the following three categories based on the monitoring and evaluation (M & E) criteria. Definition of the classification is shown below.

Category	Performance level	Total score
B	Developed	more than 14
SB	Under developing	between 8 and 14
BB	Not yet developed	less than 8

3. Technical assistance requirements for WUA

Technical assistance requirements for improving WUA's capacity to manage organization, capability to conduct operation and maintenance of tertiary irrigation system, and/or activities to collect and expense WUA member's fee.

4. Guidance requirements for farmers' groups in non-WUA tertiary blocks

Guidance requirements for encouraging farmers' groups to establish WUA aiming at participation in irrigation management activities

Form 02-03-08-01 Survey Sheet for WUA
General Information of Water Users' Association

Irrigation Scheme :

District :

Province :

No. :

Name of Water Users' Association :

Date of Establishment : day / month / year

Address : Village :

Sub-District :

Legitimate Status :

Regent's Approval No. :

Date : day / month / year

Local Court Registered No. :

Date : day / month / year

Features of Area :

Tertiary Block No. :

Tertiary Block Name :

Tertiary Canal Length : m

Registered Working Area : ha

Village Located : 1;

2;

3;

Total Number of Member Farmers : farm household

Registered Bank : Name :

Account Holder :

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Table 02-03-08-02 Weighted Score for Evaluation of WUA Turnover Progress

Item	Allocated Score
1 Organization	1.5
1.1 Completion of WUA board of directors	0.4
1.2 Completion of AD/ART(Articles of Association) and their perception	0.2
1.3 Presence of members in WUA annual meeting	0.4
1.4 Meeting frequencies of WUA board of directors	0.5
2 Water allocation and utilization	3.0
2.1 Cropping plan, cropping pattern and its realization	(0.25+0.75)
2.2 Water allocation plan and its realization	(0.25+0.75)
2.3 Regular meetings between technical irrigation officer, local Mantri Pengairan, and Ulu-ulu of WUA with farmers	1.0
3 Irrigation maintenance	3.0
3.1 Irrigation maintenance program	1.0
3.2 Implementation of irrigation maintenance program	1.0
3.3 Irrigation rehabilitation and development plan and its implementation	(0.25+0.75)
4 Financing	2.5
4.1 Collection of members' contribution	1.0
4.2 Expenses and its administration	(0.75+0.25)
4.3 Financial report to WUA general assembly	0.5
5 Physical irrigation condition	6.0
5.1 Structures	3.0
5.2 Canals	2.0
5.3 Supporting facilities	1.0
6 Government program on WUA promotion and development	4.0
6.1 Technical promotion and development	2.0
6.2 Need for technical assistance and its realization	1.0
6.3 Need for physical assistance and its realization	1.0
TOTAL	20.0

Form 02-03-08-03 Survey Sheet for WUA; Recapitulation of Monitoring and Evaluation Record on WUA's Performance

Province : District :
 Name of Irrigation Scheme :
 Registered Area of Irrigation Schem ha

No.	Name of WUA	Working Area of WUA (ha)	Number of WUA Member (person)	Name of Desa	Sub-district	District WRS Branch Office	Performance Evaluation Factors Group																				WUA Dev't Status						
							Organization					Water Allocation and Utilization				Irrigation Maintenance				Financing				Physical Condition of Irrigation				Government Program on WUA				Grand Total	
							1.1	1.2	1.3	1.4	Total	2.1	2.2	2.3	Total	3.1	3.2	3.3	Total	4.1	4.2	4.3	Total	5.1	5.2	5.3		Total	6.1	6.2	6.3	Total	Score
							Score					Score				Score				Score				Score				Score					
0.4	0.2	0.4	0.5	1.5	0.25+0.75	0.25+0.75	1.0	3.0	1.0	1.0	0.25+0.75	3.0	1.0	0.25+0.75	0.5	2.5	3.0	2.0	1.0	6.0	2.0	1.0	1.0	4.0	20.0								
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Remarks : 1.1; Completion of WUA board of directors
 1.2; Completion of Articles of Association and those perception
 1.3; Presence of members in WUA annual meeting
 1.4; Meeting frequencies of WUA board of directors
 4.1; Collection of members' contribution
 4.2; Expenses and its administration
 4.3; Financial report to WUA general assembly

2.1; Cropping plan, cropping pattern and its realization
 2.2; Water allocation plan and its realization
 2.3; Regular meetings between technical irrigation officer, local Mantri Pengairan, and Ulu-ulu of WUA with farmers
 5.1; Main structures
 5.2; Canals
 5.3; Related facilities

3.1; Irrigation maintenance program
 3.2; Implementation of irrigation maintenance program
 3.3; Irrigation rehabilitation and development plan and its implementation
 6.1; Technical promotion and development
 6.2; Need for technical assistance and its realization
 6.3; Need for physical assistance and its realization

Stage 02. Pre-F/S Level Field Investigation

1. Pre-feasibility Study for Prioritization of Irrigation Schemes

**Form 02-03-08-04 Survey Sheet for WUA
Questionnaire to Farmers
in Tertiary Irrigation Block without Water Users' Association**

1. Has establishment of Water Users' Association (WUA) been already promoted?

- Already promoted (go to Question No. 2)
- Not yet promoted (go to Question No. 3)

2. Promotion has already done

2.1 Are you interesting in participation to WUA?

- Yes
- No

2.2 What is your reason/opinion about slow progress of WUA establishment?

.....
.....

2.3 Do you have any idea/proposal in order to make WUA establishment promotion more effective?

.....
.....

2.4 Do you know duty/task of Board of Directors of WUA?

- Yes No

The reason if your answer is No.
.....

2.5 If WUA is established, what do you expect from WUA activities?

.....
.....

2.6 What is the reason that you have not joined with WUA?

.....
.....

2.7 If services can be expected, do you want to become a member of Board of Director or WUA staff?

() Yes ()

The reason if your answer is No.
.....

3. Promotion has not yet done.

3.1 How do you think about why WUA establishment has not been promoted?

.....
.....

3.2 Do you think about whether WUA establishment is needed or not?

() Yes (go to Question No. 3.3)

() No

The reason if your answer is No.
.....

.3.3 Do you think whether or not anybody is available to act as initiator for WUA establishment?

() Yes, I want to do

() Yes

() No

3.3 If WUA is established, do you become a member of WUA?

() Yes

() No

The reason if your answer is No.
.....

Form 02-03-08-05 Survey Sheet for WUA; Data Arrangement Sheet for Form D (2/2)

Name
Tertiary Block
Village
Sub-District

Item No.	Information
Q 2.2	
Q 2.3	
Q 2.4	
Q 2.5	
Q 2.6	
Q 2.7	
Q 3.1	
Q 3.2	
Q 3.4	

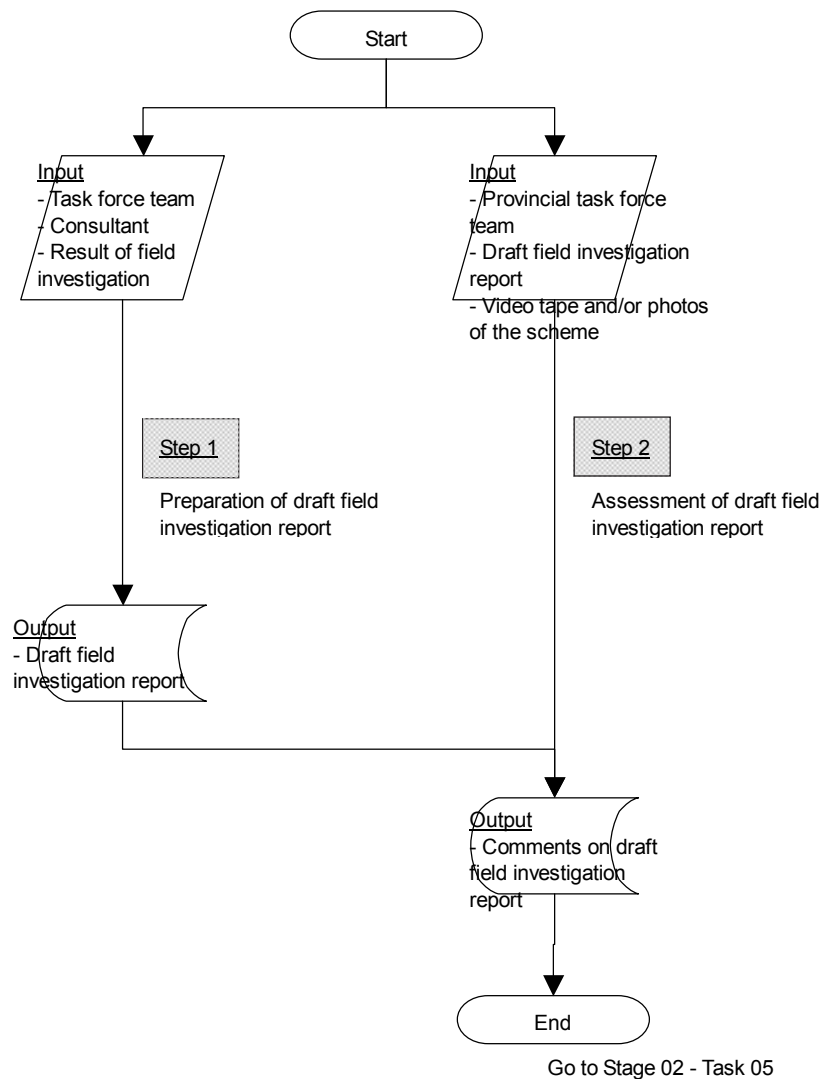
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

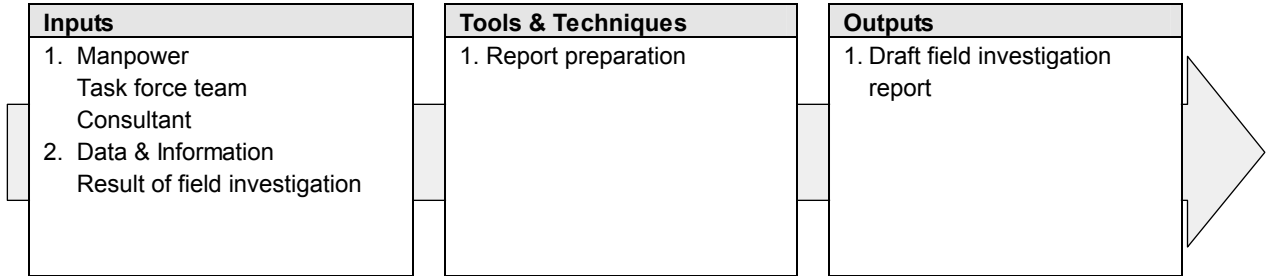
Stage 02	Pre-F/S Level Field Investigation of Each Scheme
Task 04	Preparation and Assessment of Draft Field Investigation Report
Purpose and scope	
The task is carried out to adjust and unify criteria of evaluation which may be different from scheme by scheme at provincial level.	

Flow of the Stage 02 - Task 04

Detail descriptions of required work for the respective steps are given in following pages.



Stage 02 - Task 04 Step 01	Preparation of draft field investigation report
---------------------------------------	--



Criteria, standards and references
A) Technical specification of consulting service

Inputs

- 1. Manpower**
 - Task force team
 - Consultant
- 2. Data & Information**
 - Result of field investigation

Tools & Techniques

- 1. Report preparation**

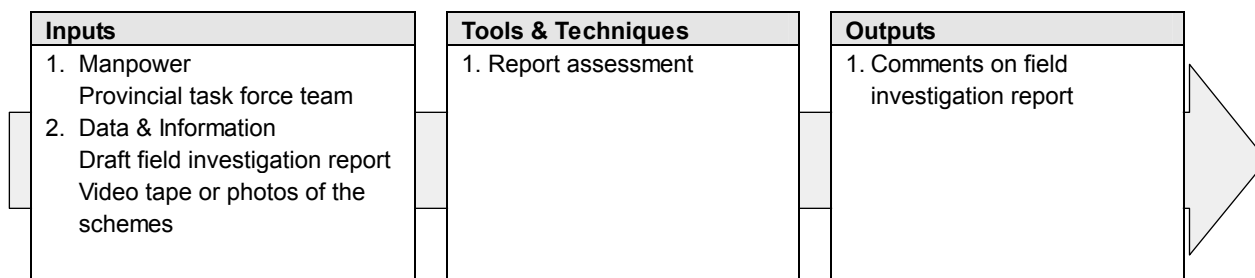
Outputs

- 1. Draft field investigation report**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Stage 02 - Task 04 Step 02	Assessment of draft field investigation report
---------------------------------------	---



Criteria, standards and references
A) Ministry of Public Works. 1999. <i>Technical Guideline for Rehabilitation & Upgrading of Irrigation Network</i> .

Inputs

- 1. Manpower**
Provincial task force team
- 2. Data & Information**
 - 1) Draft field investigation report
 - 2) Video tape or photos of the schemes

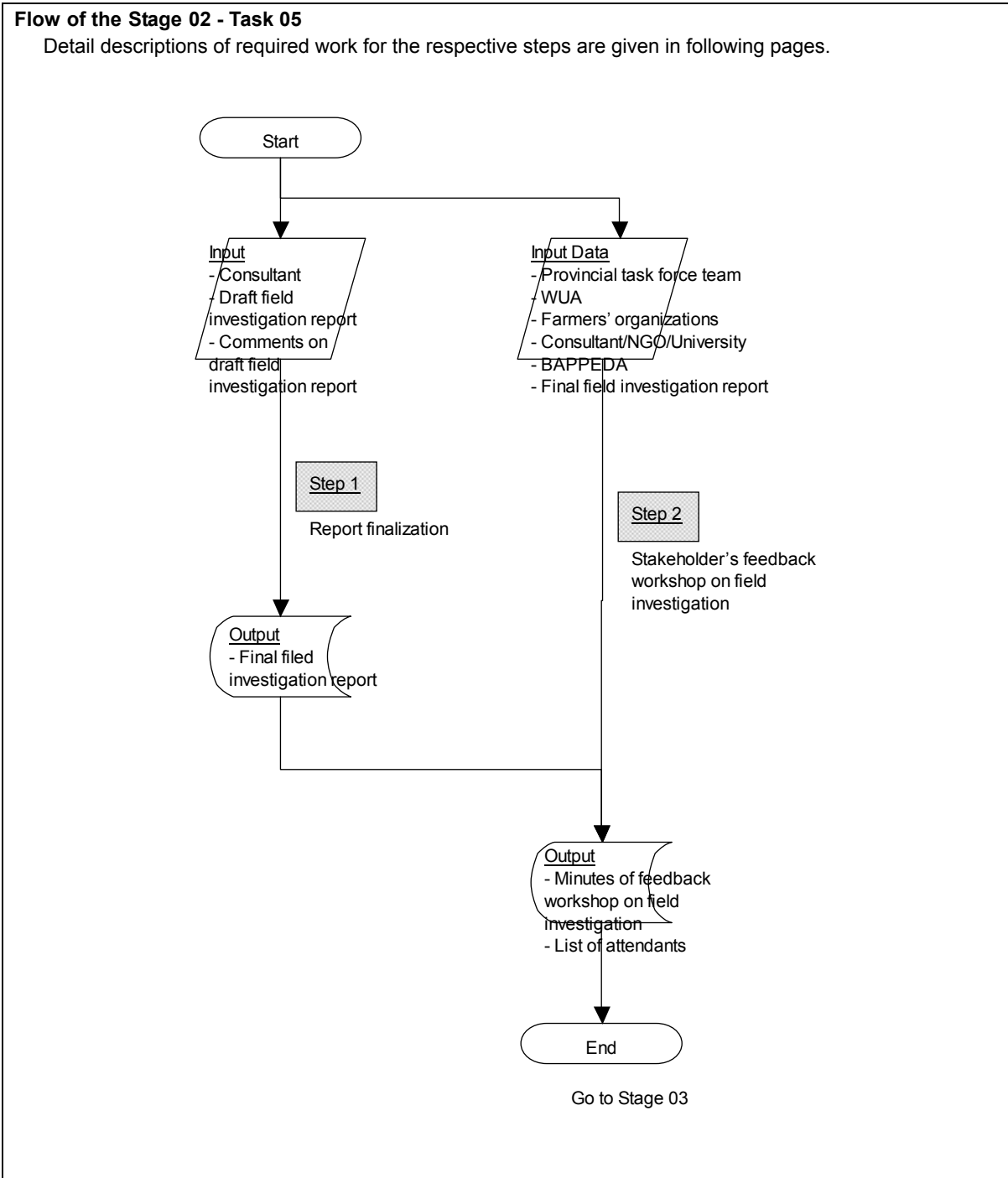
Tools & Techniques

- 1. Report assessment**
To prioritize irrigation schemes for rehabilitation in the province, summarizing of the result of field investigation for respective irrigation scheme by uniform criteria is essential. In this regards, draft field investigation report for respective irrigation scheme should be assessed by provincial task force team with uniform evaluation standard and criteria which may be different from scheme by scheme. To help provincial technical guidance team decision, video tape or photos of the schemes should be developed.

Outputs

- 1. Comments on draft field investigation report**
Comments on draft field investigation report should be given by the provincial technical guidance team.

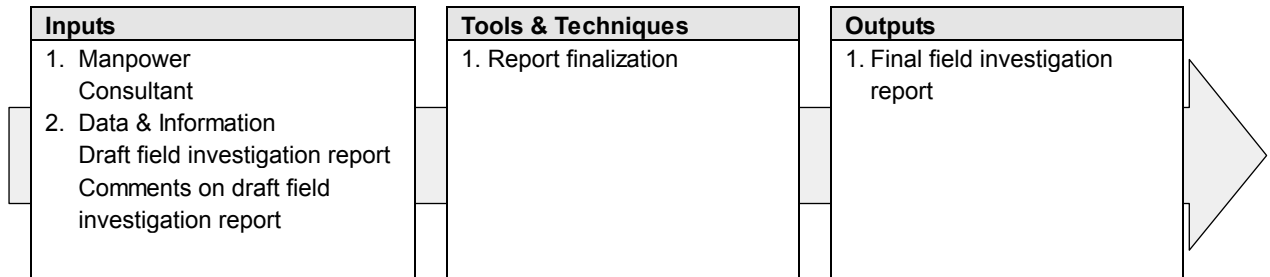
Stage 02	Pre-F/S Level Field Investigation
Task 05	Finalization and Socialization of Field Investigation Result
Purpose and scope	
The task is carried out to finalize field survey result and feed it back to irrigation commission. Understanding on present situation of the irrigation scheme should be shared with all the stakeholders.	



I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 02. Pre-F/S Level Field Investigation

Stage 02 - Task 05 Step 01	Report finalization
---------------------------------------	----------------------------



Criteria, standards and references
A) Technical specification for consulting service.

Inputs

- 1. Manpower**
 Consultant
- 2. Data & Information**
 Draft field investigation report and comments on the report given by provincial task force team.

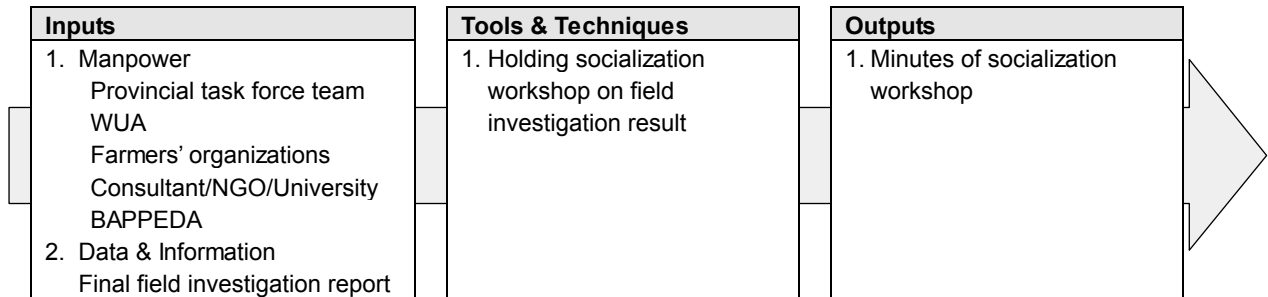
Tools & Techniques

- 1. Report finalization**

Outputs

- 1. Final field investigation report**

Stage 02 - Task 05 Step 02	Socialization workshop on field investigation result
---------------------------------------	---



Criteria, standards and references
None

Inputs

- 1. Manpower**
 - Provincial task force team
 - Representatives of WUAs
 - Representatives of farmers' organizations
 - Consultant/NGO/University
 - BAPPEDA
- 2. Data & Information**
 - Final field investigation report

Tools & Techniques

- 1. Holding socialization workshop on field investigation result**

Socialization workshop on field investigation result should be held. Major issue of the workshop are;

 - 1) Sharing understanding on present situation of the irrigation scheme with all the stakeholders, and
 - 2) Raising awareness on importance of suitable O&M of irrigation facilities.

Outputs

- 1. Minutes of socialization workshop and list of attendants**

I. Pre-Feasibility Study for
Prioritization of
Irrigation Schemes

Stage 03

Determination of Subject Area and
Second Screening of Irrigation Schemes
by Water Resources Availability

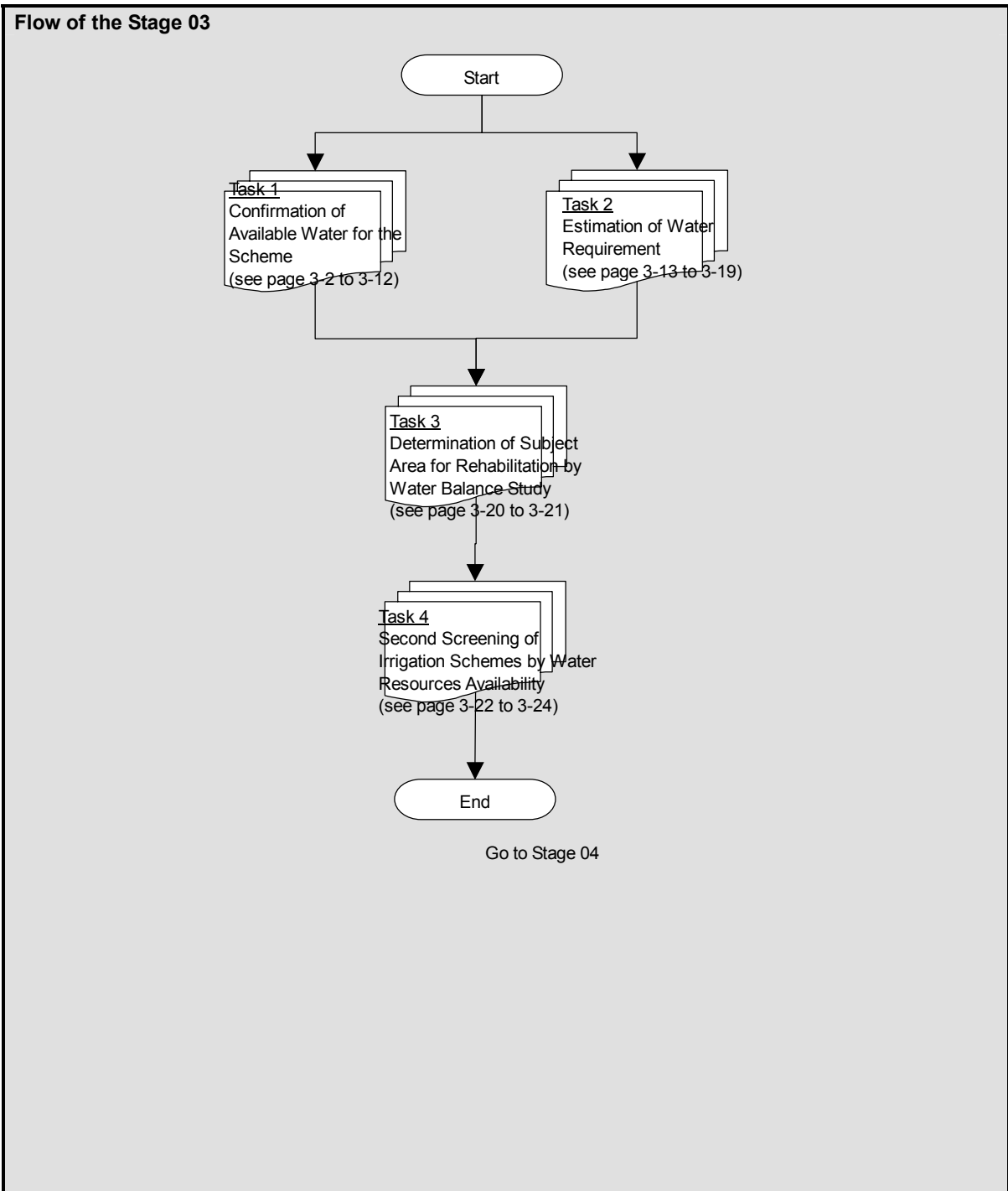
Instruction

Water resources availability and water requirement for the irrigation schemes listed in the “Master List of Irrigation Schemes for Rehabilitation”, should be confirmed for the purpose of:

- 1) Determine subject area for rehabilitation which is essential for further study; and*
- 2) Screening the irrigation schemes by water resources availability and compile the result as “List of Irrigation Schemes for Pre-F/S”.*

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

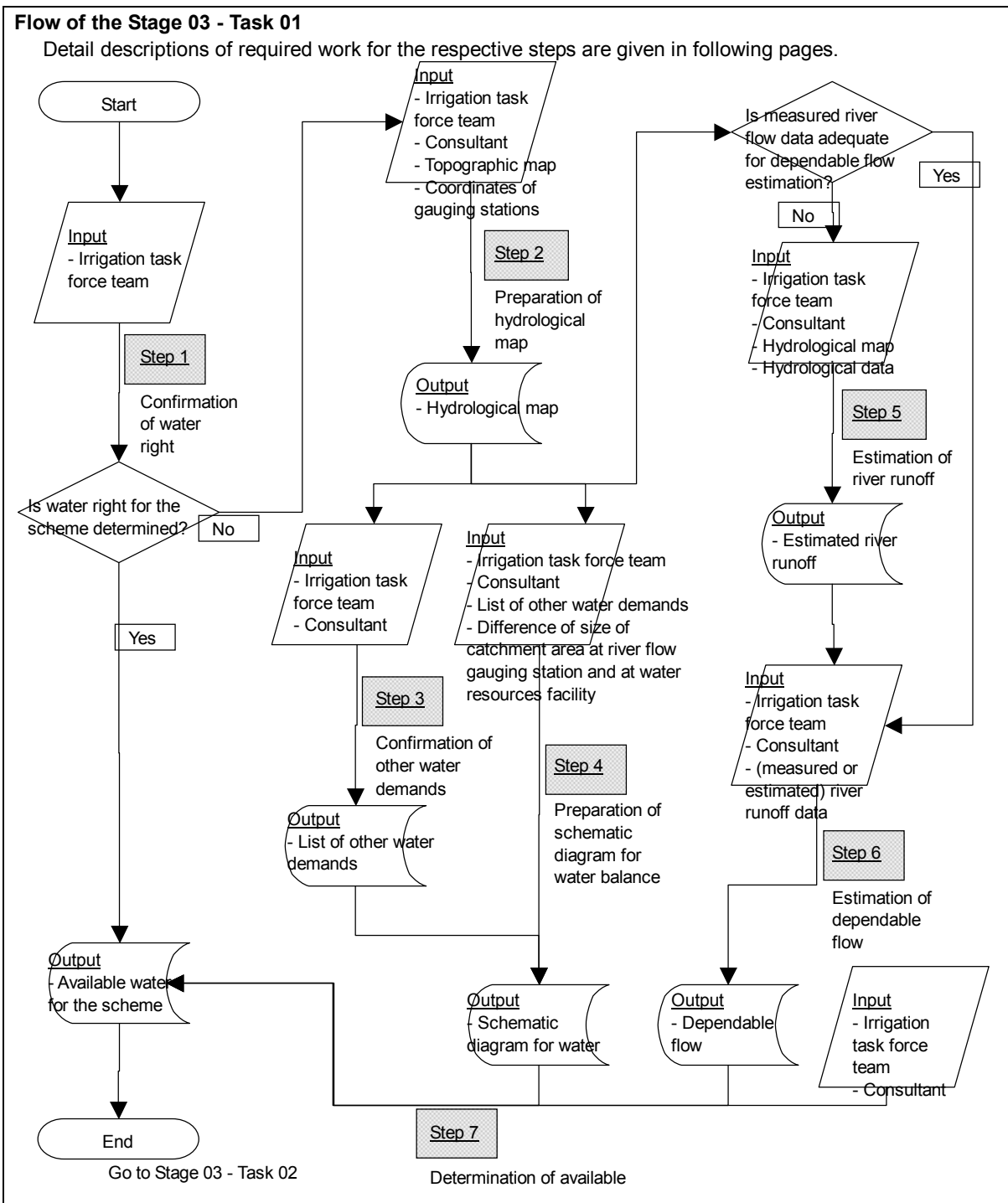
Stage 03	Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability
Purpose and scope	
Confirmation of water resources availability and determination of irrigable area for respective scheme should be conducted to: 1) Determine subject area for rehabilitation, which is essential for further study; 2) Screening the irrigation scheme of which water resources are insufficient; and 3) Declare required volume of intake water for the scheme to other water users.	



I. Pre-feasibility Study for Prioritization of Irrigation Schemes

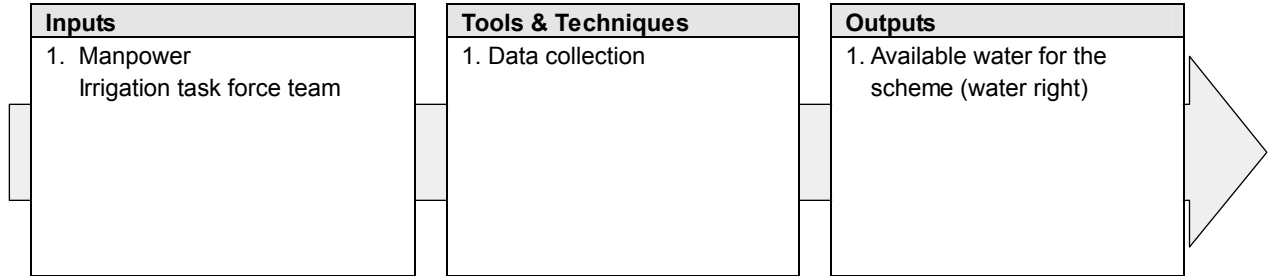
Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03	Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability
Task 01	Confirmation of Available Water for the Scheme
Purpose and scope	
Confirmation of available water is required for the purpose of: 1) Conduct water balance study and determine irrigable area.	



Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 01 Step 01	Confirmation of water right
---------------------------------------	------------------------------------



Criteria, standards and references
A) Discharge and hydrological data prepared by Dinas PSDA (<i>Inventarisasi Sungai-Sungai dan Debit Andalan</i>) B) <i>Data Pokok Pengairan</i>

Inputs

1. **Manpower**
Irrigation task force team

Tools & Techniques

1. **Data collection**
It should be confirmed whether the water right for the scheme is given or not. If it is not given, proceed to Step 02.

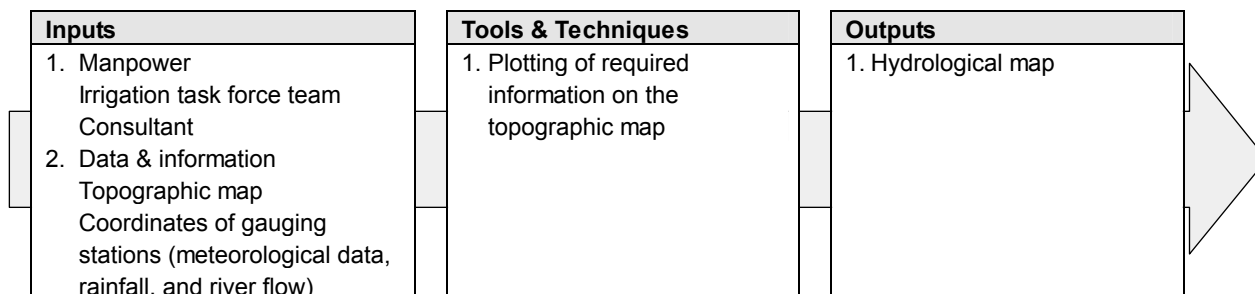
Outputs

1. **Available water for the scheme (water right)**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 01 Step 02	Preparation of hydrological map
---------------------------------------	--



Criteria, standards and references
A) 1:50,000 or 1:25,000 scale topographic maps published by Coordination Board for National Survey and Mapping B) Discharge data prepared by Dinas PSDA

Inputs

- 1. Manpower**
 Irrigation task force team
 Consultant
- 2. Data & information**
 - 1) Topographic map
 1:50,000 or 1:25,000 scale topographic maps (published by Coordination Board for National Survey and Mapping) of catchment area and irrigation area should be collected.
 - 2) Coordinate of rainfall gauging station and 3) coordinate of river flow gauging station
 Coordinate of rainfall and river flow gauging stations should be confirmed.

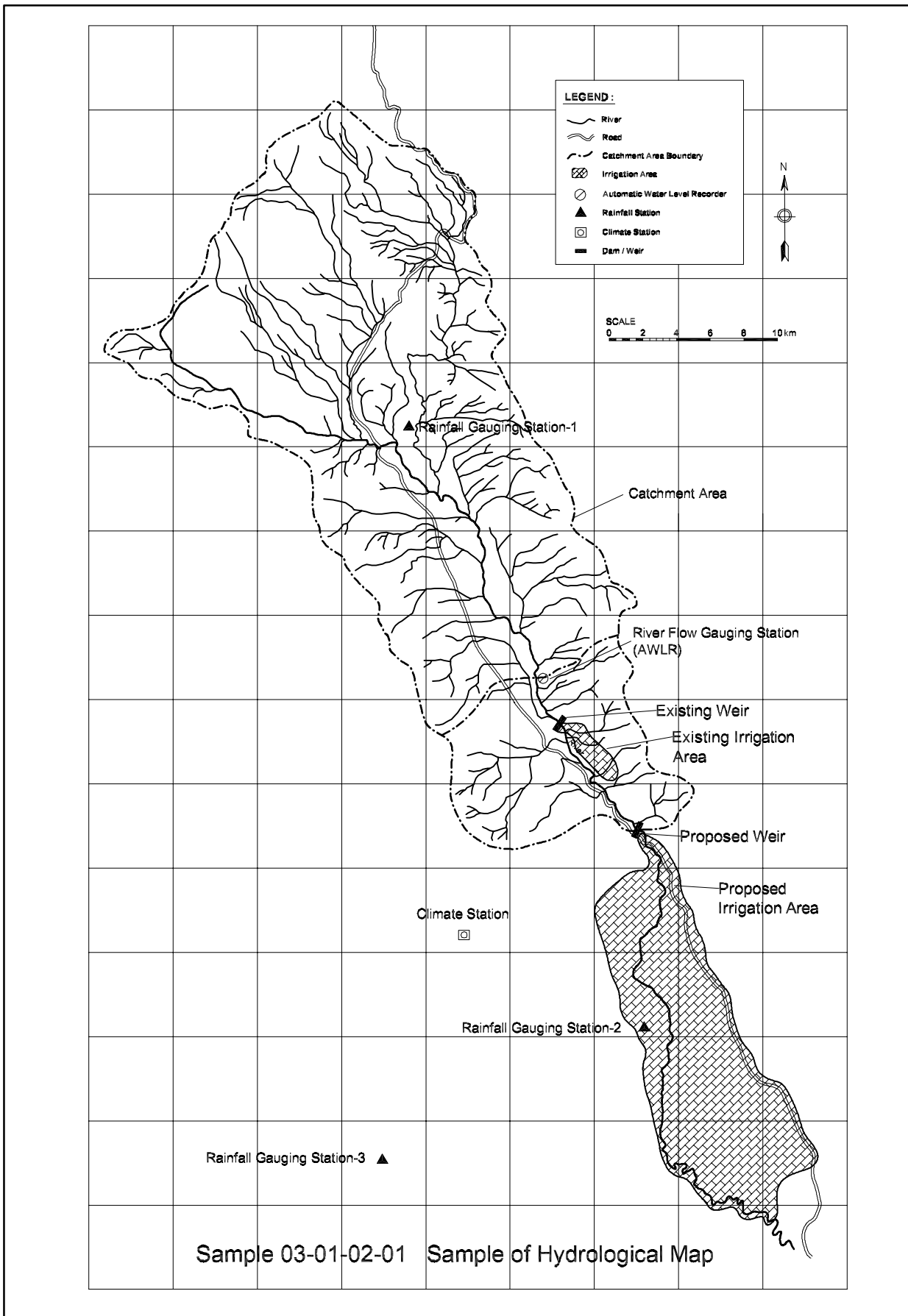
Tools & Techniques

- 1. Plotting of required information on the topographic map**
 Following information should be plotted on the topographic map:
 - 1) boundary of catchment area at river flow gauging station,
 - 2) boundary of catchment area at water resource facility,
 - 3) location of water resource facility,
 - 4) location of rainfall and river flow stations, and
 - 5) boundary of present irrigation area.

Outputs

- 1. Hydrological map**
 Hydrological map with required information should be obtained as an output of the step. Sample of hydrological map is shown in Sample 03-01-02-01.

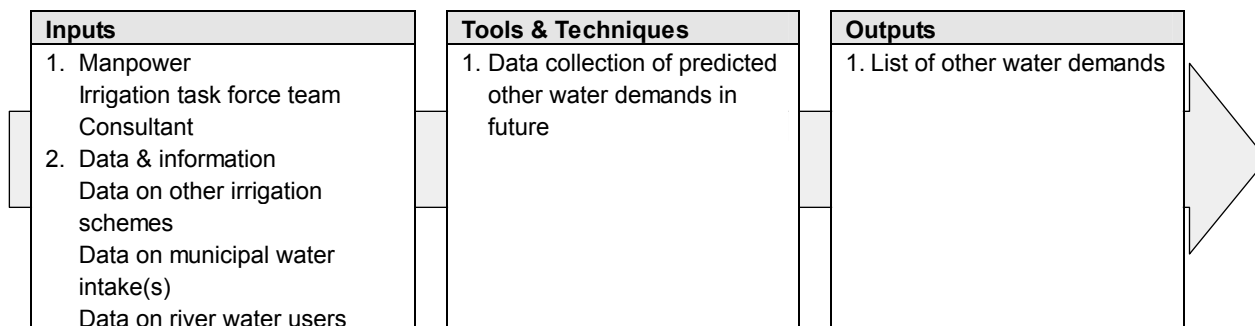
Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability



I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 01 Step 03	Confirmation of other water demands
---------------------------------------	--



Criteria, standards and references
None

Inputs

1. Manpower

Irrigation task force team
 Consultant

2. Data & information

Water supply (demand) for other irrigation schemes

Data on water supply (demand) for other irrigation schemes located on the downstream of the river flow gauging station should be collected. If there are any plans for new irrigation development or rehabilitation of existing schemes, those plans also need to be considered.

Water supply (demand) for municipal water

Data on water supply (demand) for municipal water located on the downstream of the river flow gauging station need to be compiled. Future increases in demand or increase of supply system expansions must also be considered.

Water demand for transportation

Data on any water demand for waterway transportation (ship, boat, etc.) should be collected.

Water supply (demand) for river maintenance flow

Requirements for river maintenance flow should be collected. If no such requirements are available, the volume of river maintenance flow should be carefully determined in consultation with the environment expert.

Tools & Techniques

1. Data collection for further projection of other water demands

Data on the future trends in other water demands such as, 1) irrigation water for other irrigation schemes, 2) municipal water, 3) transportation, 4) river maintenance flow, etc. need to be taken into account. Negative impacts of additional water use by the target irrigation scheme after rehabilitation must be analyzed from the view points of decreased of water flow and level in the river.

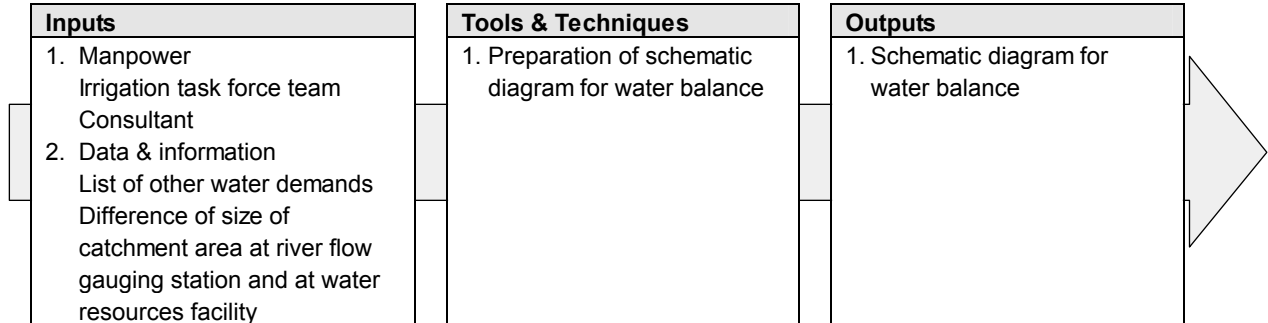
Outputs

1. List of other water demands

A list of other water demands should be prepared based on the collected data collection. In addition, the locations of intakes for other water demands need to be plotted on the hydrological map.

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 01 Step 04	Preparation of schematic diagram for water balance
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Criteria, standards and references
None

Inputs

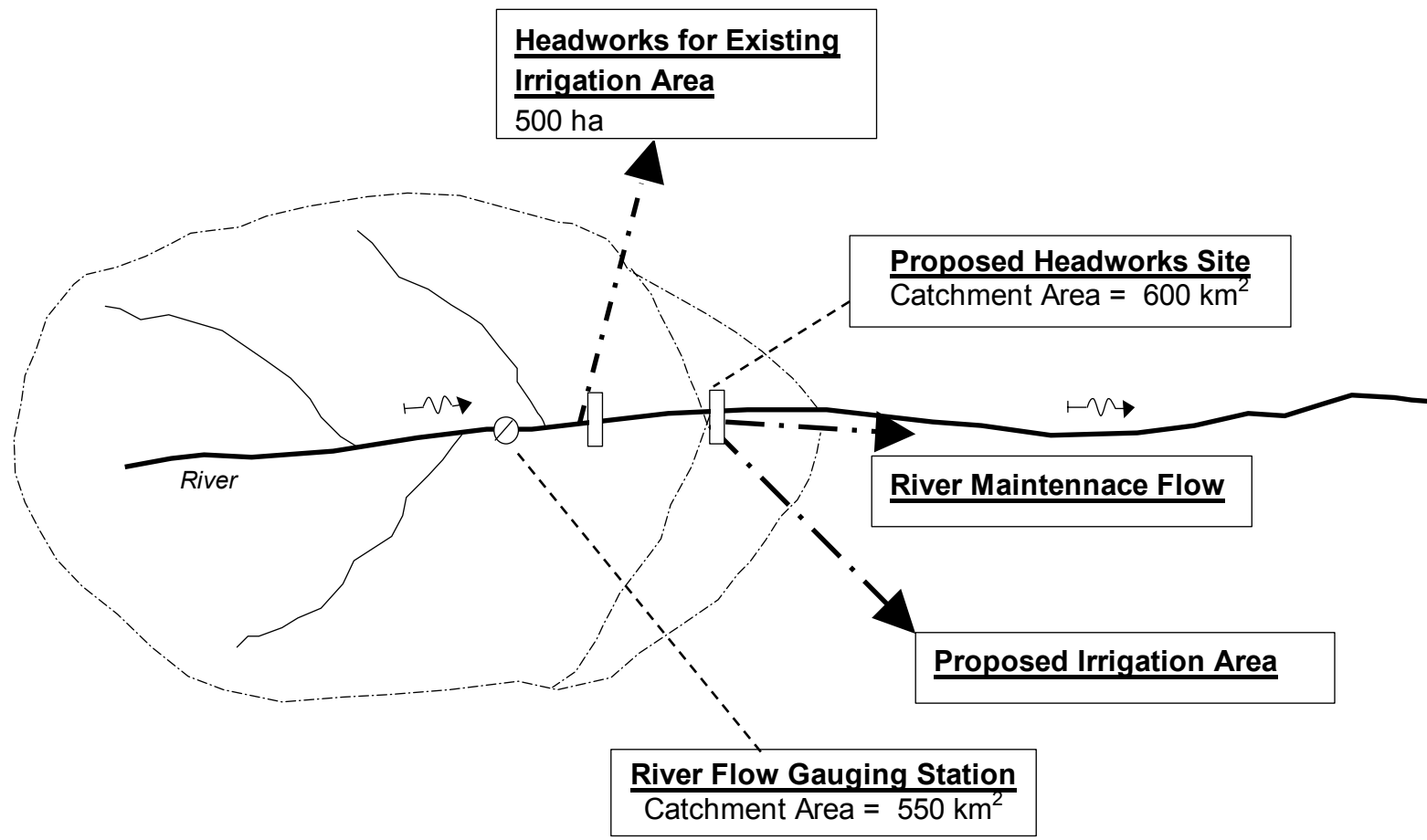
- 1. Manpower**
 Irrigation task force team
 Consultant
- 2. Data & information**
 List of other water demands
 Water supply (demand) for other irrigation schemes,
 Water supply (demand) for municipal water, etc.
 Difference of size of catchment area at river flow gauging station and water resources facility
 It should be measured by using planimeter from hydrological map.

Tools & Techniques

- 1. Preparation of schematic diagram for water balance**
 Schematic diagram for water balance with the information of i) other water demand, and ii) area difference of catchment at river flow gauging station and water resource facility should be prepared.

Outputs

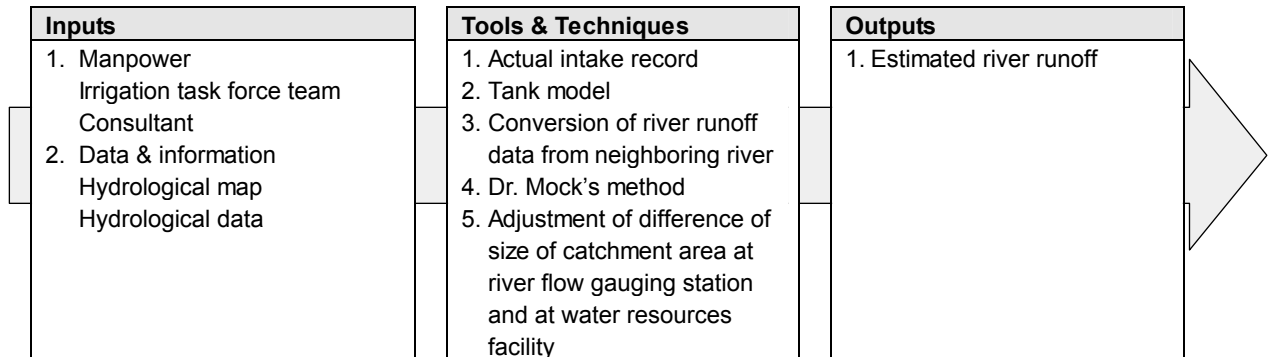
- 1. Schematic diagram for water balance**
 Schematic diagram for water balance should be obtained through the step as an output of the step. Sample of the diagram is attached. Sample of schematic diagram is shown in Sample 03-01-04-01.



Sample 03-01-04-01 Sample of Schematic Diagram for Water Balance

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 01 Step 05	Estimation of river runoff
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Criteria, standards and references

A) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-01 "Irrigation System Design"*.

Inputs

- 1. Manpower**
 Irrigation task force team
 Consultant
- 2. Data & information**
 Hydrological map
 Hydrological data

Tools & Techniques

Unit calculation period

Unit calculation period of field water requirement should be same as that of water balance. Half monthly period is recommended in the criteria and standard - A mentioned above.

1. Actual intake record

If actual record of water intake for the irrigation scheme and overflow discharge are available, total of them is the most accurate method to estimate river runoff at the water resources facility. However, confirmation on accuracy of the measurement is required.

2. Tank model

Tank model is common method to supplement incomplete river runoff data or to estimate additional period of river runoff data.

3. Conversion of river runoff data from neighboring river

In case of runoff data of water source river of the scheme is not available at all, runoff data should be brought from neighboring river with catchment area proportional conversion. On selection of neighboring river, it should be confirmed that catchment area of the neighboring river should be almost same condition as that of the water source river of the irrigation scheme.

4. Dr. Mock's method

Dr. Mock's method is also recommended in Criteria, standards and references-A mentioned above, in case of inadequate runoff data condition.

5. Adjustment of difference of size of catchment area at river flow gauging station and at water resources facility

If there is a big difference between size of catchment area at river flow gauging station and water resources facility, river flow at water resources facility should be estimated by adjusting river flow at river flow gauging station using proportional allotment. For example, in case of sample schematic diagram (Sample

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 03. Determination of Subject Area and Second Screening of
Irrigation Schemes by Water Resources Availability

03-01-04-01), river runoff at proposed headworks site will be 600/550 (=1.09) of measured runoff at river flow gauging station.

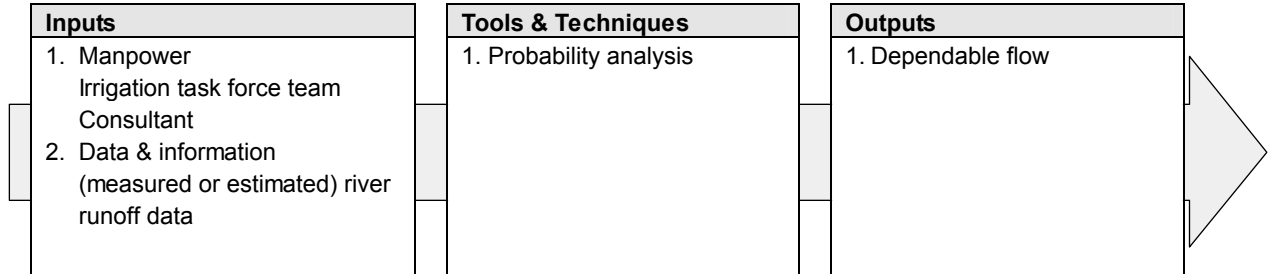
Outputs

1. Estimated river runoff

Estimated river runoff at water resources facility site should be obtained.

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 01 Step 06	Estimation of dependable flow
---------------------------------------	--------------------------------------



Criteria, standards and references
A) Ministry of Public Works. 1986. <i>Irrigation Design Standards, Design Criteria, KP-01 "Irrigation System Design"</i> .

Inputs

- 1. Manpower**
Irrigation task force team
Consultant
- 2. Data & information**
(measured or estimate) river runoff data

Tools & Techniques

Unit calculation period

Unit calculation period of field water requirement should be same as that of water balance. Half monthly period is recommended in the criteria and standard - A mentioned above.

- 1. Probability analysis**
Probability analysis on measured or estimated river runoff should be made.

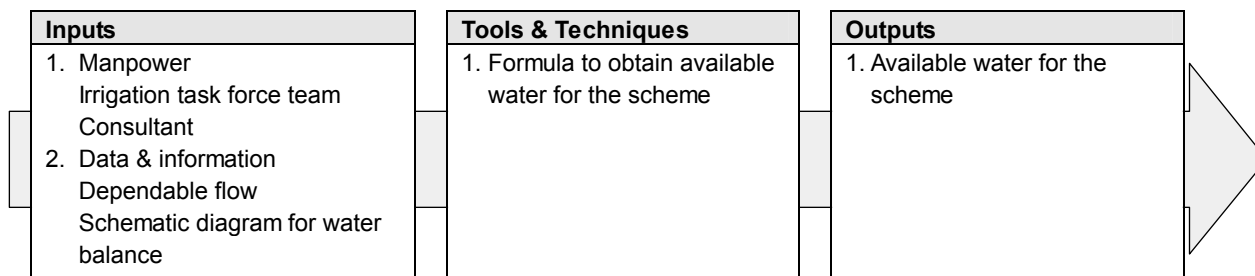
Outputs

- 1. Dependable flow**
Dependable flow at water resource facility site should be obtained.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 01 Step 07	Determination of available water
---------------------------------------	---



Criteria, standards and references
A) Ministry of Public Works. 1986. <i>Irrigation Design Standards, Design Criteria, KP-01 "Irrigation System Design"</i> .

Inputs

- 1. Manpower**
Irrigation task force team
Consultant
- 2. Data & information**
Dependable flow
Schematic diagram for water balance

Tools & Techniques

Unit calculation period

Unit calculation period of field water requirement should be same as that of water balance. Half monthly period is recommended in the criteria and standard - A mentioned above.

1. Formula to obtain available water for the scheme

Appropriate formula to obtain available water for the scheme should be established by using schematic diagram for water balance. Available water for the scheme should be calculated using this formula. Factors to be considered in the formula are:

- 1) size adjustment of catchment area (between catchment area at river flow gauging station and water intake site),
- 2) other water demands,
- 3) river maintenance flow (required minimum water release to downstream), etc.

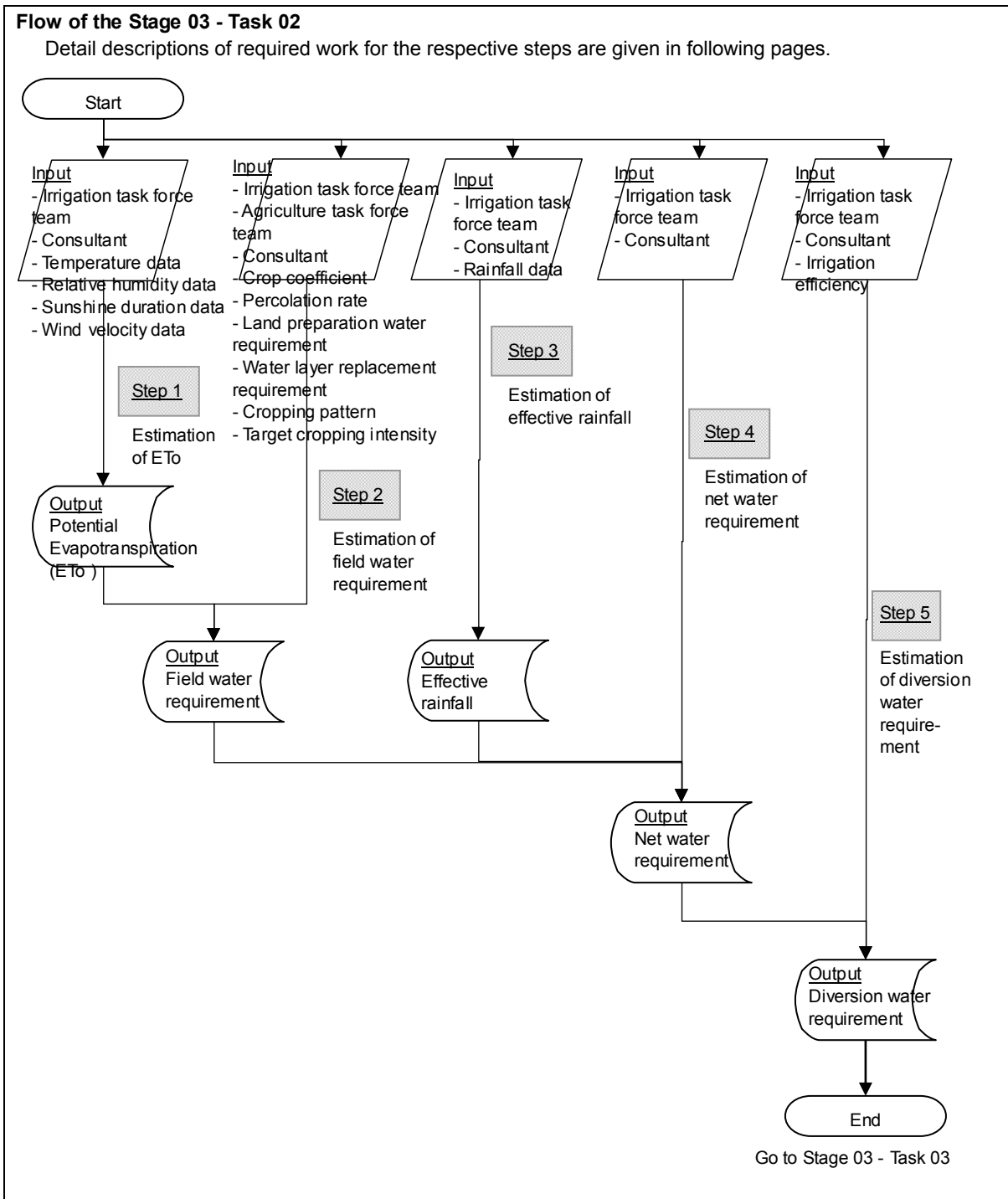
Outputs

1. Available water for the scheme

Available water for the scheme in unit calculation period is obtained.

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

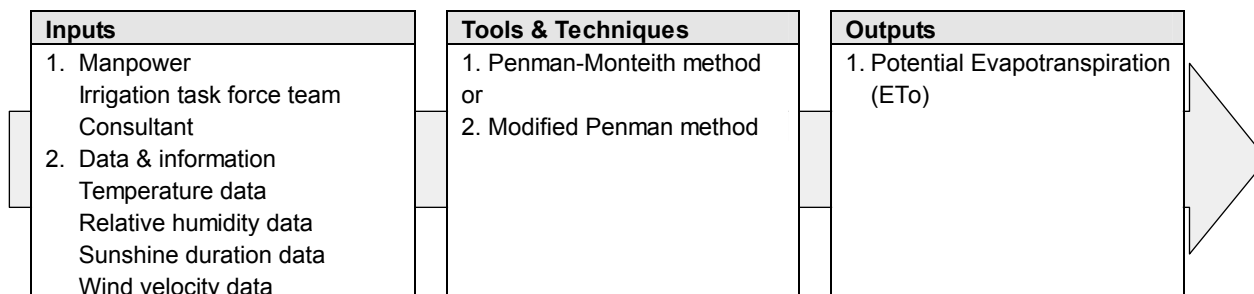
Stage 03	Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability
Task 02	Estimation of Water Requirement
Purpose and scope	
Water requirement computation is carried out to: 1) Determine irrigable area (water balance); 2) Determine size (capacity) of the canal; and 3) Determine water supply schedule.	



I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 02	Estimation of ETo
Step 01	



Criteria, standards and references

- A) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-01 "Irrigation System Design"*.
- B) FAO. 1998. *Irrigation and Drainage Paper No. 56, Crop Evapotranspiration*.
- C) FAO. 1977. *Irrigation and Drainage Paper No. 24, Crop Water Requirement*

Inputs

1. Manpower

Irrigation task force team and consultant

2. Data & information

1) Temperature, 2) Relative humidity, 3) Sunshine duration, and 4) Wind velocity

Required data is described in Criteria, standards and references - A page 74. The data might be available at Meteorology and Geophysics Agency (BMG) offices. If the obtained meteorological data are far different from average values, confirmation of the data accuracy by comparing the data with those from station nearby is required.

Tools & Techniques

Unit calculation period

Half-monthly calculation is recommended in Criteria, standards and references - A mentioned above (page 151).

1. Penman-Monteith method

ETo should be estimated by Penman-Monteith method, which is recommended by the latest FAO standard (Criteria, standards and references - B mentioned above).

2. Modified Penman method

Modified Penman method is also applicable for the estimation (see Criteria, standards and references - A and C mentioned above).

Outputs

1. Potential Evapotranspiration (ETo)

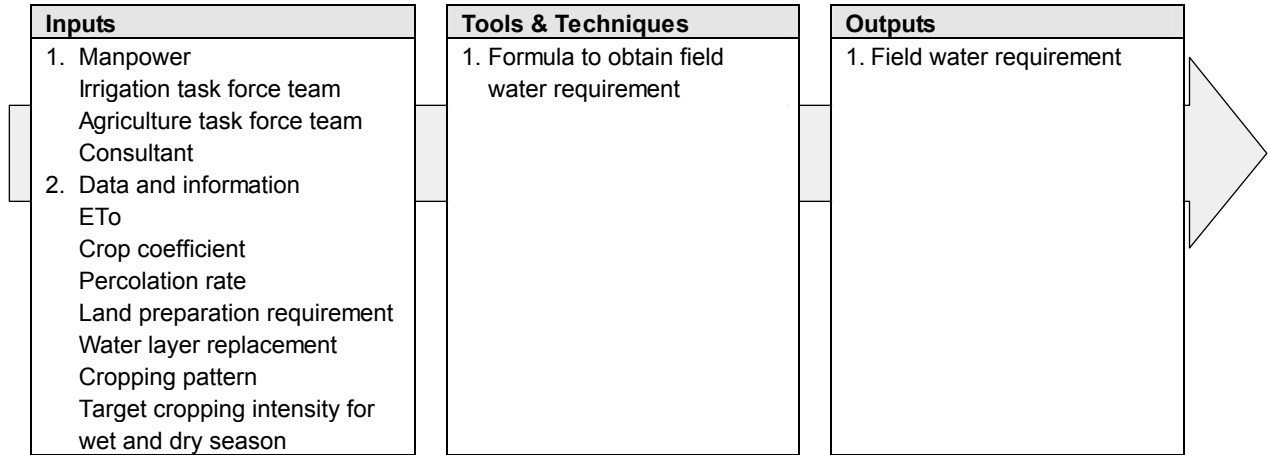
Half-monthly ETo by the mm/day should be obtained.

Monthly average of meteorological data and ETo of several places are shown below.

Item	Location	Medan (North Sumatra)	Tegal (Central Java)	Masamba (South Sulawesi)
Temperature		26.4 ~ 27.5 °C	26.6 ~ 27.9 °C	25.8 ~ 27.3 °C
Relative Humidity		81 ~ 86 %	74 ~ 87 %	80 ~ 86 %
Sunshine Duration		2.3 ~ 3.8 hours/day	4.0 ~ 7.3 hours/day	4.1 ~ 6.3 hours/day
Wind Velocity		6.0 ~ 6.9 knots	3.6 ~ 4.8 knots	1.1 ~ 1.3 knots
ETo		3.1 ~ 4.0 mm/day	3.9 ~ 5.3 mm/day	3.2 ~ 4.6 mm/day

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 02 Step 02	Estimation of field water requirement
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Criteria, standards and references

A) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-01 "Irrigation System Design"*.

Inputs

1. Manpower

Irrigation task force team, Agriculture task force team, Consultant

2. Data & information

1) ETo

ETo is obtained through Stage 03 - Task 02 - Step 01.

2) Crop coefficient

See Criteria, standards and references - A for average crop coefficient in Indonesia.

3) Percolation rate

Percolation rate should be measured by cylinder intake rate test at the site, especially for the high permeable soil.

4) Land preparation water requirement

See Criteria, standards and references - A for average land preparation water requirement in Indonesia.

5) Water layer replacement requirement

See Criteria, standards and references - A for average water layer replacement requirement in Indonesia.

6) Cropping pattern

Cropping pattern should be determined by agriculture expert.

Tools & Techniques

Unit calculation period

Unit calculation period of field water requirement should be same as that of water balance. Half monthly period is recommended in the criteria and standard - A mentioned above. 10-days period is also common in Indonesia.

1. Formula for field water requirement

See Criteria, standards and references - A mentioned above.

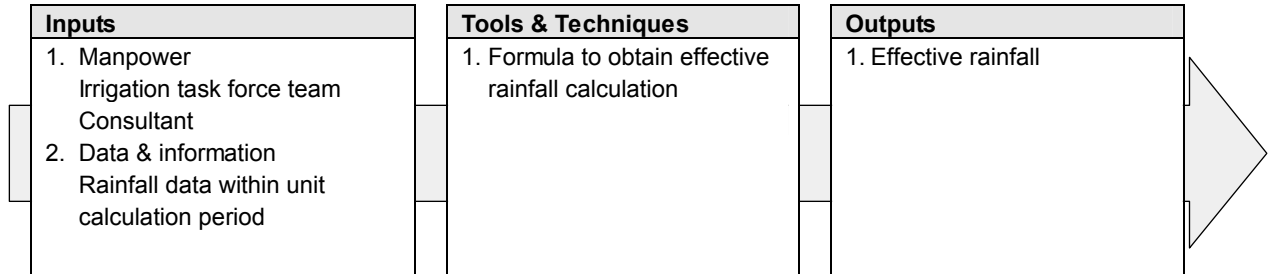
Outputs

1. Field water requirement

Field water requirement by the mm/day should be obtained. See Sample 03-02-02-01

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 02 Step 03	Estimation of effective rainfall
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Criteria, standards and references

A) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-01 "Irrigation System Design"*.

Inputs

1. Manpower

Irrigation task force team and consultant

2. Data & information

1) Rainfall data within unit calculation period

Rainfall within unit calculation period should be generated from daily rainfall data. If the obtained meteorological data are far different from average values of the region, confirmation of the data accuracy by comparing the data with those from station nearby is required. Incomplete rainfall data should be supplemented with data of adjacent station by using correlation factor.

Tools & Techniques

Unit calculation period

Unit calculation period of field water requirement should be same as that of water balance. Half monthly period is recommended in the criteria and standard - A mentioned above. 10-days period is also common in Indonesia.

1. Formula to obtain effective rainfall

See Criteria, standards and references - A mentioned above.

Outputs

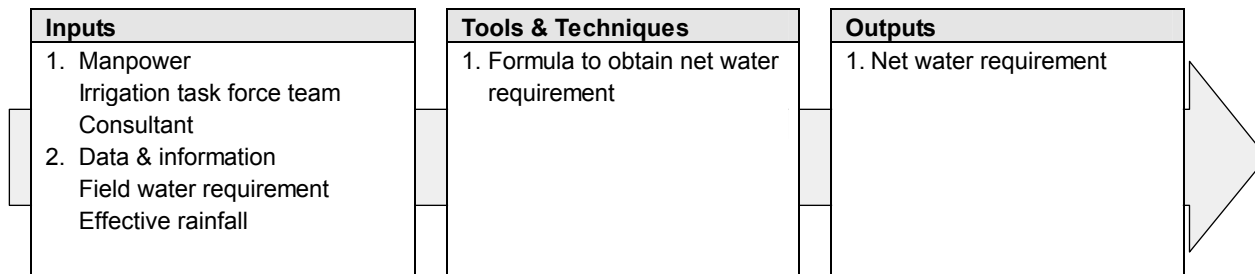
1. Effective rainfall

Effective rainfall within unit calculation period by the mm/unit should be obtained.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 02	Estimation of net water requirement
Step 04	



Criteria, standards and references
A) Ministry of Public Works. 1986. <i>Irrigation Design Standards, Design Criteria, KP-01 "Irrigation System Design"</i> .

Inputs

1. Manpower

Irrigation task force team and consultant

2. Data & information

1) Field water requirement

Field water requirement is obtained through Stage 03 - Task 02 - Step 02.

2) Effective rainfall

Effective rainfall is obtained through Stage 03 - Task 02 - Step 03.

Tools & Techniques

Unit calculation period

Unit calculation period of field water requirement should be same as that of water balance. Half monthly period is recommended in the criteria and standard - A mentioned above. 10-days period is also common in Indonesia.

1. Formula for net water requirement

See Criteria, standards and references - A mentioned above.

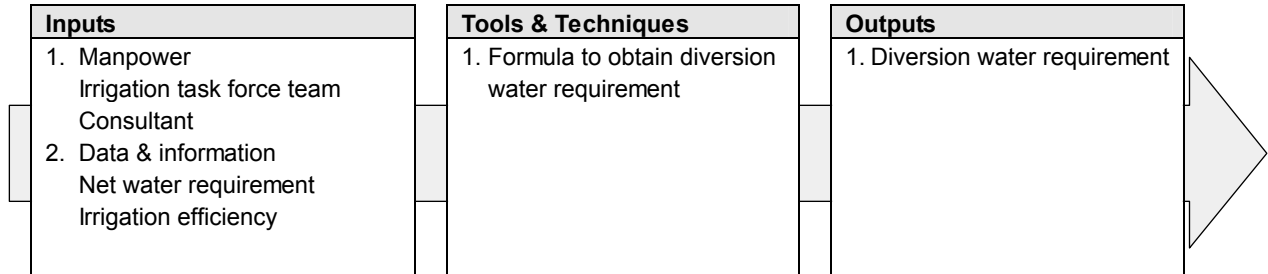
Outputs

1. Net water requirement

Net water requirement within unit calculation period by the l/sec/ha should be obtained.

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 02 Step 05	Estimation of diversion water requirement
---------------------------------------	--



Criteria, standards and references

A) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-01 "Irrigation System Design"*.

Inputs

1. Manpower

Irrigation task force team and consultant

2. Data & information

1) Net water requirement

Net water requirement is obtained through Stage 03 - Task 02 - Step 04.

2) Irrigation efficiency

See Criteria, standards and references - A mentioned above for the standard value of irrigation efficiency in Indonesia.

Tools & Techniques

Unit calculation period

Unit calculation period of field water requirement should be same as that of water balance. Half monthly period is recommended in the criteria and standard - A mentioned above. 10-days period is also common in Indonesia.

1. Formula for diversion water requirement

See Criteria, standards and references - A mentioned above. To contribute easy O&M irrigation system, introduction of technical rotation system should be carefully examined since it required more complex water management.

Outputs

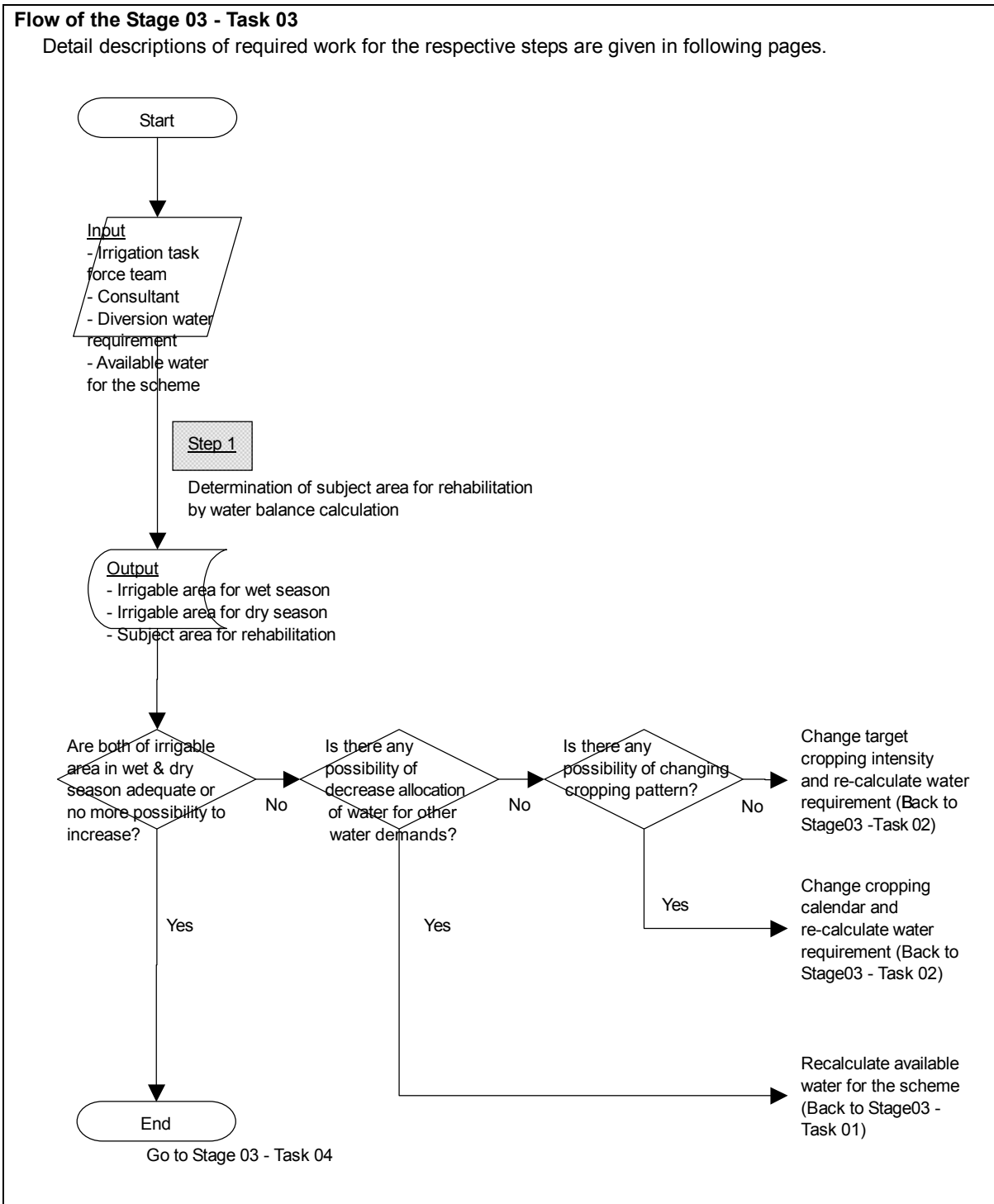
1. Diversion water requirement

Diversion water requirement for the unit calculation period by the l/sec/ha and m³/sec should be obtained. Generally speaking, it ranges from 1.30 ~ 2.10 l/sec/ha assuming that percolation rate is about 2.0 mm/day and cropping intensity 200%.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

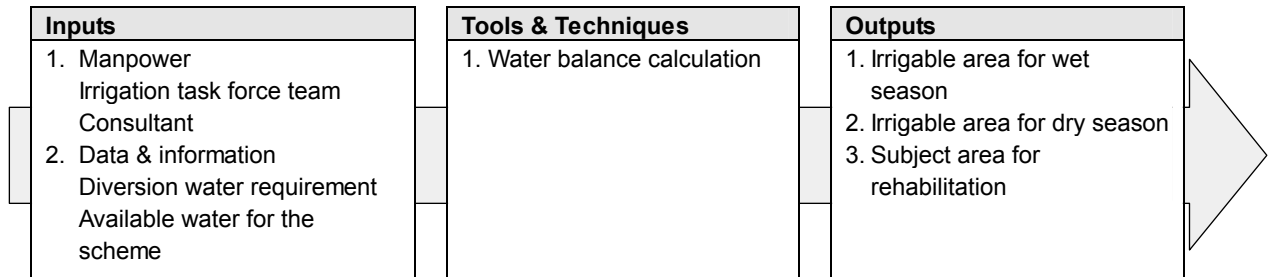
Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03	Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability
Task 03	Determination of Subject Area for Rehabilitation by Water Balance Study
Purpose and scope	
Scope of the Task are to: 1) Determine irrigable area in wet and dry season; 2) Determine cropping intensity; and 3) Determine subject area for rehabilitation.	



Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 03 Step 01	Determination of subject area for rehabilitation by water balance calculation
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Criteria, standards and references
None

Inputs

- 1. Manpower**
Irrigation task force team
Consultant
- 2. Data & information**
Diversion water requirement
Available water for the scheme

Tools & Techniques

- 1. Water balance calculation**
Water balance calculation (= available water for the scheme - diversion water requirement) should be conducted throughout the year in determined calculation unit.

Outputs

1-2. Irrigable area for wet & dry season

Irrigable area for wet & dry season are obtained by comparing available water for the irrigation scheme and water requirement for the scheme. If irrigable areas are not sufficient, re-calculation by changing of agriculture plan and water distribution plan should be tried as shown in the work flow of Stage 03 - Task 03.

3. Subject area for rehabilitation

For the irrigation schemes which have enough water to irrigate all the area

There is no difficulty to determine subject area for rehabilitation as irrigation area at present.

For the irrigation schemes which does not have enough water to irrigate all the area

If the result of water balance study shows that there is not sufficient water to irrigate all the area, the manner of water distribution should be discussed by stakeholders. In this case, there might be two options;

- 1) Decrease of irrigation area, or
- 2) Decrease of cropping intensity.

It is recommended to determine the manner of water distribution (decrease of irrigation area or decrease of cropping intensity) with full participatory of WUAs and farmers' organizations, etc.

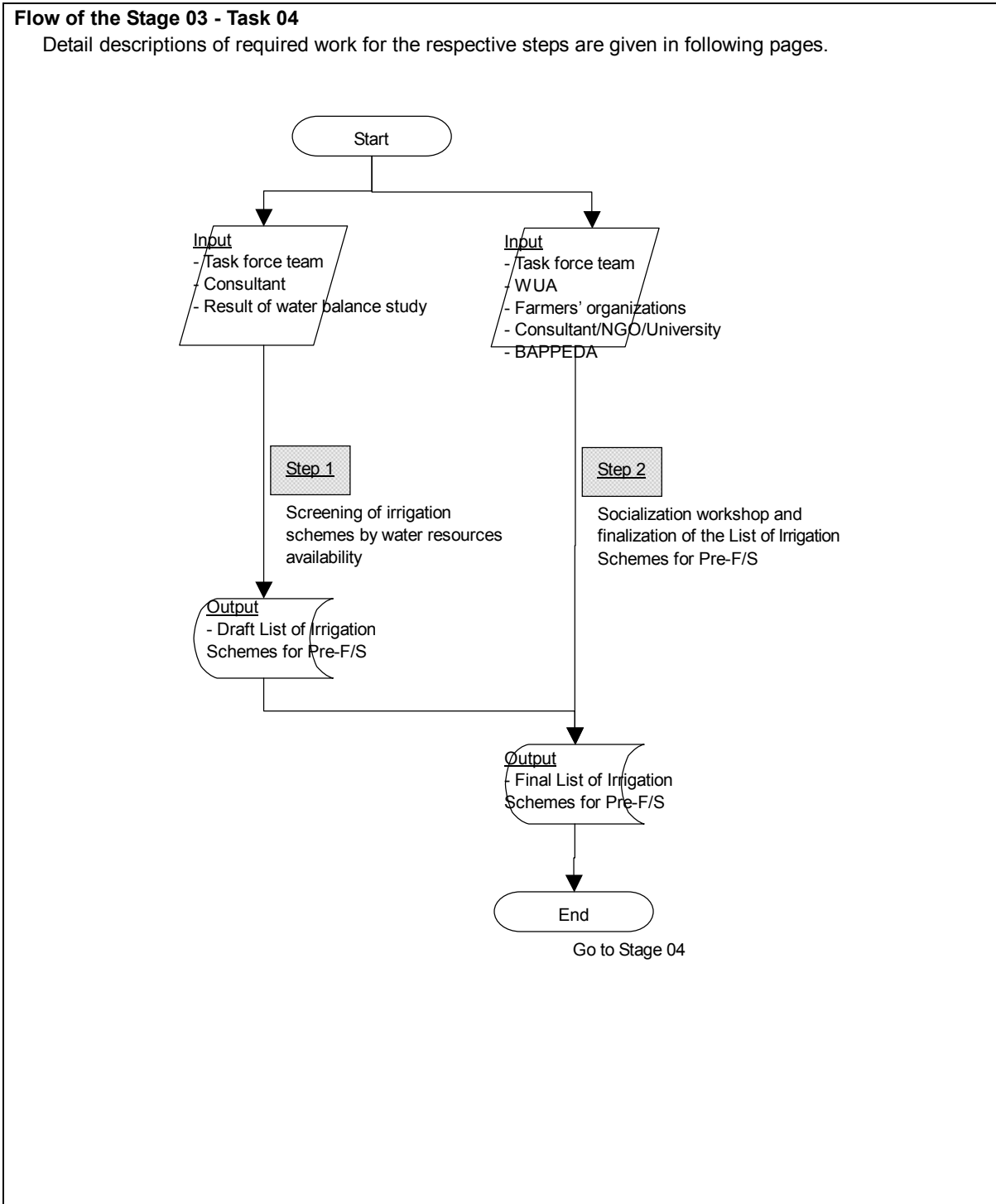
In case of decrease of irrigation area, the subject area should be decided as decreased irrigation area.

In case of decrease of cropping intensity, the subject area should be determined as irrigation area at present.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

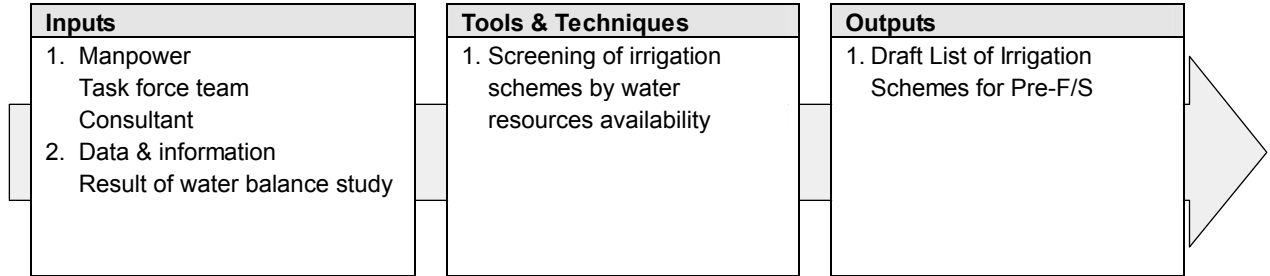
Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03	Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability
Task 04	Second Screening of Irrigation Schemes by Water Resources Availability
Purpose and scope	
The scope of the Task are to: 1) Screen irrigation schemes by water resources availability; and 2) Compile the result of 1) as List of Irrigation Schemes for Pre-F/S.	



Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 04 Step 01	Screening of irrigation schemes by water resources availability
---------------------------------------	--



Criteria, standards and references
None

Inputs

- 1. Manpower**
 - Task force team
 - Consultant
- 2. Data & information**
 - Result of water balance study

Tools & Techniques

- 1. Screening of irrigation schemes by water resources availability**

For the irrigation schemes, of which subject area for rehabilitation is far different away from present irrigation area, reformulation of water resourced development plan is required. Such kind of irrigation schemes should be classified into Group-IV (Reformulation of water resources development plan) or Group-VI (Development by other category or method) and excluded from the List of Irrigation Schemes for Pre-F/S. Rehabilitation plans in such scheme are to be suspended until status meets required criteria.

Outputs

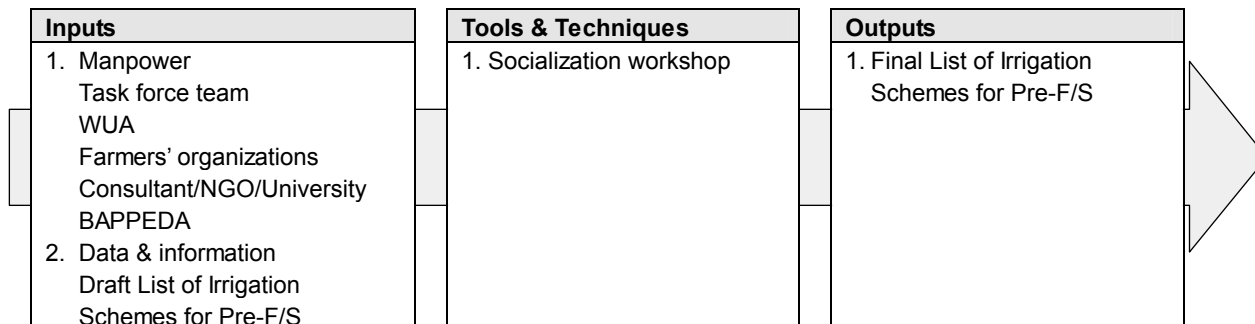
- 1. Draft List of Irrigation Schemes for Pre-F/S**

After second screening of irrigation schemes, "Draft List of Irrigation Schemes for Pre-F/S" should be obtained.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 03. Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability

Stage 03 - Task 04 Step 02	Socialization workshop and finalization of the List of Irrigation Schemes for Pre-F/S
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Criteria, standards and references
None

Inputs

- 1. Manpower**
 - Task force team
 - Representatives of WUA
 - Representatives of farmers' organizations
 - Consultant/NGO/University
 - BAPPEDA
- 2. Data & information**
 - Draft List of Irrigation Schemes for Pre-F/S

Tools & Techniques

- 1. Socialization workshop**
 - Socialization workshop on Draft List of Irrigation Schemes for Pre-F/S should be held and the list should be finalized and authorized.

Outputs

- 1. Final List of Irrigation Scheme for Pre-F/S**

I. Pre-Feasibility Study for
Prioritization of
Irrigation Schemes

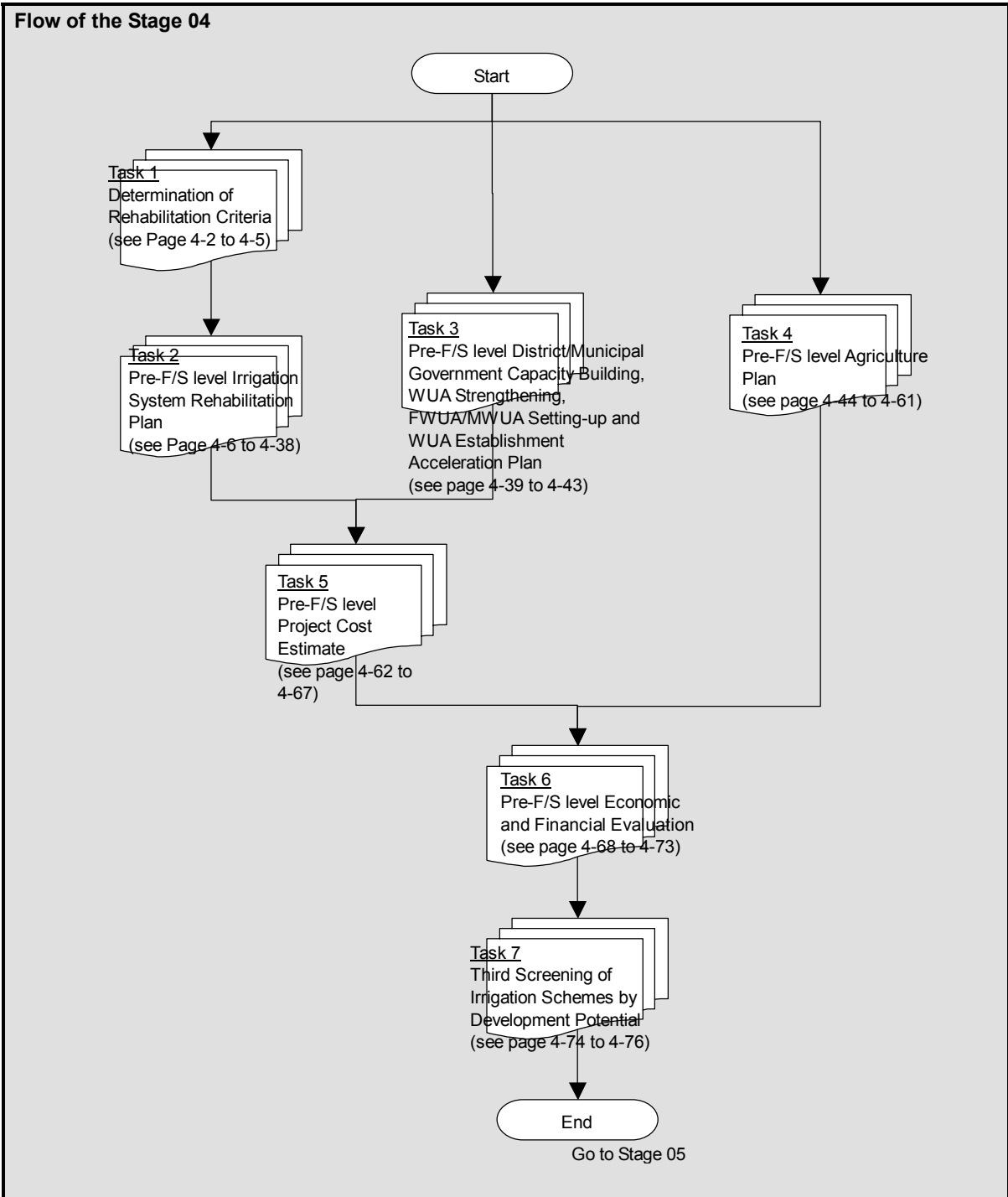
Stage 04
Formulation of Pre-F/S Level
Rehabilitation Plan and
Third Screening of Irrigation Schemes

Instruction

Pre-feasibility study should be carried out on all of irrigation schemes listed in the “List of Irrigation Schemes for Pre-F/S”. Based on the Pre-feasibility Study result, third screening of irrigation schemes should be made to separate irrigation schemes with low development potential. As a result of Pre-F/S, “List of Irrigation Schemes for Prioritization” should be prepared.

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

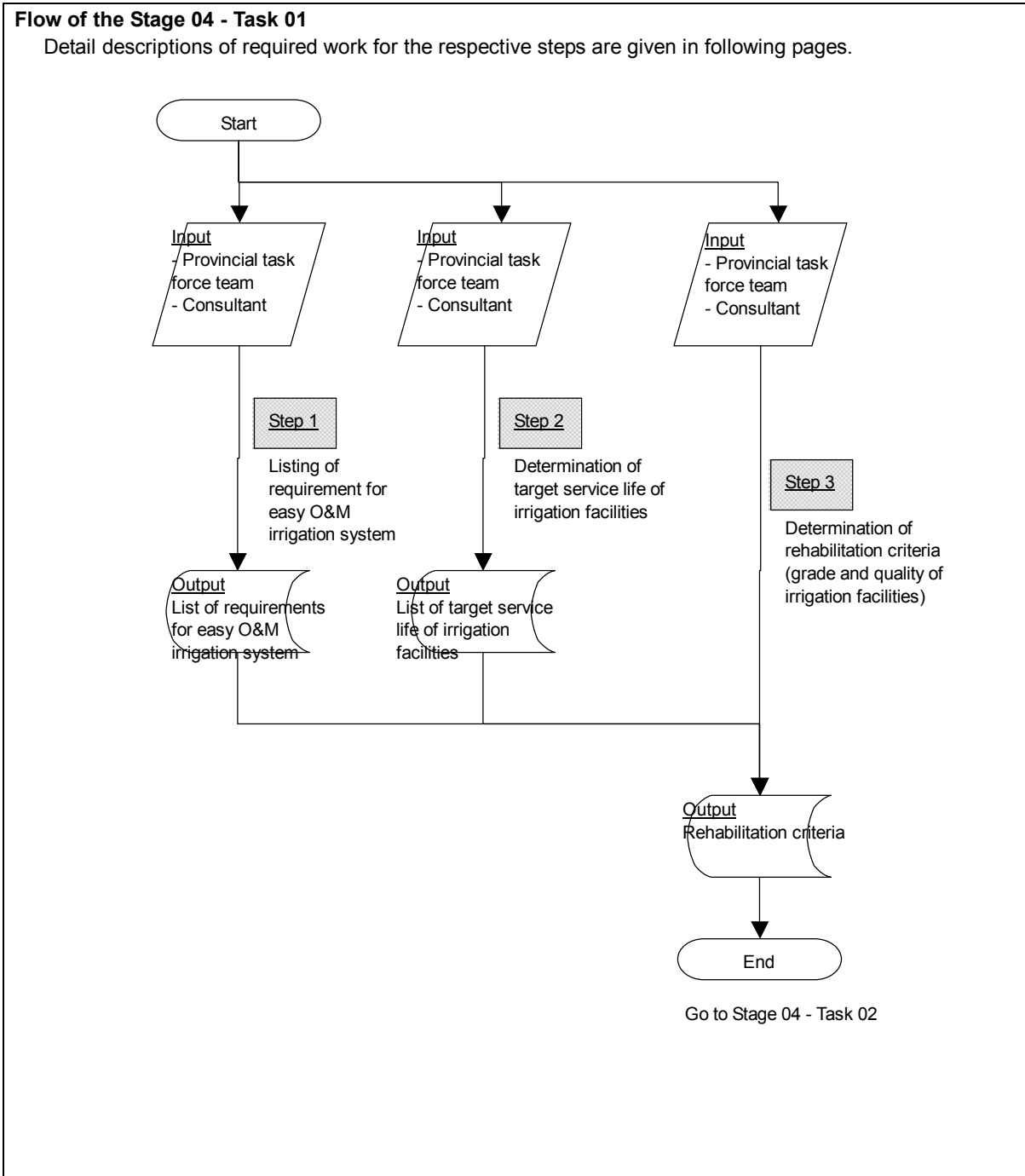
Stage 04	Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes
Purpose and scope	
Pre-feasibility study (Pre-F/S) level rehabilitation plan is required for provincial-wide prioritization of rehabilitation schemes. The procedure described in this part is applicable only for pre-F/S level planning.	



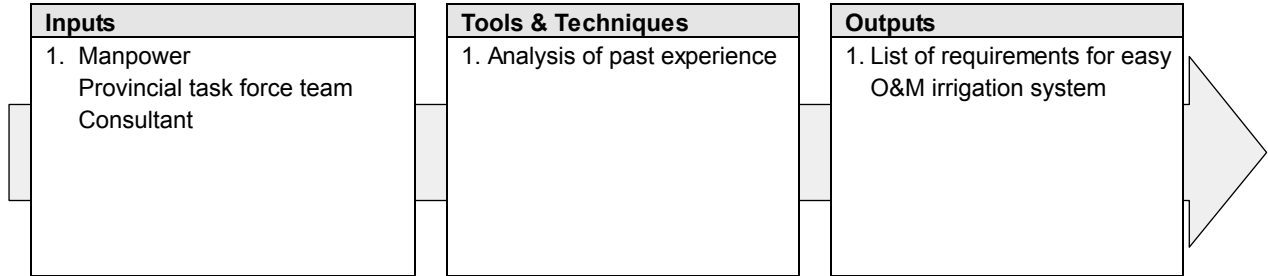
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04	Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes
Task 01	Determination of Rehabilitation Criteria
Purpose and scope	
Scope of the Task are to: 1) Analyze and define suitable irrigation facilities for easy O&M irrigation system; and 2) Determine rehabilitation criteria.	



Stage 04 - Task 01 Step 01	Listing of requirements for easy O&M irrigation system
---------------------------------------	---



Criteria, standards and references
A) Discussed item in the kick-off meeting B) Requests from WUAs C) Government policy D) Assets inventory data supplied by PSDA

Inputs

1. **Manpower**
 - Provincial task force team
 - Consultant

Tools & Techniques

1. **Analysis of past experience**
 Past experience (lessons learned), discussed item in the kick-off meeting, requests from WUAs, government policy, and general condition of existing irrigation facilities should be carefully analyzed and suitable irrigation system for easy O&M should be established.

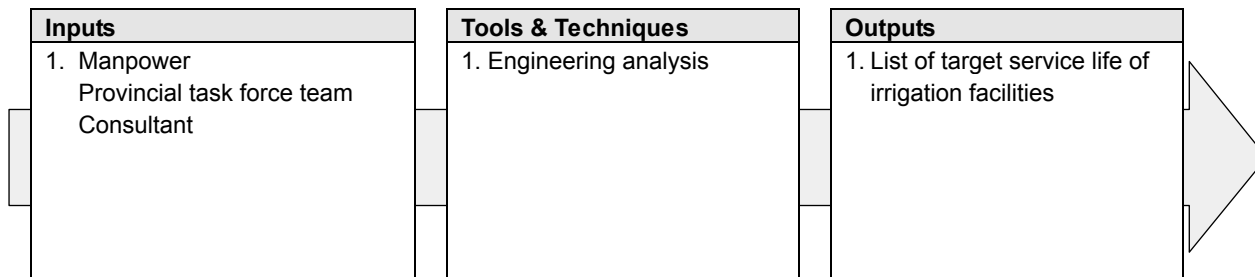
Outputs

1. **List of requirements for easy O&M irrigation system**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 01 Step 02	Determination of target service life of irrigation facilities
---------------------------------------	--



Criteria, standards and references
A) Design criteria for rehabilitation (Ministry of Public Works. 1986. <i>Irrigation Design Standards, Design Criteria</i> , etc.) B) Service life of structures

Inputs

1. **Manpower**
 - Provincial task force team
 - Consultant

Tools & Techniques

1. **Engineering analysis**
 Realistic service life of irrigation facilities should be determined through engineering analysis.

Outputs

1. **List of target service life of irrigation facilities**

Sample of service life of irrigation facilities are:

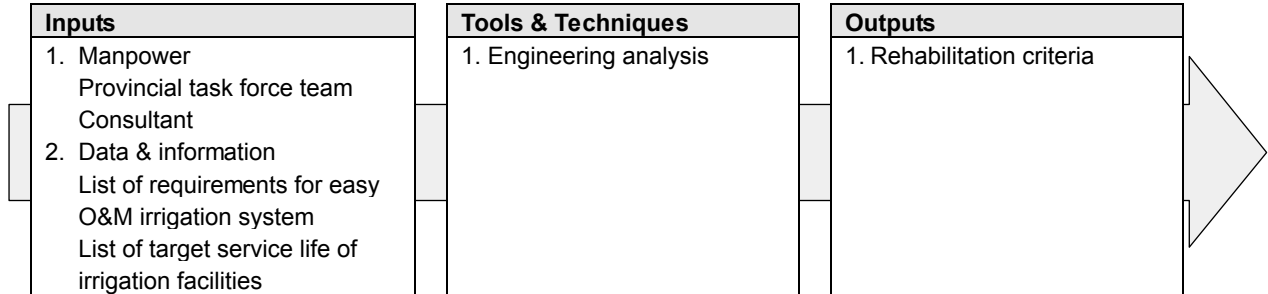
Water resources facility

- Dam; 100 years
- Headworks; 50 years
- Metal works (steel gate, trash rack, etc.); 30 years
- Pump; 30 years

Canal and related structure

- Lined canal; 30 years
- Related structure; 30 years
- Metal works; 30 years

Stage 04 - Task 01 Step 03	Determination of rehabilitation criteria (grade and quality of irrigation facilities)
---------------------------------------	--



Criteria, standards and references
None

Inputs

- 1. Manpower**
 Provincial task force team
 Consultant
- 2. Data & information**
 List of service life of irrigation facilities

Tools & Techniques

- 1. Engineering analysis**
 Past experience (lessons and learns) should be carefully analyzed and suitable irrigation system for easy O&M should be established.

Outputs

- 1. Rehabilitation criteria**
 Rehabilitation criteria should be obtained through work of the step.

Sample of rehabilitation criteria are;

Dam

- Design and construction should be made based on the criteria given by the Dam Safety Committee of related ministry.

Headworks

- Major structures (weir, apron, wall, stilling basin, etc.) should be constructed by concrete and satisfy all the safety factors designated in the related design criteria.
- Design and supply of metal works should be guaranteed its service life, which is not less than 30 years.

Canal

- Lining should be provided to all the length of canals. Concrete lining is strongly recommended taking all the aspects into account.
- Design of canal should be done based on the design criteria of MOSRI(KIMPRASWIL).

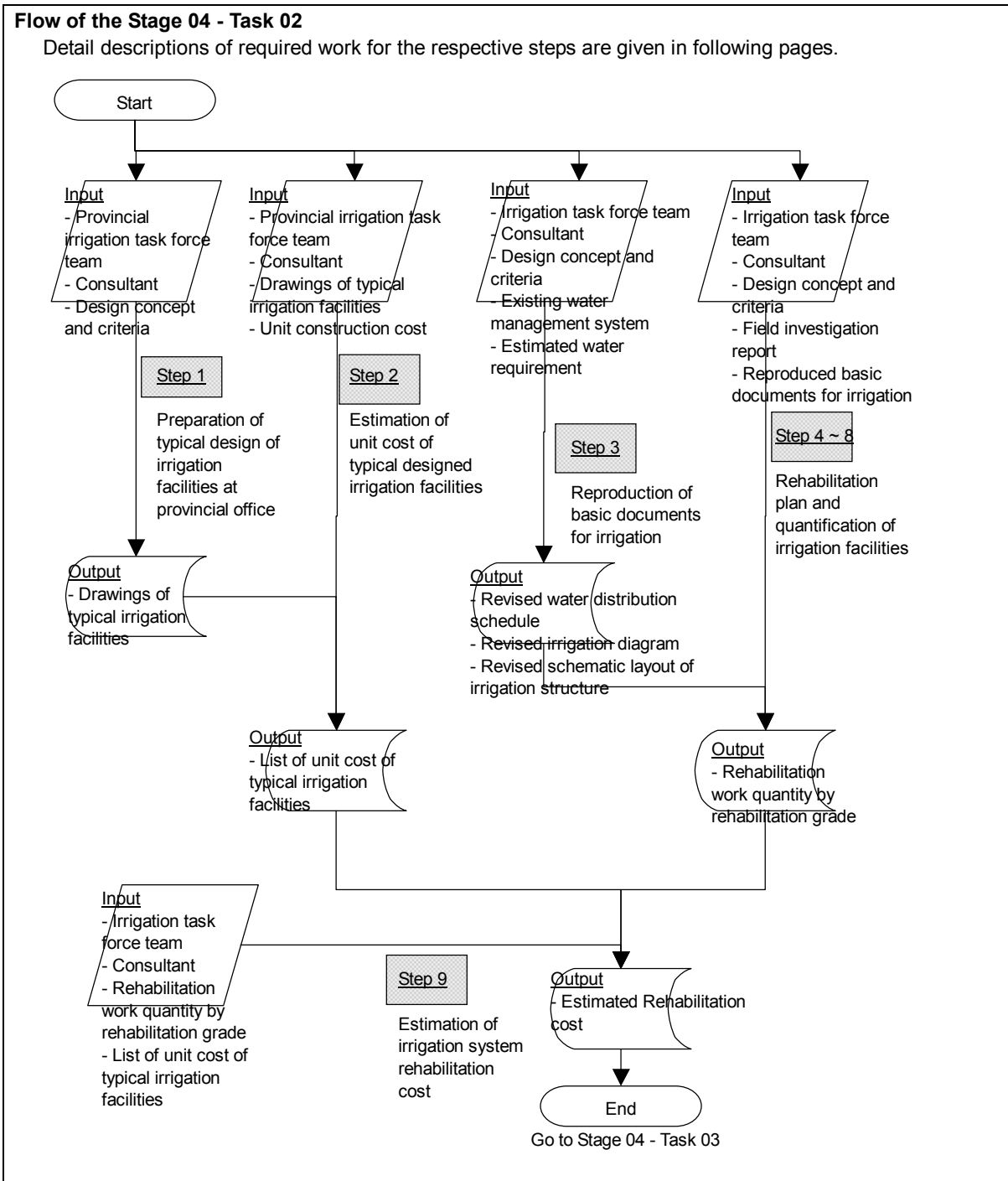
Canal related structure

- Basically, concrete construction should be applied for all the structures, except it is not suits for local condition.
- Design and supply of metal works should be guaranteed its service life, which is not less than 30 years.

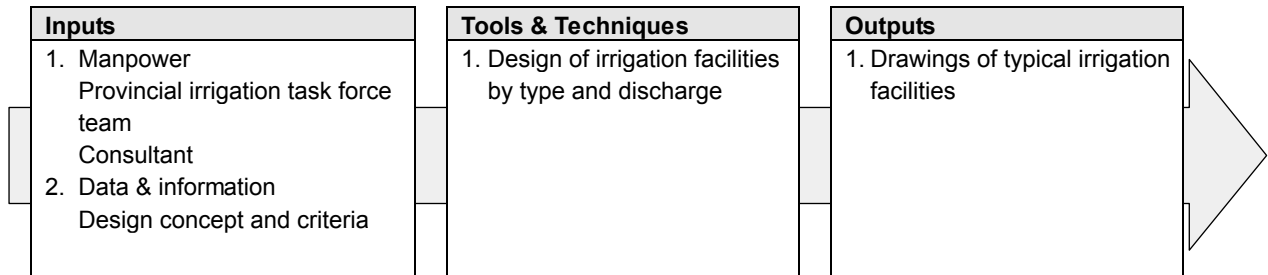
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04	Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes
Task 02	Pre-F/S Level Irrigation System Rehabilitation Plan
Purpose and scope	
<p>The scope of the Task are to:</p> <ol style="list-style-type: none"> 1) Estimate required input for the scheme according to the rehabilitation criteria (Pre-F/S level); and 2) Estimate required cost for irrigation system rehabilitation (Pre-F/S level). 	



Stage 04 - Task 02 Step 01	Preparation of typical design of irrigation facilities at provincial office
---------------------------------------	--



Criteria, standards and references

- A) Ministry of Public Works/JICA. 1999. *Technical Guideline for Rehabilitation & Upgrading of Irrigation Network*.
- B) Ministry of Settlement and Regional Infrastructure. *Manual of Rehabilitation*
- C) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-02 "Headworks"*.
- D) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-03 "Canals"*.
- E) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-04 "Structures"*.
- F) Ministry of Agriculture, Forestry and Fishery of Japan. *Design Criteria for land improvement project, "Headworks"*.

Inputs

1. Manpower

- Provincial irrigation task force team
- Consultant

2. Data & information

- Design concept and criteria

Typical design should be made based on the design concept and criteria decided in Stage 03.

Tools & Techniques

1. Design of irrigation facilities by type and discharge

Following irrigation facilities should be designed with pre-F/S level accuracy.

- 1) Headworks (weir body and gates)
- 2) Intake, civil works
- 3) Intake, mechanical works
- 4) Settling basin by discharge
- 5) Irrigation canal by discharge
- 6) Irrigation canal related structure by discharge, such as;
 - Diversion structure,
 - Off-take,
 - Drop,
 - Bridge,
 - Road crossing (culvert),
 - Drainage crossing,
 - Spillway, etc.
- 7) On-farm development by present land use

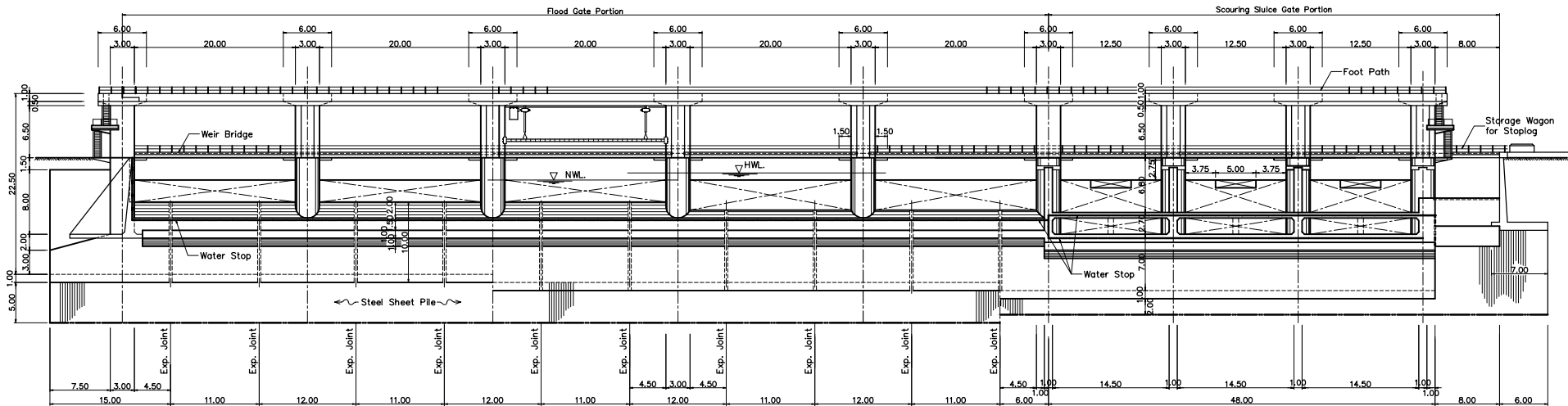
For a classification of discharge, see criteria and standard - D mentioned above (page 27).

For settling basin, sand flush function by supercritical flow is essential. To design that of settling basin, see criteria and standards - F mentioned above.

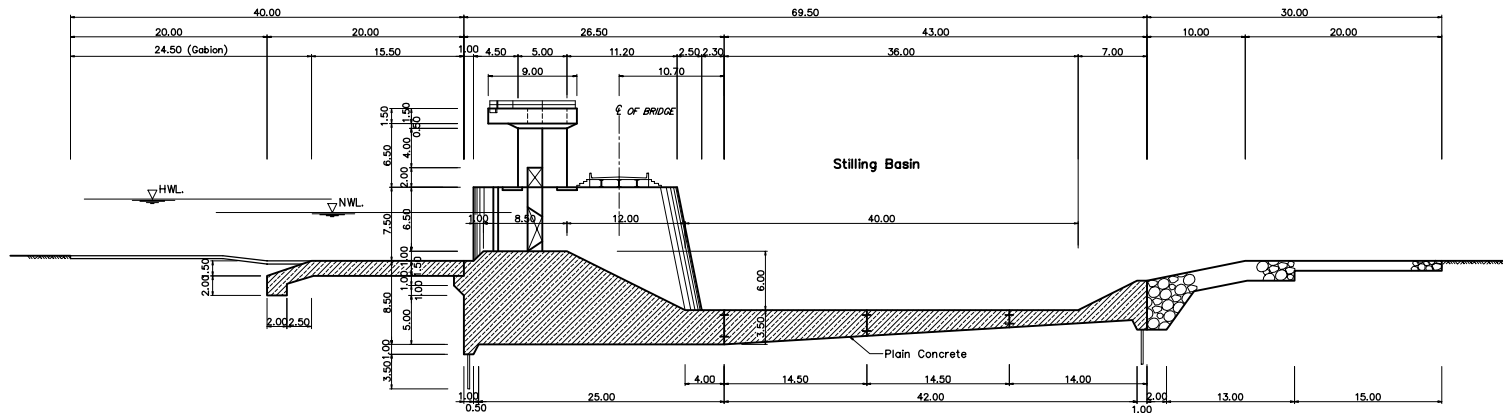
Sample of typical design of irrigation facilities are shown in Sample 04-02-01-01.

Outputs

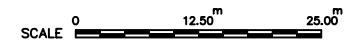
1. Typical design of irrigation facilities



FRONT VIEW



SECTION

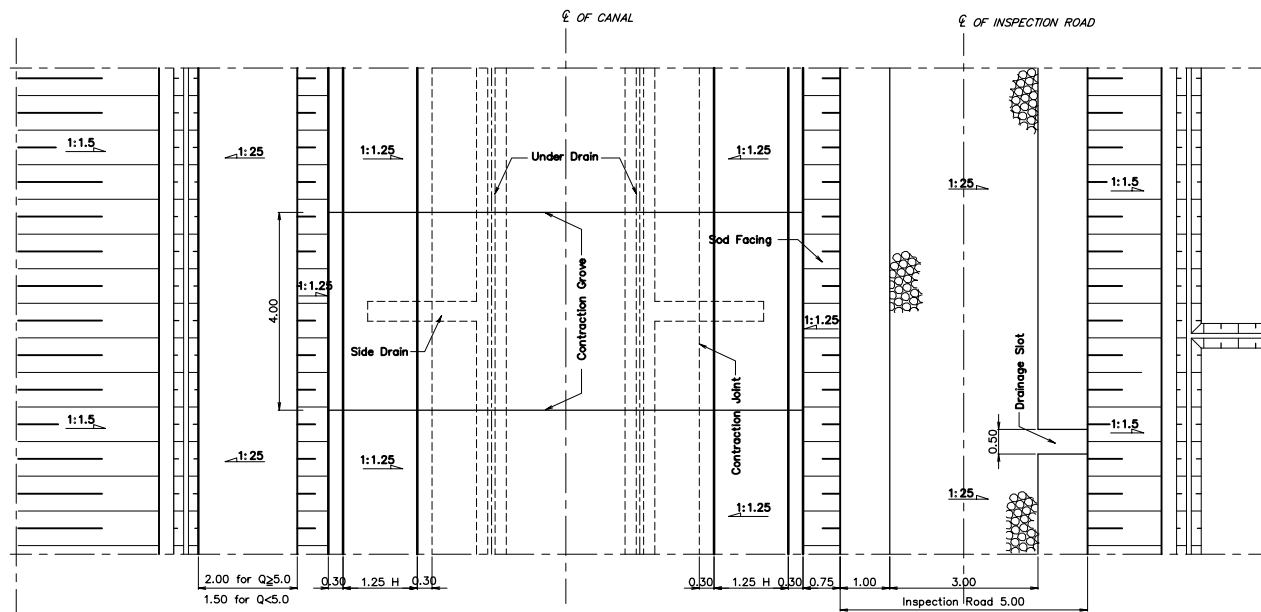


SAMPLE

Note:
All dimensions are in meters
unless specified.

The Study on Comprehensive Recovery Program
of Irrigation Agriculture
Japan International Cooperation Agency

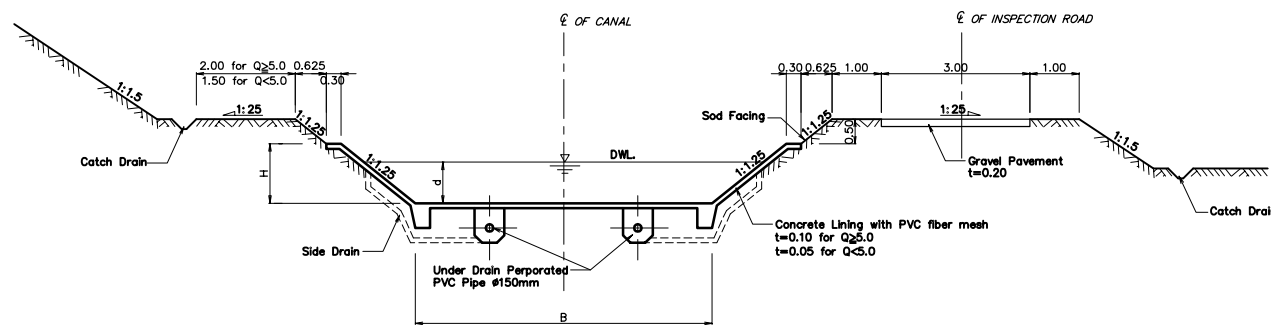
Sample 04-02-01-01 (2/16)
TYPICAL DRAWING
HEADWORKS (Movable Weir Type)



DIMENSION TABLE

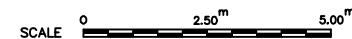
DESIGN DISCHARGE Q (m ³ /s)	B (m)	H (m)	d (m)
0.0-0.5	1.00	1.50	0.90
0.5-1.0	1.00	1.75	1.15
1.0-1.5	1.00	1.95	1.35
1.5-2.0	1.00	2.15	1.55
2.0-4.0	1.00	2.35	1.75
4.0-6.0	1.50	2.55	1.95
6.0-8.0	2.00	2.95	2.20
8.0-10.0	2.50	3.05	3.30
10.0-15.0	3.00	3.35	2.60
15.0-20.0	3.50	3.65	2.90
20.0-25.0	4.00	3.85	3.10
25.0-30.0	4.50	4.05	3.30
30.0-35.0	5.00	4.15	3.40

PLAN



Note:

All dimensions are in meters unless specified.



SECTION

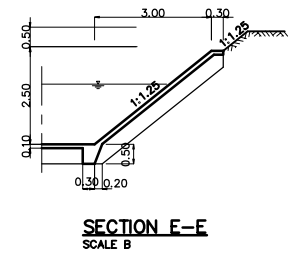
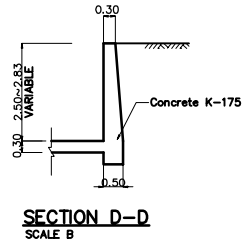
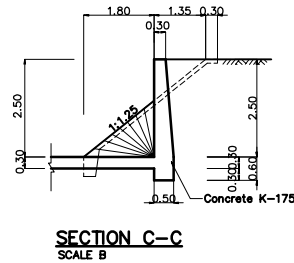
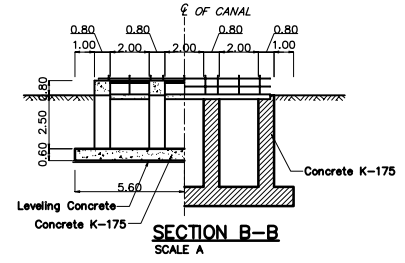
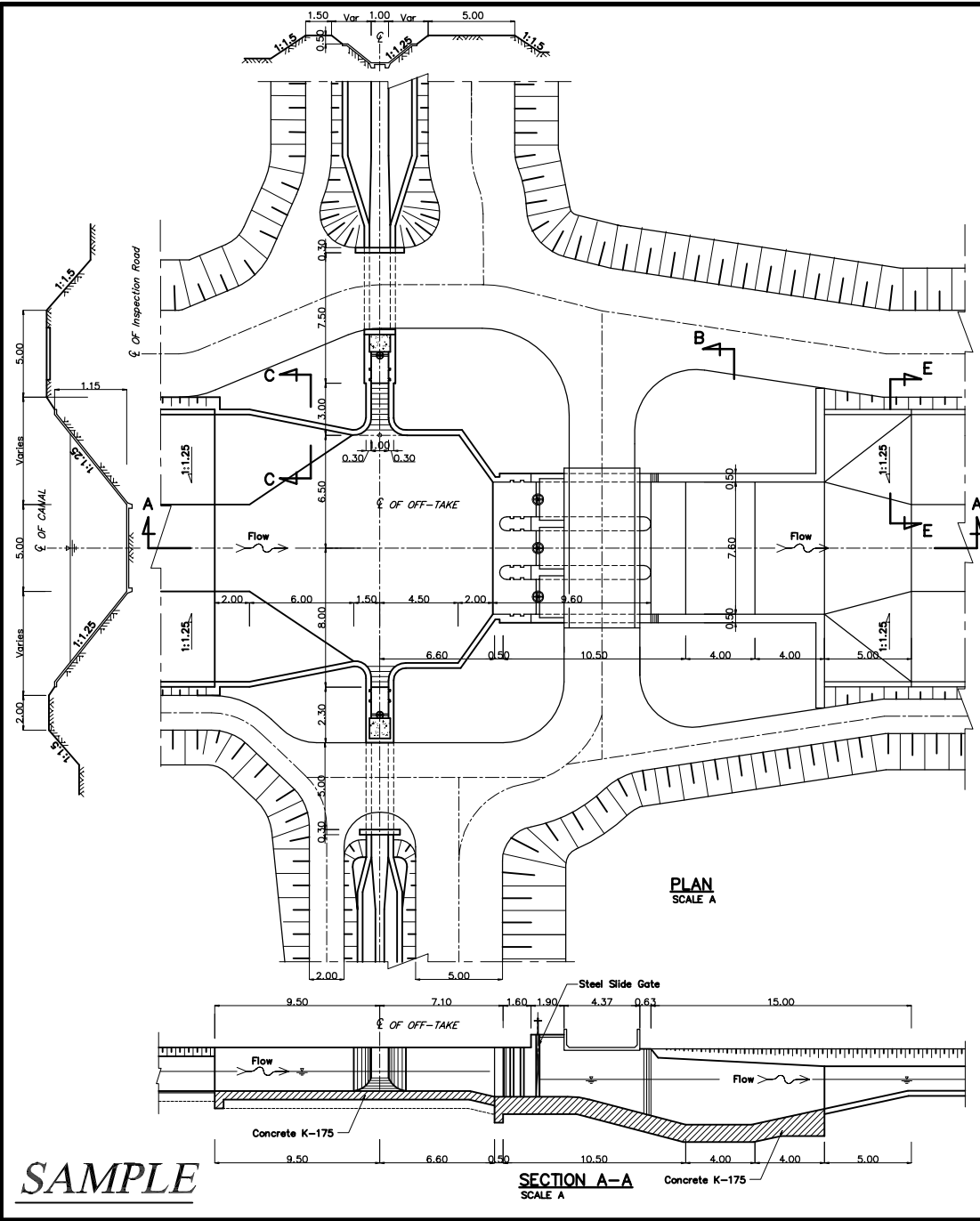
SAMPLE

The Study on Comprehensive Recovery Program
of Irrigation Agriculture

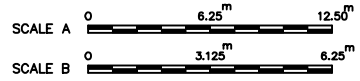
Japan International Cooperation Agency

Sample 04-02-01-01 (4/16)
TYPICAL CROSS SECTION
OF IRRIGATION CANAL

PLATE NO.



Note: All dimensions are in meters unless specified.

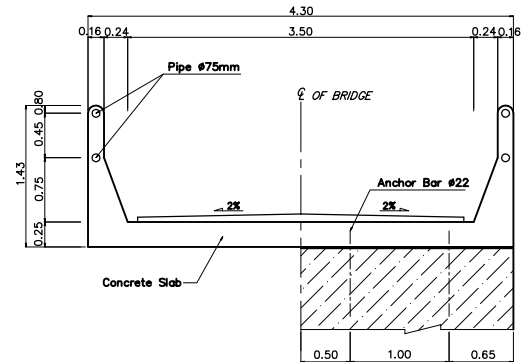
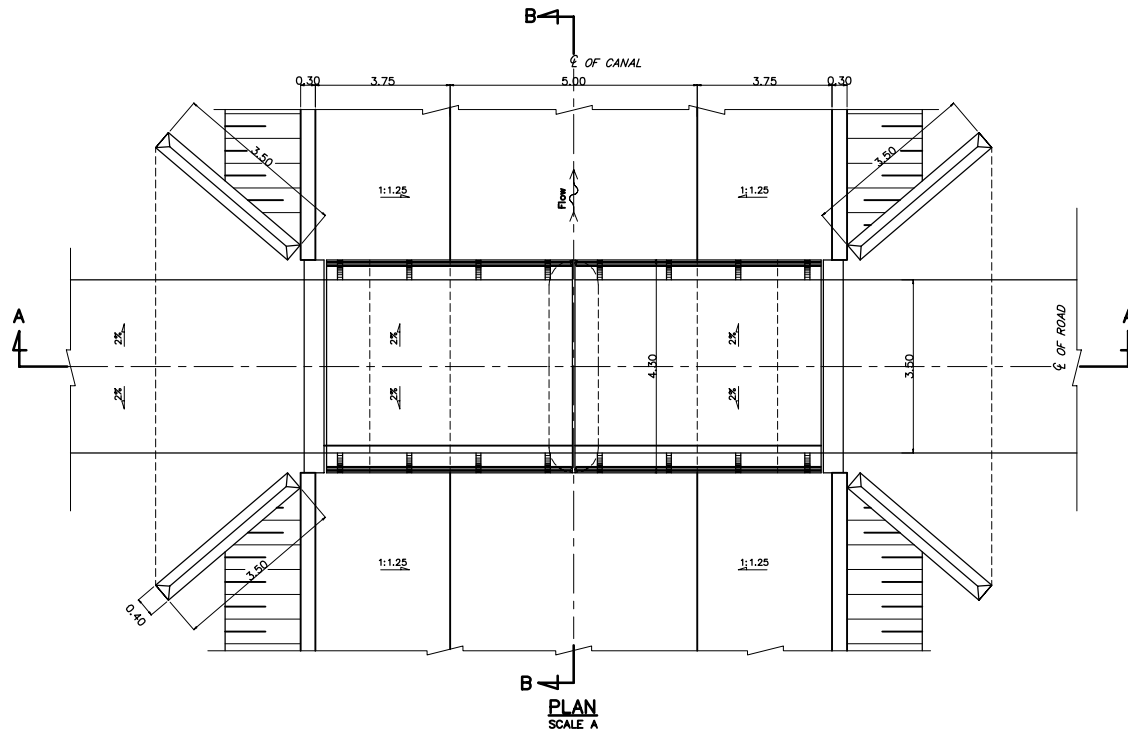


SAMPLE

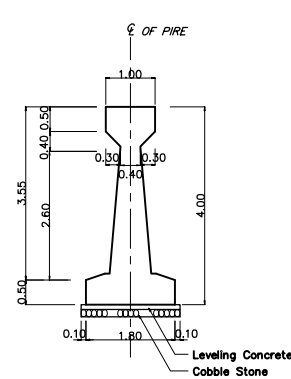
SECTION A-A
SCALE A

The Study on Comprehensive Recovery Program of Irrigation Agriculture
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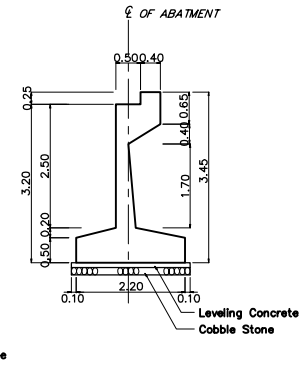
Sample 04-02-01-01 (5/16)
TYPICAL DRAWING
CHECK STRUCTRE & OFF-TAKES



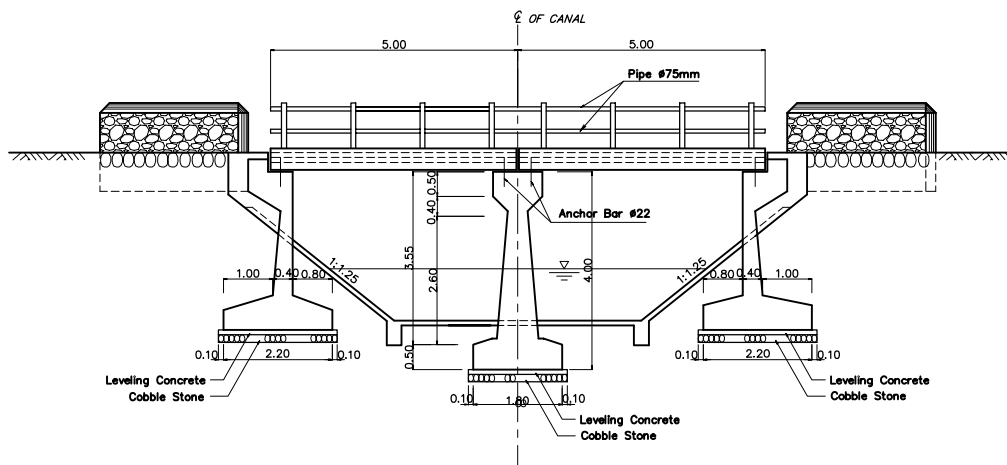
SECTION B-B
SCALE B



PIER
SCALE A

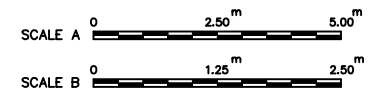


ABUTMENT
SCALE A



SECTION A-A
SCALE A

Note:
All dimensions are in meters
unless specified.

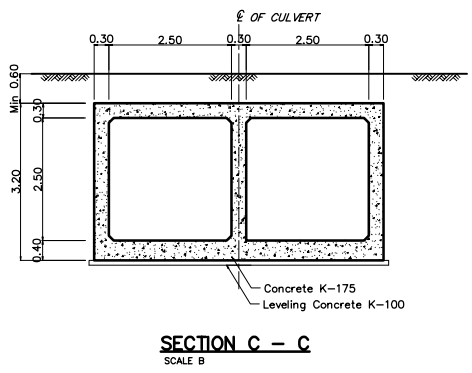
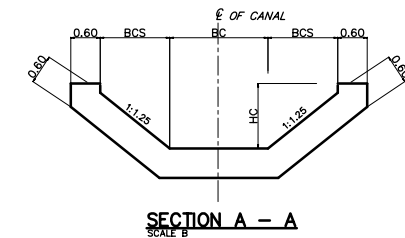
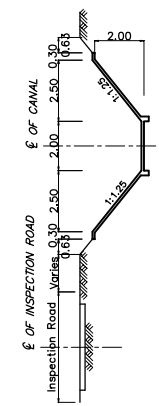
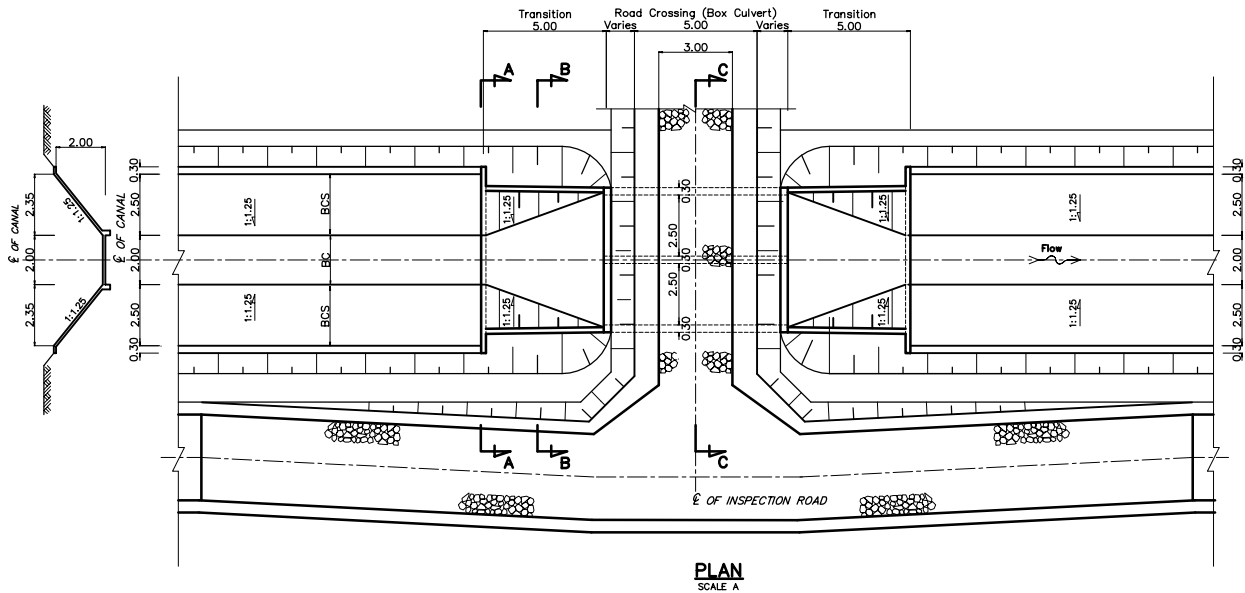


SAMPLE

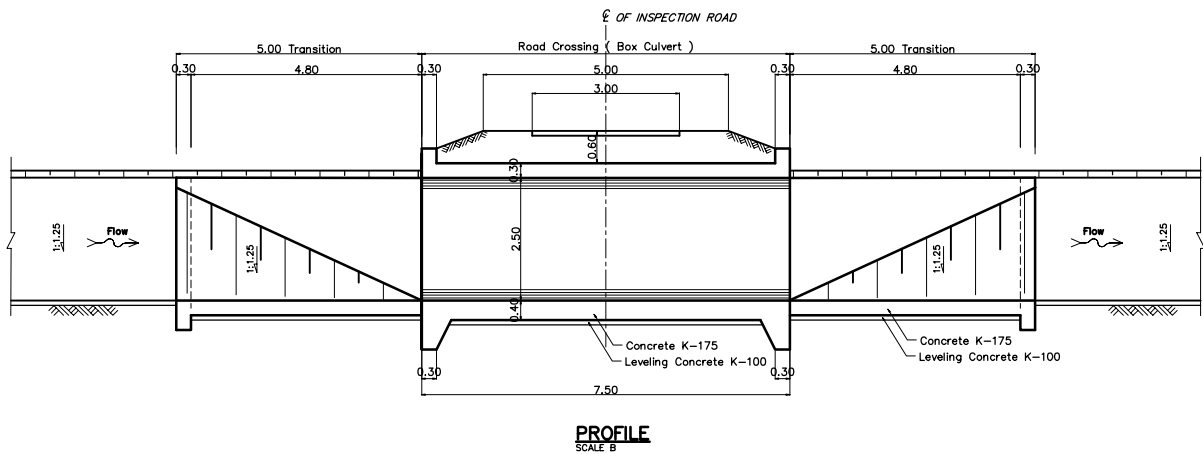
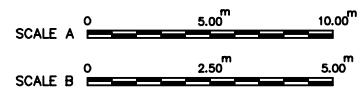
The Study on Comprehensive Recovery Program
of Irrigation Agriculture
Japan International Cooperation Agency

Sample 04-02-01-01 (8/16)
TYPICAL DRAWING
SLAB BRIDGE

PLATE NO.



Note:
All dimensions are in meters unless specified.

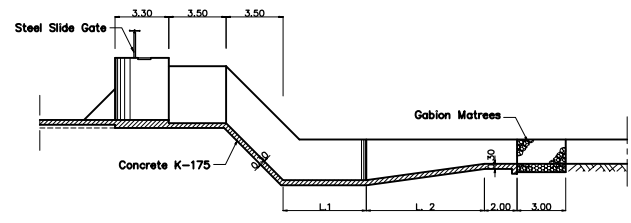


SAMPLE

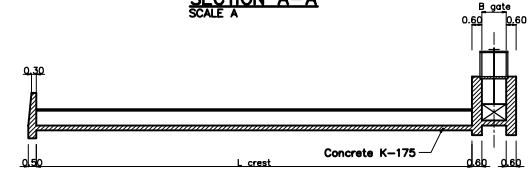
The Study on Comprehensive Recovery Program of Irrigation Agriculture
Japan International Cooperation Agency

Sample 04-02-01-01 (9/16)
TYPICAL DRAWING
ROAD CROSSING CULVERT

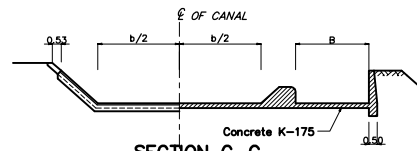
PLATE NO.



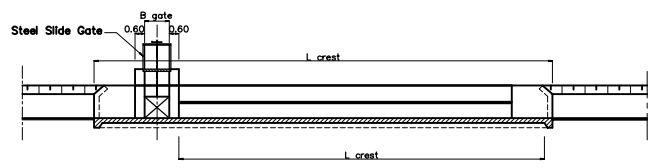
SECTION A-A
SCALE A



SECTION B-B
SCALE A

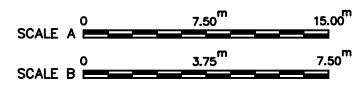


SECTION C-C
SCALE A



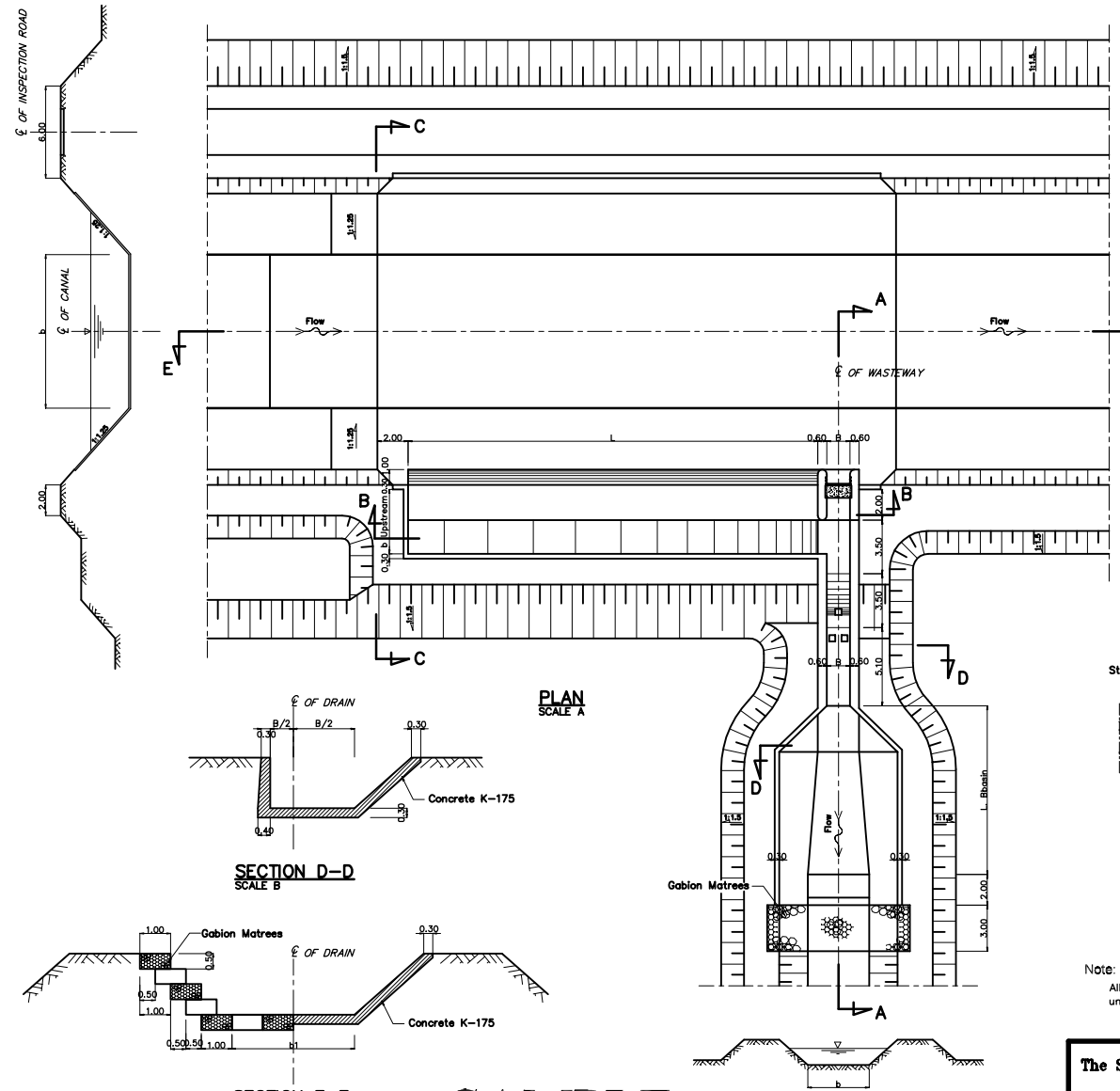
SECTION E-E
SCALE A

Note:
All dimensions are in meters
unless specified.

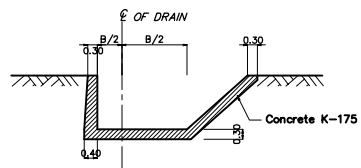


The Study on Comprehensive Recovery Program
of Irrigation Agriculture
Japan International Cooperation Agency

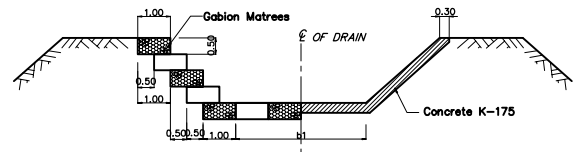
Sample 04-02-01-01 (11/16)
TYPICAL DRAWING
SPILLWAY AND WASTEWAY



PLAN
SCALE A

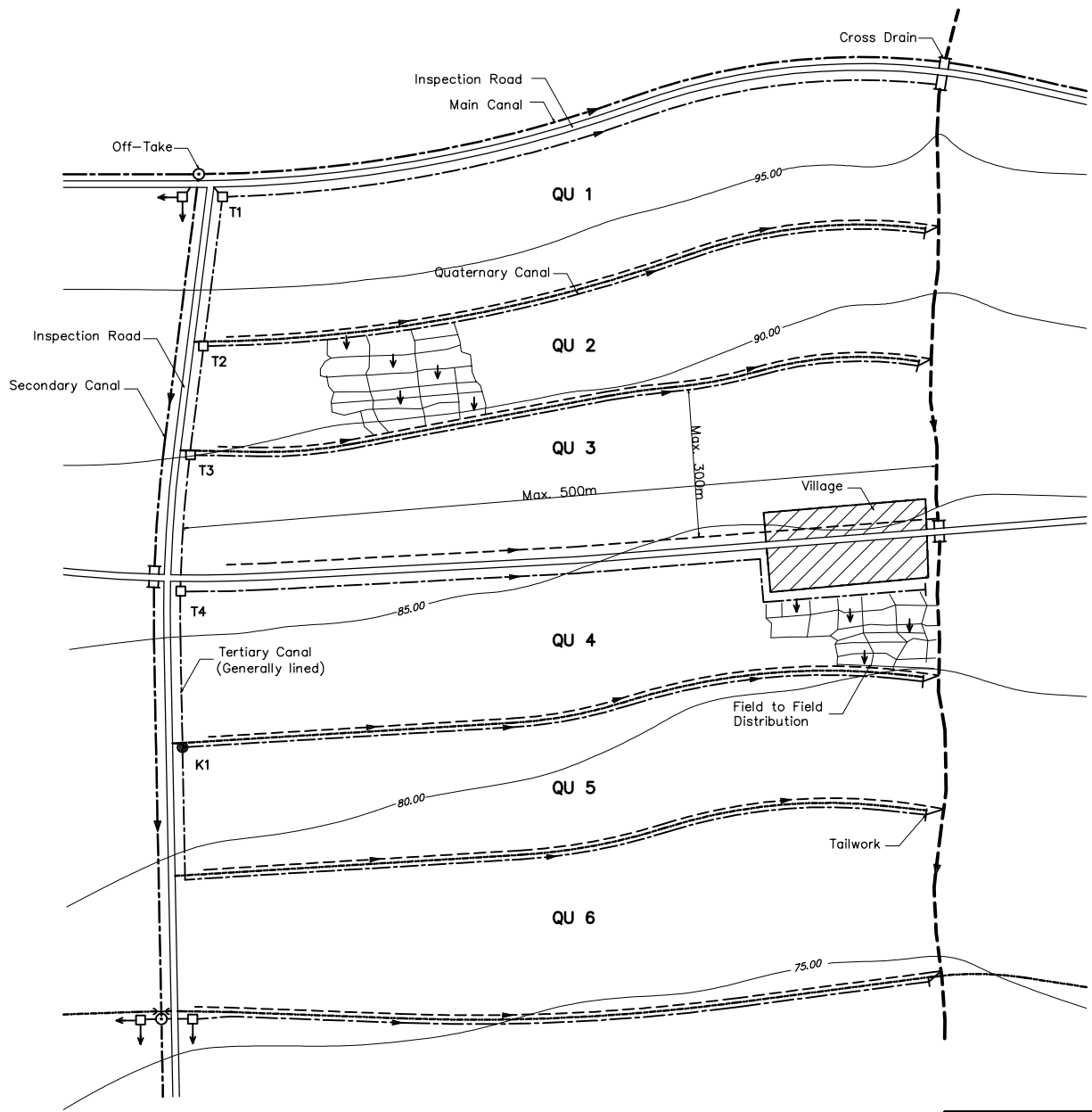


SECTION D-D
SCALE B



SECTION F-F
SCALE B

SAMPLE



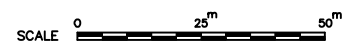
General Criteria for Tertiary Unit Development	
1,	Size of Tertiary Unit 50-100 ha
2,	Size of Quaternary Unit 8-15 ha
3,	Length of Tertiary Canal <1500 m
4,	Length of Quaternary Canal <500 m
5,	Distance between Quaternary Canal and Drainage Canal <300 m

LEGEND

- 5m Contour line
- Inspection Road
- Village
- Paddy Field
- Culvert
- Off-Take
- Tertiary Division Box
- Quaternary Division Box
- Canal with Farm Road
- Drain
- Farm Road
- Flow
- Bridge

4 - 19

SAMPLE

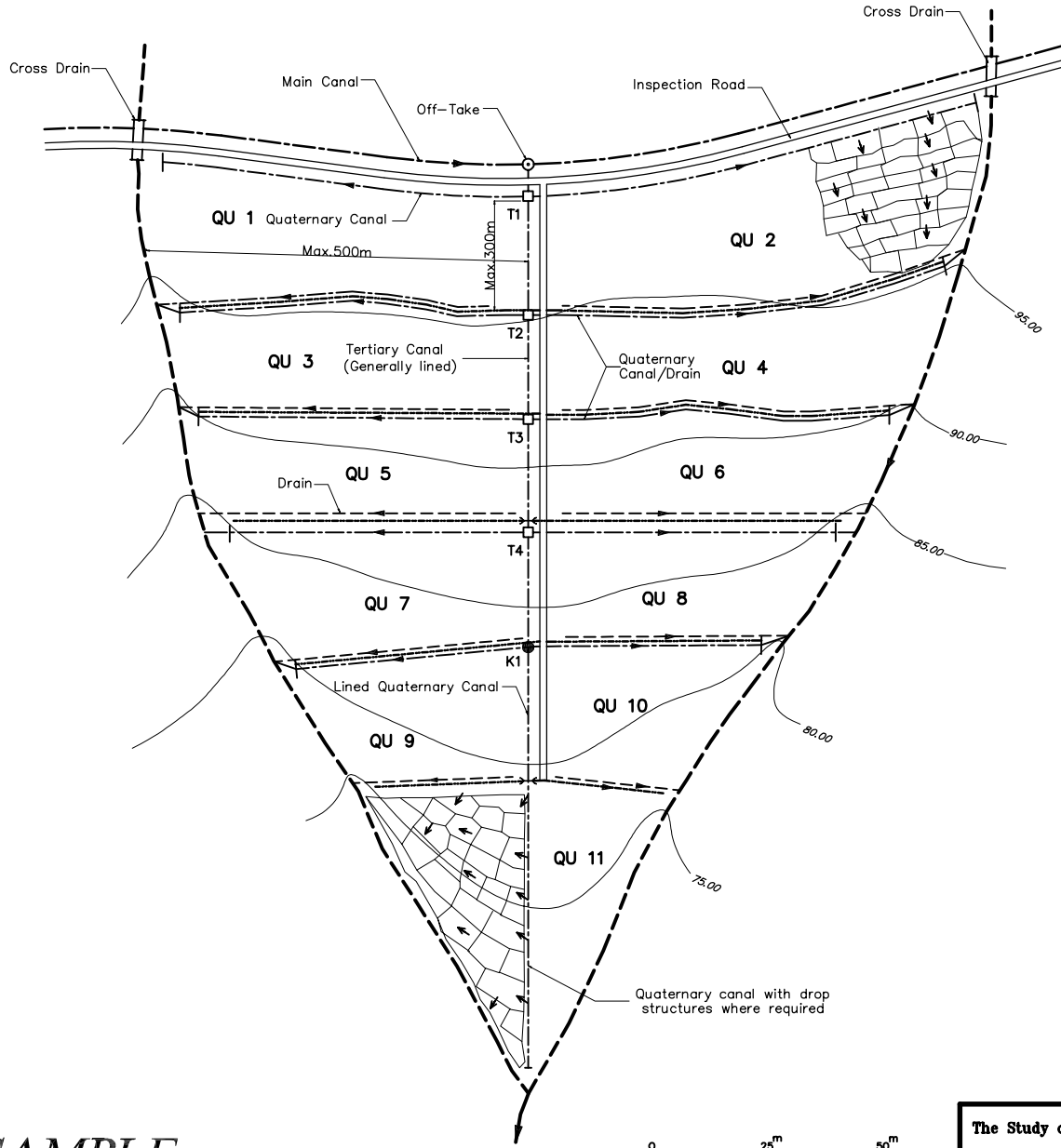


<p>The Study on Comprehensive Recovery Program of Irrigation Agriculture</p> <p>Japan International Cooperation Agency</p>	<p>Sample 04-02-01-01 (12/16)</p> <p>TYPICAL LAYOUT OF TERTIARY UNIT</p> <p>SLOPE LESS THAN 5%</p>
--	--

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

1. Pre-feasibility Study for Prioritization of Irrigation Schemes

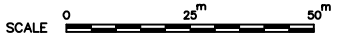
PLATE NO.



General Criteria for Tertiary Unit Development	
1,	Size of Tertiary Unit 50-100 ha
2,	Size of Quaternary Unit 8-15 ha
3,	Length of Tertiary Canal <1500 m
4,	Length of Quaternary Canal <500 m
5,	Distance between Quaternary Canal and Drainage Canal <300 m

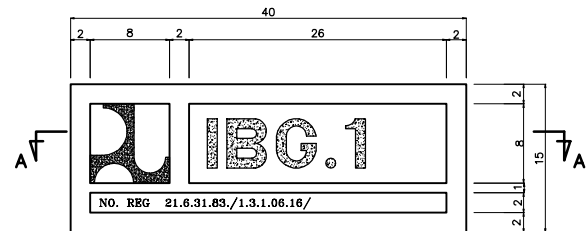
LEGEND

- 5m Contour line
- Inspection Road
- Village
- Paddy Field
- Culvert
- Off-Take
- Tertiary Division Box
- Quaternary Division Box
- Canal with Farm Road
- Drain
- Farm Road
- Flow
- Bridge

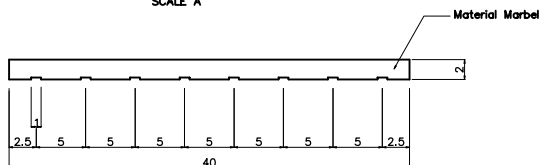


SAMPLE

The Study on Comprehensive Recovery Program of Irrigation Agriculture Japan International Cooperation Agency	Sample 04-02-01-01 (13/16) TYPICAL LAYOUT OF TERTIARY UNIT SLOPE MORE THAN 5%
--	---

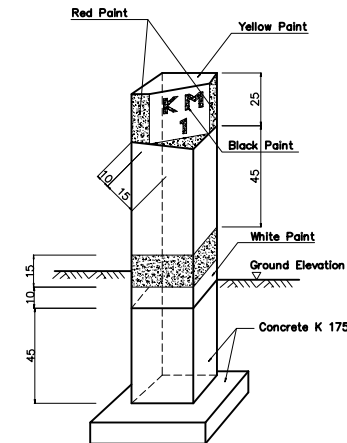
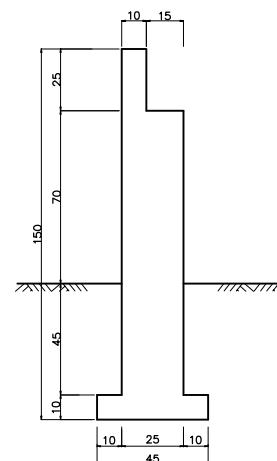


FRONT VIEW
SCALE A

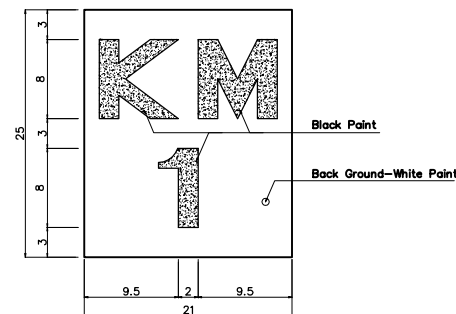


SECTION A-A
SCALE A

NAME PLATE OF STRUCTURE

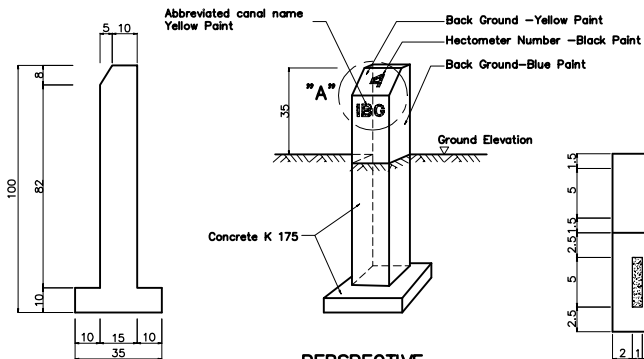


PERSPECTIVE
SCALE B



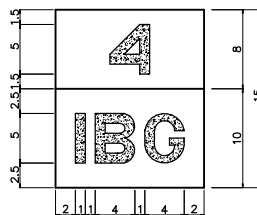
LETTERING DETAIL
SCALE A

KILOMETER POST



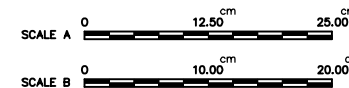
PERSPECTIVE
SCALE B

HECTOMETER POST



DETAIL "A"
SCALE A

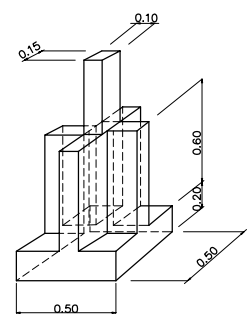
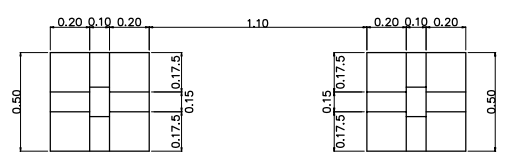
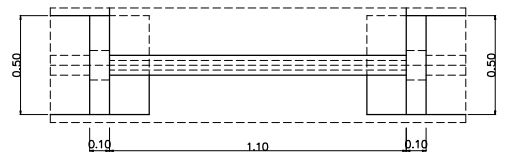
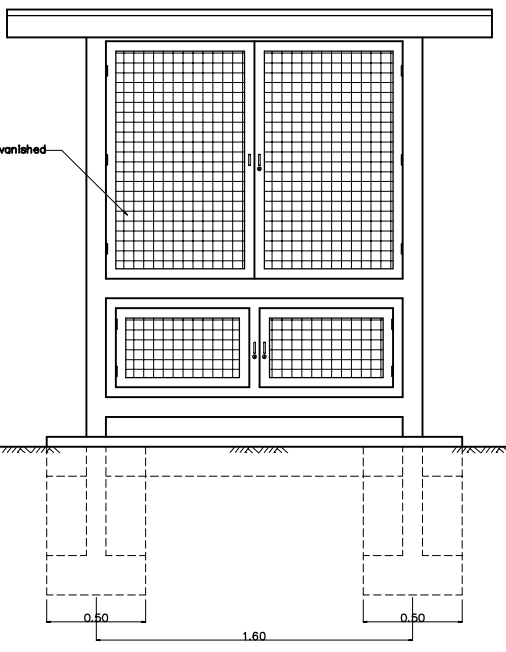
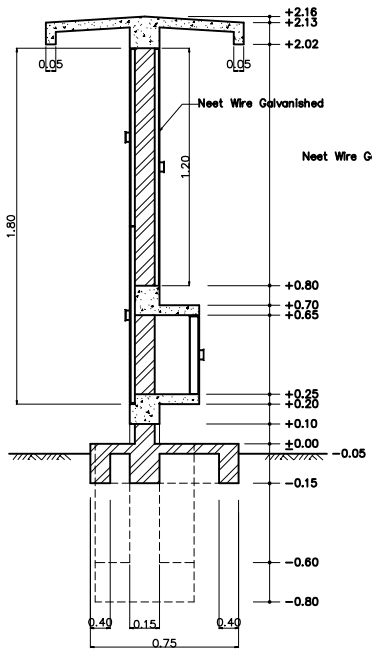
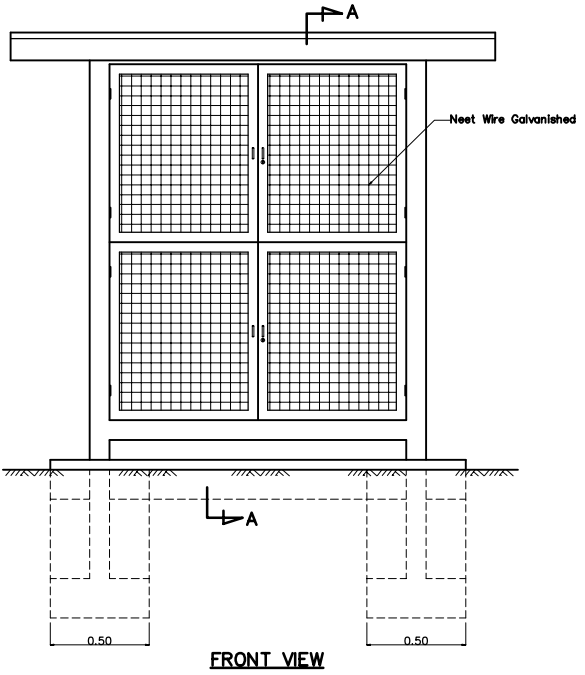
Note:
All dimensions are in centimeters
unless specified.



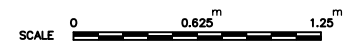
SAMPLE

<p>The Study on Comprehensive Recovery Program of Irrigation Agriculture</p>	<p>Sample 04-02-01-01 (14/16) TYPICAL DRAWING NAME PLATE OF STRUCTURE, KILOMETER & HECTOMETER POST</p>
<p>Japan International Cooperation Agency</p>	

PLATE NO.



Note:
All dimensions are in centimeters unless specified.



PAPAN EKSPLOATASI TERDIRI

Pengamat Pengaliran :
Daerah Irigasi :
Nama Petak Terlarer :
Nama Petak Terlarer :
Nama Petak Irigasi :

Periode Pemberian Air: tgl...../d.....bulan.....19.....

Jenis Tanaman	Luas Rencana Tanaman Pada Petak Terlarer (a)				Kebutuhan Air Normal di Petak/Petak Terlarer (1/500)			
	No.	No.	No.	No.	No.	No.	No.	No.
Padi								
Tebu								
Pelawija								
Jumlah								

Faktor (K) Ditetapkan (b)

Debit Harus Ditalokan	Petak Terlarer Nomor (a)(b)		Petak Terlarer Nomor (a)(b)		Petak Terlarer Nomor (a)(b)		Petak Terlarer Nomor (a)(b)	
	x	x	x	x	x	x	x	x
	1/500	1/500	1/500	1/500	1/500	1/500	1/500	1/500

TABEL DEBIT

H	Q	H	Q

Jenis Pengaliran :
Nama :

PAPAN EKSPLOATASI TERDIRI

Pengamat Pengaliran :
Daerah Irigasi :
Kode/Nama Bangunan Ukur :
Luas Sawah Irigasi :

Periode Pemberian Air: tgl...../d.....bulan.....19.....

Total Rencana Luas Tanaman : Ha

Total Kebutuhan Air Normal Terlarer dan Lain-Lain : 1/500(a)

Total Kehilangan air dan Suosai : 1/500(b)

Total Kebutuhan Air Normal di Bangunan Bagi : 1/500(c)

Faktor (K) Yang Ditetapkan : (d)

Debit Harus Ditalokan (a)(d)+(b) : x + = 1/500(e)

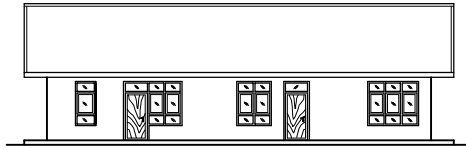
Debit Kenyataan H Cm. Q 1/500(e)

TABEL DEBIT

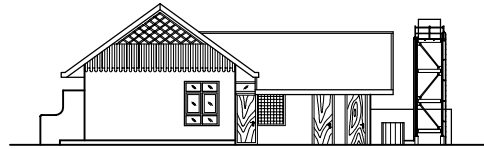
H	Q	H	Q

Jenis Pengaliran : 18....
Nama :

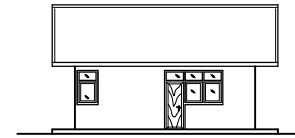
SAMPLE



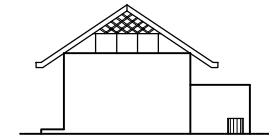
FRONT VIEW



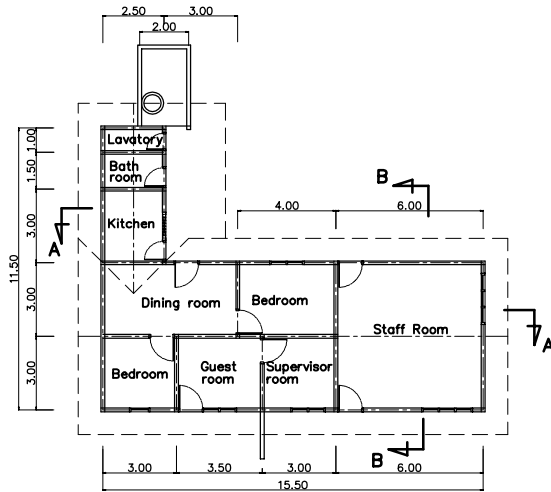
RIGHT SIDE VIEW



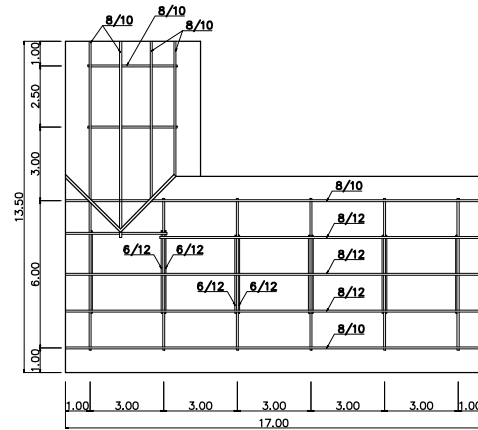
FRONT VIEW



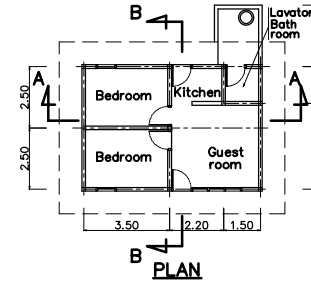
RIGHT SIDE VIEW



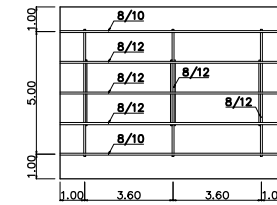
PLAN



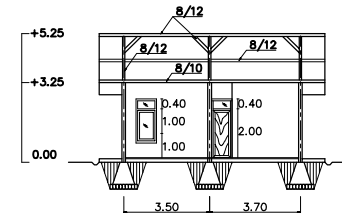
ROOF PLAN



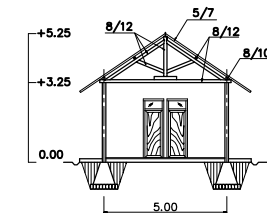
B PLAN



ROOF PLAN



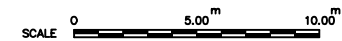
SECTION A-A



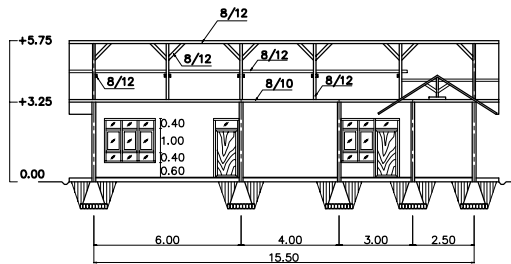
SECTION B-B

GATE KEEPER HOUSE A=36m²

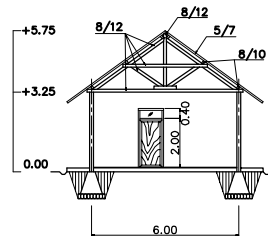
Note: All dimensions are in meters unless specified.



4 - 23



SECTION A-A



SECTION B-B

OPERATION OFFICE A= 120m²

SAMPLE

The Study on Comprehensive Recovery Program of Irrigation Agriculture

Japan International Cooperation Agency

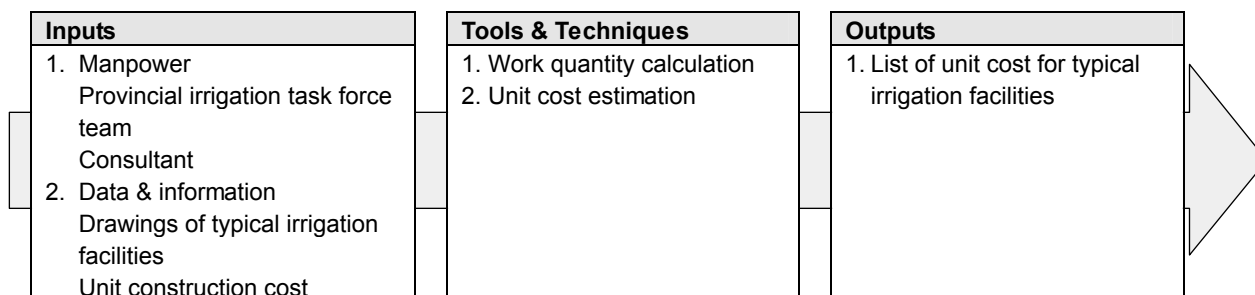
Sample 04-02-01-01 (16/16)

TYPICAL DRAWING
OPERATION OFFICE AND
GATE KEEPER HOUSE

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 02 Step 02	Estimation of unit cost of typical designed irrigation facilities
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Criteria, standards and references
None

Inputs

1. Manpower

Provincial irrigation task force team
 Consultant

2. Data & information

Drawings of typical irrigation facilities
 Unit construction cost (Sample of unit construction cost for North Sumatra, Central Java, South Sulawesi provinces at year 2003 price is attached.)

Tools & Techniques

1. Work quantity calculation

Work quantity for typical irrigation facilities by type and discharge should be taken. The work quantity of typical irrigation facilities should be calculated assuming that the facilities are for new construction.

2. Unit cost estimation of typical irrigation facilities

From calculated work quantity and unit construction cost, unit cost for typical irrigation facilities should be estimated. Unit cost should include that 1) cost for demolishing old facilities, and 2) cost for reconstruction of the facilities. It is recommended that the cost should be estimated in following unit. Sample of unit cost estimation for North Sumatra, Central Java, South Sulawesi provinces at year 2003 price is shown in Sample 04-02-02-01.

Type of Irrigation Facility	Recommended unit for pre-F/S level cost estimate	
Headworks (weir body and gates)	m (length of weir)	Rp. / m
Intake (civil works)	Nos. of barrels	Rp. / nos.
Intake (mechanical works)	Nos. of gates	Rp. / nos.
Irrigation and drainage canals	m (length of canal)	Rp. / m
Irrigation and drainage canals related structure	Nos. of structure	Rp. / nos.
Terminal facility and On-farm	ha (area)	Rp. / ha

3. Unit cost estimation by rehabilitation grade

Through the above-mentioned work, unit cost for replacement of irrigation facility is obtained. In addition to that, unit cost of typical irrigation facilities by rehabilitation grade should be estimated. For pre-F/S level cost estimate, following assumption can be applied.

Rehabilitation Grade	Work of rehabilitation	Cost
RG 1	No rehabilitation	No cost considered
RG 2	Minor rehabilitation	Cost is 30 % of replacement
RG 3	Large scale rehabilitation	Cost is 50 % of replacement
RG 4	Replacement	Cost is 100 % of replacement

Outputs

1. List of unit cost for typical irrigation facilities by rehabilitation grade

List of unit cost for typical irrigation facilities is obtained through the work of this step. The list should be distributed to respective Balai PSDA.

Sample 04-02-02-01 (1/5)
Sample of Unit Price of Construction Works
at Year 2003 Price

Work Item	Unit	Price
(Unit: Rp.)		
1. Earthworks		
1.1 Excavation, common	m3	13,000
1.2 Excavation, rock	m3	60,000
1.3 Excavation, canal inside for rehabilitation	m3	25,000
1.4 Embankment (Backfilling)	m3	30,000
1.5 Gravel pavement	m2	100,000
1.6 Asphalt pavement	m2	200,000
1.7 Sod facing	m2	6,000
1.8 Removal of sediment soil from canal	m3	25,000
1.9 Demolishing of concrete	m3	100,000
2. Concrete works		
2.1 Concrete, N=23	m3	400,000
2.2 Concrete, N=18	m3	350,000
2.3 Lining concrete, N=16	m3	400,000
2.4 Foundation concrete N=13	m3	320,000
2.5 Reinforcing bar	ton	6,000,000
2.6 Form works	m2	100,000
2.7 Gravel filter for under drain	m3	200,000
2.8 Masonry works	m3	250,000
2.9 Structure steel works	ton	20,000,000
2.10 Kilometer & Hect. Post	nos.	100,000
3. Gate & Metal works		
3.1 Gate, large scale	ton	40,000,000
3.2 Gate, medium to small scale	ton	30,000,000
3.3 Screen/Metal works	ton	25,000,000
4. On-farm development (grouped by existing land use)		
4.1 Potential area (Irrigation area)	ha	2,000,000
4.2 Potential area (Non-irrigation area)	ha	2,500,000
4.3 Potential area (Non-paddy area)	ha	5,000,000
4.4 Non-potential area (Paddy area)	ha	2,500,000
4.5 Non potential area (Non-Paddy area)	ha	5,000,000
5. Project Facilities		
5.1 Gate keepers house (50m2/site)	house	30,000,000
5.2 Field car	nos.	300,000,000
5.3 Motor cycle	nos.	20,000,000
5.4 Computers and Copy machines (1000-2000ha)	L.S.	100,000,000
5.5 Computers and Copy machines (2000-5000ha)	L.S.	150,000,000
5.6 Computers and Copy machines (5000-10000ha)	L.S.	250,000,000
5.7 Computers and Copy machines (10000-ha)	L.S.	400,000,000

Sample 04-02-02-01 (2/5)
Sample Unit Price of Weir Rehabilitation
at Year 2003 Price

		(Unit: Rp.)
Work Item	Unit	Price
Headworks (Civil & Metal)		
Minor rehabilitation	L.S.	792,320,000
Large scale rehabilitation	L.S.	396,160,000
Replacement	m	113,000,000
Intake (Civil)		
Minor rehabilitation	barrel	75,564,000
Large scale rehabilitation	barrel	113,346,000
Replacement	barrel	251,880,000
Intake (Gate)		
Minor rehabilitation	gate	25,500,000
Large scale rehabilitation	gate	42,500,000
Replacement	gate	85,000,000

Sample 04-02-02-01 (3/5)
Sample Unit Price of Settling Basin Rehabilitation
at Year 2003 Price

				(Unit: million Rp.)
Design Discharge (m ³ /s)	Rehabilitation Grade			
	RG2	RG3	RG4	
	Minor rehabilitation	Large scale rehabilitation	Replacement	
0.0-0.5	329	549	1,097	
0.5-1.0	360	600	1,200	
1.0-1.5	391	651	1,302	
1.5-2.0	421	702	1,404	
2.0-4.0	544	906	1,812	
4.0-6.0	666	1,110	2,221	
6.0-8.0	799	1,332	2,663	
8.0-10.0	932	1,553	3,106	
10.0-15.0	1,532	2,553	5,105	
15.0-20.0	2,213	3,689	7,377	
20.0-25.0	2,596	4,327	8,654	
25.0-30.0	3,079	5,131	10,262	
30.0-35.0	3,461	5,769	11,538	

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation
Plan and Third Screening of Irrigation Schemes

Sample 04-02-02-01 (4/5)

Sample Unit Price of Canal Rehabilitation at Year 2003 Price

(Unit: thousand Rp./m)

Design Discharge (m ³ /s)	Present Canal Condition				
	Case-1. No canal (new construction)	Case-2. Main Canal without existing inspection road	Case-3. Main Canal with existing inspection road	Case-4. Secondary Canal without existing	Case-5. Secondary Canal with existing
0.0-0.5	750	1,092	828	791	665
0.5-1.0	840	1,225	930	909	761
1.0-1.5	925	1,333	1,014	1,007	840
1.5-2.0	1,022	1,441	1,097	1,106	918
2.0-4.0	1,131	1,554	1,182	1,206	998
4.0-6.0	1,283	1,709	1,312	1,353	1,123
6.0-8.0	1,673	2,065	1,612	1,687	1,412
8.0-10.0	1,790	2,178	1,711	1,794	1,507
10.0-15.0	2,085	2,416	1,905	2,014	1,692

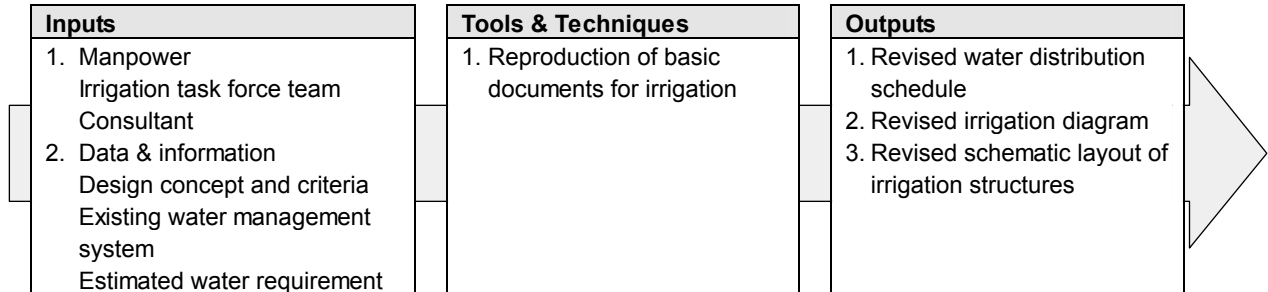
Sample 04-02-02-01 (5/5)

Sample Unit Price of Canal Related Structure at Year 2003 Price

(Unit: thousand Rp./nos.)

Design Discharge (m ³ /s)	Type of Structure						
	Check	Off-take	Bridge	Road Crossing Culvert	Spillway	Drop	Drainage Culvert
0.0-0.5	190,242	35,040	61,032	27,706	122,472	95,228	55,411
0.5-1.0	206,904	42,636	120,495	36,968	198,360	112,154	73,937
1.0-1.5	223,566	50,232	130,796	92,312	256,848	176,474	184,624
1.5-2.0	240,228	57,828	151,106	107,482	307,752	189,410	214,964
2.0-4.0	306,876	88,212	155,300	116,058	379,440	205,702	232,116
4.0-6.0	351,360	150,456	173,028	129,732	448,128	226,966	259,464
6.0-8.0	510,816	227,184	185,495	147,265	581,160	237,418	294,529
8.0-10.0	677,844	267,888	208,198	154,075	684,192	256,265	308,150
10.0-15.0	736,488		222,656	170,172	811,968	264,233	340,344

Stage 04 - Task 02 Step 03	Reproduction of basic documents for irrigation
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Criteria, standards and references
A) Ministry of Public Works. 1986. <i>Irrigation Design Standards, Design Criteria, KP-01 "Irrigation System Design"</i> .

Inputs

- 1. Manpower**
Irrigation task force team
Consultant
- 2. Data & information**

Design concept and criteria	Design concept and criteria established in Stage 03.
Existing water management system	Existing O&M manual, existing irrigation diagram, existing schematic layout of irrigation structures, present water management activities, etc.
Estimated water requirement	Estimated water requirement in Stage 04 - Task 02.

Tools & Techniques

- 1. Review of existing system by using design check list**
The existing irrigation system was designed assuming that the government will operate and maintain main part of the irrigation system. Considering with this matter, it can be said that the existing irrigation system might not be suitable for WUAs' managed irrigation. Review of existing irrigation system is thus required.
- 2. Re-design of irrigation system**
If it is judged that existing irrigation system is not suitable for WUAs' managed irrigation, the system should be re-designed. Design should be conducted based on the criteria and standards-A mentioned above.

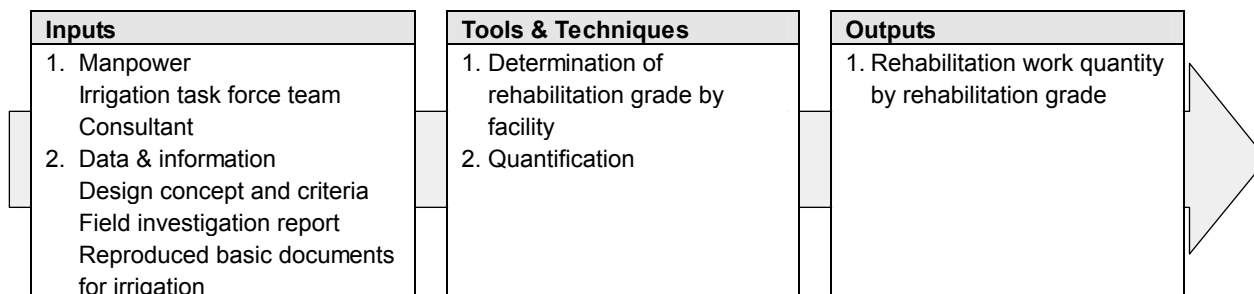
Outputs

- 1. Revised water distribution schedule**
- 2. Revised irrigation diagram**
- 3. Revised schematic layout of irrigation structures**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 02 Step 04	Water resources facility rehabilitation plan and quantification
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Criteria, standards and references

- A) Ministry of Public Works/JICA. 1999. *Technical Guideline for Rehabilitation & Upgrading of Irrigation Network*.
- B) Ministry of Settlement and Regional Infrastructure. *Manual of Rehabilitation*
- C) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-02 "Headworks"*.

Inputs

- 1. Manpower**
 Irrigation task force team
 Consultant
- 2. Data & information**
 - 1) Concept for application of rehabilitation grade
 - 2) Field investigation report
 - 3) Reproduced basic documents for irrigation

Tools & Techniques

- 1. Determination of rehabilitation grade by facility**
 Rehabilitation grade for water resource facility (1. weir body and gates, 2. intake, civil works, and 3. intake, mechanical works) and settling basin should be determined by present condition and age of structure. Following is the general criteria for water resources facility rehabilitation.

Age of the facility	Evaluation of Present Condition	Rehabilitation Grade		
		Grade	Description	
More than 50 years	A - D	>	RG 4	Replacement
	A - C	>	RG 3	Large scale rehabilitation (cost is about 50 % of replacement)
Less than 30 years	D	>	RG 4	Replacement
	A	>	RG 1	No rehabilitation
	B	>	RG 2	Minor rehabilitation (cost is about 30 % of replacement)
	C	>	RG 3	Large scale rehabilitation (cost is about 50 % of replacement)
	D	>	RG 4	Replacement

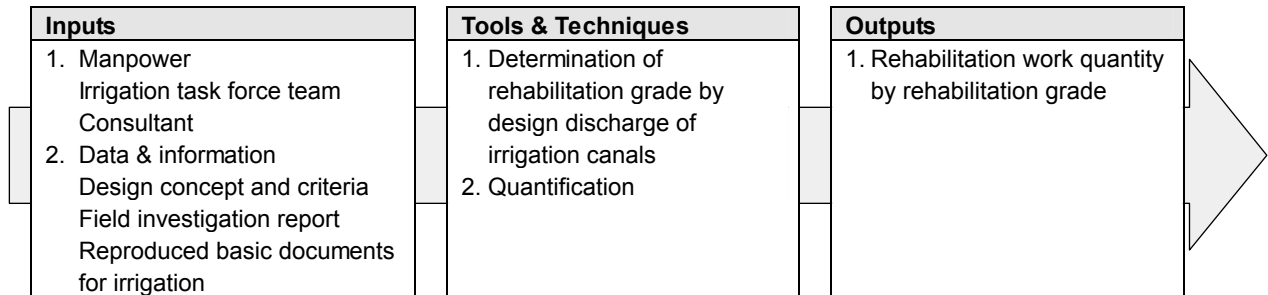
2. Quantification

Quantification of rehabilitation works should be made by irrigation expert.

Outputs

- 1. Rehabilitation work quantity by rehabilitation grade**

Stage 04 - Task 02 Step 05	Irrigation canals rehabilitation plan and quantification
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Criteria, standards and references
A) Ministry of Public Works/JICA. 1999. <i>Technical Guideline for Rehabilitation & Upgrading of Irrigation Network</i> .
B) Ministry of Settlement and Regional Infrastructure. <i>Manual of Rehabilitation</i>
C) Ministry of Public Works. 1986. <i>Irrigation Design Standards, Design Criteria, KP-03 "Canals"</i> .

Inputs

1. **Manpower**
Irrigation task force team
Consultant
2. **Data & information**
 - 1) Concept for application of rehabilitation grade
 - 2) Field investigation report
 - 3) Reproduced basic documents for irrigation

Tools & Techniques

1. Determination of rehabilitation grade by design discharge of irrigation canals

Rehabilitation grade for irrigation canals should be determined by design discharge of irrigation canals. The rehabilitation grade of canals should be decided by present condition, age of structure, design discharge, and type of present cross section.

Following is the general criteria for irrigation canals rehabilitation.

Age of the facility	Classification of Present Condition	Rehabilitation Grade		
		Grade	Description	
More than 20 years	A - D	>	RG 4	Replacement
10 - 20 years	A - C	>	RG 4 & RG 3	50 % of the length needs replacement (RG4) and 50 % of the length needs large scale rehabilitation (RG3)
	D	>	RG 4	Replacement
Less than 10 years	A	>	RG 1	No rehabilitation
	B	>	RG 2	Minor rehabilitation (cost is about 30 % of replacement)
	C	>	RG 3	Large scale rehabilitation (cost is about 50 % of replacement)
	D	>	RG 4	Replacement

2. Quantification

Quantification of rehabilitation works should be made by irrigation expert based on the basic documents for irrigation, such as irrigation diagram. The result of quantification should be summarized in Form 04-02-05-01. Sample input of Form 04-02-05-01 is shown in Sample 04-02-05-02.

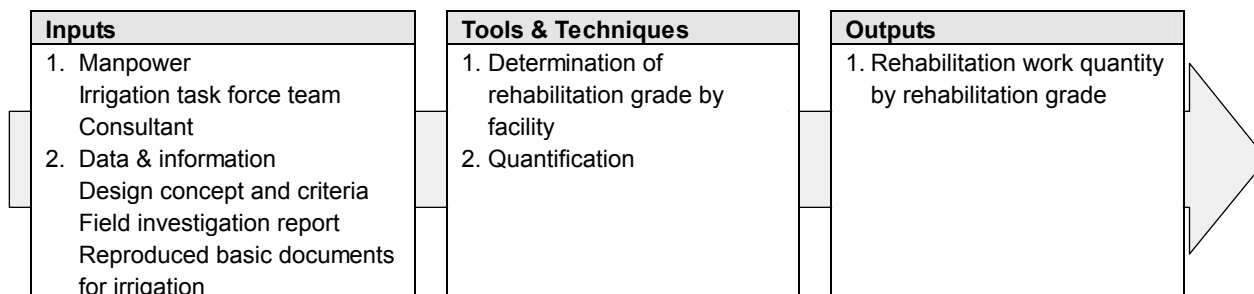
Outputs

1. **Rehabilitation work quantity by rehabilitation grade**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 02 Step 06	Irrigation canals related structures rehabilitation plan and quantification
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Criteria, standards and references

- A) Ministry of Public Works/JICA. 1999. *Technical Guideline for Rehabilitation & Upgrading of Irrigation Network*.
- B) Ministry of Settlement and Regional Infrastructure. *Manual of Rehabilitation*
- C) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-04 "Structures"*.

Inputs

- 1. Manpower**
 Irrigation task force team
 Consultant
- 2. Data & information**
 - 1) Concept for application of rehabilitation grade
 - 2) Field investigation report
 - 3) Reproduced basic documents for irrigation

Tools & Techniques

- 1. Determination of rehabilitation grade by facility**
 Rehabilitation grade for irrigation canals related structures should be determined by design discharge of structures. The rehabilitation grade for irrigation canals related structures should be decided by present condition, age of structure, design discharge, and type of structure.
 Following is the general criteria for irrigation canal related structure rehabilitation.

Age of the facility	Classification of Present Condition	Rehabilitation Grade		
		Grade	Description	
More than 50 years	A - D	>	RG 4	Replacement
	A - C	>	RG 3	Large scale rehabilitation (cost is about 50 % of replacement)
Less than 30 years	D	>	RG 4	Replacement
	A	>	RG 1	No rehabilitation
	B	>	RG 2	Minor rehabilitation (cost is about 30 % of replacement)
	C	>	RG 3	Large scale rehabilitation (cost is about 50 % of replacement)
	D	>	RG 4	Replacement

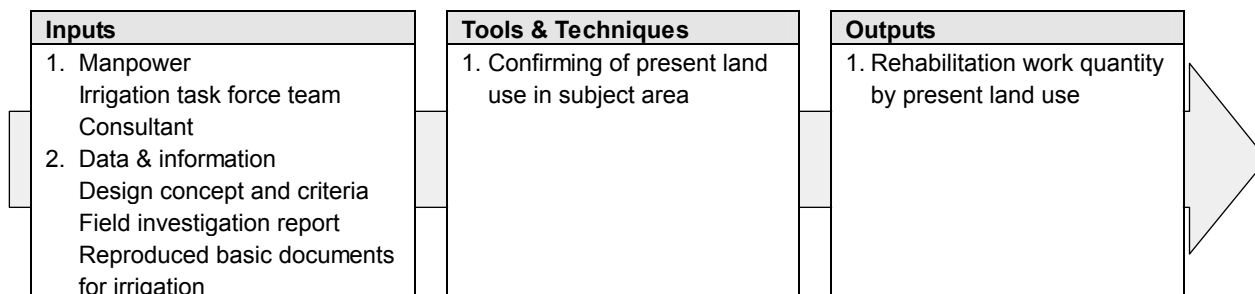
2. Quantification

Quantification of rehabilitation works should be made by irrigation expert based on the basic documents for irrigation, such as, schematic layout of irrigation structures. The result of quantification should be summarized in Form 04-02-05-01.

Outputs

- 1. Rehabilitation work quantity by rehabilitation grade**

Stage 04 - Task 02 Step 07	Terminal facility and on-farm development plan and quantification
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Criteria, standards and references

A) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-05 "Tertiary Units"*.

Inputs

- 1. Manpower**
Irrigation task force team
Consultant
- 2. Data & information**
Field investigation report

Tools & Techniques

1. Design and work quantity estimation

Since, it is difficult to estimate actual number and work volume of on-farm facility, it is recommended to estimate work volume by the type of area. Following classification of area is suitable for the estimation.

Classification of Area	Present Land Use	Present Application of irrigation	Quantity (ha)
Potential area for irrigation	Paddy	Irrigated	
	Paddy	Non-irrigated	
	Non-paddy	Non-irrigated	
Non-potential area for irrigation	Paddy	Non-irrigated	
	Non-paddy	Non-irrigated	

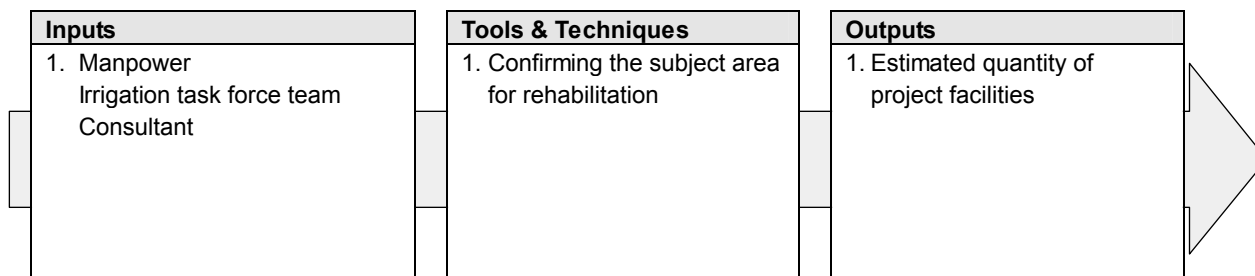
Outputs

- 1. Rehabilitation work quantity by rehabilitation grade**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 02 Step 08	Quantification of project facilities
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Criteria, standards and references
A) Minutes of Discussion of similar loan projects

Inputs

1. Manpower

Irrigation task force team
 Consultant

Tools & Techniques

1. Confirming the subject area for rehabilitation

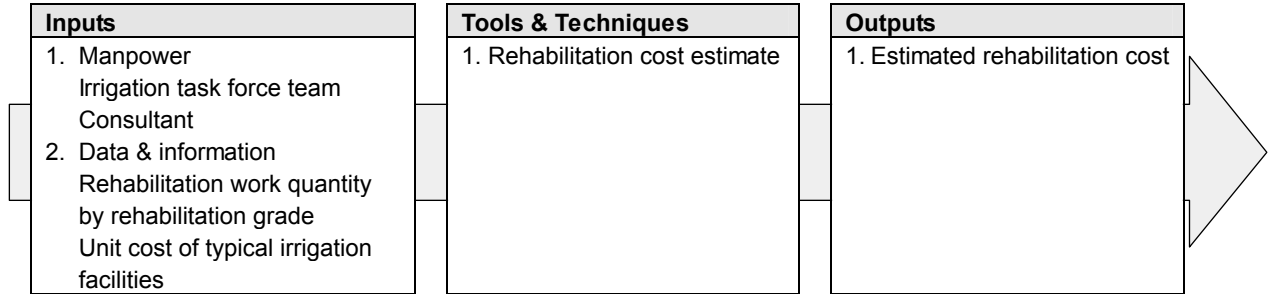
Following is the standard quantity of the project facilities by size of subject area for rehabilitation.

Item	Size of Subject Area for Rehabilitation	Unit	Quantity
Gate keeper house (50m2/site)	1,000 - 2,000 ha	nos.	2
	2,000 - 5,000 ha	nos.	4
	5,000 - 10,000 ha	nos.	8
	over 10,000 ha	nos.	10
Field car (4WD, 2800cc class)	1,000 - 5,000 ha	nos.	3
	5,000 - 10,000 ha	nos.	5
	over 10,000 ha	nos.	7
Motor cycle (125cc)	1,000 - 2,000 ha	nos.	10
	2,000 - 5,000 ha	nos.	20
	5,000 - 10,000 ha	nos.	30
	over 10,000 ha	nos.	40
Computer, Photocopy machine, and consumable (lump sum)	1,000 - 2,000 ha	Mil. Rp.	100
	2,000 - 5,000 ha	Mil. Rp.	150
	2,000 - 5,000 ha	Mil. Rp.	250
	over 10,000 ha	Mil. Rp.	400

Outputs

1-2. Estimated quantity of project facilities

Stage 04 - Task 02 Step 09	Estimation of irrigation system rehabilitation cost
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Criteria, standards and references
A) Rehabilitation cost per ha for similar projects

Inputs

- 1. Manpower**
Irrigation task force team
Consultant
- 2. Data & information**
Rehabilitation work quantity by rehabilitation grade
Unit cost of typical irrigation facilities

Tools & Techniques

- 1. Rehabilitation cost estimate**
Additional cost for dewatering works (temporary canal construction or compensation cost during rehabilitation of existing canal) should be considered . Following is a sample of additional ratio of the cost for dewatering works. For example, final main canal rehabilitation cost should be 120% of estimated rehabilitation cost of main canal, considering the dewatering works.

Type of Facility	Additional Percentage of the Cost for Dewatering Works
Headworks	15.0 %
Main canal	20.0 %
Secondary canal	10.0 %
Canal related structure	5.0 %
On-farm development	2.5 %

In addition to that, drainage canals and drainage canals related structures rehabilitation cost should also be estimated and included in the rehabilitation cost of irrigation system. For Pre-F/S level, it can be preliminary estimated at 10% of total cost for irrigation canals and irrigation canals related structures rehabilitation cost.

Sample format of estimating rehabilitation cost of irrigation system is attached.

Outputs

- 1. Estimated rehabilitation cost**

Sample 04-02-09-01 Sample of Summarized Irrigation System Rehabilitation Cost

SAMPLE

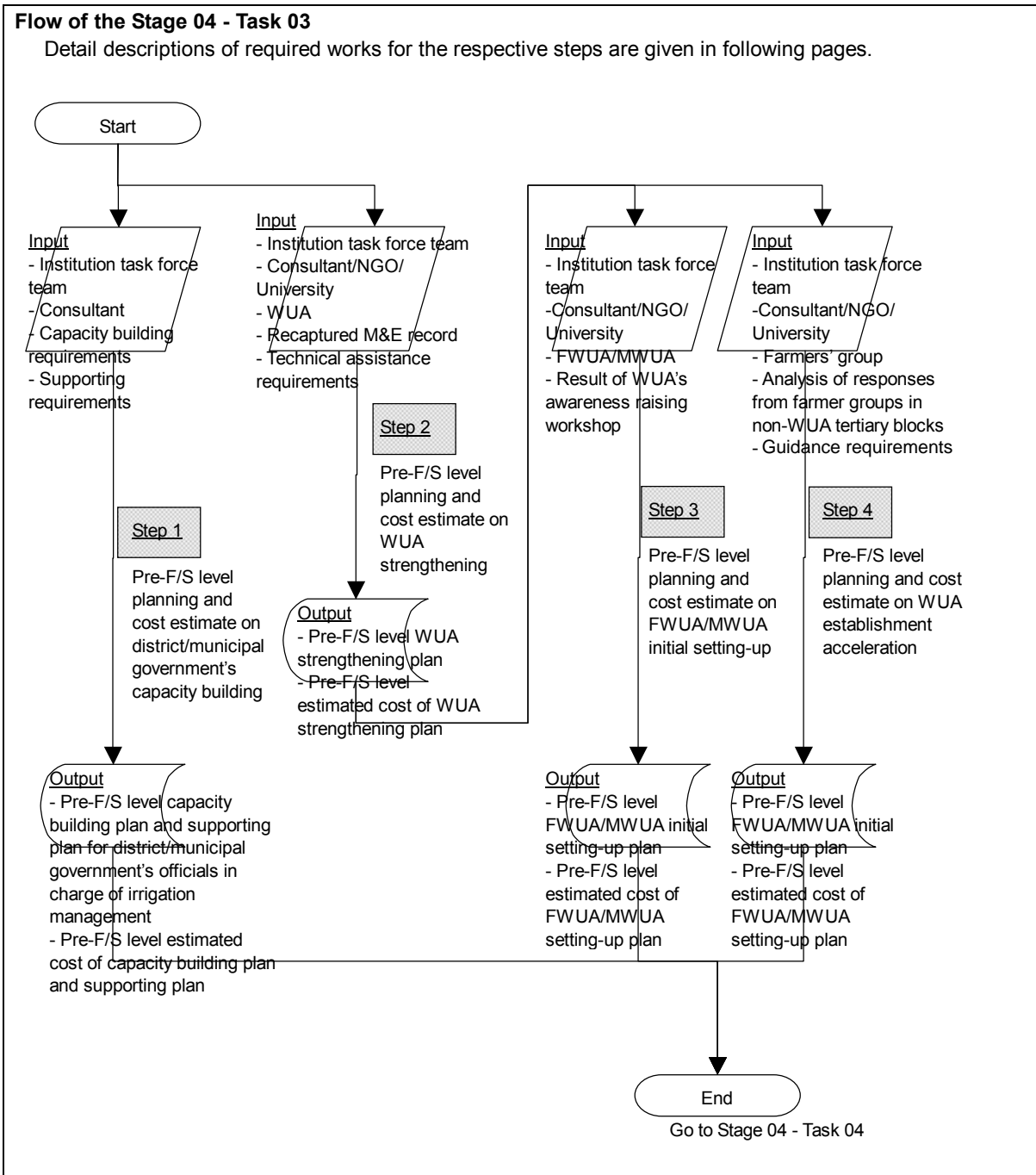
No.	Irrigation Scheme	District	Technical Level ¹⁾	Registered Area (ha)	Subject Area (ha)	Area Increment (ha)	Age of the Facilities (years)	Irrigation System Rehabilitation Cost (million Rp.)										Rehabilitation Cost per ha (US\$/ha)	
								Water Resources Facility			Irrigation Works			Drainage Works	On-Farm Development	Project Facilities	Total		
								Dam/Headworks	Settling Basin	Sub-total	Canals	Related Structures	Sub-total						
1.	Gido Sebau	Nias	T	1,258	883	-375	11	1,183	449	1,632	8,611	1,697	10,308	1,031	1,810	1,260	16,041	2,194	
2.	Batang Gadis	Mandaling Natal	T	6,628	5,575	-1,053	11	272	3,572	3,843	49,300	20,679	69,979	6,998	11,429	2,590	94,838	2,055	
3.	Batang Ilung	Tapanuli Selatan	T	4,194	3,546	-648	11	232	2,554	2,786	38,329	12,519	50,848	5,085	7,269	1,570	67,559	2,301	
4.	Blk Sitongkon/Napa Suron	Tapanuli Selatan	ST	1,012	500	-512	27	7,402	1,380	8,782	8,536	1,139	9,674	967	1,025	1,260	21,709	5,244	
5.	Siborna	Tapanuli Selatan	ST	1,000	950	-50	19	8,935	1,497	10,432	17,359	1,344	18,702	1,870	2,129	1,260	34,394	4,373	
6.	Sialii Tukka	Tapanuli Tengah	T	1,057	600	-457	17	2,984	1,380	4,363	3,484	1,712	5,195	520	1,407	1,260	12,745	2,566	
7.	Badiri Lopian	Tapanuli Tengah	T	1,283	899	-384	14	4,673	1,497	6,170	6,153	2,741	8,894	889	1,843	1,260	19,057	2,560	
8.	Pandurungan	Tapanuli Tengah	T	1,769	1,334	-435	19	1,140	1,614	2,754	15,946	4,727	20,674	2,067	2,888	1,260	29,644	2,684	
9.	Sihiong	Tapanuli Tengah	NT	2,000	779	-1,221	19	1,684	1,497	3,181	7,721	3,732	11,453	1,145	3,339	1,260	20,379	3,160	
10.	Aek Silang	Tapanuli Utara	ST	1,500	1,500	0	13	5,358	2,084	7,442	5,942	993	6,935	693	5,791	1,260	22,121	1,781	
11.	Sarulla	Tapanuli Utara	ST	1,692	1,692	0	28	1,090	2,084	3,175	5,665	641	6,307	631	4,938	1,260	16,310	1,164	
12.	Parmiahnan Hutapaung	Tapanuli Utara	ST	1,000	1,000	0	10	1,027	1,497	2,524	12,112	2,565	14,676	1,468	2,716	1,260	22,645	2,735	
13.	Sinamo	Tapanuli Utara	ST	1,000	930	-70	34	843	1,497	2,340	7,698	4,875	12,573	1,267	2,332	1,260	19,762	2,567	
14.	Aek Mandos I	Toba Samosir	ST	1,060	1,059	-1	10	814	1,614	2,428	5,084	1,490	6,574	657	2,355	1,260	13,276	1,514	
15.	Simangatasi II	Toba Samosir	T	1,515	1,514	-1	11	1,027	2,084	3,112	8,669	1,530	10,199	1,020	3,104	1,260	18,694	1,491	
16.	Buluh Iht	Labuhan Batu	T	5,000	1,355	-3,645	5	272	625	897	8,047	384	8,431	843	2,778	1,260	14,209	1,267	
17.	Perkotaan	Asahan	T	3,457	3,446	-11	14	1,376	1,277	2,653	62,483	3,842	66,325	6,633	7,119	1,570	84,300	2,955	
18.	Sungai Balai	Asahan	ST	1,185	1,130	-55	5	1,183	1,614	2,797	12,707	1,153	13,861	1,386	2,317	1,260	21,620	2,311	
19.	Panca Arga	Asahan	T	2,500	2,500	0	10	52,328 ²⁾	2,906	55,234	8,478	1,386	9,864	986	5,469	1,570	73,123	3,533	
20.	Serbangan	Asahan	T	2,333	2,044	-289	10	42,761 ²⁾	2,374	45,136	18,948	5,394	24,342	2,434	4,190	1,570	77,672	4,590	
21.	Silau Bonto	Asahan	NT	3,231	967	-2,264	10	20,171 ²⁾	1,120	21,291	8,232	4,936	13,168	1,317	4,894	1,260	41,930	5,237	
22.	Sungai Silau	Asahan	ST	1,315	452	-863	32	7,552 ³⁾	528	8,080	6,841	1,588	8,429	843	1,702	1,260	20,314	5,428	
23.	Padang Mahondang	Asahan	ST	3,231	2,905	-326	22	13,353	2,554	15,907	14,221	1,675	15,896	1,590	7,073	1,570	42,036	1,748	
24.	Simujur	Asahan	ST	2,560	2,010	-550	18	7,272	2,084	9,356	15,478	1,360	16,838	1,684	4,536	1,570	33,984	2,042	
25.	Purwodadi	Asahan	T	1,635	1,635	0	14	1,270	2,084	3,354	24,815	7,319	32,134	3,213	3,352	1,260	43,313	3,200	
26.	Pentara	Simalungun	ST	1,034	298	-736	12	1,139	0	1,139	6,863	475	7,338	734	1,404	1,260	11,875	4,813	
27.	Simantin Pane Dame	Simalungun	NT	1,000	1,000	0	14	3,385	1,497	4,881	2,680	175	2,854	285	5,125	1,260	14,406	1,740	
28.	Panambean / Panet Tongah BK	Simalungun	T	1,723	1,722	-1	12	1,183	0	1,183	19,579	10,849	30,429	3,043	3,530	1,260	39,445	2,767	
29.	Raja Hombang / T. Mangaraja	Simalungun	T	2,045	2,023	-22	9	1,260	0	1,260	35,068	8,497	43,565	4,357	4,147	1,570	54,899	3,278	
30.	Kerasaan	Simalungun	T	5,000	4,144	-856	15	1,260	3,063	4,323	76,382	6,335	82,717	8,272	9,341	1,570	106,222	3,096	
31.	Javacolonisasi/Purbogondo	Simalungun	T	1,030	1,015	-15	14	1,144	484	1,628	14,505	5,206	19,712	1,971	2,081	1,260	26,651	3,172	
32.	Naga Sompah	Simalungun	T	1,360	1,015	-345	16	3,477	1,614	5,091	16,917	3,335	20,252	2,025	2,081	1,260	30,709	3,654	
33.	Risma Duma	Dairi	ST	1,522	1,522	0	21	1,144	2,084	3,228	20,762	9,570	30,332	3,033	5,750	1,260	43,603	3,460	
34.	Lae Ordi	Dairi	ST	1,200	1,200	0	14	688	1,614	2,302	19,080	1,601	20,681	2,068	5,630	1,260	31,941	3,215	
35.	Parit Lompaten	Karo	ST	1,242	1,242	0	20	635	1,614	2,249	31,778	5,306	37,084	3,708	2,871	1,260	47,172	4,588	
36.	Bandar Sidoras	Deli Serdang	ST	3,457	3,457	0	18	10,171	2,554	12,725	52,665	5,132	57,797	5,780	7,597	1,570	85,468	2,986	
37.	Namu Rambe	Deli Serdang	T	1,036	1,036	0	37	814	1,614	2,428	18,106	4,366	22,472	2,247	2,124	1,260	30,532	3,560	
38.	Sei Belutu	Deli Serdang	ST	5,082	5,076	-6	40	7,035	3,063	10,098	34,923	1,280	36,203	3,620	10,406	2,590	62,917	1,497	
39.	Langau	Deli Serdang	ST	2,000	1,900	-100	24	11,171	2,084	13,255	7,618	814	8,432	843	4,279	1,260	28,070	1,784	
40.	Medan Krio	Deli Serdang	T	3,016	3,000	-16	25	825	2,554	3,379	28,435	7,100	35,534	3,553	6,325	1,570	50,362	2,028	
41.	Rantau Panjang	Deli Serdang	ST	2,309	2,309	0	33	4,673	2,084	6,757	24,650	8,396	33,046	3,305	4,733	1,570	49,412	2,585	
42.	Pekan Kamis	Deli Serdang	ST	1,100	1,100	0	33	4,257	1,614	5,871	8,146	1,428	9,574	957	2,347	1,260	20,010	2,197	
43.	Secanggang	Langkat	ST	1,400	1,400	0	18	4,257	2,084	6,341	35,709	2,159	37,868	3,787	3,119	1,260	52,375	4,519	
44.	Paya Lobang	Deli Serdan/Tebing Tinggi	ST	1,558	1,558	0	22	814	2,084	2,898	14,254	940	15,194	1,519	3,345	1,260	24,217	1,877	
45.	Namu Sira-sira Kiri	Langkat/Binjai	T	2,250	1,350	-900	24	460	625	1,085	20,507	4,686	25,193	2,519	2,768	1,260	32,825	2,937	
46.	Namu Sira-sira Kanan	Langkat/Binjai	T	4,100	3,953	-147	24	916	766	1,682	44,920	13,893	58,813	5,881	8,104	1,570	76,050	2,324	
47.	Bah Korah II	Simalungun/Siantar	T	1,995	1,723	-272	12	1,376	625	2,001	20,137	9,061	29,198	2,920	3,532	1,260	38,911	2,728	
48.	Sijambi	Asahan/Tanjung Balai	T	1,013	1,008	-5	10	21,054 ³⁾	1,472	22,526	9,087	1,994	11,082	1,108	2,201	1,260	38,177	4,575	
49.	Rambung Mera	P. Siantar/Simalungun	T	946	944	-2	16	1,318	449	1,768	21,227	5,347	26,574	2,657	1,935	1,260	34,194	4,375	
50.	Paya Sordang	Tapanuli Sel/Mandailing Natal	T	4,350	4,350	0	11	1,376	819	2,295	37,191	14,655	51,847	5,185	9,108	1,570	70,004	1,944	
Total				107,183	90,550	-16,633		272,034	80,031	352,065	1,002,050	224,019	1,226,070	122,607	211,688	69,690	1,982,120	146,401	2,644
Average					1,811		18												
Rp. per ha								3.004	0.884	3.888	11.066	2.474	13.540	1.354	2.338	0.770	21.890		
Itemized Total																			
				T : 25															
				ST : 22															
				NT : 3															

Note: 1): T: Technical, ST: Semi-technical, NT: Non-technical
2): Water will be supplied from integrated headworks for Panca Arga, Serbangan, and Silau Bonto schemes.
3): Water will be supplied from integrated headworks for Sungai Silau and Sijambi schemes.

Source: JICA Study Team for the Study on Comprehensive Recovery Program of Irrigation Agriculture

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

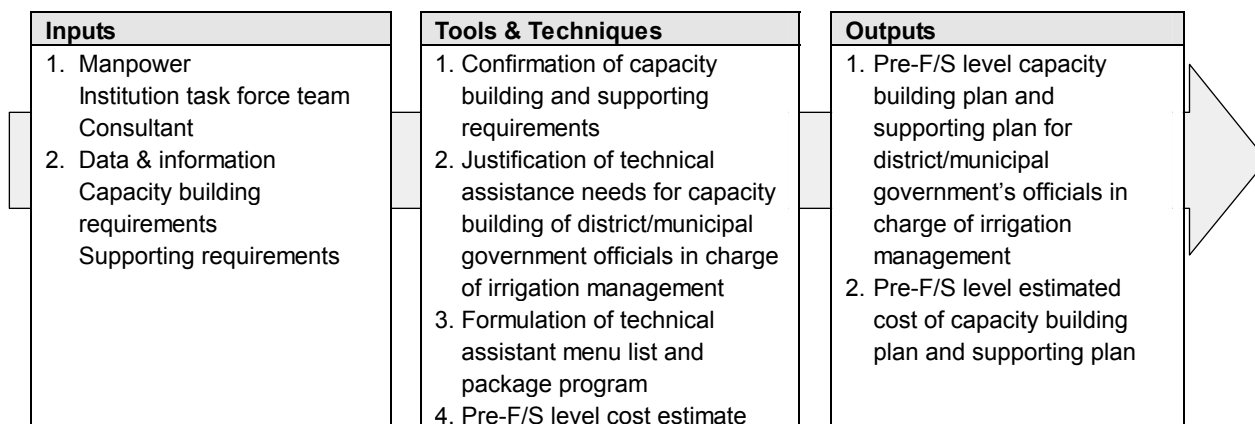
Stage 04	Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes
Task 03	Pre-F/S Level District/Municipal Government Capacity Building, WUA Strengthening, FWUA/MWUA Setting-up and WUA Establishment Acceleration Plan
Purpose and scope	
Scope of the Task are to:	
1) Estimate required input to and cost for district/municipal government's capacity building (Pre-F/S level);	
2) Estimate required input to and cost for WUA strengthening (Pre-F/S level);	
3) Estimate required input to and cost for FWUA/MWUA setting-up (Pre-F/S level); and	
4) Estimate required input and cost for WUA establishment acceleration (Pre-F/S level).	



I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 03 Step 01	Pre-F/S level planning and cost estimate on district/municipal government's capacity building
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Criteria, standards and references
None

Inputs

- 1. Manpower**
 Institution task force team
 Consultant
- 2. Data & information**
 Capacity building requirements (refer to output of Stage 01 - Task 02 - Step 06)
 Supporting requirements (refer to output of Stage 01 - Task 02 - Step 06)

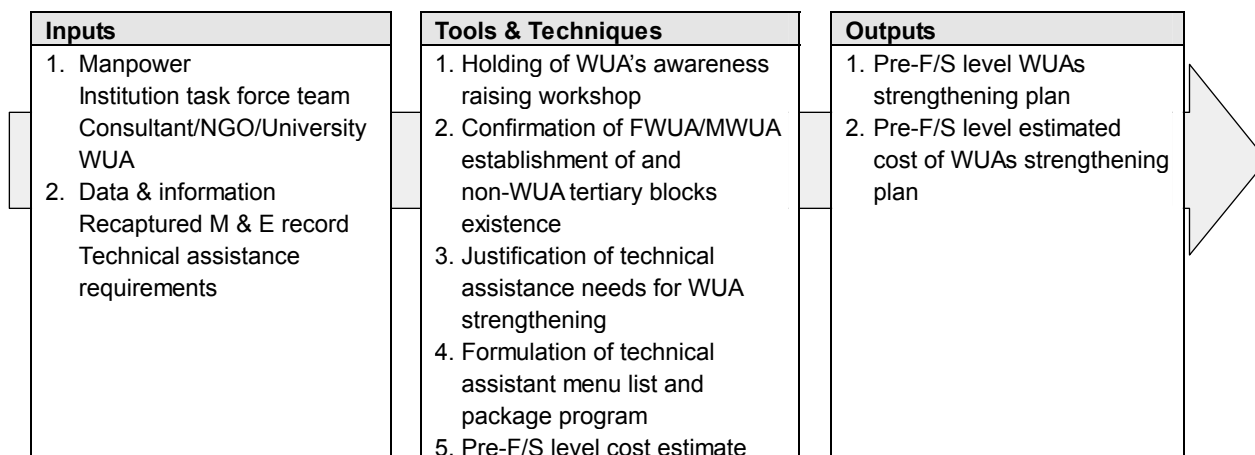
Tools & Techniques.

- 1 Confirmation of capacity building and supporting requirements**
 Confirm .capacity building requirements for district/municipal government's officials in charge of water resources (irrigation) management and supporting requirements from higher institutions on implementation of capacity building program.
- 2. Justification of technical assistance needs for capacity building of district/municipal government officials in charge of irrigation management**
 Reconfirm needs for improving weakness and justify the necessity of technical assistance by higher institution to district/municipal government through questionnaire survey to individual officials..
- 3. Formulation of technical assistant menu list and package program**
 Formulate technical assistant menu list from which a package program of technical assistance can be made according to district/municipal government's needs to improve its capacity.
- 4. Pre-F/S level cost estimate**
 Estimate unit cost of each technical assistant menu and total cost of package program.

Outputs

- 1. Pre-F/S level capacity building plan and supporting plan**
 Consist of technical assistant menu list and package program of technical assistance for capacity building of district/municipal government's officials in charge of irrigation management
- 2. Pre-F/S level estimated cost of capacity building plan and supporting plan**

Stage 04 - Task 03 Step 02	Pre-F/S level planning and cost estimate on WUA strengthening
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Criteria, standards and references
None

Inputs

1. Manpower

Institution task force team
 Consultant/MGO/University
 WUA (Chairman/Technical Director of all WUA in the irrigation scheme)

2. Data & information

Recaptured M & E record (refer to output of Stage 02 - Task 03 - Step 08)
 Technical assistance requirements (refer to output of Stage 02 - Task 03 - Step 08)

Tools & Techniques

1. Holding of WUA's awareness raising workshop

Reconfirm weak points, elaborated from recaptured M & E record by referring to Stage02 - Task 03 - Step 08, about WUA's capacity to manage organization, capability to collect and expense member's fee, and activities to conduct operation and maintenance of tertiary irrigation system as well as technical assistance requirements for WUA to overcome weakness through holding WUA's awareness raising workshop.

2. Confirmation of FWUA/MWUA establishment and non-WUA tertiary blocks existence

Go to Step 02 in case of FWUA/MWUA already established in the irrigation scheme..
 Go to Step 03 in case of non-WUA tertiary blocks remained in the irrigation scheme.

3. Justification of technical assistance needs for WUA strengthening

Reconfirm needs for improving weakness and justify the necessity of technical assistance by Regional Government to WUA through face-to-face interview to representatives (Chairman/Technical Director) of WUA invited to the above workshop.

4. Formulation of technical assistant menu list and package program

Formulate technical assistant menu list from which a package program of technical assistance can be made according to WUA's needs to improve its capacity, capability and/or activities.

5. Pre-F/S level cost estimate

Estimate unit cost of each technical assistant menu and total cost of package program.

Outputs

1. Pre-F/S level WUA strengthening plan

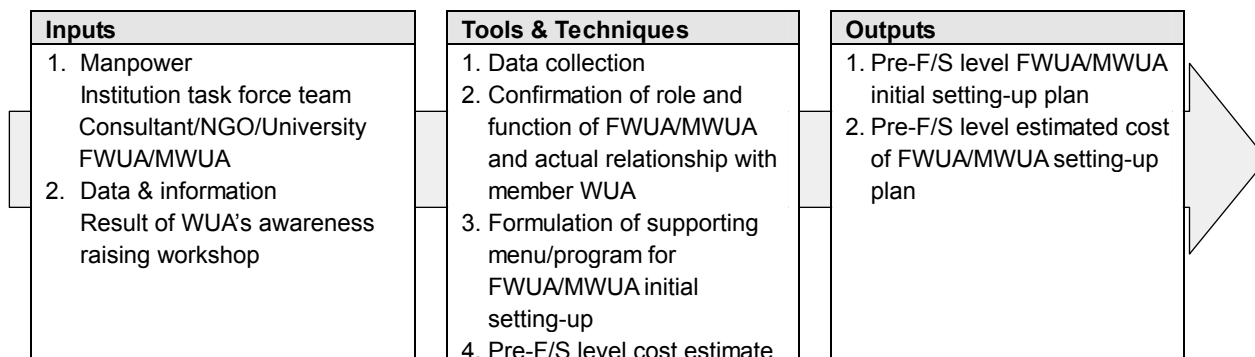
Consist of technical assistant menu list and package program of technical assistance to WUAs

2. Pre-F/S level estimated cost of WUA strengthening plan

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 03 Step 03	Pre-F/S level planning and cost estimate on FWUA/MWUA initial setting-up
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Criteria, standards and references

A) Ministerial Decree of Home Affairs No.50/2001 on Guidelines for Establishment and Empowerment of Water Users' Associations (*to be adjusted after new Water Resources Law is enforced*)

Inputs

- 1. Manpower**
 Institution task force team
 Consultant/NGO/University
 FWUA/MWUA
- 2. Data & information**
 Result of WUA's awareness raising workshop (refer to output of Stage 04 - Task 02 - Step 02)

Tools & Techniques

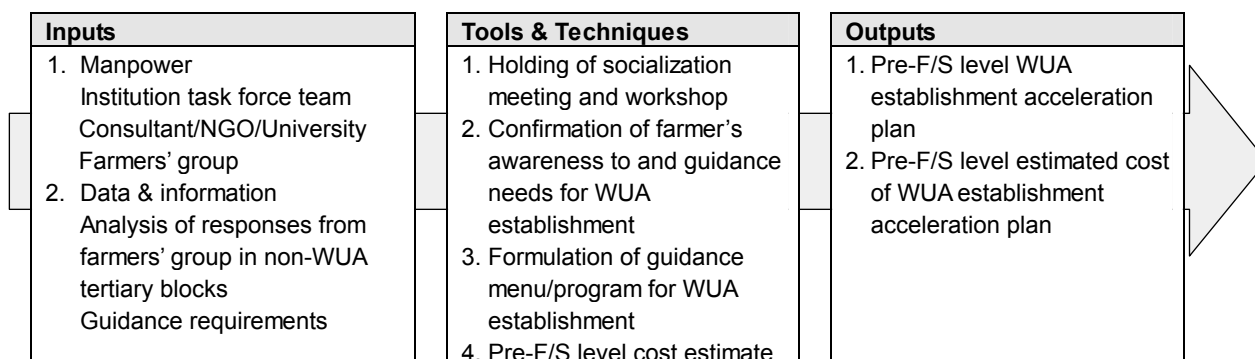
If FWUA/MWUA is not existing, start from Step 01, while, if it exists, start from Step 03.

- 1. Data collection**
 Collect list of FWUA/MWUA, list of member WUAs of each FWUA/MWUA, legal documents (decree of Regional Government's head and/or application form).
- 2. Confirmation of role and function of FWUA/MWUA and actual relationship with member WUA**
 Confirm role and function of FWUA/MWUA through review of its articles from the viewpoint of participatory irrigation management policy. Make hearing to representatives of FWUA/MWUA about who took initiative to establish FWUA/MWUA and needs for supporting its activities from Regional Government/University/NGO. Make separate hearing to those of member WUA about actual relationship with FWUA/MWUA concerned.
- 3. Formulation of supporting menu/program for FWUA/MWUA initial setting-up**
 Formulate supporting menu list from which a package program of support can be made according to supporting needs for promotion of FWUA/MWUA initial setting-up in order to cope with the participatory irrigation management policy.
- 4. Pre-F/S level cost estimate**
 Estimate unit cost of each supporting menu and package program cost.

Outputs

- 1. Pre-F/S level FWUA/MWUA initial setting-up plan**
 Consist of guidance menu list and package program of FWUA/MWUA initial setting-up.
- 2. Pre-F/S level estimated cost of FWUA/MWUA initial setting-up plan**

Stage 04 - Task 03 Step 04	Pre-F/S level planning and cost estimate on WUA establishment acceleration
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Criteria, standards and references

A) Ministerial Decree of Home Affairs No.50/2001 on Guidelines for Establishment and Empowerment of Water Users' Associations (*to be adjusted after new Water Resources Law is enforced*)

Inputs

- 1. Manpower**
 Institution task force team
 Consultant/NGO/University
 Farmers' groups
- 2. Data & information**
 Analysis of interview response from farmers' group in non-WUA tertiary blocks (refer to output of Stage 02 - Task 03 - Step 08)
 Guidance requirements (refer to output of Stage 02 - Task 03 - Step 08)

Tools & Techniques

- 1. Holding of socialization meeting and workshop**
 Hold socialization meeting and workshop to invite representatives and members of farmers' groups which are active in non-WUA tertiary blocks provided with irrigation water, for the purpose of accelerating WUA establishment and promoting participatory irrigation management.
- 2. Confirmation of farmer's awareness to and guidance needs for WUA establishment**
 In the above socialization meeting and workshop, confirm farmer's awareness to establishment of and participation to WUA as well as their needs for guidance about procedure and practice of WUA establishment.
- 3. Formulation of guidance menu/program for WUA establishment**
 Formulate guidance menu list from which a package program of guidance can be made according to farmer's basic conditions and guidance needs for accelerating WUA establishment in non-WUA tertiary blocks to which irrigation water is distributed.
- 4. Pre-F/S level cost estimate**
 Estimate unit cost of each guidance menu and total cost of package program

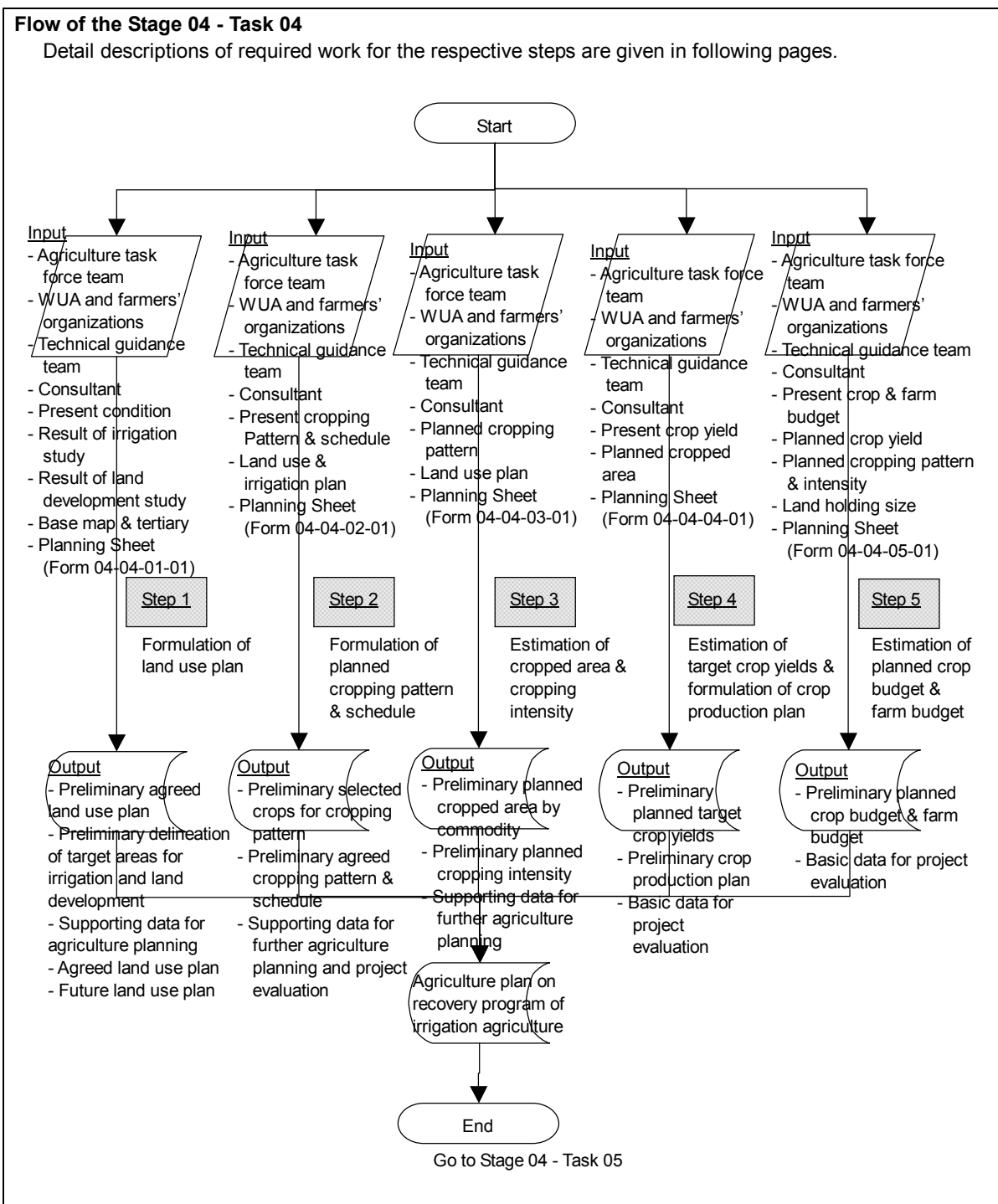
Outputs

- 1. Pre-F/S level WUA establishment acceleration plan**
 Consist of guidance menu list and package program of guidance to farmers' groups.
- 2. Pre-F/S level estimated cost of WUA establishment acceleration plan**

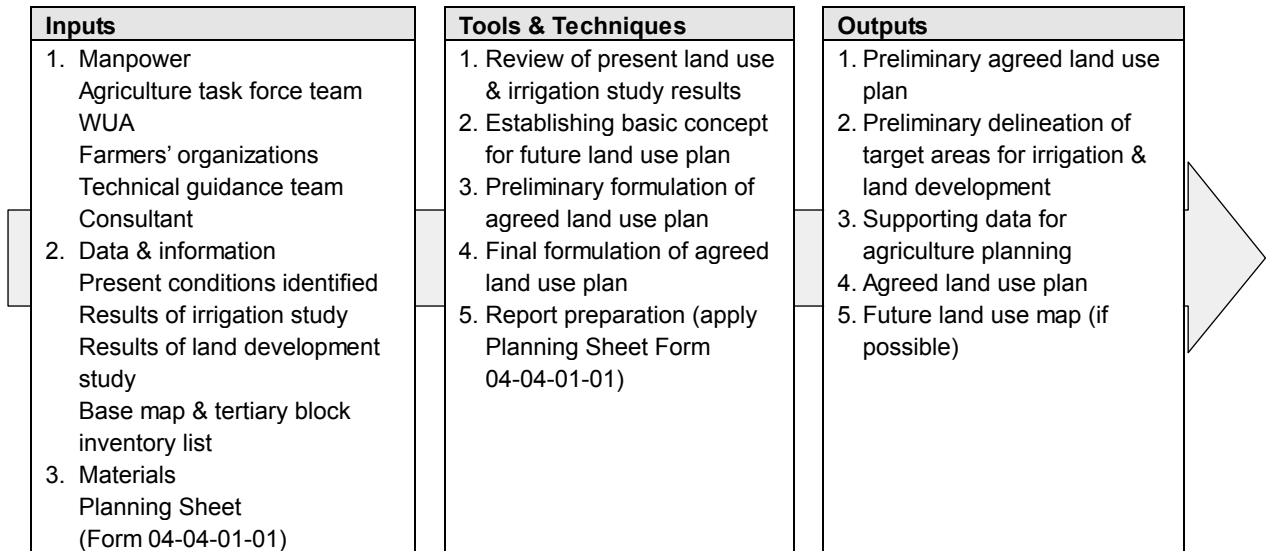
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04	Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes
Task 04	Pre-F/S Level Agriculture Plan
Purpose and scope	
Scope of the Task are to:	
<ol style="list-style-type: none"> 1) Formulate Pre-F/S level agriculture plan; 2) Estimate Pre-F/S level planned crop budgets; and 3) Estimate Pre-F/S level farm budgets under with-project condition for project evaluation. 	



Stage 04 - Task 04 Step 01	Formulation of land use plan
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Criteria, standards and references

- A) Land use categories to be applied:
 i) Irrigated paddy field; ii) Rainfed paddy field, iii) Upland field, iv) Tree crops land, v) Fish pond, vi) Uncultivated land (vegetation to be clarified , vii) Uncultivable land (as per Planning Sheet Form 04-04-01-01)
- B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

1. Manpower

- Agriculture task force team
- Representatives of WUA in the irrigation scheme
- Representatives of farmers' organizations in the irrigation scheme
- Technical guidance team Provincial officer, etc.
- Consultant

2. Data & information

- Present land use, land suitability, crop production and etc. identified.
- Results of irrigation study (planned irrigation area confirmed in Step 02).
- Results of land development (land development plan agreed & confirmed in Stage 02 - Task 03 - Step 02).
- Base map for land use planning.
- Tertiary block inventory list (showing block name, area, etc).

3. Materials

- Planning Sheet Form 04-04-01-01.

Tools & Techniques

1. Review of present land use & irrigation study results

Review on consistency between present land use, land suitability, crop production and etc. and results of irrigation study (planned irrigation area).

2. Establishing basic concept for future land use plan

Establishing agreed basic concept for future land use plan among the stakeholders in accordance with the Planning Sheet Form 04-04-01-01.

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation
Plan and Third Screening of Irrigation Schemes

3. Preliminary formulation of agreed land use plan

Preliminary formulation of land use plan based on land suitability, irrigation plan and land development plan by the stake holders in accordance with the Planning Sheet Form 04-04-01-01.

4. Formulation of agreed land use plan

Review of irrigation plan and land development plan based on the preliminary agreed land use plan. Finalization of agreed land use plan based on the review by the stake holders.

5. Report preparation

- Results should be summarized by applying the Planning Sheet Form 04-04-01-01. The Sheet should be signed by the representatives of individual institutions who participated in the joint survey.
- Preparation of future land use map (if base map available).

Outputs

- 1. Preliminary agreed land use plan**
- 2. Preliminary delineation of target areas for irrigation & land development**
- 3. Basic data for agriculture planning**
- 4. Agreed land use plan**
- 5. Future land use map (if possible)**

Form 04-04-01-01 Planning Sheet for Agriculture Plan: Land Use Plan

Irrigation Scheme: _____

Land Use Plan Of the Subject Area (Irrigable areas both in potential & non-potential areas)

Land Use Category	Present Land Use			Planned Land Use (ha)	Increment (ha)	
	Irrigable	Non-irrigable	Total			
Irrigated Paddy Field						
Rainfed Paddy Field						
Upland Field						
Uncultivated Land						
Tree Crops Land						
Fish Pond						
Right-of-ways	-	-	-			
Total						
Current Irrigation Area						
New Irrigation Area	-			-		
Total Irrigation Area						
Non-irrigation Area						

Agreed & Confirmed by

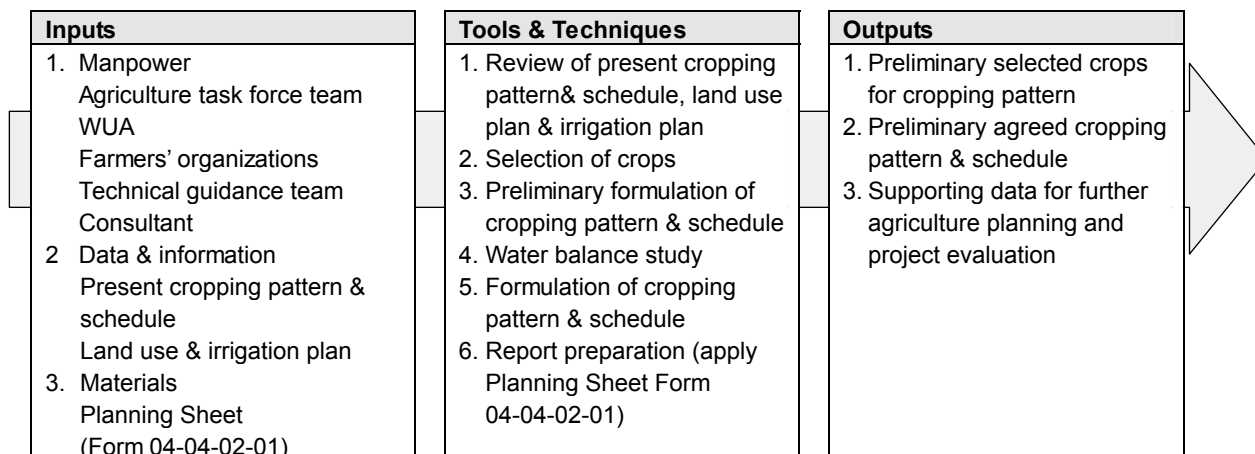
_____	_____	_____
Agriculture Services Office	Irrigation Services Office	Water Users Institution
Name:	Name:	Name:
Position:	Position:	Position:
Date:	Date:	Date:

Remarks

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 04 Step 02	Formulation of planned cropping pattern & schedule
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Criteria, standards and references

- A) Planning Sheet Form 04-04-02-01
 B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development.*

Inputs

- 1. Manpower**
 Agriculture task force team
 Representatives of WUA in the irrigation scheme
 Representatives of farmers' organizations in the irrigation scheme
 Technical guidance team Provincial officer, etc.
 Consultant
- 2. Data & information**
 - Present cropping pattern & schedule.
 - Land use plan.
 - Irrigation plan.
- 3. Materials**
 Planning Sheet Form 04-04-02-01.

Tools & Techniques

- 1. Review of present cropping pattern & schedule, land use plan & irrigation plan**
 Review of present cropping pattern & schedule, land use plan and irrigation plan for formulation of planned cropping pattern & schedule.
- 2. Selection of crops**
 - Selection of crops to be introduced in the planned cropping pattern by the stakeholders taking into account of present crops cultivated in the irrigation scheme, soil characteristics & land suitability, farmers intension and capability, growth length of crops, marketability of crops, irrigation water availability etc.
 - In principle, paddy should be selected as a base crop both in wet and dry season.
- 3. Preliminary formulation of cropping pattern & schedule**
 - Preliminary formulation of agreed cropping pattern and schedule based on current cropping pattern and schedule, irrigation water availability, efficient use of irrigation water, climatic characteristics, labor availability etc. by the stake holders in accordance with the Planning Sheet Form 04-04-02-01.
 - The basic cropping pattern to be envisaged is:
 Wet season: paddy (100%)

Dry season I: paddy/other crops (100%) or other crops (intensity depending)

Dry season II: other crops (intensity depending) or paddy/other crops (100%)

- Cropping schedule to be determined by considering current prevailing cropping schedule, climatic characteristics, irrigation schedule, O&M schedule of irrigation system and other factors.

4. Water balance study

Water balance study on the preliminarily formulated cropping pattern & schedule.

5. Formulation of cropping pattern & schedule

- Review of the preliminarily formulated pattern & schedule based on the results of the water balance study.
- Formulation of the agreed cropping pattern & schedule applied for the rehabilitation plan by the stakeholders.

6. Report preparation

Results should be summarized by applying the Planning Sheet Form 04-04-02-01. The Sheet should be signed by the representatives of individual institutions who participated in the joint survey.

Outputs

- 1. Preliminary selected crops for cropping pattern**
- 2. Preliminary agreed cropping pattern & schedule**
- 3. Supporting data for further agriculture planning and project evaluation**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Form 04-04-02-01 Planning Sheet for Agriculture Plan: Planned Cropping Pattern & Schedule

Irrigation Scheme: _____

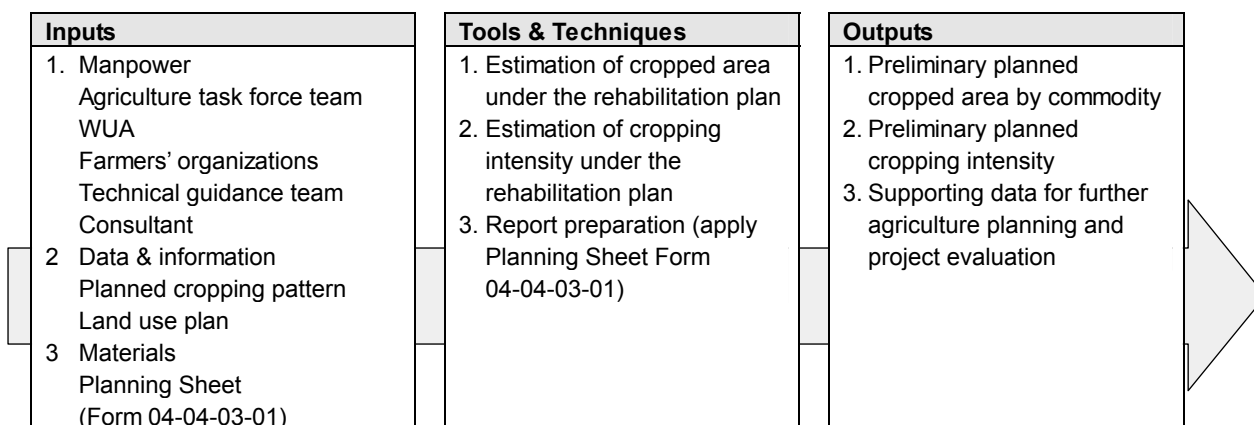
1. Irrigated Paddy Field	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Area (ha)
Paddy													
- Wet Season													
- Dry Season I													
- Dry Season II													
Palawija/Others													
- Wet Season ()													
- Dry Season I ()													
- Dry Season II ()													
- ()													
- ()													

Agreed & Confirmed by

_____ Agriculture Services Office Name: Position: Date:	_____ Irrigation Services Office Name: Position: Date:	_____ Water Users Institution Name: Position: Date:
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Remarks

Stage 04 - Task 04 Step 03	Estimation cropped area & cropping intensity
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Criteria, standards and references
A) Survey Sheet Form 04-04-03-01 B) Ministry of Public Works/JICA. 1999. <i>Guidelines for Feasibility Study of Irrigation Development.</i>

Inputs

- 1. Manpower**
 Agriculture task force team
 Representatives of WUA in the irrigation scheme
 Representatives of farmers' organizations in the irrigation scheme
 Technical guidance team Provincial officer, etc.
 Consultant
- 2. Data & information**
 Planned cropping pattern
 Land use plan
- 3. Materials**
 Planning Sheet Form 04-04-03-01.

Tools & Techniques

- 1. Estimation of cropped area under the rehabilitation plan**
 Calculation of cropped areas by cropping season and commodity based on the planned cropping pattern and land use plan at the full development stage.
- 2. Estimation of cropping intensity under the rehabilitation plan**
 Calculation of cropping intensity by cropping season and commodity based on the planned cropping pattern and land use plan at the full development stage.
- 3. Report preparation**
 Results should be summarized by applying the Planning Sheet Form 04-04-03-01. The Sheet should be signed by the representatives of individual institutions who participated in the joint survey.

Outputs

- 1. Preliminary planned cropped area by commodity**
- 2. Preliminary planned cropping intensity**
- 3. Supporting data for further agriculture planning and project evaluation**

Form 04-04-03-01 Planning Sheet for Agriculture Plan: Planned Cropped Area & Intensity

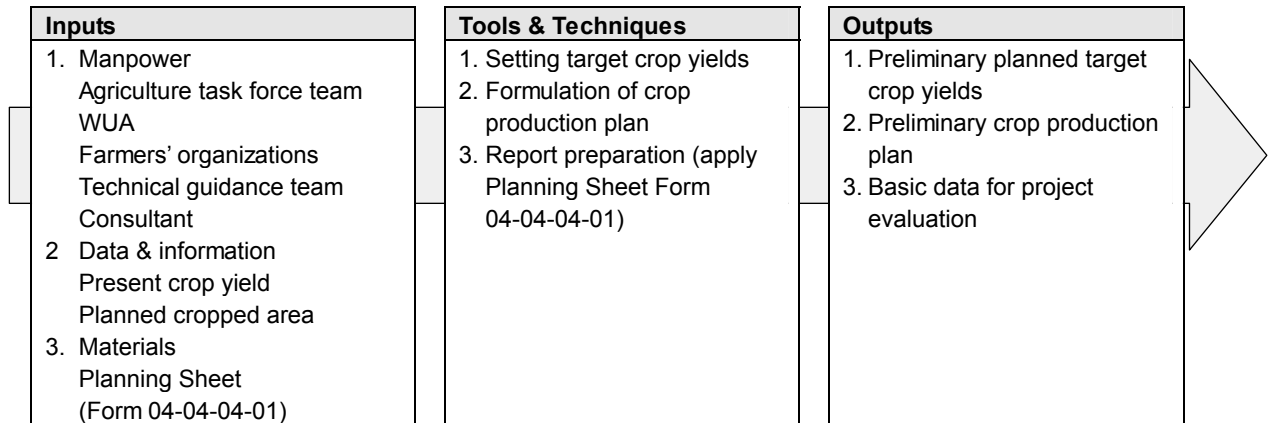
1. Irrigated Paddy Field									
Irrigated Paddy Field (ha)	Crop	Cropped Area (ha) & Cropping Intensity (CI, %)							
		Wet Season		Dry Season I		Dry Season II		Annual	
		Area	CI	Area	CI	Area	CI	Area	CI
	Paddy								
	()								
	()								
	()								
	Total								
	Paddy								
	()								
	()								
	()								
	Total								
	Paddy								
	()								
	()								
	()								
	Total								
Overall Irrigation Scheme	Paddy								
	()								
	()								
	()								
	Total								

Agreed & Confirmed by

<hr/> Agriculture Services Office Name: Position: Date:	<hr/> Irrigation Services Office Name: Position: Date:	<hr/> Water Users Institution Name: Position: Date:
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Remarks

Stage 04 - Task 04 Step 04	Estimation of target crop yields & formulation of crop production plan
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Criteria, standards and references
A) Planning Sheet Form 04-04-04-01 B) Ministry of Public Works/JICA. 1999. <i>Guidelines for Feasibility Study of Irrigation Development.</i>

Inputs

- 1. Manpower**
 Agriculture task force team
 Representatives of WUA in the irrigation scheme
 Representatives of farmers' organizations in the irrigation scheme
 Technical guidance team Provincial officer, etc.
 Consultant
- 2. Data & information**
 - Present crop yield
 - Planned cropped area
- 3. Materials**
 Planning Sheet Form 04-04-04-01.

Tools & Techniques

- 1. Estimation of target crop yields**
 - Estimating planned target yields in each cropping season after project based on current yield levels, yield levels in sufficiently irrigated fields, yield levels in advanced irrigation schemes around the irrigation scheme, high yields attained by advanced farmers in & around the irrigation scheme, potential yields of crops, yield levels of demonstration fields, farmers technical & financial capability etc.
 - In the estimation, current yield levels of subject crops, recommended farming practices to be introduced or accepted by farmers and yield levels attained by in sufficiently irrigated fields and the same attained by advanced farmers should be fully considered.
- 2. Formulation of crop production plan**
 Formulation of crop production plan based on the planned cropped area and target crop yields at the full development stage.
- 3. Report preparation**
 Results should be summarized by applying the Planning Sheet Form 04-04-04-01. The Sheet should be signed by the representatives of individual institutions who participated in the joint survey.

Outputs

- 1. Preliminary planned target crop yields**
- 2. Preliminary crop production plan**
- 3. Basic data for project evaluation**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Form 04-04-04-01 Planning Sheet for Agriculture Plan: Planned Cropped Yield & Production

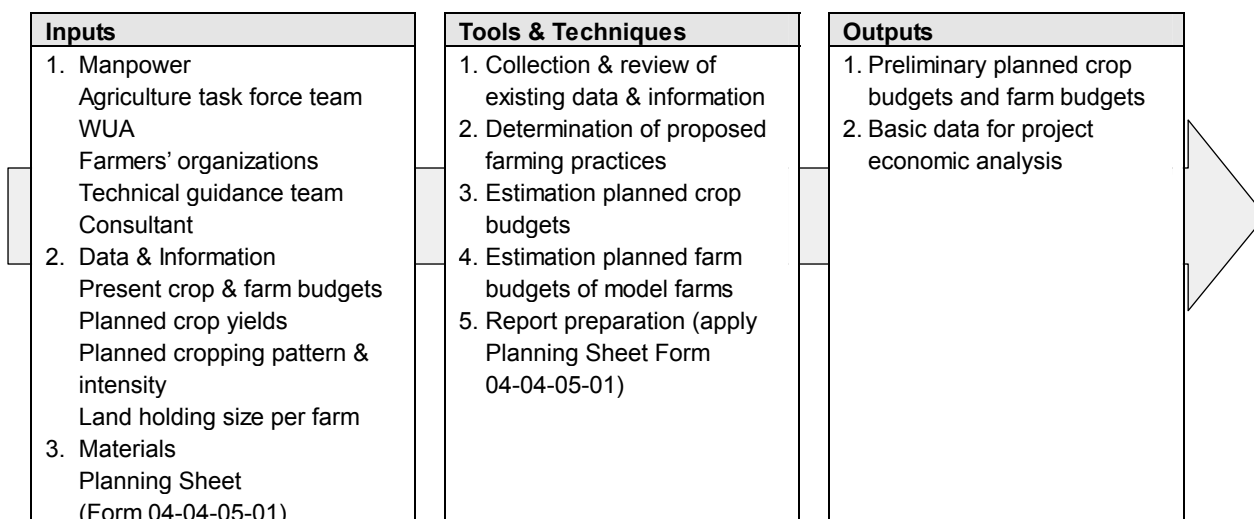
1. Irrigated Paddy Field				
Cropping Season	Crop	Cropped Area (ha)	Yield (t/ha)	Production (t)
Wet Season	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Sub-total			
Dry Season I	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Sub-total			
Dry Season II	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Sub-total			
Annual	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Total			

Agreed & Confirmed by

_____	_____	_____
Agriculture Services Office	Irrigation Services Office	Water Users Institution
Name:	Name:	Name:
Position:	Position:	Position:
Date:	Date:	Date:

Remarks

Stage 04 - Task 04 Step 05	Estimation of planned crop budget and farm budget
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Criteria, standards and references

- A) Planning Sheet Form 04-04-05-01.
- B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

- 1. Manpower**
Agriculture task force team
Representatives of WUA in the irrigation scheme
Representatives of farmers' organizations in the irrigation scheme
Technical guidance team Provincial officer, etc.
Consultant
- 2. Data & information**
 - Present crop & farm budgets estimated in Stage 02 - Task 03 - Step 07.
 - Planned crop yields.
 - Planned cropping pattern and cropping intensity.
 - Land holding size per farm
- 3. Materials**
Planning Sheet Form 04-04-05-01.

Inventory Survey

- 1. Collection & review of existing data & information**
 - Collection of secondary data on crop budgets and farm budgets in advanced irrigation schemes in and around the irrigation scheme (ex. data recorded by Mantri Tani Statistik & PPLs).
 - Collection of crop budget data on planned target yields of individual crops.
 - Collection of farm gate commodity prices of farm inputs & products.
 - Collection of production cost data such as land preparation cost, transportation cost, labor cost etc.
 - Review of the data collected for their validity
- 2. Determination of proposed or recommended farming practices**
 - Determination of proposed or recommended farming practices for individual selected crops to be introduced for the attainment of the target yield levels.
- 3. Estimation planned crop budgets**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

- Estimation of present crop budgets based on the proposed farming practices, the planned target yield levels and current farm gate commodity prices and other production costs.
- Average figures in the irrigation scheme should be applied for estimation.

4. Estimation of planned farm budgets

Estimation of planned farm budgets on model farms/typical farms selected in Stage 02 - Task 03 - Step 07 based on the planned cropping pattern, cropping intensity and crop budgets.

Estimation of incremental capacity-to-pay of the model farms/typical farms by assuming family expenditures, farm incomes from outside of the irrigation scheme and non-farm income and comparing with the estimated farm budgets in Stage 02 - Task 03 - Step 07 in accordance with the Planning Sheet Form 04-04-05-01.

5. Report preparation

Results of the investigation should be summarized by applying the Planning Sheet Form 04-04-05-01. The Sheet should be signed by the representatives of individual institutions who participated in the joint investigation.

Outputs

1. Preliminary planned crop budgets and farm budgets

Planned crop budgets and model farm budgets are estimated and confirmed.

2. Basic data for project evaluation

Planned crop budgets for project economic analysis are determined.

Form 04-04-05-01 Planning Sheet for Agriculture Plan: Planned Crop Budget - 1/2

1. Crop Budget per Ha: Irrigated Paddy									
Items	Unit	Unit Price (Rp000)	Irrigated Paddy						
			Wet Season		Dry Season I		Dry Season II		
			Q'ty	Value	Q'ty	Value	Q'ty	Value	
1. Gross Return									
Unit Yield	(t/ha)								
Unit Price	(Rp.000/t)								
Gross Return	(Rp.000)								
2. Production cost									
2-1. Farm Inputs									
Seed	(kg/ha)								
Fertilizers									
- Urea	(kg/ha)								
- SP36	(kg/ha)								
- KCl	(kg/ha)								
- ZA	(kg/ha)								
-									
-									
Agro chemicals									
- Insecticide (liquid)	(lit/ha)								
- Insecticide (powder)	(kg/ha)								
- Rodenticide	(kg/ha)								
- Herbicide	(kg/ha)								
-									
-									
2-2. Labor Requirement									
Hired Labor	(man-day)								
Family Labor	(man-day)								
Total	(man-day)								
2-3. Contracted Works (labor)									
- Planting/Transplanting	(Rp/ha)								
- Harvesting	(Rp/ha)								
2-4. Land Preparation									
By Machinery	(Rp/ha)								
By Draft Animal	(Rp/ha)								
2-5. Field Transportation	(Rp/ha)								
2-6. Other Expenses	(Rp/ha)								
3. Net Return per Ha	Rp.000								

Remarks

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation
Plan and Third Screening of Irrigation Schemes

Form 04-04-05-01 Planning Sheet for Agriculture Plan: Planned Crop Budget - 2/2

2. Crop Budget per Ha: Palawija & Other Crops									
Items	Unit	Unit Price (Rp000)	Palawija ()		Palawija ()		()		
			Q'ty	Value	Q'ty	Value	Q'ty	Value	
1. Gross Return									
Unit Yield	(t/ha)								
Unit Price	(Rp.000/t)								
Gross Return	(Rp.000)								
2. Production cost									
2-1. Farm Inputs									
Seed	(kg/ha)								
Fertilizers									
- Urea	(kg/ha)								
- SP36	(kg/ha)								
- KCl	(kg/ha)								
- ZA	(kg/ha)								
-									
Agro chemicals									
- Insecticide (liquid)	(lit/ha)								
- Insecticide (powder)	(kg/ha)								
- Rodenticide	(kg/ha)								
- Herbicide	(kg/ha)								
-									
2-2. Labor Requirement									
Hired Labor	(man-day)								
Family Labor	(man-day)								
Total	(man-day)								
2-3. Contracted Works									
- Planting/Transplanting	(Rp/ha)								
- Harvesting (labor)	(Rp/ha)								
2-4. Land Preparation									
By Machinery	(Rp/ha)								
By Draft Animal	(Rp/ha)								
2-5. Field Transportation	(Rp/ha)								
2-6. Other Expenses	(Rp/ha)								
3. Net Return per Ha	Rp.000								

Agreed & Confirmed by

<p>_____ Agriculture Services Office Name: Position: Date:</p>	<p>_____ Irrigation Services Office Name: Position: Date:</p>	<p>_____ Water Users Institution Name: Position: Date:</p>
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Remarks

Form 04-04-05-02 Planning Sheet for Agriculture Plan: Planned Farm Budget - 1/3

1. Farm Budget: Model/Typical Farm Household in Irrigated Areas

(1) Land Holding

	In DI	Outside of DI
Irrigated Paddy Field	_____ ha	_____ ha
Rainfed Paddy Field	_____ ha	_____ ha
Upland Field	_____ ha	_____ ha
Tree Crops Planted Area	_____ ha	_____ ha
Total	_____ ha	_____ ha

(2) Farm Income

a. From Farm Land in DI

Items	Irrigated Paddy		Palawija	Palawija	Other Crops
	Wet	Dry	()	()	()
Cropped Area (ha)					
Yield (t/ha)					
Production (t)					
Unit Price (Rp.000)					
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

b. From Farm Land Outside of DI

Items	Commodity				Total
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

c. Livestock Income

Items	Livestock				Total
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

d. Total Net Farm Income (Rp.000; a + b + c) _____

(3) Non-farm Income

Monthly Income (Rp.000) _____ Annual Income (Rp.000) _____

(4) Family Annual Income { d + (3) } = _____

(5) Family Annual Expenditures

Items	Foods	()	()	()
Monthly Expenditures (Rp.000)				
Annual Expenditures (Rp.000)				
Total Annual Expenditures (Rp.000)				

(6) Net Reserve {Rp.000; (4) - (5)} = _____

Form 04-04-05-02 Planning Sheet for Agriculture Plan: Planned Farm Budget - 2/3

2. Farm Budget: Model/Typical Farm Household Currently n Rainfed Paddy Areas

(1) Land Holding

	In DI	Outside of DI
Rainfed Paddy Field	_____ ha	_____ ha
Upland Field	_____ ha	_____ ha
Tree Crops Planted Area	_____ ha	_____ ha
Total	_____ ha	_____ ha

(2) Farm Income

a. From Farm Land in DI

Items	Paddy	Palawija			Other Crops
		()	()	()	
Cropped Area (ha)					
Yield (t/ha)					
Production (t)					
Unit Price (Rp.000)					
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

b. From Farm Land Outside of DI

Items	Commodity				Total
	()	()	()	()	
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

c. Livestock Income

Items	Livestock				Total
	()	()	()	()	
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

d. Total Net Farm Income (Rp.000; a + b + c) _____

(3) Non-farm Income

Monthly Income (Rp.000) _____ Annual Income (Rp.000) _____

(4) Family Annual Income { d + (3) } = _____

(5) Family Annual Expenditures

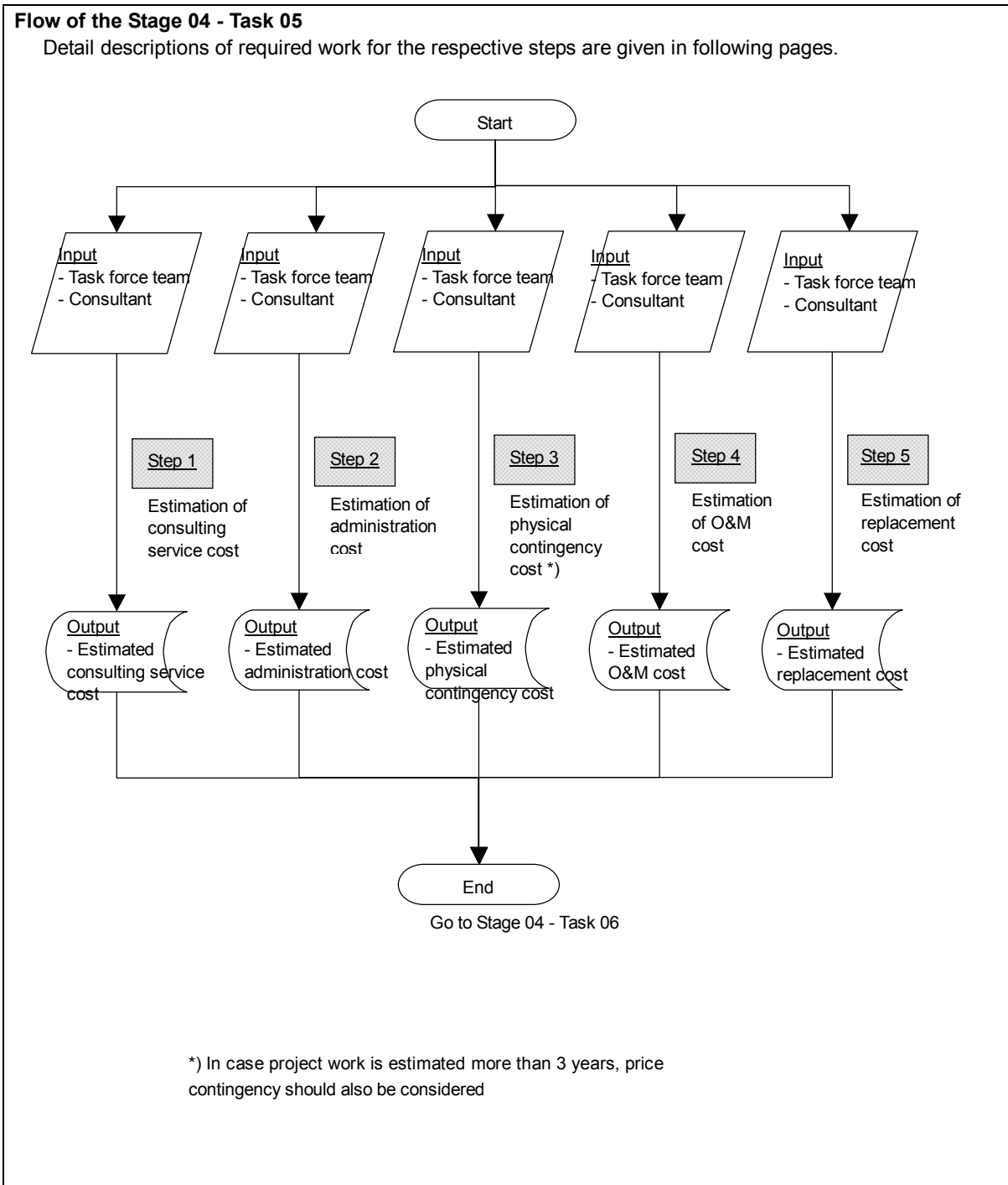
Items	Foods			
		()	()	()
Monthly Expenditures (Rp.000)				
Annual Expenditures (Rp.000)				
Total Annual Expenditures (Rp.000)				

(6) Net Reserve {Rp.000; (4) - (5)} = _____

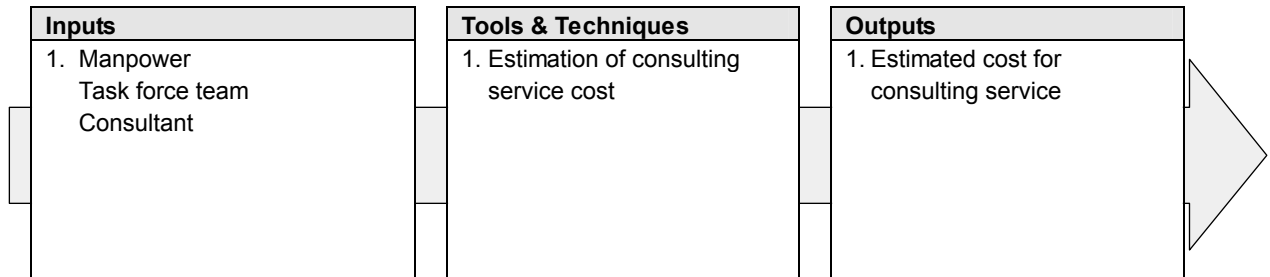
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04	Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes
Task 05	Pre-F/S Level Project Cost Estimate
Purpose and scope	
Purpose of the work is to estimate project cost for project economic evaluation.	



Stage 04 - Task 05 Step 01	Estimation of consulting service cost
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Criteria, standards and references
A) Ministry of Public Works/JICA. 1999. <i>Guidelines for Feasibility Study of Irrigation Development</i> .

Inputs

1. **Manpower**
 - Task force team
 - Consultant

Tools & Techniques

1. **Estimation of consulting service cost**
 Consulting service cost should be estimated based on the criteria and standards-A. For rough estimate, it is recommended to apply 5 to 10 % of construction cost which is estimated in Stage 04 - Task 02.

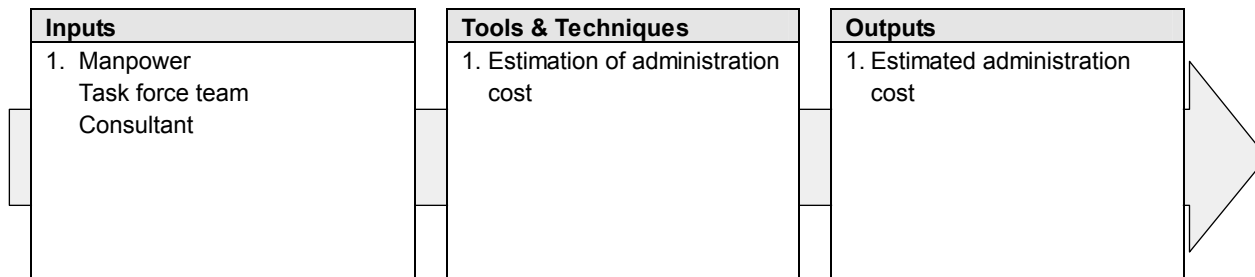
Outputs

1. **Estimated cost for consulting service**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 05 Step 02	Estimation of administration cost
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Criteria, standards and references
A) Ministry of Public Works/JICA. 1999. <i>Guidelines for Feasibility Study of Irrigation Development.</i>

Inputs

1. **Manpower**
 - Task force team
 - Consultant

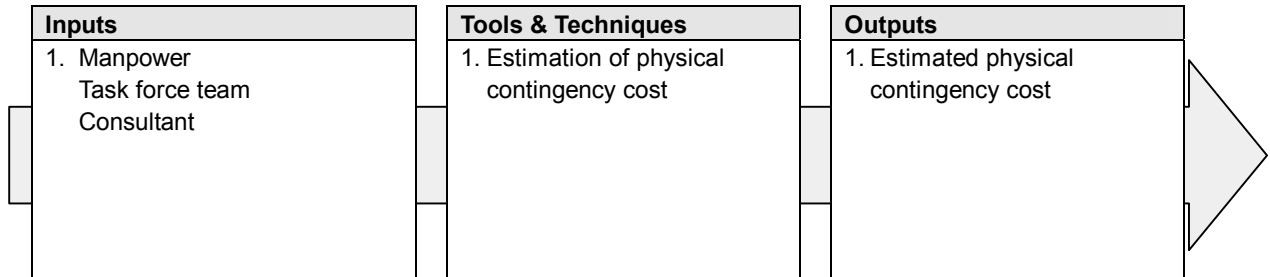
Tools & Techniques

1. **Estimation of administration cost**
 Administration cost should be estimated based on the criteria and standards-A. In the criteria and standards-A, it is described that the administration cost should be 2.5% of cost of civil works and preparatory works.

Outputs

1. **Estimated administration cost**

Stage 04 - Task 05 Step 03	Estimation of physical contingency cost
---------------------------------------	--



Criteria, standards and references
A) Ministry of Public Works/JICA. 1999. <i>Guidelines for Feasibility Study of Irrigation Development</i> .

Inputs

1. **Manpower**
 - Task force team
 - Consultant

Tools & Techniques

1. **Estimation of physical contingency cost**
 Physical contingency cost should be estimated based on the criteria and standards-A. In the criteria and standards-A, it is described that the physical contingency cost should be 10% of cost of civil works and preparatory works in general.

Outputs

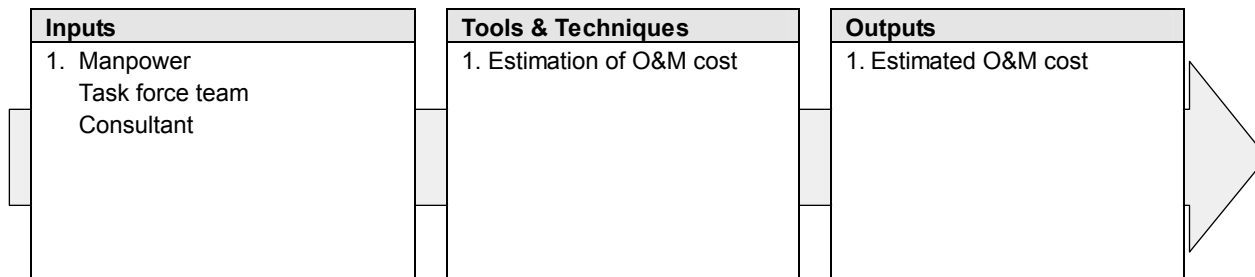
1. **Estimated physical contingency cost**

Note: In case project work is estimated more than 3 years, price contingency should be considered

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 05 Step 04	Estimation of O&M cost
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Criteria, standards and references
None

Inputs

1. **Manpower**
 - Task force team
 - Consultant

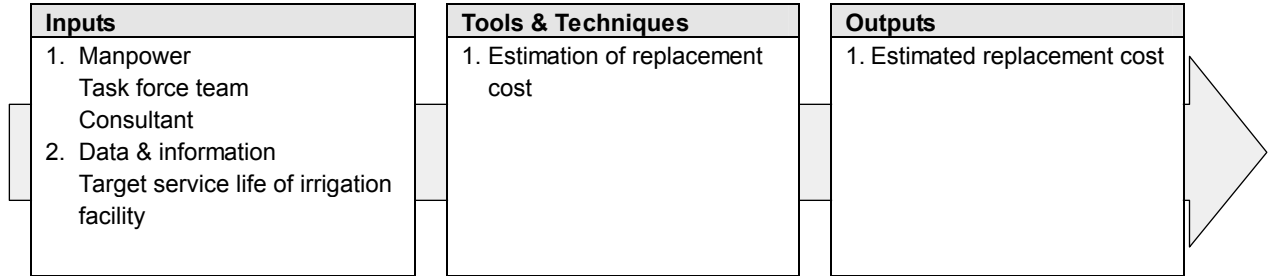
Tools & Techniques

1. **Estimation of O&M cost**
 O&M cost should be estimated by cost estimate expert and irrigation expert. In *JICA Study on Comprehensive Recovery Program of Irrigation Agriculture*, present O&M cost was preliminary estimated at Rp. 100,000/ha/year and O&M cost with project was estimated at Rp. 200,000/ha/year.

Outputs

1. **Estimated physical contingency cost**

Stage 04 - Task 05 Step 05	Estimation of replacement cost
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Criteria, standards and references
None

Inputs

- 1. Manpower**
 - Task force team
 - Consultant
- 2. Data & information**
 - Target service life of irrigation facility
 Target service life of irrigation facility set up in Stage 04 - Task 01 should be confirmed.

Tools & Techniques

- 1. Estimation of replacement cost**

Replacement cost of irrigation facility should be estimated based required cost for replacement. Timing of the replacement should be estimated based on the target service life of irrigation facility.

Sample of service life

1) Steel gates of water resources facility and canal related structure	30 years
2) Pump	30 years
3) O&M equipment	10 years

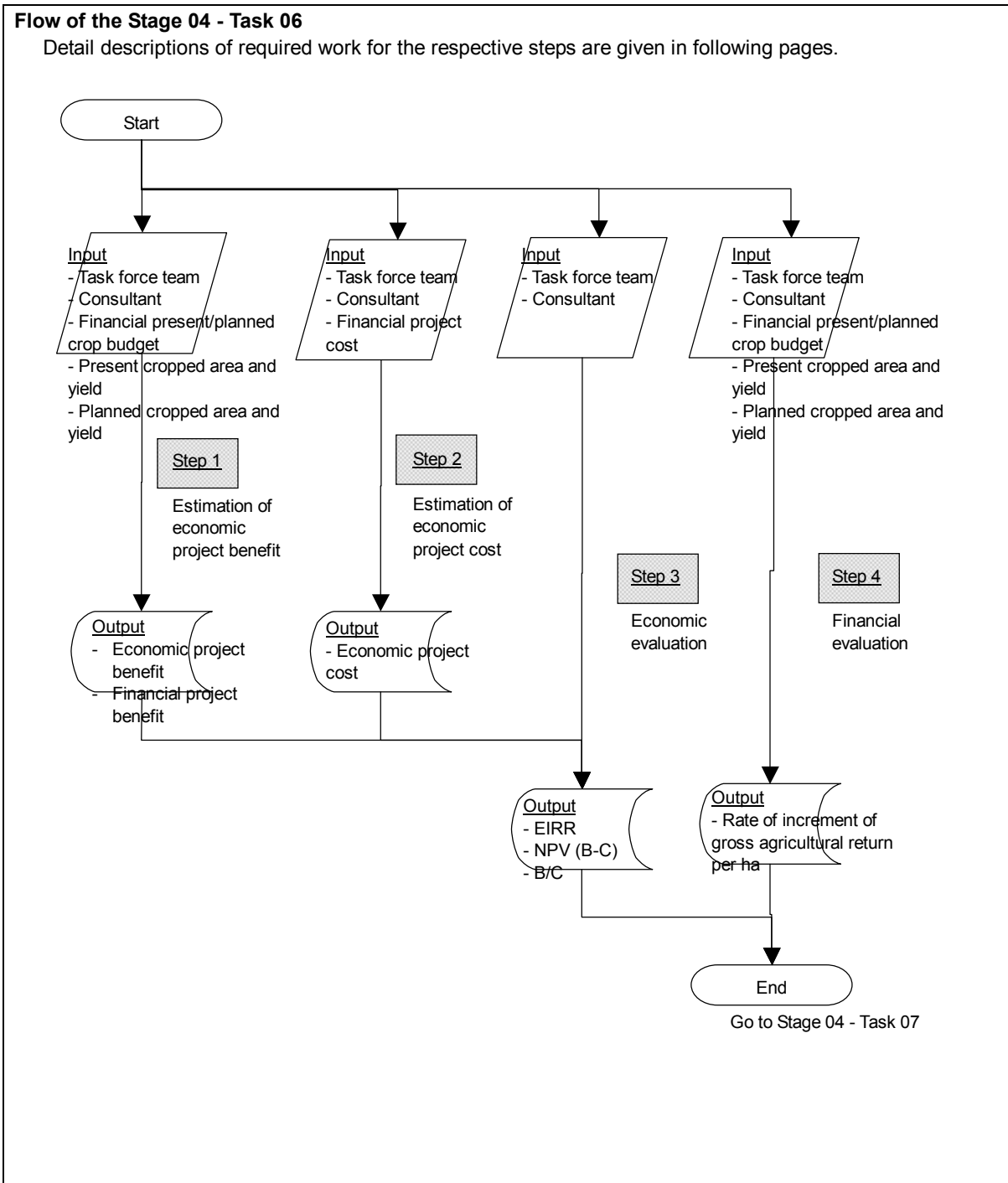
Outputs

- 1. Estimated replacement cost**

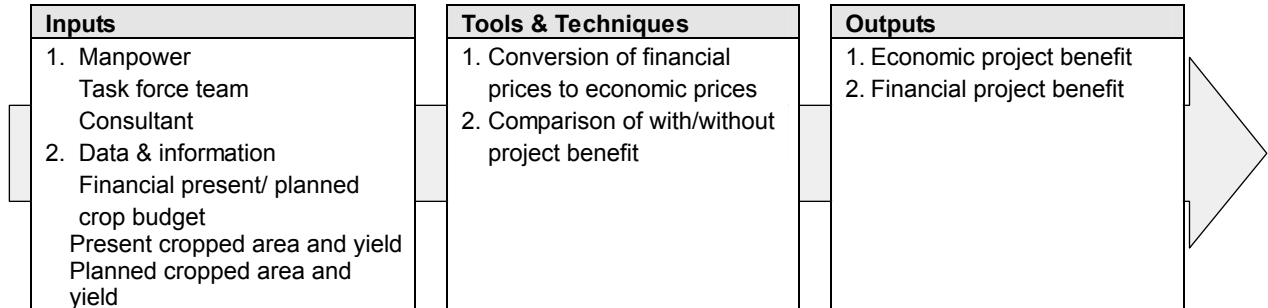
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04	Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes
Task 06	Pre-F/S Level Economic and Financial Evaluation
Purpose and scope	
Scope of the Task are to: 1) Estimate Pre-F/S level investment return; and 2) Estimate Pre-F/S level project benefit from economic and financial view point.	



Stage 04 - Task 06 Step 01	Estimation of economic project benefit
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Criteria, standards and references

A) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

- 1. Manpower**
 Task force team
 Consultant
- 2. Data & information**
 Financial present/ planned crop budget
 Present cropped area and yield
 Planned cropped area and yield

Tools & Techniques

- 1. Conversion of financial prices to economic prices**
 For the calculation of economic benefit, financial crop budget is required to be converted to economic crop budget by using of economic prices. Economic prices of trade goods are estimated on the basis of the projected world market prices. Economic prices are calculated by the following items, and sample calculation is attached as Sample 04-06-01-01 and 04-06-01-02.
 - International Commodity Price
 - CIF (Cost Insurance and Freight)
 - Transportation Cost
 - Handling, Storage and Losses
 Economic prices of non-trade goods are valued same as financial prices. On the basis of economic price, economic crop budget is calculated.
- 2. Comparison of with/without project benefit**
 Based on economic crop budget, with/ without project benefits are estimated with the data of present/ planned cropped area and yield. Economic Project Benefit is calculated as the difference of with project benefit minus without project benefit.

Outputs

- 1. Economic project benefit**
- 2. Financial project benefit**
 Financial project benefit should also be computed. It can be computed without converting financial prices to economic prices.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Sample 04-06-01-01 Sample Calculation of Economic Price

Item	Import Parity			Export Parity		
	Operation	US\$/ton	Rp/kg	Operation	US\$/ton	Rp/kg
Rice						
(1) Thai 5% broken, 2005 (constant 1990 price) *1*3		221.3			221.3	
(2) Adjusted to 2003 constant price	112.44%	248.8		112.44%	248.8	
(3) Quality adjustment	90%	223.9		90%	223.9	
(4) Freight and insurance (Bangkok-Indonesia)	+	40.0				
(5) CIF Indonesia		263.9			223.9	
(6) Conversion to Rupiah *2			2,185			1,854
(7) Losses and port handling	5% +	109		5% -		93
(8) Transportation (port to wholesaler)	+	40		-		40
(9) Ex-wholesaler			2,334			1,721
(10) Handling and transportation (wholesaler to mill)	-	80		-		80
(11) Ex-mill			2,254			1,641
(12) Conversion to paddy	68%	1,533		68%		1,116
(13) By-products (rice bran: 20% of paddy x Rp100/kg)	+	100		+		100
(14) Milling cost	-	100		-		100
(15) Transportation (mill to farm)	-	20		-		20
(16) Economic farm gate price			1,513			1,096
(Rounded)			1,510			1,100
(17) Weighted average economic farm gate price (import 100%, export 0%)						1,510

*1 Projected price in 2005 at constant 1990 price

Source: World Bank, Global Development Finance 2001.

*2 Exchange Rate as of May, 2003 (US\$1.00=Rp 8,279)

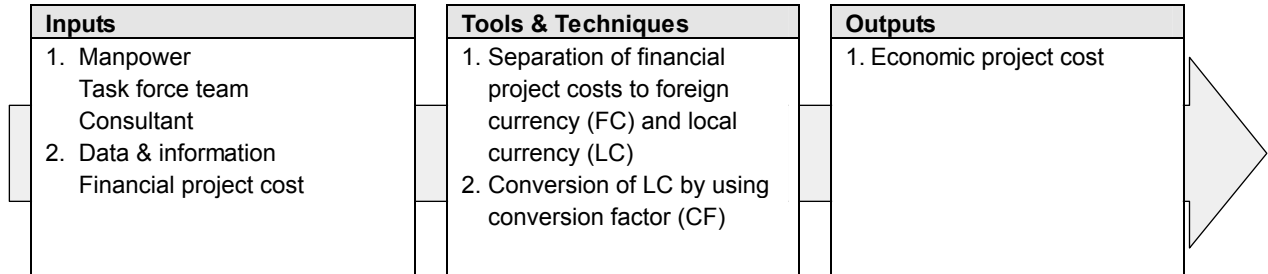
*3 Thai, white, milled, 5% broken, FOB Bangkok.

Sample 04-06-01-02 Sample Calculation of Economic Project Benefit

Irrigation Scheme:	6 Pamukulu	District:	Takalar			
Subject Area:	4,480 ha	Province:	South Sulawesi			
1. Without Project Conditions						
Land Use	Area (ha)	Cropping Season/ Crop	Cropped Area (ha)	Yield (t/ha)	Crop Budget (Rp. 000/ha)	NPV ^{*1} (Rp. million)
			(1)		(2)	(3)=(1)*(2)
Irrigated Paddy Field	4,133	Wet Paddy	4,133	4.0	3,550	14,672
		-	-	-	-	0
		Dry I Paddy	1,332	4.0	3,550	4,729
		Maize	223	2.5	1,640	366
		Dry II	-	-	-	-
		Sub-total				19,766
Rainfed Paddy Field	347	Wet Paddy	347	2.5	1,950	677
		Dry Maize	69	2.5	1,640	113
		Sub-total				
Upland Field	0	Wet	-	-	-	0
		Dry	-	-	-	0
		Sub-total				
Uncultivated Land	0	-	-	-	-	0
Overall	4,480					20,556
2. With Project Conditions						
Land Use	Area (ha)	Cropping Season/ Crop	Cropped Area (ha)	Yield (t/ha)	Crop Budget (Rp. 000/ha)	NPV ^{*1} (Rp. million)
			(1)		(2)	(3)=(1)*(2)
Irrigated Paddy Field	4,480	Wet Paddy	4,480	5.0	4,690	21,011
		-	-	-	-	0
		Dry I Paddy	3,584	5.0	4,690	16,809
		Maize	448	5.0	3,690	1,653
		Mungbeans	448	1.2	2,280	1,021
		Dry II	-	-	-	0
		Sub-total				40,495
Un-Irrigable Land	0	-	-	-	-	0
Overall	4,480					40,495
Economic Project Benefit (Rp. million)						19,938

*1: NPV=Net Production Value

Stage 04 - Task 06 Step 02	Estimation of economic project cost
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Criteria, standards and references

A) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

1. Manpower

Task force team
Consultant

2. Data & information

Financial project cost

Estimated project cost in task 04 is financial cost, which is required to be converted to economic price for the economic evaluation.

Tools & Techniques

1. Separation of financial project cost to foreign currency (FC) and local currency (LC)

Financial cost is separated to FC (or trade goods) and LC (or non-trade goods).

2. Conversion of LC by using conversion factor (CF)

LC is required to be converted to economic value by using of conversion factor (CF). CF is the ratio between economic prices and financial prices, generally CF is estimated smaller than 1. Exactly, CF needs to be estimated by each input (for instance, for construction cost that consists of material, equipment, labor and etc., its CF requires to be estimated from CFs of inputs.). However, in practice, it is reasonable to apply standard conversion factor (SCF) for the conversion. In the JICA Study on Comprehensive Recovery Program of Irrigation Agriculture, 0.90 was applied as the SCF.

Outputs

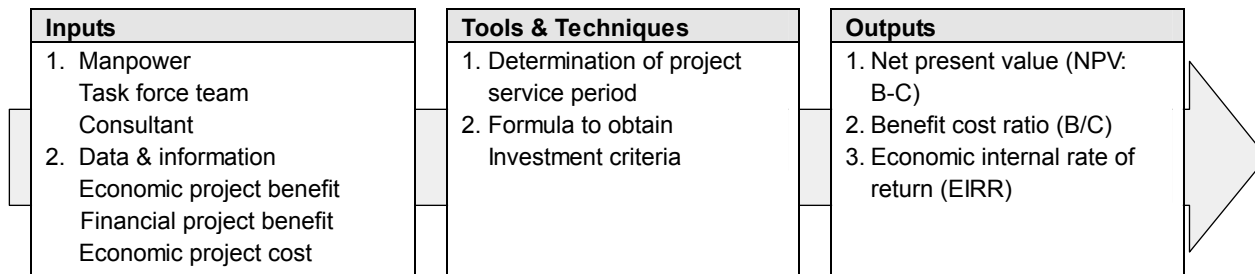
1. Economic project cost

Economic project cost is obtained through this step.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 06 Step 03	Economic evaluation
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Criteria, standards and references

A) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

1. **Manpower**
 Task force team
 Consultant
2. **Data & information**
 Economic project benefit
 Economic project cost

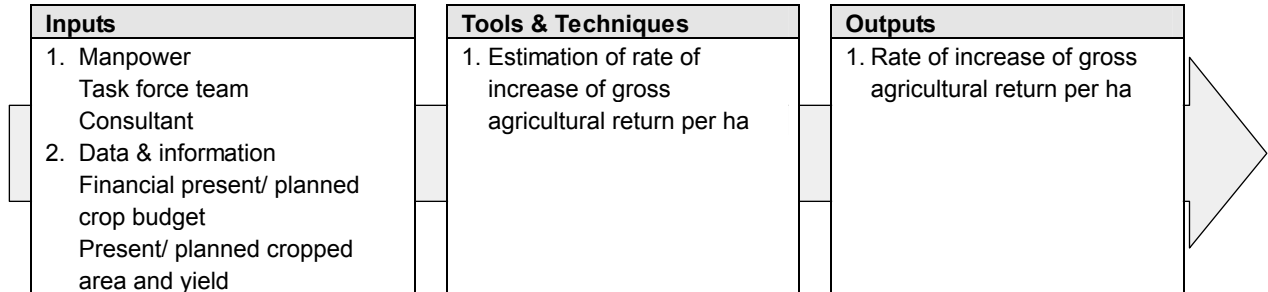
Tools & Techniques

1. **Determination of project service period**
 For executing economic evaluation, project service period should be determined as long as the project produces benefit and requires cost.
2. **Formula to obtain investment criteria**
 Generally, the investment criteria are:
 Economic project benefit exceeds economic project cost.
 Investment criteria is the indicator to verify those conditions, generally there are mainly three criteria.
 - 1) NPV (B-C)
 NPV = Overall project benefit for the project service period - Overall project cost (expressed by the present value estimated with a certain discount rate (8 ~ 12 %)).
 NPV is the total net benefit that is estimated at present value, therefore, NPV is the indicator of economic feasibility.
 - 2) B/C
 B/C = Overall project benefit/ Overall project cost
 B/C is the comparison of net present of benefit with net present value of cost.
 - 3) EIRR
 EIRR is the discount rate where present value of the overall project benefit is equal to the overall project cost; NPV (B-C) with this discount rate becomes zero. EIRR is the most popular indicator for the economic evaluation. Generally speaking, 10 ~ 12 % or higher EIRR is the criteria for feasible economic investment for international lending agencies.

Outputs

1. **Net present value (NPV: B-C)**
2. **Benefit cost ratio (B/C)**
3. **Economic internal rate of return (EIRR)**

Stage 04 - Task 06 Step 04	Financial evaluation
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Criteria and standards
None

Inputs

- 1. Manpower**
Task force team
Consultant
- 2. Data & information**
Financial present/ planned crop budget
Present/ planned cropped area and yield

Tools & Techniques

- 1. Estimation of rate of increase of gross agricultural return per ha**
Obtain the gross return per ha for each commodity from the financial present/ planned crop budget. Estimate the present/ planned annual gross return, based on the present/ planned cropped area and yield data. (Calculation method is referred to Sample 04-06-01-02.)
Estimate the rate of increase of gross agricultural return per ha (divide planned annual gross return per ha/ into present annual gross return per ha)

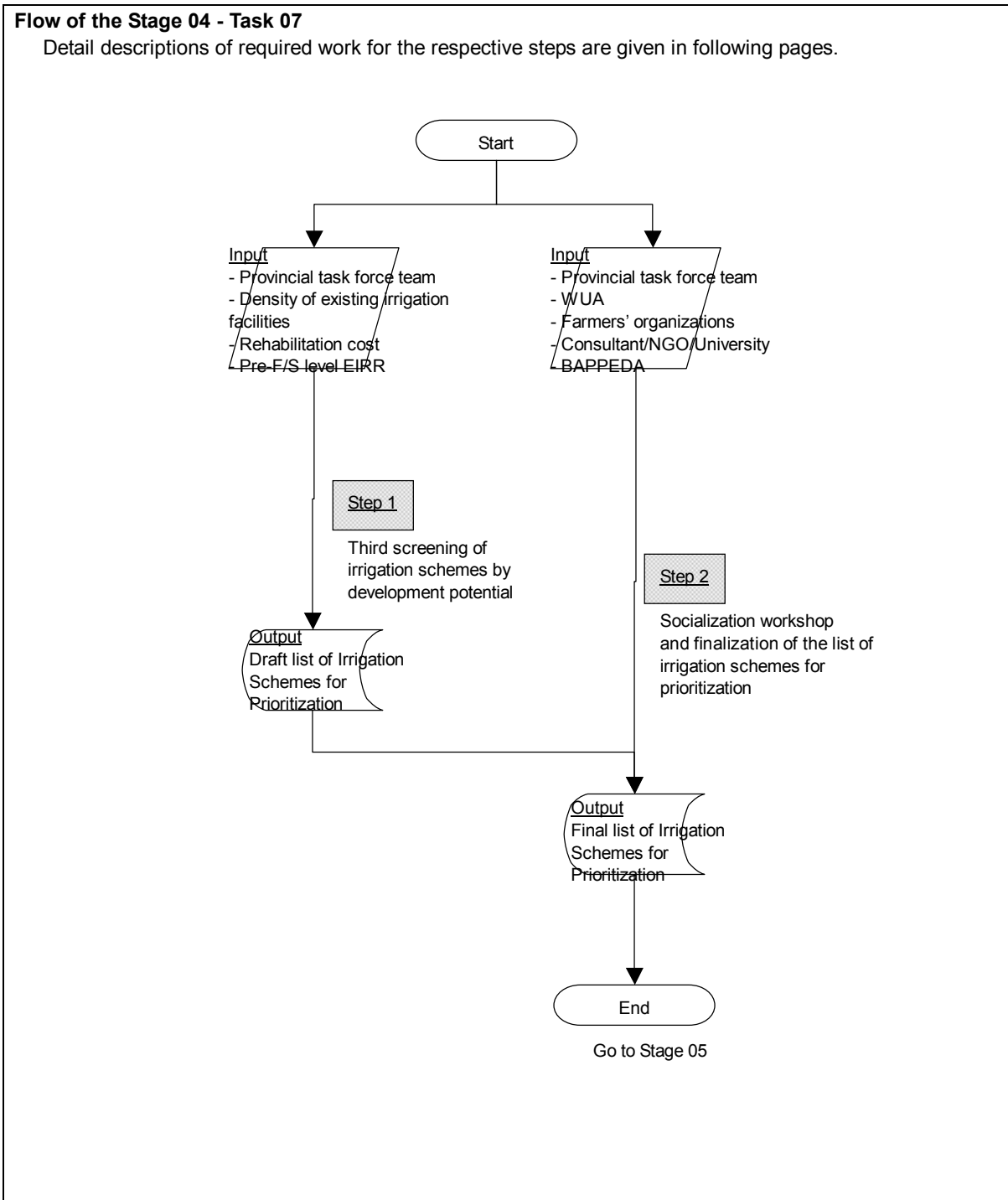
Outputs

- 1. Rate of increase of gross agricultural return per ha**
This data is required as one of evaluation indicators for the following prioritization of irrigation schemes for rehabilitation.

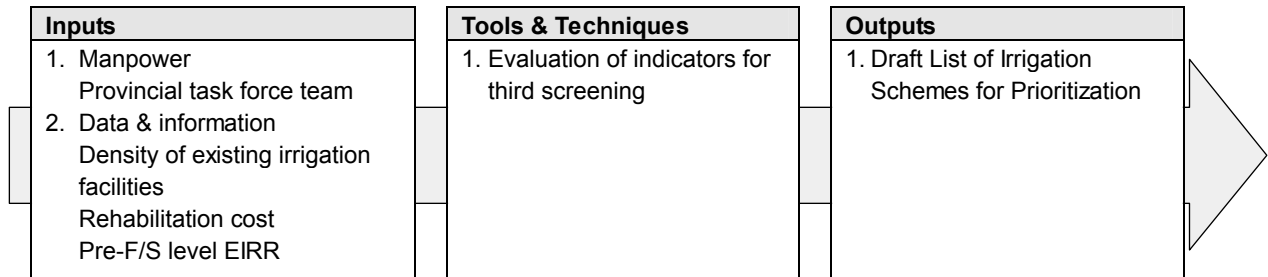
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04	Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes
Task 07	Third Screening of Irrigation Schemes by Development Potential
Purpose and scope	
Scope of the Task is to screen irrigation schemes for prioritization.	



Stage 04 - Task 07 Step 01	Third screening of irrigation schemes by development potential
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Criteria, standards and references
None

Inputs

- 1. Manpower**
 - Provincial task force team
 - Consultant
- 2. Data & information**
 - Density of existing irrigation facilities
 - Rehabilitation cost (per ha)
 - EIRR

Tools & Techniques

- 1. Evaluation of indicators for third screening**

The irrigation schemes of which indicators are as follows should be separated from the list and categorized into Group-VI (Development by other category or method).

 - 1) Density of provided irrigation facilities: less than 50 % of requirement,
 - 2) Unit construction cost per hectare: more than US\$ 3,500 (per ha), and
 - 3) EIRR is less than 0 %.

Outputs

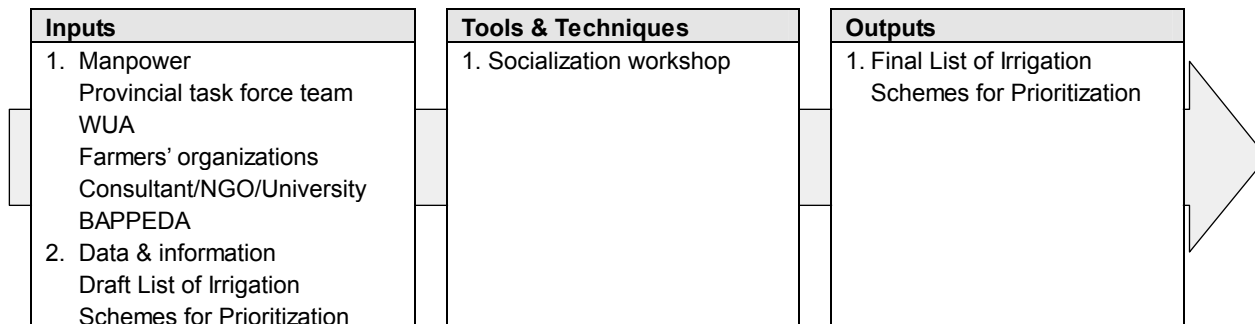
- 1. Draft List of Irrigation Schemes for Prioritization**

After third screening of the irrigation schemes, "Draft List of Irrigation Schemes for Prioritization" should be obtained.

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes

Stage 04 - Task 07 Step 02	Socialization workshop and finalization of the List of Irrigation Schemes for Prioritization
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Criteria, standards and references
None

Inputs

- 1. Manpower**
 - Provincial task force team
 - Representatives of WUA
 - Representatives of farmers' organizations
 - Consultant/NGO/University
 - BAPPEDA
- 2. Data & information**
 - Draft List of Irrigation Schemes for Prioritization

Tools & Techniques

- 1. Socialization workshop**
 - Socialization workshop on Draft List of Irrigation Schemes for Prioritization should be held and the list should be finalized and authorized. In this workshop, process and result of the third screening should be clearly explained.

Outputs

- 1. Final List of Irrigation Scheme for Prioritization**

I. Pre-Feasibility Study for
Prioritization of
Irrigation Schemes

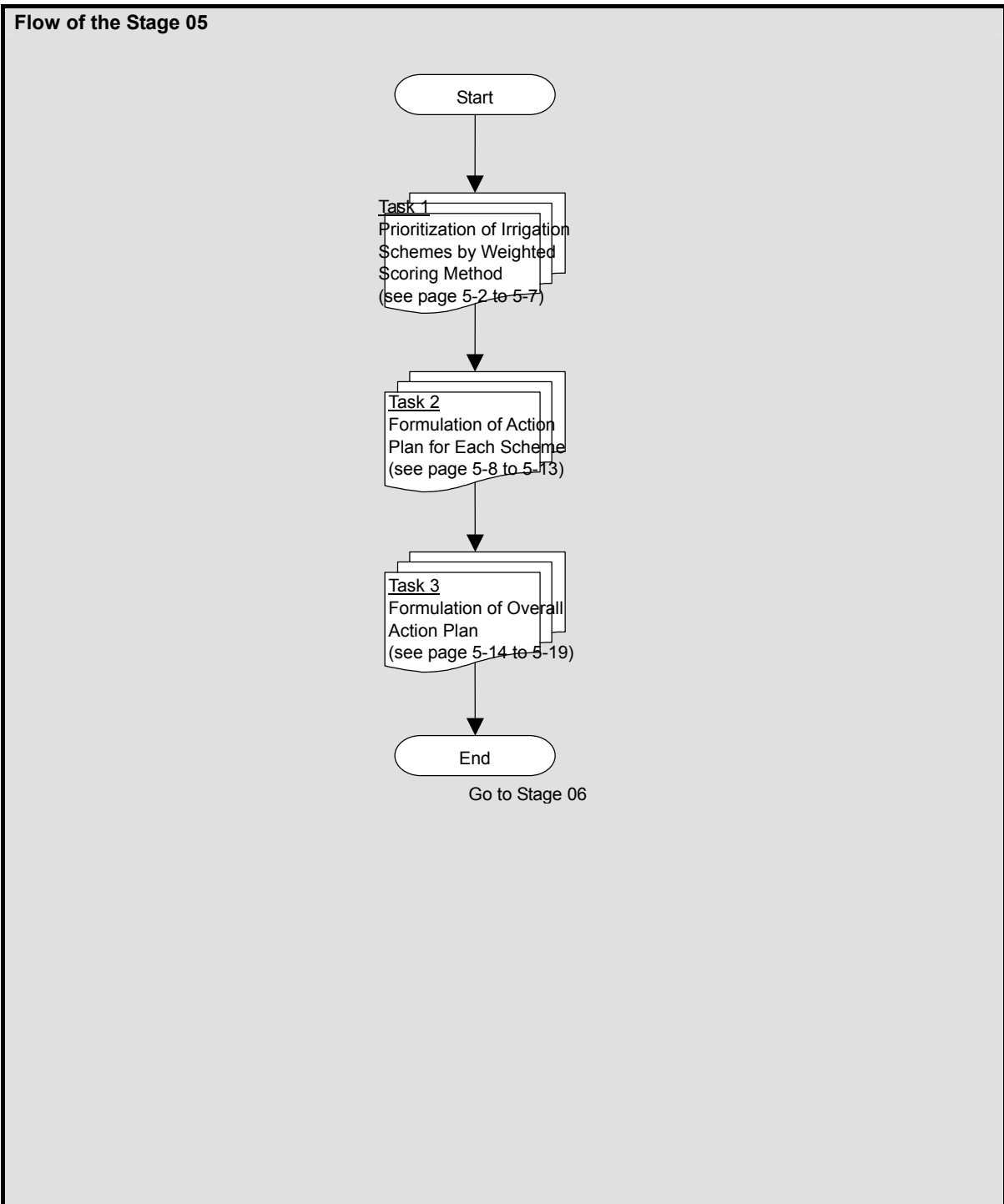
Stage 05

**Prioritization of Irrigation Schemes
for Rehabilitation and
Preparation of Action Plan**

Instruction

Prioritization on all of irrigation schemes listed in the “List of Irrigation Schemes for Prioritization” should be made based on the result of Pre-feasibility study. The result of prioritization should be compiled as “Priority List of Irrigation Scheme for Rehabilitation”. Action Plan to implement rehabilitation works should also be prepared.

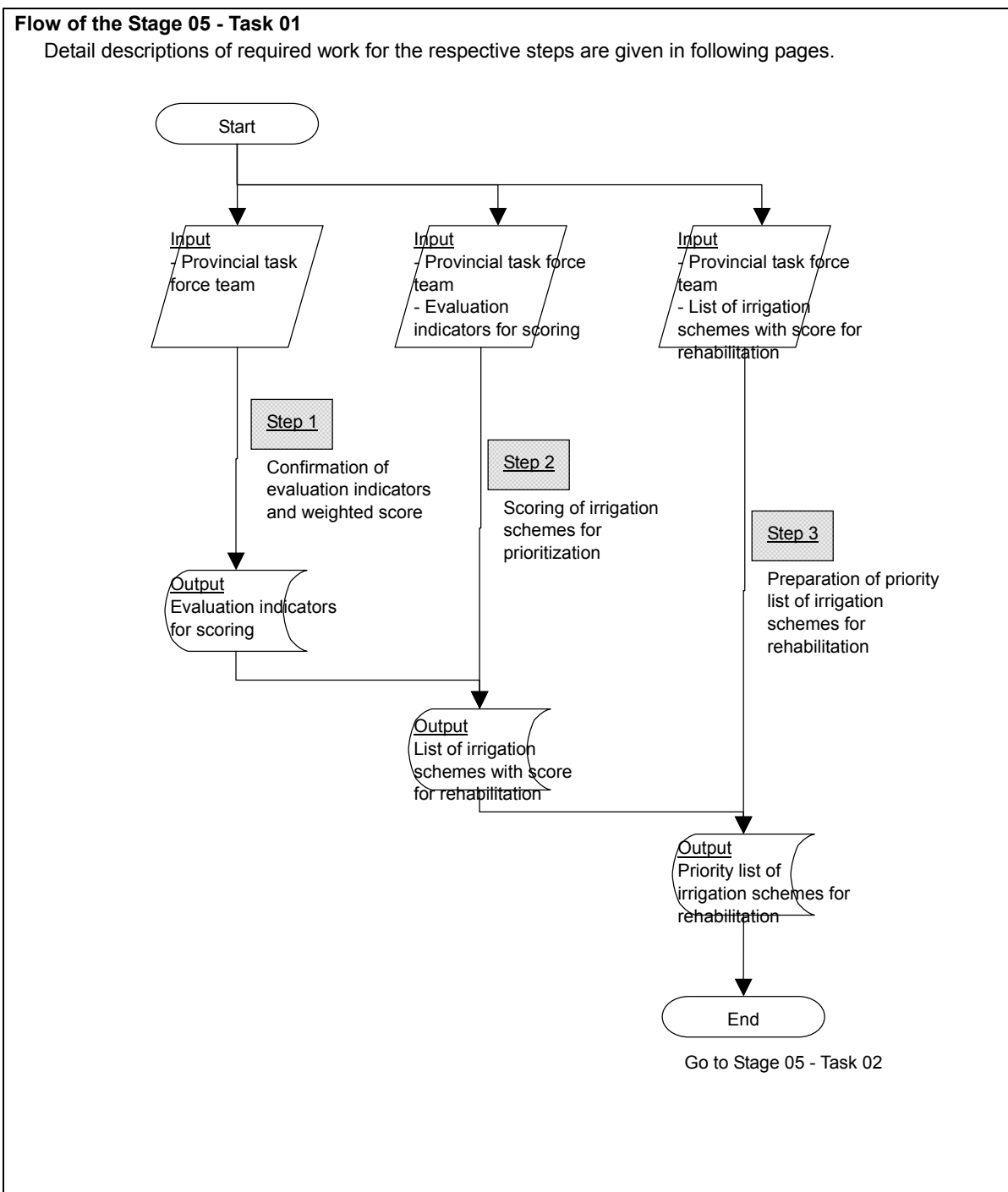
Stage 05 Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan
Purpose and scope
Scope of the work are to: 1) Determine evaluation indicators for scoring and weighting score; 2) Execute prioritization and ranking; and 3) Authorize the result.



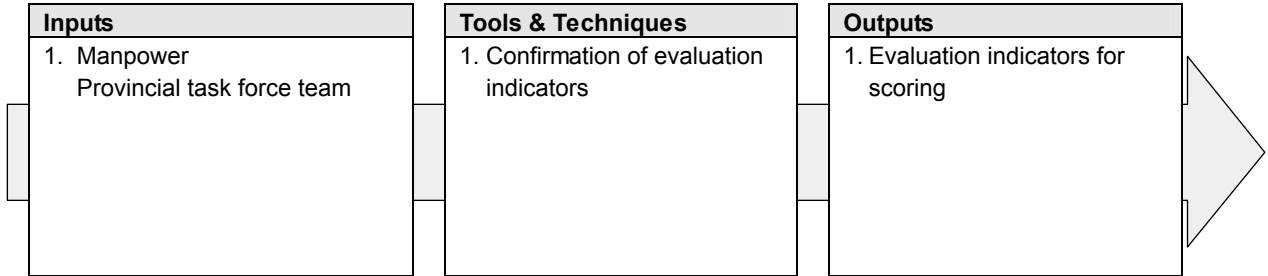
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 05. Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan

Stage 05	Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan
Task 01	Prioritization of Irrigation Schemes by Weighted Scoring Method
Purpose and scope	
Scope of the Task are to: 1) Evaluation of the irrigation schemes by weighted scoring method, and 2) Preparation of priority list of irrigation schemes for rehabilitation.	



Stage 05 - Task 01 Step 01	Confirmation of evaluation indicators and weighted score
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Criteria, standards and references
A) Table 05-01-01-01

Inputs

1. **Manpower**
 Provincial task force team

Tools & Techniques

1. **Confirmation of evaluation indicators**
 Evaluation indicators for prioritization of irrigation schemes rehabilitation should be confirmed and finalized.
 Sample of weighted score for prioritization of irrigation schemes is attached in next page (Table 05-01-01-01).

Outputs

1. **Evaluation indicators for scoring**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

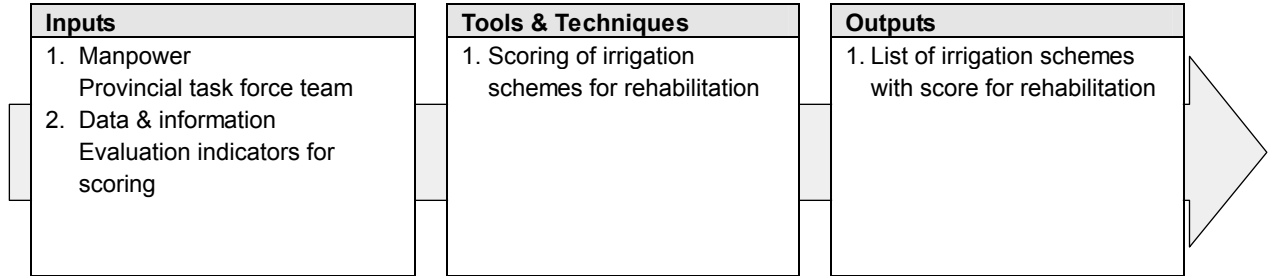
Stage 05. Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan

Table 05-01-01-01 Weighted Score for Prioritization of Irrigation Schemes

Issues for Evaluation	Full Score	Evaluation Index	Weight	Weighted Score	Situation for High Priority
1 Issues on Irrigation System	50.0				
1.1 Rate of Utilization of Irrigation Potential (= present irrigation paddy area / irrigated paddy area with project x 100)	10.0	(1) Less than 50 % (2) 50 - 69 % (3) 70 - 100 %	1.0 0.8 0.5	10.0 8.0 5.0	Severe problem on irrigation program achievement.
1.2 Urgency of Rehabilitation	25.0				Severe problem on irrigation facilities
1.2.1 Function of Water Resources	10.0	(1) Serious condition for operation (Evaluation: D) (2) Not functioning well (Evaluation: C) (3) Partially deteriorated (Evaluation: B) (4) Functioning well (Evaluation: A)	1.0 0.8 0.6 0.4	10.0 8.0 6.0 4.0	
1.2.2 Function of Main Canal System	7.0	(1) Serious condition for operation (Evaluation: D) (2) Not functioning well (Evaluation: C) (3) Partially deteriorated (Evaluation: B) (4) Functioning well (Evaluation: A)	1.0 0.8 0.6 0.4	7.0 5.6 4.2 2.8	
1.2.3 Function of Secondary Canal	5.0	(1) Serious condition for operation (Evaluation: D) (2) Not functioning well (Evaluation: C) (3) Partially deteriorated (Evaluation: B) (4) Functioning well (Evaluation: A)	1.0 0.8 0.6 0.4	5.0 4.0 3.0 2.0	
1.2.4 Function of On-farm System	3.0	(1) Serious condition for operation (Evaluation: D) (2) Not functioning well (Evaluation: C) (3) Partially deteriorated (Evaluation: B) (4) Functioning well (Evaluation: A)	1.0 0.8 0.6 0.4	3.0 2.4 1.8 1.2	
1.3 Sustainability of Irrigation System	15.0				Severe problem on sustainability
1.3.1 Age of the Facility	7.5	(1) More than 50 years (2) 30 - 49 years (3) 15 - 29 years (4) Less than 15 years	1.0 0.8 0.6 0.4	7.5 6.0 4.5 3.0	
1.3.2 Technical Level	7.5	(1) Non-technical level (2) Semi-technical level (3) Technical level	1.0 0.8 0.5	7.5 6.0 3.8	
2 Issues on Agricultural Productivity	20.0				
2.1 Current Cropping Intensity of Paddy (= annual cropped area of paddy / subject area x 100)	10.0	(1) Less than 100 % (2) 100 - 149 % (3) 150 - 199 % (4) More than 200 %	1.0 0.8 0.6 0.4	10.0 8.0 6.0 4.0	Severe problem on agriculture (low productivity)
2.2 Current Unit Yield of Paddy (= weighted average unit yield of irrigated & rainfed paddy in the scheme)	10.0	(1) Less than 60 % of planned target yield (2) 60 - 79 % of planned target yield (3) 80 - 100 % of planned target yield	1.0 0.8 0.5	10.0 8.0 5.0	Severe problem on agriculture (low productivity)
3 Issues on Society	15.0				Severe social problem
3.1 Contribution to Regional Economy (Current Number of Beneficiaries)	7.5	(1) Less than 30 % of with project beneficiaries (2) 30 - 59 % of with project beneficiaries (3) 60 - 89 % of with project beneficiaries (4) More than 90 % of with project beneficiaries	1.0 0.8 0.6 0.4	7.5 6.0 4.5 3.0	
3.2 Provision of Social Infrastructure (Current ratio of Inspection Road Provision)	7.5	(1) Less than 40 % of total canal length of main & secondary canal (2) 40 - 59 % of total canal length of main & secondary canal (3) 60 - 79 % of total canal length of main & secondary canal (4) 80 - 100 % of total canal length of main & secondary canal	1.0 0.8 0.6 0.4	7.5 6.0 4.5 3.0	
4 Issues on Economic and Financial	15.0				High economic and financial impact
4.1 Feasibility (Pre-F/S level EIRR)	7.5	(1) More than 20 % (2) 15 - 19 % (3) 10 - 14 % (4) Less than 10 %	1.0 0.8 0.6 0.4	7.5 6.0 4.5 3.0	
4.2 Rate of Increase of Gross Agricultural (= planned annual gross return per ha / current annual gross return per ha x 100)	7.5	(1) More than 200 % (2) 150 - 199 % (3) Less than 150 %	1.0 0.8 0.6	7.5 6.0 4.5	
TOTAL	100.0				

Note: Indicators and scores above were applied for the JICA Study on Comprehensive Recovery Program of Irrigation Agriculture.

Stage 05 - Task 01 Step 02	Scoring of irrigation schemes for prioritization
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Criteria, standards and references
A) Table 05-01-01-01

Inputs

- 1. Manpower**
 Provincial task force team
- 2. Data & information**
 Evaluation indicators for scoring

Tools & Techniques

- 1. Scoring of irrigation schemes for rehabilitation**
 The irrigation schemes should be evaluated by weighted scoring method.

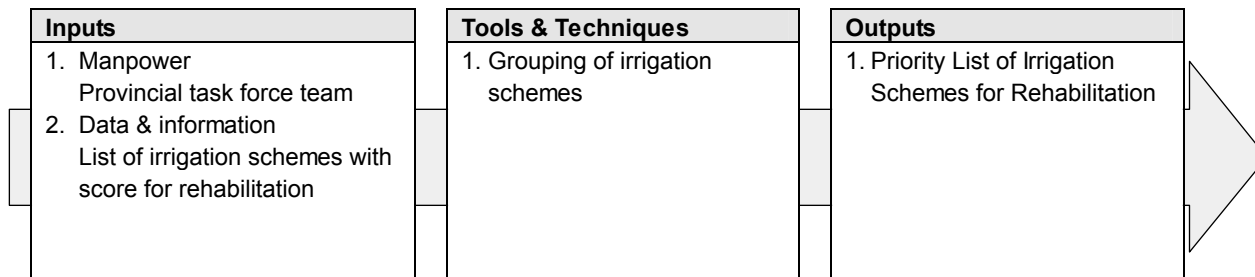
Outputs

- 1. List of irrigation schemes with score for rehabilitation**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 05. Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan

Stage 05 - Task 01 Step 03	Preparation of Priority List of Irrigation Schemes for Rehabilitation
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Criteria, standards and references
None

Inputs

- 1. Manpower**
Provincial task force team
- 2. Data & information**
List of irrigation schemes with score for rehabilitation

Tools & Techniques

- 1. Grouping of irrigation schemes**
 The irrigation schemes listed in the “List of Irrigation Schemes for Prioritization” should be classified into three groups. They are : i) Group-I, ii) Group-II, and iii) Group-III.
 Recommended means of grouping is:

Group I	:	First priority group	(33% of schemes from the top)
Group II	:	Second priority group	(33% of schemes following Group I)
Group III	:	Third priority group	(remaining schemes)

 Schemes categorized into Group-IV and Group-VI are to be developed by other category and method. They might be: i) downsizing of irrigation scheme, ii) combining and integrating schemes for cost down, iii) completion of works in case low density of irrigation facility, etc. For the scheme classified into Group V, acceleration of WUAs establishment or institutional capacity building should be made before starting rehabilitation works.
 In accordance with the results of prioritization, the central and local Government should held meeting with the related agencies and authorities for authorization.

Outputs

- 1. Priority List of Irrigation Schemes for Rehabilitation**
 Sample of Priority List is shown in Sample 05-01-03-01.

SAMPLE

Sample 05-01-03-01 Priority List of Irrigation Schemes for Rehabilitation

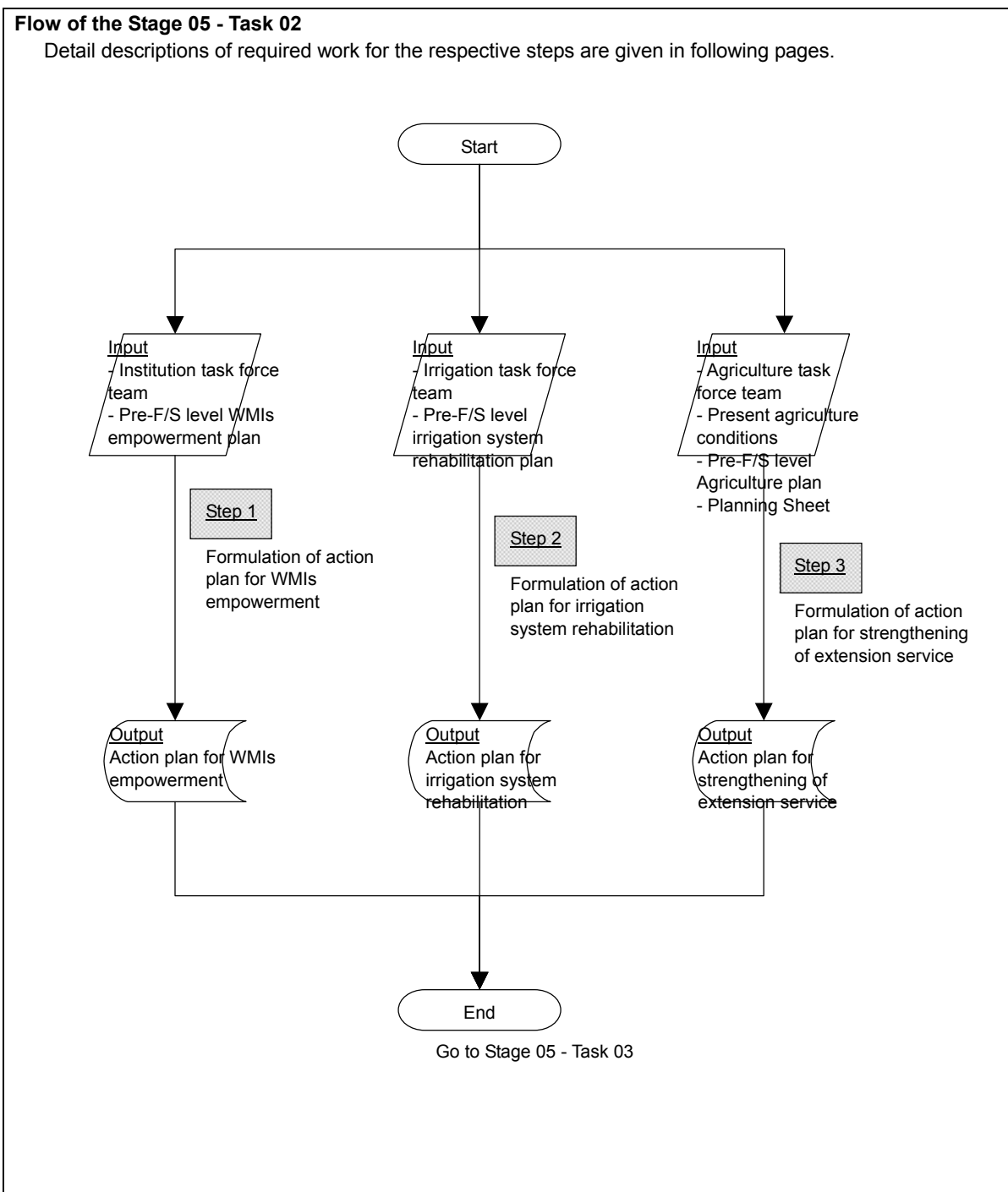
Irrigation Scheme	Utilization of Irrigation Potential	Function of Water Resources Facility	Function of Main Canal	Function of Secondary Canal	Function of On-farm	Factor of Deterioration by Year of Construction	Technical Level	Current Cropping Intensity	Current Unit Yield of Paddy	Contribution to Regional Economy	Provision of social infrastructure	EIRR	Rate of Increase of Gross Agricultural Return	Total Score	Ranking	Classified Group	
1 Gido Sebu																Group VI (Subject area is less than 1,000 ha)	Group VI
2 Batang Gadis	(3)	(3)	(3)	(2)	(2)	(4)	(3)	(3)	(3)	(4)	(4)	(3)	(3)	54.4	18	Group III	
3 Batang Ilung	(3)	(3)	(2)	(2)	(4)	(3)	(3)	(3)	(3)	(4)	(2)	(3)	(3)	58.8	16	Group III	
4 Blk Sitongkon/Napa Suron																Group VI (Subject area is less than 1,000 ha)	Group VI
5 Siborna																Group VI (Subject area is less than 1,000 ha)	Group VI
6 Sialii Tukka																Group VI (Subject area is less than 1,000 ha)	Group VI
7 Badiri Lopian																Group VI (Subject area is less than 1,000 ha)	Group VI
8 Pandurungan	(3)	(1)	(1)	(2)	(3)	(3)	(2)	(2)	(3)	(1)	(3)	(2)	76.2	2	Group I		
9 Sihiong																Group VI (Subject area is less than 1,000 ha)	Group VI
10 Aek Silang																Group V (Accerlation of WUAs establishment)	Group V
11 Sarulla																Group V (Accerlation of WUAs establishment)	Group V
12 Parmiahutan Hutapaung																Group V (Accerlation of WUAs establishment)	Group V
13 Sinamo																Group VI (Subject area is less than 1,000 ha)	Group VI
14 Aek Mandos I	(3)	(2)	(3)	(1)	(1)	(4)	(2)	(1)	(2)	(4)	(2)	(2)	74.7	4	Group I		
15 Simangatasi II	(3)	(2)	(2)	(2)	(2)	(4)	(3)	(2)	(2)	(4)	(1)	(1)	73.3	5	Group I		
16 Bulung Iht	(3)	(3)	(1)	(1)	(2)	(4)	(3)	(3)	(3)	(4)	(4)	(2)	59.7	15	Group III		
17 Perkotaan	(3)	(3)	(2)	(2)	(3)	(4)	(3)	(3)	(3)	(4)	(4)	(4)	53.7	19	Group III		
18 Sungai Balai	(3)	(2)	(1)	(1)	(2)	(4)	(2)	(3)	(3)	(4)	(1)	(3)	66.9	6	Group I		
19 Panca Arga																Group IV (Reformulation of development plan)	Group IV
20 Serbangan																Group IV (Reformulation of development plan)	Group IV
21 Silau Bonto																Group V (Accerlation of WUAs establishment)	Group V
22 Sungai Silau																Group IV (Reformulation of development plan)	Group IV
23 Padang Mahondang	(1)	(1)	(1)	(1)	(1)	(3)	(2)	(2)	(1)	(1)	(4)	(2)	87.5	1	Group I		
24 Simujur	(2)	(1)	(1)	(1)	(1)	(3)	(2)	(2)	(2)	(4)	(4)	(3)	76.0	3	Group I		
25 Purwodadi	(3)	(2)	(1)	(1)	(2)	(4)	(3)	(3)	(3)	(1)	(4)	(4)	63.2	9	Group II		
26 Pentara																Group VI (Subject area is less than 1,000 ha)	Group VI
27 Simantini Pane Dame																Group V (Accerlation of WUAs establishment)	Group V
28 Panambean / Panet Tengah BK	(3)	(3)	(2)	(1)	(2)	(4)	(3)	(3)	(3)	(4)	(1)	(4)	59.8	12	Group II		
29 Raja Hombang / T. Mangaraja	(3)	(3)	(2)	(1)	(1)	(4)	(3)	(3)	(3)	(4)	(1)	(3)	63.4	8	Group II		
30 Kerasaan	(3)	(2)	(2)	(1)	(1)	(3)	(3)	(2)	(3)	(4)	(4)	(3)	64.4	7	Group I		
31 Javacolonisasi/Purbogondo	(3)	(3)	(2)	(1)	(2)	(4)	(3)	(3)	(3)	(4)	(3)	(4)	56.8	17	Group III		
32 Naga Sompah																Group VI (High rehabilitation cost)	Group VI
33 Risma Duma																Group VI (Less facility was provided)	Group VI
34 Lae Ordi																Group V (Accerlation of WUAs establishment)	Group V
35 Parit Lompaten																Group VI (High rehabilitation cost)	Group VI
36 Bandar Sidoras																Group V (Accerlation of WUAs establishment)	Group V
37 Namu Rambe																Group VI (High rehabilitation cost)	Group VI
38 Sei Belutu																Group V (Accerlation of WUAs establishment)	Group V
39 Langau																Group V (Accerlation of WUAs establishment)	Group V
40 Medan Krio																Group V (Accerlation of WUAs establishment)	Group V
41 Rantau Panjang																Group VI (Less facility was provided)	Group VI
42 Pekan Kamis																Group V (Accerlation of WUAs establishment)	Group V
43 Secanggang																Group VI (High rehabilitation cost)	Group VI
44 Paya Lombang																Group V (Accerlation of WUAs establishment)	Group V
45 Namu Sira-sira Kiri	(3)	(3)	(2)	(2)	(1)	(3)	(3)	(2)	(3)	(4)	(4)	(3)	61.4	10	Group II		
46 Namu Sira-sira Kanan	(3)	(3)	(2)	(2)	(2)	(3)	(3)	(2)	(3)	(4)	(4)	(3)	60.8	11	Group II		
47 Bah Korah II	(3)	(3)	(2)	(1)	(2)	(4)	(3)	(3)	(3)	(3)	(2)	(4)	59.8	12	Group II		
48 Sijambi																Group V (Accerlation of WUAs establishment)	Group V
49 Rambung Mera																Group VI (Subject area is less than 1,000 ha)	Group VI
50 Paya Sordang	(3)	(3)	(2)	(1)	(2)	(4)	(3)	(3)	(3)	(3)	(4)	(3)	59.8	12	Group II		
Average																64.8	
Itemized Total	(1)	1	3	6	13	6	0	0	1	1	2	5	1	3		Group I :	7
	(2)	1	5	11	6	12	0	4	7	4	0	3	3	7		Group II :	7
	(3)	17	11	2	0	1	6	15	11	14	3	1	10	9		Group III :	5
	(4)	0	0	0	0	0	13	0	0	0	14	10	5	0		Group IV :	3
																Group V :	13
																Group VI :	15

Source: JICA Study Team for the Study on Comprehensive Recovery Program of Irrigation Agriculture
 Group I: First priority group (Ranking 1 - 7)
 Group II: Second priority group (Ranking 8 - 13)
 Group III: Third priority group (Ranking 14 - 19)
 Group IV: Reformulation of water resources development plan
 Group V: Accerlation of WUAs establishment and institutional development
 Group VI: Development by other category or method

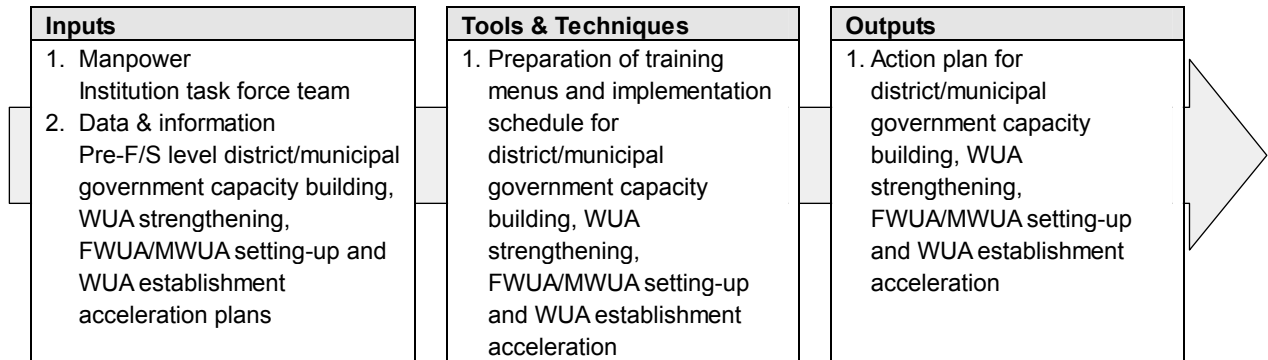
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 05. Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan

Stage 05	Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan
Task 02	Formulation of Action Plan for Each Scheme
Purpose and scope	
Scope of the Task is to formulate action plan for each scheme, which indicates schedule, required budget, responsible agency, etc. for implementation. The action plan for each scheme consists of 1) Action plan for district/municipal government capacity building, WUA strengthening, FWUA/MWUA setting-up and WUA establishment acceleration, 2) Action plan for irrigation system rehabilitation, and 3) Action plan for strengthening of extension service.	



Stage 05 - Task 02 Step 01	Formulation of action plan for district/municipal government's officials capacity building, WUA strengthening, FWUA/MWUA setting-up and WUA establishment acceleration
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Criteria, standards and references
None

Inputs

1. Manpower

Institution task force team

2. Data & Information

Pre-F/S level district/municipal government capacity building plan (refer to output of Stage 04 - Task 03 - Step 01)

Pre-F/S level WUA strengthening plan (refer to output of Stage 04 - Task 03 - Step 02)

Pre-F/S level FWUA/MWUA setting-up (refer to output of Stage 04 - Task 03 - Step 03)

Pre-F/S level WUA establishment acceleration plan (refer to output of Stage 04 - Task 03 - Step 04)

Tools & Techniques

1. Preparation of training menus and implementation schedule for district/municipal government capacity building, WUA strengthening, FWUA/MWUA setting-up and WUA establishment acceleration

Outputs

1. Action plan for district/municipal government capacity building, WUA strengthening, FWUA/MWUA setting-up and WUA establishment acceleration

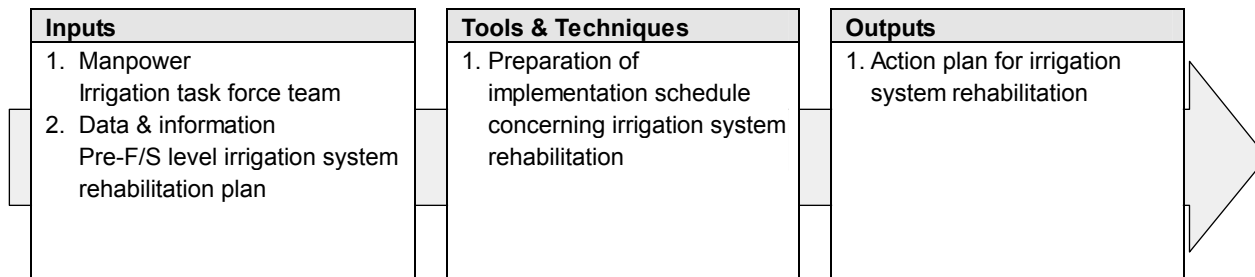
Action plan is composed of:

- Training program for WUA members to be aware of role of WUA in managing irrigation scheme concerned,
- Capacity building program for WUA representatives to prepare irrigation management plan covering;
 - 1) purpose and objectives of irrigation management carried out by WUA;
 - 2) detailed work program for the implementation of operation and maintenance works of tertiary irrigation system;
 - 3) irrigation management budget requirement,
 - 4) fund sources needed to finance irrigation management, and
 - 5) membership fee and its allocation plan to WUA's members.
- Capacity building program for district/municipal government's officials covering:
 - 1) concept and strategies of participatory irrigation management in line with the draft Law on Water Resources
 - 2) modification and dissemination of job description of district/municipal government's officials in charge of irrigation management
 - 3) seminar and workshop implementation plan

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 05. Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan

Stage 05 - Task 02 Step 02	Formulation of action plan for irrigation system rehabilitation
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Criteria, standards and references
None

Inputs

1. **Manpower**
 Irrigation task force team

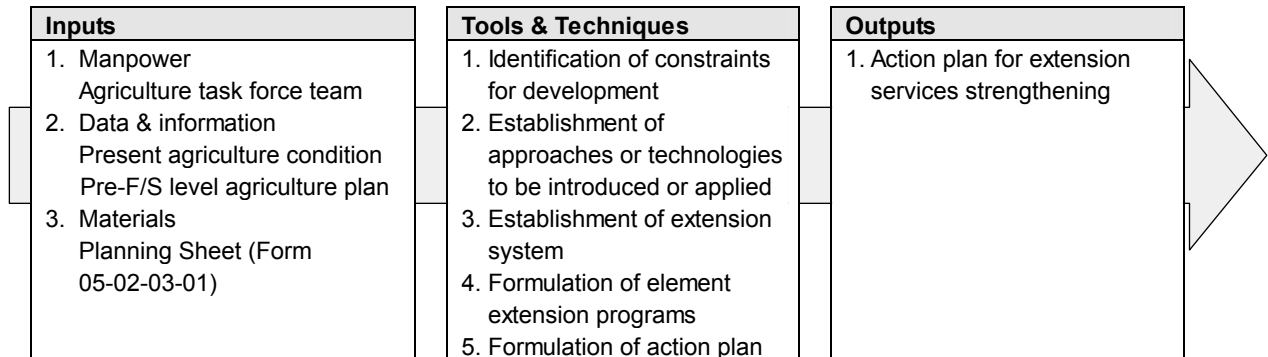
Tools & Techniques

1. **Preparation of implementation schedule concerning irrigation facilities rehabilitation**

Outputs

1. **Action plan for irrigation facilities rehabilitation**
 Action plan composed of:
 - Schedule of survey, design, tender, construction until completion

Stage 05 - Task 02 Step 03	Formulation of action plan for strengthening of extension services
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Criteria, standards and references
None

Inputs

1. **Manpower**
Agriculture task force team
2. **Data & information**
Present agriculture condition
Pre-F/S level agriculture plan
3. **Material**
Planning sheet (Form 05-02-03-01)

Tools & Techniques

1. **Identification of constraints for development**
 - Review of the present agriculture conditions clarified in pre-F/S and identification of constraints to be addressed or mitigated for the attainment of the target set in the agriculture plan.
 - Field confirmation of the constraints by the research-extension dialog team.
2. **Establishment of approaches or technologies to be introduced or applied**
 - Establishment of approaches for the mitigation of the constraints identified.
 - Establishment of counter measures to be introduced for the mitigation of the constraints identified.
 - Establishment or development of agriculture technologies to be introduced to the mitigation of the constraints identified.
3. **Establishment of extension system**
Based on the extension system employed in a district, the modified system accommodating area with specific conditions and needs should better be worked out by emphasizing promotion of farmer/farmer group's participation and initiatives in the execution of extension services in a irrigation scheme
4. **Formulation of element extension programs**
 - Formulation of element extension programs for the mitigation of individual or plural development constraints by emphasizing farmer-to-farmer approaches.
 - Element extension programs should be area specific ones tailored to area specific needs and will include: farmer/farmer group empowerment program, staff empowerment program, field demonstration program, technical development or trial program, training program in class & in field (field school), study tour, workshop, mass guidance, etc.

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 05. Prioritization of Irrigation Schemes for
Rehabilitation and Preparation of Action Plan

5. Formulation of action plan

- Formulation of action plan for strengthening of extension services well synchronized with the implementation schedule of rehabilitation works for the mitigation of individual or plural development constraints by emphasizing farmer-to-farmer approaches.
- Action plan should be area specific ones tailored to area specific needs and will include: farmer/farmer group empowerment program, staff empowerment program, field demonstration program, technical development or trial program, training program in class & in field (field school), study tour, workshop, mass guidance, etc.
- Budget availability should dully be taken into account in the formulation.

Outputs

1. Action plan for extension service strengthening

A form for action plan (Form 05-02-03-01) is shown in next page.

Form 05-02-03-01 Planning Sheet for Agriculture Plan: Action Plan for Extension Services

Irrigation Scheme: _____

Program Category/ Program		Year				Target Areas/Group
		1st	2nd	3rd	4th	
1. Technology Development Programs	Schedule					
	Volume					
2. Field Extension Programs	Schedule					
	Volume					
- Verification Trial	Schedule					
- Demonstration Plot/Farm/Area	Schedule					
- IPM	Schedule					
- Research-Extension Dialog	Schedule					
	Volume					
3. Farmer/Farmer Group Training Programs	Schedule					
	Volume					
- Farmer/Farmer Group Training	Schedule					
- Mass Guidance/Campaign	Schedule					
- Field School	Schedule					
- Study Tour	Schedule					
- Farmer Group Activation Guidance	Schedule					
	Volume					
4. Seed Production Program	Schedule					
	Volume					
5. Staff Training	Schedule					
	Volume					
6. Workshop	Schedule					
	Volume					
7. Provision of Farm Inputs	Schedule					
	Volume					

Agreed & Confirmed by

 Agriculture Services Office
 Name:
 Position:
 Date:

 Irrigation Services Office
 Name:
 Position:
 Date:

 Water Users Institution
 Name:
 Position:
 Date:

Instructions To Fill-in

- a.
- b.
- c.

Remarks

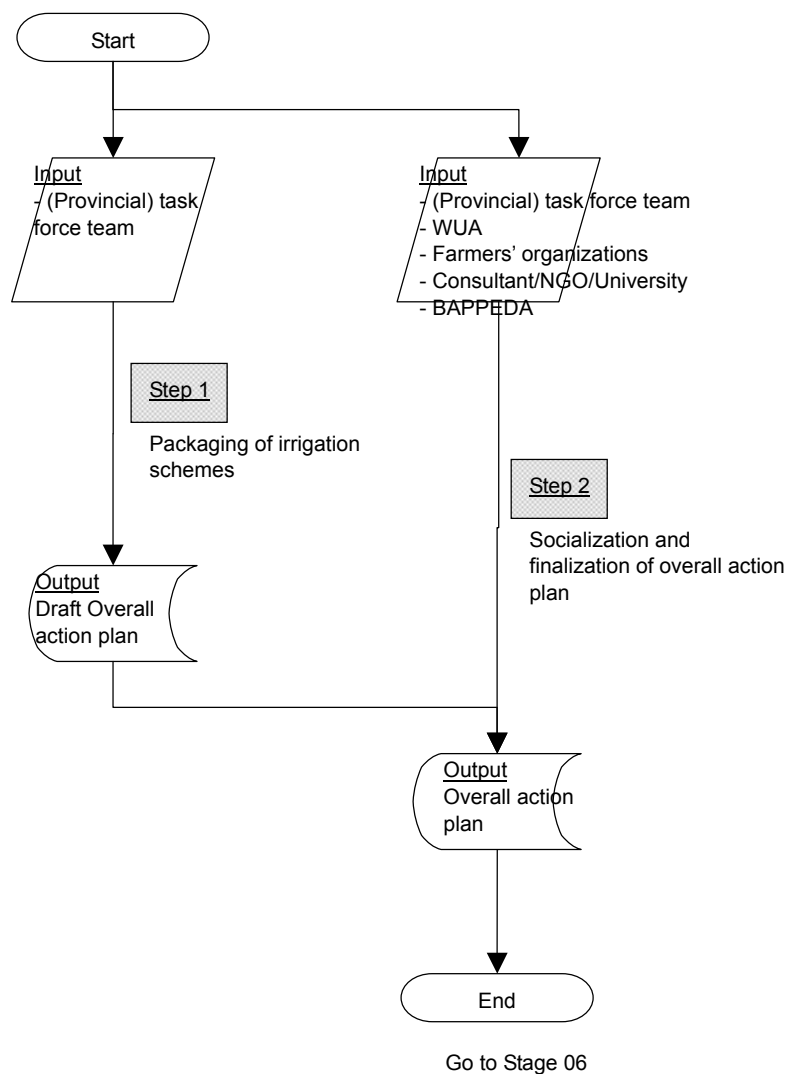
I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 05. Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan

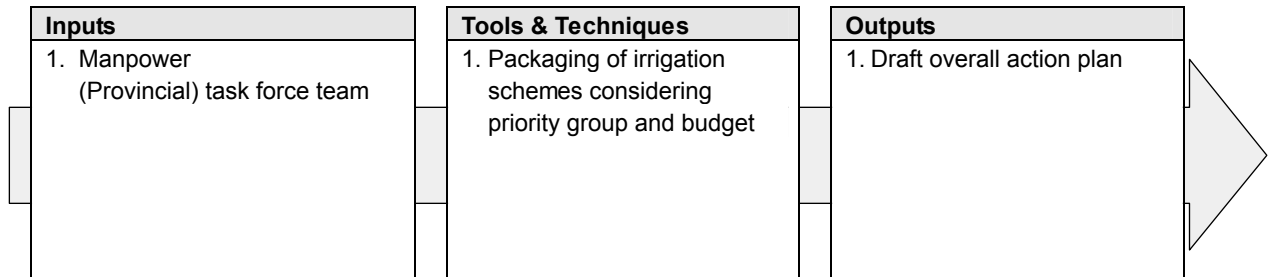
Stage 05	Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan
Task 03	Formulation of Overall Action Plan
Purpose and scope	
Scope of the Task is to formulate overall action plan for target region (province or district), which indicates package of irrigation schemes, schedule, required budget, responsible agency, etc. for implementation.	

Flow of the Stage 05 - Task 03

Detail descriptions of required work for the respective steps are given in following pages.



Stage 05 - Task 03 Step 01	Packaging of irrigation schemes
---------------------------------------	--



Criteria, standards and references
None

Inputs

1. **Manpower**
(Provincial or district) task force team

Tools & Techniques

1. **Packaging of irrigation schemes considering priority group and budget**
 - Number and scale of one contract package are recommended as follows:
 - (1) Duration of construction should be 3 years as standard.
 - (2) Size of a contract amount should be 30 – 40 Billion Rupiah.
 - (3) Number of schemes for one contract should be referred to contract amount shown in above (2).
 - Minimum scale of a contract should be one irrigation scheme and no division of one scheme should be considered.
 - No inter-district contract package should be considered.

Samples of overall action plan are shown in Sample 05-03-01-01 to 05-03-01-03.

Outputs

1. **Draft overall action plan**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 05. Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan

Sample 05-03-01-01 Sample of Action Plan: Breakdown of Area, Cost, Construction Package for Recovery Program

Priority Group	Scheme No.	Irrigation Scheme	District	Subject Area (ha)	Const. Cost (Bil. Rp.)	Nos. of Contract		Const. Period
						F/S	Construction	
I	PI-1.	Padaelo	Pangkep	1,802	40	1	1	2
	PI-2.	Cillallang	Wajo	1,113	21	1	1	2
	PI-3.	Gamo-Gamo	Polmas	4,743	54	1	1	2
	PI-4.	Bulucenrana	Sidrap	5,583	108	1	2	3
	PI-5.	Padang Sapa	Luwu	10,889	149	1	3	3
	PI-6.	Lamasi Kanan	Luwu	5,170	99	1	2	3
	PI-7.	Pattrio	Bone	4,739	132	1	3	2
	PI-8.	Sanrego	Bone	5,676	124	1	3	3
	PI-9.	Palakka	Bone	3,260	59	1	1	2
	PI-10.	Salobunne	Soppeng	1,296	30	1	1	2
	PI-11.	Pamukulu	Takalar	4,480	97	1	2	2
	Total I			48,751	913	11	20	
II	PII-1.	Aparang Hulu	Sinjai	1,094	17	1	1	2
	PII-2.	Leang Lonrong	Pangkep	1,229	24	1	1	2
	PII-3.	Pamukulu	Takalar	4,480	97	1	2	2
	PII-4.	Bulotimorang	Sidrap	4,950	64	1	2	2
	PII-5.	Kanjiro	Luwu Utara	1,301	26	1	1	2
	PII-6.	Kalaena Kiri	Luwu Utara	3,536	73	1	2	2
	Total II			16,590	301	6	9	
III	PIII-1.	Aparang I	Sinjai	1,049	25	1	1	2
	PIII-2.	Bantimurung	Maros	2,483	98	1	2	2
	PIII-3.	Unyi	Bone	1,136	32	1	1	2
	PIII-4.	Jalling	Bone	1,301	27	1	1	2
	PIII-5.	Leworeng	Soppeng	2,187	23	1	1	2
	PIII-6.	Tinco Kiri	Soppeng	2,620	43	1	1	3
	PIII-7.	Maloso, Sekka	Polmas	2,357	37	1	1	2
	PIII-8.	Kalaena (Rt. Bendung)	Luwu Utara	2,154	34	1	1	2
	Total III			15,287	319	8	9	
IV		Nil						
V	PV-1.	Bayang-Bayang	Bulukumba	4,121	78	1	N.A	
	PV-2.	Bontonami	Bulukumba	3,297	53	1	N.A	
	PV-3.	Bontonyeleng	Bulukumba	1,079	18	1	N.A	
	PV-4.	Bettu	Bulukumba	1,802	30	1	N.A	
	PV-5.	Alekarajae	Sidrap	1,253	28	1	N.A	
	PV-6.	Bajo	Luwu	6,462	119	1	N.A	
	PV-7.	Makawa	Luwu	1,000	16	1	N.A	
	PV-8.	Kalaena Kanan II	Luwu Utara	3,787	58	1	N.A	
	PV-9.	Kuri-Kuri Kasambi	Luwu Utara	3,000	63	1	N.A	
	PV-10.	Bone-Bone	Luwu Utara	2,625	2	1	N.A	
	PV-11.	Kalaena Kanan I	Luwu Utara	6,332	103	1	N.A	
	Total V			34,758	568	11	N.A	
VI	GVI-1.	Jenemarrung	Takala	975	19	1	N.A	
	GVI-2.	Lanca	Bone	676	16	1	N.A	
	GVI-3.	Kalosi	Pinrang	838	14	1	N.A	
	GVI-4.	Pagang Alipan	Luwu	795	12	1	N.A	
	GVI-5.	Lakejo	Polmas	960	12	1	N.A	
	Total VI			4,244	73	5		
	Grand Total			106,576	1,946			

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 05. Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan

Sample 05-03-01-02 Sample of Action Plan: Time Schedule

Priority Group	Phase	Work Description	Pre-F/S		Year from commencement of Midterm Phase																
			1st	2nd	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th		
-	Initiation	Pre-Feasibility	- Preparation of Master List	█																	
			- Pre-F/S level Field Investigation	█																	
			- Second Screening by Water Resources Availability		█																
			- Formulation of Pre-F/S level Development Plan		█																
			- Prioritization			█															
			- Preparation of Action Plan			█															
I.	Midterm	Feasibility Stud:	- Procurement of Consultant			█															
			- Preparation of F/S				█														
			- Financial Arrangement					█													
	Final	Implementation	- Procurement of Consultant							█											
			- Detailed Design								█										
			- Tender									█									
			- Construction										█								
		- Guidance, training etc.									█										
II.	Midterm	Feasibility Stud:	- Procurement of Consultant																		
			- Preparation of F/S																		
			- Financial Arrangement																		
	Final	Implementation	- Procurement of Consultant																		
			- Detailed Design																		
			- Tender																		
			- Construction																		
		- Guidance, training etc.																			
III.	Midterm	Feasibility Stud:	- Procurement of Consultant																		
			- Preparation of F/S																		
			- Financial Arrangement																		
	Final	Implementation	- Procurement of Consultant																		
			- Detailed Design																		
			- Tender																		
			- Construction																		
		- Guidance, training etc.																			
IV.	Nil																				
V.	Midterm	Institutional Capacity Building																			
VI.	Midterm	Review and Preparation of Development Plan																			

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

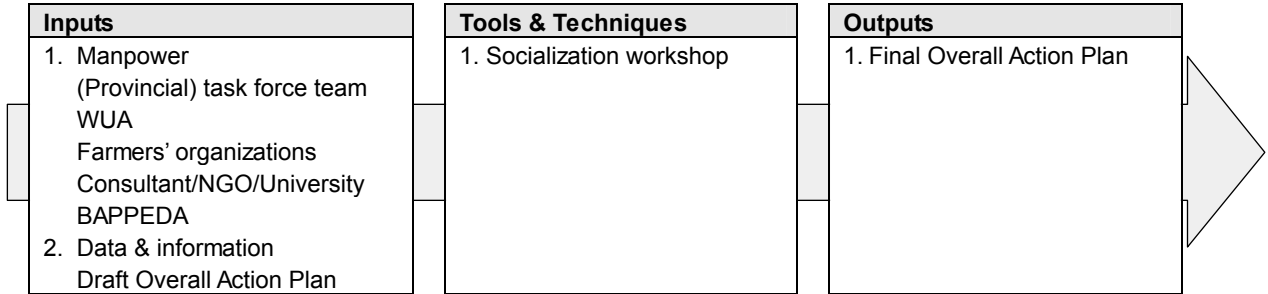
Stage 05. Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan

Sample 05-03-01-03 Work Process, Task and Responsibility in Respective Phase

Stage	Task	Responsibility Matrix								
		DGWRD	Governor /Province	Forum Chairman	Forum Member	DINAS/ Sub-Dinas PSDA	Project Office	WUA	International Lending Agency	
INITIATION PHASE : PRE-FEASIBILITY STUDY FOR PRIORITIZATION OF IRRIGATION SCHEMES										
01 First Screening of Irrigation Schemes for Rehabilitation										
	01	Preparation of Original List of Irrigation Schemes in the Province		C	C	C	A	B	D	
	02	First Screening of Irrigation Schemes and Preparation of Draft Master List			C		A	B		
02 Pre-Feasibility Study Level Field Investigation										
	01	Preparation of Technical Specification and Contract with Consultant for Pre-FS			A	C	A	B		
	02	Field Investigation on Irrigation System					A	B	D	
	03	Field Investigation on Agriculture and WUAs					A	B	D	
	04	Preparation and Assessment of Draft Field Investigation Report					A	B		
	05	Finalization and Socialization of Field Investigation Result					A	B	D	
03 Determination of Subject Area and Second Screening of Irrigation Schemes by Water Resources Availability										
	01	Confirmation of Available Water for the Scheme			A	C	A	B		
	02	Estimation of Water Requirement					A	B		
	03	Determination of Subject Area for Rehabilitation by Water Balance Study					A	B	D	
	04	Second Screening of Irrigation Scheme by Water Resources Availability			A	C	B	B	D	
04 Formulation of Pre-F/S Level Rehabilitation Plan and Third Screening of Irrigation Schemes										
	01	Analyzing Requirement for Easy O/M Irrigation System					A	B	D	
	02	Pre-F/S Level Irrigation System Rehabilitation Plan					A	B	D	
	03	Pre-F/S Level WMLs Empowerment Plan					A	B	D	
	04	Pre-F/S Level Agriculture Plan					A	B	D	
	05	Pre-F/S Level Project Cost Estimate					A	B		
	06	Pre-F/S level Economic Evaluation					A	B		
	07	Third Screening of Irrigation Schemes by Development Potential			A	C	B	B	D	
05 Prioritization of Irrigation Schemes for Rehabilitation and Preparation of Action Plan										
	01	Prioritization of Irrigation Schemes by Weighted Scoring Method	C	C	A	C	B	B	D	
	02	Formulation of Action Plan for Each Scheme			B	C	A	B	D	
	03	Formulation of Overall Action Plan	A	C	A	C	A	B	D	
MIDTERM PHASE : FEASIBILITY STUDY										
06 Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program										
	01	Preparation of Terms of References (T.O.R) for Procurement of Consultant and Selection of Consultant for F/S	A				A	B		C
	02	F/S Level Irrigation System Rehabilitation Plan	A		A	B	A	B	D	C
	03	Participatory Approach to WUAs and Formulation of F/S Level WMLs Empowerment Plan			A	C	B	B	D	C
	04	F/S Level Agriculture Plan			A	C	B	B	D	C
	05	F/S Level Project Cost Estimation			A	C	B	B	D	C
	06	F/S Level Economic Evaluation			A	C	B	B	D	C
	07	Environmental Assessment					A	B	D	C
	08	Socialization of F/S Result and Preparation of F/S Report	A		A	C	B	B	D	C
	09	Preparation of Implementation Program (I/P) and Arrangement of Project Budget	A	C	C	C	B	B	A	
FINAL PHASE : IMPLEMENTATION										
07 Implementation and Commencement of Operation										
	01	Procurement of Consultant	A				B	B	A	
	02	Rehabilitation of Irrigation Scheme			A	C	A	B	D	
	03	WMLs Empowerment					A	B	D	D
	04	Extension Service Strengthening					A	B	D	D
	05	Preparation of Tools and Manuals					A	B	D	D
	06	Operation and Maintenance					A	B	D	D

Remarks: A: Full responsibility for decision
 B: Responsible to task force
 C: Ideas/ Inputs and agreeing
 D: Examination and assent

Stage 05 - Task 03 Step 02	Socialization and finalization of the Overall Action Plan
---------------------------------------	--



Criteria, standards and references
None

Inputs

- 1. Manpower**
 (Provincial or district) task force team
 Representatives of WUA
 Representatives of farmers' organizations
 Consultant/NGO/University
 BAPPEDA
- 2. Data & information**
 Draft Overall Action Plan

Tools & Techniques

- 1. Socialization workshop**
 Socialization workshop on Draft Overall Action Plan should be held and the list should be finalized and authorized. In this workshop, process and result of Priority List of Irrigation Schemes for Rehabilitation and Overall Action Plan should be clearly explained to all the stakeholders.

Outputs

- 1. Final Overall Action Plan**

II. Feasibility Study

Instruction

Feasibility Study should be carried out to evaluate project feasibility from economic, environmental, and other point of view.

II. Feasibility Study and Formulation of Action Plan

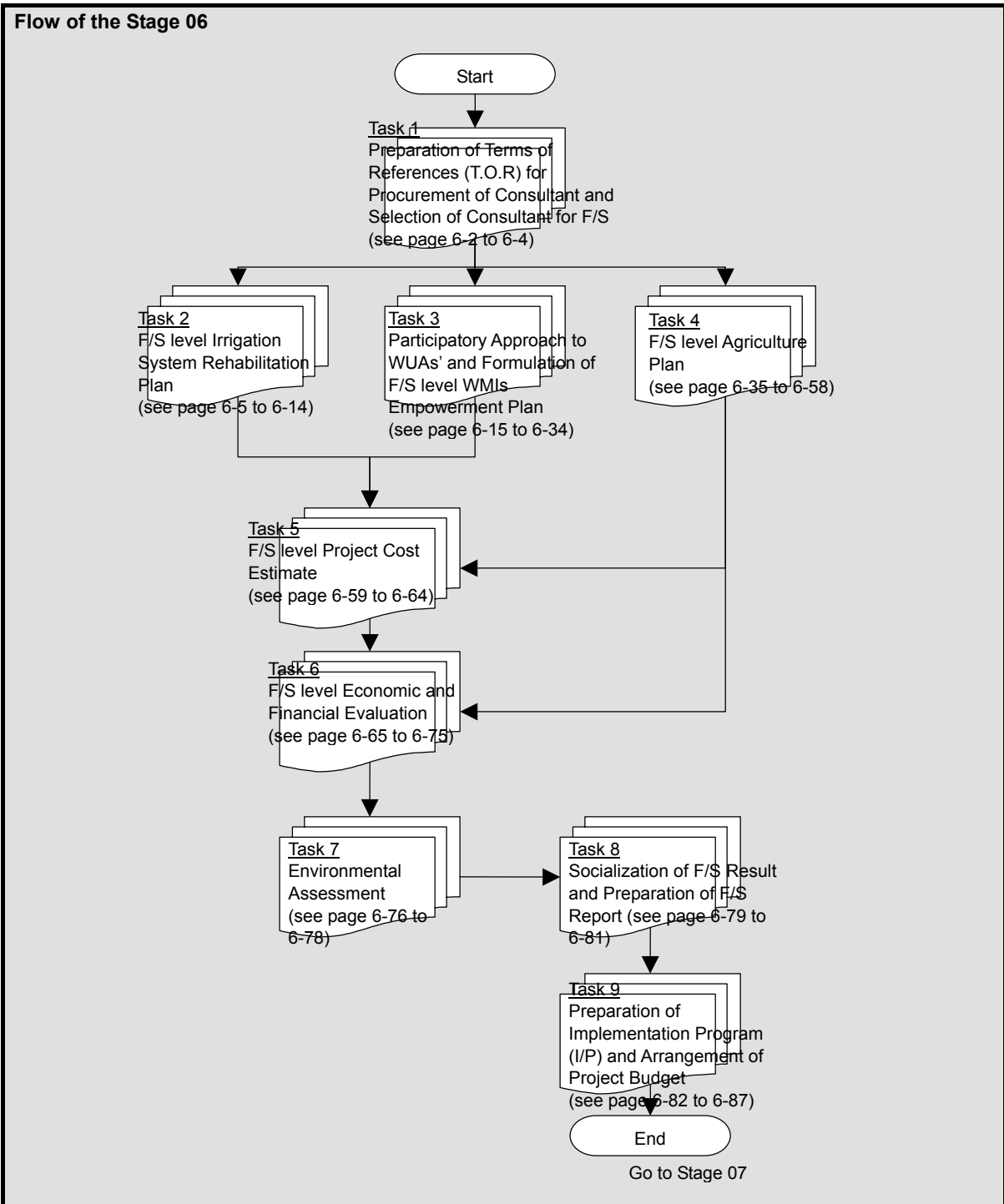
Stage 06 **Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program**

Instruction

Feasibility Study should be carried out to evaluate project feasibility from economic, environmental, and other point of view.

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06	Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program
Purpose and scope	
Scope of the work are to: 1) Improve accuracy of project benefit and cost from pre-F/S level to F/S level. 2) Re-evaluate project feasibility with F/S level accuracy.	



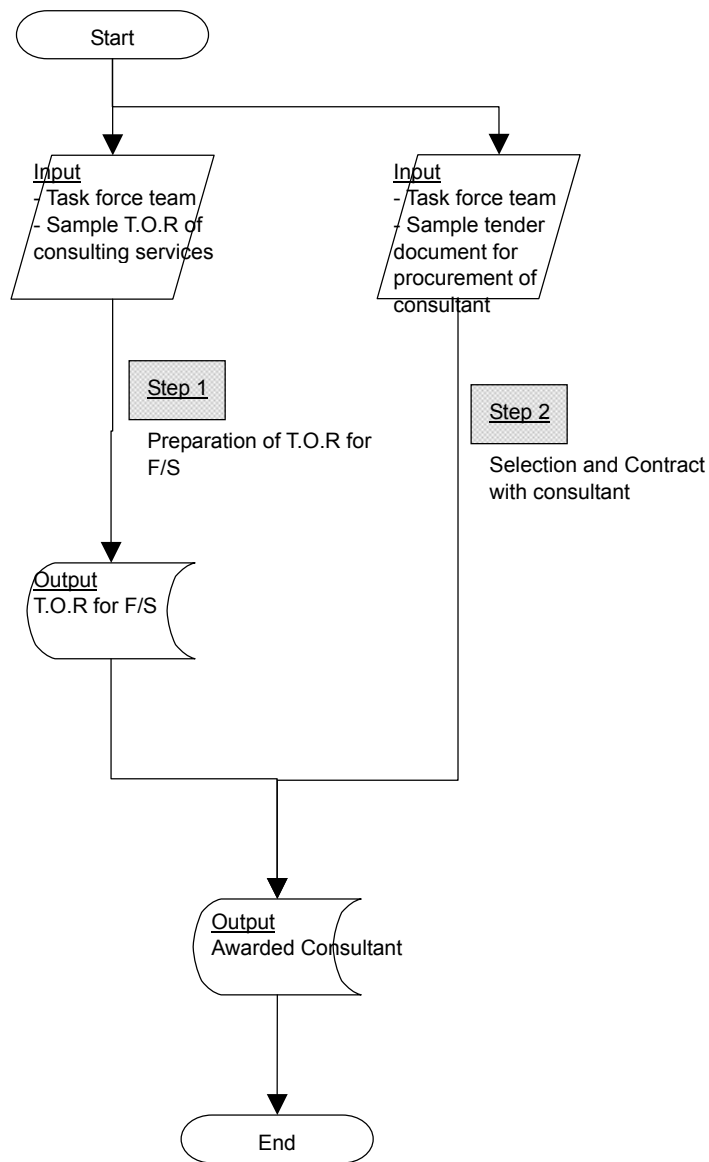
II. Feasibility Study and
Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06	Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program
Task 01	Preparation of Terms of References (T.O.R) for Procurement of Consultant and Selection of Consultant for F/S
Purpose and scope	
<p>Scope is the Task are to:</p> <ol style="list-style-type: none"> 1) Prepare technical specification of consulting service for F/S; 2) Selection of consultant for F/S; and 3) Contract with awarded consultant. 	

Flow of the Stage 06 - Task 01

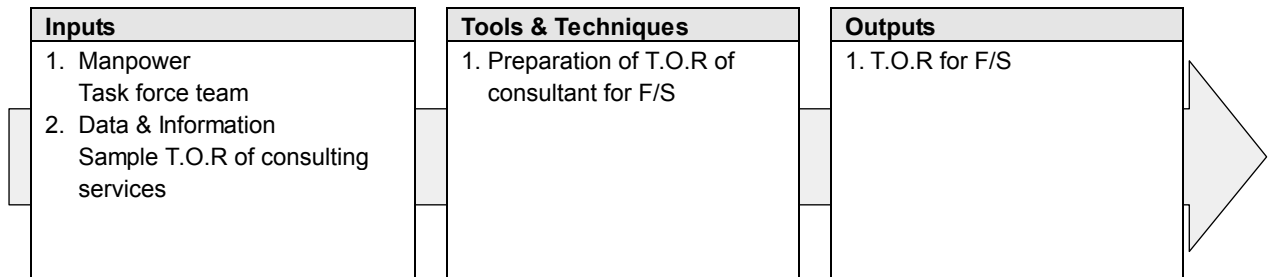
Detail descriptions of required work for the respective steps are given in following pages.



Go to Stage 06 - Task 02

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 01 Step 01	Preparation of T.O.R of consultant for F/S
---------------------------------------	---



Criteria, standards and references

- A) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.
- B) Ministry of Public Works. 1986. *Irrigation Design Standards, Technical Specifications, PT-01 "Irrigation System Design"*.
- C) Loan handbook of international lending agencies

Inputs

- 1. Manpower**
Task force team
- 2. Data & information**
T.O.R for similar irrigation schemes should be collected as a sample.

Tools & Techniques

- 1. Preparation of T.O.R**
If field survey should be conducted by consultant, T.O.R of consulting services should be prepared. In case the survey should be carried out by government agencies, this step can be skipped (go to Stage 06 - Task 02).

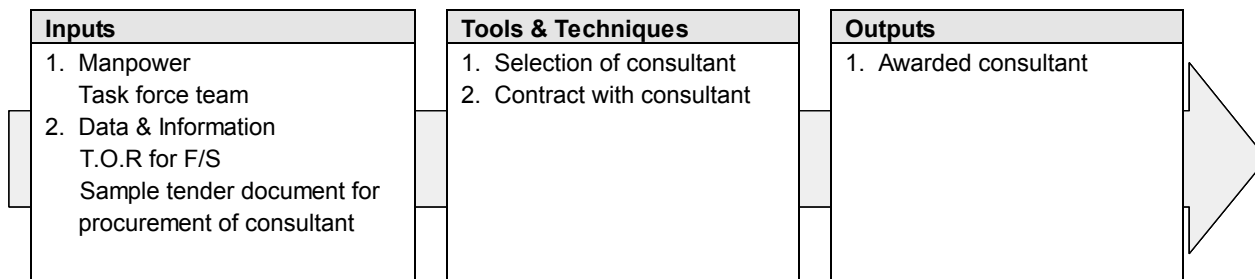
Outputs

- 1. T.O.R for F/S**

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 01 Step 02	Selection and contract with consultant
---------------------------------------	---



Criteria, standards and references
A) Standard tender documents for procurement of consultant B) Evaluation criteria for procurement of consultant C) Ministry of Public Works/JICA. 1999. <i>Guidelines for Feasibility Study of Irrigation Development</i> . D) Loan handbook of international lending agencies

Inputs

- 1. Manpower**
Task force team
- 2. Data & information**
Tender documents for another project should be collected as a sample.

Tools & Techniques

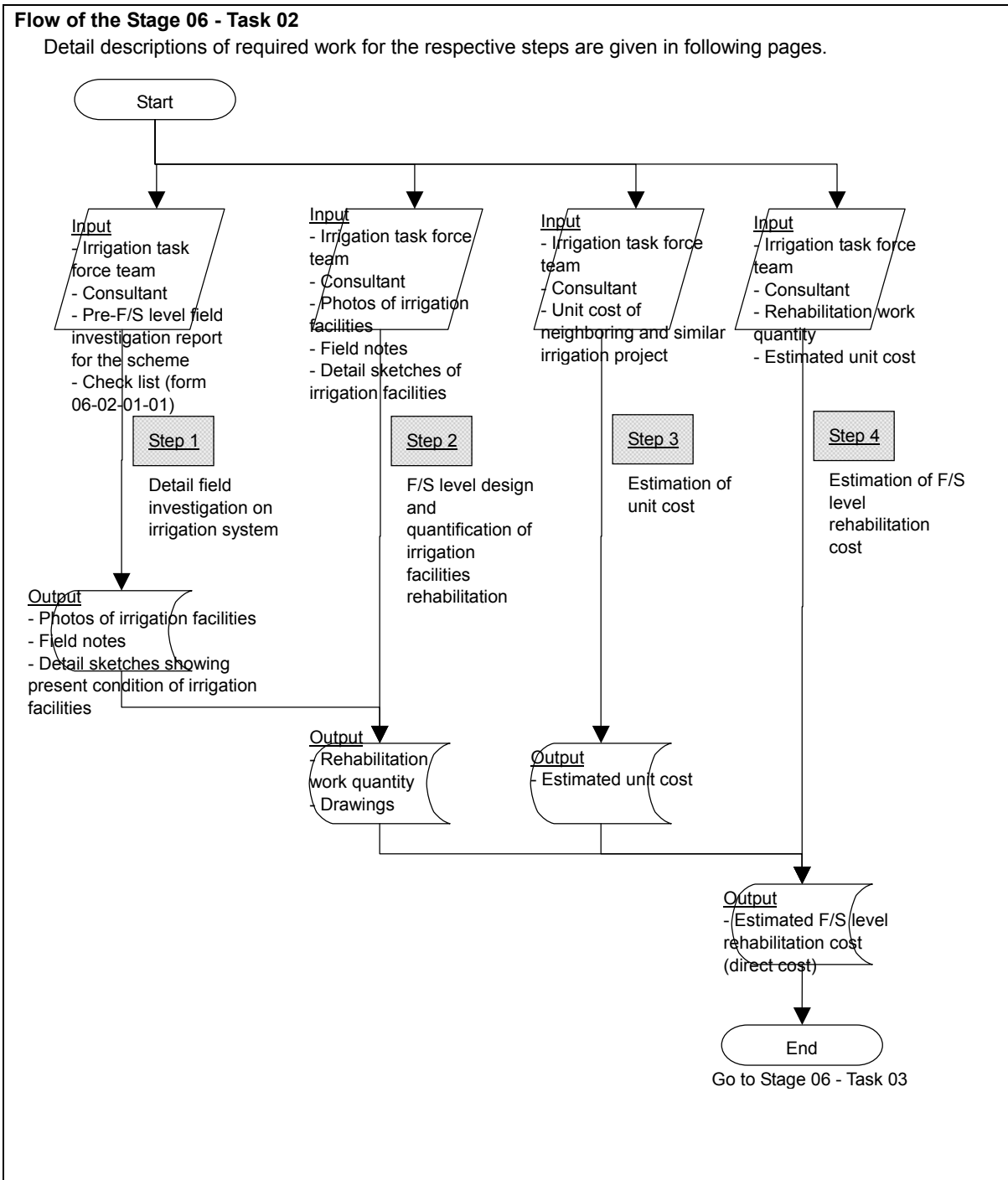
- 1. Selection and contract with consultant**
Selection of consultant should be carried out by tender.

Outputs

- 1. Awarded consultant**

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

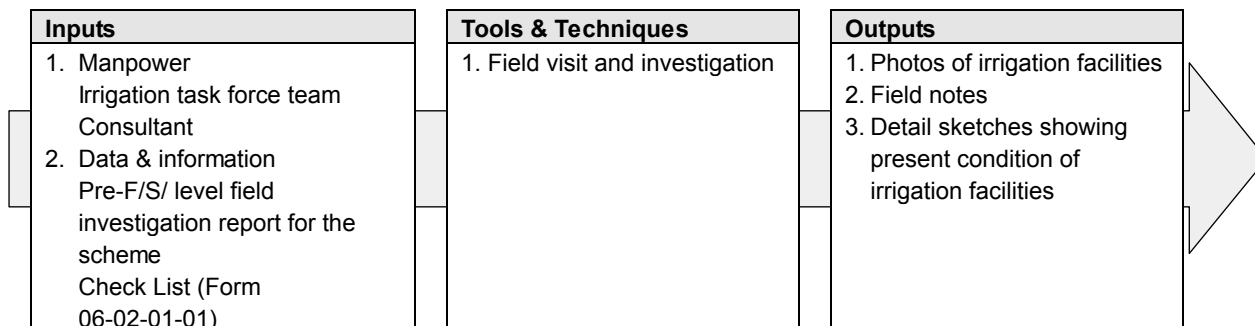
Stage 06	Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program
Task 02	F/S Level Irrigation System Rehabilitation Plan
Purpose and scope	
<p>The scope of the Task are to:</p> <ol style="list-style-type: none"> 1) Estimate required input for the scheme according to the rehabilitation criteria (F/S level); and 2) Estimate required cost for irrigation system rehabilitation (F/S level). 	



II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 02 Step 01	Detail field investigation on irrigation system
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Criteria, standards and references

- A) Ministry of Public Works. 1999. *Technical Guideline for Rehabilitation & Upgrading of Irrigation Network*.
- B) Ministry of Settlement and Regional Infrastructure. *Manual of Rehabilitation*
- C) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria, KP-02 "Headworks"*.
- D) Check List Form 06-02-01-01

Inputs

- 1. Manpower**
 Irrigation task force team
 Consultant
- 2. Data & information**
 1) Pre-F/S level field investigation report for the scheme
 2) Check List Form 06-02-01-01

Tools & Techniques

- 1. Field visit and investigation**
 Condition of irrigation facility should be evaluated with F/S level investigation and survey. In F/S level field investigation and survey, extent of damage on irrigation facility should be measured as much as possible and sketches showing present condition of major irrigation facility should be prepared. Survey result should be check by using Check List Form 06-02-01-01.

Outputs

- 1. Photos of irrigation facilities**
- 2. Field notes**
- 3. Detail sketches showing present condition of irrigation facilities**

Form 06-02-01-01(1/2) Check List for Irrigation and Drainage Plan

Stage : Feasibility Study

Prepared by:

Objective Subject: Irrigation and Drainage F Date: / /2003

(1/2)

Item	No.	Subject	Contents of Subject for Check	Reference value and information	Check (mark with √)		
					OK	Not	N.A
A. Water requirement							
AA General							
	AA-1	Water balance	Examined and confirmed the domination of plan through the alternative studies considering irrigation area, cropping pattern?				
	AA-2	Accuracy of basic data	Examined the accuracy of basic data for the calculation of water requirement?				
	AA-3	Water management	Examined and applied the water management (operation) for the calculation?				
	AA-4	Agriculture plan	Examined and confirmed the cropping pattern and agricultural plan of the project area?				
	AA-5	Percolation rate	Examined and compared with value of vicinity irrigation area?				
	AA-6	Crop coefficient	Examined and confirmed the value of crop coefficient (Kc) and referred data of FAO. No.24?				
	AA-7	Efficiency of irrigation	Considered the efficiency of on-farm, conveyance, operation, and wet and dry season?				
	AA-8	Authorization of efficiency	Discussed and agreed upon the Client to the value of coefficient?				
A.B Headworks							
	AB-1	Social Restriction	Examined and considered the social restraints?	Water right, river maintenance flow, future development plan			
	AB-2	Location	Examined and determined the location such as i) stability, ii) stable intake during dry season, iii) operation and maintenance, etc?				
	AB-3	Type of structure	Examined and analyzed several types considering i) free intake type, ii) function of flood control, iii) topographic condition, etc?	Fixed type, movable gate type, free intake			
A.C Canal and Related Structures							
	AC-1	Route selection of canal	Examined and confirmed the domination of alignment through the alternative studies considering topographic condition, social condition, construction cost, etc?				
	AC-2	Future development plan of area	Examined and confirmed the future development plan in the area and avoided the routes in case development plan is projected?				
	AC-3	Spoil bank and quarry site	Invested and confirmed the locations of spoil banks and quarry sites?				

Note: N.A ; Not Applicable

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Form 06-02-01-01(2/2) Check List for Irrigation and Drainage Plan

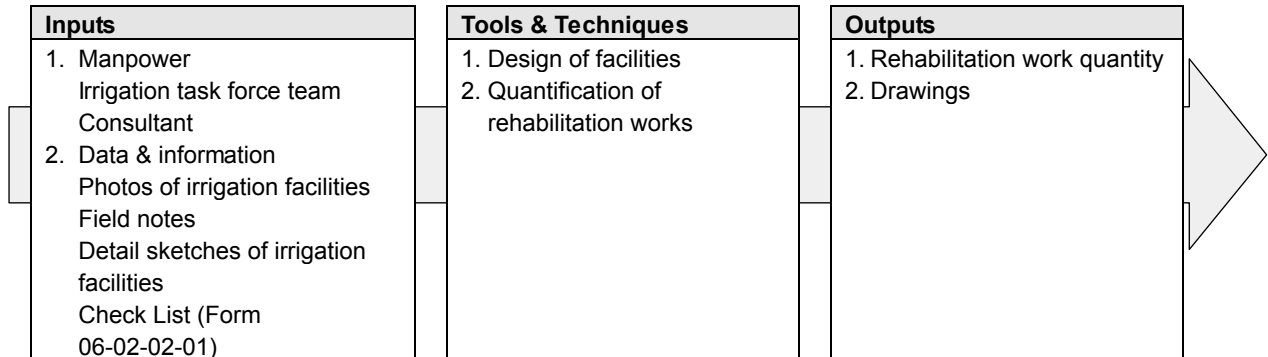
(2/2)

Item	No.	Subject	Contents of Subject for Check	Reference value and information	Check (mark with √)		
					OK	Not	N.A
	AC-4	Layout of structure	Examined and determined the layout of structure considering water management and operation method of irrigation system?				
	AC-5	Layout of inspection and farm roads	Examined and layout the road alignment considering O&M and farming practice?				
	AC-6	Foundation condition	Invested the foundation condition at major structure sites such as headworks, siphon, bridge, aqueduct?				
	AC-7	Safety facility	Examined and provided safety facility?	Fence, handrail, safety rope, etc.			
A.D Drainage Plan							
	AD-1	Existing conditions	Examined the existing drainage conditions such as i) existing drainage network, ii) constant drainage discharge by liquid waste, from houses and factories, iii) intruding water, etc.?				
	AD-2	Safety against various discharge	Examined and confirmed the safety against discharge below design value?				
	AD-3	Future development plan	Examined and applied the value of drainage requirement by future development plan?	Applied discharge coefficient			
	AD-4	Method of drainage	Examined relation between inner drainage level and outer water level?	inundation volume, area, discharge (inflow and runoff discharge)			
	AD-5	Applied formula	Discussed and authorized the applied formula for runoff analysis by the client?				
A.E Drainage Canal							
	AE-1	Location of drainage outlet	Examined and determined the location and alignment of drainage canal such as i) river bed elevation of flood way, ii) river mouth closing, iii) tidal compartment, etc.?				
	AE-2	Protection at confluence	Provided slope protection works to avoid erosion and scouring at confluence?				
	AE-3	Location of drainage sluice	Examined the following condition at location of drainage sluice? i) Lowest site, ii) unaffected site from river flow, wave, current stream, iii) unaffected site from production of bars, shoal, etc.?				
	AE-4	Design of sluices	Examined and designed with following condition: i) hydrograph, ii) tidal level, iii) design inundation level, iv) design inundation hours, etc.?				

Note: N.A ; Not Applicable

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 02 Step 02	F/S Level design and quantification of irrigation facilities rehabilitation
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Criteria, standards and references

- A) Ministry of Public Works. 1999. *Technical Guideline for Rehabilitation & Upgrading of Irrigation Network*.
- B) Ministry of Settlement and Regional Infrastructure. *Manual of Rehabilitation*
- C) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria*.
- D) Check List Form 06-02-01-01

Inputs

- 1. Manpower**
Irrigation task force team
Consultant
- 2. Data & information**
 - 1) Photos of irrigation facilities
 - 2) Field notes
 - 3) Detail sketches of irrigation facilities
 - 4) Check List Form 06-02-01-01

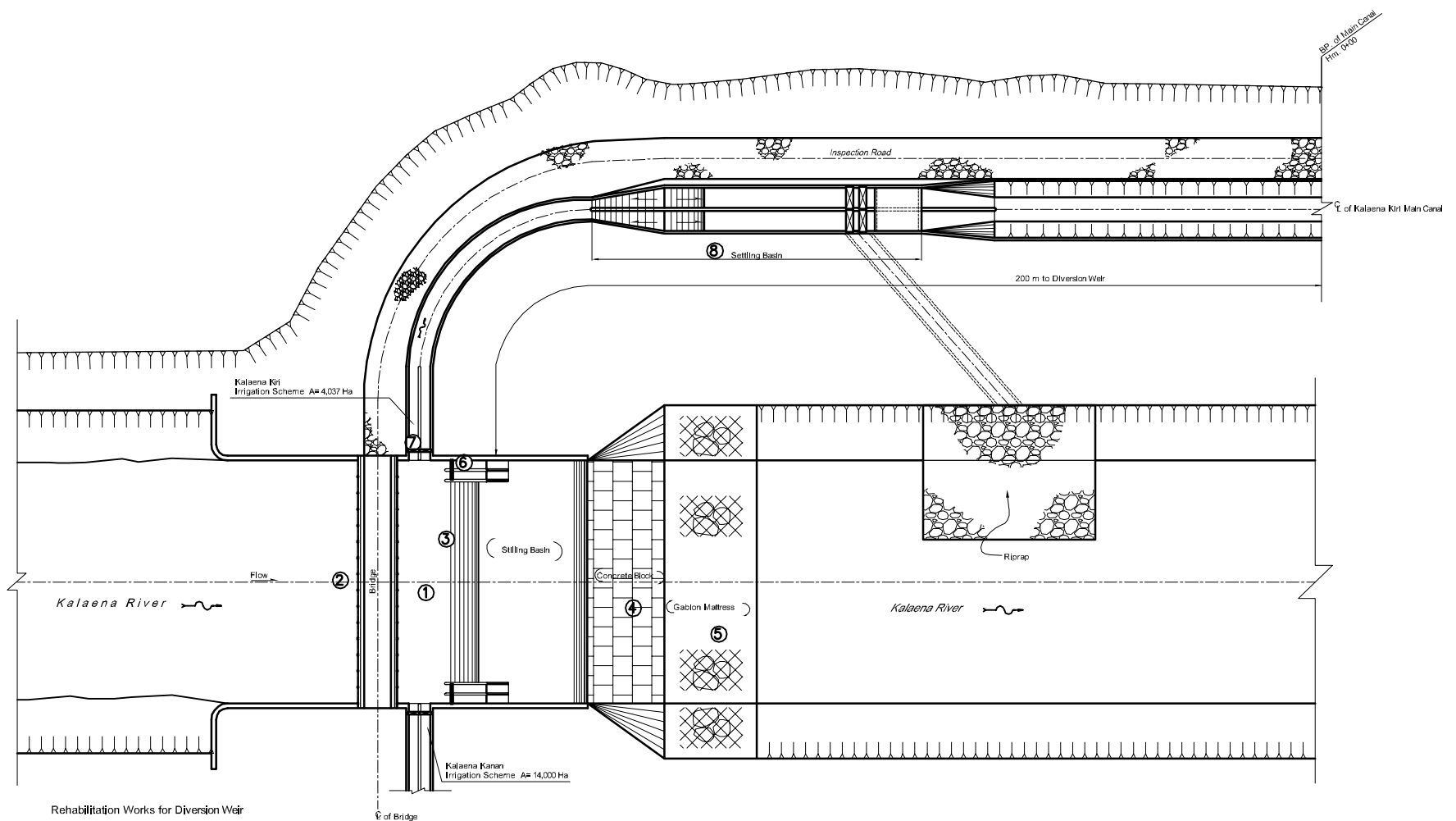
Tools & Techniques

- 1. Design of facilities**
Work quantity for rehabilitation should be estimated with F/S level. In F/S level work quantity estimation, following information, which are omitted in pre-F/S level quantity estimation should be carefully considered.
 - 1) type of facility,
 - 2) material of facility,
 - 3) shape of facility, and
 - 4) site condition.
 It means that it is not always necessary to follow full requirements of the rehabilitation criteria determined in Stage 04 - Task 01, as long as designed facilities can meet target service life.
Design of the facilities should be confirmed by using Check List Form 06-02-01-01.
- 2. Quantification of rehabilitation works**

Outputs

- 1. Rehabilitation work quantity**
Rehabilitation work quantity with F/S level accuracy should be obtained.
- 2. Drawings (see Sample 06-02-02-01 to 06-02-02-03)**

PLATE NO.



Rehabilitation Works for Diversion Weir

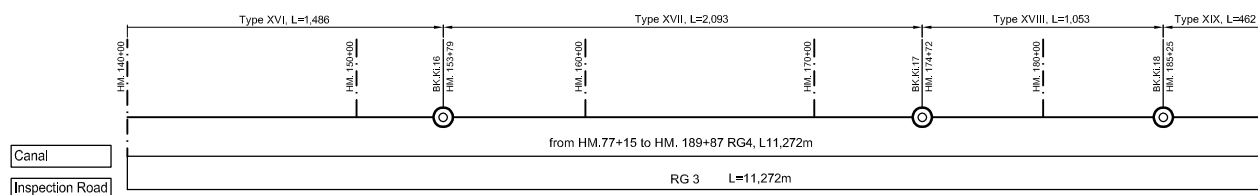
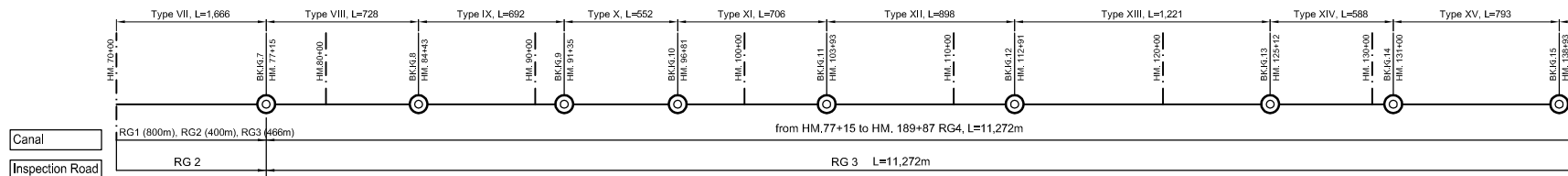
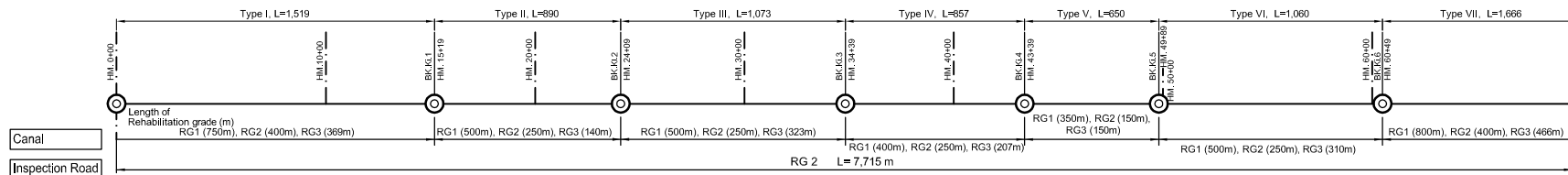
Mark	Location	Rehabilitation Works
1	Upstream apron	Removal of & Sedimentation
2	Bridge	Repair of piers, provision of pavement on slab
3	Overflow Weir	Repair and provision of anti-wear concrete
4	Protection Work (1)	Provision of concrete blocks
5	Protection Work (2)	Provision of gabion mattress (≒1.2 m)
6	Scouring Sluice	Repair of sluice gates
7	Intake gate	Provision of trash rack, repair of gates, repair of civil works
8	Settling Basin	New construction of settling basin

Rehabilitation Plan of Kalaena Diversion Weir
Not to Scale

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Sample 06-02-02-01
Sample of Rehabilitation Plan of Water Resources Facility

Rehabilitation Plan of Main Canal and Inspection Road

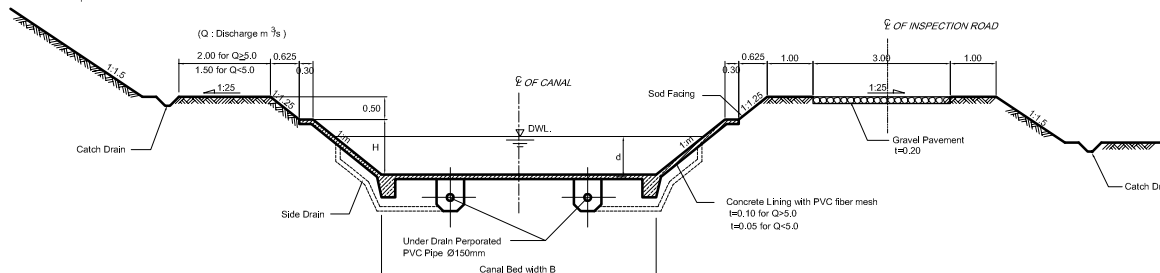


Dimension of Kalaena Kiri Main Canal

HM	BK	Length (m)	Design Discharge (m ³ /s)	Canal Bed Width (B) (m)	Canal Height (m)	Lining Height (H) (m)	Uniform Water Depth (d) (m)	Side Slope 1:m	Hydraulic Gradient 1:l	Canal Type
0+00	-	618	6.26	2.50	2.18	1.43	1.24	1.00	981	
6+18	-	620	6.26	2.50	2.27	1.52	1.14	1.00	722	I
8+78	-	641	6.26	5.40	2.27	1.52	1.28	1.50	5,157	
15+19	BK.Ki.1	890	5.75	3.50	1.95	1.20	1.03	1.50	1,324	II
24+09	Bk. Ki.2	1,073	5.57	2.80	1.87	1.12	0.92	1.50	643	III
34+82	BK. Ki.3	859	5.37	4.45	2.18	1.43	1.29	1.50	5,197	IV
43+39	BK. Ki.4	650	5.28	3.50	1.93	1.18	1.07	1.50	1,791	V
49+89	BK.Ki.5	1,060	5.04	4.10	2.16	1.41	1.28	1.50	4,926	VI
60+49	BK.Ki.6	4,666	4.80	4.00	2.13	1.38	1.16	1.50	3,609	VII
77+15	BK.Ki.7	728	4.60	4.00	2.20	1.70	1.04	1.25	3,800	VIII
84+43	BK.Ki.8	692	4.37	4.00	2.10	1.60	0.98	1.25	3,500	IX
91+35	BK.Ki.9	552	4.21	4.00	2.10	1.60	0.98	1.25	3,700	X
96+87	BK.Ki.10	706	3.90	3.60	2.10	1.60	0.96	1.25	3,300	XI
103+93	BK.Ki.11	898	3.30	3.40	2.00	1.50	0.89	1.25	3,200	XII
112+91	BK.Ki.12	1,221	3.21	3.40	2.00	1.50	0.89	1.25	3,400	XIII
125+12	BK.Ki.13	588	2.80	3.00	2.00	1.50	0.83	1.25	2,800	XIV
131+00	BK.Ki.14	793	2.43	2.80	1.90	1.40	0.83	1.25	3,300	XV
138+93	BK.Ki.15	1,486	2.17	2.40	1.90	1.40	0.83	1.25	3,200	XVI
153+79	BK.Ki.16	2,093	1.88	2.20	1.90	1.40	0.80	1.25	3,200	XVII
174+72	BK.Ki.17	1,053	1.72	2.00	1.90	1.40	0.76	1.25	2,700	XVIII
185+25	BK.Ki.18	462	1.59	2.00	1.90	1.40	0.78	1.25	3,400	XIX
189+87	BK.Ki.19									

Rehabilitation grade :

- RG 1 : No Rehabilitation
- RG 2 : Minor Rehabilitation
- RG 3 : Large Scale Rehabilitation
- RG 4 : Replacement or New Construction



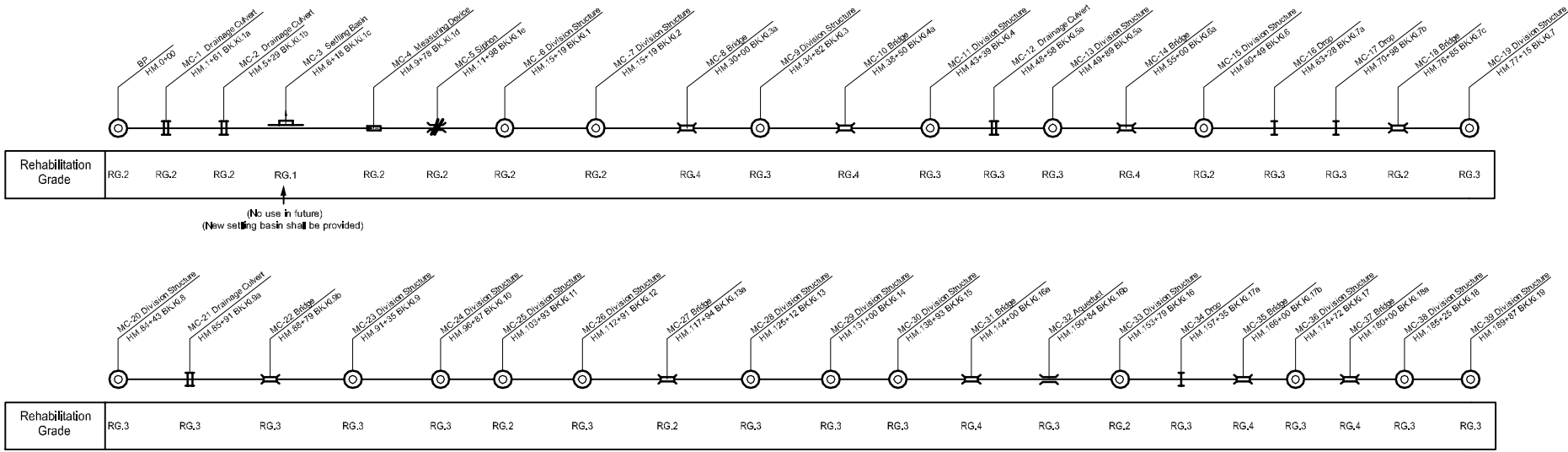
TYPICAL SECTION OF CANAL for HM. 77+15 to HM. 189+87

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Sample 06-02-02-02
Sample of Rehabilitation Plan of Canal and Inspection Road

PLATE NO.

REHABILITATION PLAN OF RELATED STRUCTURES



(No use in future)
(New setting basin shall be provided)

Rehabilitation grade :

- RG 1 : No Rehabilitation
- RG 2 : Minor Rehabilitation
- RG 3 : Large Scale Rehabilitation
- RG 4 : Replacement or New Construction

Legend :

- : Diversion Structure
- ▭ : Drainage Culvert
- ▭ : Setting Basin
- ⊗ : Siphon
- ▭ : Bridge
- ▭ : Aqueduct
- I : Drop

Summary of Rehabilitation Works of Related Structures

Structure Serial No.	Structure	HM	Name/Code of Structure	Rehabilitation Grade	Description of Rehabilitation Works	
					Civil	Metal
MC-1	Drainage Culvert	1+61	BK, Ki 1a	RG.2	C-1,2	-
MC-2	Drainage Culvert	5+29	BK, Ki 1b	RG.2	C-1,2	-
MC-3	Setting Basin	6+18	BK,Ki 1c	RG.1	No use in future	
MC-4	Measuring device	9+78	BK,Ki 1d	RG.2	C-2	M-4
MC-5	Siphon	11+98	BK,Ki 1e	RG.2	C-3,4	M-3
MC-6	Division Structure	15+19	BK, Ki 1	RG.2	C-2,3	M-2,4
MC-7	Division Structure	24+09	BK, Ki 2	RG.2	C-2,3	M-2,4
MC-8	Bridge	30+00	BK, Ki 3a	RG.4	New construction	
MC-9	Division Structure	34+82	BK, Ki 3	RG.3	C-2,3	M-2,4
MC-10	Bridge	38+50	BK, Ki 4a	RG.4	New construction	
MC-11	Division Structure	43+39	BK, Ki 4	RG.3	C-2,3	M-2,4
MC-12	Drainage Culvert	48+58	BK, Ki 5a	RG.3	C-1,2	-
MC-13	Division Structure	49+89	BK, Ki 5	RG.3	C-2,3	M-2,4
MC-14	Bridge	55+00	BK, Ki 6a	RG.4	New construction	
MC-15	Division Structure	60+49	BK, Ki 6	RG.2	C-2,3	M-2,4
MC-16	Drop	63+28	BK, Ki 7a	RG.3	C-2	-
MC-17	Drop	70+98	BK, Ki 7c	RG.3	C-2	-
MC-18	Bridge	76+85	BK, Ki 7d	RG.2	C-6	-
MC-19	Division Structure	77+15	BK, Ki 7	RG.3	C-3	-
MC-20	Division Structure	84+43	BK, Ki 8	RG.3	C-2,3	M-2,4
MC-21	Drainage Culvert	85+91	BK, Ki 9a	RG.3	C-1,2	-

Description of Rehabilitation Works:

- Civil works
- C-1: Removal of sediment in the barrels
 - C-2: Repair of walls, slab, barrels
 - C-3: Provision of slab bridge for traffic passing (T10 class)
 - C-4: Provision of safety facility
 - C-5: Repair of substructure
 - C-6: Repair of superstructure
 - C-7: Provision of measuring facility

Metal Works

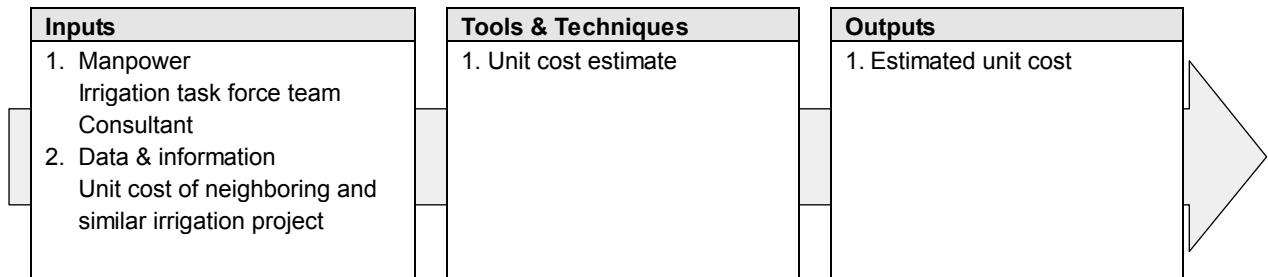
- M-1: Major repair of gates and hoists
- M-2: Provision of additional gates
- M-3: Provision of trash rack
- M-4: Painting and lubricating to facility

Structure Serial No.	Structure	HM	Name/Code of Structure	Rehabilitation Grade	Description of Rehabilitation Works	
					Civil	Metal
MC-22	Bridge	88+79	BK, Ki 9b	RG.3	C-5,6	-
MC-23	Division Structure	91+35	BK, Ki 9	RG.3	C-2,3	M-2,4
MC-24	Division Structure	96+87	BK, Ki 10	RG.3	C-2,3	M-2,4
MC-25	Division Structure	103+93	BK, Ki 11	RG.2	C-2,3	M-2,4
MC-26	Division Structure	112+91	BK, Ki 12	RG.3	C-2,3	M-2,4
MC-27	Bridge	117+94	BK, Ki 13a	RG.2	C-6	-
MC-28	Division Structure	125+12	BK, Ki 13	RG.3	C-2,3	M-2,4
MC-29	Division Structure	131+00	BK, Ki 14	RG.3	C-2,3	M-2,4
MC-30	Division Structure	138+93	BK, Ki 15	RG.3	C-2,3	M-2,4
MC-31	Bridge	144+00	BK, Ki 16a	RG.4	New construction	
MC-32	Aqueduct	150+84	BK, Ki 16b	RG.3	C-2, 4, 5, 6	M-2,4
MC-33	Division Structure	153+79	BK, Ki 16	RG.2	C-2,3	M-2,4
MC-34	Drop	157+35	BK, Ki 17a	RG.3	C-2,4	-
MC-35	Bridge	165+00	BK, Ki 17a-1	RG.4	New construction	
MC-36	Division Structure	174+72	BK, Ki 17	RG.3	C-2,3	M-2,4
MC-37	Bridge	180+00	BK, Ki 18a	RG.4	New construction	
MC-38	Division Structure	185+25	BK, Ki 18	RG.3	C-2,3	M-2,4
MC-39	Division Structure	189+87	BK, Ki 19	RG.3	C-2,3	M-2,4

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Sample 06-02-02-03
Sample of Rehabilitation Plan
of Canal Related Structures

Stage 06 - Task 02 Step 03	Estimation of unit cost
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Criteria, standards and references
A) Owners estimate in detailed design stage and results of tender for other projects in same province/district

Inputs

- 1. Manpower**
Irrigation task force team
Consultant
- 2. Data & information**
Unit cost of neighboring and similar irrigation project

Tools & Techniques

- 1. Unit construction cost**
Unit cost should be estimated by irrigation expert. The estimated cost should be compared with unit cost of neighboring and similar irrigation project.
Following cost should also be estimated.
 - 1) Compensation cost for decrease of crop yield during construction
 - 2) Dewatering cost during construction

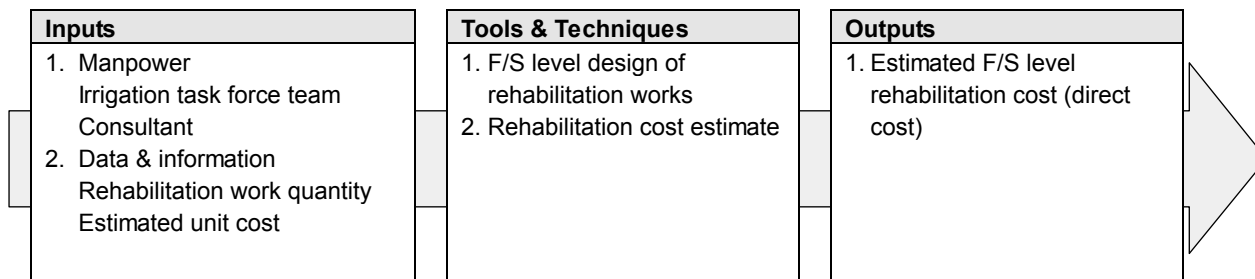
Outputs

- 1. Estimated unit construction cost**

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 02 Step 04	Estimation of F/S level rehabilitation cost
---	--



Criteria, standards and references
A) Unit cost per ha for other similar project

Inputs

- 1. Manpower**
Irrigation task force team
Consultant
- 2. Data & information**
Rehabilitation work quantity
Estimated unit cost

Tools & Techniques

- 1. Rehabilitation cost estimate**
F/S level rehabilitation cost should include required cost for items shown below.
 - 1) water resources facility (including settling basin etc.) rehabilitation cost
 - 2) irrigation canals and irrigation canals related structures rehabilitation cost
 - 3) drainage canals and drainage canals related structures rehabilitation cost
 - 4) terminal facilities and on-farm development cost
 - 5) project facilities cost

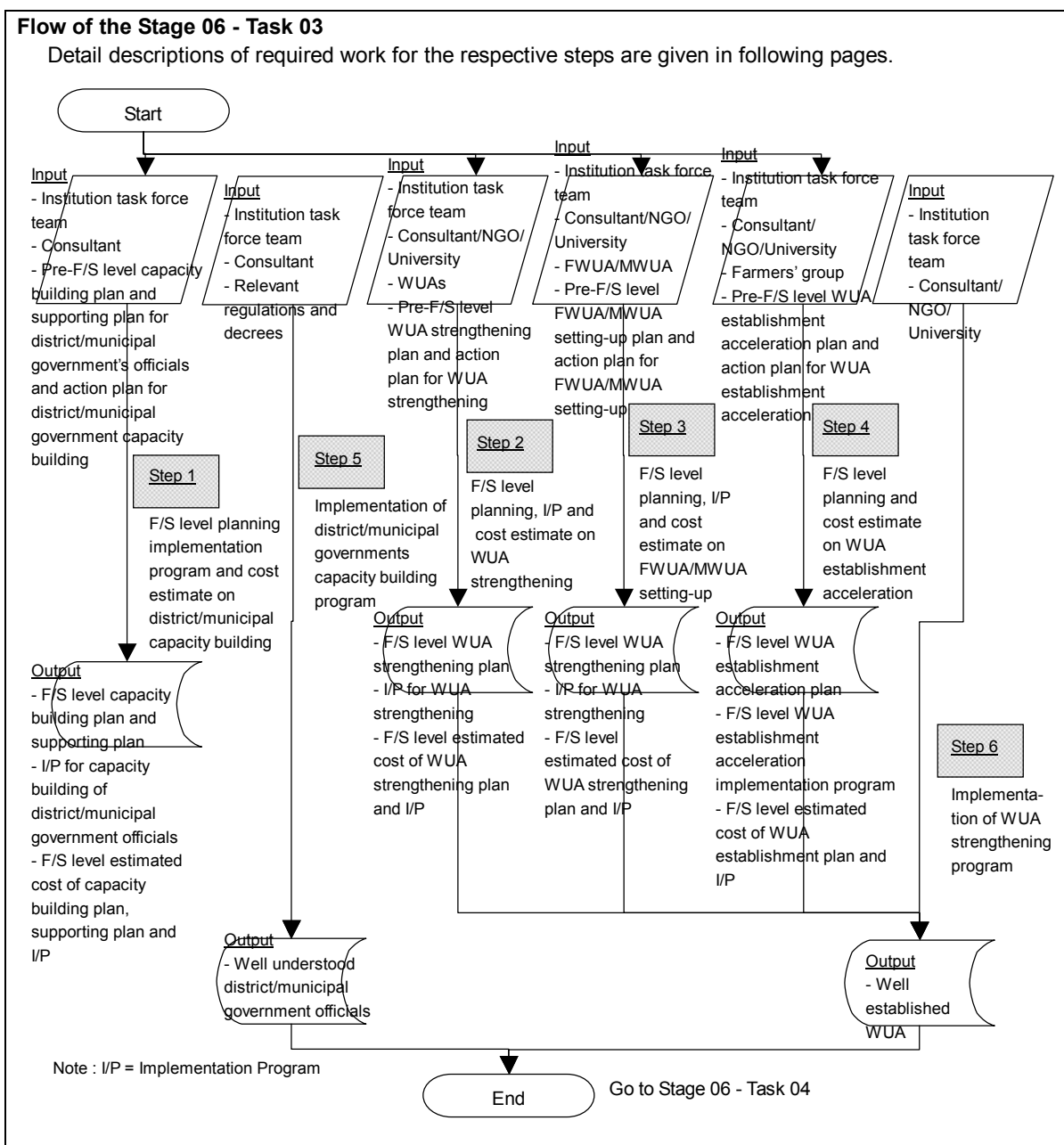
Rehabilitation cost should also include dewatering works (temporary canal construction or compensation cost during rehabilitation of existing canal).

Outputs

- 1. Estimated F/S level rehabilitation cost (direct cost)**

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

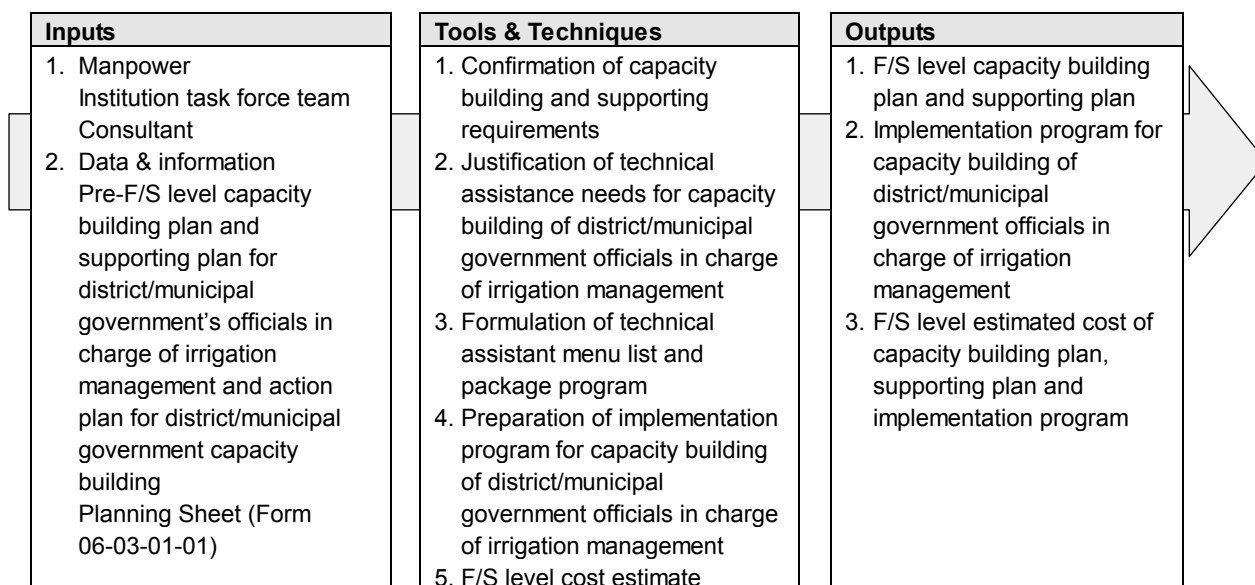
Stage 06	Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program
Task 03	Formulation of F/S Level District/Municipal Government's Officials Capacity Building, WUA Strengthening, FWUA/MWUA Setting-up and WUA Establishment Acceleration Plans, and Implementation of District/Municipal Government's Officials Capacity Building and WUA Strengthening Programs
Purpose and scope	
Purpose of the Task are to: 1) Formulate F/S level district/municipal government's officials capacity building plan and implementation program; 2) Formulate F/S level WUA strengthening plan and implementation program; 3) Formulate F/S level FWUA/MWUA setting-up and implementation program; 4) Formulate F/S level WUA establishment acceleration plan and implementation program; and 5) Estimate F/S level district/municipal government's officials capacity building, WUA strengthening, FWUA/MWUA setting-up and WUA establishment acceleration cost.	



II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 03 Step 01	F/S level planning, implementation program and cost estimate on district/municipal government's capacity building
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Criteria, standards and references
None

Inputs

- 1. Manpower**
Institution task force team
Consultant
- 2. Data & information**
Pre-F/S level capacity building plan and supporting plan for district/municipal government's officials in charge of irrigation management (refer to output of Stage 04 - Task 03 - Step 01) and action plan for district/municipal government capacity building (refer to output of Stage 05 - Task 02 - Step 01)

Tools & Techniques.

- 1. Confirmation of capacity building and supporting requirements**
Requirements shall be confirmed by face-to-face interview to officials concerned of district/municipal government, using Form 06-03-01-01.
- 2. Justification of technical assistance needs for capacity building of district/municipal government officials in charge of irrigation management**
- 3. Formulation of technical assistant menu list and package program**
- 4. Preparation of implementation program for capacity building of district/municipal government officials in charge of irrigation management**
- 5. F/S level cost estimate**

Outputs

- 1. F/S level capacity building plan and supporting plan**
- 2. Implementation program for capacity building of district/municipal government officials in charge of irrigation management**
- 3. F/S level estimated cost of capacity building plan, supporting plan and implementation program**

Form 06-03-01-01 Survey Sheet for Government Officials
Questionnaire to Officials
Water Resources Services Office of District/Municipal Government

1. How do you think about beneficiary farmer's behavior of the irrigation scheme?

.....
.....

2. What kind of programs have you carried out for strengthening WUA and how do you evaluate by yourself effectiveness/efficiency of these programs?

	Program	Effectiveness/Efficiency		
1)	..... ( ) Good	() Fair	() Poor	
2)	..... ( ) Good	() Fair	() Poor	
3)	..... ( ) Good	() Fair	() Poor	
4)	..... ( ) Good	() Fair	() Poor	
5)	..... ( ) Good	() Fair	() Poor	

3. How can you justify about number and capability of staff to complete management, works directed by you, particularly irrigation system from primary to tertiary levels? .

.....
.....
.....

4. What measures can you conduct to motivate WUA member farmers to perform O&M of tertiary irrigation system?

.....
.....
.....

5. Do you think about what is the key point to maintain close connection and coordination with WUA?

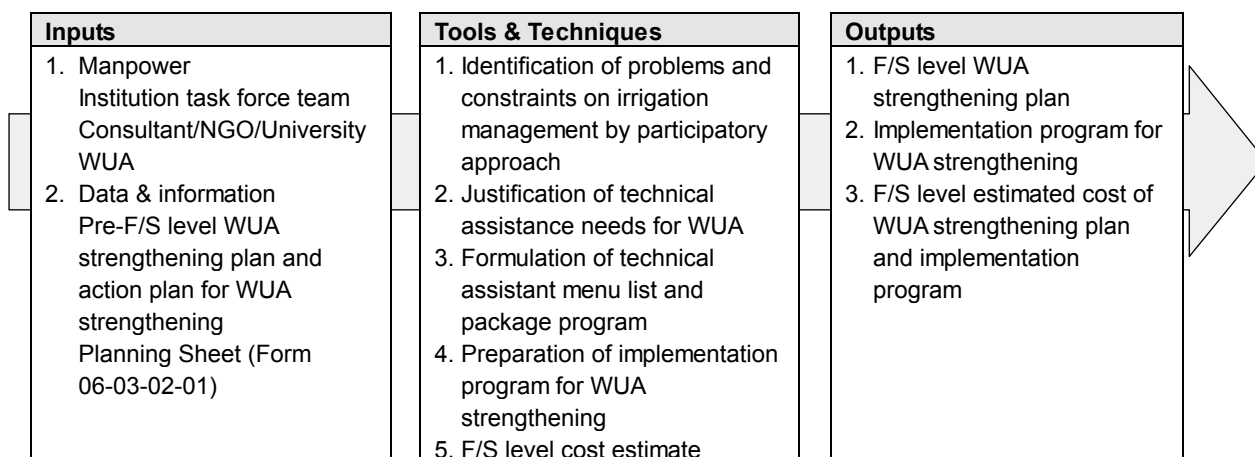
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Name
Position
Office.

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 03 Step 02	F/S level planning, implementation program and cost estimate on WUA strengthening
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Criteria, standards and references
None

Inputs

- 1. Manpower**
 Institution task force team
 Consultant/MGO/University
 WUA (Chairman/Technical Director of all WUA in the irrigation scheme)
- 2. Data & information**
 Pre-F/S level WUA strengthening plan (refer to output of Stage 04 - Task 03 - Step 02) and action plan for WUA strengthening (refer to output of Stage 04 - Task 03 - Step 02).

Tools & Techniques

- 1. Identification of problems and constraints on irrigation management by participatory approach**
 To problems and constraints, which are faced by WUA's members but not described in statistical data, participatory approach shall be applied. Types of participatory approach are 1) PRA (participatory rural appraisal) or PLA (participatory learning and action), 2) RRA (rapid rural appraisal), 3) PCM (project cycle management), 4) Conversation workshop, etc. To collect opinions as much as possible within shorter period from WUA's members, RRA method is recommendable, using Form 06-03-02-01.
- 2. Justification of technical assistance needs for WUAs**
 Reconfirm needs for improving weakness and justify the necessity of technical assistance by Regional Government to WUA through arrangement and analysis of answers from respondents of RRA..
- 3. Formulation of technical assistant menu list and package program**
 Formulate technical assistant menu list from which a package program of technical assistance can be made according to WUA's needs to improve its capacity, capability and/or activities.
- 4. Preparation of implementation program for WUA strengthening**
- 5. F/S level cost estimate**

Outputs

- 1. F/S level WUA strengthening plan**
- 2. Implementation program for WUA strengthening**
- 3. F/S level estimated cost of WUA strengthening plan and implementation program**

Form 06-03-02-01 Survey Sheet for WUA
Questionnaire to Member Farmers of Water Users' Association

I. Organization

1. Completion of WUA Board of Directors

() Already set up () Not yet set up

The reason of Board of Directors not yet set up

.....
.....

When will be the Board of Directors set up?

.....

2. Completion of Articles of WUA and those perception

() Already prepared () Not yet prepared

The reason of Articles not yet prepared.

.....
.....

When will be the Articles prepared?

.....

3. Presence of members in WUA annual meeting

() Attended () Not attended

The reason of members not attended

.....
.....

Frequency of meeting () times per () month/year

4. Holding and frequency of WUA Board Meeting

() Held () Not held

The reason of Board Meeting not held

.....
.....

Frequency of meeting () times per () month/year

.....
.....

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

II. Water Allocation and Utilization

1-1. Planting schedule and cropping pattern

- Planting schedule available Cropping pattern available
 Not available

The reason of planting schedule and cropping pattern not available

.....
.....

1-2. Practice of planting schedule and cropping pattern

- Schedule followed Schedule done but not followed
 Schedule not done Pattern followed
 Pattern not done Pattern done but not followed

The reason of planting schedule and cropping pattern not done

.....
.....

2-1 Water allocation plan

- Available Not available

The reason of water allocation plan not available

.....
.....

2-2 Implementation of water allocation plan

- Plan followed Plan done but not followed
 Plan not done

The reason of not implementing water allocation plan

.....
.....

3. Regular meetings of technical irrigation officer/local Mantri Pengairan and Ulu-ulu of WUA with frequency

- Held Not held

The reason of regular meeting not held

.....
.....

Frequency of meeting times per month/year

III. Irrigation Maintenance

1. Irrigation maintenance program

Available Not available

The reason of irrigation maintenance program not available

.....
.....

2. Implementation of irrigation maintenance program

Program implemented Program partly implemented

Program done but different way Program not implemented

The reason of program not implemented

.....
.....

3. Tertiary irrigation system rehabilitation and up-grading plan

Not damaged Damaged but no plan available

Rehabilitation plan not available

Up-grading plan not available

What component of rehabilitation/up-grading has been planned?

.....
.....

If rehabilitation/up-grading plan is not yet formulated, what is the reason?

.....
.....

II. Feasibility Study and
Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

IV. Financing

1. Collection of WUA members' contribution

Collected

Amount/ha Rp.....

In cash or in kind?

Not collected

The reason of members' contribution not collected

.....
.....

2. Expenses and its administration

Paid

Amount/ha Rp.....

In cash or in kind?

Not paid

The reason of expenses not born

.....
.....

3. Financial Report to WUA general assembly

Prepared Not prepared

The reason of financial report not prepared

.....
.....

V. Physical Condition of Irrigation Facilities

1. Intake

- Functioned Partly functioned
 Not functioned

2. Main canal

- Functioned Partly functioned
 Not functioned

3. Secondary canal

- Functioned Partly functioned
 Not functioned

4. Tertiary canal

- Functioned Partly functioned
 Not functioned

The reason of irrigation facilities not functioned

.....
.....

5. Division box, on-farm channel, watchman house and related facilities

- Functioned Partly functioned
 Not functioned

The reason of irrigation facilities not functioned

.....
.....

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

VI. Government Program on WUA Promotion and Development

1. Technical promotion and development

- Implemented
 - Field school training program
 - Classroom training program
 - Lecture
 - Seminar
- Not implemented

The reason of program not implemented

.....
.....

2. Need for technical assistance to WUA and its realization

- Required
 - Activity 1 By whom implemented.....
 - Activity 2 By whom implemented.....
- Required but not requested
 - Activity 1 By whom implemented.....
 - Activity 2 By whom implemented.....
- Not required

The reason of program not implemented

.....
.....

3. Need for physical assistance and its realization

- Required in the form of cash
 - Amount Rp. Activity.....
 - Amount Rp. Activity.....
- Required in the form of equipment/tool
 - Good.....Quantity.....unit
 - Good.....Quantity.....unit
- Required but not requested
 - Good.....Quantity.....unit
 - Good.....Quantity.....unit
- Not required

The reason of program not implemented

.....
.....

VII. Question to Board Members of WUA

1. Is there any similar organization in this area?

.....
.....

2. What is your duty/task in the Board?

.....
.....
.....
.....

3. What problems/constraints have your staff faced and what method to overcome such problems do you consider?

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4. What program do WUA members need to carry out immediately?

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.....
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II. Feasibility Study and
Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Profile of Respondents

Name

Age

Sex

Ethnic

Educational background

- | | | | |
|--------------------------|--------------------|--------------------------|--------------------|
| <input type="checkbox"/> | Not schooling | <input type="checkbox"/> | Primary school |
| <input type="checkbox"/> | Junior high school | <input type="checkbox"/> | Senior high school |
| <input type="checkbox"/> | Diploma | <input type="checkbox"/> | Academy |
| <input type="checkbox"/> | University | | |

Village

Tertiary Irrigation Block

Land Ownership Own land Lease land

Land Holding Size _____ ha

Status Full time farmer Part time farmers

Farm Labor Family labor _____ person

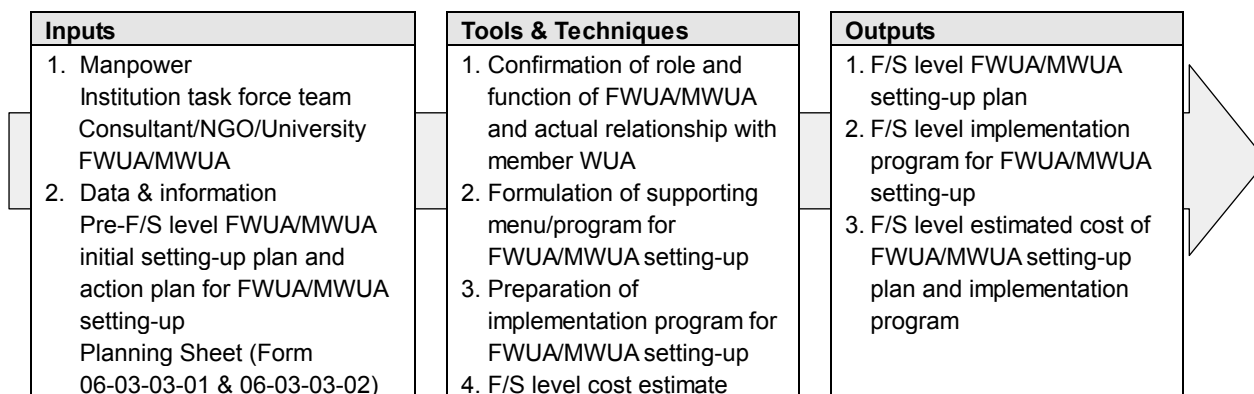
Hired labor _____ person

Other labor source Available Not available

From where.....

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 03 Step 03	F/S level planning, implementation program and cost estimate on FWUA/MWUA setting-up
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Criteria, standards and references

- A) Ministerial Decree of Home Affairs No.50/2001 on Guidelines for Establishment and Empowerment of Water Users' Associations (*to be adjusted after new Water Resources Law is enforced*)

Inputs

1. Manpower

Institution task force team
Consultant/NGO/University
FWUA/MWUA

2. Data & information

Pre-F/S level FWUA/MWUA initial setting-up plan (refer to output of Stage 04 - Task 03 - Step 03) and action plan for FWUA/MWUA setting-up (refer to output of Stage 05 - Task 02 - Step 01)

Tools & Techniques

1. Confirmation of role and function of FWUA/MWUA and actual relationship with member WUA

Face-to-face interview shall be made to representative of FWUA/MWUA using Form 06-03-03-01, while in case in case of no FWUA, group interview to representatives of WUAs concerned shall be done using Form 06-03-03-02.

2. Formulation of supporting menu/program for FWUA/MWUA setting-up

3. Preparation of implementation program for FWUA/MWUA setting-up

4. F/S level cost estimate

Outputs

1. F/S level FWUA/MWUA setting-up plan

2. F/S level implementation program for FWUA/MWUA setting-up

3. F/S level estimated cost of FWUA/PWUA setting-up plan and implementation program

Form 06-03-03-01 Survey Sheet for FWUA/MWUA
Questionnaire to Representatives of
Federation and Main Federation of WUA

1. When this federation was established, who led establishment activities?

.....
.....

2. When this federation was established, did you work together with WUA which should be core members?

() Yes () No

The reason if your answer is No.

.....
.....

3. If your federation is based on member WUA, do you pay special attention to maintain good relationship, cooperation and connection with member WUA in managing administrative aspects? .

.....
.....
.....

4. What support from Regional Government do you need in carrying out management works?

.....
.....
.....

Form 06-03-03-02 Survey Sheet for WUA
Questionnaire to Representatives of WUA
for Establishment of Federation and Main Federation of WUA

1. Do you have a definite plan of establishment of federation with other WUA under the same irrigation scheme?

.....
.....

2. If you have, when do you expect to realize your establishment plan?

.....
.....

3. Have you heard or found any federation of WUA and its background in and around the irrigation scheme? .

.....
.....
.....

4. Have you made deep discussion with other WUA about establishment of federation?

.....
.....
.....

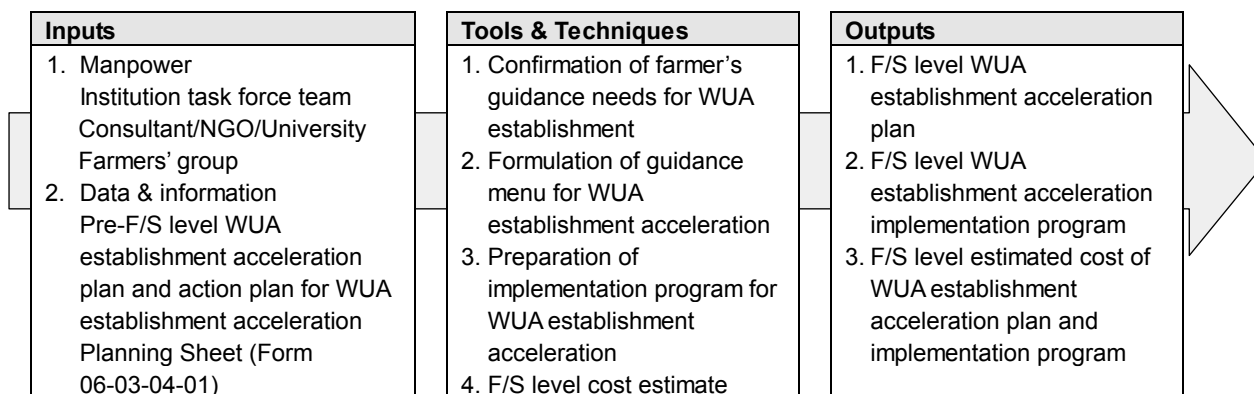
5. What support from Regional Government do you need in promoting your plan of federation establishment?

.....
.....
.....

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 03 Step 04	F/S level planning and cost estimate on WUA establishment acceleration
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Criteria, standards and references

A) Ministerial Decree of Home Affairs No.50/2001 on Guidelines for Establishment and Empowerment of Water Users' Associations (*to be adjusted after new Water Resources Law is enforced*)

Inputs

1. **Manpower**
Institution task force team
Consultant/NGO/University
Farmers' groups
2. **Data & information**
Pre-F/S level WUA establishment acceleration plan (refer to output of Stage 04 - Task 03 - Step 04) and action plan for WUA establishment acceleration (refer to output of Stage 05 - Task 02 - Step 01)

Tools & Techniques

1. **Confirmation of farmer's guidance needs for WUA establishment**
Face-to-face interviews to Farmers' Group leaders shall be made using Form 06-03-04-01.
2. **Formulation of guidance menu for WUA establishment acceleration**
3. **Preparation of implementation program for WUA establishment acceleration**
1. **F/S level cost estimate of WUA establishment acceleration plan and implementation program**

Outputs

1. **F/S level WUA establishment acceleration plan**
2. **F/S level WUA establishment acceleration implementation program**
3. **F/S level estimated cost of WUA establishment acceleration plan and implementation program**

**Form 06-03-04-01 Survey Sheet for WUA
Questionnaire to Farmers
in Tertiary Irrigation Block without Water Users' Association**

1. Has establishment of Water Users' Association (WUA) been already promoted?

- () Already promoted (go to Question No. 2)
- () Not yet promoted (go to Question No. 3)

2. Promotion has already done

2.1 Are you interesting in participation to WUA?

- () Yes
- () No

2.2 What is your reason/opinion about slow progress of WUA establishment?

.....
.....

2.3 Do you have any idea/proposal in order to make WUA establishment promotion more effective?

.....
.....

2.4 Do you know duty/task of Board of Directors of WUA?

- () Yes () No

The reason if your answer is No.

.....

2.5 If WUA is established, what do you expect from WUA activities?

.....
.....

2.6 What is the reason that you have not joined with WUA?

.....
.....

II. Feasibility Study and
Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

2.7 If services can be expected, do you want to become a member of Board of
Director or WUA staff?

() Yes ()

The reason if your answer is No.
.....

3. **Promotion has not yet done.**

3.1 How do you think about why WUA establishment has not been promoted?

.....
.....

3.2 Do you think about whether WUA establishment is needed or not?

() Yes (go to Question No. 3.3)

() No

The reason if your answer is No.
.....

3.3 Do you think whether or not anybody is available to act as initiator for WUA
establishment?

() Yes, I want to do

() Yes

() No

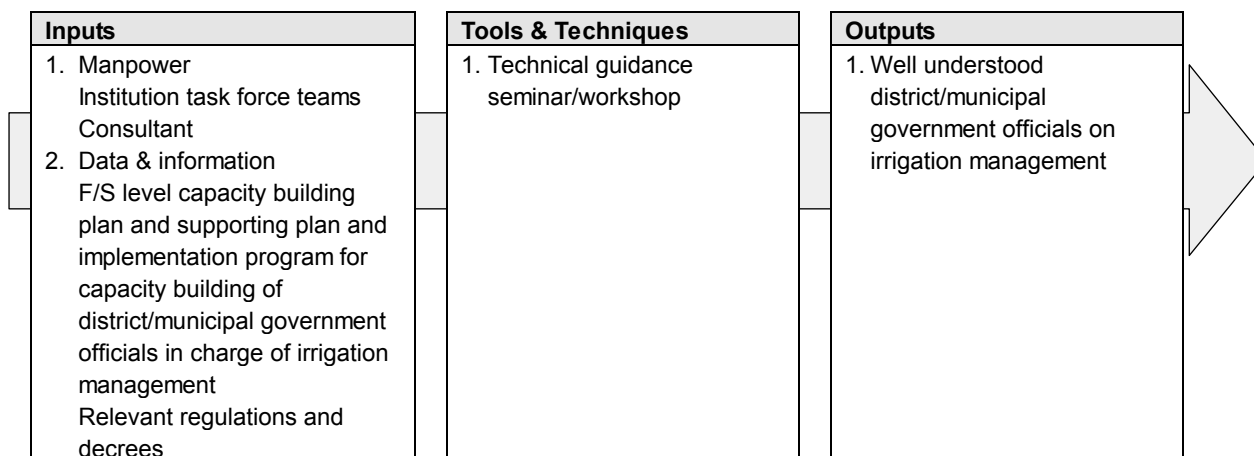
3.3 If WUA is established, do you become a member of WUA?

() Yes

() No

The reason if your answer is No.
.....

Stage 06 - Task 03 Step 05	Implementation of district/municipal government's capacity building program
---------------------------------------	--



Criteria, standards and references
None

Inputs

- 1. Manpower**
 Institution task force teams
 Consultant
- 2. Data & information**
 F/S level capacity building plan, supporting plan and implementation program for district/municipal government officials in charge of irrigation management (refer to output of Stage 06 - Task 03 - Step 01).
 Relevant regulations and decrees to be adjusted and modified once the new Law on Water Resources is enforced

Tools & Techniques

- 1. Technical guidance seminar/workshop**
 Agenda covers participatory irrigation management policy to be adjusted to the new Law on Water Resources, key points of relevant regulations and decrees on irrigation management, to be modified, and government's responsibility and job description of officials at district/municipal level for irrigation management activities.

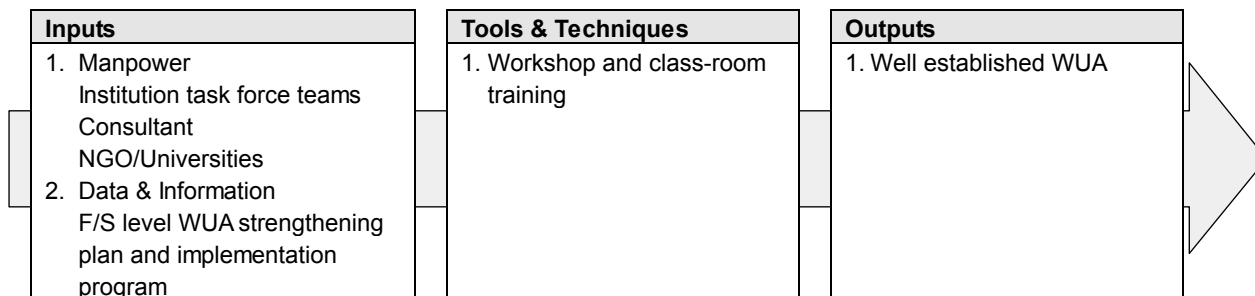
Outputs

- 1. Well understood district/municipal government officials on irrigation management**

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 03 Step 06	Implementation of WUA strengthening program
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Criteria, standards and references
None

Inputs

- 1. Manpower**
 Institution task force teams
 Consultant
 NGO/Universities
- 2. Data & information**
 F/S level WUA strengthening plan and implementation program (refer to output of Stage 06 - Task 03 - Step 02).

Tools & Techniques

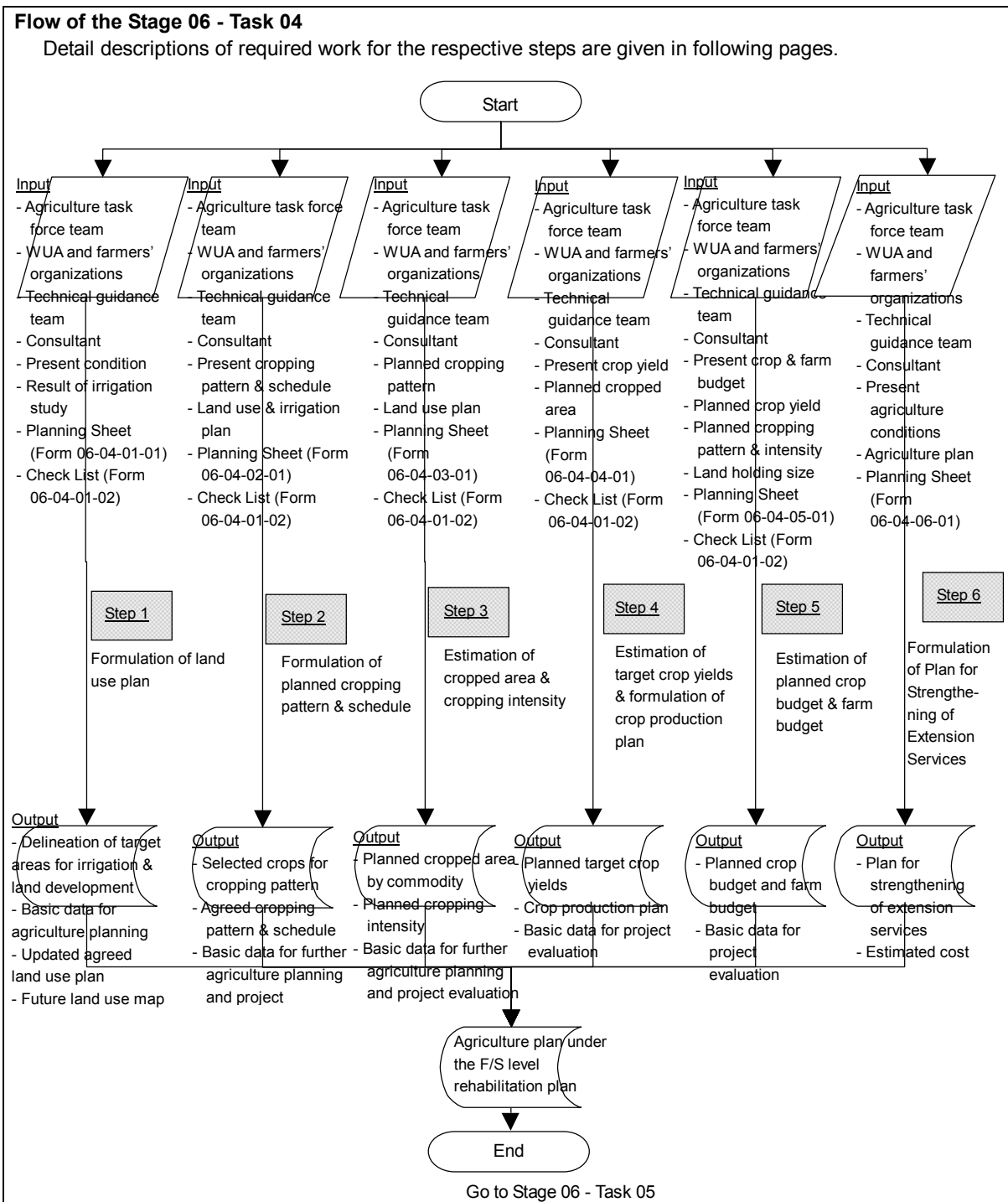
- 1. Workshop and class-room training**
 Focal points of training programs are WUA's responsibility for participatory irrigation management system, detailed planning of water allocation and utilization, well coordinated O&M plan of tertiary irrigation system, budgeting and fund management procedure, and membership fee determination, collection and expenditure rules, relationship with FWUA/MWUA, etc.

Outputs

- 1. Well established WUA**

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06	Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program
Task 04	F/S Level Agriculture Plan
Purpose and scope	
Scope of the Task are to review and update the agriculture plan and planned crop budgets and farm budgets formulated under the Pre-F/S level rehabilitation plan (Stage 04 - Task 04) and to formulate plan for strengthening of agriculture extension services:	
1) Formulate F/S level agriculture plan;	
2) Estimate F/S level planned crop budgets & farm budgets under with-project condition for project evaluation;	
3) Formulate a plan for strengthening of agriculture extension services.	



II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 04 Step 01	Formulation of land use plan by reviewing and updating the plan formulated under the Pre-F/S
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Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"> 1. Manpower Agriculture task force team WUA Farmers' organizations Technical guidance team Consultant 2. Data & information Pre-F/S level study results (Present land use: Form: 02-03-02-01) Pre-F/S level study results (Land use plan: Form 04-04-01-01) Results of irrigation study Results of land development study Base map & tertiary block inventory list 3. Materials Planning Sheet (Form 06-04-01-01) 4. Check List (Form 06-04-01-01) 	<ol style="list-style-type: none"> 1. Review & updating of present land use & irrigation study results 2. Reviewing & updating of basic concept for future land use plan 3. Reviewing & updating of land use plan 4. Report preparation (apply Planning Sheet Form 06-04-01-01) 	<ol style="list-style-type: none"> 1. Delineation of target areas for irrigation & land development 2. Basic data for agriculture planning 3. Agreed land use plan 4. Future land use map (if possible)

Criteria, standards and references
<p>A) Land use categories to be applied: i) Irrigated paddy field; ii) Rainfed paddy field, iii) Upland field, iv) Tree crops land, v) Fish pond, Vi) Uncultivated land (vegetation to be clarified , vii) Uncultivable land (as per Planning Sheet Form 06-04-01-01)</p> <p>B) Ministry of Public Works/JICA. 1999. <i>Guidelines for Feasibility Study of Irrigation Development</i>.</p> <p>C) Check List Form 06-04-01-02</p>

Inputs

1. Manpower

Agriculture task force team
Representatives of WUA in the irrigation scheme
Representatives of farmers' organizations in the irrigation scheme
Technical guidance team Provincial officer, etc.
Consultant

2. Data & information

- Pre-F/S level study results (Present land use: Form: 02-03-02-01)
- Pre-F/S level study results (Land use plan: Form 04-04-01-01)
- Present land use, land suitability, crop production and etc. identified.
- Results of irrigation study (planned irrigation area confirmed in Stage 06 - Task 02 - Step 02).
- Results of land development (land development plan agreed & confirmed in Stage 02 - Task 03 - Step 02).
- Base map for land use planning.
- Tertiary block inventory list (showing block name, area, etc).

3. Materials

Planning Sheet Form 06-04-01-01
Check List Form 06-04-01-02

Tools & Techniques

1. Review & updating of present land use & irrigation study results

Review & updating the present land use identified in the Pre-F/S level study (Present land use: Form: 02-03-02-01).

Review on consistency between present land use, land suitability, crop production and etc. and results of irrigation study (planned irrigation area).

2. Reviewing & updating of basic concept for future land use plan

Review & updating of the basic concept for future land use plan formulated in the Pre-F/S level study among the stakeholders in accordance with the Planning Sheet Form 06-04-01-01.

3. Reviewing & updating of land use plan

Review & updating of land use plan formulated in the Pre-F/S level study (Land use plan: Form 04-04-01-01) based on land suitability, irrigation plan and land development plan by the stake holders in accordance with the Planning Sheet Form 06-04-01-01 and formulation of the updated agreed land use plan..

4. Report preparation

- Results shall be reported by applying the Planning Sheet Form 06-04-01-01. The Sheet shall be signed by the representative of individual institutions participated in the joint survey.
- Preparation of future land use map (if base map available).

Outputs

1. Agreed land use plan

2. Delineation of target areas for irrigation & land development

3. Basic data for agriculture planning

4. Agreed land use plan

5. Future land use map (if possible)

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Form 06-04-01-02 Check List for Agriculture Plan

Stage : Feasibility Study
Objective Subject: Agriculture Plan

Prepared by:
Date: / /2003

Item	No.	Subject	Contents of Subject for Check	Reference value and information	Check (mark with √)		
					OK	Not	N.A
B. Basic Concept							
B.A General							
	BA-1	Development policy	Examined and confirmed the national development policy of agriculture such as: improvement of self supply of food, improvement of farmer's income, improvement of life standard, earning of foreign currency by export of crops, etc. ?	National development plan			
	BA-2	Land use	Examined and selected the irrigable area based on the land classification map ?				
	BA-3	Consistency of development	Examined and planned the development plan in consistency with other development plan ?				
	BA-4	Proposed crops	Examined and selected the proposed crops with following consideration: i) national development plan, ii) natural condition such as meteorology and soils, iii) market demands, iv) technical level of farming, v)				
B.B Farming Practice							
	BB-1	Farm Machinery	Examined the farming practice by machinery ?				
	BB-2	Project benefit	Prepared the project benefit monitoring program ?				
B.C Marketing and Price							
	BC-1	Demand Balance	Projected the demand balance with following factors: population, crop consumption, marketable surplus, etc. ?				
	BC-2	Product and farm input costs	Determined the product and farm input costs including following marketing costs: i) fertilizer, agro-chemical, ii) labor cost, iii) farm machinery cost, iv) draft animal cost, v) irrigation service fee ?				

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 04 Step 02	Formulation of planned cropping pattern & schedule by reviewing and updating the plan formulated under the Pre-F/S
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Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"> 1. Manpower Agriculture task force team WUA Farmers' organizations Technical guidance team Consultant 2. Data & information Pre-F/S level study results (Present cropping pattern & schedule: Form: 02-03-04-01) Pre-F/S level study results (Planned cropping pattern & schedule: Form 04-04-02-01) Present cropping pattern & schedule Land use & irrigation plan 3. Materials Planning Sheet (Form 06-04-02-01) 4. Check List (Form 06-04-01-01) 	<ol style="list-style-type: none"> 1. Review & updating of present cropping pattern & schedule, land use plan & irrigation plan 2. Review & updating of selected of crops 3. Review & updating of cropping pattern & schedule 4. Report preparation (apply Planning Sheet Form 06-04-02-01) 	<ol style="list-style-type: none"> 1. Selection of crops introduced in cropping pattern 2. Agreed cropping pattern & schedule 3. Basic data for further agriculture planning and project evaluation

Criteria, standards and references

- A) Planning Sheet Form 06-04-02-01.
- B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.
- C) Check List Form 06-04-01-02

Inputs

1. Manpower

- Agriculture task force team
- Representatives of WUA in the irrigation scheme
- Representatives of farmers' organizations in the irrigation scheme
- Technical guidance team Provincial officer, etc.
- Consultant

2. Data & information

- Pre-F/S level study results (Present cropping pattern & schedule: Form: 02-03-04-01)
- Pre-F/S level study results (Planned cropping pattern & schedule: Form 04-04-02-01)
- Present cropping pattern & schedule.
- Land use plan.
- Irrigation plan.

3. Materials

- Planning Sheet Form 06-04-02-01
- Check List Form 06-04-01-02

Tools & Techniques

1. Review & updating of present cropping pattern & schedule, land use plan & irrigation plan

- Review & updating the present cropping pattern & schedule identified in the Pre-F/S level study (Present cropping pattern & schedule: Form: 02-03-04-01).

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

2. Review & updating of selected crops

Review & updating the selected crops in the Pre-F/S level study (Planned cropping pattern & schedule: Form 04-04-02-01).

- Selection of crops to be introduced in the planned cropping pattern by the stakeholders taking into account of present crops cultivated in the irrigation scheme, soil characteristics & land suitability, farmers intension and capability, growth length of crops, marketability of crops, irrigation water availability etc.
- In principle, paddy shall be selected as a base crop both in wet and dry season.
- Water balance study on the preliminary formulated cropping pattern & schedule.

3. Review & updating of cropping pattern & schedule

- Review & updating of the planned cropping pattern & schedule formulated in the Pre-F/S level study (Planned cropping pattern & schedule: Form 04-04-02-01) based on the results of the water balance study.
- Formulation of the agreed cropping pattern & schedule applied for the rehabilitation plan by the stakeholders and formulation of the updated agreed cropping pattern and schedule.

4. Report Preparation

Results shall be reported by applying the Planning Sheet Form 06-04-02-01. The Sheet shall be signed by the representative of individual institutions participated in the joint survey.

Outputs

- 1. Selected crops for cropping pattern**
- 2. Agreed cropping pattern & schedule**
- 3. Basic data for further agriculture planning and project evaluation**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Form 06-04-02-01 Planning Sheet for Agriculture Plan: Planned Cropping Pattern & Schedule

Irrigation Scheme: _____

1. Irrigated Paddy Field													
Crop/Season	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Area (ha)
Paddy													
- Wet Season													
- Dry Season I													
- Dry Season II													
Palawija/Others													
- Wet Season ()													
- Dry Season I ()													
- Dry Season II ()													
- ()													
- ()													

Agreed & Confirmed by

<p>_____</p> <p>Agriculture Services Office</p> <p>Name:</p> <p>Position:</p> <p>Date:</p>	<p>_____</p> <p>Irrigation Services Office</p> <p>Name:</p> <p>Position:</p> <p>Date:</p>	<p>_____</p> <p>Water Users Institution</p> <p>Name:</p> <p>Position:</p> <p>Date:</p>
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Remarks

Stage 06 - Task 04 Step 03	Estimation of cropped area & cropping intensity by reviewing and updating the plan formulated under the Pre-F/S
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Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"> 1. Manpower Agriculture task force team WUA Farmers' organizations Technical guidance team Consultant 2. Data & information Pre-F/S level study results (Present cropped area & cropping intensity: Form: 02-03-05-01) Pre-F/S level study results (Planned cropped area & cropping intensity: Form 04-04-03-01) Planned cropping pattern Land use plan 3. Materials Planning Sheet (Form 06-04-03-01) 4. Check List (Form 06-04-01-01) 	<ol style="list-style-type: none"> 1. Review & updating of cropped area under the rehabilitation plan 2. Review & updating of cropping intensity under the rehabilitation plan 3. Report preparation (apply Planning Sheet Form 06-04-03-01) 	<ol style="list-style-type: none"> 1. Planned cropped area by commodity 2. Planned cropping intensity 3. Basic data for further agriculture planning and project evaluation

Criteria, standards and references

- A) Planning Sheet Form 06-04-03-01
 B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.
 C) Check List Form 06-04-01-02

Inputs

- 1. Manpower**
Agriculture task force team
Representatives of WUA in the irrigation scheme
Representatives of farmers' organizations in the irrigation scheme
Technical guidance team Provincial officer, etc.
Consultant
- 2. Data & information**
Pre-F/S level study results (Present cropped area & cropping intensity: Form: 02-03-05-01)
Pre-F/S level study results (Planned cropped area & cropping intensity: Form 04-04-03-01)
Planned cropping pattern
Land use plan
- 3. Materials**
Planning Sheet Form 06-04-03-01
Check List Form 06-04-01-02

Tools & Techniques

- 1. Estimation of cropped area under the rehabilitation plan**
Calculation of cropped areas by cropping season and commodity based on the planned cropping pattern (Planning Sheet Form 06-04-02-01) and land use plan (Planning Sheet Form 06-04-01-01) at the full development stage.
- 2. Estimation of cropping intensity under the rehabilitation plan**

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Calculation of cropping intensity by cropping season and commodity based on the planned cropping pattern and land use plan at the full development stage.

3. Report preparation

Results shall be reported by applying the Planning Sheet Form 06-04-03-01. The Sheet shall be signed by the representative of individual institutions participated in the joint survey.

Outputs

- 1. Planned cropped area by commodity**
- 2. Planned cropping intensity**
- 3. Basic data for further agriculture planning and project evaluation**

Form 06-04-03-01 Planning Sheet for Agriculture Plan: Planned Cropped Area & Intensity

1. Irrigated Paddy Field									
Irrigated Paddy Field (ha)	Crop	Cropped Area (ha) & Cropping Intensity (CI, %)							
		Wet Season		Dry Season I		Dry Season II		Annual	
		Area	CI	Area	CI	Area	CI	Area	CI
	Paddy								
	()								
	()								
	()								
	Total								
	Paddy								
	()								
	()								
	()								
	Total								
	Paddy								
	()								
	()								
	()								
	Total								
Overall Irrigation Scheme	Paddy								
	()								
	()								
	()								
	Total								

Agreed & Confirmed by

<p>_____</p> <p>Agriculture Services Office</p> <p>Name:</p> <p>Position:</p> <p>Date:</p>	<p>_____</p> <p>Irrigation Services Office</p> <p>Name:</p> <p>Position:</p> <p>Date:</p>	<p>_____</p> <p>Water Users Institution</p> <p>Name:</p> <p>Position:</p> <p>Date:</p>
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Remarks

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 04 Step 04	Estimation of target crop yields & formulation of crop production plan by reviewing and updating the plan formulated under the Pre-F/S
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Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"> 1. Manpower Agriculture task force team WUA Farmers' organizations Technical guidance team Consultant 2. Data & information Pre-F/S level study results (Present crop yields & production: Form: 02-03-06-01) Pre-F/S level study results (Target crop yields & crop production plan: Form 04-04-04-01) Present crop yield Planned cropped area 3. Materials Planning Sheet (Form 06-04-04-01) 4. Check List (Form 06-04-01-01) 	<ol style="list-style-type: none"> 1. Review & updating of target crop yields 2. Review & updating of crop production plan 3. Report preparation (apply Planning Sheet Form 06-04-04-01) 	<ol style="list-style-type: none"> 1. Planned target crop yields 2. Crop production plan 3. Basic data for project evaluation

Criteria, standards and references
<p>A) Planning Sheet Form 06-04-04-01. B) Ministry of Public Works/JICA. 1999. <i>Guidelines for Feasibility Study of Irrigation Development</i>. C) Check List Form 06-04-01-02</p>

Inputs

- 1. Manpower**
Agriculture task force team
Representatives of WUA in the irrigation scheme
Representatives of farmers' organizations in the irrigation scheme
Technical guidance team Provincial officer, etc.
Consultant
- 2. Data & information**
- Pre-F/S level study results (Present crop yields & production: Form: 02-03-06-01)
- Pre-F/S level study results (Target crop yields & crop production plan: Form 04-04-04-01)
- Present crop yield
- Planned cropped area
- 3. Materials**
Planning Sheet Form 06-04-04-01
Check List Form 06-04-01-02

Tools & Techniques

- 1. Review & updating of crop yields**
- Review & updating the target crop yields planned in the Pre-F/S level study (Target crop yields & crop production plan: Form 04-04-04-01).

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

- Estimating planned target yields in each cropping season after project based on current yield levels, yield levels in sufficiently irrigated fields, yield levels in advanced irrigation schemes around the irrigation scheme, high yields attained by advanced farmers in & around the irrigation scheme, potential yields of crops, yield levels of demonstration fields, farmers technical & financial capability etc.
- In the estimation, current yield levels of subject crops, recommended farming practices to be introduced or accepted by farmers and yield levels attained by in sufficiently irrigated fields and the same attained by advanced farmers shall be dully considered.

2. Review & updating of crop production plan

Review & updating of crop production plan based on the planned cropped area and target crop yields at the full development stage and determination of the updated target crop yields and formulation of crop production plan.

3. Report preparation

Results shall be reported by applying the Planning Sheet Form 06-04-04-01. The Sheet shall be signed by the representative of individual institutions participated in the joint survey.

Outputs

- 1. Planned target crop yields**
- 2. Crop production plan**
- 3. Basic data for project evaluation**

Form 06-04-04-01 Planning Sheet for Agriculture Plan: Planned Cropped Yield & Production

1. Irrigated Paddy Field				
Cropping Season	Crop	Cropped Area (ha)	Yield (t/ha)	Production (t)
Wet Season	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Sub-total			
Dry Season I	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Sub-total			
Dry Season II	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Sub-total			
Annual	Irrigated Paddy			
	Palawija ()			
	Palawija ()			
	()			
	Total			

Agreed & Confirmed by

_____	_____	_____
Agriculture Services Office	Irrigation Services Office	Water Users Institution
Name:	Name:	Name:
Position:	Position:	Position:
Date:	Date:	Date:

Remarks

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 04 Step 05	Estimation of planned crop budget and farm budget by reviewing and updating the plan formulated under the Pre-F/S
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Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"> 1. Manpower Agriculture task force team WUA Farmers' organizations Technical guidance team Consultant 2. Data & Information Pre-F/S level study results (Current crop budget & farm budget: Form: 02-03-07-01 & 02-03-07-02) Pre-F/S level study results (Current crop budget & farm budget: Form: 04-04-05-01 & 04-04-05-02) Present crop & farm budgets Planned crop yields Planned cropping pattern & intensity Land holding size per farm 3. Materials Planning Sheet (Form 06-04-05-01) 4. Check List (Form 06-04-01-01) 	<ol style="list-style-type: none"> 1. Collection & review of existing data & information 2. Determination of proposed farming practices 3. Review & updating planned crop budgets 4. Review & updating of planned farm budgets of model farms 5. Preliminary formulation of plan for strengthening of agriculture extension services 6. Report preparation (apply Planning Sheet Form 06-04-05-01) 	<ol style="list-style-type: none"> 1. Planned crop budgets and farm budgets 2. Basic data for project evaluation

Criteria, standards and references

- A) Planning Sheet Form 06-04-05-01.
 B) Ministry of Public Works/JICA. 1999. *Guidelines for Feasibility Study of Irrigation Development*.
 C) Check List Form 06-04-01-02

Inputs

1. Manpower

Agriculture task force team
 Representatives of WUA in the irrigation scheme
 Representatives of farmers' organizations in the irrigation scheme
 Technical guidance team Provincial officer, etc.
 Consultant

2. Data & information

- Present crop & farm budgets estimated in Stage 02 - Task 03 - Step 07.
- Planned crop yields.
- Planned cropping pattern and cropping intensity.
- Land holding size per farm

3. Materials

Planning Sheet Form 06-04-05-01
 Check List Form 06-04-01-02

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Inventory Survey

1. Collection & review of existing data & information

- Collection of secondary data on crop budgets and farm budgets in advanced irrigation schemes in and around the irrigation scheme (ex. data recorded by Mantri Tani Statistik & PPLs).
- Collection of crop budget data on planned target yields of individual crops.
- Collection of farm gate commodity prices of farm inputs & products.
- Collection of production cost data such as land preparation cost, transportation cost, labor cost etc.
- Review of the data collected for their validity

2. Determination of proposed or recommended farming practices

- Determination of proposed or recommended farming practices for individual selected crops to be introduced for the attainment of the target yield levels.

3. Review & updating of planned crop budgets

- Estimation of planned crop budgets by reviewing the crop budgets estimated in Stage 02 - Task 03 - Step 07 and based on the proposed farming practices, the planned target yield levels and current farm gate commodity prices and other production costs.
- Average figures in the irrigation scheme shall be applied for estimation.

4. Review& updating of planned farm budgets

Estimation planned farm budgets on model farms/typical farms selected in Stage 02 - Task 03 - Step 07 by reviewing the crop budgets estimated in Stage 02 - Task 03 - Step 07 and based on the planned cropping pattern, cropping intensity and crop budgets.

Estimation of incremental capacity-to-pay of the model farms/typical farms by assuming family expenditures, farm incomes from outside of the irrigation scheme and non-farm income and comparing with the estimated farm budgets in Stage 02 - Task 03 - Step 07 in accordance with the Planning Sheet Form 06-04-05-01.

5. Report preparation

Results of the investigation shall be reported by applying the Planning Sheet Form 06-04-05-01. The Sheet shall be signed by the representative of individual institutions participated in the joint investigation.

Outputs

1. Planned crop budgets and farm budgets

Planned crop budgets and model farm budgets are estimated and confirmed.

2. Basic data for project evaluation

Planned crop budgets for project economic analysis are determined.

Form 06-04-05-01 Planning Sheet for Agriculture Plan: Planned Crop Budget - 1/2

1. Crop Budget per Ha: Irrigated Paddy								
Items	Unit	Unit Price (Rp000)	Irrigated Paddy					
			Wet Season		Dry Season I		Dry Season II	
			Q'ty	Value	Q'ty	Value	Q'ty	Value
1. Gross Return								
Unit Yield	(t/ha)							
Unit Price	(Rp.000/t)							
Gross Return	(Rp.000)							
2. Production cost								
2-1. Farm Inputs								
Seed	(kg/ha)							
Fertilizers								
- Urea	(kg/ha)							
- SP36	(kg/ha)							
- KCl	(kg/ha)							
- ZA	(kg/ha)							
-								
-								
Agro chemicals								
- Insecticide (liquid)	(lit/ha)							
- Insecticide (powder)	(kg/ha)							
- Rodenticide	(kg/ha)							
- Herbicide	(kg/ha)							
-								
-								
2-2. Labor Requirement								
Hired Labor	(man-day)							
Family Labor	(man-day)							
Total	(man-day)							
2-3. Contracted Works (labor)								
- Planting/Transplanting	(Rp/ha)							
- Harvesting	(Rp/ha)							
2-4. Land Preparation								
By Machinery	(Rp/ha)							
By Draft Animal	(Rp/ha)							
2-5. Field Transportation	(Rp/ha)							
2-6. Other Expenses	(Rp/ha)							
3. Net Return per Ha	Rp.000							

Remarks

Form 06-04-05-01 Planning Sheet for Agriculture Plan: Planned Crop Budget - 2/2

2. Crop Budget per Ha: Palawija & Other Crops								
Items	Unit	Unit Price (Rp000)	Palawija ()		Palawija ()		()	
			Q'ty	Value	Q'ty	Value	Q'ty	Value
1. Gross Return								
Unit Yield	(t/ha)							
Unit Price	(Rp.000/t)							
Gross Return	(Rp.000)							
2. Production cost								
2-1. Farm Inputs								
Seed	(kg/ha)							
Fertilizers								
- Urea	(kg/ha)							
- SP36	(kg/ha)							
- KCl	(kg/ha)							
- ZA	(kg/ha)							
-								
Agro chemicals								
- Insecticide (liquid)	(lit/ha)							
- Insecticide (powder)	(kg/ha)							
- Rodenticide	(kg/ha)							
- Herbicide	(kg/ha)							
-								
2-2. Labor Requirement								
Hired Labor	(man-day)							
Family Labor	(man-day)							
Total	(man-day)							
2-3. Contracted Works								
- Planting/Transplanting	(Rp/ha)							
- Harvesting (labor)	(Rp/ha)							
2-4. Land Preparation								
By Machinery	(Rp/ha)							
By Draft Animal	(Rp/ha)							
2-5. Field Transportation	(Rp/ha)							
2-6. Other Expenses	(Rp/ha)							
3. Net Return per Ha	Rp.000							

Agreed & Confirmed by

Agriculture Services Office
Name:
Position:
Date:

Irrigation Services Office
Name:
Position:
Date:

Water Users Institution
Name:
Position:
Date:

Remarks

Form 06-04-05-02 Planning Sheet for Agriculture Plan: Planned Farm Budget - 1/3

1. Farm Budget: Model/Typical Farm Household in Irrigated Areas

(1) Land Holding

	In DI	Outside of DI
Irrigated Paddy Field	ha	ha
Rainfed Paddy Field	ha	ha
Upland Field	ha	ha
Tree Crops Planted Area	ha	ha
Total	ha	ha

(2) Farm Income

a. From Farm Land in DI

Items	Irrigated Paddy		Palawija	Palawija	Other Crops
	Wet	Dry	()	()	()
Cropped Area (ha)					
Yield (t/ha)					
Production (t)					
Unit Price (Rp.000)					
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

b. From Farm Land Outside of DI

Items	Commodity				Total
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

c. Livestock Income

Items	Livestock				Total
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

d. Total Net Farm Income (Rp.000; a + b + c) _____

(3) Non-farm Income

Monthly Income (Rp.000) _____ Annual Income (Rp.000) _____

(4) Family Annual Income { d + (3) } = _____

(5) Family Annual Expenditures

Items	Foods	()	()	()
Monthly Expenditures (Rp.000)				
Annual Expenditures (Rp.000)				
Total Annual Expenditures (Rp.000)				

(6) Net Reserve {Rp.000; (4) - (5)} = _____

Form 06-04-05-02 Planning Sheet for Agriculture Plan: Planned Farm Budget - 2/3

2. Farm Budget: Model/Typical Farm Household Currently n Rainfed Paddy Areas

(1) Land Holding

	In DI	Outside of DI
Rainfed Paddy Field	_____ ha	_____ ha
Upland Field	_____ ha	_____ ha
Tree Crops Planted Area	_____ ha	_____ ha
Total	_____ ha	_____ ha

(2) Farm Income

a. From Farm Land in DI

Items	Paddy	Palawija			Other Crops
		()	()	()	
Cropped Area (ha)					
Yield (t/ha)					
Production (t)					
Unit Price (Rp.000)					
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

b. From Farm Land Outside of DI

Items	Commodity				Total
	()	()	()	()	
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

c. Livestock Income

Items	Livestock				Total
	()	()	()	()	
Gross Income (Rp.000)					
Production Costs (Rp.000)					
Net Income (Rp.000)					
Total Net Income (Rp.000)					

d. Total Net Farm Income (Rp.000; a + b + c) _____

(3) Non-farm Income

Monthly Income (Rp.000) _____ Annual Income (Rp.000) _____

(4) Family Annual Income { d + (3) } = _____

(5) Family Annual Expenditures

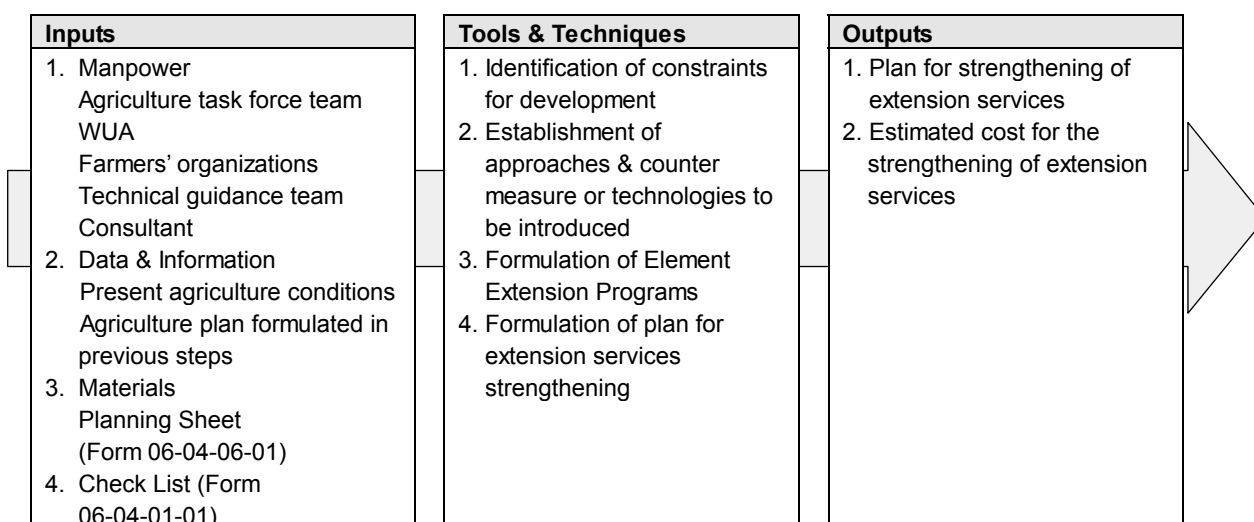
Items	Foods	()	()	()
Monthly Expenditures (Rp.000)				
Annual Expenditures (Rp.000)				
Total Annual Expenditures (Rp.000)				

(6) Net Reserve {Rp.000; (4) - (5)} = _____

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 –Task 04 Step 06	Formulation of plan for strengthening of extension services
--------------------------------------	--



Criteria and Standards
None

Inputs

1. Manpower

- Agriculture task force team
- Representatives of WUA in the irrigation scheme
- Representatives of farmers' organizations in the irrigation scheme
- Technical guidance team Provincial officer, etc.
- Consultant

2. Data & information

- Present agriculture conditions in irrigation schemes identified in Stage 03 Task 03 and the updated information on the same.
- Agriculture plan formulated in Step 01 to 05
- Data & information on program costs for extension & support services

3. Materials

- Planning Sheet (Form 06-04-06-01)
- Check List Form 06-04-01-02

Methodologies

1. Identification of constraints for development

- Review of the present agriculture conditions clarified in Stage 03 Task 03 and the updated information on the same and identification of constraints to be mitigated for the attainment of the targets set in the agriculture plan.
- Field confirmation of the constraints by the research-extension dialog team.

2. Establishment of approaches & counter measures or technologies to be introduced

- Establishment of approaches for the mitigation of the constraints identified.
- Establishment of counter measures to be introduced for the mitigation of the constraints identified.
- Establishment or development of agriculture technologies to be introduced for the mitigation of the constraints identified.

3. Formulation of element extension programs

- Formulation of element extension programs for the mitigation of individual or plural development constraints by emphasizing farmer-to-farmer approaches.
- Element extension programs should be area specific ones tailored to area specific needs and will include: farmer/farmer group empowerment program, staffs empowerment program, field demonstration program, technical development or trial program, training program in class & in field (field school), study tour, workshop,

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

mass guidance etc.

4. Formulation of plan for strengthening of extension services

Formulation of extension services strengthening plan for a certain period, ex. 3 to 5 years, based on the time series implementation scheduling of element programs, budget requirement & availability, staffs availability & capability.

Formulation of plan for strengthening of extension services well synchronized with the implementation schedule of rehabilitation works by emphasizing farmer-to-farmer approaches.

Plan should be area specific ones tailored to area specific needs.

5. Cost estimation for strengthening of extension services

Estimation of the cost for the planned strengthening of extension services

Outputs

1. Plan for strengthening of extension services

Planning Sheet (Form 06-04-06-01)

2. Estimated cost for the extension services strengthening

Planning Sheet (Form 06-04-06-01)

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Form 06-04-06-01 Planning Sheet for Agriculture Plan: Plan for Strengthening of Extension Services

Irrigation Scheme: _____

Program Category/ Program		Year					Target Areas/ Target Groups
		1st	2nd	3rd	4th	5th	
1. Technology Development Programs	Schedule						
	Volume						
	Cost						
2. Field Extension Programs - Verification Trial	Schedule						
	Volume						
	Cost						
- Demonstration Plot/Farm/Area	Schedule						
	Volume						
	Cost						
- IPM	Schedule						
	Volume						
	Cost						
3. Farmer/Farmer Group Training Programs - Farmer/Farmer Group Training	Schedule						
	Volume						
	Cost						
- Mass Guidance/Campaign	Schedule						
	Volume						
	Cost						
- Study Tour	Schedule						
	Volume						
	Cost						
- Farmer Group Activation Guidance	Schedule						
	Volume						
	Cost						
4. Staff Training	Schedule						
	Volume						
	Cost						
4. Workshop	Schedule						
	Volume						
	Cost						

Agreed & Confirmed by

Agriculture Services Office
Name:
Position:
Date:

Irrigation Services Office
Name:
Position:
Date:

Water Users Institution
Name:
Position:
Date:

Instructions To Fill-in

- Plan to be formulated based on site specific needs and needs of target groups to attain the targets set in the agriculture plan
- Participatory approaches to be employed for the formulation
- Program costs to be based on costs of similar programs implemented in province/district.

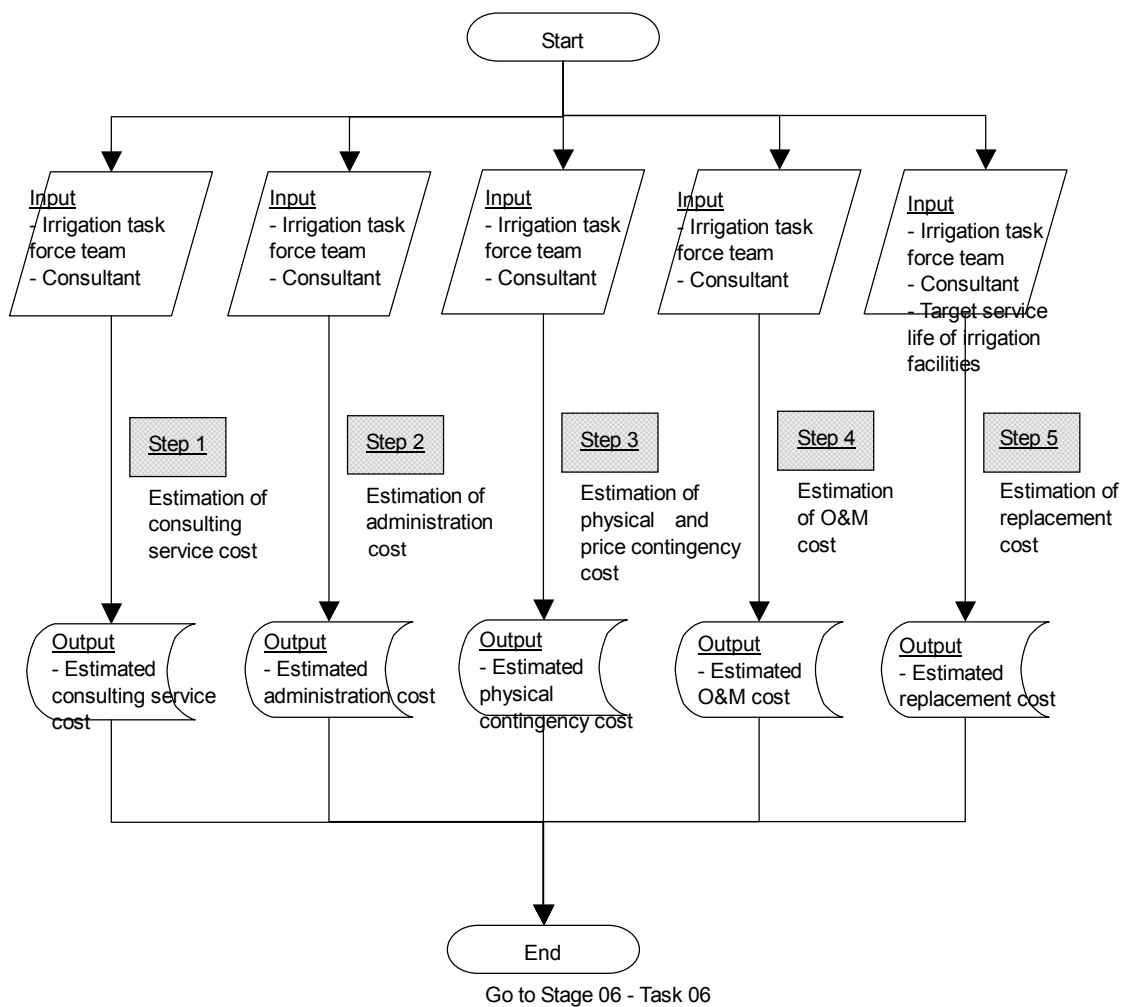
Remarks

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06	Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program
Task 05	F/S Level Project Cost Estimate
Purpose and scope	
Purpose of the work is to estimate project cost for project economic evaluation.	

Flow of the Stage 06 - Task 05

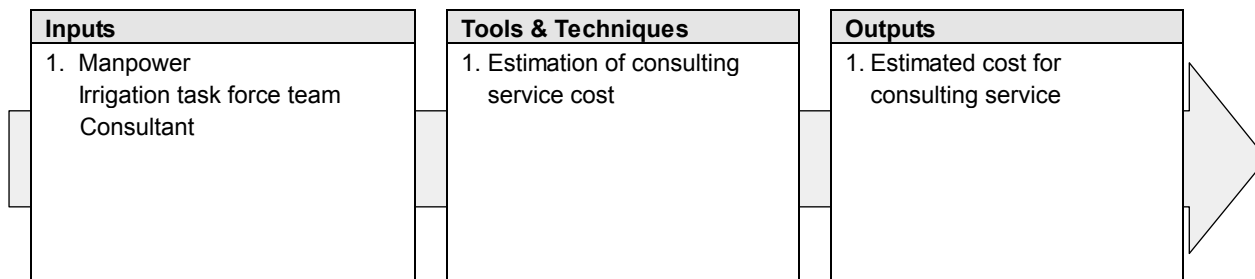
Detail descriptions of required work for the respective steps are given in following pages.



II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 05 Step 01	Estimation of consulting service cost
---------------------------------------	--



Criteria, standards and references
A) Ministry of Public Works. 1999. <i>Guidelines for Feasibility Study of Irrigation Development</i> . B) Loan handbook of international lending agencies (WB, ADB, JBIC, IFAD, etc.)

Inputs

1. **Manpower**
 Irrigation task force team
 Consultant

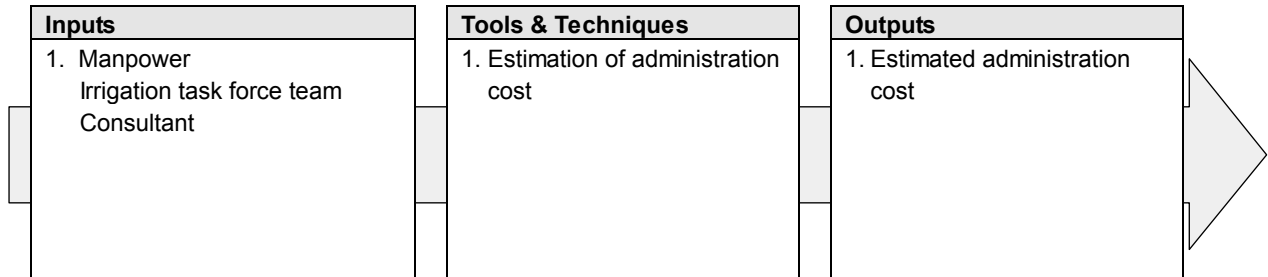
Tools & Techniques

1. **Estimation of consulting service cost**
 Consulting service cost should be estimated based on the Criteria, standards and references-A. For rough estimate, it is recommended to apply 5 to 10 % of construction cost which is estimated in Stage 06 - Task 02.

Outputs

1. **Estimated cost for consulting service**

Stage 06 - Task 05 Step 02	Estimation of administration cost
---------------------------------------	--



Criteria, standards and references

A) Ministry of Public Works. 1999. *Guidelines for Feasibility Study of Irrigation Development*.

Inputs

1. **Manpower**
 Irrigation task force team
 Consultant

Tools & Techniques

1. **Estimation of administration cost**
 Administration cost should be estimated based on the Criteria, standards and references-A. In the Criteria, standards and references-A, it is described that the administration cost should be 2.5% of cost of civil works and preparatory works.

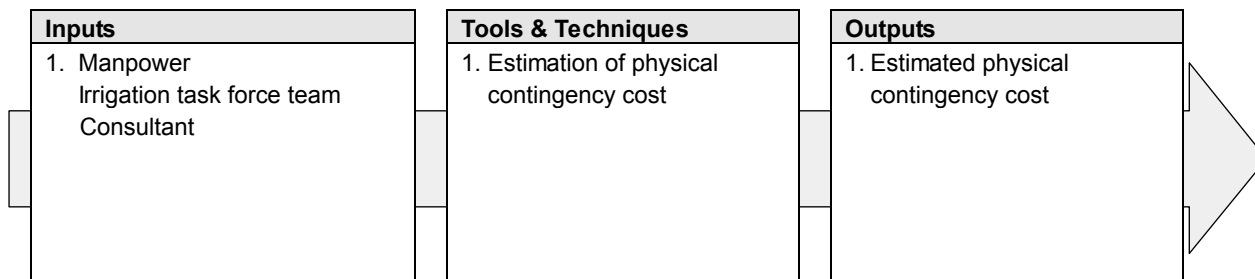
Outputs

1. **Estimated administration cost**

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 05 Step 03	Estimation of physical and price contingency cost
---	--



Criteria, standards and references
A) Ministry of Public Works. 1999. <i>Guidelines for Feasibility Study of Irrigation Development</i> .

Inputs

1. **Manpower**
 Irrigation task force team
 Consultant

Tools & Techniques

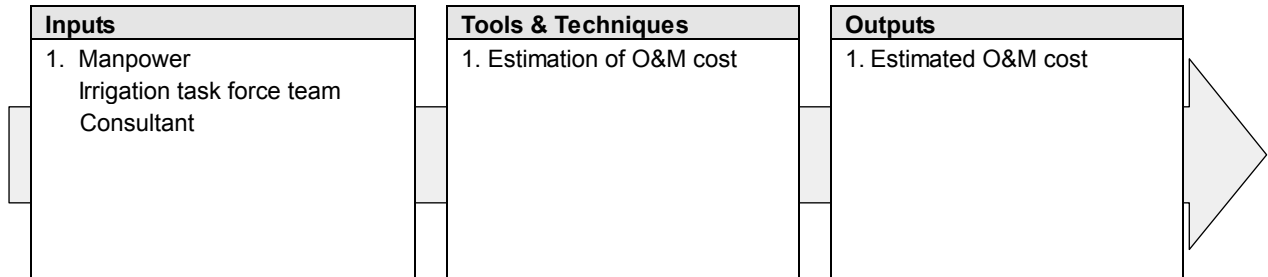
1. **Estimation of physical contingency cost**
 Physical contingency cost should be estimated based on the Criteria, standards and references-A. In the Criteria, standards and references-A, it is described that the physical contingency cost should be 10% of cost of civil works and preparatory works in general.

Outputs

1. **Estimated physical contingency cost**

Note: In case project work is estimated more than 3 years, price contingency should be considered

Stage 06 - Task 05 Step 04	Estimation of O&M cost
---	-----------------------------------



Criteria, standards and references
A) O&M cost for other similar projects

Inputs

1. **Manpower**
 Irrigation task force team
 Consultant

Tools & Techniques

1. **Estimation of O&M cost**
 O&M cost should be estimated by cost estimate expert and irrigation expert. Standard O&M cost should be in a range of 200,000 - 300,000 Rp./ha.

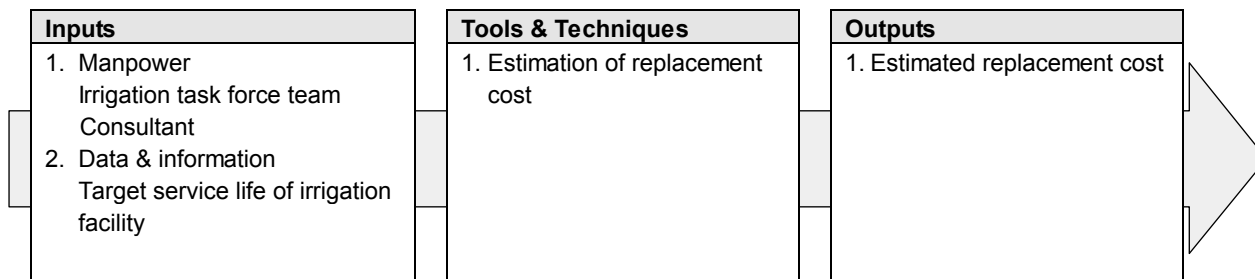
Outputs

1. **Estimated O&M cost**

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 05 Step 05	Estimation of replacement cost
---	---------------------------------------



Criteria, standards and references
A) Past experience of other similar projects

Inputs

- 1. Manpower**
 Irrigation task force team
 Consultant
- 2. Data & information**
 - Target service life of irrigation facility
 Target service life of irrigation facility set up in Stage 04 - Task 01 should be confirmed.

Tools & Techniques

- 1. Estimation of replacement cost**
 Replacement cost of irrigation facility should be estimated based required cost for replacement. Timing of the replacement should be estimated based on the target service life of irrigation facility.
 Sample of service life

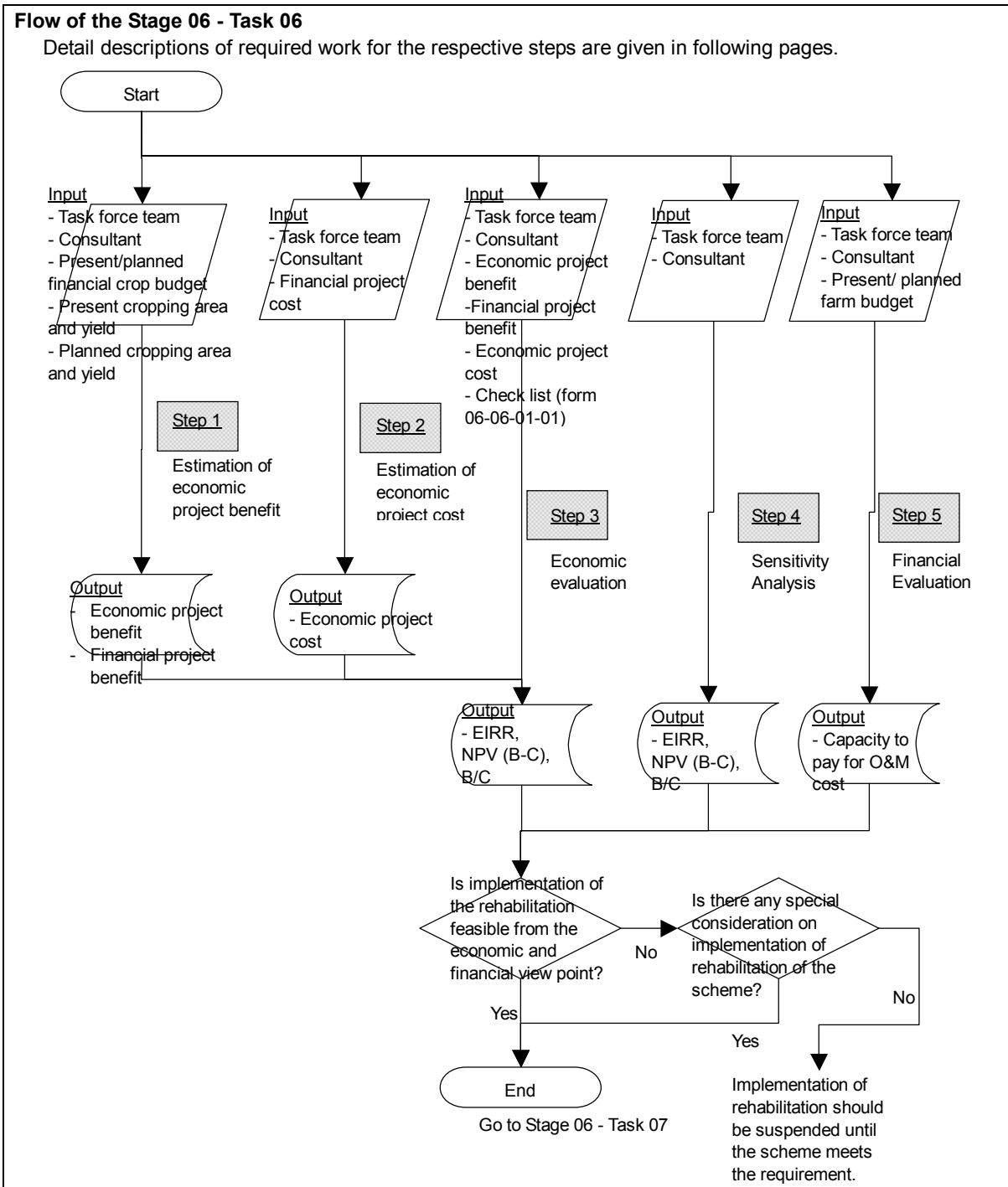
1) Steel gates of water resources facility and canal related structure	30 years
2) Pump	30 years
3) O&M equipment	10 years

Outputs

- 1. Estimated replacement cost**

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

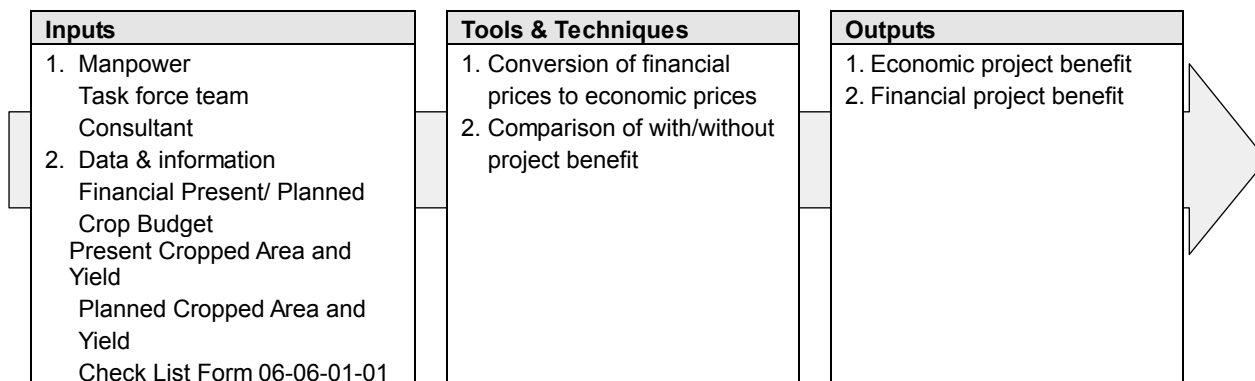
Stage 06	Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program
Task 06	F/S Level Economic and Financial Evaluation
Purpose and scope	
Purpose of the work are to: 1) Estimate F/S level investment return, and 2) Estimate F/S level project benefit from economic and financial view point.	



II. Feasibility Study and
Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 06 Step 01	Estimation of economic project benefit
---	---



Criteria, standards and references

- A) Ministry of Public Works. 1999. *Guidelines for Feasibility Study of Irrigation Development*.
 B) Check List Form 06-06-01-01

Inputs

- 1. Manpower**
 Task force team
 Consultant
- 2. Data & information**
 Financial Present/ Planned Crop Budget
 Present Cropped Area and Yield
 Planned Cropped Area and Yield
 Check List Form 06-06-01-01

Tools & Techniques

- 1. Conversion of financial prices to economic prices**
 For the calculation of economic benefit, financial crop budget is required to be converted to economic crop budget by using of economic prices. Economic prices of trade goods are estimated on the basis of the projected world market prices. Economic prices are calculated by the following items, and sample calculation is attached as Sample 06-06-01-02 and 06-06-01-03.
 - International Commodity Price
 - CIF (Cost Insurance and Freight)
 - Transportation Cost
 - Handling, Storage and Losses
 Economic prices of non-trade goods are valued same as financial prices. On the basis of economic price, economic crop budget is calculated.
- 2. Comparison of with/without project benefit**
 Based on economic crop budget, with/ without project benefits are estimated with the data of present/ planned cropped pattern, area and yield. Economic Project Benefit is calculated as the difference of with project benefit minus without project benefit.

Outputs

- 1. Economic project benefit**
- 2. Financial project benefit**
 Financial project benefit should also be computed. It can be computed without converting financial prices to economic prices.
 The result should be confirmed by using Check List 06-06-01-01

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Form 06-06-01-01(1/2) Check List for Economic Analysis

Stage : Feasibility Study

Prepared by:

Objective Subject: Economic Analysis

Date: / /2003

(1/2)

Item	No.	Subject	Contents of Subject for Check	Reference value and information	Check (mark with √)		
					OK	Not	N.A
D. Economic Evaluation							
D.A Financial Cost							
	DA-1	Cost	Examined the work quantities, unit prices and construction cost whether adequacy and appropriate compared with similar projects?				
	DA-2	Items of cost	Examined and included i) temporary work cost, ii) land acquisition cost, iii) administration cost during implementation?				
	DA-3	Contingency	Examined and confirmed the ratio of i) physical and ii) price contingency?				
	DA-4	Consulting Service Cost	Examined the cost of consulting services?				
D.B Economic Cost							
	DB-1	Economic cost	Deducted i) transfer payments and ii) price contingency?				
	DB-2	Sunk cost	Estimated the appropriate sunk cost and examined it adequacy?				
	DB-3	Trade goods	Converted the trade goods into the economic cost?	CIF Price			
	DB-4	Non-trade goods	Converted the non-trade goods (local currency portion of financial cost) into the economic cost?				
	DB-5	Labor cost	Converted the labor cost into the economic cost?				
	DB-6	Land acquisition cost	Converted the land acquisition cost into the economic cost?				
D.C Annual Investment Cost							
	DC-1	O&M cost	Estimated O&M cost adequacy compare with other similar projects?				
	DC-2	Replacement cost	Estimated replacement cost (gate, equipment, pump) appropriately?				
	DC-3						
D.D Financial Benefit							
	DD-1	Assumption	Examined the assumption of "with project" and "without project" appropriately?				
	DD-2	Calculation	Checked the over estimate and double counting of benefit?				
	DD-3	Production cost	Estimated the production cost appropriately?				
	DD-4	Benefit	Converted the financial benefit into economic benefit?				

Note: N.A ; Not Applicable

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Form 06-06-01-01(2/2) Check List for Economic Analysis

(2/2)

Item	No.	Subject	Contents of Subject for Check	Reference value and information	Check (mark with √)		
					OK	Not	N.A
D.E Economic Evaluation							
	DE-1	Sensitive analysis	Examined the assumption of analysis?				
	DE-2	Price prospect	Considered the i) price prospect, ii) conversion factor, iii) shadow price for the estimate of economic price?				
	DE-3	Authorization	Authorized the value of i) conversion factor and ii) shadow price through discussion with the client?				
D.F Financial Evaluation							
	DF-1	Loan portion	Distinguished the loan portion in the financial cost?				
	DF-2	Loan condition	Referred the rate of interest, grace period etc., of the lending agency?				
	DF-3	Income	Estimated the non-farm income and family expenditure appropriately?				
	DF-4	Farm economic analysis	Examined the assumption of evaluation in "with project" and "without project" for farm economic analysis appropriately?				
D.G Socio-economic Impacts							
	DG-1	Evaluation of impacts	Examined the following impacts properly: 1) contribution to foreign exchange saving, ii) opportunity of employment, iii) environmental, iv) benefit from other sectors, etc.?				

Note: N.A ; Not Applicable

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Sample 06-06-01-02 Sample Calculation of Economic Price

Item	Import Parity			Export Parity		
	Operation	US\$/ton	Rp/kg	Operation	US\$/ton	Rp/kg
Rice						
(1) Thai 5% broken, 2005 (constant 1990 price) *1*3		221.3			221.3	
(2) Adjusted to 2003 constant price	112.44%	248.8		112.44%	248.8	
(3) Quality adjustment	90%	223.9		90%	223.9	
(4) Freight and insurance (Bangkok-Indonesia)	+	40.0				
(5) CIF Indonesia		263.9			223.9	
(6) Conversion to Rupiah *2			2,185			1,854
(7) Losses and port handling	5% +	109		5% -		93
(8) Transportation (port to wholesaler)	+	40		-		40
(9) Ex-wholesaler			2,334			1,721
(10) Handling and transportation (wholesaler to mill)	-	80		-		80
(11) Ex-mill			2,254			1,641
(12) Conversion to paddy	68%	1,533		68%		1,116
(13) By-products (rice bran: 20% of paddy x Rp100/kg)	+	100		+		100
(14) Milling cost	-	100		-		100
(15) Transportation (mill to farm)	-	20		-		20
(16) Economic farm gate price (Rounded)			1,513			1,096
(17) Weighted average economic farm gate price (import 100%, export 0%)			1,510			1,100

*1 Projected price in 2005 at constant 1990 price

Source : World Bank, Global Development Finance 2001.

*2 Exchange Rate as of May, 2003 (US\$1.00=Rp 8,279)

*3 Thai, white, milled, 5% broken, FOB Bangkok.

Sample 06-06-01-03 Sample Calculation of Economic Project Benefit

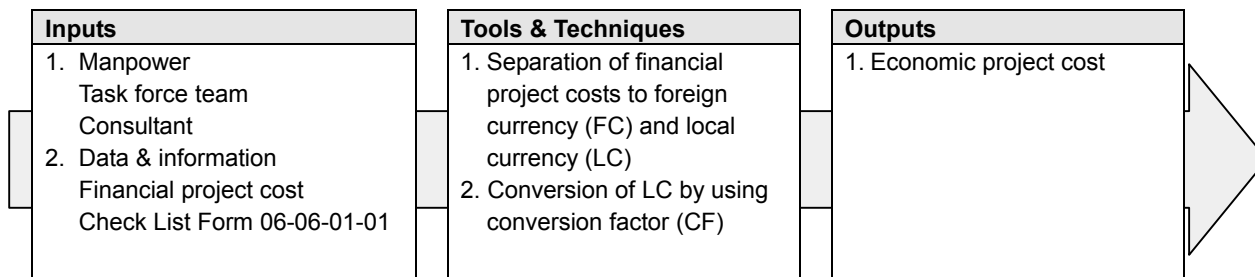
Irrigation Scheme:	<u>6 Pamakulu</u>	District:	<u>Takalar</u>			
Subject Area:	<u>4,480 ha</u>	Province:	<u>South Sulawesi</u>			
1. Without Project Conditions						
Land Use	Area (ha)	Cropping Season/ Crop	Cropped Area (ha)	Yield (t/ha)	Crop Budget (Rp. 000/ha)	NPV ^{*1} (Rp. million)
			(1)		(2)	(3)=(1)*(2)
Irrigated Paddy Field	4,133	Wet Paddy	4,133	4.0	3,550	14,672
		-	-	-	-	0
		Dry I Paddy	1,332	4.0	3,550	4,729
		Maize	223	2.5	1,640	366
		Dry II -	-	-	-	0
		Sub-total				19,766
Rainfed Paddy Field	347	Wet Paddy	347	2.5	1,950	677
		Dry Maize	69	2.5	1,640	113
		Sub-total				790
Upland Field	0	Wet -	-	-	-	0
		Dry -	-	-	-	0
		Sub-total				0
Uncultivated Land	0	-				0
Overall	4,480					20,556
2. With Project Conditions						
Land Use	Area (ha)	Cropping Season/ Crop	Cropped Area (ha)	Yield (t/ha)	Crop Budget (Rp. 000/ha)	NPV ^{*1} (Rp. million)
			(1)		(2)	(3)=(1)*(2)
Irrigated Paddy Field	4,480	Wet Paddy	4,480	5.0	4,690	21,011
		-	-	-	-	0
		Dry I Paddy	3,584	5.0	4,690	16,809
		Maize	448	5.0	3,690	1,653
		Mungbeans	448	1.2	2,280	1,021
		Dry II -	-	-	-	0
		Sub-total				40,495
Un-Irrigable Land	0	-				0
Overall	4,480					40,495
Economic Project Benefit (Rp. million)						19,938

*1: NPV=Net Production Value

II. Feasibility Study and
Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 06 Step 02	Estimation of economic project cost
---	--



Criteria, standards and references

- A) Ministry of Public Works. 1999. *Guidelines for Feasibility Study of Irrigation Development*.
 B) Check List Form 06-06-01-01

Inputs

- 1. Manpower**
 Task force team
 Consultant
- 2. Data & information**
 Financial project cost
 Estimated project cost in Task 04 is financial cost, which is required to be converted to economic price for the economic evaluation.
 Check List Form 06-06-01-01

Tools & Techniques

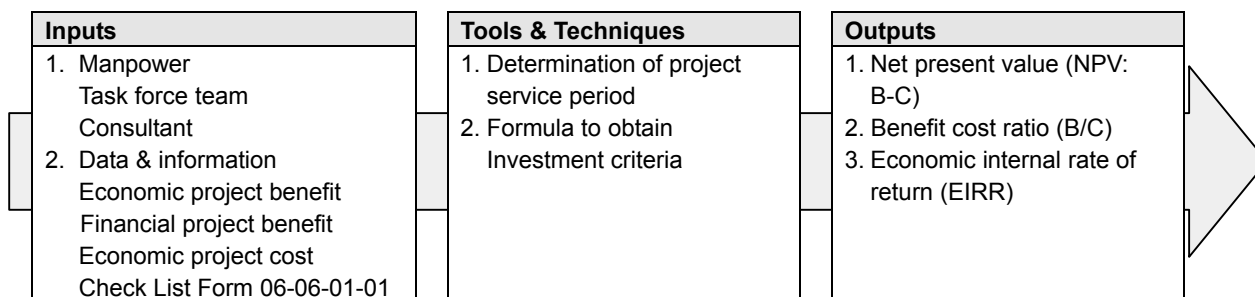
- 1. Separation of financial project cost to foreign currency (FC) and local currency (LC)**
 Financial cost is separated to FC (or trade goods) and LC (or non-trade goods).
- 2. Conversion of LC by using conversion factor (CF)**
 LC is required to be converted to economic value by using of conversion factor (CF). CF is the ratio between economic prices and financial prices, generally CF is estimated smaller than 1. Exactly, CF needs to be estimated by each input (for instance, for construction cost that consists of material, equipment, labor and etc., its CF requires to be estimated from CFs of inputs.). However, in practice, it is reasonable to apply standard conversion factor (SCF) for the conversion. In the JICA Study on Comprehensive Recovery Program of Irrigation Agriculture, 0.90 was applied as the SCF.

Outputs

- 1. Economic project cost**
 The result should be confirmed by using Check List 06-06-01-01.

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 06 Step 03	Economic evaluation
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Criteria, standards and references

- A) Ministry of Public Works. 1999. *Guidelines for Feasibility Study of Irrigation Development*.
 B) Check List Form 06-06-01-01

Inputs

- 1. Manpower**
 Task force team
 Consultant
- 2. Data & information**
 Economic project benefit
 Economic project cost
 Check List Form 06-06-01-01

Tools & Techniques

- 1. Determination of project service period**
 For executing economic evaluation, project service period should be determined as long as the project produces benefit and requires cost.
- 2. Formula to obtain investment criteria**
 Generally, the investment criteria are:
 Economic project benefit exceeds economic project cost.
 Investment criteria is the indicator to verify those conditions, generally there are mainly three criteria.
 - 1) NPV (B-C)
 NPV = Overall project benefit for the project service period - Overall project cost (expressed by the present value estimated with a certain discount rate (8 ~ 12 %)).
 NPV is the total net benefit that is estimated at present value, therefore, NPV is the indicator of economic feasibility.
 - 2) B/C
 B/C = Overall project benefit/ Overall project cost
 B/C is the comparison of net present of benefit with net present value of cost.
 - 3) EIRR
 EIRR is the discount rate where present value of the overall project benefit is equal to the overall project cost; NPV (B-C) with this discount rate becomes zero. EIRR is the most popular indicator for the economic evaluation. Generally speaking, 10 ~ 12 % or higher EIRR is the criteria for feasible economic investment for international lending agencies.

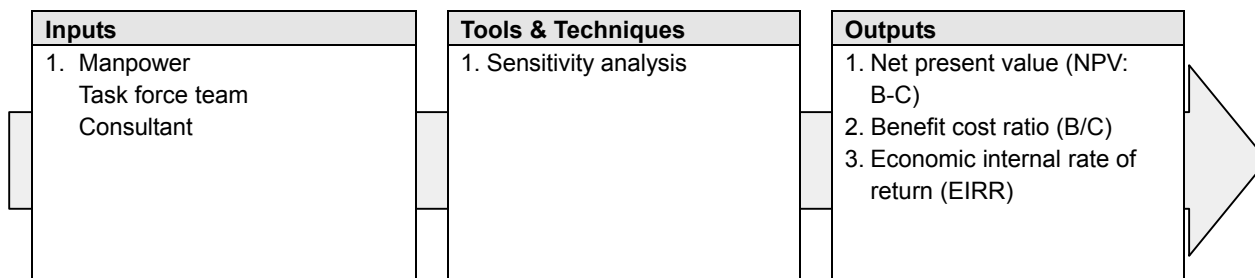
Outputs

- 1. Net present value (NPV: B-C)**
- 2. Benefit cost ratio (B/C)**
- 3. Economic internal rate of return (EIRR)**
 The result should be confirmed by using Check List 06-06-01-01.

II. Feasibility Study and
Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 06 Step 04	Sensitivity analysis
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Criteria and standards
A) Ministry of Public Works. 1999. <i>Guidelines for Feasibility Study of Irrigation Development</i> . B) Check List Form 06-06-01-01

Inputs

1. **Manpower**
 - Task force team
 - Consultant

Tools & Techniques

1. **Sensitivity Analysis**

Basic factors for economic analysis, such as project input and output price, its amount, conversion factor and etc., is estimated on some assumption or uncertainty. Therefore, in economic analysis, it should be analyzed the influence to investment criteria (EIRR, B-C and B/C) when the assumption is altered. This is called sensitivity analysis.

Generally, sensitivity analysis is executed by the alteration of following factors.

- 1) Decrease of planned crop yields
- 2) Decrease of commodity price
- 3) Increase of project cost
- 4) Extension of project term

Which factor is applied for analysis depends on the possibility of the alteration of each factor. For example of 1) Decrease of planned crop yields, investment criteria is calculated on the basis of the assumed benefit when planned crop yields decrease 5% or 10%. Sample calculation is attached (Sample 06-06-04-01).

Outputs

1. **Net present value (NPV: B-C)**
2. **Benefit cost ratio (B/C)**
3. **Economic internal rate of return (EIRR)**

Sample 06-06-04-01 Sample Calculation of Sensitivity Analysis

		Planned Crop Yield (ha)		
		Original	Case 1	Case 2
Wet	Paddy	5.0	5.0	4.5
	-	-	-	-
Dry I	Paddy	5.0	4.5	4.5
	Maize	5.0	5.0	5.0
Dry II	Mungbeans	1.2	1.2	1.2
	-	-	-	-
EIRR		13.7%	12.4%	10.6%

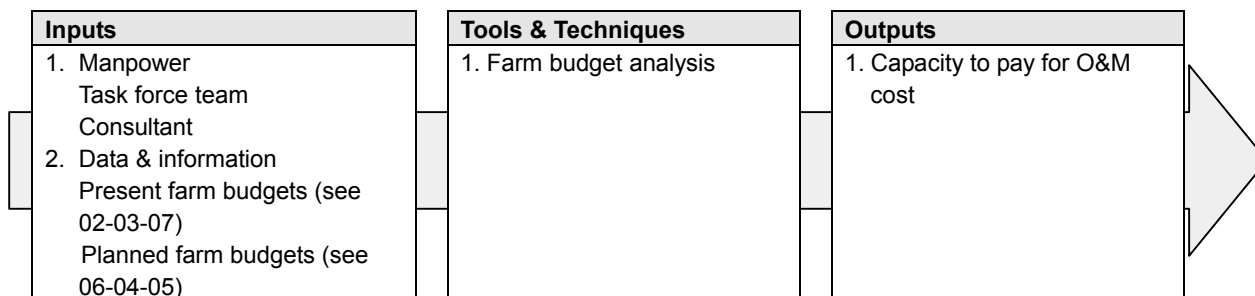
Case 1: Planned paddy yield of Dry I season decreases 10%.

Case 2: Planned paddy yields of Wet and Dry I season decrease 10%.

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 06 Step 05	Financial evaluation
---------------------------------------	-----------------------------



Criteria and standards
A) Check List Form 06-06-01-01

Inputs

- 1. Manpower**
 Task force team
 Consultant
- 2. Data & information**
 Present farm budgets (see 02-03-07)
 Planned farm budgets (see 06-04-05)

Tools & Techniques

- 1. Farm budget analysis**
 Farm budget analysis enables the direct impact on the farm economy by the project to be evaluated. Farm budget analysis is made by the comparison of net reserve of model farms between planned farm budgets (see 02-03-07) and present farm budgets (see 06-04-05).
 Based on the farm budget analysis, it is estimated whether incremental net reserve has capacity to pay for O&M cost or not. Sample calculation is attached (sample 06-06-05-01).

Outputs

- 1. Capacity to pay for O&M cost**

Sample 06-06-05-01 Sample Calculation of Capacity to pay for
O&M cost

(Unit: Rp. 000/year)

	Farm Households in Irrigated Areas		Farm Households in Rainfed Paddy Areas	
	Present	With Project	Present	With Project
1 Family Annual Income	7,300	9,825	4,100	9,750
- Farm Income	6,200	9,000	2,600	9,000
- Non-farm Income ^{*1}	1,100	825	1,500	750
2 Family Annual Expenditures ^{*2}	5,600	7,000	3,600	7,200
3 Net Reserve	1,700	2,825	500	2,550
4 O&M Cost ^{*3}		300		300

*1: With project condition is 75% of present in irrigated area, 50% in rainfed area.

*2: With project condition is 125% of present in irrigated area, 200% in rainfed area.

*3: Rp300,000/ha/year x 1.0ha(holding size) = Rp300,000

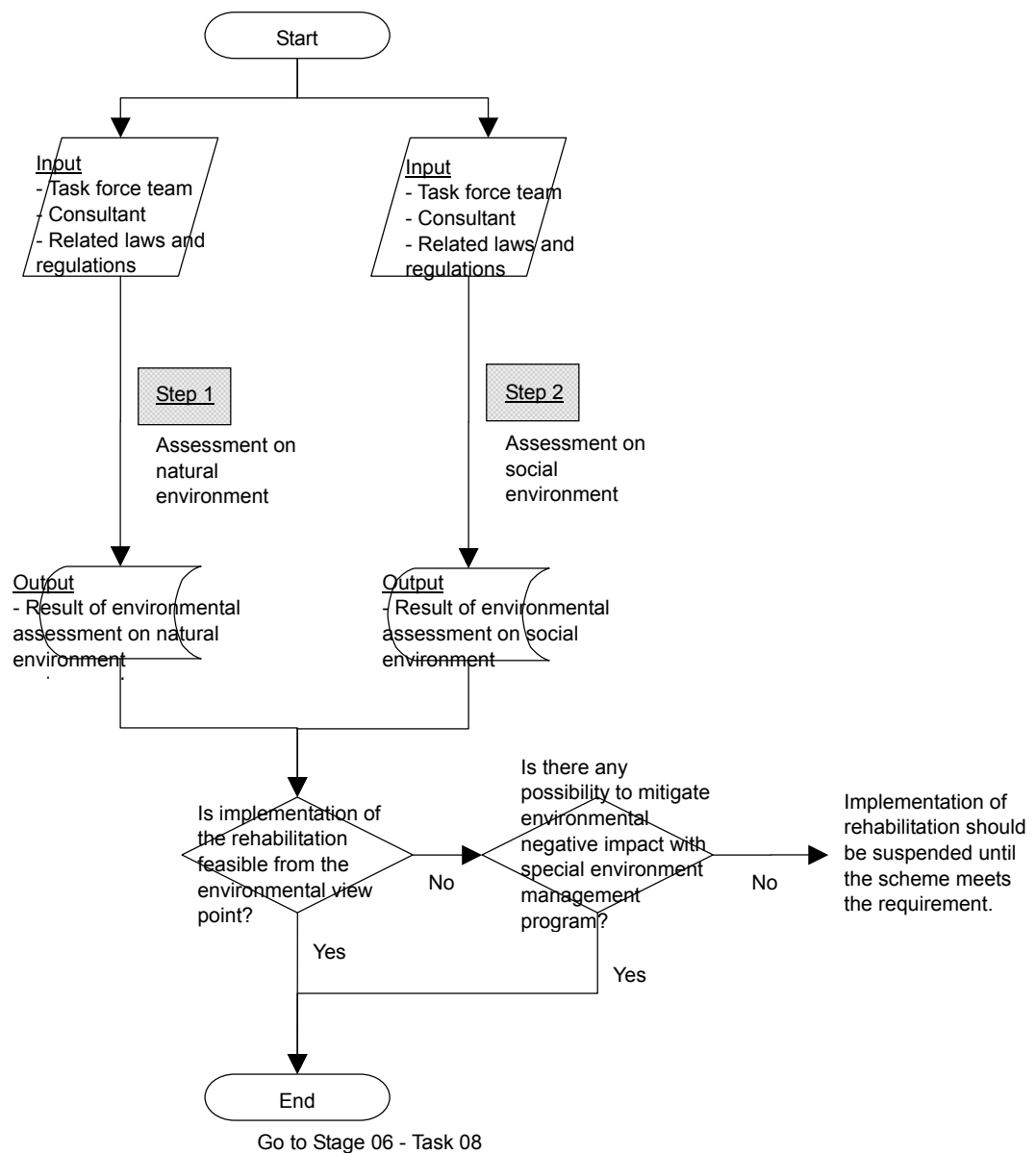
II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

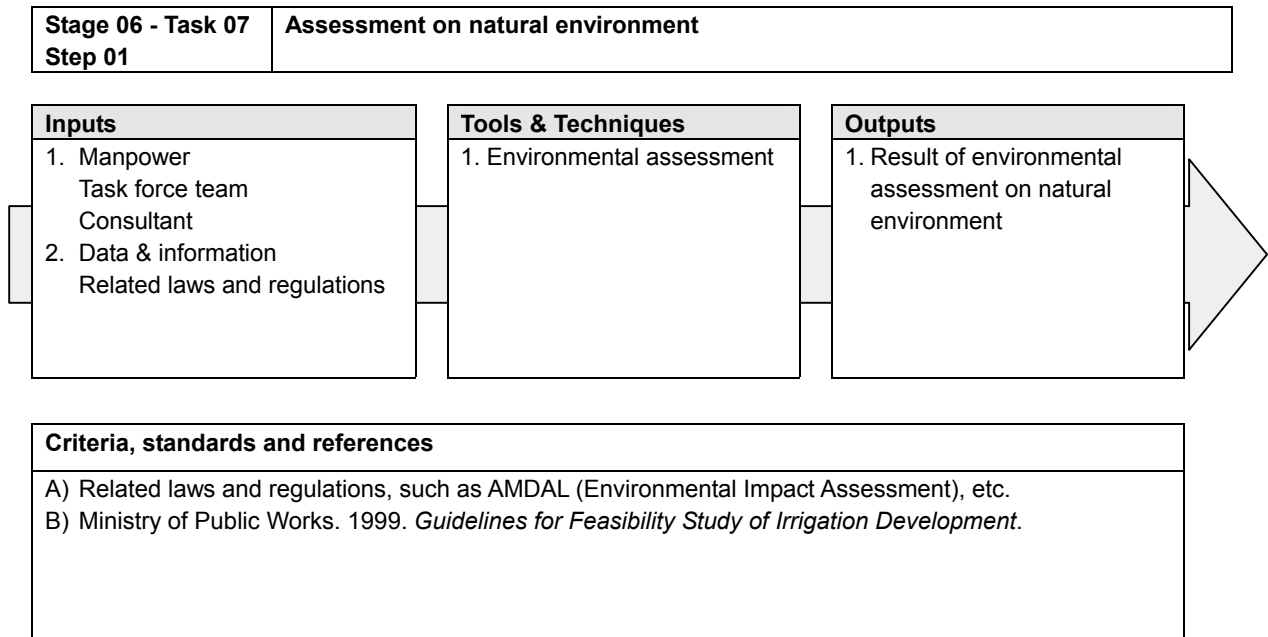
Stage 06	Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program
Task 07	Environmental Assessment
Purpose and scope	
Scope of the work are to: 1) Assess negative impact of the project to natural environment; and 2) Assess negative impact of the project to social environment.	

Flow of the Stage 06 - Task 07

Detail descriptions of required work for the respective steps are given in following pages.



Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program



Inputs

- 1. Manpower**
 - Task force team
 - Consultant
- 2. Data & information**
 - Related laws and regulations

Tools & Techniques

- 1. Environmental assessment**
 - Environmental assessment on natural environment should be carried out in accordance with related laws and regulations, such as AMDAL (Environmental Impact Assessment).
 - Negative impact on natural environment should be carefully studied, if any.

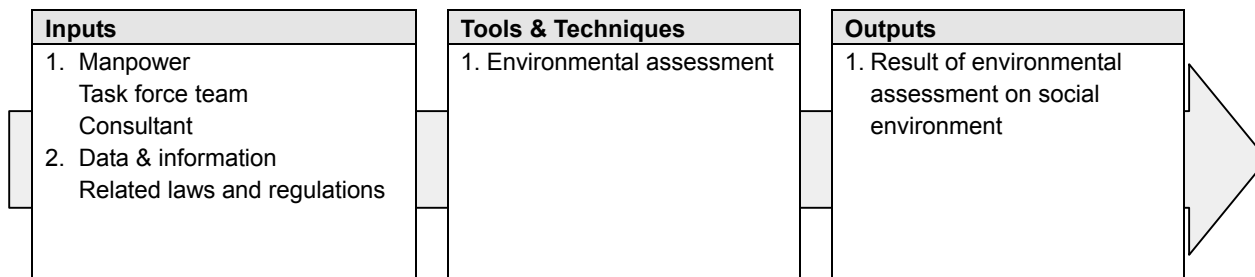
Outputs

- 1. Result of environmental assessment**

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 07 Step 02	Assessment on social environment
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Criteria, standards and references
A) Related laws and regulations (AMDAL, etc.) B) Ministry of Public Works. 1999. <i>Guidelines for Feasibility Study of Irrigation Development.</i>

Inputs

- 1. Manpower**
 Task force team
 Consultant
- 2. Data & information**
 Related laws and regulations

Tools & Techniques

- 1. Environmental assessment**
 Environmental assessment on social environment should be carried out in accordance with related laws and regulations, such as AMDAL.
 Negative impact on society (social conflict, etc.) should be carefully studied, if any.

Outputs

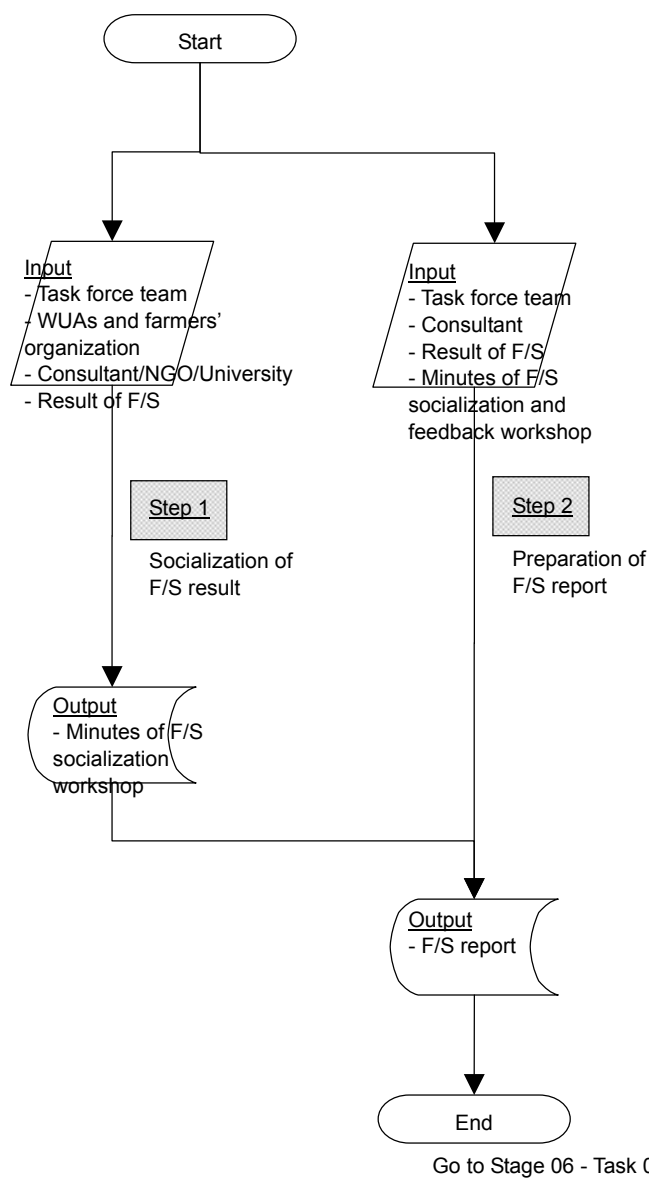
- 1. Result of environmental assessment**

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06	Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program
Task 08	Socialization of F/S Result and Preparation of F/S Report
Purpose and scope	
Scope of the work are to: 1) Socialize the result of F/S with all the stakeholders; and 2) Prepare F/S report.	

Flow of the Stage 06 - Task 08

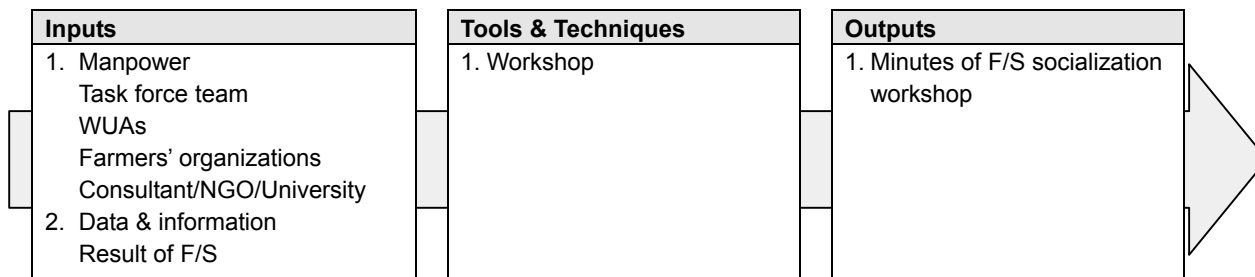
Detail descriptions of required work for the respective steps are given in following pages.



II. Feasibility Study and
Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 08 Step 01	Socialization of F/S result
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Criteria, standards and references
None

Inputs

- 1. Manpower**
 - Task force team
 - WUAs
 - Farmers' organizations
 - Consultant/NGO/University
- 2. Data & information**
 - Result of F/S

Tools & Techniques

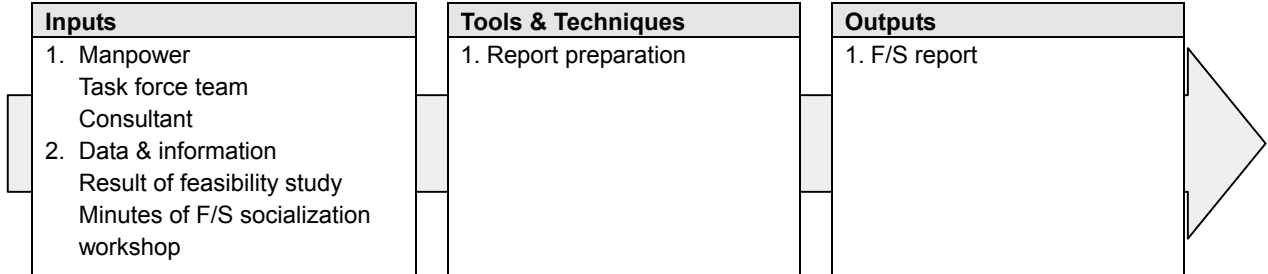
- 1. Workshop**

Outputs

- 1. Minutes of F/S socialization workshop**

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 08 Step 02	Preparation of F/S report
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Criteria, standards and references
None

Inputs

- 1. Manpower**
 - Task force team
 - Consultant
- 2. Data & information**
 - Result of feasibility study
 - Minutes of F/S socialization workshop

Tools & Techniques

- 1. Report preparation**

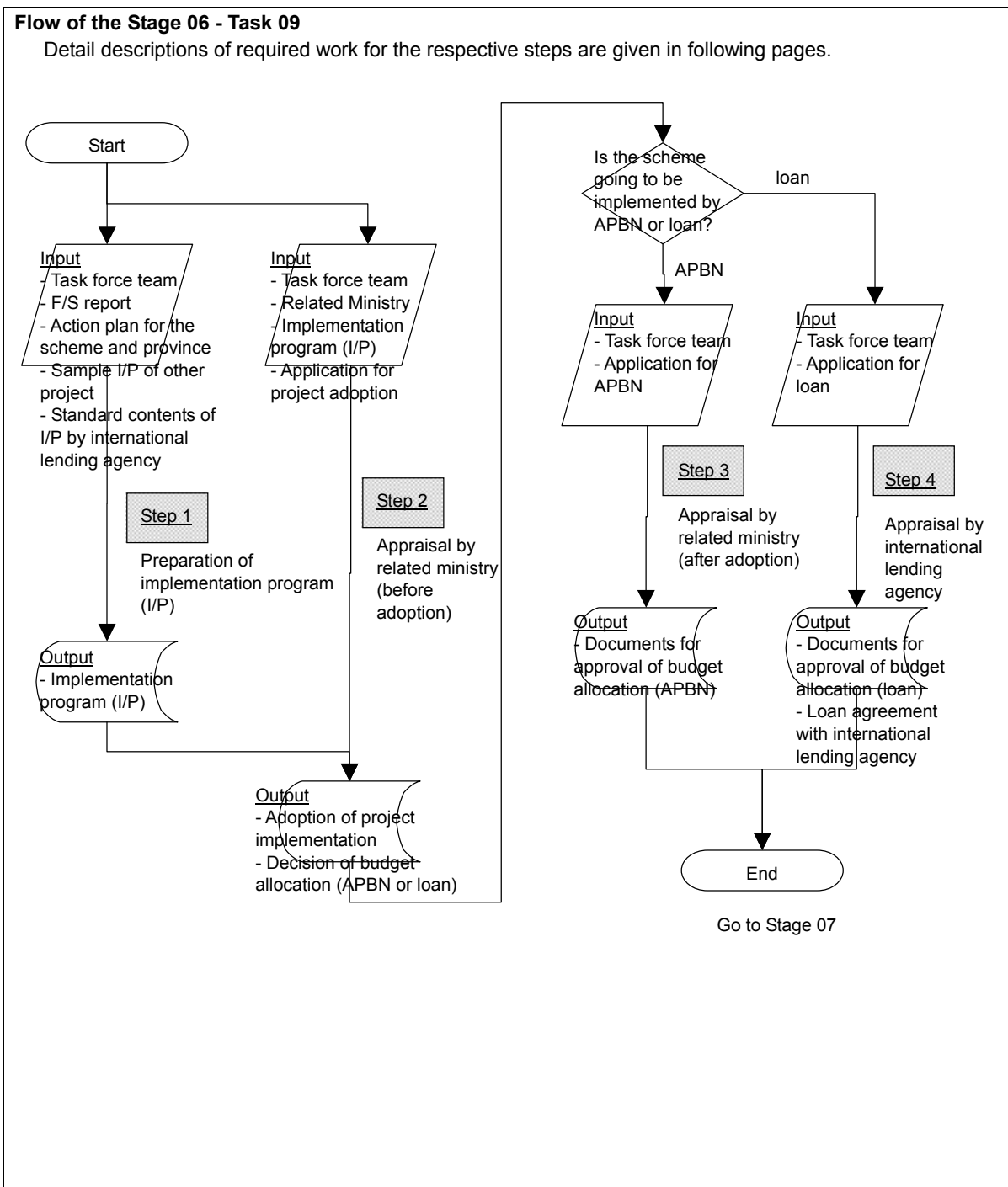
Outputs

- 1. F/S report**

II. Feasibility Study and Preparation of Action Plan

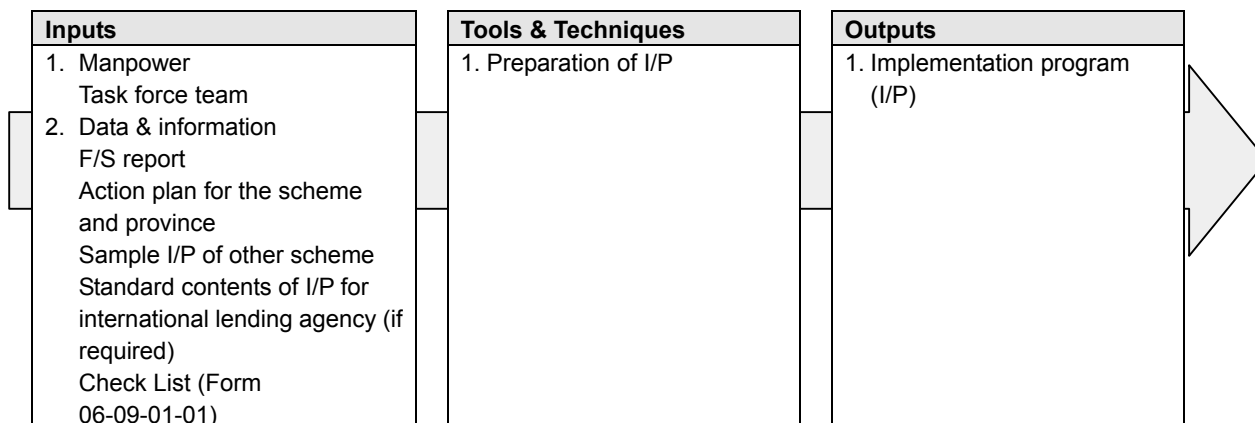
Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06	Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program
Task 09	Preparation of Implementation Program (I/P) and Arrangement of Project Budget
Purpose and scope	
Scope of the Task are to: 1) Prepare implementation program (I/P), and 2) Arrange budget to implement the project.	



Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 09 Step 01	Preparation of implementation program (I/P)
---------------------------------------	--



Criteria and standards

- A) Check List Form 06-09-01-01
B) Loan handbook of international lending agencies (WB, ADB, JBIC, IFAD, etc.)

Inputs

- 1. Manpower**
Task force team
- 2. Data & information**
F/S report
Action plan for scheme and province
Sample I/P of other scheme
Standard contents of I/P for international lending agency (for loan project only)
Check List Form 06-09-01-01

Tools & Techniques

- 1. Preparation of I/P**
Implementation program should be prepared referring sample I/P of other project. If the scheme is going to be implemented by international lending agency, standard contents of I/P for international lending agency should also be referred. Prepared I/P should be confirmed by using Check List 06-09-01-01.
Contents of I/P should be
 - 1) History of the scheme
 - 2) Economy of country and national development plan
 - 3) Needs for the scheme
 - 4) Project plan
 - 5) Project cost and financial plan
 - 6) Project implementation, management and operation plans (program)
 - 7) Financial evaluation
 - 8) Economic evaluation
 - 9) Social evaluation
 - 10) Environmental evaluation
 - 11) Supervision
 - 12) Conclusion

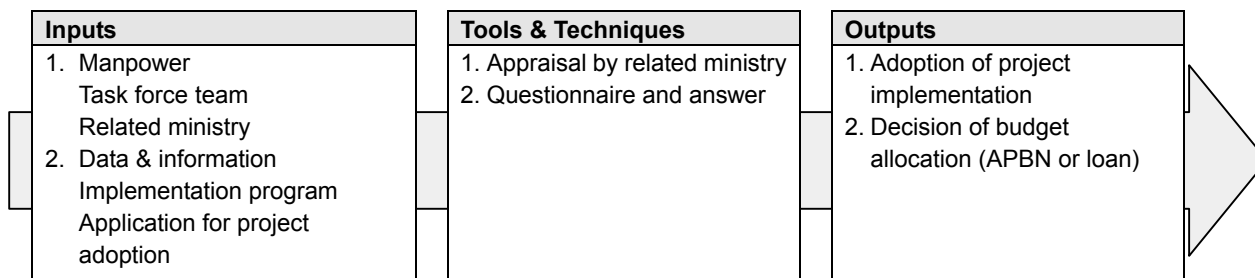
Outputs

- 1. Implementation program (I/P)**

II. Feasibility Study and Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Stage 06 - Task 09 Step 02	Appraisal by related ministry (before adoption)
---------------------------------------	--



Criteria and standards
A) Loan handbook of international lending agency (WB, ADB, JBIC, IFAD, etc.) B) Related laws and regulations in Indonesia

Inputs

- 1. Manpower**
 Task force team
 Related ministry
- 2. Data & information**
 Implementation program (I/P)
 Application for project adoption

Tools & Techniques

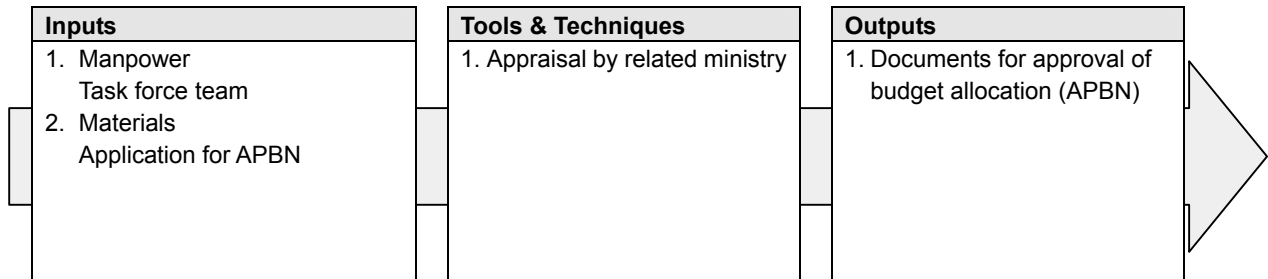
- 1. Appraisal by related ministry**
 Appraisal by related ministries (BAPPENAS) and agencies should be made.
- 2. Questionnaire and answer**
 Evaluation of answer replied to questionnaire issued by related ministries and agencies.

Outputs

- 1. Adoption of project implementation**
- 2. Decision of budget allocation, APBN or loan**

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 09 Step 03	Appraisal by related ministry (after adoption)
---------------------------------------	---



Criteria and standards
A) Criteria of MOSRI

Inputs

1. **Manpower**
 Task force team
2. **Data & information**
 Application for APBN

Tools & Techniques

1. **Appraisal by related ministry**
 Appraisal by related ministries (APBN) and agencies should be made.

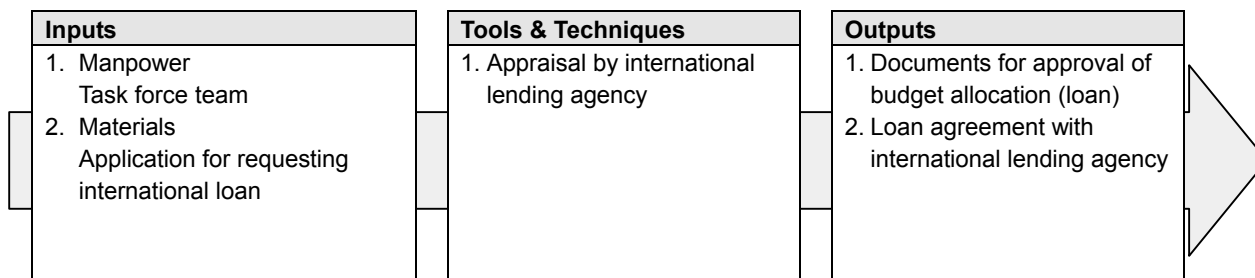
Outputs

1. **Documents for approval for budget allocation (APBN)**

II. Feasibility Study and
Preparation of Action Plan

Stage 06. Formulation of F/S Level Rehabilitation Plan
and Preparation of Implementation Program

Stage 06 - Task 09 Step 04	Appraisal by international lending agency
---------------------------------------	--



Criteria and standards
A) Loan handbook of international lending agencies (WB, ADB, JBIC, IFAD, etc.)

Inputs

1. **Manpower**
 Task force team
2. **Data & information**
 Application for requesting international loan

Tools & Techniques

1. **Appraisal by international lending agency**
 Appraisal by international lending agency should be made.

Outputs

1. **Documents for approval of budget allocation (loan)**
2. **Loan agreement with international lending agency**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 06. Formulation of F/S Level Rehabilitation Plan and Preparation of Implementation Program

Form 06-09-01-01 Check List for Preparation of Implementation Program

Stage : Feasibility Study Prepared by:
Objective Subject: Implementation Program Date: / /2003

(1/1)

Item	No.	Subject	Contents of Subject for Check	Reference value and information	Check (mark with √)		
					OK	Not	N.A
C. Implementation Program							
CA Preparation of IP							
	CA-1	Implementation Program	Followed the contents and requirements of international lending agency?	Loan Handbook of JBIC, World Bank, Asian Development			
	CA-2	Ratio of F/C and L/C	Examined the Loan Agreement and the regulation of borrower country?				
	CA-3	Required Period	Examined and applied the required periods for detailed design and construction for preparation of IP?				
	CA-4	Capacity of Local Consultants	Examined the capacity of local consultants and applied for time factor of DD and SV in case the local consultants are employed?				
C.B Construction Plan							
	CB-1	Local conditions	Examined and prepared the construction plan and time schedule taking into account of: i) scale of project, ii) meteorology, iii) site access, iv) religion, etc. ?	Labor low, national holiday			
	CB-2	Time schedule	Examined and determined the time schedule due consideration of meteorology condition?				
	CB-3	Environmental matter	Examined and applied to the countermeasures for the negative impacts due to construction of the project?	Water quality, exhaust gas, industrial solid waste			
	CB-4	Compensation of crops	Confirmed the matter of crop compensation during construction period with the client?				
C.C Organization and Management							
	CC-1	Organization	Established and cleared the responsibility of the government agency for the Project Implementation?				
	CC-2	Stake holders	Confirmed the stake holders for the implementation of the project?				
	CC-3	Land acquisition of right of way	Confirmed the completion of land acquisition and right of way matter before commencement of construction?				

III. Implementation

Instruction

Actual rehabilitation works should be started if it is confirmed that the scheme is feasible by feasibility study.

III. Implementation and Commencement of Operation

Stage 07 **Implementation and Commencement of Operation**

Instruction

Actual rehabilitation works should be started if it is confirmed that the scheme is feasible by feasibility study.

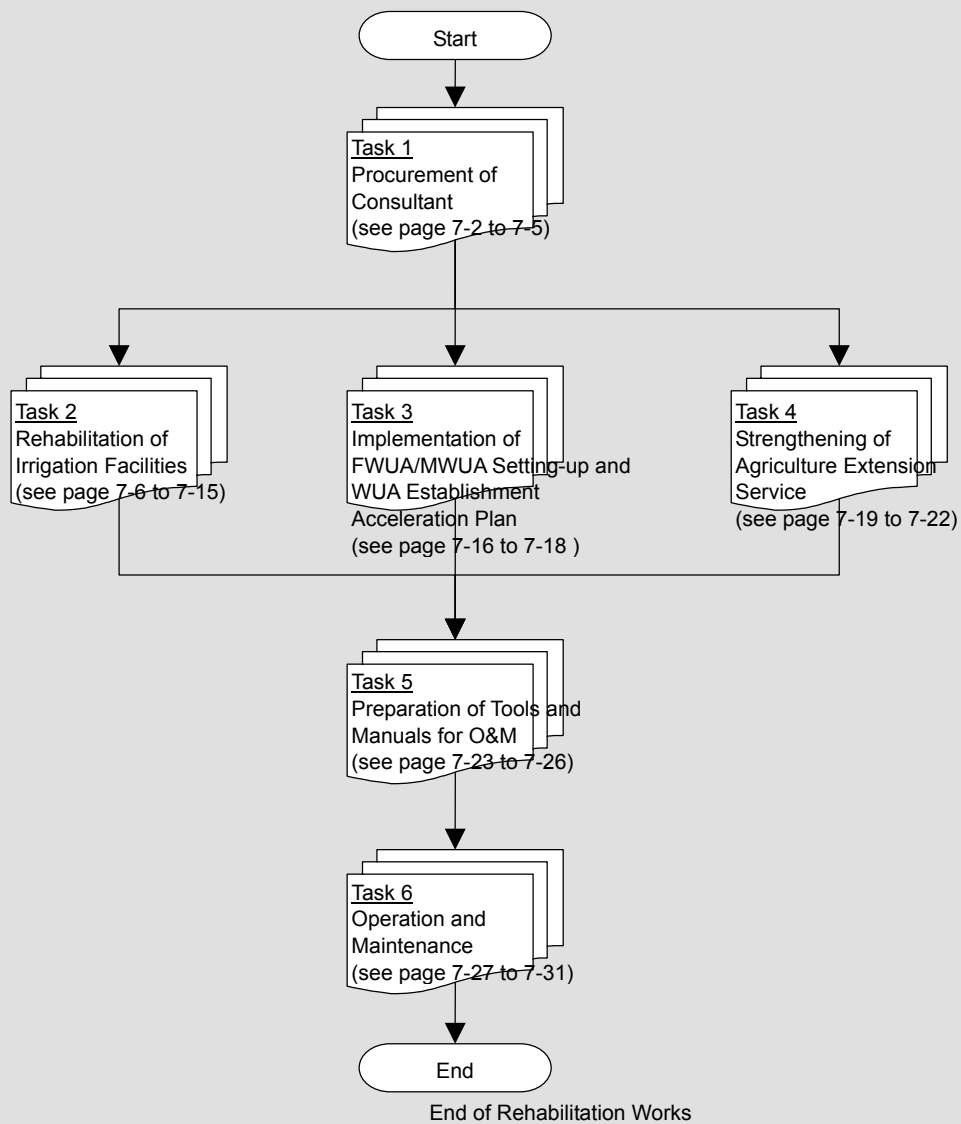
Stage 07 Implementation and Commencement of Operation

Purpose and scope

Purpose of the work are to:

- 1) Employ consultant for assist and advise government agency;
- 2) Prepare detailed design and rehabilitation of irrigation facilities;
- 3) Execute training to WUAs for strengthening;
- 4) Strengthen agriculture extension services; and
- 5) Prepare tools and manuals for operation and maintenance of facilities, institutions, and agriculture.

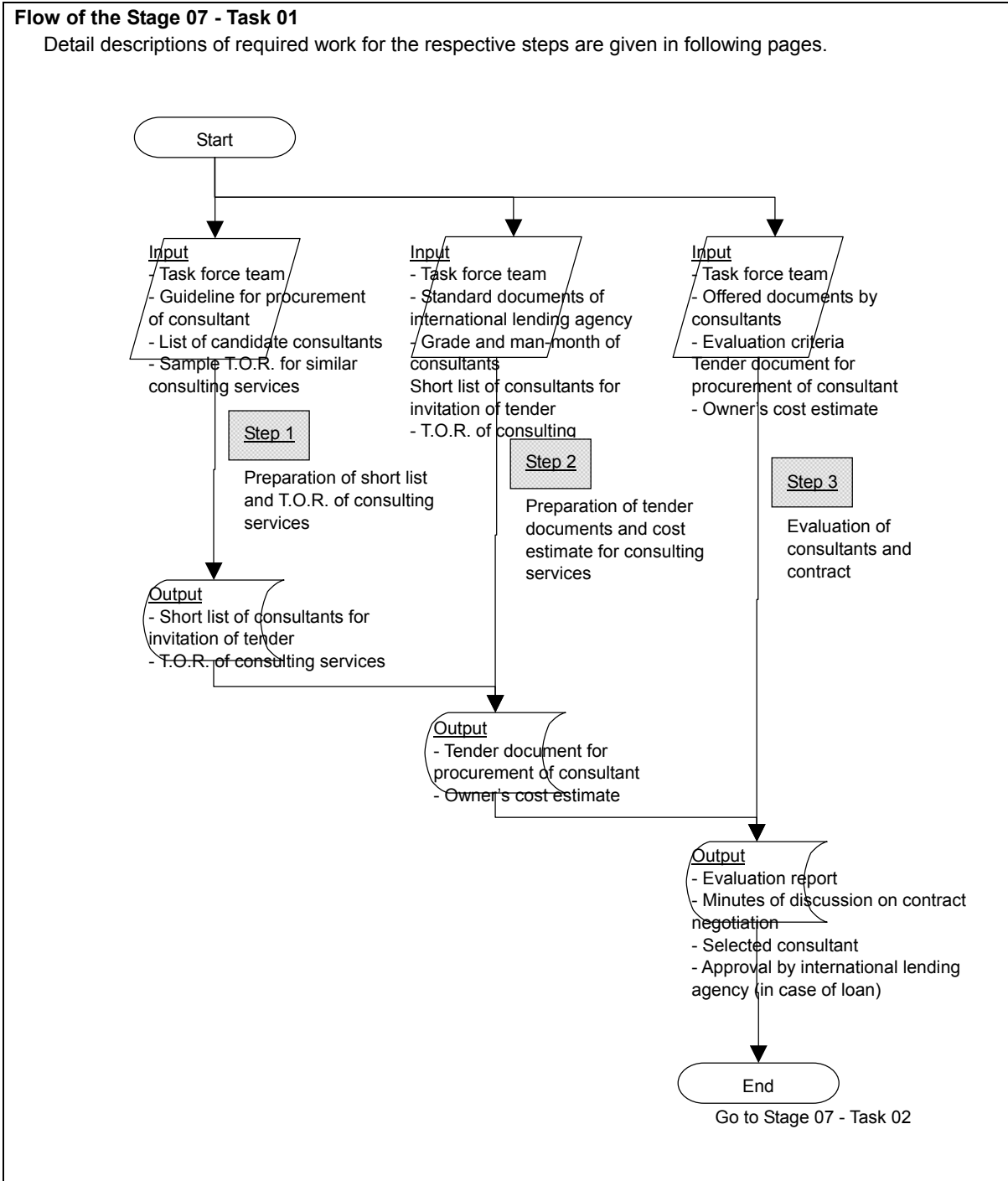
Flow of the Stage 07



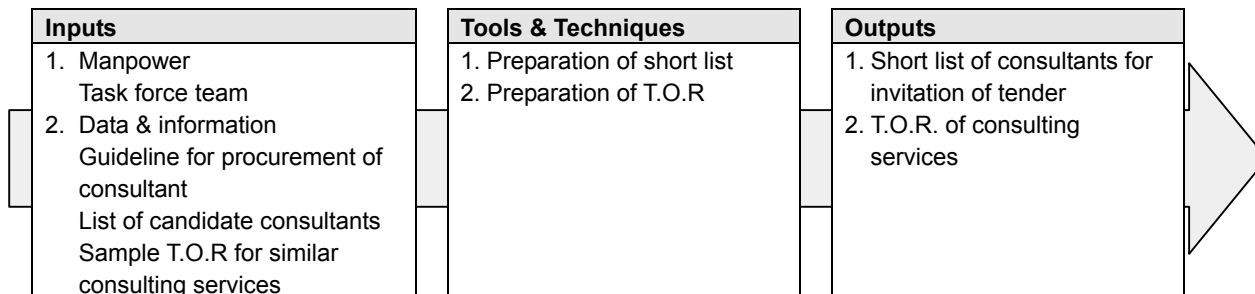
III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07	Implementation
Task 01	Procurement of Consultant
Purpose and scope	
Scope of the Task are to: 1) Prepare a short list of consultants; 2) Prepare a terms of reference of the consulting services; and 3) Select and employ a consultant to assist and advise government agency through tender or direct appointment.	



Stage 07 - Task 01 Step 01	Preparation of short list and T.O.R of consulting services
---------------------------------------	---



Criteria, standards and references
A) Procurement guideline for consultant

Inputs

- 1. Manpower**
Task force team
- 2. Data & information**
 - Guideline of procurement of consultant
 - List of candidate consultant
 - Sample terms of reference (T.O.R.) for similar consulting services

Tools & Techniques

- 1. Preparation of short list**
Select 3 consulting farms at least.
- 2. Preparation of T.O.R.**
T.O.R of consulting services should be prepared according to the procurement guideline of consultant.

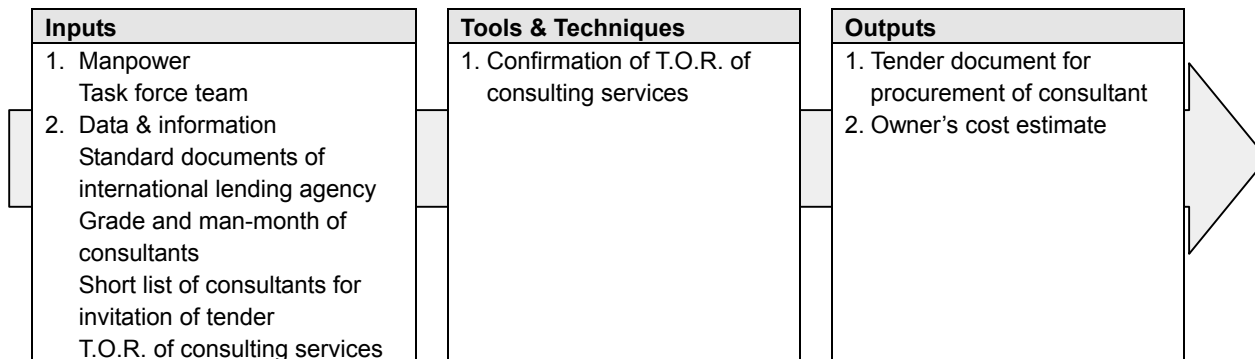
Outputs

- 1. Short list of consultants for invitation of tender**
- 2. T.O.R. of consulting services**

III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07 - Task 01 Step 02	Preparation of tender documents and cost estimate for consulting services
---------------------------------------	--



Criteria, standards and references
A) Standard documents of international lending agency

Inputs

- 1. Manpower**
Task force team
- 2. Data & information**
 - Standard document of international lending agency
 - Grade and man-months of consultants

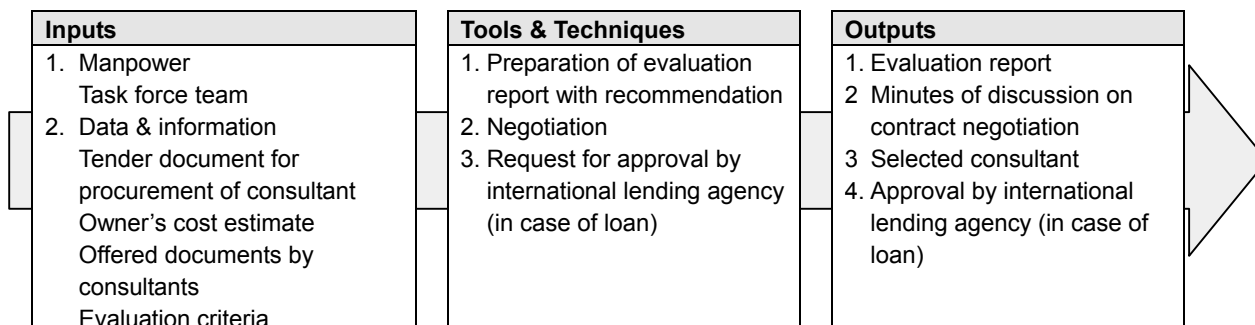
Tools & Techniques

- 1. Confirmation of T.O.R. of consulting services**
Grade and man-month of consultants should be determined based on the prepared T.O.R. of consulting services. After determination of grade and man-month of consultants, cost for consulting services should be estimated and tender document for procurement of consulting services should be prepared.

Outputs

- 1. Tender document for procurement of consultant**
- 2. Owner's cost estimate**

Stage 07 - Task 01 Step 03	Evaluation of consultants and contract
---------------------------------------	---



Criteria, standards and references
A) Evaluation criteria of international lending agency

Inputs

1. **Manpower**
 Task force team
2. **Data & information**
 - Offered documents by consultants
 - Evaluation criteria

Tools & Techniques

1. **Preparation of evaluation report with recommendation**
 Evaluation report on consultant selection should be prepared.
2. **Negotiation**
 Negotiation with candidate consultant firm should be made.
3. **Request for approval by international lending agency (in case of loan)**
 Evaluation report and result of negotiation should be reported to international lending agency to get approval.

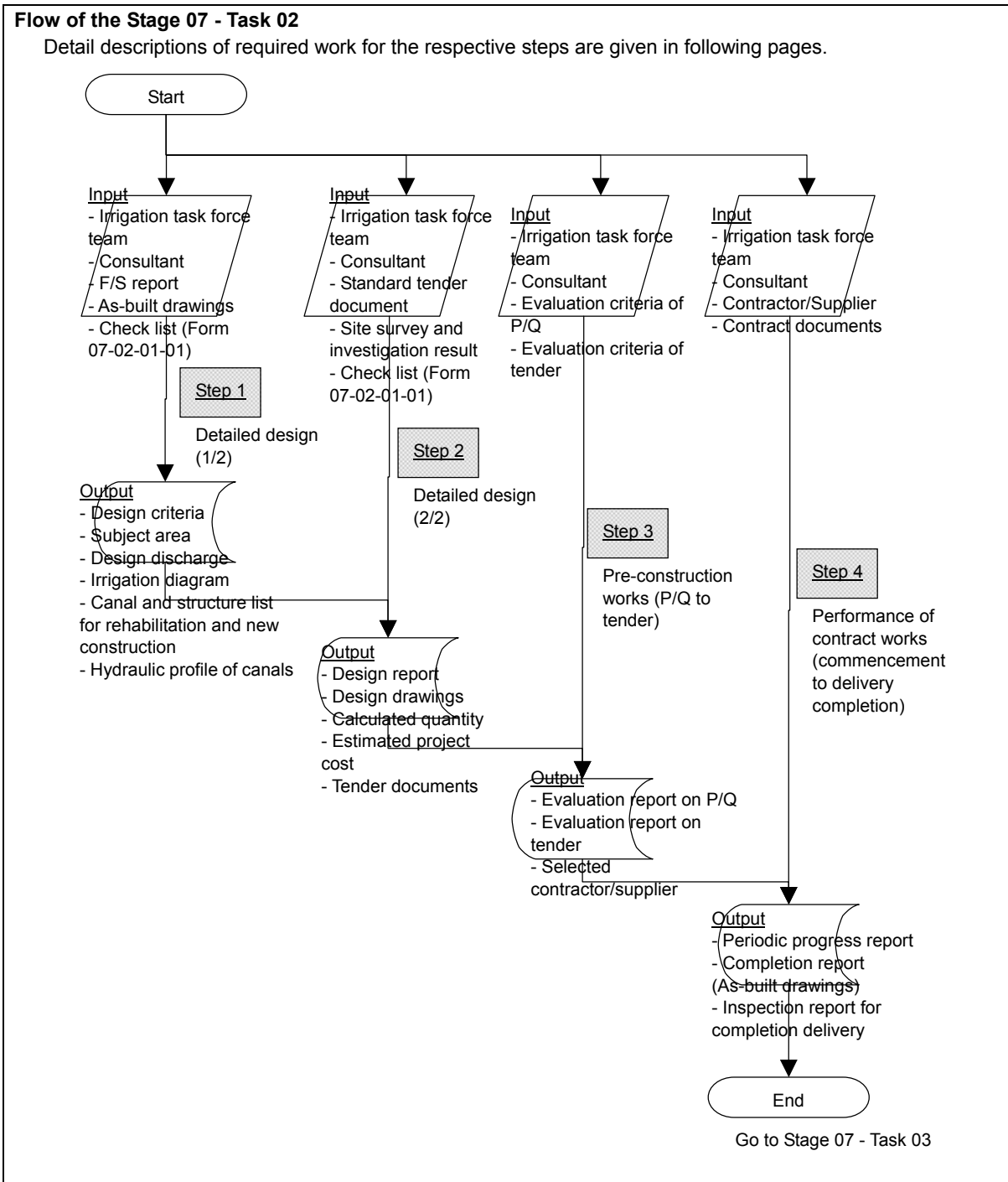
Outputs

1. **Evaluation report**
2. **Minutes of discussion on contract negotiation**
3. **Selected consultant**
4. **Approval by international lending agency**

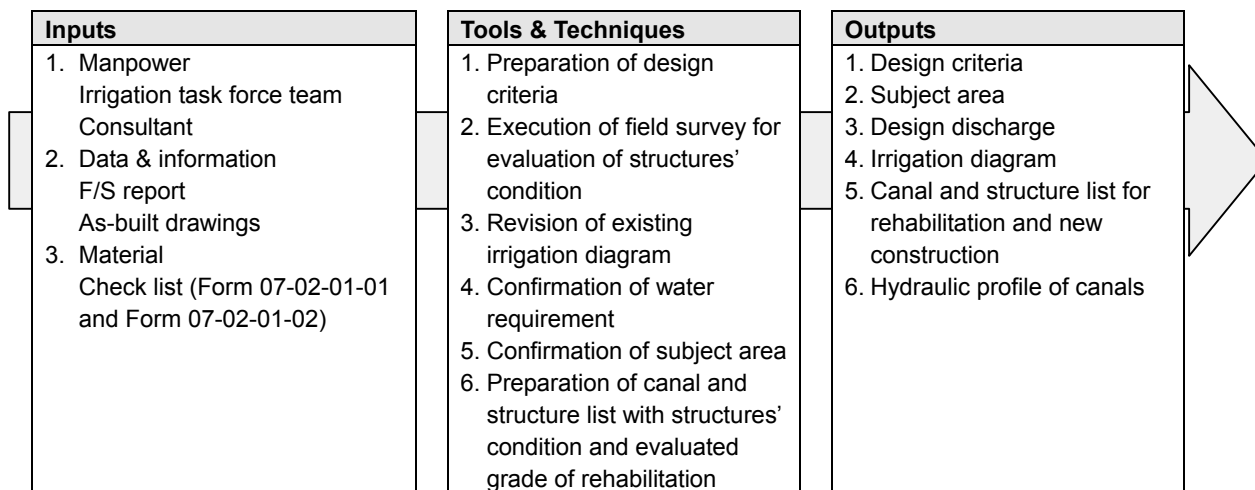
III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07	Implementation and Commencement of Operation
Task 02	Rehabilitation of Irrigation Facilities
Purpose and scope	
Scope of the Task are to: 1) Prepare detailed design for rehabilitation of irrigation scheme; 2) Execute pre-construction works (P/Q to tender); and 3) Perform contract works (commencement to delivery).	



Stage 07 - Task 02 Step 01	Detailed design (1/2)
---------------------------------------	------------------------------



Criteria, standards and references

- A) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria.*
- B) Evaluation criteria for rehabilitation works
- C) Check list Form 07-02-01-01 and Form 07-02-01-02

Inputs

- 1. Manpower**
Irrigation task force team
Consultant
- 2. Data & information**
F/S report
As-built drawings
- 3. Material**
Check list Form 07-02-01-01 and Form 07-02-01-02

Tools & Techniques

- 1. Preparation of design criteria**
- 2. Execution of field survey for evaluation of structures' condition**
- 3. Revision of existing irrigation diagram**
- 4. Confirmation of water requirement**
- 5. Confirmation of subject area**
- 6. Preparation of canal and structure list with structures' condition and evaluated grade of rehabilitation**
Output of the design works should be confirmed by using of design check list attached (Form 07-02-01-01 and Form 07-02-01-02).

Outputs

- 1. Design criteria**
- 2. Subject area**
- 3. Design discharge**
- 4. Irrigation diagram**
- 5. Canal and structure list for rehabilitation and new construction**
- 6. Hydraulic profile of canals**

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 07. Implementation and Commencement of Operation

Form 07-02-01-01(1/2) Check List for Detailed Design of Headworks

Stage : Detailed Design

Prepared by:

Objective Subject: Headworks

Date: / /2003

(1/2)

Item	No.	Subject	Contents of Subject for Check	Reference value and information	Check (mark with √)		
					OK	Not	N.A
A. Headworks							
AA General							
	AA-1	Design criteria	Taken authorization from the Client?	KP, Kimpraswil (1986)			
	AA-2	River bed variation	Examined and analyzed the riverbed variation after construction?				
	AA-3	Free board of flood dike	Taken enough free board against design flood for upstream of headworks?				
	AA-4	Hydraulic model test	Examined the necessity of hydraulic model test?				
	AA-5	Blockage of intake by sand during flood	Examined and taken necessary measures for design?				
A.B Intake							
	AB-1	Base level of intake gate	Examined the height between river bed and intake base level approximately 40 % of intake water depth?				
	AB-2	Height clearance between base elevation of scouring sluice and	Kept clearance (deference of height) more than 1 m?				
	AB-3	Intake velocity	Kept velocity more or less 0.6 m/s or lower?	To prevent inflow of bed load into the canal			
A.C Flood and Scouring Sluice							
	AC-1	Length of downstream stilling basin	Taken enough length and examine the downstream river water depth for the design?				
	AC-2	Condition of flow during scouring through scouring sluice	Examined the flow range in supercritical flow?	Froude's number>1			
	AC-3	Blockouts of pier	Kept enough effective thickness of pier considering size of blockouts?				
	AC-4	Stability analysis of weir	Applied design calculations for designated loading condition in the criteria?				
	AC-5	Measures for logs and floating debris	Examined and provided necessary facility in case logs and floating debris were considered?				
A.D River Protection							
	AD-1	Length of downstream protection	Examined the condition of flow against design flow and determined the material and length of protection works at downstream of stilling basin?				
	AD-2	Safety against various discharge	Examined and confirmed the safety against discharge below design value?				

Note: N.A ; Not Applicable

I. Pre-feasibility Study for Prioritization
of Irrigation Schemes

Stage 07. Implementation and
Commencement of Operation

FORM 07-02-01-01(2/2) CHECK LIST: Detailed Design of Headworks

(2/2)

Item	No.	Subject	Contents of Subject for Check	Reference value and information	Check (mark with \checkmark)		
					OK	Not	N.A
A.E Foundation							
	AE-1	Design value of internal friction angle	Examined the value of internal friction angle got by N-value, max. degree should be less than 35°?				
	AE-2	Steel sheet pile for cut-off	Examined the geology layer of foundation, whether driving of sheet pile is possible or not?				
	AE-3	Allowable bearing capacity of foundation	Examined the design value of bearing capacity and cross check with similar foundation material?				
	AE-4	Coefficient of friction (f) between concrete and foundation in case direct foundation	Examined the value of internal friction angle with $f=(0.5-0.66)\text{Tangent } \Phi$				
	AE-5	Corrosion allowance of steel pile	Considered corrosion allowance for thickness of pile?				
A.F Settling Basin and Fish Ladder							
	AF-1	Design particle size of sand	Confirmed the size of particle for the design?	KP: 0.076 mm, Japan: 0.25-0.3 mm			
	AF-2	Flushing method	Examined the flushing method whether natural or artificial flushing method taking into account of the site condition, operation and maintenance condition, etc.?				
	AF-3	Artificial flushing method	Examined enough space for equipment operation?	Mini. 10 m wide space at both sides			
	AF-4	Kind of fishes	Invested kind of fishes and applied to the design of fish ladder?				
A.G Operation Facility							
	AG-1	Design load of operation /inspection	Applied appropriate design load and effective wide?	T-20 or T-14			
	AG-2	Clearance of free board	Kept appropriate clearance under the bridge beam?				
	AG-3	Operation and maintenance method	Discussed and applied to the design through the discussion with Client?				
	AG-4	Emergency power source	Examined the necessity of provision of emergency power source, in case normal power source is electric?				
A.H Coffering and Dewatering							
	AH-1	Crest height of cofferdam	Kept enough free board to the crest of coffer dam against flood?	To be kept more than 1 m in minimum			
	AH-2	Penetrate depth of sheet pile of coffer dam	Kept enough penetrate depth against boiling phenomena?				

Note: N.A ; Not Applicable

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 07. Implementation and Commencement of Operation

Form 07-02-01-02(1/2) Check List for Detailed Design of Canal

Stage : Detailed Design
Objective Subject: Canal

Prepared by:
Date: / /2003

(1/2)

Item	No.	Subject	Contents of Subject for Check	Reference value and information	Check (mark with √)		
					OK	Not	N.A
B. Open Canal and Related Structures							
B.A General							
	BA-1	Design discharge	Examined applying current hydrology data and information?	Comparison with near irrigation scheme			
	BA-2	Alignment	Avoided the route at the soft ground foundation layer?				
	BA-3	Ground water level	Examined the ground water level on the route?				
	BA-4	Foundation treatment at soft ground	Avoided piling method and applied replacement method of foundation?				
B.B Canal Section							
	BB-1	Side slope	Examined and applied appropriate side slope considering property of soil?				
	BB-2	Free board against drainage inflow ?	Examined and confirmed the free board against inflow of drainage discharge during rain?				
B.C Canal Lining							
	BC-1	Necessity of lining	Examined the necessity of lining in case high to medium permeability ground?				
	BC-2	Stability of embankment	Examined the stability under the condition on rapid drawdown of water level at inside of canal?	SF>1.2			
	BC-3	Lining at expanding soil	Examined necessary countermeasures at the expandable soil in case concrete lining?	To avoid soil property classified into CH, OH, MH			
	BC-4	Countermeasures for ground water and uplift	Provided underdrain, weepholes, etc., for reduce of uplift pressure?				
B.D U-type concrete flume canal							
	BD-1	Minimum requirement of reinforcement bars	Provided and kept minimum requirement of re-bars in case small scale U-type canal?	0.1 to 0.15 % against effective sectional area			
	BD-2	Spacing of joints	Provided appropriated joints space for concrete canal?	@ 9-12 m in standard			
B.E Inverted Siphon							
	BE-1	Covering depth above barrel	Kept enough covering depth above barrel?	Normal: 1.2 m, River : 2 m (mini.)			
	BE-2	Air valve and blow-off	Provided air valve and blow-off in case length is more than 100 m ?				
	BE-3	Siphon Seal	Provided appropriated siphon seal at inlet of siphon?	D> 1,000 mm, 40-50 cm, D<1000 mm, 10			
	BE-4	Max. degree at incline	Kept less than 25 degree?				
	BE-5	Decrease of allowable stress of re-bars	Decreased allowable stress according to acting inner pressure?	Rectangular section: Sa= 1600-40H, Circular: Sa= 1300-10H (H: inner pressure (m))			

Note: N.A ; Not Applicable

Form 07-02-01-02(2/2) Check List for Detailed Design of Canal

(2/2)

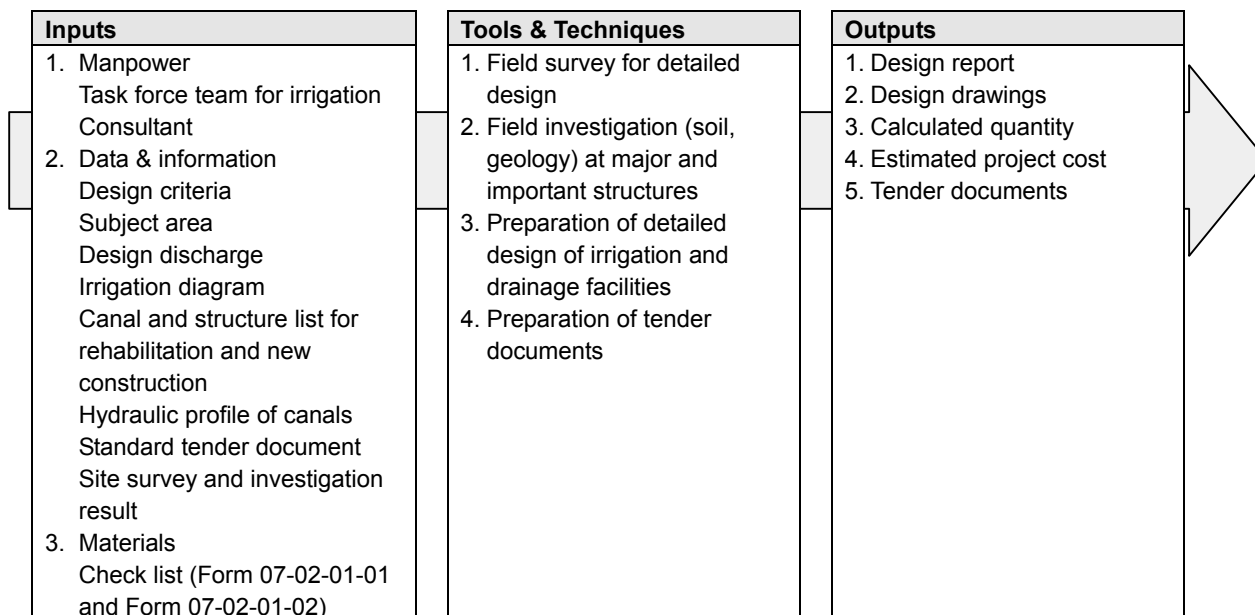
Item	No.	Subject	Contents of Subject for Check	Reference value and information	Check (mark with √)		
					OK	Not	N.A
B.F Aqueduct							
	BF-1	Comparison with siphon	Examined the cost comparison between siphon?	Normally, siphon is lower cost than aqueduct.			
	BF-2	Clearance of height	Checked and enough clearance between lower level of aqueduct and river, railway, road?	River: 1.5 m, Road: 4.5 m			
	BF-3	Necessity of walk way	Examined the necessity of walk way for inspection purpose?				
	BF-4	Design road	Applied wind load for the design of superstructure?				
	BF-5	Joint	Provided expansion joints between barrel and transition?				
	BF-6	Measures for scouring	Provided protection work for pier and abutments for scouring?				
B.G Diversion Structure							
	BG-1	Measuring device	Provided measuring devices?				
	BG-2	Clearance of gate and water surface	Kept appropriate clearance when gate is fully opened?				
	BG-3	Operation and maintenance method	Discussed and applied to the design through the discussion with Client?				
B.H Drop and Chute							
	BH-1	Length of protection	Kept enough length of protection at downstream of structure to avoid scouring of canal?	To be kept more than 1 m in minimum			
	BH-2	Baffle or deflector	Provided baffle pier or deflector in the basin to avoid flow influence to the downstream?				
B.I Bridge							
	BI-1	Design load	Examined design load and taken approval from client?	Consider future use of farm machinery and			
	BI-2	Future plan	Examined and applied to the future development plan of river?				
	BI-3	Clearance below beam	Examined and applied design				
B.J Drainage Culvert							
	BJ-1	Type of culvert	Avoided to provide siphon type culvert?				
	BJ-2	Sand trap	Provided sand trap and basin at inlet of culvert ?				
B.K Miscellaneous Works							
	BK-1	Safety Facilities and domestic service facility	Discussed and applied for kind of safety facilities and devices through discussion of client?	Fence, safety rope, animal washing basin, washing step			
	BK-2	Posts	Provided hectometer and kilometer posts?				

Note: N.A ; Not Applicable

III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07 - Task 02	Detailed design (2/2)
Step 02	



Criteria, standards and references

- A) Ministry of Public Works. 1986. *Irrigation Design Standards, Design Criteria*.
 B) Evaluation criteria for rehabilitation works
 C) Check list Form 07-02-01-01 and Form 07-02-01-02

Inputs

- 1. Manpower**
Task force team for irrigation
Consultant
- 2. Data & information**
Design criteria
Subject area
Design discharge
Irrigation diagram
Canal and structure list for rehabilitation and new construction
Hydraulic profile of canals
Standard tender document
Site survey result and investigation result
Standard tender document (related ministry or international lending agency)
- 3. Material**
Check list Form 07-02-01-01 and Form 07-02-07-02

Tools & Techniques

- 1. Field survey for detailed design**
- 2. Field investigation (soil, geology) at major and important structures**
- 3. Preparation of detailed design of irrigation and drainage facilities**
- 4. Preparation of tender documents**
Output of the design works should be confirmed by using of design check list attached (Form 07-02-01-01 and Form 07-02-01-02).

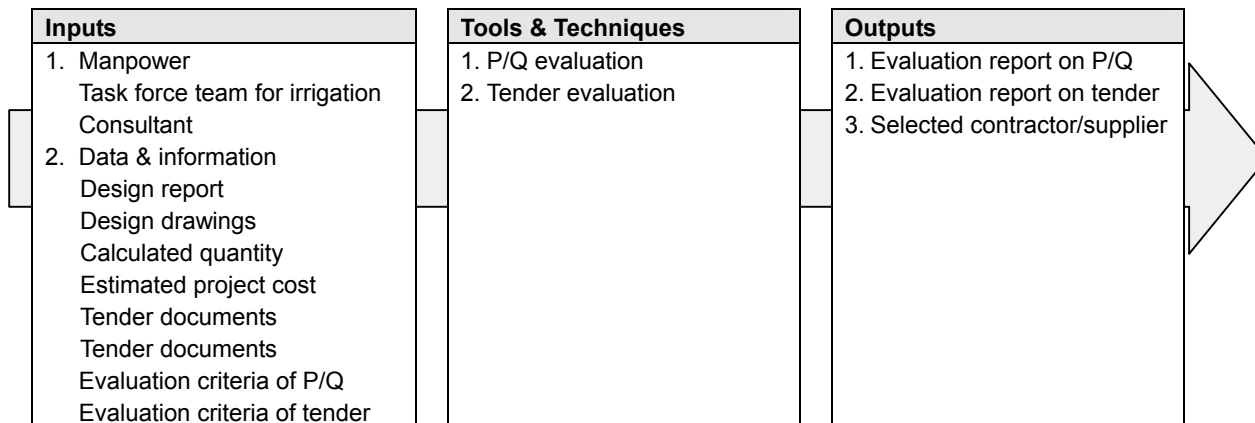
Outputs

1. Design report
2. Design drawings
3. Calculated quantity
4. Estimated project cost
5. Tender documents (pre-qualification document, invitation to tender, general conditions, technical specifications, drawings, bill of quantities)

III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07 - Task 02 Step 03	Pre-construction works (P/Q to tender)
---	---



Criteria, standards and references
<ul style="list-style-type: none"> A) Loan handbook of international lending agencies B) Relevant criteria of Ministry of Settlement and Regional Infrastructure

Inputs

- 1. Manpower**
 - Task force team for irrigation
 - Consultant
- 2. Data & information**
 - Design report
 - Design drawings
 - Calculated quantity
 - Estimated project cost
 - Tender documents
 - Tender documents
 - Evaluation criteria of P/Q
 - Evaluation criteria of tender

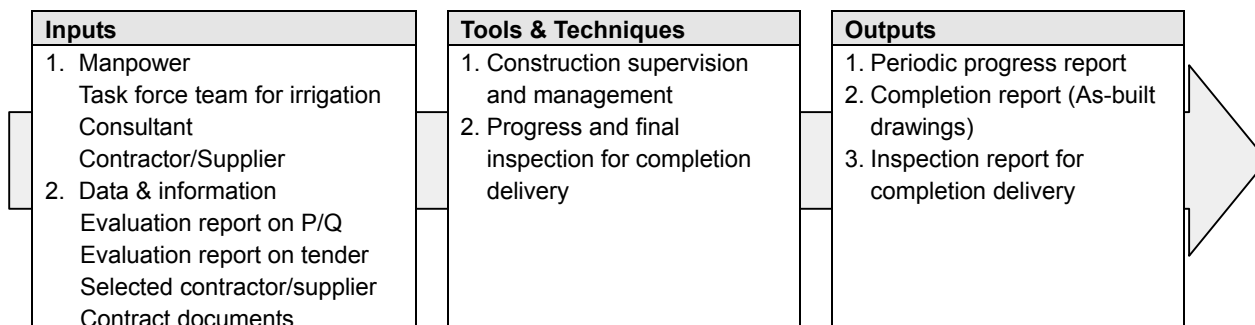
Tools & Techniques

- 1. P/Q evaluation**
- 2. Tender evaluation**

Outputs

- 1. Evaluation report on P/Q**
- 2. Evaluation report on tender**
- 3. Selected contractor/supplier**

Stage 07 - Task 02 Step 04	Performance of contract works (commencement to delivery completion)
---------------------------------------	--



Criteria, standards and references
<ul style="list-style-type: none"> A) Standard criteria and specific criteria for construction supervision issued by ministry B) Standard form/report issued by international lending agency

Inputs

- 1. Manpower**
 - Task force team for irrigation
 - Consultant
 - Contractor/Supplier
- 2. Data & information**
 - Evaluation report on P/Q
 - Evaluation report on tender
 - Selected contractor/supplier
 - Contact documents

Tools & Techniques

- 1. Construction supervision and management**
 - Construction management should be done by government agency and consultant.
- 2. Progress and final inspection for completion delivery**

Outputs

- 1. Periodic progress report**
- 2. Completion report (As-built drawings)**
- 3. Inspection report for completion delivery**

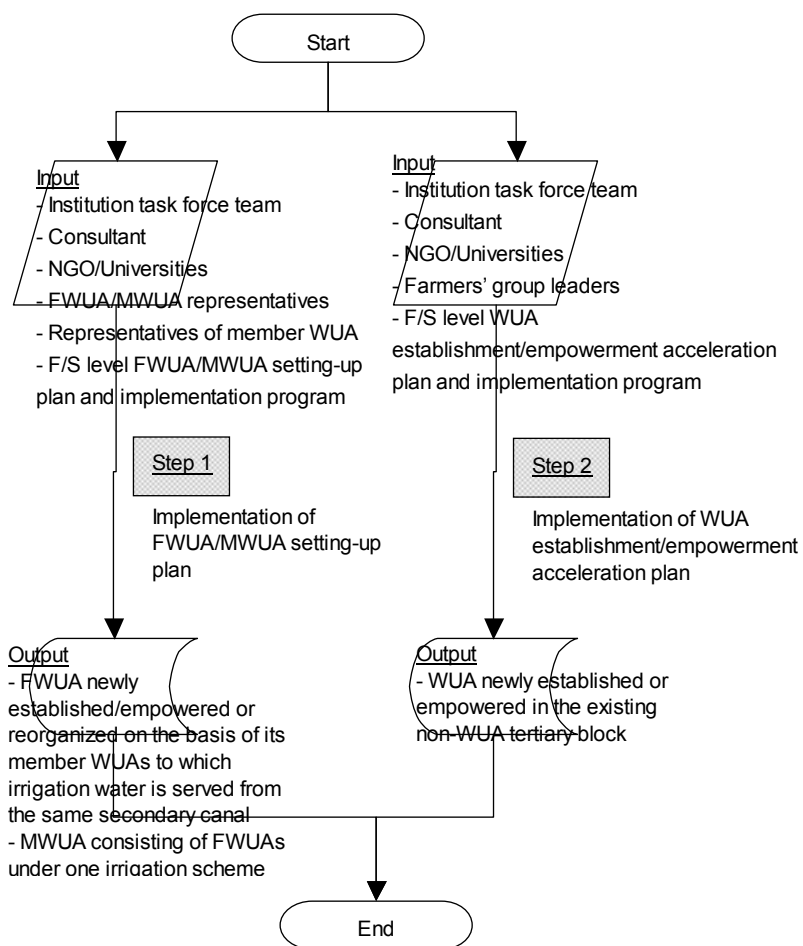
III. Implementation

Stage 07. Implementation and Commencement of Operation

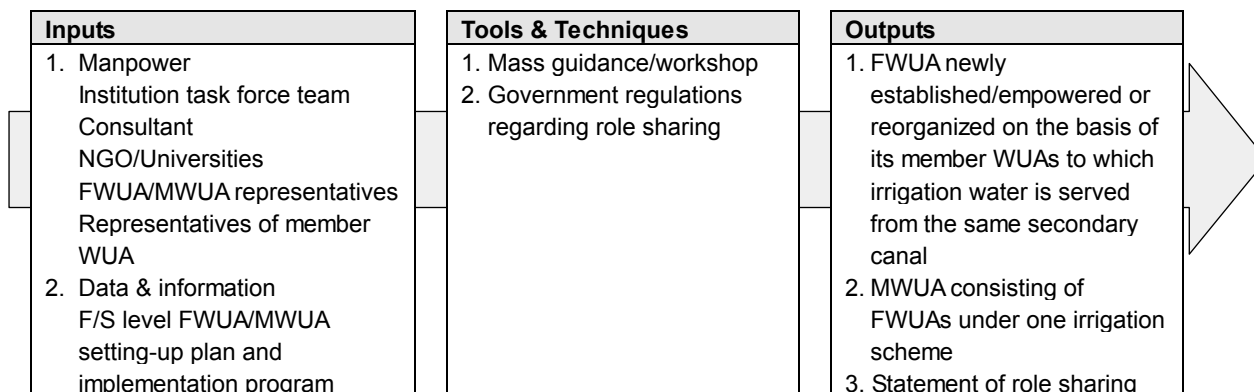
Stage 07 Implementation and Commencement of Operation
Task 03 Implementation of FWUA/MWUA Setting-up and WUA Establishment/Empowerment Acceleration Plans
Purpose and scope
Scope of the task is to implement FWUA/MWUA setting-up and WUA establishment/empowerment acceleration plans

Flow of the Stage 07 - Task 03

Detail descriptions of required work for the respective steps are given in following pages.



Stage 07 - Task 03 Step 01	Implementation of FWUA/MWUA setting-up and role sharing plan between Government and WUA
---------------------------------------	--



Criteria, standards and references

- A) Related laws and regulations.
- B) Government regulations for role sharing.

Inputs

- 1. Manpower**
Institution task force team
Consultant
NGO
FWUA/MWUA representatives
Representatives of member WUA
- 2. Data & information**
F/S level FWUA/MWUA setting-up plan and implementation program (refer to output of Stage 06 - Task 03 - Step 03).

Tools & Techniques

- 1. Mass guidance/workshop**
- 2. Government regulations regarding role sharing**

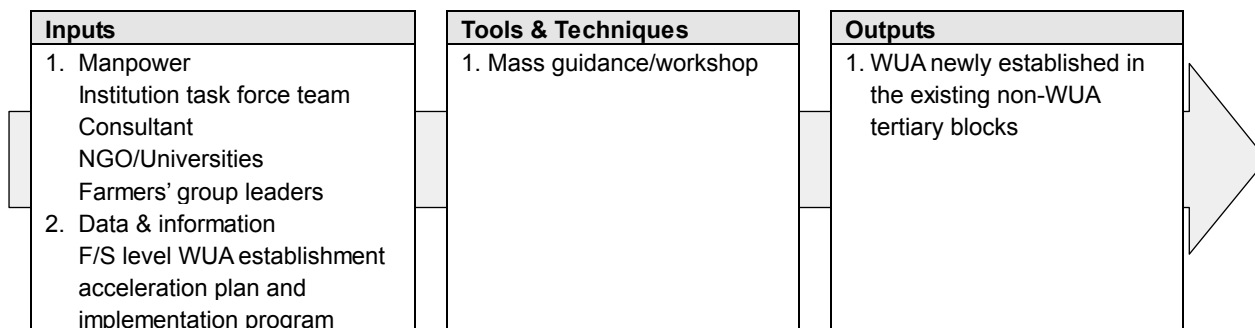
Outputs

- 1. FWUA newly established/empowered or reorganized on the basis of its member WUA to which irrigation water is served from the same secondary canal**
- 2. MWUA consisting of FWUA under one irrigation scheme**
- 3. Statement of role sharing**

III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07 - Task 03 Step 02	Implementation of WUA establishment acceleration plan
---------------------------------------	--



Criteria, standards and references
A) Related laws and regulations.

Inputs

- 1. Manpower**
 - Institution task force team
 - Consultant
 - NGO
 - Farmers' Group leaders
- 2. Data & information**
 - F/S level WUA establishment acceleration plan and implementation program

Tools & Techniques

- 1. Mass guidance/workshop**

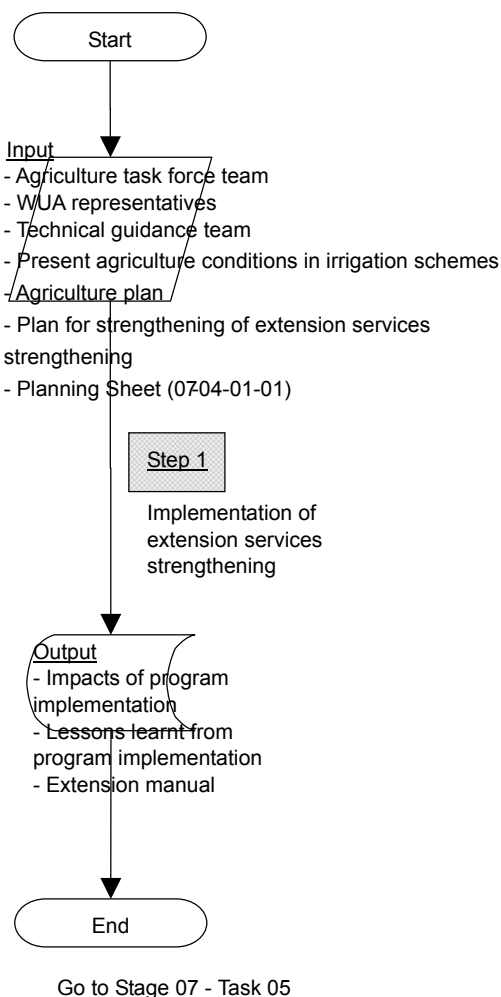
Outputs

- 1. WUA newly established in the existing non-WUA tertiary blocks**

Stage 07	Implementation and Commencement of Operation
Task 04	Strengthening of Agriculture Extension Services
Purpose and scope	
Formulation of annual work program for strengthening of agriculture extension services, budget arrangement, preparation of agreed plan of operation (APO), preparation of extension manual & materials, implementation of programs, monitoring & evaluation of program implementation & impacts.	

Flow of the Stage 07 - Task 04

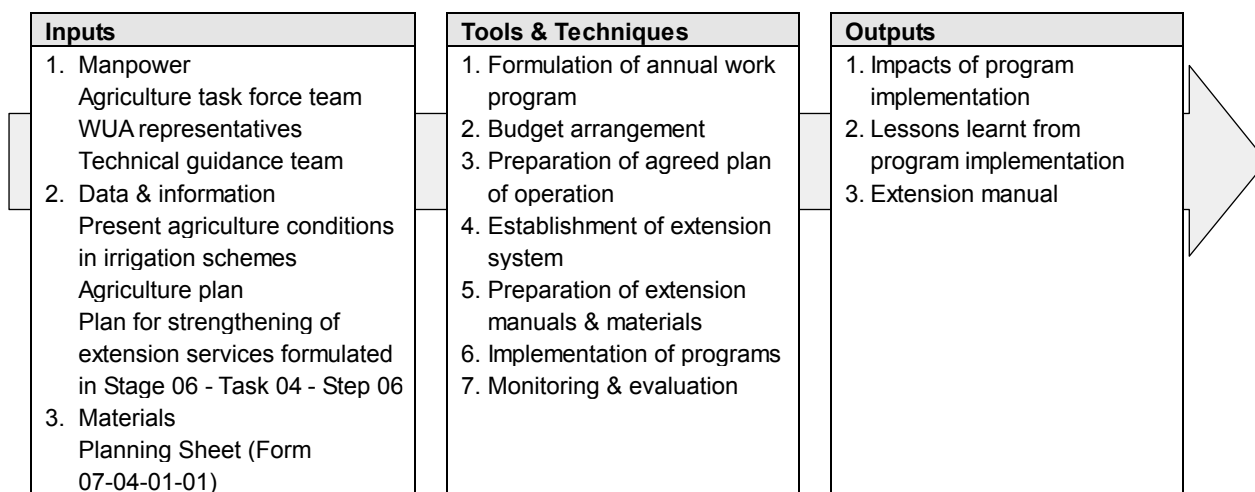
Detail descriptions of required work for the respective steps are given in following pages.



III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07 - Task 04 Step 01	Implementation of extension services strengthening
---------------------------------------	---



Criteria, standards and references

- A) Kebijakan Nasional Penyelenggaraan Penyuluhan Pertanian, Departmen Pertanian, 2002
 Pelatihan Pengembangan Metodologi Penyuluhan Pertanian Partispatif, Badan Pengembangan Sumber
- B) Daya Manusia Pertanian, Departmen Pertanian *bekerjasama dengan* JICA, 2002

Inputs

- 1. Manpower**
 Agriculture task force team
 WUA representatives
 Technical guidance team Provincial staffs, BPTP (Center for Agriculture Technology Assessment), etc.
- 2. Data & information**
 - Present agriculture conditions in irrigation schemes
 - Agriculture plan formulated in pre-F/S stage
 - Plan for strengthening of extension services formulated in Stage 06 - Task 04 - Step 06
- 3. Materials**
 - Planning Sheet Form 07-04-01-01

Tools & Techniques

- 1. Formulation of annual work program**
 - Formulation of annual work program for the strengthening of extension services in individual irrigation schemes by reviewing & updating the plan for strengthening of extension services formulated under the F/S level rehabilitation plan.
 - For the formulation, participatory planning approaches should be employed through a workshop held in individual irrigation schemes.
 - Budget availability should dully be taken into account.
- 2. Budget arrangement**
 Budget arrangement on the basis of the annual work program formulated above.
- 3. Preparation of agreed plan of operation (APO)**
 Preparation of detail agreed plan of operation for the implementation of strengthening programs accommodated in the budgets through participatory approaches of stakeholders involved in the implementation of the programs.
- 4. Establishment of extension system**

Stage 07. Implementation and
Commencement of Operation

Based on the extension system employed in a district, the modified system accommodating area specific conditions and needs should better be worked out by emphasizing promotion of farmer/ farmer group's participation and initiatives in the execution of extension services in a irrigation scheme.

5. Preparation of extension manual & materials

- Preparation of an extension manual by reviewing & updating an existing manual in each district or preparation of a new one under the technical guidance and cooperation of a provincial & central extension agency (Reference material: Pelatihan Pengembangan Metodologi Penyuluhan Pertanian Partispatif, Badan Pengembangan Sumber Daya Manusia Pertanian, 2002)
- Extension materials or materials required for the implementation of the extension programs accommodated in APO should be prepared in time for the execution of the programs.
- Based on the establishment or development of agriculture technologies to be introduced, simple extension materials to be distributed to farmer/farmer group should be prepared.

6. Implementation of programs

- The implementation of the programs for the strengthening of extension services should better be carried out by a Working Team organized for the implementation of the programs in individual irrigation schemes. The Working Team should be composed of: staff of district agriculture services office, field agriculture & irrigation staffs, representatives of WUA and representatives of participants of the programs.
- Monitoring & supervision of the program implementation by the agriculture task force team should be carried out continuously throughout the program implementation stage.

7. Monitoring & evaluation

- Monitoring of the program implementation and impacts should be made by the working team under the supervision of the task force team. Preparation of periodical reporting of the results and findings of monitoring activities should be institutionalized.

Outputs

1. Impacts of program implementation

2. Lessons learnt from program implementation

The lessons learnt from the program implementation should dully be accommodated in the formulation of annual work program in the following years.

3. Extension manual

I. Pre-feasibility Study for Prioritization of Irrigation Schemes

Stage 04. Formulation of Pre-F/S level Rehabilitation Plan and Third Screening of Irrigation Schemes

Form 07-04-01-01 Planning Sheet for Agriculture Plan: Agreed Plan of Operation for Extension Services

Irrigation Scheme: _____		FY		FY												Responsible Agency
Programs/Activities	Q'ty	10	11	1	2	3	4	5	6	7	8	9	10	11	12	
1.																
1.1																
- Formation of Working Team																Task Force Team
- Preparation of Technical Guideline																Task Force Team
- Financial Arrangement																DIPERTA Tk I/II
- Preparation for Operation																Working Team
- Implementation of Program																Working Team
- Supervision & Monitoring																Task Force Team
2.																
2.1																
- Formation of Working Team																Task Force Team
- Preparation of Technical Guideline																Task Force Team
- Financial Arrangement																DIPERTA Tk I/II
- Preparation for Operation																Working Team
- Implementation of Program																Working Team
- Supervision & Monitoring																Task Force Team
3.																
3.1																
- Formation of Working Team																Task Force Team
- Preparation of Technical Guideline																Task Force Team
- Financial Arrangement																DIPERTA Tk I/II
- Preparation for Operation																Working Team
- Implementation of Program																Working Team
- Supervision & Monitoring																Task Force Team
4.																
4.1																
- Formation of Working Team																Task Force Team
- Preparation of Technical Guideline																Task Force Team
- Financial Arrangement																DIPERTA Tk I/II
- Preparation for Operation																Working Team
- Implementation of Program																Working Team
- Supervision & Monitoring																Task Force Team

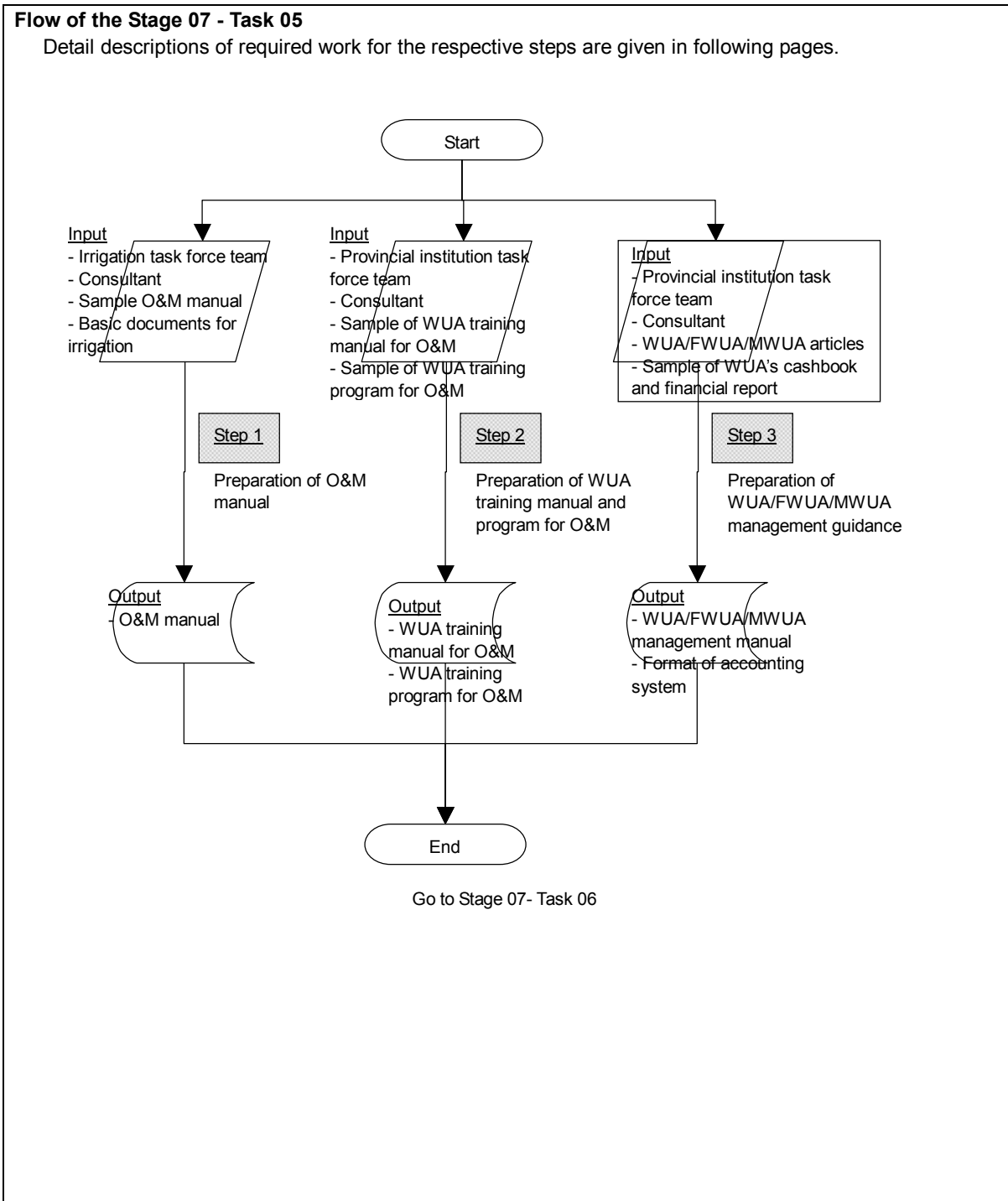
Agreed & Confirmed by		
_____	_____	_____
Agriculture Services Office	Irrigation Services Office	Water Users Institution
Name:	Name:	Name:
Position:	Position:	Position:
Date:	Date:	Date:

Instructions To Fill-in

- Consistency with cropping schedule of the target scheme to be kept in scheduling of field programs.
- Field programs in dry season to be emphasized in principle.
- Participatory planning of target groups essential.

Remarks

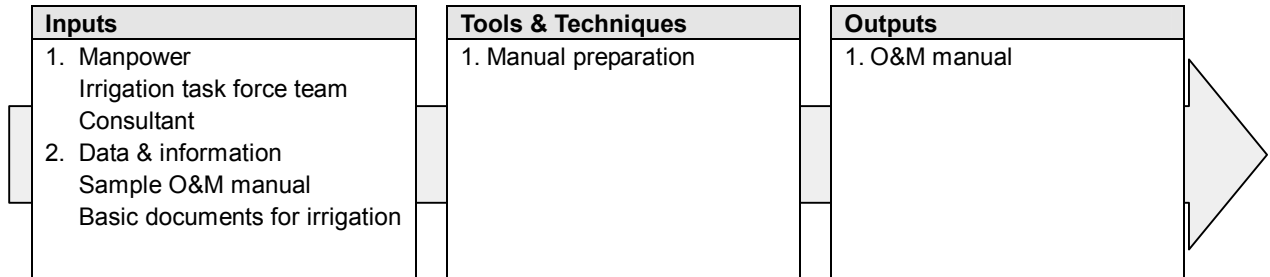
Stage 07	Implementation and Commencement of Operation
Task 05	Preparation of Tools and Manuals for O & M
Purpose and scope	
Scope of the Task is to prepare required tools and manuals for O&M of irrigation system.	



III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07 - Task 05	Preparation of O&M manual
Step 01	



Criteria, standards and references
A) Sample O&M manuals of similar projects

Inputs

1. Manpower

- Irrigation task force team
- Consultant

2. Data & information

- Sample O&M manual of other irrigation scheme, and
- Basic documents for irrigation, such as 1) layout map of irrigation system, 2) irrigation diagram, 3) schematic layout of related structures, etc. should be collected.

Tools & Techniques

1. Manual preparation

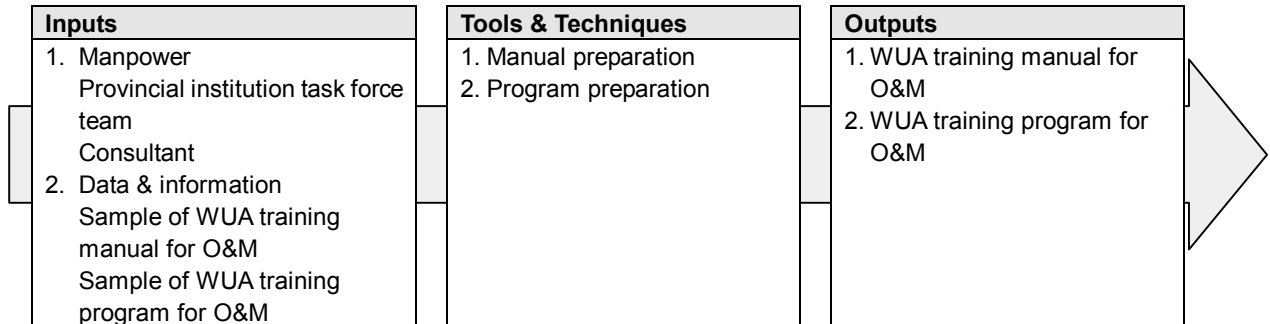
Sample contents of O&M manual is shown below.

- 1) Project Facilities (features of the project facilities)
- 2) Operation and Maintenance Organization (staff, facilities, and equipment for O&M)
- 3) Plan of Irrigation Operation (basic concept of operation)
- 4) Water Delivery Schedule (planned schedule of water delivery and irrigation water requirement)
- 5) Method of operation and maintenance of headworks (system and operation rule of spillway and scoring sluice gate etc.)
- 6) Method of canal operation and maintenance (operation for conveying and distributing irrigation water, routine inspection, repair and maintenance program, O&M equipment, etc.)
- 7) Operation and Maintenance in Rotational Area (WUI and water management in rotational area)

Outputs

1. O&M manual

Stage 07 - Task 05 Step 02	Preparation of WUA training manual and program for O&M
---------------------------------------	---



Criteria, standards and references
A) Sample of WUA training manual and program for O&M of similar projects

Inputs

- 1. Manpower**
Provincial institution task force team
Consultant
- 2. Data & information**
Sample WUA training manual and program for O&M of similar irrigation scheme shall be collected.

Tools & Techniques

- 1. Manual preparation**
- 2. Program preparation**

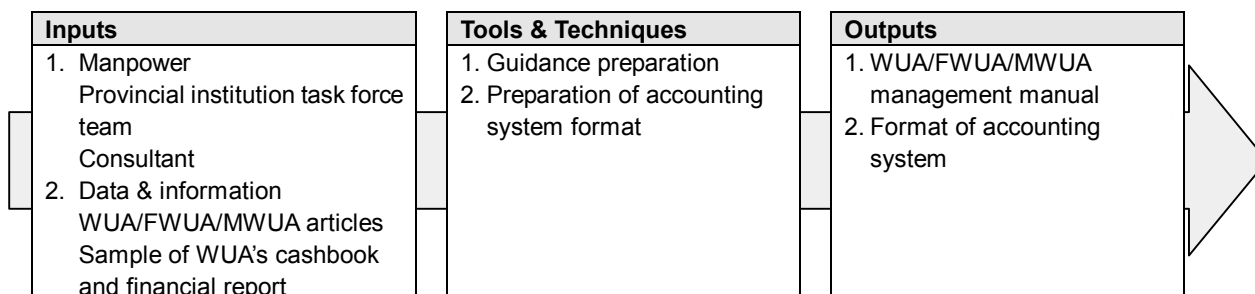
Outputs

- 1. WUAs training manual for O&M**
- 2. WUAs training program for O&M**

III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07 - Task 05 Step 03	Preparation of WUA/FWUA/MWUA management guidance
---	---



Criteria, standards and references

A) Sample of WUA's cashbook and financial report of similar projects

Inputs

- 1. Manpower**
Provincial task force team for WMI
Consultant
- 2. Data & information**
WUA/FWUA/MWUA articles and sample of WUA's cashbook and financial report of similar irrigation scheme shall be collected.

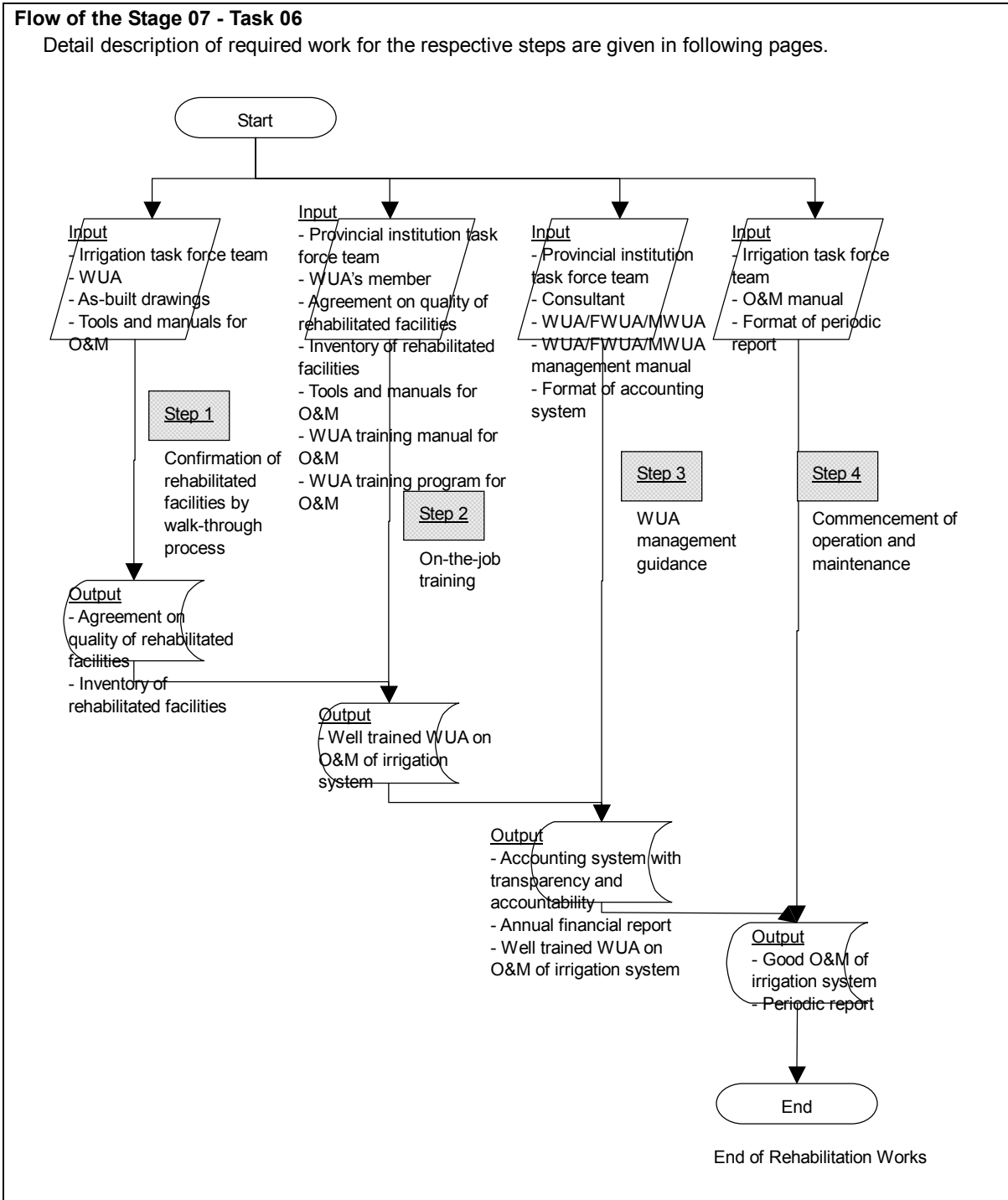
Tools & Techniques

- 1. Guidance preparation**
WUA member's fee covers administration cost, O&M expenditure of tertiary irrigation system and annual share of FWUA/MWUA management cost.
Guidance includes determination of WUA member's fee, collection of fee from WUA's members either in kind or in cash, expenditures for WUA's administration cost and tertiary irrigation system O&M cost as well as FWUA/MWUA management cost.
- 2. Preparation of accounting system format**
Including the procedure of auditing system by the third party

Outputs

- 1. WUA/FWUA/MWUA management guidance**
- 2. Format of accounting system**

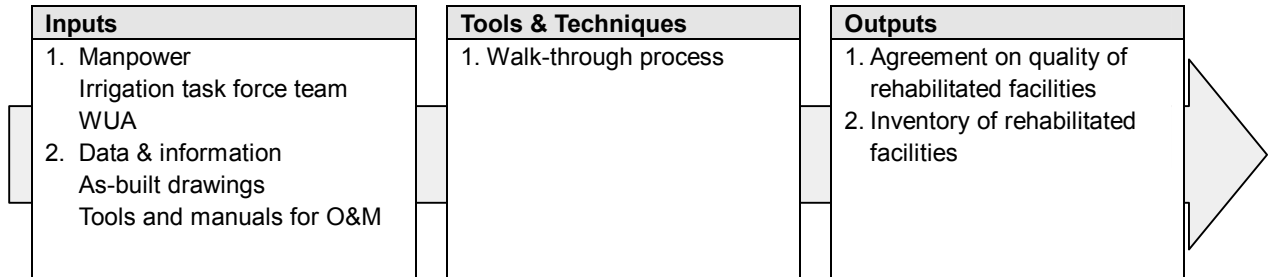
Stage 07	Implementation and Commencement of Operation
Task 06	Operation and Maintenance
Purpose and scope	
Scope of the Task are to: 1) Confirm status of rehabilitated facilities together with WUA; 2) On-the-job training on O&M; and 3) Commencement of O&M.	



III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07 - Task 06 Step 01	Confirmation of rehabilitated facilities by walk-through process
---------------------------------------	---



Criteria, standards and references
A) As-built drawings B) Completion report

Inputs

- 1. Manpower**
 Irrigation task force team
 WUA Representatives of related WUA
- 2. Data & information**
 As-built drawings
 Tools and manuals for O&M (O&M, WUA training)

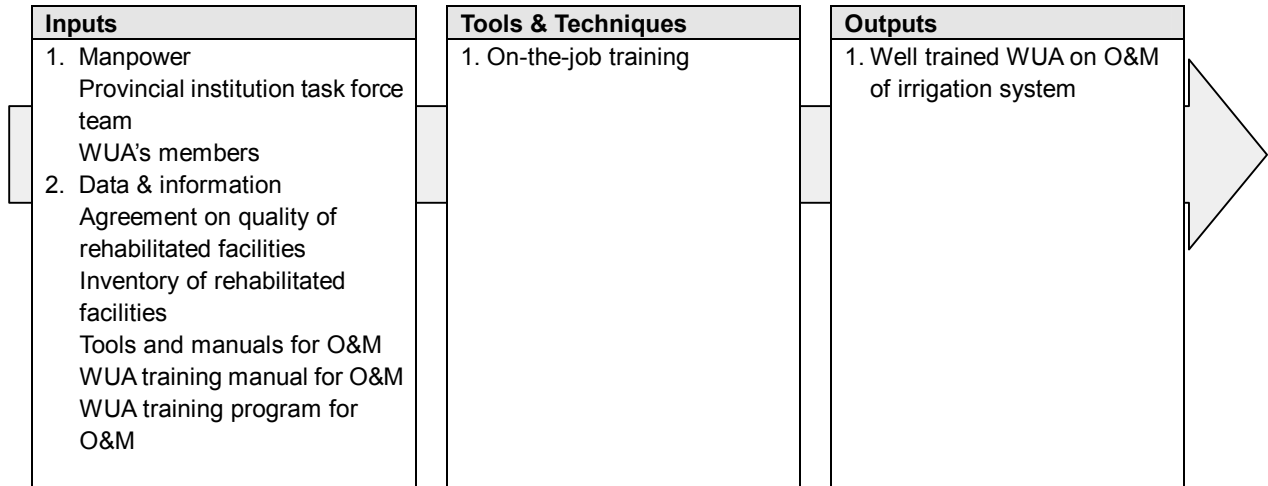
Tools & Techniques

- 1. Walk-through process**
 Walk-through process shall be applied to confirm result of rehabilitation works. To contribute future maintenance works of irrigation facilities, photos of the facilities shall be taken.

Outputs

- 1. Agreement on quality of rehabilitation facilities**
 After confirm the quality of rehabilitated irrigation facilities by walk-through process, agreement on quality of rehabilitating facilities between irrigation service agency and WUA representatives shall be prepared.
- 2. Inventory of rehabilitated facilities**
 Inventory (code number, type and dimension, design discharge, photos, explanation, etc. of rehabilitated irrigation facilities shall be obtained through the walk-through process.

Stage 07 - Task 06 Step 02	On-the-job training
---------------------------------------	----------------------------



Criteria, standards and references
<ul style="list-style-type: none"> A) O&M manual for the scheme B) Water management manual for the scheme C) As-built drawings D) Completion report

Inputs

- 1. Manpower**
 - Provincial institution task force team
 - WUA's members
- 2. Data & information**
 - Agreement on quality of rehabilitated facilities
 - Inventory of rehabilitated facilities
 - Tools and manuals for O&M (Water management, operation and maintenance, agriculture extension)
 - WUA training manual for O&M
 - WUA training program for O&M

Tools & Techniques

- 1. On-the-job training**
 - Knowledge on O&M of irrigation system shall be transferred to WUA through on-the-job training.

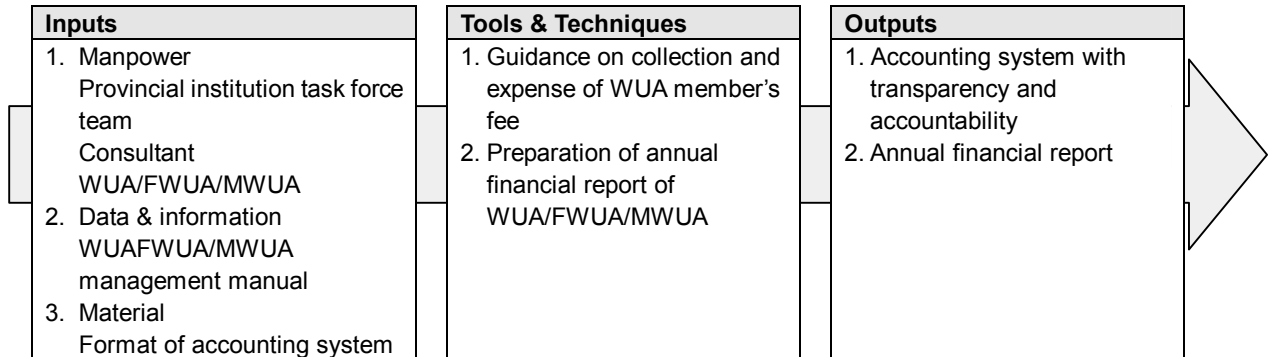
Outputs

- 1. Well trained WUA on O&M of irrigation system**

III. Implementation

Stage 07. Implementation and Commencement of Operation

Stage 07 - Task 06 Step 03	WUA management guidance
---	--------------------------------



Criteria, standards and references
A) WUAFWUA/MWUA management manual B) Sample of cashbook C) Sample of financial report (annual)

Inputs

- 1. Manpower**
 Provincial institution task force team
 Consultant
 WUA/FWUA/MWUA
- 2. Data & information**
 WUAFWUA/MWUA management manual
- 3. Material**
 Format of accounting system The format should be prepared by Provincial institution task force team.

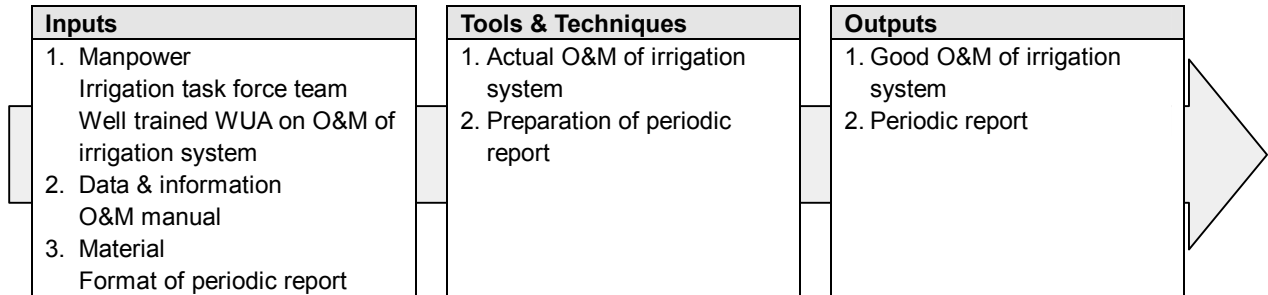
Tools & Techniques

- 1. Guidance on collection and expenses of WUA member's fee**
- 2. Preparation of annual financial report of WUA/FWUA/MWUA**

Outputs

- 1. Account system with transparency and accountability**
- 2. Annual financial report**

Stage 07 - Task 06 Step 04	Commencement of operation and maintenance
---	--



Criteria, standards and references
<ul style="list-style-type: none"> A) O&M manual B) As-built drawings C) Sample periodic report (monthly/annual)

Inputs

- 1. Manpower**
Irrigation task force team
Well trained WUA on O&M of irrigation system
- 2. Data & information**
O&M manual
- 3. Material**
Format of periodic report The format should be prepared by task force team

Tools & Techniques

- 1. Actual O&M of irrigation system**
- 2. Preparation of periodic report**

Outputs

- 1. Good O&M of irrigation system**
- 2. Periodic report**

Attachments

**(Contents of Reference
Documents)**

Technical Guideline for Rehabilitation & Upgrading of Irrigation Network

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Technical Specification for Rehabilitation & Upgrading of Irrigation Network

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Guideline for Feasibility Study of Irrigation Development

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**Irrigation Design Standards
Design Criteria
KP-01
Irrigation System Design**

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Irrigation Design Standards
Design Criteria
KP-02
Headworks

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BI-01
Typical Irrigation Structures
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TYPICAL IRRIGATION STRUCTURES
BI – 01

GENERAL

Topographic map at scale 1 : 25,000
Topographic map at scale 1 : 5,000
Land capability map
Project map (boundaries – irrigable area)
Layout irrigation scheme and drainage scheme
Irrigation scheme
Structures scheme
Benchmark network

HEADWORKS

River map at scale 1 : 2,000
Soil investigation map
Geological profiles
Plan of headworks and appurtenant structures
Plan of weir
Section of weir, plan of left bank abutment
Plant of right bank with scouring sluice and main intake
Sections of weir, scouring sluice and main intake
Plan and longitudinal section of sediment trap
Plan of flushing sluice and intake primary canal
Sections of flushing sluice and intake primary canal

CANALS

Typical cross-sections irrigation and drainage canals; inspection roads
Typical lining cross-sections (masonry, concrete), weep holes
Irrigation canal : location map and longitudinal section

Irrigation canal : cross-sections
Drainage canal : location map and longitudinal section
Drainage canal : cross-sections
Flood dike : location map and longitudinal section
Flood dike : cross-sections

STRUCTURES

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Layout division/off-take structure in secondary canal
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Layout division/off-take structure in secondary canal
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Off-take in tertiary canal with Crump-de Gruyter gate
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Drop structure
Drop structure
Drop structure
Drop structure
Drop structure
Drop structure
Drop structure
Chute
Side Spillways

TERTIARY SYSTEM

Layout existing system in sloping area
Layout designed system in sloping area
Layout existing system in gently sloping area
Layout designed system in gently sloping area
Canal alignment with longitudinal section
Canal alignment with longitudinal section
Location and longitudinal section quaternary drainage canal

Tertiary boxes
Tertiary boxes
Quaternary boxes
Tertiary culvert
Chute

MISCELLANEOUS

Wooden bridge
Flat sliding gate (wood)
Hoisting device for gate of drawing 602
Radial gate
Details of drawing 604
Radial gate without top seal
Details of drawing 606
Automatic gate (Vlugter type)
Automatic gate (tidal outlet)
Detail of drawing 609
Operating shed (steel)
Details of drawing 611
Operating shed (concrete)
Houses for operation staff

STANDARDIZED IRRIGATION STRUCTURES BI-02

STANDARD DRAWINGS

Flat sliding gate (steel)
Stop logs
Broad crested weir with rectangular section (masonry)
Broad crested weir with trapezoidal section (masonry)
Romijn measuring weir (steel-works for gate) $B = 0,50$ m; $H = 0,33$ m
Romijn measuring weir $B \leq 1,00$ m
Romijn measuring weir $B > 1,00$ m
Centimeter and liter scales for Romijn measuring weirs
Connection of centimeter and liter scales to Romijn measuring weir, water level gauges
Crump-de Gruyter adjustable orifice (steelworks for gate)
Connection of gauge to Crump-de Gruyter adjustable orifice
Gauges for Crump-de Gruyter adjustable orifice
Hoisting device with single spindle
Hectometer post
Benchmark and azimuth mark
Name plates for canals

Abutments (masonry/concrete) for culverts and bridges
Reinforced concrete decks for bridges (incl. hand railing)
Reinforced concrete plates for culverts and operation slabs
Bridge in tertiary road
Concrete pipes for culverts
Name plates for weir and water level gauge
Washing steps
Buffalo pools
Details for gabions and masonry work
Flat sliding gate for tertiary boxes
Drop structure in tertiary system
Drop structure (type Vlugter)
Drop structure (vertical)

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Technical Specifications
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Irrigation System Design
PT-03
Geotechnical Investigations
PT-04
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**JBIC Manual
(Loan Handbook)
Instructions, Handbook, Guidelines, and
Sample Documents**

**2002
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**Asian Development Bank (ADB)
Guidelines
(Loan Handbook)**

**2002
Asian Development Bank (ADB)**

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