

APPENDICES

APPENDIX 1

Member List of the Study Team

Appendix 1 Member List of the Study Team(1) During Field Survey (2nd Phase of the Study on Rural Water Supply in Tabora Region)

Mr. Yasumasa YAMASAKI	Team Leader/Rural Water Supply Planner	Earth System Science Co., Ltd
Mr. Takuya YABUTA	Deputy Team Leader/Groundwater Development Planner	Earth System Science Co., Ltd
Mr. Masakazu SAITO	Hydrogeologist 1, Implementation and Procurement Planner/Cost Estimator 1	Earth System Science Co., Ltd.
Mr. Tadashi YAMAKAWA	Hydrogeologist 2	Earth System Science Co., Ltd. (Mitsubishi Materials Techno Corporation)
Mr. Hiroyuki NAKAYAMA	Specialist for Water Quality, Database/GIS 1	Earth System Science Co., Ltd.
Mr. Shigekazu FUJISAWA	Hydrologist/Meteorologist	Kokusai Kogyo Co., Ltd.
Ms. Mana ISHIGAKI	Socio-Economist	Japan Techno Co., Ltd. (I. C. Net Ltd.)
Mr. Teruki MURAKAMI	Urban Water Supply Planner	Japan Techno Co., Ltd.
Mr. Susumu ENDO	Geophysicist 1	Earth System Science Co., Ltd. (Mitsubishi Materials Techno Corporation)
Mr. Kengo OHASHI	Geophysicist 2	Earth System Science Co., Ltd.
Mr. Tatsuya SUMIDA	Drilling Engineer, Supervisor of Hand Pump Repairing, Implementation and Procurement Planner/Cost Estimator 2	Earth System Science Co., Ltd.
Mr. Daisuke NAKAJIMA	Water Supply Facility Designer	Kokusai Kogyo Co., Ltd.
Mr. Naoki MORI	Specialist for Operation and Maintenance	Japan Techno Co., Ltd.
Mr. Norikazu YAMAZAKI	Specialist for Environment and Social Consideration	Kokusai Kogyo Co., Ltd.
Mr. Naoki TAKE	Specialist for Public Health and Hygiene	Earth System Science Co., Ltd. (Kaihatsu Management Consulting, Inc.)
Mr. Tadashi SATO	Coordinator, Specialist for Database/GIS 2	Earth System Science Co., Ltd.

(2) Explanation of Preparatory Survey

Mr. Minoru MIYASAKA	Mission Leader	Senior Adviser to the Director General, Global Environment Department, JICA
Mr. Hayato SATO	Project Coordinator	Water Resources Management Division 2, Global Environment Department, JICA
Mr. Yasumasa YAMASAKI	Team Leader/Rural Water Supply Planner	Earth System Science Co., Ltd
Mr. Takuya YABUTA	Deputy Team Leader/Groundwater Development Planner	Earth System Science Co., Ltd
Mr. Masakazu SAITO	Hydrogeologist 1, Implementation and Procurement Planner/Cost Estimator 1	Earth System Science Co., Ltd.
Mr. Naoki MORI	Specialist for Operation and Maintenance	Japan Techno Co., Ltd.
Mr. Tadashi SATO	Coordinator, Specialist for Database/GIS 2	Earth System Science Co., Ltd.

APPENDIX 2

Study Schedule

Study Schedule

Contents of the study	Phase-1												Phase-2											
	2009						2010						2011											
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May		
<div style="display: flex; justify-content: space-between; align-items: center;"> □ study in Japan ■ study in Tanzania </div>																								
Phase-1 : Aug 2009 to Mar 2010																								
1st Study in Tanzania																								
[1-5] Discussion of Inception Report	■																							
[1-6] Collection, review and analyses of existing data	■	■	■	■																				
[1-7] Field survey	■	■	■	■	■																			
[1-8] Preparation, Presentation and Discussion of Progress Report						■																		
[1-9] Provision of Training for Improved Operation and Maintenance							■																	
[1-10] Study on groundwater development potential			■	■	■																			
[1-11] Estimation of water demand			■	■	■																			
[1-12] Formulation of Water Supply Plan						■	■	■																
[1-13] Selection of priority project and villages						■	■	■																
[1-14] Preparation, Presentation and Discussion of Interim Report								■																
[1-15] Assistance to prepare a request of priority project to Japanese Government									■															
[1-16] Reporting of Results of Field Survey to EOU and JICA Office										■														
Phase-2 : Apr 2010 to Mar 2011																								
1st Study in Japan																								
[2-1] Processing of high resolution satellite image																					□			
2nd Study in Tanzania																								
[2-2] Survey of Actual Conditions of Candidate Villages (Detailed Socio-Economic Survey)																					■			
[2-3] Hydrogeological Field Reconnaissance, Geophysical Prospection, Test Well Drilling, Well Logging, Pumping Test, Water Quality Analysis and Groundwater Level Observation in Priority Villages																					■			
[2-4] Supplementary Survey and Collection of Necessary Information																					■			
[2-5] Selection of priority villages																					■			
[2-6] Survey for Preliminary Design of Water Supply																					■			
[2-7] Collection of Information for Cost Estimation, Construction Plan and Procurement Plan																					■			
[2-8] Technically assist the implementation Environmental impact assessment(EIA)																					■			
[2-9] Formulation of plan hand pump maintenance to easy maintain																					■			
[2-10] Technical Training in Third Country																					■			
[2-11] Report about field survey																					■			
2nd Study in Japan																								
[2-12] Outline design of water supply system																					■			
[2-13] Formulation of Construction and Equipment Procurement Plan																					■			
[2-14] Preliminary Project Cost Estimation																					■			
[2-15] Formulation of Soft Component Plan																					■			
[2-16] Evaluation of Priority Project (in the points of view of economy, finance, policy, society and environment)																					■			
[2-17] Preparation of Draft Final Report																					■			
3rd Study in Tanzania																								
[2-18] Submission and discussion of Draft Final Report																					■			
2nd Study in Japan																								
[2-19] Preparation and Submission of Final Report																					□			
Document to be submitted																								
Reports	▲IC/R						▲PR				▲IT/R									▲R1	▲R2	▲R3		
Summary of the field survey results																						▲R4		
Report of basic design policy																						▲R5		
Summary document of basic design study																						▲R6		
Rendering of facilities																						▲R7		
Digital images																						▲R8		
Summary document of preliminary project cost estimation																						▲R9		
IC/R: Inception Report PR: Progress Report IT/R: Interim Report R1: Summary of the field survey results R2: Report of basic design policy R3: Outline document of basic design study R4: Rendering of facilities R5: Digital images R6: Summary document of preliminary project cost estimation R7: Final Report																								

APPENDIX 3

List of Parties Concerned in Tanzania

Appendix 3 List of Parties Concerned in Tanzania

1. During Field Survey (2nd Phase of the Study on Rural Water Supply in Tabora Region)

(1) Embassy of Japan

Hiroshi NKAGAWA	Ambassador
Yukinori SEKI	Secretary
Toru TANAKA	Secretary

(2) JICA Tanzania Office

Yukihide KATSUTA	Chief Representative
Toshihisa HASEGAWA	Senior Representative
Tetsuya YAMAMOTO	Representative
Emiko NISHIMURA	Representative

(3) Ministry of Water

Christopher N. Sayi	Permanent Secretary
John A. Mukumwa	Director, CWSD
Frida C. Rweyemamu	Assistant Director, CWSD
Gibson J. Kisaka	Assistant Director, CWSD
Bernard Chikarabhani	Principal Hydrogeologist, Tabora Water Office, Lake Tanganyika Basin Water Office
Joseph Kubena	Environmental Coordinator, EIA Section

(4) Tabora Regional Administrative Secretariat

Longino K. Kazimoto	Acting Regional Administrative Secretary
Muhibu Sosthenes Lubasa	Regional Water Expert
Ernest Nshana	Regional Statistic Manager
Wilson Shadrack Yomba	Acting Regional Environmental Officer

(5) District and Municipality

Magayane T. P.	District Executive Director,	Igunga District
Kessy S. M.	District Planning Officer,	Igunga District
Robert Mgetta	District Community Development Officer,	Igunga District
Gaston R. Ntulo	District Water Engineer,	Igunga District
A. A. Mwakitalu	Acting District Executive Director,	Nzega District
Mariam Majala	District Water Engineer,	Nzega District
Jakanyango Martin	District Planning Officer,	Nzega District
Rosalia Magotti	District Community Development Officer,	Nzega District
Paschal Ngunda	District Water Engineer,	Sikonge District
B. Ntalyaga	District Planning Officer,	Sikonge District
Themistocles Byarugaba	District Community Development Officer,	Sikonge District

Doroth A. Rwiza	District Executive Director,	Tabora Rural District
Niwdemo N. M.	District Water Engineer,	Tabora Rural District
Faustine K. Misango	Acting District Water Engineer,	Tabora Rural District
Sizo E. J.	District Community Development Officer,	Tabora Rural District
Fanuel K. Senge	Municipal Director,	Tabora Municipality
Mohamed Almas	Municipal Water Engineer,	Tabora Municipality
Ntulila S. H.	District Community Development Officer,	Tabora Municipality
J. M. Molai	District Executive Director,	Urambo District
Rebman Ganshonga	District Water Engineer,	Urambo District
Peter Sinyana	Acting District Water Engineer,	Urambo District
Mary Luhulula	District Planning Officer,	Urambo District
Sabala Rukonda	District Community Development Officer,	Urambo District

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(1) Embassy of Japan

Hiroshi NKAGAWA	Ambassador
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(2) JICA Tanzania Office

Yukihide KATSUTAI	Chief Representative
Toshihisa HASEGAWA	Senior Representative
Tetsuya YAMAMOTO	Representative

(3) Ministry of Water

Christopher N. Sayi	Permanent Secretary
John A. Mukumwa	Director, CWSD
Gibson J. Kisaka	Assistant Director, CWSD
Amami I. B. Mfil	Assistant Director, CWSD
Salum M. Chusi	Acting Assistant Director, CWSD
Bernard Chikarabhani	Principal Hydrogeologist, Tabora Water Office, Lake Tanganyika Basin Water Office

(4) Tabora Regional Administrative Secretariat

Longino K. Kazimoto	Acting Regional Administrative Secretary
Mjanja Hamis	Internal Auditor
Muhibu Sosthenes Lubasa	Regional Water Expert
Ezekiel K. Chamu	Economist

(5) District and Municipality

John W. Wangwe	Acting District Water Engineer	Igunga District
Robert Mgetta	District Community Development Officer	Igunga District
Devotha J. Kilindo	Acting District Community Development Officer	Nzega District
Barnabas Taligunga	Acting District Water Engineer	Nzega District
Paschal Ngunda	District Water Engineer	Sikonge District
Themistocles Byarugaba	District Community Development Officer,	Sikonge District
Faustine K. Misango	Acting District Water Engineer	Tabora Rural District
Sizo E. J.	District Community Development Officer	Tabora Rural District
Mohamed Almas	Municipal Water Engineer	Tabora Municipality
Ntulila S. Hadoni	Municipal Community Development Officer	Tabora Municipality
Lucky Mgeni	Acting District Water Engineer	Urambo District
Sabada Rukonda	Acting District Community Development Officer	Urambo District

APPENDIX 4
Minutes of Discussions

**MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
ON
THE PROJECT
FOR
RURAL WATER SUPPLY IN TABORA REGION
IN
THE UNITED REPUBLIC OF TANZANIA
(EXPLANATION OF DRAFT PREPARATORY SURVEY REPORT)**

The Japan International Cooperation Agency (hereinafter referred to as "JICA") implemented the Preparatory Survey on the Project for Rural Water Supply in Tabora Region (hereinafter referred to as "the Project") as a part of the Study on Rural Water Supply in Tabora Region in The United Republic of Tanzania (hereinafter referred to as "Tanzania"). JICA prepared a Draft Preparatory Survey Report (hereinafter referred to as "Draft Report") through discussion and technical examination of the results of the survey.

In order to explain and to consult with the Government of Tanzania on the components of the Draft Report, JICA sent to Tanzania the Draft Report Explanation Team (hereinafter referred to as "the Team") which was headed by Mr. Minoru Miyasaka, Senior Advisor to the Director General, Global Environment Department, JICA, and stayed in the country from 12th to 21st 2011.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Dar es Salaam, 20th April, 2011


宮坂 実

Mr. Minoru Miyasaka
Leader
Draft Report Explanation Team
Japan International Cooperation Agency
Japan



Eng. Christopher N. Sayi
Permanent Secretary
Ministry of Water
The United Republic of Tanzania

(Witness)



Ms. Philipina W. Malisa
Acting Commissioner for External Finance
Ministry of Finance
The United Republic of Tanzania

ATTACHMENT

1. Components of the Draft Report

The Tanzanian side agreed and accepted in principle the components of the Draft Report explained by the Team.

2. Responsible and Implementing Organization

2-1. The responsible organization is Ministry of Water (hereinafter referred to as "MoW") including facilitation of securing budget.

2-2. The implementing organization is Community Water Supply Division (hereinafter referred to as "CWSD"), MoW.

3. Japan's Grant Aid Scheme

3-1. The Tanzanian side understood the Japan's Grant Aid Scheme as described in **Annex-1**.

3-2. The Tanzanian side agreed to take the necessary measures for smooth implementation of the Project, as a condition for the Japan's Grant Aid to be implemented, as described in **Annex-2**.

4. Schedule of the Survey

JICA will complete the final report in accordance with the confirmed items and send it to the Government of Tanzania by the end of May 2011.

5. Other Relevant Issues

5-1. Combined Procedure of Development Study and Grant Aid

JICA combined Grant Aid process within the Study on Rural Water Supply in Tabora Region as trial for the smooth implementation of Grant Aid project. Tanzanian side understood the omission of some procedures in the Project and appreciated for the steps taken for early start of the implementation of the Project.

5-2. Components of the Project

The Tanzanian side agreed the components of the Project described in **Annex-3**.

5-3. Project Cost Estimate

The Team explained to the Tanzanian side the Project Cost Estimate as described in **Annex-4**. It is a provisional estimate and would be further examined by the Government of Japan for the approval of the Grant. The Tanzanian side understood that the Project Cost Estimate is not final and is subject to be modified. Both sides agreed that the Project Cost Estimate should never be duplicated or released to any outside parties until signing of all the contract(s) for the Project.

5-4. Necessary Budget to be covered by the Tanzanian Side

The Japanese side explained necessary project cost to be covered by the Tanzanian side and necessary operation and maintenance cost as attached in **Annex-4**.

The Tanzanian side promised to secure necessary budget as attached in **Annex-4**.

5-5. Project Sites

The contents of the request about water supply facilities made by the Tanzanian side were six (6) piped water supply schemes (Level-2) and one hundred and seventy four (174) deep wells with hand pumps (Level-1) in 20 target villages.

Based on the survey results, the number of water supply facilities to be constructed in the



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Project would be four (4) Level-2 and one hundred and fourteen (114) Level-1 in 20 target villages as shown in Annex-5, if the Government of Japan would finally decide to finance the Project.

In order to fulfill the planned number of wells, it is reasonable to change the location to the alternative village. Alternative villages will be provided in the Project based on the concept as shown in Annex-6.

5-6. Water Quality Standard for Fluoride

Based on the result of water quality of test wells, MoW requested JICA to change the standard for evaluation of Fluoride content from the WHO Guidelines (1.5mg/L) to the Tanzania Health Standard (4.0mg/L) in the Project due to the importance of allowable safety water supply for rural people, and JICA agreed with the request.

Both sides confirmed that MoW shall follow up and take measures to reduce the possibility of influence of Fluoride as below.

- (1) To collect epidemiological information of Fluoride in Tanzania and consider revising the Tanzania Standard based on the results collected thereof, if necessary.
- (2) To inform villagers of some adverse effects of excessive Fluoride and possible measures for reducing the risks.

5-7. Coordination with JICA's Technical Cooperation Project

JICA and Tanzanian side confirmed that JICA Technical Cooperation "Rural Water Supply and Sanitation Capacity Development Project Phase 2 (RUWASA-CAD 2)" to be implemented would have close relation with the Project. In the implementation of soft component of the Project, activities of RUWASA-CAD 2 shall be considered and arranged to complement each other for capacity development.

5-8. Construction Cost of Branch Power Line

Commercial power supply is available in Isanga and Mabama Villages. In order to use the commercial power supply, it is necessary to construct a branch line from the main power line to the site. In addition, construction of an intake facility is required including a power transformer.

In general, the construction cost of the branch power line is borne by the recipient country. Both sides agreed that the construction cost of the branch power line in Isanga and Mabama is to be borne by the Japanese side for reducing the maintenance cost of constructed water facilities.

5-9. Climate Change Related to the Project

This project is expected to contribute to adaptation to climate change.

5-10. Undertakings of the Tanzanian Side

The Tanzanian side will take necessary measures as described in Annex-7 for smooth implementation of the project, as a condition for the Japan's Grant Aid to be implemented.

End

- Annex-1 : Japan's Grant Aid Scheme
- Annex-2 : Major Undertakings to be taken by Each Government
- Annex-3 : The Components of the Project
- Annex-4 : Project Cost Estimation
- Annex-5 : Project Sites List
- Annex-6 : Concept of Alternative Village
- Annex-7 : Undertakings of the Tanzanian Side

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Annex-I Japan's Grant Aid Scheme

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect in October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japan's Grant Aid is supplied through following procedures:

- Preparatory Survey
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country



which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japan's Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

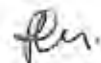
In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as described in Annex-2 and Annex-7.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.



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(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (H/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

The recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

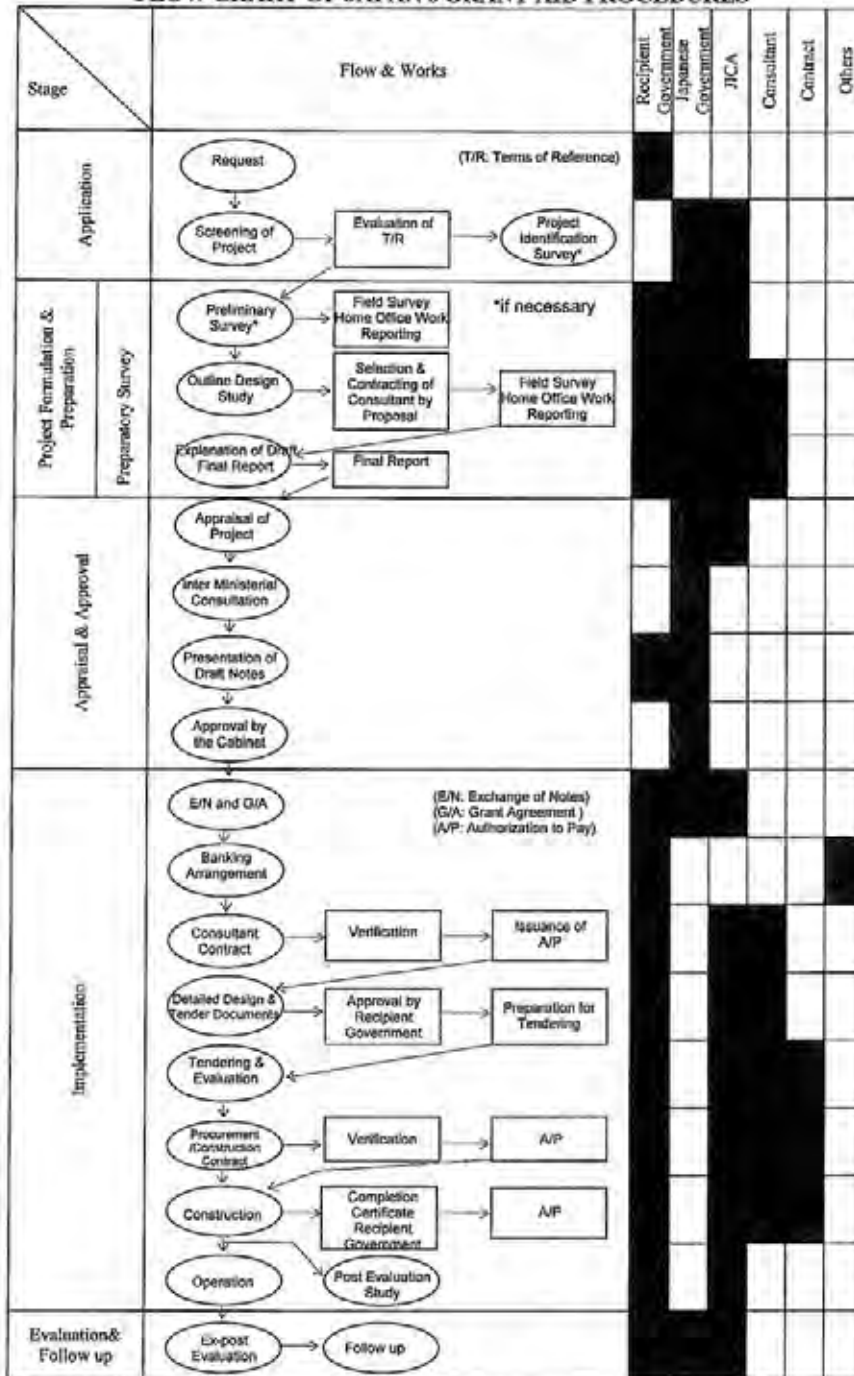
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FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



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Annex-2 Major Undertakings to be taken by Each Government

No.	Items	To be covered by Japanese Government	To be covered by Recipient Government
1	To secure lots of lands necessary for the implementation of the Project and to clear the sites		●
2	To ensure prompt customs clearance of the products and to assist internal transportation of the products in the recipient country		
	1) Marine (Air) transportation of the Products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	●
3	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services may be exempted according to existing laws of Tanzania		●
4	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
5	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
7	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
8	To give due environmental and social consideration in the implementation of the Project.		●

(B/A : Banking Arrangement, A/P : Authorization to Pay)

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Annex-3 The Components of the Project

Item	Specification/Capacity/Quantity
1. Construction of water supply facility	
(1) Deep well with hand pump (Level-1)	114 wells
(2) Piped water supply scheme with public water point	4 sites
1) Intake	4 sites
2) Transmission pipeline	12.28 km (total)
3) Distribution pipeline	31.18 km (total)
4) Distribution tank	50 m ³ x 3 sites 90 m ³ x 1 site
5) Public water points	60 public water points (68 taps)
2. Procurement of equipment	
(1) Electro-magnetic survey equipment	1 set
(2) Two dimensional resistivity survey equipment	1 set
(3) GPS	4 sets
3. Software component	
(1) Operation and maintenance of water supply schemes	1 lot
(2) Training for geophysical survey and groundwater development	1 lot

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This Page is closed due to the confidentiality.

Annex-5 Project Sites List

District/Municipality	Village	Number of Level-2	Number of Level-1
Igunga District	Busomeke	0	7
	Kalemela	0	5
Nzega District	Isanga	1	0
	Kitangili	0	10
	Makomelo	0	6
	Wella	0	7
Sikonge District	Kasandalala	0	7
	Usunga	0	5
	Mpombwe	0	8
Tabora Rural District	Mabama	1	2
	Ufuluma	0	7
	Mpumbuli	1	3
Tabora Municipality	Kakola	1	2
	Misha	0	5
	Uyui	0	8
Urambo District	Imalamakoye	0	4
	Kapilula	0	5
	Kalembela	0	7
	Kiloleni	0	6
	Nsungwa	0	10
Total		4	114

Annex-6 Concept of Alternative Village

Alternative villages will be provided in the Project. The concept is summarized in Table as below.

Condition of Shifting	Contents of Shifting
I. Two (2) consecutive wells are unsuccessful in a target village.	The site is shifted to the alternative village if it is considered to be difficult to get successful well by continuing drilling at the same site, judging from the drilling data and the hydrogeological situation.
II. Two (2) consecutive wells at more than two (2) sites in a same village are unsuccessful.	Drilling sites remained undrilled are shifted to the alternative village, if it is considered to be difficult to get successful well by continuing drilling at the same site, judging from the drilling data and the hydrogeological situation.
A. Successful well was not consecutively obtained at the first drilling site and the second drilling site.	All the sites are shifted to the alternative village.
B. Two (2) wells are failed at the plural sites inconsecutively	Drilling site to be drilled the second unsuccessful site is shifted to the alternative village.

The alternative villages shall be basically selected from the villages evaluated priority-2. If no village evaluated as priority-2 exists in a District/Municipality, the alternative village(s) will be selected from those evaluated as priority-3. The alternative village(s) will be sequentially selected from those with a higher priority.

Factors to be considered are water quality, groundwater potential and water supply coverage used in evaluation of the priority of the villages in the Study.

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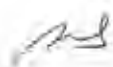
Annex-7 Undertakings of the Tanzanian Side

(1) General Issues

- a) To provide land necessary for the construction of the intake and distribution tank, and access to the site.
- b) To provide the storage site for equipment and materials, and for temporary works during the construction period.
- c) To provide and transfer the data and information necessary for the detailed design study.
- d) To facilitate the assistance and cooperation to the Project by the community people and to take necessary measure for traffic control.
- e) To provide a storage area for the residual clay and a place for discharge.
- f) To carry out ancillary works of the construction of drainage channel.
- g) To ensure all the expense and prompt execution for unloading, custom clearance at the port of disembarkation of the equipment and materials necessary for the Project.
- h) To open Banking Arrangement (B/A) and issuance of an Authorization to Pay (A/P), and to bear an advising commission of the Authorization to Pay (A/P) and payment commission to the Bank.
- i) To accord a facility to Japanese nationals whose services may be required for implementation of the Project, for their entry into Tanzania and their stay therein for the performance of the Project.
- j) To use and maintain the facilities/equipment constructed/purchased properly under the Japanese Grant Aid Project.
- k) To bear the cost for items not included in the Japanese Grant Aid Scheme but necessary for the Project.

(2) Specific Issues in the Project

- a) Arrangement of water use permits for water source
Water source of the water supply schemes to be constructed in the Project is entirely groundwater. Since the required yield of water source was decided in the Study, a water use permits shall be given by Lake Tanganyika Basin Water Office before the commencement of the Project.
- b) Arrangement of permission necessary for the Project
Pipelines will be installed crossing the railway in Mabama Village in Tabora Rural District and Kakola Village in Tabora Municipality. In the pipe laying work, inspection by the Tanzania Railway Limited (TRL) is required. The Tanzanian side agreed to take the necessary procedures and to bear the necessary inspection cost.
- c) Arrangement of necessary procedures to lay pipe line in or along the main roads
Construction work will be carried out along the main roads (District/Municipal roads and TANROAD) and sometimes in the road reserve area. If inspection or permission is required from authorities concerned, the Tanzanian side shall take necessary procedures.
- d) Announcement to community people prior to the commencement of the Project.
It is desirous to inform of the community people about the contents and implementation schedule of the Project prior to the commencement of the Project, in order to ask cooperation of the community people and to keep safety during the construction works.



e) Arrangement of travel expenses in the geophysical survey in the detailed design study

In the detailed design study stage, the consultant will carry out a geophysical survey to decide the drilling location of the deep wells for the level-1 schemes. The Electro-Magnetic survey method and the Two-Dimensional Resistivity survey method will be applied. On-the-job-training will be carried out to the Tanzanian personnel in order to familiarize the operation of the equipment. The Tanzanian side is required to bear the cost for the personnel to attend the training, such as travel allowance and daily allowance.

f) Arrangement of budget for attending the soft component programme

Two (2) soft component programme below are planned in the Project to develop the capacity of the Tanzanian side. The cost to attend the programme is borne by the Tanzanian side.

- 1) Operation and maintenance of the water supply schemes for DWST/MWST held in both Tabora Municipality and each District/Municipality.
- 2) Ability to develop groundwater for the water supply schemes for the members of Lake Tanganyika Basin Water Office (Tabora office) held in Tabora Municipality and in the field.

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APPENDIX 5
Software Component Plan

THE PROJECT FOR RURAL WATER SUPPLY IN TABORA REGION

Software Component Plan

1. GENERAL

The Study on Rural Water Supply in Tabora Region (hereinafter referred to as “the Study”) started in August 2009 and is planned to be completed in May 2011. The Study is composed of two (2) phases, of which 1st phase includes the survey to grasp the current situation and the formulation of the rural water supply plan and the 2nd phase include the feasibility study and preliminary survey of the priority project.

In 1st phase of the Study, the rural water supply plan for 429 villages distributed in Tabora Region was formulated. 20 villages from these 429 villages were selected for the priority project. The government of Tanzania requested the government of Japan to implement the priority project as a Japan’s Grant Aid Project.

In 2nd phase, the detailed survey on natural conditions and socio-economic conditions in 20 target villages was carried out. The budget of the project was estimated in the same level with one of the basic design study. Namely, the Study has both respects of the 2nd phase of the planning support project and preparatory survey for the implementation of the grant aid project.

The contents of the priority project were selected as the following, as a result of the survey in 2nd phase:

Item	Contents	Qty.
Construction	Piped Water Supply Scheme (Level-2)	4 schemes
	Deep Well with Hand Pump (Level-1)	114 schemes
Equipment Procurement	Electro-Magnetic Survey Equipment	1 set
	Two Dimensional Resistivity Survey Equipment	1 set
	GPS	4 sets

A Level-2 scheme cannot always cover the whole area of a village. In this case, the remaining area of the village will be supplied with water by constructing Level-1 schemes.

This software component plan describes the plan for the capacity building of the implementing organization of the Tanzanian side, in the respects of the following two (2) issues;

- 1) software component relating the capacity development of operation and maintenance of the water supply facilities

This software component is the capacity building so that the water supply facilities to be constructed in the Project will be smoothly operated and maintained.

- 2) software component relating the capacity building for the groundwater development using the geophysical survey equipment.

This software component aims to improve the capacity of the proper siting of the wells which are the water sources for the water supply schemes by using the geophysical

survey equipment to be procured in the Project. The improved groundwater development by proper siting method will induce the increase of the coverage rate of the Study Area.

In Tabora Region, the groundwater exists mainly in fractures of hard rock, while its existence in weathered part of the basement rock or in sedimentary layer is scarce. In this reason, the proper groundwater development requires the effective way of identification of the fractures (lineaments). The electro-magnetic survey equipment is suitable for the detection of the lineament in the rock.

The two-dimensional resistivity survey equipment is used in order to grasp the two-dimensional underground structures. The target lineament for this survey will be pre-detected by the electro-magnetic survey and the survey line of the two-dimensional resistivity survey will be set across the line of the electro-magnetic survey. Such a survey method will facilitate the proper selection of the groundwater structure type which possesses the water in the fractures with promised possibility.

The locations of the survey points and/or lines shall be properly registered with their coordinates. GPS is the most suitable and accurate instrument for this purpose. In the Study, the inventories of existing wells and water supply schemes were constructed. These inventories shall be updated according to the progress of the well drilling and the water supply facilities construction in the future projects. In this respect, GPS will be the practical and useful position recorder.

2.1 BACKGROUND OF SOFT COMPONENT PLAN

Formation and capacity development of COWSOs (Community-Owned Water Supply Organizations), which own and manage the water supply scheme, and capacity building of local governments and concerned organizations in provision of technical guidance for the community is implemented under this Software Component Program (hereinafter referred as “Program”) in the Project for Rural Water Supply in Tabora Region in the United Republic of Tanzania (hereinafter referred as “Project”), as well as construction of the Level-1 and Level-2 supply schemes.

Reviewing the national policy and strategy of rural water supply sub-sector and assessing current operation and maintenance of rural supply scheme in the Preparatory Survey for the Project, problems of communities, local government, and concerned organizations in operation and maintenance and issues to be improved are summarized as followed.

2.1.1 NATIONAL WATER POLICY AND NATIONAL WATER SECTOR DEVELOPMENT

STRATEGY

In Tanzania, improvement of operation and maintenance for the rural water supply facilitates has been one of major development issues in rural water supply sector.

The National Water Policy 2002 (NAWAPO) is the national basic policy for water resource management and water supply, of which principles in operation and maintenance for rural water supply system are to promote 1) decentralization in implementation of water supply and sanitation projects to the lowest appropriate institutions, 2) introduction of user-pay principle to recover the cost for operation and maintenance, and 3) enhancement of community-based management (CBM) to sustain the supply system. On the other hand, in National Water Sector

development Strategy (NWSDS) that is a basic strategy of the sector development and Water Sector Development Program (WSDP) that illustrates national sector investment program, emphasis is placed on the capacity development of local authority in planning and implementation of district water supply and sanitation plan, as well as improvement of community-based operation and maintenance. For improvement of operation and maintenance for the rural water supply facilities, introduction of user-pay and participation principles and provision of technical support to the communities by local authorities such as District/Municipal Water Engineer Office has been adopted. In such approaches, beneficiary communities are required not only to establish community-based organization, but also to develop their capacity for operation and maintenance of rural water supply facilities. On the other hand, local authorities represented by DWE is responsible for provision of technical guidance and monitoring to the communities to develop their capacity in operation and maintenance. Along with such strategy and approaches, this Software Component Plan under the Project also applied the principles as such; 1) promotion of community-based operation and maintenance, and 2) enhancement of capacity of local authorities in provision of technical guidance to the communities.

2.1.2 DEVELOPMENT ISSUES IN OPERATION AND MAINTENANCE IN THE PROJECT AREA

Reviewing development issues in current operation and maintenance for the rural water supply facilities in the Project area, the following approaches are emphasised in operation and maintenance plan prepared in the Project.

(1) NECESSITY OF FORMATION AND CAPACITY BUILDING OF COWSO (COMMUNITY-OWNED WATER SUPPLY ORGANIZATION)

Significance of user-paying principle in operation and maintenance of the supply scheme in rural setting has been reconfirmed in NAWAPO of 2002. NWSDS enacted officially in 2008 also advocates introduction of Community-Owned Water Supply Organization (COWSO). It is due to the fact that conventional Village Water Committee (VWC) is inactivated as expected for improved operation and maintenance for the rural water supply facilities. VWC has been usually appointed by and formed under Village Council, which is expected to execute its responsibilities for operation and maintenance of supply facilities. However, without capacity development for them in operation and maintenance through provision of necessary training and technical guidance by local authorities, VWC has been left inactive. Also, intervention and influence by Village Council, as well as lack of skills in fee collection and mismanagement of the Water Fund, inactivate and malfunctioned most of VWC. As such disadvantages and limits of community- and voluntary-based management by VWC has been recognized since mid 1990's, the government urges introduction of COWSO as sustainable form of community-based management for the supply schemes.

There is clear distinction between conventional Village Water Committee (VWC) and Community-Owned Water Supply Organization, the latter legally owning and managing the water supply scheme. In the process of its formation, consensus building is made among community on COWSO management option, preparation of organizational and managerial constitution/by-law, and selection of COWSO management board members in a fair manner by community election. Through those processes, functional roles and responsibilities of COWSO are clearly defined and fully recognized by the community. Therefore, COWSO is a community-based organization founded on the relationship with user communities (consumers) as a potential service provider, while conventional VWC is a consumer organization less independent from and formed under Village Council. Although COWSO takes variety of

organizational forms, such as Water Users Association (WUA), Water User Group (WUG), Water Company by Guarantee, according to their constitution/by-law developed, management option, and acts applied for their registration, general characteristics of the organization are as followed:

- Consensus is built among community on organizational and management options for operation and maintenance of the supply scheme.
- Organizational and managerial constitutions/by-laws are prepared in a participatory manner with communities and approved by the communities.
- Management board of COWSO is selected in a fair manger through community election.
- The organizations are registered as civil society under Ministry of Water or local government, and functional roles and responsibilities are clarified with their constitutions/by-laws.
- Decision making process is independent and different from Village Council.
- The organization is independent entity and cooperating relationship is built with Village Council and local politics (i.e. local councilors, and political group).
- Capacity development of the organization in operation and maintenance is ensured through trainings provided by External Supporting Agencies (ESA), such as donor, local authorities, and NGOs.
- Monitoring and follow-up is regularly provided by local authorities.

Conceptual framework of COWSO has been already introduced in the rural water supply project implemented by Ministry of Water. In the implementation of those rural water supply program and project, COWSOs, in the form of Water Users Association (WUA) and Water Users Group (WUG), are formed, aiming at realization of the community-based management in sustainable manners. Furthermore, in the rural water supply scheme implemented in early 2000's in Morogoro Region, trustee entity to manage the supply scheme was formed in the community and incorporated to Water Company by Guarantee, which is successfully performed as professional service provider. Those Water Companies by Guarantee contracted to manage the supply scheme with WUAs formed in the communities as trust body, setting performance target and indicator.

As a result of assessment on these forms of COWSOs (refer to *Table 1.1*) and considering technical and managerial requirements, it is concluded that the WUA is suitable management option for operation and maintenance of Level-2 facilities which is constructed under the Project. Although it is considered that WUG is appropriate option for the operation and maintenance of Level-1 facilities, it is reconsidered that the WUA is also applicable management option due to considerable number of Level-1 facilities to be constructed in each target communities, which requires more integrated management system covering all facilities by having one WUA.

Table 1.1 Management Options of COWSOs

Village Water Committee (VWC)	The most conventional form of community-based organization to manage supply scheme, of which members are appointed by Village Council. Formed under Village Council, most of VWCs are less independent and competent in its management without required skills and knowledge.
Water User Group (WUG)	This community-based organization is formed in each domestic water points, such as wells installed with hand pumps and water kiosk, which manage only domestic water points, rather than entire supply scheme. Thus, a number of WUGs are often exists in a community, which often brings lack of unity and inefficiency in entire scheme management.
Water User Association (WUA)	This form of community-based organization is formed in the supply scheme consisted of a number of domestic water points and other supply facilities.. General assembly of the WUA is consisted of each and every user household, and directive board members are elected for the management of the supply scheme. WUAs are regally registered under relevant authorities, preparing their constitutions for the scheme and organizational management.
Water Company by Guarantee	Water Company by Guarantee is formed (or exists) as service provider to provide operation and maintenance service and/or entire scheme management according to the contract concluded with COWSOs. Their competency in the service provision is relatively high, but as well as their transaction costs.
Water Company by Share	This is consirably professional form of service provider to provide entire scheme management in a large urban schale.

(2) CAPACITY DEVELOPMENT OF DISTRICT/MUNICIPAL COUNCIL IN PROVISION OF TECHNICAL GUIDANCE

Although the most of supply schemes in the Project area are operated and maintained by the communities forming VWCs, the inventory survey on the existing rural water supply schemes in all six District/Municipality in Tabora regions conducted under the Study (JICA, 2009) revealed that functionality rate of Level-2 schemes amounts to 37 percent in average. It is also revealed that the major reasons for non-functionality of Level-2 schemes are break-down of mechanical pump unit, theft of pump, and, pipe leakage. On the other hand, it is also found that the breakdown rate of hand pump which is installed in 2000s amounts to 43 percent among 475 numbers. Indeed, 36 percent of non-functional Level-1 schemes attributed its non-functionality to problem with pump. While the most direct cause of the low functioning rate is breakdowns and leaving unrepaired of water pumping devices, it can be rooted in poor management of the scheme by VWCs. In the implementation of the Project, capacity of the target communities shall be improved in operation and maintenance of the scheme, introducing appropriate form of COWSO and providing training in organizational and scheme management through implementation of “Software Component Program” under the Project.

While establishment of COWSO is facilitated that is expected to take initiative in operation and maintenance of the supply scheme, capacity development of the organization in the scheme management is also desirable. However, most of the target communities has less experienced in organizational management of the supply scheme. Survey results and findings, gained through the Study and experiences of NGOs involved in the capacity development community in the Study area identify the training needs for the target communities and suggest provision of training for improvement of their capacity in the following concerns to assure sustainability in the community-based operation and management;

- Leadership skill
- Community communication skills

- Organizational/Institutional management skills
- Tariff setting and collection methods
- Financial management skills such as budget preparation, accounting, and fund management
- Technical operation and maintenance, and trouble shooting
- Participatory monitoring and evaluation with preparation of monitoring check list

(3) CAPACITY DEVELOPMENT OF DISTRICT/MUNICIPAL COUNCIL IN PROVISION OF TECHNICAL GUIDANCE

Lack of institutional support, such as technical guidance for the community in formation of community-based organization, organizational management, financial management and accounting, and follow-up and monitoring, has been stated as one of major problem in operation and maintenance of rural water supply scheme, which is also regarded as one of causes for low functional rate of the supply scheme in the Project area. It can be said that the provision of institutional support to the communities is indispensable for sustainable community-based management for the supply scheme facilitated by COWSO described above. In the national policy and strategy for rural water supply, District/Municipal Water Engineer (DWE/MWE) assigned under District/Municipal Council is responsible for mobilization of communities in establishment of community-based organization, provision of training for capacity development of the organization in operation and maintenance, and provision of technical guidance and community monitoring. However, there are limits in capacity of DWE/MWE to provide such institutional supports in planned and organized manners.

In order to strength capacity of local authorities, guiding model has been facilitated in the country to form and develop capacity of District/Municipal Water and Sanitation Team (DWST/MWST). In general, DWST/MWST is formed under each District/Municipal Council and consists of District/Municipal Water Engineer (DWE/MWE), District/Municipal Planning Officer, District/Municipal Health Officer, District/Municipal Community Development, of which composition enables integrated approach for the sub-sector development. In the targeted District and Municipality, DWST/MWST has not been formed, and their capacity in provision of technical guidance and monitoring is poorly developed. In addition to the introduction of COWSO described above, establishment and capacity building of DWST/MWST shall be also enhanced by implementation of software component of the Project. The Figure 2.1 shows the relationship among COWSO, DWST/MWST, local government and the Ministry.

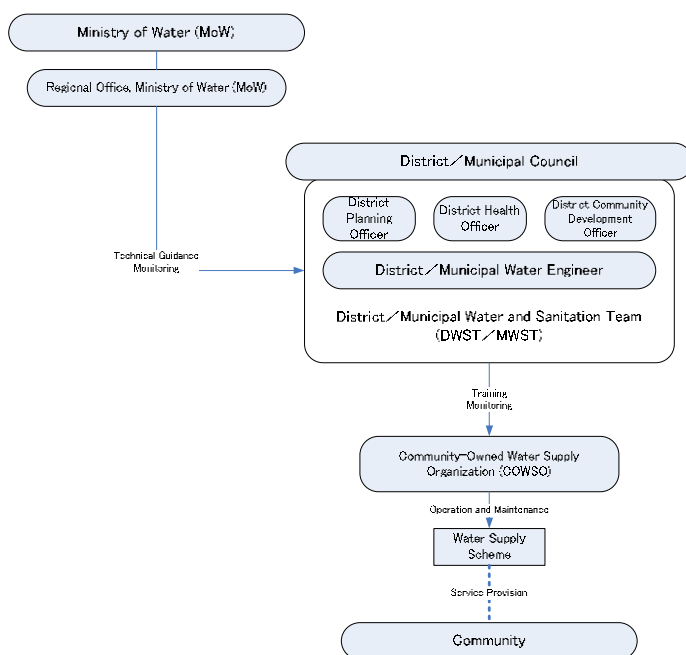


Figure 2.1 Operation and Maintenance Structure

In order to establish improved operation and maintenance mechanism in the Project, capacity development of DWE/MWE and local government is indispensable. For strengthening their administrative support, reorganization and capacity development of DWST/MWST is conducted. DWST/MWST that is established under the local government take initiative for formation of community-based operation and maintenance mechanism in the implementation of the Project, and provide technical guidance and monitoring for the communities after completion of the Project.

(4) USER-PAY PRINCIPLE IN OPERATION AND MAINTENANCE

User-Pay Principle (UPP) is introduced in the country for operation and maintenance of rural water supply facilities. Inventory survey (JICA, 2009) that was conducted under the Survey for the Project revealed that only one-third of the communities owing their rural water supply facilities carry out water user fee collection. In circumstances that the most cases where periodical or regular fee collections are practiced in the communities managing Level-1 scheme, and considerably less number of communities operating and maintaining the facilities in a sustainable manner through fee collection are not found in vicinity, JICA inventory survey found that their willingness to pay (WTP) amount only to 0.66 Tsh/l and 0.41 Tsh/l respectively for Level-2 and Level-1, which is less than 1.0 Tsh/l of de-facto standards in the country. The detailed socio-economic survey (JICA, 2010) also confirmed that mean monthly household income in the target communities amounted to 150,000 – 200,000 Tsh. Setting water user fee at 1.0 Tsh/l as standardized in de-facto manner and assuming their water consumption at 25l/capita/day by average of 7 household members, ratio of expenditure for water in total household income amounts to 2.5 to 3.5 percent, which is less than the limit of 5 percent to assure their affordability to pay (ATP) for water. Thus, it is became obvious that 1.0 Tsh/l is water user fee affordable for the communities. Thus, considering there is less community regularly and customary collecting water fee and ATP is higher while WTP is lower, component activities to increase their awareness and willingness in user-pay principle is indispensable.

(5) SENSE OF COMMUNITY IN WATER AND HYGIENE

Access to safe water can prevent people from suffering from water-borne diseases such as malaria, diarrhoeal diseases and intestinal worms. To do that, people are required to utilise the water properly, and possess proper knowledge on importance of access to safe water and utilisation of the water. However, people living in rural areas of Tabora Region do not have sufficient knowledge on health, sanitation and hygiene including safe water. The results of the detail socio-economic survey by JICA Survey Team under the Survey for the Project (JICA, 2010) revealed that the respondents know access to safe water can prevent them from diarrhoeal diseases but few know proper hand washing can also do that. The socio-economic survey also revealed that while 70 percent of the community rely its domestic water source on traditional and unprotected sources (i.e. chroco dam, shallow well, pond/river), 30 percent of community member responded they “do very satisfy” and/or “satisfy” for water quality from those traditional source, and including those who responded “fair) the figure increases at 60 percent. It is inferred that people do not know what safe water is. In order to maximize the impact on health and hygiene aspects brought by improved water supply facilities and increase awareness in payment of water user fee and participation in operation and maintenance, measures to enhance awareness in “water and sanitation” shall be included in the software component plan.

Villages and schools are forefront of health education. Village Health Workers (VHW) and Village Health Committees (VHC) perform health education in the village/community level, while Health Teachers play a role of health-related instruction. Actual performance of health education by VHW/VHC and Health Teachers is not high. They provide education without any manuals, teaching guides or teaching aids.

Therefore, hereby it is proposed to develop manuals/teaching guides and teaching aids (if necessary) that concisely compile the standard operating procedures (SOP) for health education as a “soft component”. Through providing these manuals with TOT (Training of Trainer) to relevant personnel, structure for promotion of health and hygiene education is strengthened. Manual/teaching guides and teaching aids are developed under the Program, applying approach of Community-Led Total Sanitation (CLTS)¹ as guideline prepared by Ministry of Water advocates.

In addition, since Tanzanian water quality standard is applied for fluoride as Tanzanian government requested, in the community which own water supply facilities of which contamination of fluoride exceeds to WHO standards, guidance to the community about its anxiety on health and its countermeasures are provided.

2.2 SOFTWARE COMPONENT RELATING TO THE GROUNDWATER DEVELOPMENT BY USING GEOPHYSICAL SURVEY EQUIPMENT

The development and the management of the groundwater resources in Tabora Region are under the control of the Tabora Branch of the Lake Tanganyika Basin Office. Tabora Branch carries out the water well siting upon the request from the NGOs or other organization. They have the roll of the supporting centre for groundwater development in Tabora Region.

¹ CLTS is concept and participatory educational tool for improved personal hygiene and sanitation practices, which utilize locally available resources through problem findings and analysis in participatory manner.

Ministry of Water (MoW) had a plan to increase the water supply coverage rate in rural areas to 65 % by the year 2010, which was the goal of the “MKUKUTA (National Strategy for Growth and Reduction of Poverty (NSGRP)) ” in 2005. However, the coverage rate in Tabora Region was 49.1 % in the fiscal year of 2007/2008, while this Study proved actually it was 17.5 %. Tabora Region is one of the least developed regions in Tanzania in terms of the water supply.

In Tabora Region, there is poor surface water resource because rivers area seasonal. Therefore, only the reliable water sources are the groundwater. In this respect, it is an urgent issue to promote the groundwater development. However, the serious constrain is that it is difficult for Tabora Branch to carry out proper geophysical survey activities as a groundwater development supporting centre, because their equipment is completely aged and their accuracy is no more reliable.

Tabora Region is the under the difficult hydrological conditions for the groundwater development. In the Study, it was confirmed that only 125 wells had enough yield of 289 wells which had been drilled in the past. Namely, the success rate of the well drilling for Level-1 schemes is as low as 43.3 %. The test well drilling was carried out in the Study and the combination method of the electro-magnetic survey and the two-dimensional resistivity survey was adopted for the well siting. This method gave the clear detection image of the target lineament and geological structure. This result induced the security of the water sources of the Level-2 schemes. This method is also effective for the siting of the wells for Level-1 schemes of the Project in the improvement of the success rate of the drilling. Furthermore, Tabora Branch is expected to properly function as a groundwater development supporting centre for the promotion of the groundwater development in Tabora Region by possessing and use the above equipment after the completion of the Project.

3. SOFTWARE COMPONENT RELATING TO OPERATION AND MAINTENANCE OF WATER

SUPPLY SCHEMES

3.1 OBJECTIVES OF SOFTWARE COMPONENT

In order to achieve the project objective of “safe and stable water is supplied to and consumed by the target communities through the water supply scheme constructed by the Project” and assure sustainability of impact brought by the Project, the software component of the Project is implemented to establish community-based operation and maintenance mechanism and enhance capacity of local authorities in provision of technical guidance to the target communities.

3.2 EXPECTED OUTPUT OF THE SOFTWARE COMPONENT

Outputs expected by the implementation of the software component of the Project are as followed:

Output (1) Community-based operation and maintenance mechanism is established and enhanced in the target community of the Project

One of the outputs is to establish community-based operation and maintenance mechanism in the community through the implementation of related activities. To put it concretely, its realization is aimed through provision of technical support for each target community to form and develop the capacity of Water Users Association (WUA). The followings are detail outputs expected in the establishment of community-based operation and maintenance mechanism.

- Consensus is build among each target community on managerial and organizational options for community-based operation and maintenance of the supply scheme.
- Users pay for membership fee to join WUA, and General Assembly of WUA composed of all users are formed.
- General Assembly meeting of WUA is held and Directive Board members of WUA are selected through the community election.
- Constitutions/by-laws regarding organizational management is prepared by Directive Board of WUA, and approved by General Assembly.
- Constitutions/by-laws regarding operation and maintenance of the supply scheme is prepared by Directive Board of WUA, and approved by General Assembly.
- Newly formed WUA is registered as civil society either under Ministry of Water or local government framework, and functional roles and responsibilities of WUA, community, and local government in operation and maintenance of the supply scheme is clearly defined and understood.
- Capacity of WUA is improved in operation and maintenance of the supply scheme and organizational management through provision of training packages in these fields.
- WUA builds cooperating relationship with Village Council and local political group, while keeping independence in decision making process of WUA.

Output (2) Capacity of District/Municipal Council to provide technical guidance for the communities is improved

District/Municipal Water and Sanitation Team (DWST/MWST) is formed in each District and Municipal Council, and preparedness of institutional support to the communities is enhanced. Detail output expected in this regards are described as followed:

- District/Municipal Water and Sanitation Team (DWST/MWST) is formed, which composes of Water Engineer, Planning Officer, Health Officer, and Community Officer under District/Municipal Council.
- Capacity of DWST/MWST is improved in support for establishment of community-based organization, community mobilization and consensus building, provision of technical guidance in operation and maintenance.
- DWST/MWST provides regular follow-up and monitoring activities for community-based management of the supply scheme.

Output (3) Structure to enhance sense and awareness in “Water and Hygiene” is strengthened

- Manual/teaching guide and teaching aids in “water and hygiene” for VHW, VHH and health teachers prepared
- Capacity of VHW, VHH and health teachers in promotion of “Water and Hygiene” is enhanced.

- Structure to provide guidance anxiety of fluoride on health and its countermeasures is strengthened.

3.3 MEANS OF VERIFICATION

Means of verification to assess the output set in 3 above are as followed:

Means of Verification for Output (1) Community-based operation and maintenance mechanism is established and enhanced in the target community

- Minutes of agreement in the General Assembly of WUA on selection of community-based operation and maintenance options for the supply scheme.
- Members list for General Assembly of WUA
- Minutes of meeting in General Assembly of WUA, Records of election for Directive Board of WUA, and members list for Directive Board
- Constitution of WUA regarding operation and maintenance of the supply scheme
- Constitution of WUA regarding organizational and institutional management
- Registration certificate of WUA
- Records of operation, maintenance, and accounting
- Records of training provided for WUA
- Completion Report of Software Component Program

Means of Verification for Output (2) Capacity of District/Municipal Council to provide technical guidance for the communities is improved

- Member list of DWST
- Training manual for DWST/MWST in establishment of community-based operation and maintenance and PHAST (Participatory Health and Sanitation Transformation)
- Record of OJT for DWST/MWST
- Prepared plan of DWST/MWST for monitoring and evaluation
- Completion report of Software Component Program

Means of Verification for Output (3) Structure to enhance sense and awareness in “Water and Hygiene” is strengthened

- Manual/teaching guides, teaching aids
- Record of training for VHW, VHC, and Health Teacher
- Completion report of Software Component Program

3.4 ACTIVITIES AND INPUT IN SOFTWARE COMPONENT PROGRAM

Activities necessary for achievement of objectives and outputs set above are described as followed:

- 1) Activities related for establishment of community-based operation and maintenance mechanism

Appendix 5 Software Component Plan

- Prepare field guide for community
 - Conduct general community meeting
 - Carry out participatory community assessment and prepare CAP (Community Action Plan)
 - Implement activities to facilitate community participation in the target communities
 - Form General Assembly of WUA and conduct community election to select Directive Board of WUA
 - Prepare WUA constitution regarding operation and maintenance, and organization management
 - Register WUA under Ministry of Water or local authority
 - Provide capacity development training for WUA in operation and maintenance of the supply scheme
- 2) Activities related for capacity building of DWST/MWST in provision of technical guidance for the communities
- Prepare field manual for DWST/MWST
 - Form DWST/MWST (District/Municipal Water and Sanitation Team)
 - Provide TOT (Training of Trainers) for DWST/MWST, and prepare action plan of DWST/MWST
 - Provide OJT (On-the-Job Training) for DWST/MWST to carry out activities at field level, utilizing field manual prepared.
 - Prepare action plan of DWST/MWST for monitoring and evaluation.
- 3) Activities related to the capacity building of health education organization concerning “Water and Sanitation”
- Prepare “Water and Sanitation Manual” for VHWs, VHCs and Health Teachers.
 - Provide the training to VHWs, VHCs and Health Teachers, based on the above manual.
- 4) Activities to measure the impact brought by the Project
- Carry out monitoring and follow-up activities by DWST/MWST
 - Implement post baseline survey

The following table summarizes activities described above by objectives, target group, means of implementation, days and human resources required, and output for each activity.

Table 3.1 Details of Software Component Program for Improved Operation and Maintenance of Rural Water Supply Facilities

Activity	Output	Target	Means of Implementation	Period	Implementer [Responsibility]	Output of Submission
Stage 1: Pre-Planning 1-1) Preparation of Field Implementation Manual	For the implementation of software component program, three (3) kinds of field implementation manual (operation and maintenance, community mobilization, participatory health education) are prepared and utilized by DWST/MWST	5 Districts 1 Municipalities	Review of existing manual, discussion with MoW, training needs assessment, preparation of manuals, field test, submission to MoW	7 days	Japanese Consultant NGO/Local Consultant 【Japanese Side】	field implementation manuals (operation and maintenance, community mobilization, participatory health education)
1-2) Preparation of Field Guide for Communities	As field guide utilized by community, operation and maintenance guide and organizational management guide for WUJA, as well as participatory health and hygiene education for VHW, VHC, and health teacher are prepared.	5 Districts 1 Municipalities	Review of existing manual, discussion with MoW, training needs assessment, preparation of manuals, field test, submission to MoW	7 days	Japanese Consultant NGO/Local Consultant 【Japanese Side】	Field Guide for Communities (operation and maintenance, organizational management, participatory health and hygiene education)
1-3) Formation of DWST/MWST (District/Municipal Water and Sanitation Team	DWST/MWST, which composes of district/municipal staff involved in development of water and sanitation sector, is formed in each district and municipality, and multi sector approaches can be introduced.	5 Districts 1 Municipalities	Request to each district and municipality by implementing agency	0.5 month/ district, municipality	MoW, District/Municipal Council 【Tanzanian Side】	Member list of DWST/MWST
1-4) Provision of TOT (Training of Trainers) for DWST/MWST and Preparation of DWST/MWST Action Plan 【Contents】	Utilizing field implementation manual, facilitation skills of DWST/MWST are improved, and DWST/MWST Action Plan for the implementation of software component program is prepared.	5 DWST 1 MWST	Workshop seminar	5 days/ district, municipality	Japanese Consultant NGO/Local Consultant 【Japanese Side】	Workshop Report DWST/MWST Action Plan
➢ Leadership Skill						
➢ Organizational Management Skill						
➢ Financial Management						
➢ Technical Operation and Maintenance						
➢ PHAST (Participatory Health and Sanitation Transformation)						
➢ Participatory Monitoring and Evaluation						

Activity	Output	Target	Means of Implementation	Period	Implementer [Responsibility]	Output of Submission
Stage 2: Participatory Planning						
2-1) Community Consultative Meeting, and Confirmation of Pre-Conditions for Construction	Communities understand project purpose, expected output, and detail activities and willingness to collaborate the project is enhanced. In particular, User-Pay-Principle is understood. Pre-condition (WUA formation and registration) for the construction of improved water supply system is confirmed. In the community where contents of fluoride exceeds WHO standard, guidance to the community in its anxiety on health and countermeasures are provided	All of Target Communities	Meetings	0.5 day/Community	Japanese Consultant NGO/Local Consultant DWST/MWST 【Japanese Side】	Minutes of Meeting
2-2) Participatory Community Assessment, and Preparation of Community Action Plan (CAP)	Problems and concerns in operation and maintenance of improved water supply scheme are identified and analyzed, and Community Action Plan (CAP), which indicated community task, and means of implementation, is developed in participatory manner.	All of Target Communities	Participatory field workshop	1.0 day/community	Japanese Consultant NGO/Local Consultant DWST/MWST 【Japanese Side】	Workshop Report Community Action Plan (CAP)
2-3) Community Consultative Meeting (Consensus Building for Community Action Plan) and Establishment of WUA	Community consensus for CAP is made and WUA is established	All of Target Communities	Meeting	0.5 day/community	Japanese Consultant NGO/Local Consultant DWST/MWST 【Japanese Side】	Agreed CAP
Stage 3: Construction/Implementation						
3-1) Preparation of Constitution for community-based operation and maintenance, and orientation on the WSS (Water Supply and Sanitation) Management Option under Sector Reform	Various WSS management options under sector reform are introduced to the communities, and constitutions of WUA for community-based management are prepared.	All of Target Communities (WUA)	Participatory field workshop	0.5 day/community	Japanese Consultant NGO/Local Consultant DWST/MWST 【Japanese Side】	WUA Constitution Workshop Report

Activity	Output	Target	Means of Implementation	Period	Implementer [Responsibility]	Output of Submission
3-2) Capacity Building of Communities in Operation and Maintenance, Implementation of Health and Sanitation Education, and OJT (On-the-Job Training) <ul style="list-style-type: none"> ➢ Facilitation of Community Participation ➢ Improvement of Leadership Skill of WUA ➢ Enhancement of Financial Management for WUA Accountant ➢ Technical Training for WUA Artisan in Operation and Maintenance ➢ Training for VHW, VHC, health teacher in CLTS, and Participatory Health and Sanitation Education ➢ Guidance on health impact of Fluoride and its countermeasures 	Capacity of community in management, operation and maintenance of improved water supply scheme and community awareness in health and sanitation is improved, and facilitation skills of DWST/MWST is enhanced through OJT. In the community where contents of fluoride exceeds WHO standard, guidance to the community in its anxiety on health and countermeasures are provided	All of Target Communities DWST/MWST VHW, VHC, health teacher	Participatory field workshop	7.0 days/ Community	Japanese Consultant NGO/Local Consultant DWST/MWST 【Japanese Side】	Training Report
3-3) Follow-up Activities for Capacity Building, and Health and Sanitation Education	Sense of community ownership, capacity of community in operation and maintenance, and awareness in health and sanitation is improved.	All of Target Communities	Participatory Field Workshop	2.0 days/ Community	NGO/Local Consultant DWST/MWST 【Japanese Side】	Minutes of Meeting
Stage 4: Operation and Maintenance						
4-1) Guidance for WUA in operation and preventive maintenance of water supply facilities	Through actual operation and maintenance of improved water supply scheme, training needs are identified, and training package to strengthen community capacity is prepared and provided.	All of Target Communities (WUA)	Field Training	2.0 days/ Community	NGO/Local Consultant DWST/MWST 【Japanese Side】	Training Report
4-2) Follow-up Training for WUA (Strengthening Community Capacity in Operation and Maintenance)	Assessing and identifying training needs through actual operation and maintenance of supply facilities and WUA management, follow-up training is provided to community	All of Target Communities (WUA)	Participatory Field Workshop	6.0 days/ Community	NGO/Local Consultant DWST/MWST 【Japanese Side】	Training Report
Stage 5: Monitoring and Follow-up						
5-1) Preparation of Monitoring and Follow-up Check List of DWST/MWST	Issues to monitor and follow-up is identified, and monitoring and follow-up check list of DWST/MWST, which includes indicators and means of verification, is prepared.	4 Districts 3 Municipalities	Workshop	1.0 days/ District, Municipality	NGO/Local Consultant DWST/MWST 【Japanese Side】	Monitoring and Follow-up Check List
5-2) Monitoring and Follow-up	Monitoring and follow-up activities are provided by DWST/MWST	All of Target Communities	Field Investigation	2.0 days/ month/ community	DWST 【Tanzanian Side】	Monitoring Report

3.5 ASSIGNMENT OF PERSONNEL

Personnel to be assigned to implement the Software Component Program are as followed.

1) Japanese Consultant (Operation and Maintenance/Health and Sanitation Education)

Since the implementation agency of the Project has less skills and experiences for the implementation of the Software Component Program, a Japanese consultant is responsible for: 1) formulation and supervision of the Software Component Program, 2) reporting to the implementing agency and Japanese Side concerned, and coordinating parties concerned in the program, and, 3) coordination in implementation of the Program with construction schedule. Also, technical advice and capacity building will be given to local staff from the implementing agency and NGO/local consultant.

2) Counterpart Staff from Implementing Agency

One staff from MoW will participate as a counterpart to the Japanese consultant to cooperate in supervisory activities. In the course of program implementation, the counterpart will also coordinate administrative matters with Tanzanian authorities concerned when necessary.

3) NGO/Local Consultant

Since District/Municipal Council in the target area has less experiences and skills for the implementation of Software Component Program, local NGO and/or local consultant experienced and capable is employed to carry out the activities, and skills and technology is transferred to the Councils, in particular, District/Municipal Water Engineers Office through provision of workshop and OJT. Staff from local NGO/consultant is deployed as followed, considering the scale and schedule of activities involved in the program. Each staff member shall be experienced in implementation of the similar program and fluent in the local language.

① Program Coordinator: One person/Region (One person)

Under the supervision of Japanese consultant, one program coordinator per Region takes the leading roles in implementation of field activities and manages the schedule, methodology and output of the Program, as well as reporting to the Japanese consultant. The program coordinator shall be experienced as a team leader in the similar programs.

② Community Facilitator: One person/District, Municipality (Two persons)

Supervised by program coordinator, one community facilitators per District/Municipality is deployed to conduct field activities to support the program coordinators. The community facilitators shall be experienced in establishment of community-based management, participatory planning, participatory monitoring and evaluation, capacity building, and health and sanitation education in the water and sanitation sector.

4) District/Municipal Water and Sanitation Team (DWST/MWST)

DWST/MWST is formed in each target District/Municipality of the Project. It comprises the District/Municipal Water Engineer and other District/Municipal staff involved in development of water and sanitation sector. Prior to the implementation of

the Software Component Program, MoW takes leading roles to request to and coordinate with each District/Municipal Executive Officer for formation of DWST/MWST. DWST/MWST is provided with TOT (Training of Trainers) and OJT (on-the-job training) through the implementation of field activities to establish community-based management and facilitate health and sanitation education, so that the knowledge and skills are improved and retained in each Council.

3.6 IMPLEMENTATION SCHEDULE

The implementation schedule is described in Table 3.2.

3.7 OUTPUT OF SUBMISSION

Outputs of submission are field implementation manuals for DWST/MWST, DWST/MWST action plan, community action plan (CAP), various training reports, minutes of meeting, monitoring check list, and post-baseline survey report.

Table 3.2 Implementation Schedule of Software Component Program for Improved Operation and Maintenance of Rural Water Supply Facilities

Year	2011												2012												2013												2014												2015	
Fiscal Year	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2								
Item																																																		
Construction																																																		
Activities of Software Component Program	Months Required	Target	Total Months Required																																															
Stage 1) Pre-Planning																																																		
1-1) Preparation of Field Implementation Manual	0.23	1 Project	0.23																																															
1-2) Preparation of Field Guide for Communities	0.23	1 Project	0.23																																															
[To be borne by Tanzanian Side] 1-3) Formation of DWST/MWST (District/Municipal Water and Sanitation Team)	0.50	Municipality / District	3.00																																															
1-4) Provision of TOT (Training of Trainers) for DWST/MWST and Preparation of DWST/MWST Action Plan	0.17	6 Municipality / District	1.02																																															
Stage 2) Participatory Planning																																																		
2-1) Community Consultative Meeting, and Confirmation of Pre-Conditions for Construction	0.02	20 community	0.40																																															
2-2) Participatory Community Assessment, and Preparation of Community Action Plan (CAP)	0.03	20 community	0.60																																															
2-3) Community Consultative Meeting (Consensus Building for Community Action Plan) and Establishment of WUA	0.02	20 community	0.40																																															
Stage 3: Construction/Implementation																																																		
3-1) Preparation of Constitution for community-based operation and maintenance, and orientation on the WSS (Water Supply and Sanitation) Management Option under Sector Reform	0.02	20 community	0.40																																															
3-2) Capacity Building of Communities in Operation and Maintenance, Implementation of Health and Sanitation Education, and OJT (On-the-job Training)	0.23	20 community	4.60																																															
3-3) Follow-up Activities for Capacity Building and Health and Sanitation Education	0.07	20 community	1.40																																															
Stage 4: Operation and Maintenance																																																		
4-1) Guidance for WUA in Operation and Preventive Maintenance of Rural Water Supply Facilities	0.07	20 community	1.40																																															
4-2) Follow-up Training for WUA (Strengthening Community Capacity in Operation and Maintenance)	0.20	20 community	4.00																																															
[To be borne by Tanzanian Side] 5-2) Monitoring and Follow-up	0.07	20 community	1.40																																															
1. Japanese Consultant (Community-Based O&M / Health and Sanitation Education)	M/M		4.00																																															
2. Local NGO / Consultant	M/M																																																	
Program Coordinator			12.00																																															
Facilitator (Community-Based O&M / Health and Sanitation Education)			29.64																																															
				Total 12 M/M																																														
				Total 29.64M/M																																														

4. SOFTWARE COMPONENT ON CAPACITY BUILDING FOR GROUNDWATER DEVELOPMENT

4.1 OBJECTIVES OF SOFTWARE COMPONENT

The purpose of the software component is to improve the water supply situation in Tabora Region, by promoting the construction of the water supply schemes, as a result of the capacity building of the groundwater development using the geophysical survey equipment to be procured in the Project.

4.2 EXPECTED OUTPUT OF THE SOFTWARE COMPONENT

Output (1) The staff of the Tabora Branch obtain the knowledge and skills to formulate the survey (well siting) plan for themselves in consideration of the topographical, geological and hydrogeological conditions

Output (2) The staff of the Tabora Branch acquire the proper use of the geophysical equipment to be used in the Project

2-1) The ability of the geophysical survey for various local conditions is improved

2-2) The ability of the judgement whether or not the quality of the acquired data is suitable for the geological and hydrogeological analysis

Output (3) The staff of the Tabora Branch acquire the knowledge and skills to analyze the survey data to formulate the groundwater development plan in the target areas

3-1) The ability to analyse the acquired data and prospect the hydrogeological structures is improved

3-2) The ability to formulate the concrete groundwater development plan from the data analysis results is improved

3-3) The ability to analyse to re-evaluate the groundwater development plan from the actual drilling results is improved

3-4) The ability of the re-analysis of the survey data and the revision of the groundwater development plan is improved

4.3 MEANS OF VERIFICATION

Means of verification to assess the output set in 4.2 above are as followe:

Means of Verification for Output (1)

- Groundwater Development (Geophysical Survey) Plan

Means of Verification for Output (2)

- On-site confirmation by the Consultant

(The Japanese Expert of the Consultant will confirm 1) whether or not they can set out the proper survey lines suitable for the site conditions, 2) whether or not measurement is properly done and the proper data for the analysis)

Means of Verification for Output (3)

- Evaluation of the survey data by the Consultant and groundwater development plan revised by the trainee

4.4 ACTIVITIES AND INPUT IN SOFTWARE COMPONENT PROGRAM

1) Activities related to the formulation of the survey (well siting) plan in the target areas

- Classroom Study using the existing plan and survey results from the Study on Rural Water Supply in Tabora Region (2010)
- Classroom Study of the planning exercises for the target villages for Level-1 schemes in the Project

2) Activities related to the improvement of the knowledge and skills of geophysical survey techniques

- On site training of survey line setting, equipment manipulation, measurement works etc
- On site training of the evaluation of the quality of the acquired data

3) Activities related to the analysis of the survey data and the formulation of groundwater development plan

- Training of the survey data analysis
- Training of the groundwater development plan formulation (siting of the drilling points, decision of the probable drilling depth etc.)
- Training of the evaluation of the survey data analysis by comparing survey data analysis results and drilling results
- Training of the re-analysis of the survey data and the revision of the groundwater development plan

The following table summarizes activities described above by objectives, target group, means of implementation, days and human resources required, and output for each activity.

Table 4.1 Details of Software Component on Capacity Building for Groundwater Development

Activity	Output	Target	Means of Implementation	Period	Implementer [Responsibility]	Output of Submission
Stage 1: Preparation, Investigation(Geophysical Survey), Training for Planning						
1-1) Explanation of the entire activities, discussion	Explain to the concerned parties (MoW, staff of Tabora Branch of Lake Tanganyika Basin Office) the objectives and contents of the software component to have a mutual accord, in the beginning of the software component program. Have meetings with MoW in Dar es Salaam and with Tabora Branch of Lake Tanganyika Basin office in Tabora.	MoW Community Water Supply Division, Water Resources Division staff of Tabora Branch of Lake Tanganyika Basin Office	Explanation and Discussion based on the Software Component Plan	0.08 month	Japanese Consultant [to be borne by Japanese side]	
1-2) Training of formulation of Investigation (Geophysical Survey) Plan	Facilitate the staff of Tabora Branch to be able to formulate for themselves the investigation (geophysical survey) plan in consideration of the topographical, geological and hydrogeological conditions.	staff of Tabora Branch of Lake Tanganyika Basin Office	Classroom study using the examples of plan formulation in the development study	0.09 month	Japanese Consultant [to be borne by Japanese side]	Groundwater Development Plan
Stage 2: Training of Geophysical Survey Techniques						
2-1) Training of geophysical survey for various site conditions	Facilitate the staff of Tabora Branch to be able to carry out the proper geophysical survey suitable for the various conditions in the target areas.	staff of Tabora Branch of Lake Tanganyika Basin Office	Practical training on site		Japanese Consultant [to be borne by Japanese side]	Geophysical Survey Data

Activity	Output	Target	Means of Implementation	Period	Implementer [Responsibility]	Output of Submission
2-2) Training of evaluation of the quality of the survey data	Facilitate the staff of Tabora Branch to be able to obtain the quality data.	staff of Tabora Branch of Lake Tanganyika Basin Office	Practical training on site	Total 0.22 month	Japanese Consultant [to be borne by Japanese side]	
Stage 3: Training of the analysis method and formulation of the groundwater development plan						
3-1) Training of the analysis of the acquired data and hydrogeological structures	Improve the ability to properly analyze the survey data and to examine the hydrogeological structure in the target area.	staff of Tabora Branch of Lake Tanganyika Basin Office	Training of analysis in the office		Japanese Consultant [to be borne by Japanese side]	Analysis Results of Geophysical Survey Data
3-2) Training of groundwater development plan (well siting, decision of drilling depth etc.)	Improve the ability to formulate the concrete groundwater development plan based on the results of the geophysical survey.		Classroom study using the examples of plan formulation in the development study			Groundwater Development Plan
3-3) Training of the comparison of the survey data and the drilling results, reevaluation of the survey data analysis	Improve the ability to review the survey data analysis using the existing survey data and drilling results from the development study.					Revised Groundwater Development Plan
3-4) Training of the reanalysis of the survey data and the revision of the groundwater development plan	Improve the ability to revise the groundwater development plan based on the re-analysis results of the survey data.			Total 0.26 month		

4.5 ASSIGNMENT OF PERSONNEL

Personnel to be assigned to implement the Software Component Program are as followed.

1) Japanese Consultant (Hydrogeology and Geophysical Survey)

A Japanese Consultant is responsible for: 1) formulation and supervision of the Software Component Program, 2) reporting to the implementing agency and Japanese Side concerned, and coordinating parties concerned in the program, and, 3) coordination in implementation of the Program with construction schedule. Also, technical advice and capacity building will be given to local staff from the implementing agency.

2) Staff of Tabora Branch of Lake Tanganyika Basin Office

1 person for Hydrogeology

1 person for Geophysical Survey

4.6 IMPLEMENTATION SCHEDULE

Since the software component for groundwater development will be implemented using the geophysical survey equipment to be used for the Level-1 construction work of the Project, it will start in the end of the construction work of the Level-1 construction.

The implementation schedule is described in Table 4.2.

3.7 OUTPUT OF SUBMISSION

Outputs of submission are shown in Table 4.1. The completion report will be submitted to the implementing agency of the Tanzanian side and the Japanese side.

Table 4.2 Implementation Schedule of Software Component Program for Groundwater Development

Software Component Program		M/M	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						
			Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun						
Travel	Japan-DAR	0.17																																				
	DAR-Tabora	0.09																																				
Discussion/Reporting	MoW	0.04																																				
	Concerned Organization	0.04																																				
Training or Groundwater Development Plan Formulation		0.09																																				
	On-site Training of Geophysical Survey	0.22																																				
Completion/Evaluation	Training of Survey Data Analysis	0.26																																				
		0.09																																				
Assignment (Groundwater Development)	Class 3	1.00																																				

5. UNDERTAKINGS BY TANZANIAN AUTHORITIES

In the implementation of the above-mentioned two (2) Software Component Programs, the following activities shall be undertaken by Tanzanian side.

1) Software Component for Operation and Maintenance of Water Supply Schemes

- Formation of DWST/MWST
- Monitoring and follow-up activities after completion of the Project

2) Software Component for Groundwater Development

- Securing of the staff of the Tabora Branch of Lake Tanganyika Office during training period
- Announcement to Disticts/Municiplity/Villages before the on-site activities
- Cost for the Travel of the staff of the Tanzanian side

APPENDIX 6

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APPENDIX 7

Other Relevant Data

- (1) Results of Test Well Drilling and Pumping Test
- (2) Results of Water Quality Analysis
- (3) Plan of Geophysical Survey
- (4) Cross Section & Profiles of Two-Dimensional Resistivity,
Electro-Magnetic and Radon Survey
- (5) Drilling Report
- (6) Pumping Test Report

Table 1 Result of Test Well Drilling and Pumping Test

No.	Drilling No.	Registration No.	District	Village	Drilling				Remarks
					Date		Drilling Depth (m)	Casing Depth (m)	
					from	to			
1	NZ-047BH1	672/2010	Nzega	Isanga	2010/9/24	2010/9/27	85	80.9	
2	NZ-047BH2	673/2010	Nzega	Isanga	2010/9/27	2010/9/28	80	78.0	
3	SK-028BH1	670/2010	Sikonge	Usunga	2010/9/14	2010/9/17	98	96.0	
4	SK-028BH2	671/2010	Sikonge	Usunga	2010/9/18	2010/9/22	150	137.5	
5	SK-037BH1	-	Sikonge	Mpombwe	2010/9/10	2010/9/11	79	-	Back filled
6	SK-037BH2	669/2010	Sikonge	Mpombwe	2010/9/12	2010/9/13	92	91.0	
7	TR-054BH1	-	Tabora Rural	Mpumbuli	2010/8/17	2010/8/17	50	-	Back filled
8	TR-054BH2	662/2010	Tabora Rural	Mpumbuli	2010/8/18	2010/8/19	130	125.0	
9	TR-069BH1	664/2010	Tabora Rural	Mabama	2010/9/1	2010/9/9	79	75.7	
10	TR-069BH2	665/2010	Tabora Rural	Mabama	2010/9/10	2010/9/13	82	63.7	
11	TR-069BH3	-	Tabora Rural	Mabama	2010/9/14	2010/9/16	86	-	Back filled
12	TR-098BH1	-	Tabora Rural	Ufuluma	2010/9/19	2010/9/22	86	-	Back filled
13	TU-008BH1	663/2010	Tabora Municipality	Kakola	2010/8/26	2010/8/31	108	102.0	
14	IG-007BH1	675/2010	Igunga	Iguno	2010/9/24	2010/9/28	80	78.0	
15	IG-012BH1	-	Igunga	Buhekela	2010/9/29	2010/10/6	70	-	Back filled
16	IG-033BH1	-	Igunga	Kagongwa	2010/9/29	2010/10/1	82	-	Back filled

No.	Drilling No.	Registration No.	District	Village	Step Draw Down Test				Constant discharge Test				Water Quality Analysis	Well Head Type	Resulted Status	
					Date		SWL (m)	Max. Discharge Rate (m ³ /h)	Max DWL (m)	Date	SWL (m)	Discharge Rate (m ³ /h)				DWL (m)
					From	To										
1	NZ-047BH1	672/2010	Nzega	Isanga	2010/10/17	2010/10/17	1.74	4.5	74.20	2010/10/17	2010/10/19	2.82	3.7	63.55	C/S	Water Source for Level -2
2	NZ-047BH2	673/2010	Nzega	Isanga	2010/10/20	2010/10/20	5.52	4.0	53.09	2010/10/20	2010/10/22	6.64	3.0	42.98	C/S	Water Source for Level -2
3	SK-028BH1	670/2010	Sikonge	Usunga	-	-	-	-	-	2010/10/12	2010/10/12	46.20	0.3	93.90	C/S	Observation Well
4	SK-028BH2	671/2010	Sikonge	Usunga	2010/10/27	2010/10/27	17.39	1.2	60.23	2010/9/28	2010/9/30	17.24	0.8	117.29	C/S	Observation Well
5	SK-037BH2	669/2010	Sikonge	Mpombwe	-	-	-	-	-	2010/10/15	2010/10/15	59.21	0.3	85.95	C/S	Observation Well
6	TR-054BH2	662/2010	Tabora Rural	Mpumbuli	2010/10/6	2010/10/7	33.04	9.8	107.69	2010/10/7	2010/10/13	33.09	9.0	101.38	C/S	Water Source for Level -2
7	TR-069BH1	664/2010	Tabora Rural	Mabama	2010/9/22	2010/9/23	5.93	15.0	67.53	2010/9/23	2010/9/25	6.21	14.0	66.69	C/S	Water Source for Level -2
8	TR-069BH2	665/2010	Tabora Rural	Mabama	2010/10/14	2010/10/15	11.68	1.2	60.23	2010/10/14	2010/10/16	11.20	0.8	60.20	C/S	Observation Well
9	TU-008BH1	663/2010	Tabora Municipality	Kakola	2010/10/2	2010/10/2	14.06	7.7	97.28	2010/10/2	2010/10/5	14.35	6.0	87.87	C/S	Water Source for Level -2
10	IG-007BH1	675/2010	Igunga	Iguno	2010/10/27	2010/10/27	9.61	1.1	76.57	2010/10/27	2010/10/27	9.82	1.0	49.03	C/S	Observation Well

C/S = Concrete and Steel Pipe

Table 2 Result of Water Quality Analysis

Physical & Chemical Parameters	Village Name		Isanga	Isanga	Usunga	Usunga	Mpombwe	Mpumbuli	Mabama	Mabama	Kakola	Igumo
	Drilling No.	Registration No.										
Turbidity	NZ-047BH1	672/2010	67/3/2010	67/3/2010	67/1/2010	669/2010	662/2010	664/2010	665/2010	663/2010	663/2010	675/2010
pH		0.99	2.53	7.4	7.5	7.6	7.7	7.7	7.2	7.7	7.7	7.8
Colour		NIL	NIL	Pale brown	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Electrical Conductivity		864	687	937	268	835	1370	1183	1181	1200	1200	1038
Total Filterable residue*4		475.2	377.8	468	134	459.2	685	592	590	600	600	570.9
Odour		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Taste		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Nitrate		0.479	0.17	1	0.9	0.471	0.5	0.29	1.76	0.02	0.02	0.291
Nitrite		0.01	NIL	0.6	0.01	0.02	0.01	0.01	0.02	NIL	NIL	0.002
Phenolphalein Alkalinity		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total Alkalinity		400	350	450	50	200	250	500	350	300	300	400
Non Carbonate Hardness		NIL	NIL	NIL	75	25	NIL	NIL	NIL	125	125	NIL
Total Hardness		300	300	200	125	225	200	325	200	425	425	250
Arsenic		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Bicarbonate (HCO3)		300	300	200	50	200	200	325	200	300	300	250
Calcium		80	60	60	40	50	50	100	70	160	160	60
Magnesium		24.3	36.48	12.16	6.08	24.3	18.24	18.24	6.08	6.08	6.08	24.32
Manganese		NIL	NIL	0.05	NIL	1.5	NIL	NIL	NIL	NIL	NIL	NIL
Zinc		NIL	0.001	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Iron		NIL	NIL	0.64	NIL	3.02	0.02	NIL	0.02	NIL	NIL	NIL
Chloride		88.6	53.1	194.97	53.17	88.6	212.7	124.07	141.8	159.5	159.5	70.9
Sulphate (SO4)		NIL	NIL	8	9.6	1.7	250	NIL	70	48	48	18.72
Nickel		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Sodium		60.2	18.8	119.37	3.22	86.9	220.5	121.9	176.41	79.81	79.81	121.4
Potassium		1.5	2.4	7.7	2.2	3.3	4.9	1.7	6	2.1	2.1	4.6
Lead (Pb)		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Fluoride		2.4	1.1	1.46	2.53	1.1	3.95	1.5	2.24	1.61	1.61	7
Copper (Cu)		NIL	NIL	0.001	NIL	0.001	0.001	NIL	0.002	NIL	NIL	NIL
Ammonium (NH3+ NH4)		NIL	NIL	NIL	0.001	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Orthophosphate		NIL	NIL	NIL	NIL	NIL	NIL	NIL	0.001	NIL	NIL	NIL
Temperature		28.6	28.7	26.5	26	28.8	28	26	26	25	25	28.7
Cadmium (Cd)		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
BACTERIOLOGICAL PARAMETERS												
Total Coliform	Count/100mL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Escherichia coli		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

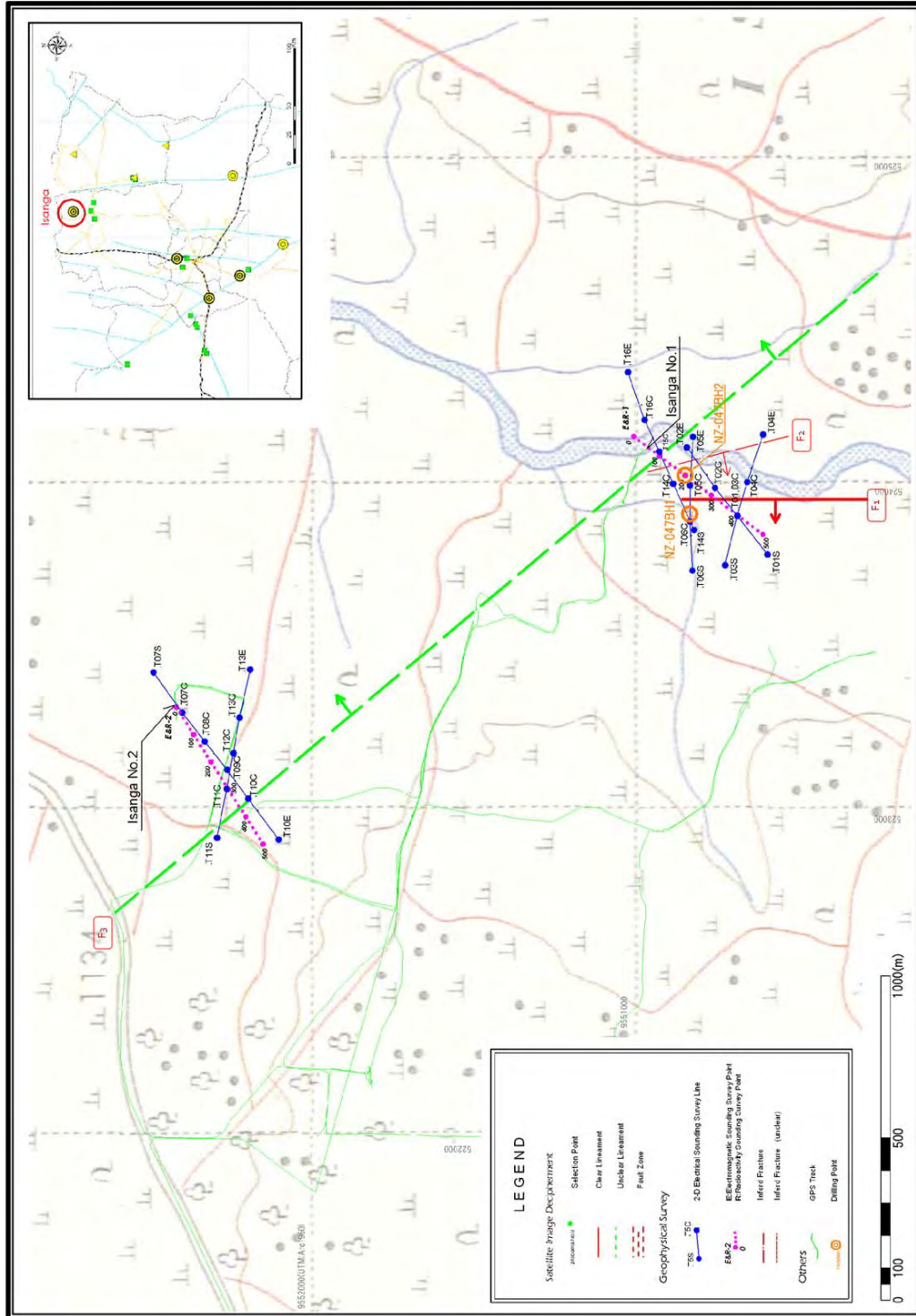


Figure-1 Plan of Geophysical Survey 1/12 (Level-2: Isanga Village)

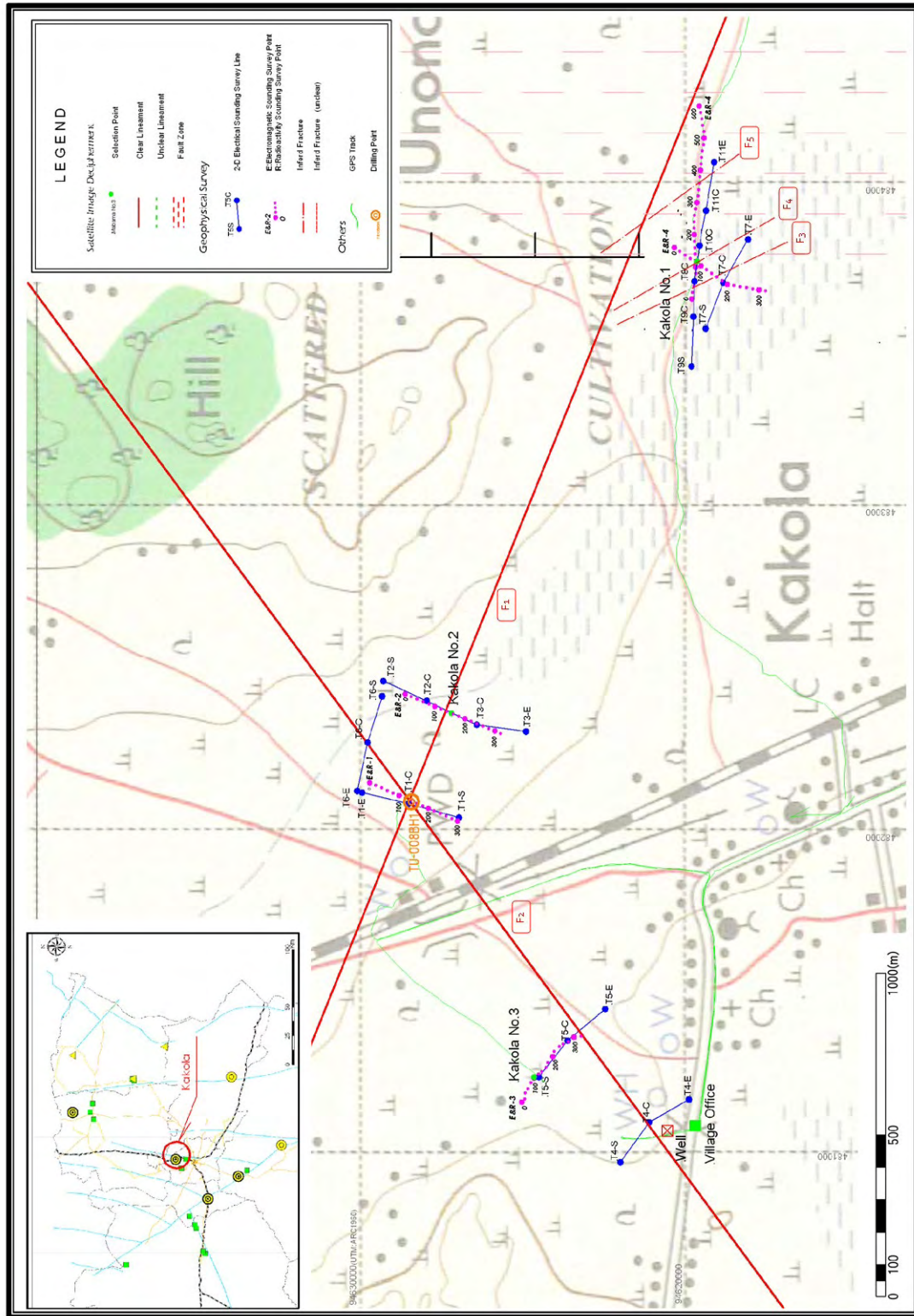


Figure-1 Plan of Geophysical Survey 2/12 (Level-2: Kakola Village)

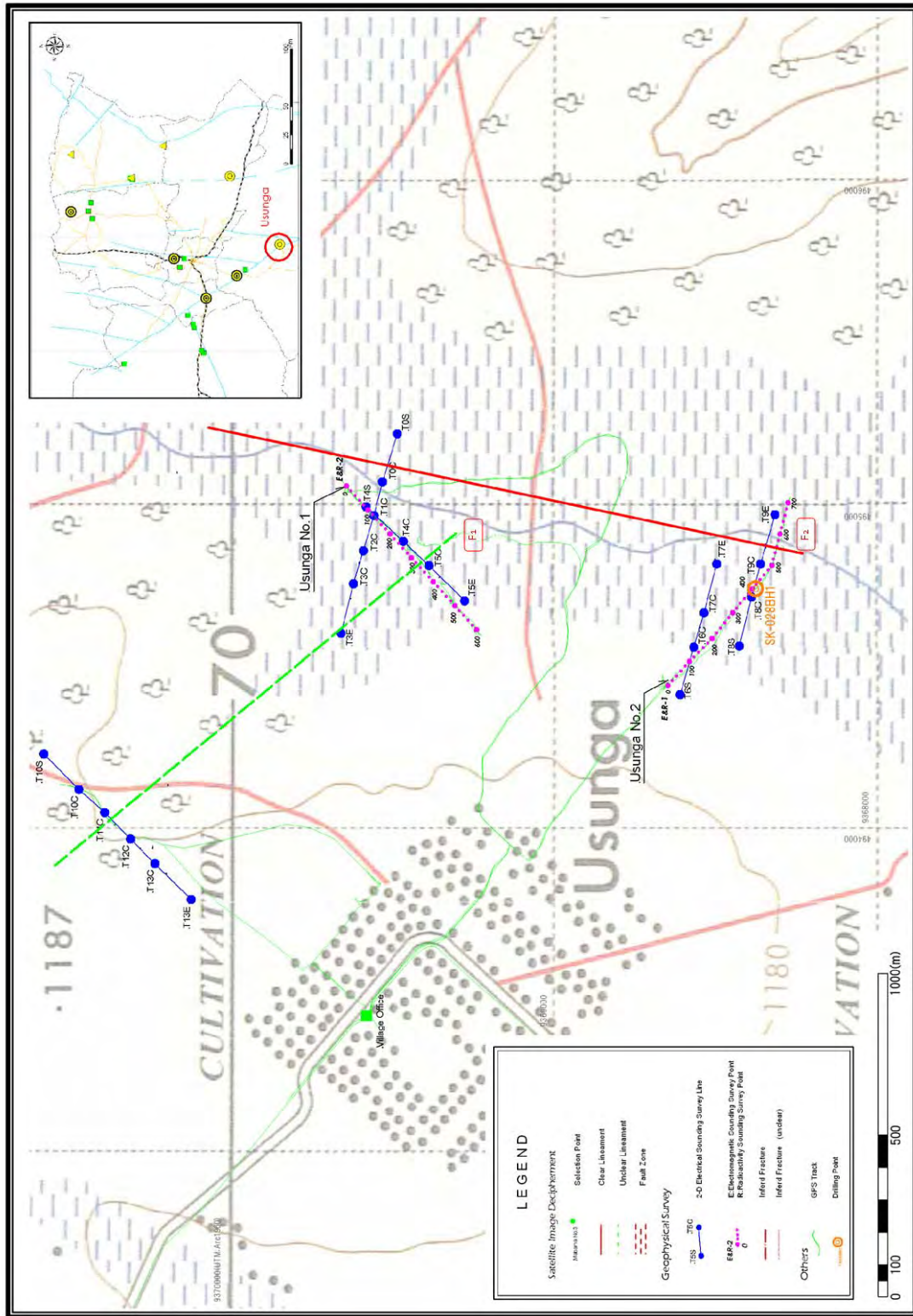


Figure-1 Plan of Geophysical Survey 3/12 (Level-2: Usunga 1/2)

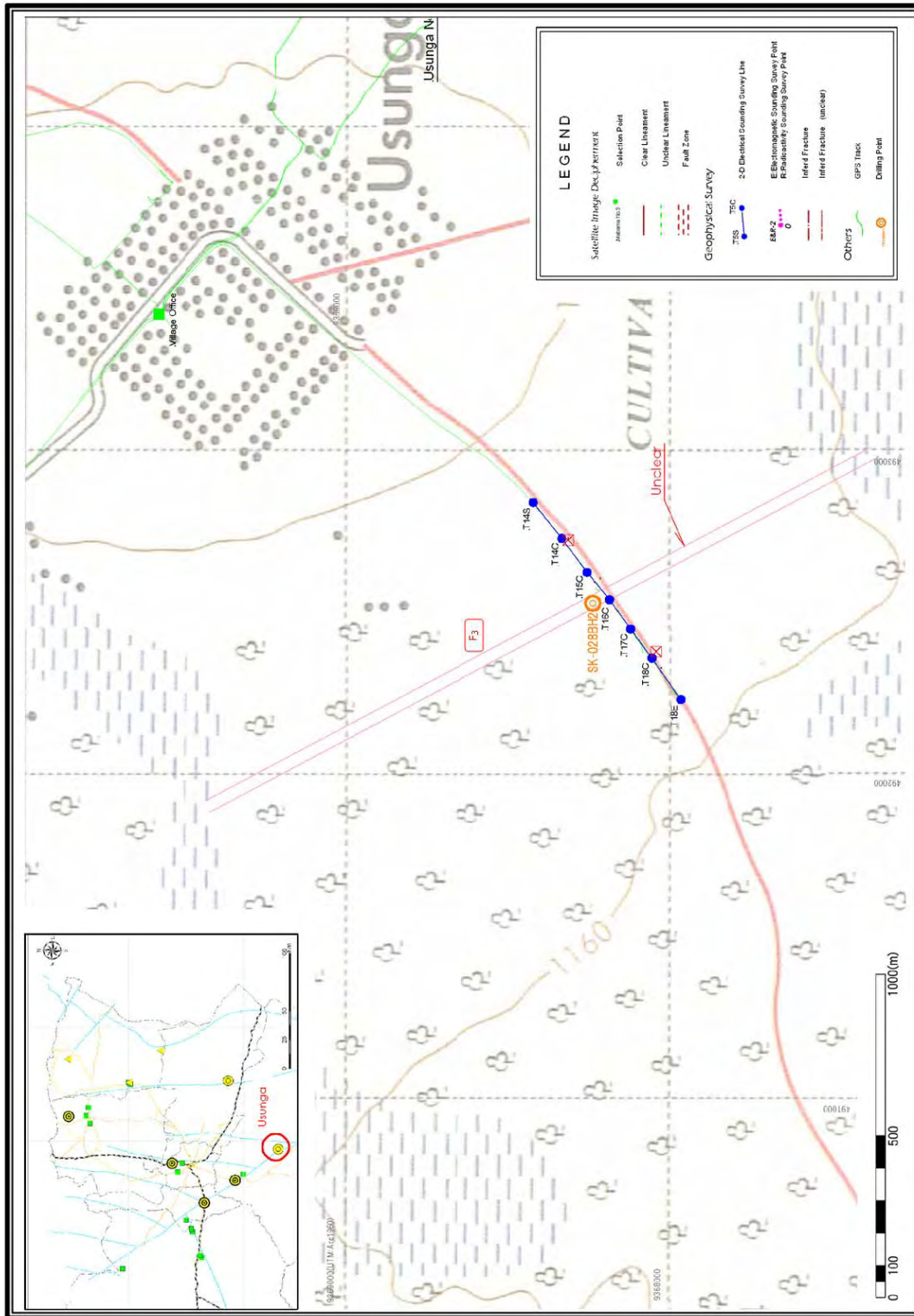


Figure-1 Plan of Geophysical Survey 4/12 (Level-2: Usungu 2/2)

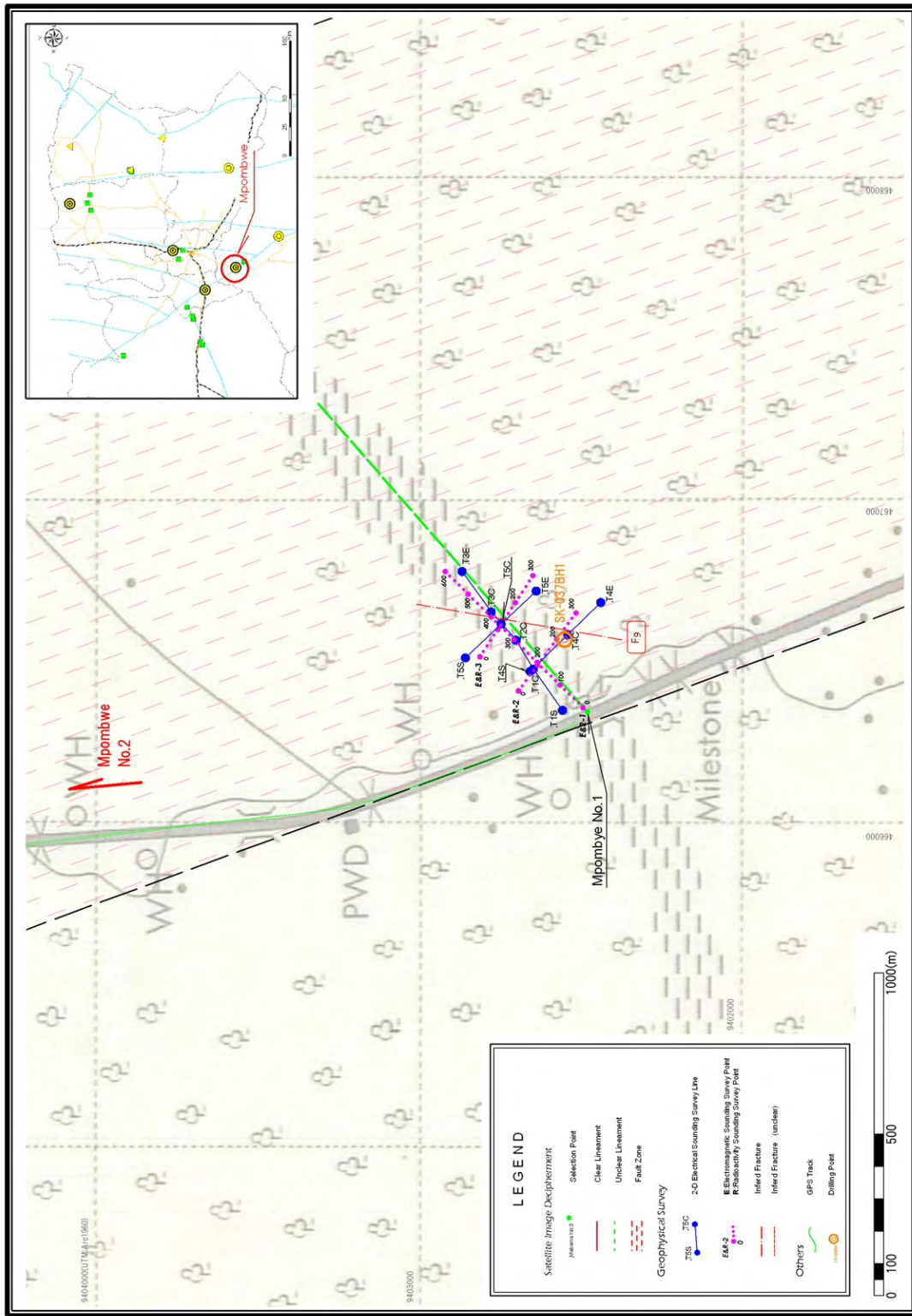


Figure-1 Plan of Geophysical Survey 5/12 (Level-2: Mpombwe Village 1/2)

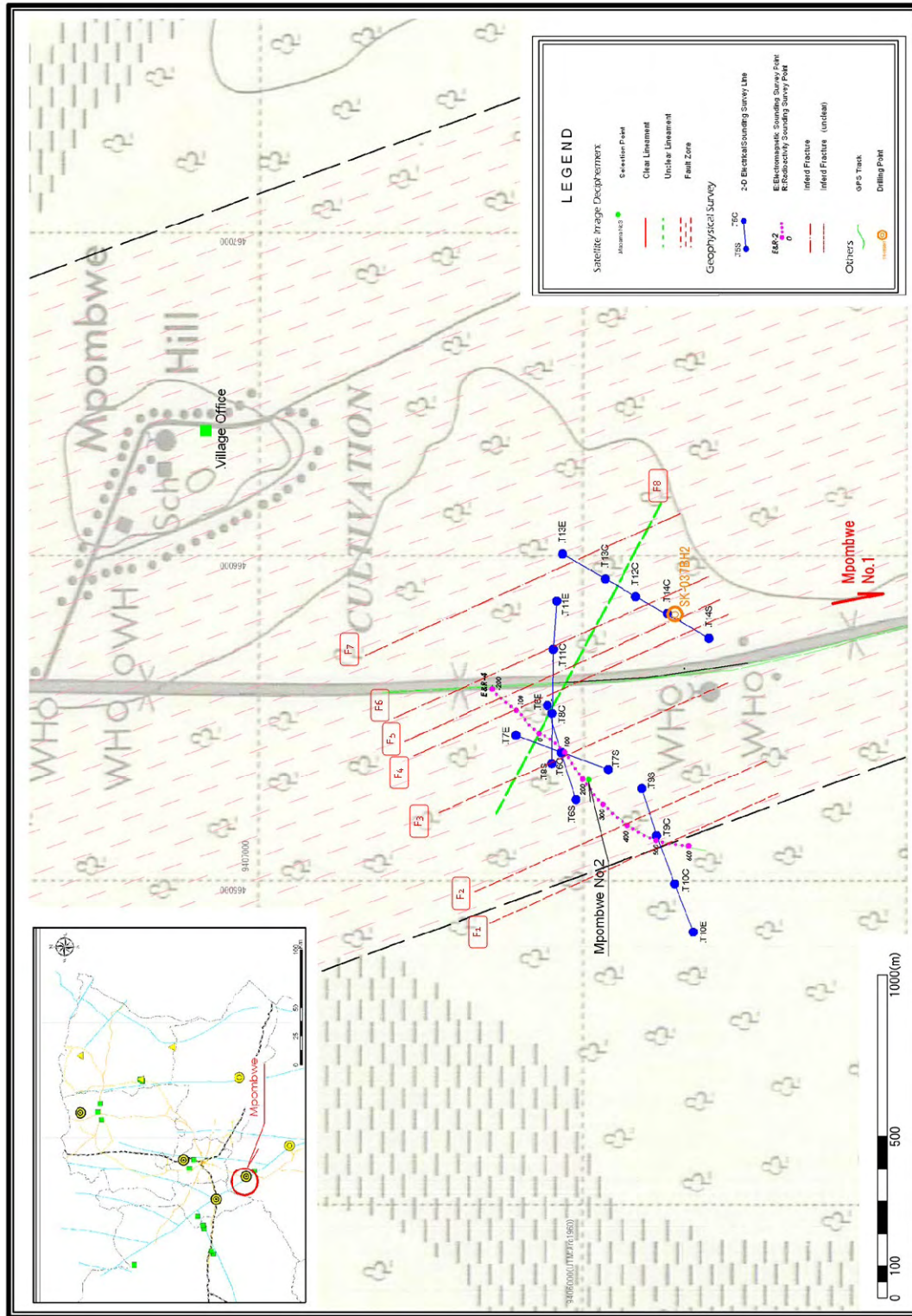


Figure-1 Plan of Geophysical Survey 6/12 (Level-2: Mpombwe Village 2/2)

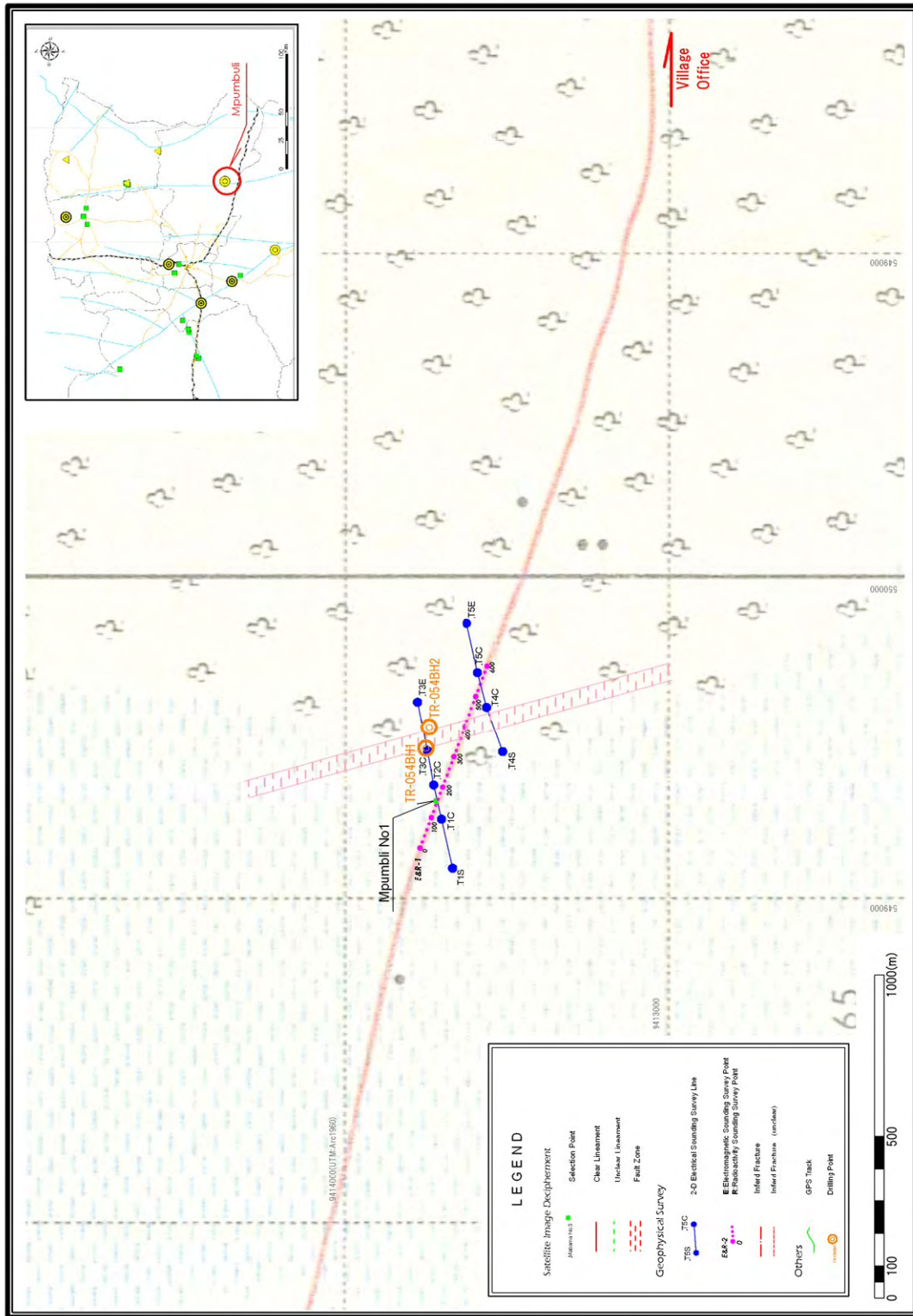


Figure-1 Plan of Geophysical Survey 7/12 (Level-2: Mpumbuli Village)

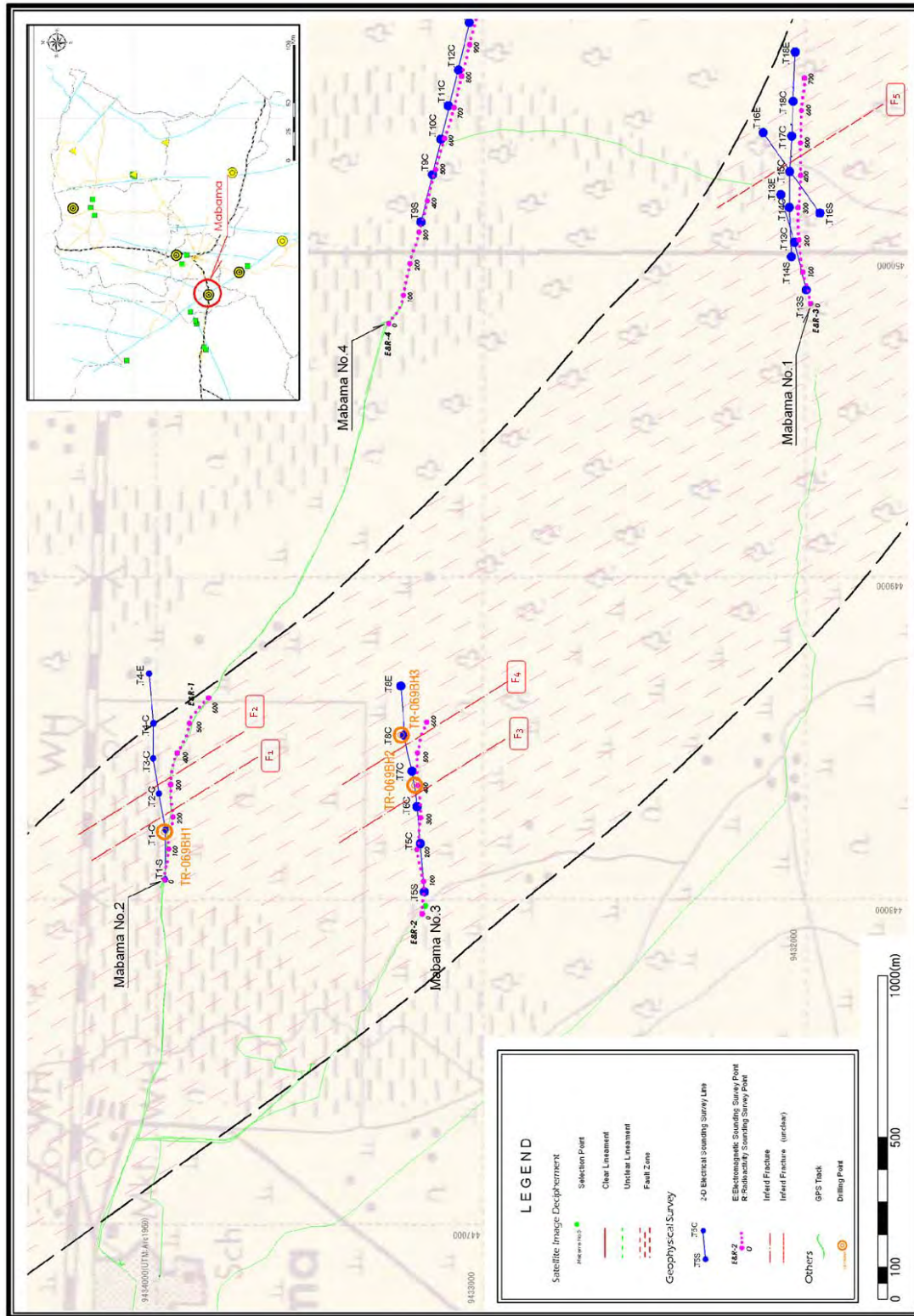


Figure-1 Plan of Geophysical Survey 8/12 (Level-2): Mabama Village

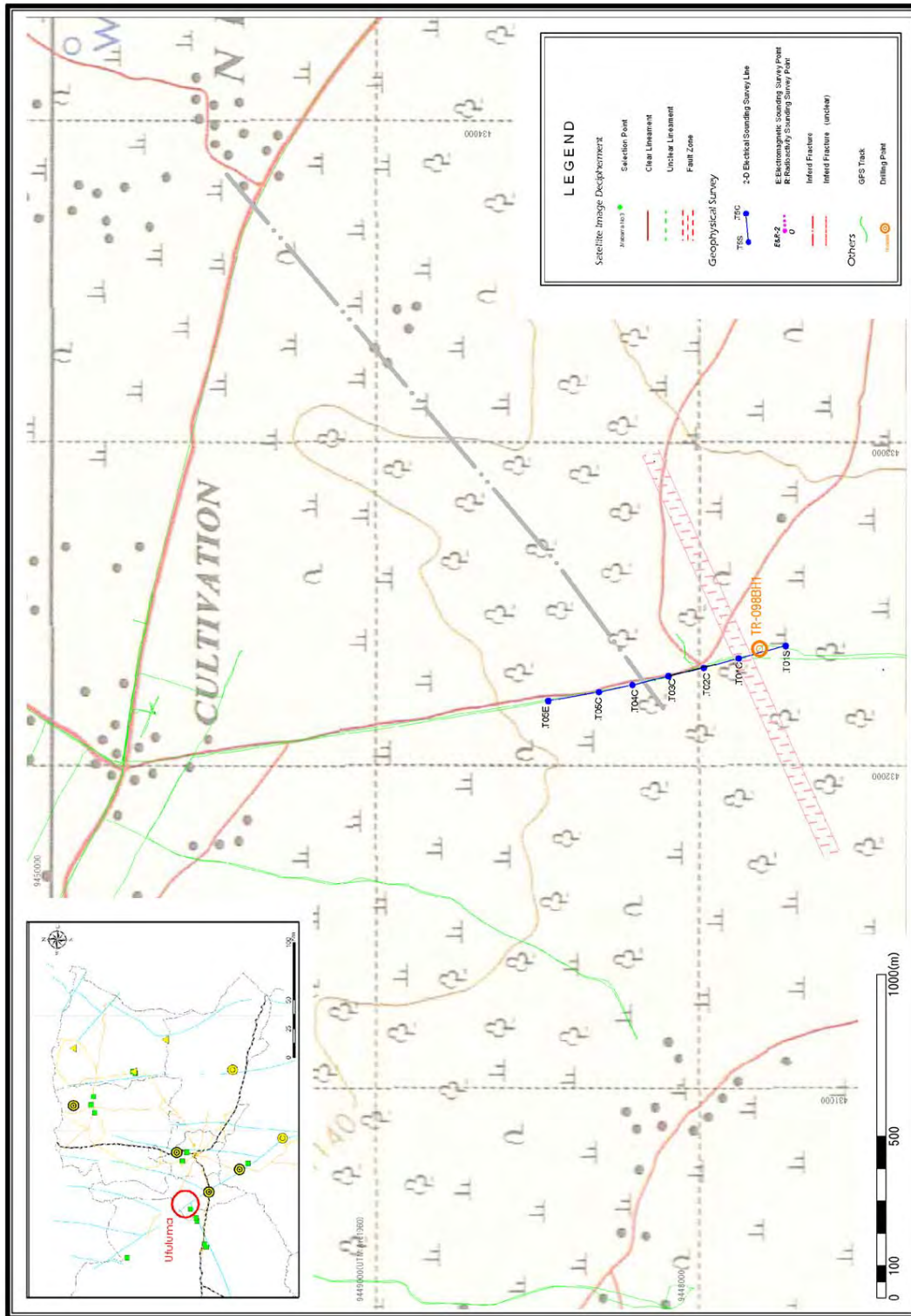


Figure-1 Plan of Geophysical Survey 9/12 (Level-2: Ufuluma Village)

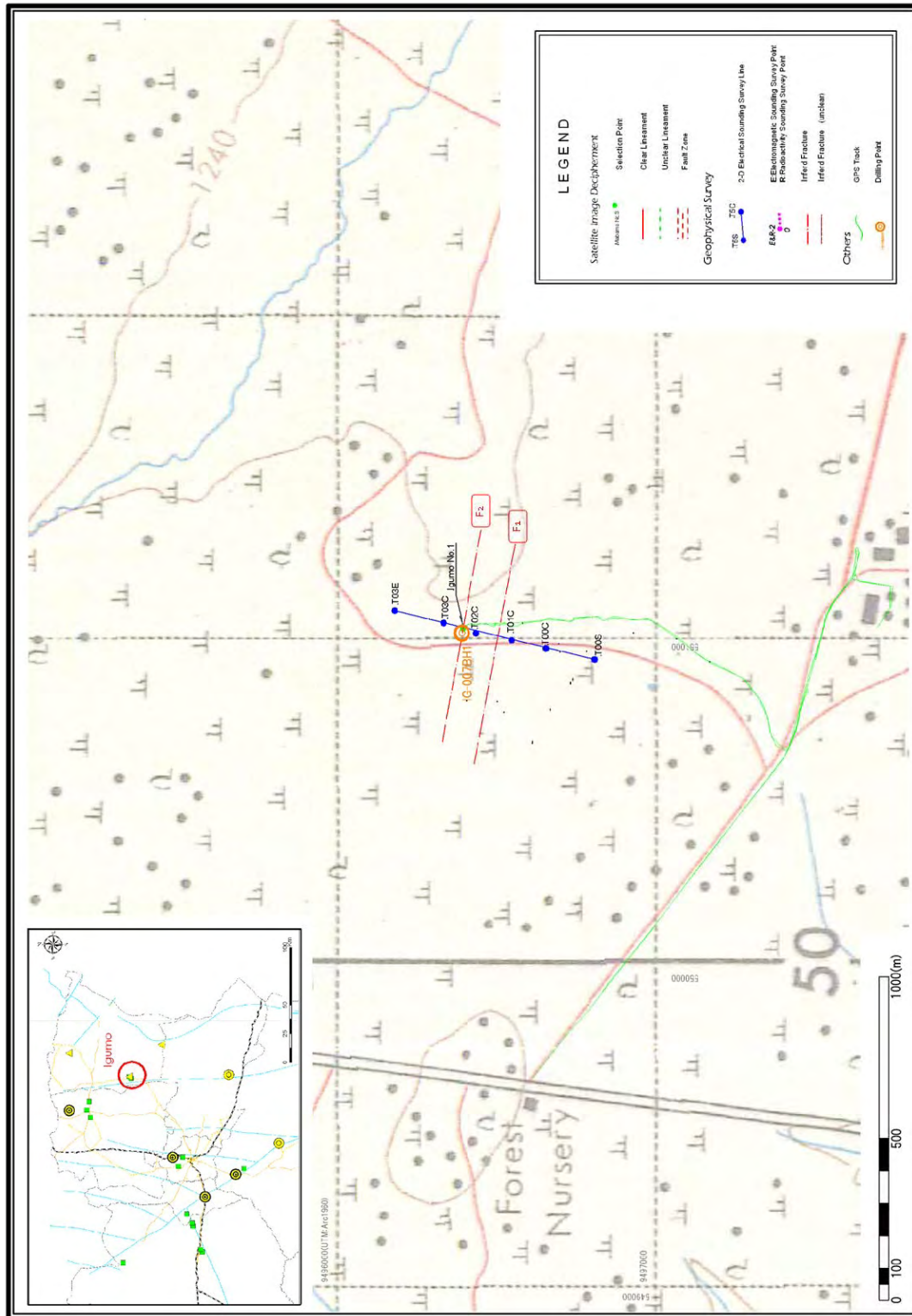


Figure-1 Plan of Geophysical Survey 10/12 (Site for Water Quality Confirmation: Igumo Village)

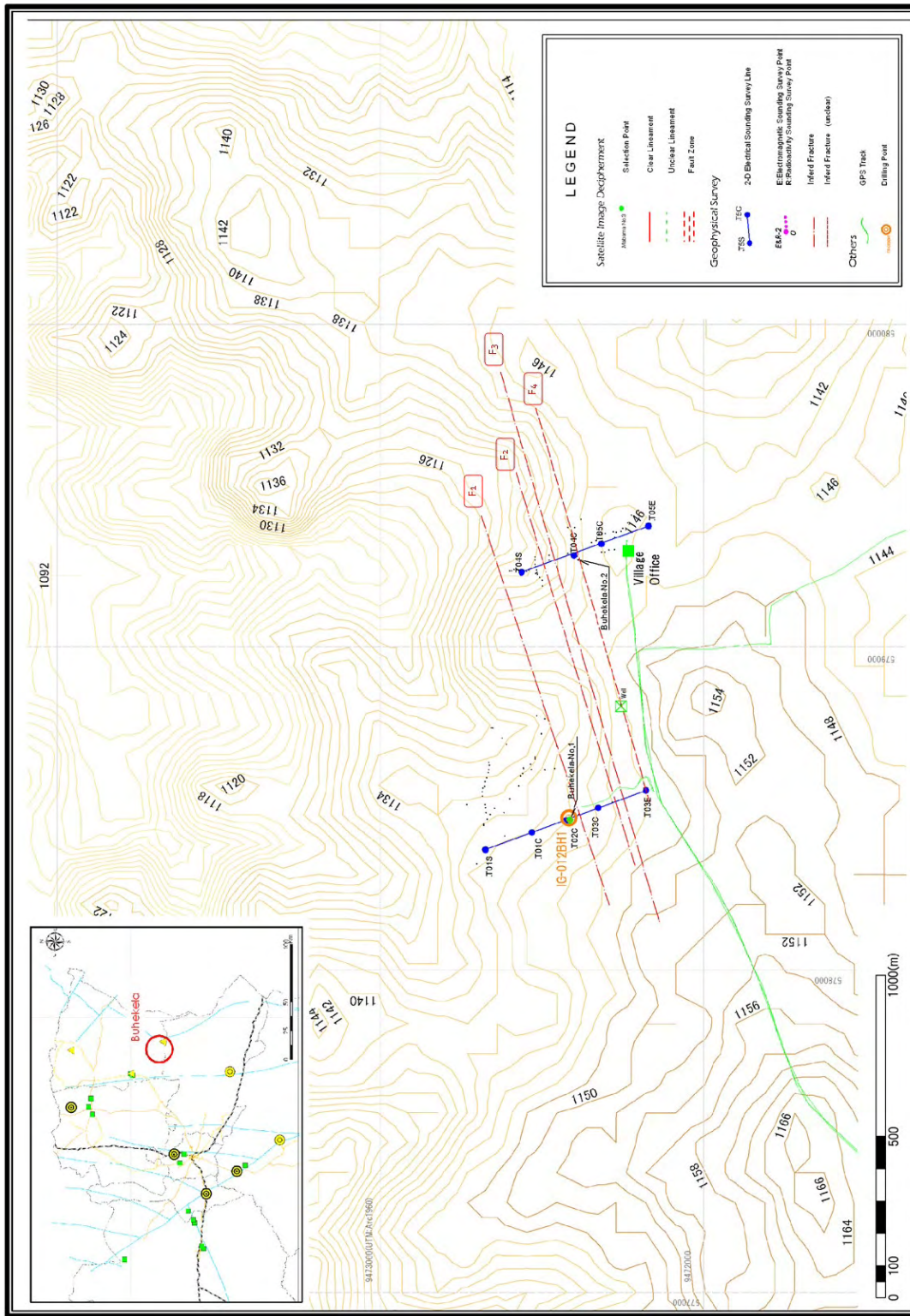


Figure-1 Plan of Geophysical Survey 11/12 (Site for Water Quality Confirmation: Buhekela Village)

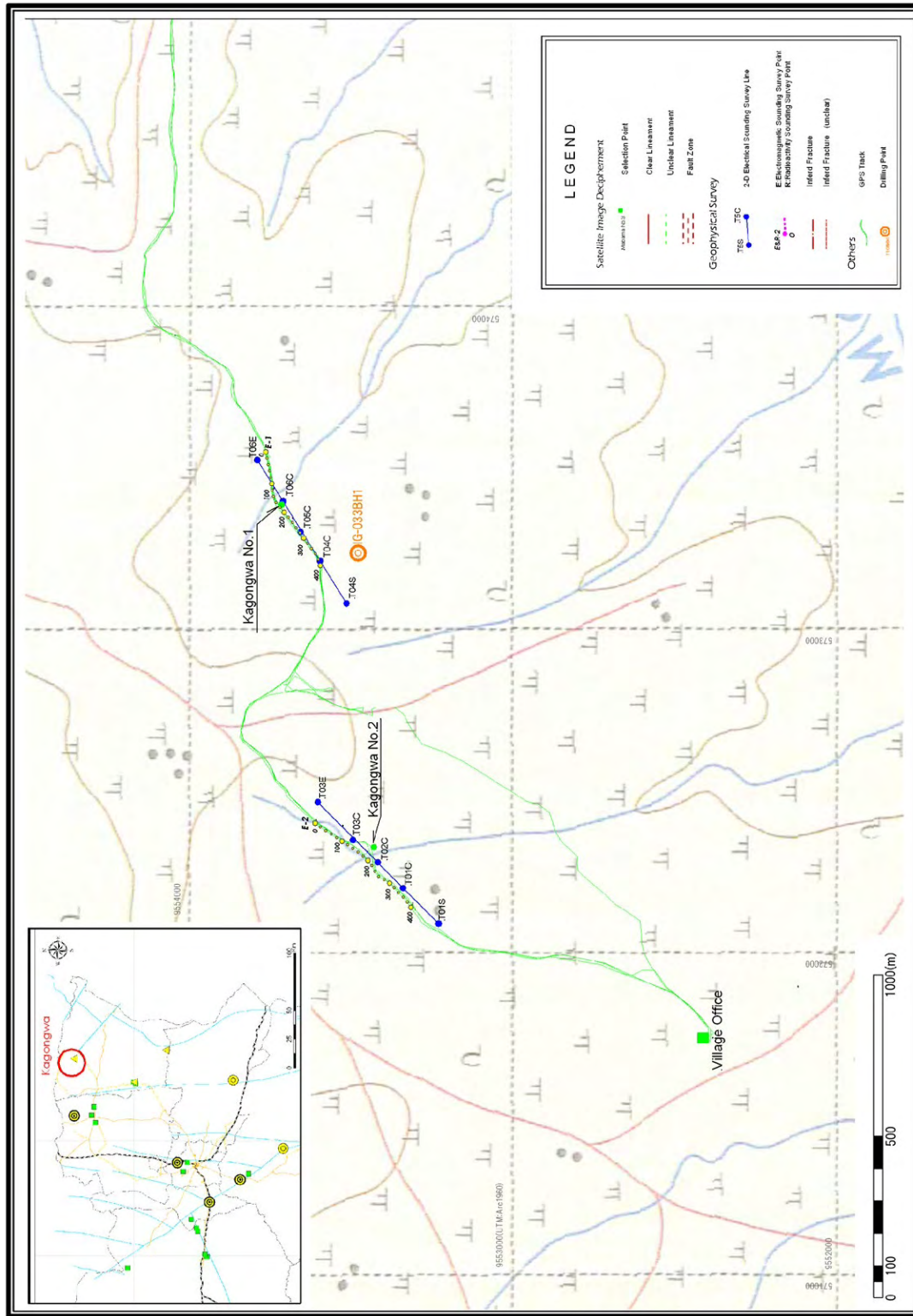


Figure-1 Plan of Geophysical Survey 12/12 (Site for Water Quality Confirmation: Kagongwa Village)