## 4.3 Groundwater Development Plan

### 4.3.1 Evaluation of Exploitable Amount of Groundwater

The mass balance of groundwater by the Tank Model Calculation and extraction of groundwater in each district is estimated in the following table.

Table 4.3-1: Potential Volume of Groundwater Exploitation and Extraction

| Region | District | total | Recharge to Groundwater | *Extractable Groundwater | **Potential Discharge of Existing Hand Pump | | ***Potential Discharge of Existing Motorized Pump | | ****Planned Hand Pump Exploitation | *****Planned Motorized Pump Exploitation | Total Exploitation from Groundwater | Persentage in the Explotable Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | m^3/sec | m^3/day | m^3/day | Number | m^3/day | Number | m^3/day | m^3/day | m^3/day | m^3/day | % |
| Mwanza | Missungwi | 126.78 | 10,953,978 | 5476989 | 267 | 1922.4 | 59 | 1982.4 | 477 | 528 | 4909.8 | 0.0896441 |
| | Sengerema | 147.16 | 12,714,442 | 6357221 | 205 | 1476 | 5 | 168 | 2195 | 312 | 4151 | 0.0652958 |
| | Kwimba | 196.78 | 17,002,010 | 8501005 | 612 | 4406.4 | 18 | 604.8 | 1042 | 2016 | 8069.2 | 0.0949205 |
| | Magu | 195.39 | 16,881,811 | 8440905 | 791 | 5695.2 | 42 | 1411.2 | 885 | 388 | 8379.4 | 0.0992713 |
| | Geita | 270.59 | 23,378,909 | 11689454 | 198 | 1425.6 | 49 | 1646.4 | 3233 | 416 | 6721 | 0.0574963 |
| | Ilemela-Nyamang | 28.02 | 2,421,064 | 1210532 | 90 | 648 | 0 | 0 | 143 | | 791 | 0.0653432 |
| Mara | Ukerewe | 93.52 | 8,080,247 | 4040123 | 268 | 1929.6 | 0 | 0 | 75 | 0 | 2004.6 | 0.0496173 |
| | Bunda | 169.89 | 14,678,128 | 7339064 | 173 | 1245.6 | 3 | 100.8 | 795 | 70 | 2211.4 | 0.0301319 |
| | Musoma | 189.38 | 16,362,690 | 8181345 | 60 | 432 | 6 | 201.6 | 2207 | 696 | 3536.6 | 0.0432276 |
| | Tarime | 221.08 | 19,101,607 | 9550804 | 16 | 115.2 | 7 | 235.2 | 7117 | 623 | 8090.4 | 0.0847091 |
| | Serengeti | 733.38 | 63,364,255 | 31682128 | 52 | 374.4 | 8 | 268.8 | 1331 | 830 | 2804.2 | 0.008851 |

** Extractable Groundwater = Groundwater Recharge * 0.5*

*** Assuming all wells have hand pumps with 15 l/min discharge operating 8 hours a day*

**** Assuming all wells have functioning motorized pumps with 70 l/min discharge operating 8 hours a day*

***** Planned hand pumps exploitation in year of 2015*

****** Planned motorized pumps exploitation in year of 2015*

The total of the existing and planned volume for the exploitation of groundwater and the ratio (percentage) to the total recharge is less than 0.1 %. The highest percentage is in Magu District, which has only a small catchment area.

### 4.3.2 Remarkable Points for the Groundwater Development Plan

#### a. Groundwater Development Plan for 428 Villages

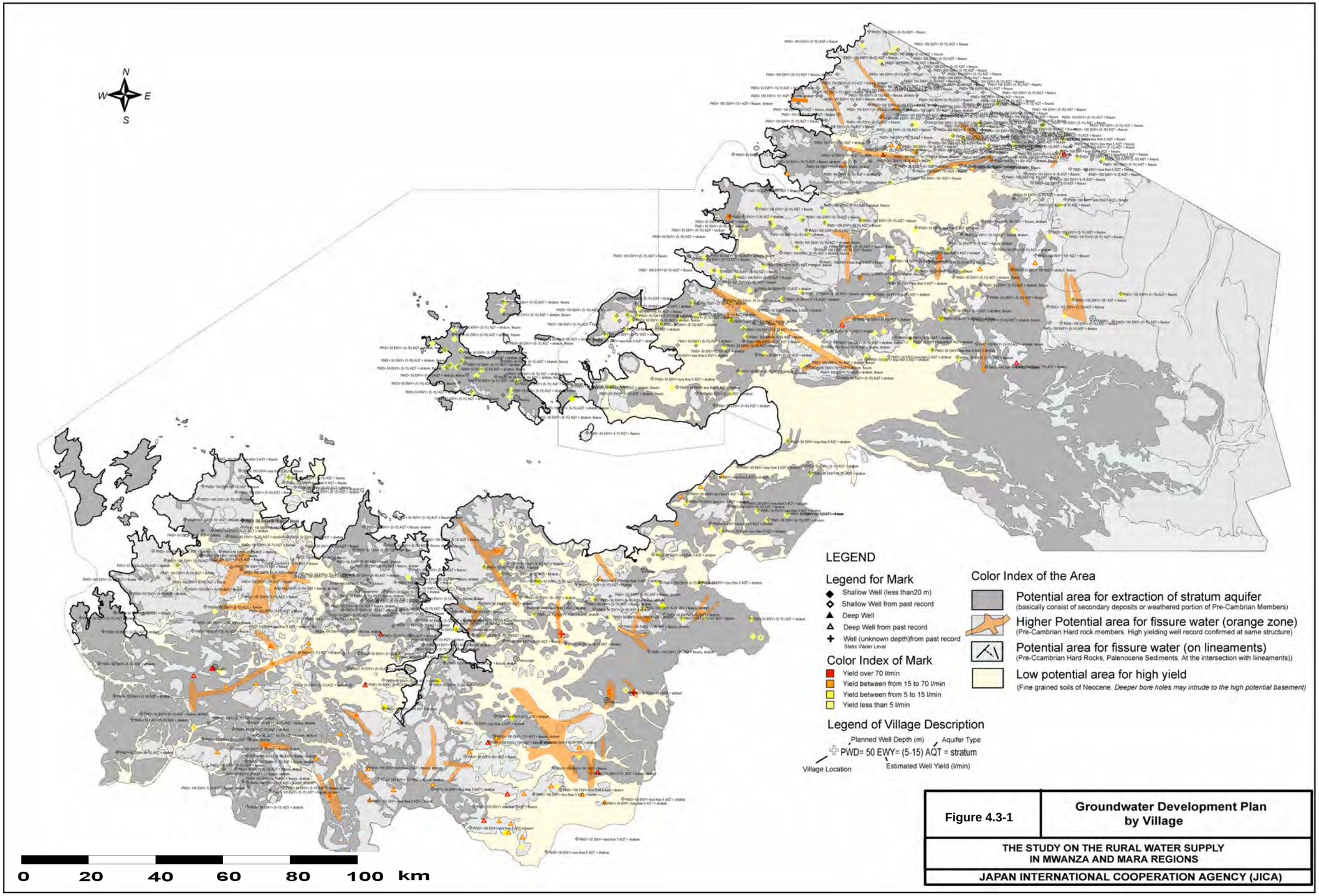
Groundwater development is relatively difficult, especially estimating the yield and the depth to the water strike zones. Therefore, for villages within 9 km from Lake Victoria, the lake water will be used instead of groundwater.

Most of the facilities for groundwater extraction are boreholes drilled up to 50 meters and installed with a hand pump (as the yield of the well is very difficult to predict, a motorized pump is not planned unless certain data is available to assure a yield of more than 70 l/min).

#### b. Groundwater Development Plan for the Priority Project.

A total of 61 villages were surveyed in detail for the examination of the water development potential for groundwater source. The purpose of this detailed hydrogeological field reconnaissance was to identify a potential drilling site at each village within the village boundary. The surveyed villages are presented in Figure 4.3-2.

The method of the survey was; 1) Detailed hydrogeological field reconnaissance within the village boundary, 2) Interview with the village leaders to locate most appropriate site for water source, 3) Review respective point from the hydrogeological point of view with the rank of A (good), B (fair) and C (poor) 4) Additional recommended site are marked on the topographical map in case the requested site does not have good potential.




| Figure 4.3-1 | Groundwater Development Plan by Village |
|---|---|
| THE STUDY ON THE RURAL WATER SUPPLY IN MWANZA AND MARA REGIONS | |
| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) | |

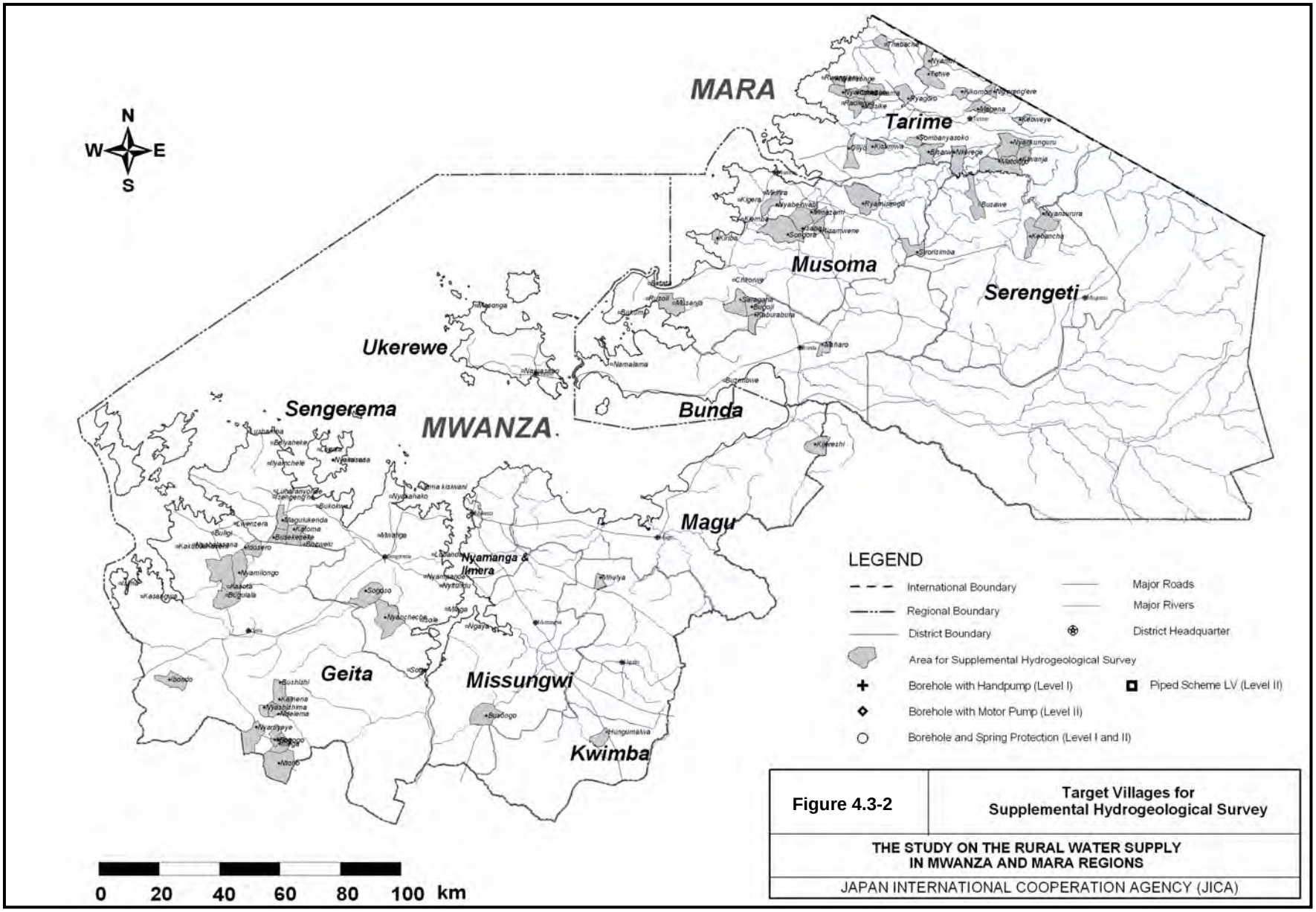



**Figure 4.3-2** Target Villages for Supplemental Hydrogeological Survey

THE STUDY ON THE RURAL WATER SUPPLY IN MWANZA AND MARA REGIONS

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

## 4.4 Water Quality in Study Area

Water quality analysis was conducted on groundwater and surface water (lake water, river water, pond water, dam water, etc.) to confirm the nature and safeness of the water for potable purposes. In addition the seasonal fluctuation of water quality was also examined. Other than some bacterial contamination, none of the water sources exceeded the Upper Limit of Tanzanian Standard for drinking water.

### 4.4.1 Methodology and Water Quality Items

The total number of the samples are 154, 68 samples taken in the dry season, 68 in the wet season and 18 samples from the test wells. The 14 parameters for on site and 40 parameters were analyzed in the laboratory. The parameters analyzed were compared with the drinking water standards of Tanzania with reference to the WHO, and major ions which may affect human health. An additional 19 samples from test well and lake were analyzed in the Phase II study.

### 4.4.2 Characteristic of Water Quality

#### a. Characteristic of Water Quality by Water Source

Deep wells are not so much affected by bacteria but they contain a series of metal ions such as Fe, Pb, Cr, Se, Ba and F. Granite fissure type aquifers in Kwimba and Magu indicated a high content of Fluoride. Shallow Wells have a large variation by area. Some Neocene deposits, have an extremely high concentration of $Cl^-$, $SO_4^{2-}$, Cd, $Na^+$, and $K^+$, and the EC value exceeds 40,000 $\mu$ S/m. Shallow wells also have a high concentration of coliform and bacteria, and also indicate a high EC value.

Lake Victoria water is safe in general. BOD is generally high and turbidity is high in some areas. Most of the locations are influenced by bacteriological contamination, such as general bacteria and coliform.

The river water indicates a high value for colour, turbidity, BOD, $SO_4^{2-}$ and some bacteriological contamination. Mara and Grumeti Rivers contain Hg above the allowable value of the Tanzanian standard.

The water from the outlet of Schemes also varies. The high value of color and bacteriological contamination shows that the treatment procedure is not functioning adequately. The variation of the values also indicates the degree of maintenance. Dams and Ponds show the same tendency for river water quality.

#### b. Seasonal Deference of Water Quality by Source

Shallow wells have the most particular difference of reduction of EC, TSS, Ca, $Cl^-$, $K^+$, PO4 in wet season and an increase of coliform, bacteria, F, $NH_4^+$, B, $NO_2^-$, $HCO_3^-$ and $Na^+$ in dry season. In the wet season, the value of Deep wells, EC, TDS, total hardness, Mg, $K^+$, $PO_4$ and F increased, and B was reduced. This fact suggests that even the deep boreholes are affected by seasonal deference.

The value varies by the sampling point at Piped Schemes, but in general, most of the substances tend to be reduced in the wet season. The tendency of seasonal change of Lakes is a reduction in value for most of the parameters but shows an increase of coliform, B, F, and $Na^+$. River water values tend to decrease. However, boron, color and turbidity increase in the

rainy season. Dams and ponds also fall in this category. Fe and Hg which categorized in the toxic substances are also found in river water in the dry season.

# Chapter 5

*Water Supply Plan*

# 5 Water Supply Plan

## 5.1 Villages and Piped Schemes, Population and Water Demand for Water Supply Plan

There are 205 selected target villages for water supply plan in the Mwanza region and 223 villages in the Mara region, totaling 428 villages in the study area. Also, the number of existing piped schemes for the water supply plan is identified as a total of 57 piped schemes, consisting of 37 in the Mwanza region and 20 in the Mara region. The priority project of the water supply plan, which is the construction of water supply facilities in the implementation phase, will be completed by the year 2010. The water supply facilities for the priority project will be designed to meet the water demand anticipated in the year 2015. The administrative population to be served by hand pump and spring is about 1,372,000 and by piped scheme about 2,521,000 in the year 2025 for water supply plan.

The unit water demand is calculated based on Tanzania's "Design Manual for Water Supply and Waste Water Disposal (1997)". The total water demand is estimated for the Mwanza and Mara regions of the year 2005 as approximately $17.8 \times 10^3 m^3$/day and in the year 2015, the overall water demand is projected as approximately $56.4 \times 10^3 m^3$/day.

## 5.2 Water Sources

The water sources existing in the Mwanza and Mara regions can generally be classified as surface water, groundwater and rain water. The surface water resources from which water is collected include rivers, streams, Lake Victoria, and small-scale dams, while the groundwater sources include springs, shallow wells, and deep wells (Boreholes). Finally, it was decided that water sources are available for groundwater, spring water and lake water from Lake Victoria in the Study area. The important factors in considering water sources are (1) Sustainability for water use, (2) Availability through out the year, and (3) Safety of water quality. Regarding the utilization of groundwater for water sources, the actual exploitable yield and number of wells is decided based on the groundwater potential according to the hydrogeological interpretation and analysis.

## 5.3 Water Supply Plan

The water supply plan for the 428 villages is shown in Table 5.3-1.

The water supply plan is grouped into the following types in study area.

(1) Spring Protection

(2) Medium and Deep Well with Hand Pump

(3) Newly Installed Piped Scheme

(4) Expanded Piped Scheme

(5) Rehabilitated Piped Scheme

In regard to springs, protected springs for safety are planned at two spring sites. The total number of the Medium and Deep wells with Hand Pumps is 1,869 wells and the population served by hand pimp is about 581,000 in 2025. The total number of piped schemes, such as the newly installed piped schemes, expanded and rehabilitated piped schemes is 121 sites with 368 villages and served population is about 1,260,000 in 2025.

# Table 5.3-1: Water Supply Plan (1/5)

| Region | DISTRICT | No. by District | Village | Population in 2025 | Water Sources type | | | | served coverage rate(%) in 2005 | served coverage rate(%) in 2025 | Served Population in 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HP=Hand pump MP=Motor pump | No. of HP or MP | Additional Medium BH | Total (HP) | Water Sources | | | |
| Mwanza | MISUNGWI | 6 | Mapilinga | 3,192 | Newly Piped Scheme | | | | Lake V. | 11 | 77 | 2,455 |
| | MISUNGWI | 10 | Ibongoya A | 5,303 | HP | 4 | 4 | 8 | Deep BH | 31 | 69 | 3,644 |
| | MISUNGWI | 17 | Mwasagela | 3,455 | HP | 3 | 3 | 6 | Medium BH | 19 | 62 | 2,156 |
| | MISUNGWI | 21 | Mwamaguha | 3,462 | HP | 3 | 2 | 5 | Deep BH | 19 | 55 | 1,908 |
| | MISUNGWI | 22 | Buhingo | 2,754 | Expanded Piped Scheme MP | 1 | | 1 | BH | 23 | 89 | 2,448 |
| | MISUNGWI | 23 | Kabale | 4,648 | Expanded Piped Scheme MP | 2 | | 2 | BH | 7 | 73 | 3,389 |
| | MISUNGWI | 24 | Nyamainza | 5,677 | HP | 6 | 4 | 10 | Medium BH | 6 | 50 | 2,841 |
| | MISUNGWI | 25 | Busongo | 6,361 | Newly Piped Scheme MP | 2 | | 2 | BH | 5 | 93 | 5,916 |
| | MISUNGWI | 26 | Isenengeja | 2,163 | HP | 2 | 2 | 4 | Medium BH | 15 | 61 | 1,324 |
| | MISUNGWI | 27 | Mbarika | 3,799 | Expanded Piped Scheme | | | | Lake V. | 17 | 83 | 3,150 |
| | MISUNGWI | 28 | Ngaya | 4,974 | Newly Piped Scheme | | | | Lake V. | 13 | 100 | 4,974 |
| | MISUNGWI | 30 | Usagara | 3,242 | Expanded Piped Scheme MP | 1 | | 1 | BH | 28 | 94 | 3,045 |
| | MISUNGWI | 31 | Kanyelele | 5,253 | HP | 4 | 3 | 7 | Medium BH | 31 | 64 | 3,379 |
| | MISUNGWI | 33 | Budutu | 2,078 | HP | 2 | 1 | 3 | Medium BH | 16 | 52 | 1,082 |
| | MISUNGWI | 35 | Isamilo | 5,997 | Newly Piped Scheme | | | | Lake V. | 16 | 82 | 4,912 |
| | MISUNGWI | 36 | Mwalogwabagole | 4,514 | Expanded Piped Scheme | | | | Lake V. | 15 | 81 | 3,652 |
| | SENGEREMA | 5 | Ibondo | 9,921 | Expanded Piped Scheme | | | | Lake V. | 0 | 59 | 5,845 |
| | SENGEREMA | 6 | Iusunganghol o | 4,699 | HP | 5 | 2 | 7 | Medium BH | 0 | 37 | 1,750 |
| | SENGEREMA | 7 | Mwabaluhi | 5,879 | Expanded Piped Scheme | | | | Lake V. | 0 | 59 | 3,463 |
| | SENGEREMA | 8 | Sima | 10,821 | Rehabilitated Piped S. MP | 2 | | 2 | BH | 16.9 | 76 | 8,204 |
| | SENGEREMA | 10 | Igulumuki | 4,480 | HP | 5 | 5 | 10 | Medium BH | 0 | 56 | 2,500 |
| | SENGEREMA | 11 | Ijinga | 3,639 | HP | 4 | 2 | 6 | Medium BH | 0 | 41 | 1,500 |
| | SENGEREMA | 12 | Ishishang'holo | 3,489 | HP | 3 | 3 | 6 | Medium BH | 0 | 43 | 1,500 |
| | SENGEREMA | 13 | Sogoso | 7,306 | HP | 6 | 3 | 9 | Deep BH | 0 | 31 | 2,250 |
| | SENGEREMA | 14 | Tabaruka | 6,931 | Expanded Piped Scheme | | | | Lake V. | 11.5 | 70 | 4,880 |
| | SENGEREMA | 15 | Mayuga | 3,160 | HP | 3 | 3 | 6 | Medium BH | 16.4 | 64 | 2,018 |
| | SENGEREMA | 16 | Kishinda | 8,255 | HP | 7 | 4 | 11 | Medium BH | 11.1 | 44 | 3,666 |
| | SENGEREMA | 17 | Nyasenga | 7,596 | Newly Piped Scheme | | | | Lake V. | 23.5 | 82 | 6,260 |
| | SENGEREMA | 18 | Nyampande | 6,532 | Newly Piped Scheme | | | | Lake V. | 9.2 | 68 | 4,449 |
| | SENGEREMA | 19 | Busurumwangili | 4,942 | HP | 5 | 4 | 9 | Deep BH | 6 | 52 | 2,547 |
| | SENGEREMA | 20 | Tunyenye | 6,566 | HP | 6 | | 6 | Deep BH | 0 | 23 | 1,500 |
| | SENGEREMA | 21 | Mauri | 2,047 | HP | 2 | 4 | 6 | Medium BH | 0 | 73 | 1,500 |
| | SENGEREMA | 22 | Kahumulo | 6,043 | Newly Piped Scheme | | | | Lake V. | 11.2 | 70 | 4,237 |
| | SENGEREMA | 23 | Nyamasale | 4,279 | Expanded Piped Scheme | | | | Lake V. | 0 | 59 | 2,521 |
| | SENGEREMA | 24 | Nyitundu | 3,864 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 2,276 |
| | SENGEREMA | 26 | Lubanda | 4,545 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 2,678 |
| | SENGEREMA | 30 | Juma kisiwani | 5,394 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 3,178 |
| | SENGEREMA | 31 | Kasomeko | 6,467 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 3,810 |
| | SENGEREMA | 32 | Ilekanilo | 7,829 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 4,612 |
| | SENGEREMA | 36 | Nyamizeze | 7,452 | Expanded Piped Scheme | | | | Lake V. | 37.3 | 96 | 7,170 |
| | SENGEREMA | 37 | Mwaliga | 2,741 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 1,615 |
| | SENGEREMA | 38 | Kijuka | 5,938 | Expanded Piped Scheme | | | | Lake V. | 0 | 59 | 3,498 |
| | SENGEREMA | 43 | Nyamahona | 8,838 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 5,207 |
| | SENGEREMA | 44 | Nyakahako | 9,400 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 5,538 |
| | SENGEREMA | 47 | Ngoma B | 5,240 | Newly Piped Scheme | | | | Lake V. | 32.2 | 91 | 4,775 |
| | SENGEREMA | 48 | Irunda | 5,123 | Newly Piped Scheme | | | | Lake V. | 12.8 | 72 | 3,674 |
| | SENGEREMA | 50 | Karumo | 7,174 | Newly Piped Scheme | | | | Lake V. | 12.7 | 72 | 5,138 |
| | SENGEREMA | 56 | Bulyhilu | 7,934 | Newly Piped Scheme | | | | Lake V. | 16.6 | 76 | 5,991 |
| | SENGEREMA | 58 | Igakamba | 13,292 | Newly Piped Scheme | | | | Lake V. | 7.8 | 67 | 8,868 |
| | SENGEREMA | 59 | Bupandwa | 26,219 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 15,447 |
| | SENGEREMA | 61 | Bilulumo | 4,109 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 2,421 |
| | SENGEREMA | 62 | Luhorongoma | 6,469 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 3,811 |
| | SENGEREMA | 65 | Ngoma A | 11,141 | HP | 9 | 0 | 9 | Medium BH | 18.1 | 38 | 4,267 |
| | SENGEREMA | 66 | Lubungo | 3,537 | Newly Piped Scheme | | | | Lake V. | 14.2 | 73 | 2,586 |
| | SENGEREMA | 67 | Sotta | 5,605 | HP | 5 | 2 | 7 | Deep BH | 0 | 31 | 1,750 |
| | SENGEREMA | 69 | Isole | 6,392 | HP | 5 | 2 | 7 | Deep BH | 17.8 | 45 | 2,888 |
| | SENGEREMA | 71 | Bitoto | 5,297 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 3,121 |
| | SENGEREMA | 72 | Kalangalanga | 2,424 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 1,428 |
| | SENGEREMA | 73 | Mlaga | 3,616 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 2,131 |
| | SENGEREMA | 75 | Buswelu | 4,812 | Newly Piped Scheme MP | 2 | | 2 | Deep BH | 12.4 | 82 | 3,946 |
| | SENGEREMA | 76 | Migukulama | 3,892 | Expanded Piped Scheme | | | | Lake V. | 11.3 | 70 | 2,733 |
| | SENGEREMA | 77 | Nyanzenda | 7,219 | Expanded Piped Scheme | | | | Lake V. | 7.4 | 66 | 4,787 |
| | SENGEREMA | 78 | Isaka | 11,281 | HP | 7 | 5 | 12 | Medium BH | 33.4 | 60 | 6,768 |
| | SENGEREMA | 79 | Ruharanyonda | 6,288 | HP | 5 | 0 | 5 | Deep BH | 10 | 30 | 1,879 |
| | SENGEREMA | 80 | Kayenze | 6,574 | HP | 5 | 0 | 5 | Deep BH | 23.2 | 42 | 2,775 |
| | SENGEREMA | 81 | Nyamadoke | 7,346 | Newly Piped Scheme | | | | Lake V. | 23.2 | 82 | 6,032 |
| | SENGEREMA | 83 | Busekeseke | 4,354 | HP | 4 | 3 | 7 | Deep BH | 0 | 40 | 1,750 |
| | SENGEREMA | 84 | Katoma | 5,151 | HP | 5 | 3 | 8 | Deep BH | 0 | 39 | 2,000 |
| | SENGEREMA | 86 | Magulukenda | 6,483 | HP | 6 | 2 | 8 | Deep BH | 0 | 31 | 2,000 |
| | SENGEREMA | 87 | Buzilasoga | 4,543 | HP | 4 | 1 | 5 | Deep BH | 10.7 | 38 | 1,736 |
| | SENGEREMA | 88 | Ikoni | 3,160 | HP | 3 | 0 | 3 | Deep BH | 17.3 | 41 | 1,297 |
| | SENGEREMA | 89 | Igaka | 4,865 | HP | 5 | 3 | 8 | Medium BH | 0 | 41 | 2,000 |
| | SENGEREMA | 90 | Kanyelele | 3,916 | HP | 4 | 0 | 4 | Deep BH | 0 | 26 | 1,000 |
| | SENGEREMA | 93 | Bukokwa | 13,908 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 8,194 |
| | SENGEREMA | 94 | Kagunga | 8,028 | HP | 8 | 0 | 8 | Medium BH | 0 | 25 | 2,000 |
| | SENGEREMA | 95 | Lwenge | 4,024 | HP | 4 | 1 | 5 | Medium BH | 0 | 31 | 1,250 |
| | SENGEREMA | 96 | Nyancheche | 9,773 | HP | 5 | 4 | 9 | Deep BH | 0 | 23 | 2,250 |
| | SENGEREMA | 97 | Nyanzumla | 6,495 | HP | 6 | 3 | 9 | Medium BH | 0 | 35 | 2,250 |
| | SENGEREMA | 99 | Nyamiswi | 4,156 | Newly Piped Scheme | | | | Lake V. | 0 | 70 | 2,909 |
| | SENGEREMA | 100 | Nyakasasa | 7,267 | Newly Piped Scheme | | | | Lake V. | 0 | 70 | 5,087 |
| | SENGEREMA | 102 | Bugoro | 7,271 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 4,284 |
| | SENGEREMA | 103 | Nyakabanga | 4,768 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 2,809 |
| | SENGEREMA | 104 | Lugata | 22,204 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 13,081 |

# Table 5.3-1: Water Supply Plan (2/5)

| Region | DISTRICT | No. by District | Village | Population in 2025 | Water Sources type | | | | | served coverage rate(%) in 2005 | served coverage rate(%) in 2025 | Served Population in 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HP=Hand pump MP=Motor pump | No. of HP or MP | Additional Medium BH | Total (HP) | Water Sources | | | |
| Mwanza | SENGEREMA | 106 | Lushamba | 19,250 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 11,341 |
| | SENGEREMA | 108 | Bulyaheke | 9,382 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 5,527 |
| | SENGEREMA | 110 | Ilyamchele | 3,093 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 1,822 |
| | SENGEREMA | 114 | Luharanyonga | 6,288 | Newly Piped Scheme | | | | Lake V. | 17.9 | 77 | 4,830 |
| | SENGEREMA | 115 | Isengeng'he | 5,575 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 3,284 |
| | SENGEREMA | 118 | Nyakasungwa | 11,103 | Expanded Piped Scheme | | | | Lake V. | 4.6 | 64 | 7,052 |
| | SENGEREMA | 119 | Igwanzozu | 2,641 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 1,556 |
| | KWIMBA | 3 | Ilumba | 3,893 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 29 | 90 | 3,513 |
| | KWIMBA | 22 | Hungumalwa | 8,711 | Newly Piped Scheme MP | 2 | | 2 | BH | 35 | 100 | 8,711 |
| | KWIMBA | 24 | Manayi | 5,979 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 7 | 68 | 4,080 |
| | KWIMBA | 25 | Ilula | 5,158 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 16 | 77 | 3,984 |
| | KWIMBA | 31 | Kijida | 5,022 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 28 | 89 | 4,482 |
| | KWIMBA | 34 | Igumangobo | 3,103 | HP | 3 | 3 | 6 | Deep BH | 0 | 48 | 1,500 |
| | KWIMBA | 35 | Shigongama | 4,590 | HP | 5 | 0 | 5 | Medium BH | 0 | 27 | 1,250 |
| | KWIMBA | 40 | Mwamitinje | 1,580 | HP | 2 | 0 | 2 | Medium BH | 0 | 32 | 500 |
| | KWIMBA | 44 | Izizimba A | 6,097 | Expanded Piped Scheme | | | | Deep BH | 0 | 61 | 3,734 |
| | KWIMBA | 45 | Izizimba B | 4,591 | Expanded Piped Scheme | | | | Deep BH | 0 | 61 | 2,812 |
| | KWIMBA | 55 | Sanga | 5,536 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 0 | 61 | 3,390 |
| | KWIMBA | 61 | Nyamikoma | 2,681 | HP | 3 | 2 | 5 | Medium BH | 6 | 53 | 1,411 |
| | KWIMBA | 66 | Mwampulu | 4,799 | HP | 5 | 2 | 7 | Medium BH | 9 | 45 | 2,182 |
| | KWIMBA | 68 | Ngulla | 4,820 | HP | 5 | 3 | 8 | Medium BH | 9 | 50 | 2,434 |
| | KWIMBA | 69 | Nyamatala | 5,714 | HP | 5 | 3 | 8 | Medium BH | 7 | 42 | 2,400 |
| | KWIMBA | 70 | Nyambuyi | 3,348 | HP | 3 | 2 | 5 | Medium BH | 0 | 37 | 1,250 |
| | KWIMBA | 71 | Mhulya | 3,756 | HP | 4 | 4 | 8 | Deep BH | 0 | 53 | 2,000 |
| | KWIMBA | 72 | Mwangika | 3,381 | HP | 3 | 0 | 3 | Deep BH | 13 | 35 | 1,190 |
| | KWIMBA | 74 | Ngogo | 5,342 | HP | 4 | 1 | 5 | Medium BH | 32 | 55 | 2,960 |
| | KWIMBA | 82 | Bungandando | 6,254 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 34 | 95 | 5,956 |
| | KWIMBA | 83 | Icheja | 2,338 | HP | 2 | 2 | 4 | Deep BH | 14 | 57 | 1,327 |
| | KWIMBA | 84 | Nqwaswengele | 8,354 | Rehabilitated Piped S.MP | 2 | | 2 | BH | 0 | 61 | 5,116 |
| | KWIMBA | 85 | Nyamigamba | 7,839 | Newly Piped Scheme MP | 2 | | 2 | Deep BH | 22 | 83 | 6,525 |
| | MAGU | 1 | Nyamahanga | 3,523 | Expanded Piped Scheme | | | | Lake V. | 32.2 | 96 | 3,367 |
| | MAGU | 6 | Inolelo | 3,127 | HP | 3 | 0 | 3 | Medium BH | 12 | 36 | 1,125 |
| | MAGU | 13 | Kitongosima | 6,219 | HP | 4 | 0 | 4 | Deep BH | 37 | 53 | 3,301 |
| | MAGU | 22 | Bubinza | 5,911 | Newly Piped Scheme | | | | Lake V. | 12.5 | 76 | 4,484 |
| | MAGU | 26 | Bugatu | 6,595 | HP | 4 | 0 | 4 | Medium BH | 39.3 | 54 | 3,592 |
| | MAGU | 32 | Mahaha | 11,882 | HP | 9 | 2 | 11 | Medium BH | 21.6 | 45 | 5,316 |
| | MAGU | 33 | Nyasoto | 4,722 | HP | 4 | 4 | 8 | Medium BH | 23 | 65 | 3,086 |
| | MAGU | 37 | Igekemaja | 3,889 | HP | 4 | 0 | 4 | Medium BH | 9.6 | 35 | 1,373 |
| | MAGU | 38 | Kitumba | 6,367 | Rehabilitated Piped S.MP | 2 | | 2 | BH | 14.2 | 78 | 4,939 |
| | MAGU | 43 | Mwagulanja | 4,426 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 34 | 97 | 4,310 |
| | MAGU | 44 | Bulima | 8,462 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 24.4 | 88 | 7,428 |
| | MAGU | 50 | Ihayabuyaga B | 4,679 | HP | 5 | 2 | 7 | Medium BH | 8 | 45 | 2,124 |
| | MAGU | 51 | Lwagwe | 2,273 | HP | 3 | 3 | 6 | Medium BH | 0 | 66 | 1,500 |
| | MAGU | 55 | Simanilwe | 3,345 | Expanded Piped Scheme | | | | Lake V. | 22.2 | 86 | 2,862 |
| | MAGU | 58 | Badugu | 7,097 | HP | 6 | 1 | 7 | Medium BH | 16 | 41 | 2,886 |
| | MAGU | 59 | Manala | 2,380 | HP | 3 | 3 | 6 | Medium BH | 6.2 | 69 | 1,648 |
| | MAGU | 66 | Lukungu | 4,384 | Newly Piped Scheme | | | | Lake V. | 8.4 | 72 | 3,146 |
| | MAGU | 67 | Mayenga | 3,660 | Expanded Piped Scheme | | | | Lake V. | 10.1 | 73 | 2,689 |
| | MAGU | 74 | Mwakiloba | 4,071 | Newly Piped Scheme | | | | Lake V. | 9.1 | 72 | 2,950 |
| | MAGU | 75 | Kijereshi | 8,759 | HP | 8 | 2 | 10 | Deep BH | 8.4 | 37 | 3,236 |
| | MAGU | 78 | Nyangili | 3,715 | Expanded Piped Scheme | | | | Lake V. | 0 | 63 | 2,354 |
| | MAGU | 80 | Malili | 2,530 | HP | 2 | 3 | 5 | Medium BH | 21.1 | 71 | 1,784 |
| | MAGU | 83 | Mwamgomba | 2,462 | HP | 2 | 3 | 5 | Medium BH | 15.4 | 66 | 1,629 |
| | GEITA | 2 | Igate | 8,376 | HP | 8 | 0 | 8 | Deep BH | 0 | 24 | 2,000 |
| | GEITA | 3 | Idosero | 7,324 | HP | 6 | 4 | 10 | Deep BH | 0 | 34 | 2,500 |
| | GEITA | 4 | Lwenzera | 21,354 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 12,641 |
| | GEITA | 5 | Nzera | 13,599 | Expanded Piped Scheme | | | | Lake V. | 20.2 | 79 | 10,798 |
| | GEITA | 6 | Buligi | 13,764 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 8,148 |
| | GEITA | 8 | Kakubilo | 26,458 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 15,663 |
| | GEITA | 9 | Nyabalasana | 10,102 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 5,980 |
| | GEITA | 10 | Kaseni | 5,768 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 3,414 |
| | GEITA | 14 | Nyamboge | 13,986 | Expanded Piped Scheme | | | | Lake V. | 0 | 59 | 8,280 |
| | GEITA | 15 | Katoma | 12,917 | Newly Piped Scheme | | | | Lake V. | 23 | 82 | 10,617 |
| | GEITA | 16 | Nyakasenze | 4,513 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 2,672 |
| | GEITA | 17 | Bugulala | 11,440 | HP | 5 | 6 | 11 | Deep BH | 0 | 24 | 2,750 |
| | GEITA | 18 | Kasota | 12,942 | HP,Spring | 5 | 4 | 9 | Deep BH、S | 0 | 17 | 2,250 |
| | GEITA | 19 | Nyamilongo | 10,793 | HP | 6 | 2 | 8 | Deep BH | 0 | 19 | 2,000 |
| | GEITA | 20 | Nyalwanzaja | 9,590 | HP | 7 | 4 | 11 | Deep BH | 22.1 | 51 | 4,869 |
| | GEITA | 21 | Imalampaka | 4,388 | HP | 3 | 7 | 10 | Medium BH | 25 | 82 | 3,597 |
| | GEITA | 22 | Kamera | 10,966 | HP | 5 | 3 | 8 | Deep BH | 0 | 18 | 2,000 |
| | GEITA | 23 | Bushishi | 6,260 | HP | 4 | 5 | 9 | Deep BH | 0 | 36 | 2,250 |
| | GEITA | 24 | Ndelema | 5,537 | HP | 3 | 7 | 10 | Deep BH | 0 | 45 | 2,500 |
| | GEITA | 25 | Nyashishima | 2,616 | HP | 2 | 3 | 5 | Deep BH | 0 | 48 | 1,250 |
| | GEITA | 26 | Bogogo | 13,151 | HP | 6 | 2 | 8 | Deep BH | 13 | 28 | 3,710 |
| | GEITA | 27 | Ikina | 3,160 | HP | 2 | 5 | 7 | Deep BH | 0 | 55 | 1,750 |
| | GEITA | 28 | Butombula | 5,498 | HP | 5 | 5 | 10 | Deep BH | 0 | 45 | 2,500 |
| | GEITA | 29 | Ntono | 12,343 | HP | 6 | 4 | 10 | Deep BH | 0 | 20 | 2,500 |
| | GEITA | 30 | Ihega | 5,023 | HP | 3 | 8 | 11 | Deep BH | 0 | 55 | 2,750 |
| | GEITA | 31 | Nyakangwe | 6,117 | HP | 6 | 3 | 9 | Deep BH | 0 | 37 | 2,250 |
| | GEITA | 32 | Nyaruyeye | 7,347 | HP | 5 | 3 | 8 | Deep BH | 0 | 27 | 2,000 |
| | GEITA | 34 | Mhama | 3,130 | HP | 3 | 3 | 6 | Medium BH | 0 | 48 | 1,500 |
| | GEITA | 35 | Rukarakata | 8,715 | HP | 8 | 2 | 10 | Medium BH | 0 | 29 | 2,500 |
| | GEITA | 38 | Kashishi | 7,439 | HP | 5 | 0 | 5 | Deep BH | 36.7 | 54 | 3,980 |
| | GEITA | 40 | Kasungamile | 3,422 | HP | 3 | 3 | 6 | Medium BH | 0 | 44 | 1,500 |
| | GEITA | 42 | Ibondo | 9,713 | HP | 7 | 6 | 13 | Deep BH | 0 | 33 | 3,250 |
| | GEITA | 43 | Inyara | 9,928 | HP | 9 | 4 | 13 | Medium BH | 0 | 33 | 3,250 |

## Table 5.3-1: Water Supply Plan (3/5)

| Region | DISTRICT | No. by District | Village | Population in 2025 | Water Sources type | | | | | served coverage rate(%) in 2005 | served coverage rate(%) in 2025 | Served Population in 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HP=Hand pump MP=Motor pump | No. of HP or MP | Additional Medium BH | Total (HP) | Water Sources | | | |
| Mwanza | GEITA | 45 | Shilabela | 3,648 | HP | 4 | 2 | 6 | Medium BH | 0 | 41 | 1,500 |
| | GEITA | 51 | Mabamba | 8,314 | HP | 8 | 5 | 13 | Medium BH | 0 | 39 | 3,250 |
| | GEITA | 52 | Chikobe | 7,919 | Expanded Piped Scheme | | | | Lake V. | 37 | 96 | 7,618 |
| | GEITA | 53 | Kasangwa | 12,095 | Newly Piped Scheme | | | | Lake V. | 0 | 59 | 7,160 |
| | GEITA | 54 | Isima | 5,357 | Expanded Piped Scheme | | | | Lake V. | 0 | 59 | 3,171 |
| | GEITA | 57 | Lulama | 2,711 | HP | 3 | 3 | 6 | Medium BH | 0 | 55 | 1,500 |
| | GEITA | 59 | Kharumwa | 9,223 | Expanded Piped Scheme | | | | Lake V. | 38.2 | 97 | 8,983 |
| | GEITA | 61 | Bukungu | 5,291 | Expanded Piped Scheme | | | | Lake V. | 33 | 92 | 4,878 |
| | GEITA | 63 | Ikangala | 2,642 | Expanded Piped Scheme | | | | Lake V. | 0 | 59 | 1,564 |
| | GEITA | 64 | Mwamakiliga | 1,975 | HP | 2 | 0 | 2 | Deep BH | 26.8 | 52 | 1,029 |
| | UKEREWE | 2 | Chankamba | 4,987 | Newly Piped Scheme | | | | Lake V. | 15.6 | 76 | 3,803 |
| | UKEREWE | 3 | Bwasa | 4,656 | Expanded Piped Scheme | | | | Lake V. | 6.5 | 67 | 3,127 |
| | UKEREWE | 5 | Murutilima | 8,284 | Expanded Piped Scheme | | | | Lake V. | 0 | 61 | 5,025 |
| | UKEREWE | 9 | Busangu | 6,049 | Expanded Piped Scheme | | | | Lake V. | 31.5 | 92 | 5,574 |
| | UKEREWE | 12 | Namasabo | 3,772 | Newly Piped Scheme | | | | Lake V. | 0 | 61 | 2,288 |
| | UKEREWE | 14 | Bugala | 11,446 | Expanded Piped Scheme | | | | Lake V. | 27.4 | 88 | 10,078 |
| | UKEREWE | 15 | Itira | 4,354 | Expanded Piped Scheme | | | | Lake V. | 12.5 | 73 | 3,185 |
| | UKEREWE | 16 | Ihebo | 4,591 | Expanded Piped Scheme | | | | Lake V. | 6.8 | 67 | 3,096 |
| | UKEREWE | 17 | Igongo | 4,267 | Expanded Piped Scheme | | | | Lake V. | 0 | 61 | 2,588 |
| | UKEREWE | 18 | Muriti | 4,374 | Expanded Piped Scheme | | | | Lake V. | 31.3 | 92 | 4,022 |
| | UKEREWE | 21 | Nyamanga | 4,974 | HP | 4 | 2 | 6 | Medium BH | 0 | 30 | 1,500 |
| | UKEREWE | 22 | Nyang'ombe | 6,919 | Newly Piped Scheme | | | | Lake V. | 21.1 | 82 | 5,656 |
| | UKEREWE | 38 | Masonga | 9,478 | Expanded Piped Scheme | | | | Lake V. | 5 | 66 | 6,222 |
| | UKEREWE | 45 | Bukonyo | 2,832 | Expanded Piped Scheme | | | | Lake V. | 25.7 | 86 | 2,445 |
| | UKEREWE | 48 | Malegea | 5,835 | Expanded Piped Scheme | | | | Lake V. | 29.5 | 90 | 5,260 |
| | UKEREWE | 49 | Mukasika | 3,086 | Expanded Piped Scheme | | | | Lake V. | 0 | 61 | 1,872 |
| | UKEREWE | 50 | Muhande | 4,063 | Expanded Piped Scheme | | | | Lake V. | 29.5 | 90 | 3,663 |
| | UKEREWE | 51 | Kweru | 6,311 | Newly Piped Scheme | | | | Lake V. | 0 | 61 | 3,828 |
| | UKEREWE | 54 | Sizu | 3,663 | Newly Piped Scheme | | | | Lake V. | 0 | 61 | 2,222 |
| | UKEREWE | 58 | Bulamba | 6,675 | Expanded Piped Scheme | | | | Lake V. | 0 | 61 | 4,048 |
| | UKEREWE | 67 | Bugombe | 2,954 | Expanded Piped Scheme | | | | Lake V. | 0 | 61 | 1,791 |
| | UKEREWE | 68 | Nantare | 4,511 | Newly Piped Scheme | | | | Lake V. | 0 | 61 | 2,736 |
| | UKEREWE | 72 | Halwego | 8,750 | Expanded Piped Scheme | | | | Lake V. | 7.6 | 68 | 5,972 |
| | UKEREWE | 73 | Buhima | 9,094 | Expanded Piped Scheme | | | | Lake V. | 0 | 61 | 5,515 |
| | UKEREWE | 74 | Chamuhunda | 4,465 | Newly Piped Scheme | | | | Lake V. | 24.3 | 85 | 3,793 |
| | NYAMAGANA & ILEMELA | 2 | Kishili | 13,562 | HP | 9 | 2 | 11 | Deep BH | 25 | 45 | 6,141 |
| Mara | BUNDA | 9 | Kinyambwiga | 4,867 | Expanded Piped Scheme | | | | Lake V. | 0 | 64 | 3,115 |
| | BUNDA | 16 | Marambeka | 4,584 | HP | 5 | 2 | 7 | Medium BH | 24.2 | 62 | 2,859 |
| | BUNDA | 17 | Mugeta | 2,995 | HP | 3 | 0 | 3 | Midium BH | 25 | 50 | 1,499 |
| | BUNDA | 18 | Sanzate | 4,258 | HP | 5 | 2 | 7 | Midium BH | 17.6 | 59 | 2,499 |
| | BUNDA | 19 | Nyang'aranga | 4,504 | HP | 6 | 2 | 8 | Midium BH | 0 | 44 | 2,000 |
| | BUNDA | 20 | Kyandege | 5,131 | HP | 6 | 2 | 8 | Midium BH | 14.5 | 53 | 2,744 |
| | BUNDA | 23 | Manchimweru | 5,522 | HP | 6 | 2 | 8 | Midium BH | 20.7 | 57 | 3,143 |
| | BUNDA | 26 | Ligamba B | 2,319 | HP | 3 | 3 | 6 | Deep BH | 10 | 75 | 1,732 |
| | BUNDA | 27 | Misisi | 3,476 | Newly Piped Scheme MP | 1 | | 1 | Deep BH | 23.13 | 87 | 3,028 |
| | BUNDA | 30 | Kangetutya | 3,153 | HP | 4 | 2 | 6 | Midium BH | 10.87 | 58 | 1,843 |
| | BUNDA | 33 | Mcharo | 1,518 | HP | 4 | 1 | 5 | Deep BH | 11.36 | 94 | 1,422 |
| | BUNDA | 37 | Nyamatoke | 2,666 | HP | 4 | 3 | 7 | Midium BH | 0 | 66 | 1,750 |
| | BUNDA | 42 | Kabasa | 4,297 | HP | 4 | 3 | 7 | Midium BH | 27.69 | 68 | 2,940 |
| | BUNDA | 46 | Hunyari | 6,029 | HP | 6 | 2 | 8 | Midium BH | 24.88 | 58 | 3,500 |
| | BUNDA | 48 | Mariwanda | 6,201 | HP | 7 | 2 | 9 | Midium BH | 17.45 | 54 | 3,332 |
| | BUNDA | 51 | Buzimbwe | 3,171 | Newly Piped Scheme | | | | Lake V. | 0 | 64 | 2,029 |
| | BUNDA | 52 | Kabainja | 2,572 | Newly Piped Scheme | | | | Lake V. | 0 | 64 | 1,646 |
| | BUNDA | 62 | Kiroreli | 5,464 | HP | 5 | 0 | 5 | Deep BH | 34 | 57 | 3,108 |
| | BUNDA | 67 | Karukekere | 5,595 | Expanded Piped Scheme | | | | Lake V. | 0 | 64 | 3,581 |
| | BUNDA | 68 | Muranda | 4,518 | Expanded Piped Scheme | | | | Lake V. | 0 | 64 | 2,892 |
| | BUNDA | 69 | Haruzale | 2,000 | Expanded Piped Scheme | | | | Lake V. | 0 | 64 | 1,280 |
| | BUNDA | 84 | Nafuba | 3,531 | Newly Piped Scheme | | | | Lake V. | 0 | 64 | 2,260 |
| | BUNDA | 85 | Igundu | 4,812 | Newly Piped Scheme | | | | Lake V. | 7.3 | 71 | 3,431 |
| | BUNDA | 88 | Namalama | 2,194 | Newly Piped Scheme | | | | Lake V. | 0 | 64 | 1,404 |
| | BUNDA | 93 | Sunsi | 6,073 | Newly Piped Scheme | | | | Lake V. | 0 | 64 | 3,887 |
| | MUSOMA | 1 | Wegero | 4,761 | HP | 6 | 0 | 6 | Midium BH | 10 | 42 | 1,976 |
| | MUSOMA | 2 | Baranga | 4,008 | HP | 5 | 2 | 7 | Midium BH | 12 | 56 | 2,231 |
| | MUSOMA | 5 | Kitalamanka | 4,666 | HP | 4 | 3 | 7 | Midium BH | 30 | 68 | 3,150 |
| | MUSOMA | 6 | Sirorisimba | 4,730 | HP | 4 | 4 | 8 | Deep BH | 0 | 42 | 2,000 |
| | MUSOMA | 8 | Ryamisanga | 5,644 | HP | 6 | 2 | 8 | Deep BH | 18 | 53 | 3,016 |
| | MUSOMA | 14 | Mirwa | 4,188 | HP | 5 | 0 | 5 | Midium BH | 17 | 47 | 1,962 |
| | MUSOMA | 15 | Magunga | 5,728 | HP | 8 | 0 | 8 | Midium BH | 0 | 35 | 2,000 |
| | MUSOMA | 17 | Kinyariri | 2,630 | Expanded Piped Scheme | | | | Lake V. | 0 | 63 | 1,666 |
| | MUSOMA | 19 | Ikibubwa | 3,774 | HP | 5 | 5 | 10 | Deep BH | 0 | 66 | 2,500 |
| | MUSOMA | 20 | Busegwe | 7,223 | HP | 9 | 7 | 16 | Deep BH | 0 | 55 | 4,000 |
| | MUSOMA | 21 | Kisamwene | 5,239 | HP | 6 | 5 | 11 | Deep BH | 0 | 52 | 2,750 |
| | MUSOMA | 23 | Bukabwa | 4,333 | Expanded Piped Scheme MP | 1 | | 1 | BH | 0 | 63 | 2,746 |
| | MUSOMA | 24 | Mmazami | 5,918 | HP | 7 | 4 | 11 | Deep BH | 0 | 46 | 2,750 |
| | MUSOMA | 25 | Kirumi | 3,662 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 2,321 |
| | MUSOMA | 26 | Mwiringo | 4,106 | Newly Piped Scheme | | | | Lake V. | 29 | 92 | 3,793 |
| | MUSOMA | 27 | Bwaikwitururu | 6,293 | Newly Piped Scheme | | | | Lake V. | 25 | 88 | 5,561 |
| | MUSOMA | 28 | Bwaikumsoma | 7,794 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 4,939 |
| | MUSOMA | 31 | Chirorwe | 3,859 | HP | 5 | 3 | 8 | Deep BH | 0 | 52 | 2,000 |
| | MUSOMA | 32 | Wanyere | 4,587 | HP | 6 | 5 | 11 | Deep BH | 0 | 60 | 2,750 |
| | MUSOMA | 33 | Bugoji | 6,450 | HP | 7 | 3 | 10 | Deep BH | 22 | 61 | 3,919 |
| | MUSOMA | 35 | Saragana | 5,492 | Newly Piped Scheme MP | 2 | | 2 | Deep BH | 9 | 72 | 3,975 |
| | MUSOMA | 36 | Kaburabura | 2,661 | HP | 4 | 3 | 7 | Deep BH | 0 | 66 | 1,750 |
| | MUSOMA | 42 | Mwanzaburiga | 3,572 | HP | 5 | 2 | 7 | Deep BH | 0 | 49 | 1,750 |
| | MUSOMA | 45 | Kwigutu | 4,112 | HP | 5 | 3 | 8 | Medium BH | 10 | 59 | 2,411 |
| | MUSOMA | 46 | Nyasirori | 4,989 | Expanded Piped Scheme | | | | Lake V. | 21 | 84 | 4,210 |
| | MUSOMA | 47 | Nyamikoma | 6,206 | HP | 6 | 3 | 9 | Medium BH | 27.5 | 64 | 3,957 |

## Table 5.3-1: Water Supply Plan (4/5)

| Region | DISTRICT | No. by District | Village | Population in 2025 | Water Sources type | | | | | served coverage rate(%) in 2005 | served coverage rate(%) in 2025 | Served Population in 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HP=Hand pump MP=Motor pump | No. of HP or MP | Additional Medium BH | Total (HP) | Water Sources | | | |
| Mara | MUSOMA | 50 | Nyankanga | 7,951 | HP | 7 | 5 | 12 | Deep BH | 32 | 70 | 5,544 |
| | MUSOMA | 52 | Nyarukoru | 1,728 | HP | 2 | 2 | 4 | Medium BH | 0 | 58 | 1,000 |
| | MUSOMA | 53 | Bisumwa | 5,759 | HP | 8 | 3 | 11 | Medium BH | 0 | 48 | 2,750 |
| | MUSOMA | 54 | Nyabekwabi | 6,340 | HP | 8 | 3 | 11 | Deep BH | 0 | 43 | 2,750 |
| | MUSOMA | 55 | Isaba | 4,906 | HP | 3 | 7 | 10 | Deep BH | 20 | 71 | 3,481 |
| | MUSOMA | 56 | Songora | 8,726 | HP | 8 | 6 | 14 | Deep BH | 20 | 60 | 5,245 |
| | MUSOMA | 58 | Ryamugabo | 3,269 | Expanded Piped Scheme | | | | Lake V. | 0 | 63 | 2,072 |
| | MUSOMA | 59 | Bugwema | 2,762 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 1,750 |
| | MUSOMA | 60 | Masinono | 3,946 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 2,501 |
| | MUSOMA | 61 | Muhoji | 2,655 | HP | 4 | 0 | 4 | Medium BH | 0 | 38 | 1,000 |
| | MUSOMA | 64 | Mabuimerafu | 2,962 | Expanded Piped Scheme | | | | Lake V. | 0 | 63 | 1,877 |
| | MUSOMA | 65 | Musanja | 6,112 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 3,873 |
| | MUSOMA | 67 | Butata | 7,666 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 4,858 |
| | MUSOMA | 68 | Buanga | 3,851 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 2,441 |
| | MUSOMA | 69 | Rusoli | 4,403 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 2,790 |
| | MUSOMA | 70 | Kwikerege | 1,506 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 954 |
| | MUSOMA | 72 | Bukumi | 3,527 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 2,235 |
| | MUSOMA | 74 | Maneke | 5,132 | Newly Piped Scheme | | | | Lake V. | 15 | 78 | 4,022 |
| | MUSOMA | 75 | Tegeruka | 3,463 | Newly Piped Scheme | | | | Lake V. | 28 | 91 | 3,164 |
| | MUSOMA | 77 | Katario | 4,063 | HP | 4 | 3 | 7 | Medium BH | 26 | 69 | 2,806 |
| | MUSOMA | 80 | Bulinga | 5,571 | Newly Piped Scheme | | | | Lake V. | 8 | 71 | 3,976 |
| | MUSOMA | 82 | Chitare | 5,447 | Newly Piped Scheme | | | | Lake V. | 35 | 98 | 5,359 |
| | MUSOMA | 83 | Chimati | 3,153 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 1,998 |
| | MUSOMA | 84 | Makojo | 3,277 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 2,077 |
| | MUSOMA | 87 | Seka | 4,312 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 2,733 |
| | MUSOMA | 88 | Mikuyu | 2,180 | Expanded Piped Scheme | | | | Lake V. | 0 | 63 | 1,381 |
| | MUSOMA | 91 | Mmahale | 1,680 | Expanded Piped Scheme | | | | Lake V. | 0 | 63 | 1,064 |
| | MUSOMA | 92 | Mkirira | 4,077 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 2,583 |
| | MUSOMA | 93 | Rubuka | 2,597 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 1,646 |
| | MUSOMA | 94 | Kabegi | 3,437 | Newly Piped Scheme | | | | Lake V. | 23 | 86 | 2,969 |
| | MUSOMA | 97 | Kiemba | 4,971 | Newly Piped Scheme | | | | Lake V. | 0 | 63 | 3,150 |
| | MUSOMA | 98 | Kigera | 8,844 | Expanded Piped Scheme | | | | Lake V. | 0 | 63 | 5,604 |
| | MUSOMA | 99 | Kwikuba | 2,262 | Newly Piped Scheme | | | | Lake V. | 21 | 84 | 1,908 |
| | MUSOMA | 103 | Kiriba | 4,309 | Newly Piped Scheme | | | | Lake V. | 13 | 76 | 3,291 |
| | TARIME | 5 | Kenyamanyori | 6,619 | HP | 7 | 3 | 10 | Deep BH | 17.1 | 55 | 3,632 |
| | TARIME | 7 | Nkende | 5,352 | HP | 6 | 0 | 6 | Deep BH | 13.1 | 41 | 2,201 |
| | TARIME | 8 | Magena | 3,968 | HP | 3 | 6 | 9 | Deep BH | 24.7 | 81 | 3,230 |
| | TARIME | 12 | Mogabiri | 9,073 | HP | 8 | 2 | 10 | Deep BH | 33.2 | 61 | 5,512 |
| | TARIME | 14 | Nyasaricho | 1,758 | HP | 2 | 3 | 5 | Deep BH | 17.6 | 89 | 1,559 |
| | TARIME | 15 | Kemakorere | 7,477 | HP | 9 | 3 | 12 | Deep BH | 0 | 40 | 3,000 |
| | TARIME | 16 | Nyarero | 4,707 | HP | 5 | 3 | 8 | Deep BH | 14.2 | 57 | 2,668 |
| | TARIME | 17 | Soroneta | 4,536 | HP | 6 | 3 | 9 | Deep BH | 0 | 50 | 2,250 |
| | TARIME | 18 | Rosana | 2,186 | HP | 3 | 1 | 4 | Deep BH | 8.3 | 54 | 1,181 |
| | TARIME | 19 | Magoto | 6,010 | HP | 8 | 2 | 10 | Deep BH | 0 | 42 | 2,500 |
| | TARIME | 20 | Borega A | 5,402 | HP | 6 | 0 | 6 | Deep BH | 9.6 | 37 | 2,019 |
| | TARIME | 21 | Ganyango | 4,791 | HP | 6 | 3 | 9 | Deep BH | 0 | 47 | 2,250 |
| | TARIME | 22 | Kebweye | 3,610 | HP | 3 | 9 | 12 | Deep BH | 0 | 83 | 3,000 |
| | TARIME | 23 | Nyarwana | 6,499 | Rehabilitated Piped S.MP | 2 | | 2 | BH | 0 | 62 | 4,000 |
| | TARIME | 24 | Nyankunguru | 7,034 | HP | 5 | 4 | 9 | Deep BH | 0 | 32 | 2,250 |
| | TARIME | 25 | Wegita | 4,886 | Newly Piped Scheme MP | 2 | | 2 | Deep BH | 0 | 62 | 3,007 |
| | TARIME | 29 | Muriba | 9,011 | HP | 11 | 4 | 15 | Deep BH | 6 | 48 | 4,291 |
| | TARIME | 30 | Bungurere | 4,246 | HP | 5 | 2 | 7 | Deep BH | 2.7 | 44 | 1,865 |
| | TARIME | 31 | Kobari | 3,152 | HP | 4 | 3 | 7 | Deep BH | 0 | 56 | 1,750 |
| | TARIME | 32 | Nyantira | 11,105 | HP | 13 | 2 | 15 | Deep BH | 7.2 | 41 | 4,550 |
| | TARIME | 33 | Mangucha | 8,946 | HP | 11 | 2 | 13 | Deep BH | 4.7 | 41 | 3,670 |
| | TARIME | 34 | Itiryo | 9,853 | HP | 12 | 0 | 12 | Deep BH | 0 | 30 | 3,000 |
| | TARIME | 35 | Kegonga | 7,324 | HP | 9 | 2 | 11 | Deep BH | 6.9 | 44 | 3,255 |
| | TARIME | 36 | Gibasa | 10,481 | HP | 12 | 3 | 15 | Deep BH | 5 | 41 | 4,274 |
| | TARIME | 37 | Genkuru | 8,867 | HP | 11 | 5 | 16 | Deep BH | 0 | 45 | 4,000 |
| | TARIME | 38 | Kangariani | 5,692 | HP | 7 | 2 | 9 | Deep BH | 0 | 40 | 2,250 |
| | TARIME | 39 | Kitawasi | 8,986 | HP | 10 | 2 | 12 | Deep BH | 8 | 41 | 3,719 |
| | TARIME | 40 | Masanga | 8,079 | HP | 10 | 5 | 15 | Deep BH | 0 | 46 | 3,750 |
| | TARIME | 41 | Matongo | 5,031 | HP | 4 | 2 | 6 | Deep BH | 0 | 30 | 1,500 |
| | TARIME | 43 | Kerende | 6,264 | HP | 7 | 2 | 9 | Deep BH | 8.2 | 44 | 2,764 |
| | TARIME | 44 | Kiwanja | 6,309 | HP | 4 | 1 | 5 | Deep BH | 24 | 44 | 2,764 |
| | TARIME | 45 | Murito | 6,127 | HP | 7 | 2 | 9 | Deep BH | 15 | 52 | 3,169 |
| | TARIME | 47 | Remagwe | 3,908 | HP | 5 | 4 | 9 | Deep BH | 8 | 66 | 2,563 |
| | TARIME | 49 | Kitagasembe | 2,699 | HP | 3 | 1 | 4 | Deep BH | 9.3 | 46 | 1,251 |
| | TARIME | 50 | Ng'ereng'ere | 3,605 | HP | 5 | 1 | 6 | Deep BH | 0 | 42 | 1,500 |
| | TARIME | 51 | Getenga | 5,637 | HP | 7 | 0 | 7 | Deep BH | 0 | 31 | 1,750 |
| | TARIME | 52 | Kyoruba | 4,369 | HP | 6 | 2 | 8 | Deep BH | 0 | 46 | 2,000 |
| | TARIME | 53 | Pemba | 3,361 | HP | 4 | 1 | 5 | Deep BH | 8.2 | 45 | 1,526 |
| | TARIME | 54 | Nyabitocho | 3,598 | HP | 4 | 2 | 6 | Deep BH | 10.6 | 52 | 1,881 |
| | TARIME | 55 | Nyabisaga | 7,089 | HP | 9 | 2 | 11 | Deep BH | 0 | 39 | 2,750 |
| | TARIME | 56 | Borega B | 3,699 | HP | 4 | 0 | 4 | Deep BH | 11.9 | 39 | 1,440 |
| | TARIME | 57 | Kiongera | 5,287 | HP | 7 | 2 | 9 | Deep BH | 0 | 43 | 2,250 |
| | TARIME | 58 | Nyabirongo | 5,642 | HP | 7 | 3 | 10 | Deep BH | 0 | 44 | 2,500 |
| | TARIME | 59 | Kikomori | 3,282 | HP | 4 | 2 | 6 | Deep BH | 0 | 46 | 1,500 |
| | TARIME | 60 | Kubiterere | 5,381 | HP | 7 | 3 | 10 | Deep BH | 0 | 46 | 2,500 |
| | TARIME | 61 | Korotambe | 5,554 | HP | 7 | 3 | 10 | Deep BH | 0 | 45 | 2,500 |
| | TARIME | 62 | Nyamhunda | 3,488 | HP | 5 | 2 | 7 | Deep BH | 0 | 50 | 1,750 |
| | TARIME | 63 | Kewamamba | 2,790 | HP | 4 | 2 | 6 | Deep BH | 0 | 54 | 1,500 |
| | TARIME | 64 | Nkerege | 4,256 | HP | 5 | 4 | 9 | Deep BH | 0 | 53 | 2,250 |
| | TARIME | 65 | Nyagisya | 3,099 | HP | 4 | 0 | 4 | Deep BH | 0 | 32 | 1,000 |
| | TARIME | 66 | Gamasara | 3,707 | HP | 4 | 3 | 7 | Deep BH | 11.9 | 59 | 2,191 |
| | TARIME | 67 | Kemange | 6,314 | HP | 7 | 3 | 10 | Deep BH | 8.1 | 48 | 3,011 |
| | TARIME | 68 | Mtama | 3,135 | HP | 4 | 2 | 6 | Deep BH | 14.2 | 62 | 1,945 |

# Table 5.3-1: Water Supply Plan (5/5)

| Region | DISTRICT | No. by District | Village | Population in 2025 | Water Sources type | | | | served coverage rate(%) in 2005 | served coverage rate(%) in 2025 | Served Population in 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HP=Hand pump MP=Motor pump | No. of HP or MP | Additional Medium BH | Total (HP) | Water Sources | | | |
| Mara | TARIME | 69 | Sombanyasoko | 1,452 | HP | 1 | 3 | 4 | Deep BH | 14.9 | 84 | 1,216 |
| | TARIME | 70 | Surubu | 4,378 | HP | 4 | 2 | 6 | Deep BH | 21 | 55 | 2,419 |
| | TARIME | 71 | Bisarwi | 4,489 | HP | 3 | 5 | 8 | Deep BH | 16.6 | 61 | 2,745 |
| | TARIME | 73 | Nyamirambaro | 2,540 | HP | 3 | 2 | 5 | Deep BH | 0 | 49 | 1,250 |
| | TARIME | 74 | Kiterere | 1,597 | HP | 2 | 0 | 2 | Deep BH | 0 | 31 | 500 |
| | TARIME | 75 | Turgeti | 2,937 | HP | 3 | 2 | 5 | Deep BH | 15.7 | 58 | 1,711 |
| | TARIME | 76 | Kwisarara | 3,925 | HP | 5 | 3 | 8 | Deep BH | 0 | 51 | 2,000 |
| | TARIME | 77 | Kitenga | 5,280 | HP | 7 | 4 | 11 | Deep BH | 0 | 52 | 2,750 |
| | TARIME | 78 | Buganja | 5,237 | HP | 6 | 0 | 6 | Deep BH | 10 | 39 | 2,024 |
| | TARIME | 79 | Mika | 4,263 | HP | 5 | 0 | 5 | Deep BH | 0 | 29 | 1,250 |
| | TARIME | 80 | Nyasoro | 3,759 | HP | 3 | 2 | 5 | Deep BH | 30 | 63 | 2,378 |
| | TARIME | 81 | Utegi | 3,452 | HP | 4 | 0 | 4 | Deep BH | 14.9 | 44 | 1,514 |
| | TARIME | 83 | Mnag'ore | 1,849 | HP | 2 | 0 | 2 | Deep BH | 28 | 55 | 1,018 |
| | TARIME | 84 | Osiri | 3,292 | HP | 3 | 1 | 4 | Deep BH | 27 | 57 | 1,889 |
| | TARIME | 85 | Nyambogo | 5,213 | HP | 7 | 4 | 11 | Deep BH | 0 | 53 | 2,750 |
| | TARIME | 86 | Sakana | 5,722 | HP | 7 | 3 | 10 | Deep BH | 0 | 44 | 2,500 |
| | TARIME | 87 | Kitembe | 3,769 | HP | 5 | 2 | 7 | Deep BH | 0 | 46 | 1,750 |
| | TARIME | 88 | Roche | 4,685 | HP | 6 | 0 | 6 | Deep BH | 7.8 | 40 | 1,865 |
| | TARIME | 89 | Ng'ope | 3,764 | HP | 5 | 2 | 7 | Deep BH | 0 | 46 | 1,750 |
| | TARIME | 90 | Kogaja | 4,448 | HP | 5 | 2 | 7 | Deep BH | 0 | 39 | 1,750 |
| | TARIME | 91 | Nyamasanda | 3,994 | HP | 5 | 0 | 5 | Deep BH | 0 | 31 | 1,250 |
| | TARIME | 92 | Ikoma | 5,457 | HP | 7 | 3 | 10 | Deep BH | 0 | 46 | 2,500 |
| | TARIME | 93 | Kwibuse | 4,297 | HP | 6 | 3 | 9 | Medium BH | 0 | 52 | 2,250 |
| | TARIME | 94 | Kisumwa | 3,279 | HP | 2 | 3 | 5 | Deep BH | 15.1 | 53 | 1,745 |
| | TARIME | 95 | Nyanchabakenye | 4,148 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 12.1 | 74 | 3,055 |
| | TARIME | 96 | Mrasibora | 3,539 | Expanded Piped Scheme MP | 1 | | 1 | BH | 0 | 62 | 2,178 |
| | TARIME | 97 | Nyanjagi | 2,183 | HP | 3 | 3 | 6 | Medium BH | 0 | 69 | 1,500 |
| | TARIME | 108 | Lolwe | 2,504 | HP | 3 | 0 | 3 | Deep BH | 0 | 30 | 750 |
| | TARIME | 110 | Minigo | 3,970 | Expanded Piped Scheme | | | | Lake V. | 0 | 62 | 2,443 |
| | TARIME | 111 | Nyabikonda | 3,322 | Expanded Piped Scheme | | | | Lake V. | 0 | 62 | 2,044 |
| | TARIME | 112 | Nyankonge | 2,524 | HP | 2 | 3 | 5 | Deep BH | 0 | 50 | 1,250 |
| | TARIME | 113 | Omoche | 5,609 | HP | 5 | 6 | 11 | Deep BH | 0 | 49 | 2,750 |
| | TARIME | 114 | Ryagati | 3,363 | Expanded Piped Scheme | | | | Lake V. | 15 | 77 | 2,574 |
| | TARIME | 116 | Bwiri | 3,431 | Newly Piped Scheme | | | | Lake V. | 9.3 | 71 | 2,431 |
| | TARIME | 117 | Kirongwe | 6,141 | Rehabilitated Piped S. | | | | Lake V. | 0 | 62 | 3,779 |
| | TARIME | 118 | Nyambori | 3,042 | HP | 3 | 2 | 5 | Deep BH | 15.1 | 56 | 1,709 |
| | TARIME | 119 | Thabache | 2,689 | HP | 2 | 7 | 9 | Deep BH | 0 | 84 | 2,250 |
| | TARIME | 120 | Kyangasaga | 7,538 | Rehabilitated Piped S. | | | | Lake V. | 0 | 62 | 4,639 |
| | TARIME | 122 | Muharago | 6,069 | Expanded Piped Scheme | | | | Lake V. | 0 | 62 | 3,735 |
| | TARIME | 127 | Bureta | 3,015 | Newly Piped Scheme | | | | Lake V. | 0 | 62 | 1,855 |
| | TARIME | 128 | Radienya | 2,913 | Newly Piped Scheme | | | | Lake V. | 0 | 62 | 1,793 |
| | TARIME | 129 | Masike | 4,045 | HP | 5 | 6 | 11 | Deep BH | 0 | 68 | 2,750 |
| | TARIME | 130 | Randa | 6,686 | HP | 8 | 5 | 13 | Deep BH | 0 | 49 | 3,250 |
| | TARIME | 131 | Bukama | 6,367 | HP | 4 | 7 | 11 | Deep BH | 0 | 43 | 2,750 |
| | TARIME | 133 | Raranya | 5,784 | Expanded Piped Scheme | | | | Lake V. | 0 | 62 | 3,560 |
| | TARIME | 135 | Busanga | 5,520 | Rehabilitated Piped S. | | | | Lake V. | 0 | 62 | 3,397 |
| | TARIME | 136 | Manira | 2,334 | Expanded Piped Scheme | | | | Lake V. | 0 | 62 | 1,436 |
| | TARIME | 137 | Nyarombo | 3,248 | HP | 4 | 6 | 10 | Deep BH | 10.7 | 88 | 2,848 |
| | TARIME | 138 | Rwang'enyi | 5,095 | Expanded Piped Scheme | | | | Lake V. | 11.7 | 73 | 3,731 |
| | TARIME | 143 | Makongoro | 5,848 | HP | 7 | 3 | 10 | Medium BH | 6.4 | 49 | 2,874 |
| | TARIME | 144 | Oliyo | 5,537 | HP | 5 | 4 | 9 | Deep BH | 0 | 41 | 2,250 |
| | TARIME | 146 | Omuga | 3,900 | HP | 5 | 0 | 5 | Deep BH | 0 | 32 | 1,250 |
| | TARIME | 148 | Detti | 2,579 | HP | 3 | 1 | 4 | Medium BH | 0 | 39 | 1,000 |
| | TARIME | 149 | Ochuna | 2,210 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 0 | 62 | 1,360 |
| | TARIME | 150 | Chereche | 5,439 | HP | 7 | 1 | 8 | Medium BH | 0 | 37 | 2,000 |
| | TARIME | 151 | Ryagoro | 4,599 | HP | 4 | 6 | 10 | Deep BH | 0 | 54 | 2,500 |
| | TARIME | 152 | Balongo | 2,896 | HP | 4 | 2 | 6 | Deep BH | 0 | 52 | 1,500 |
| | TARIME | 154 | Sudi | 7,434 | Rehabilitated Piped S.MP | 2 | | 2 | BH | 0 | 62 | 4,575 |
| | TARIME | 155 | Nyamsi | 2,799 | HP | 2 | 7 | 9 | Deep BH | 0 | 80 | 2,250 |
| | TARIME | 156 | Panyakoo | 5,902 | HP | 7 | 2 | 9 | Deep BH | 9.4 | 48 | 2,805 |
| | TARIME | 157 | Tatwe | 6,477 | HP | 5 | 6 | 11 | Deep BH | 0 | 42 | 2,750 |
| | SERENGETI | 3 | Nyamisingisi | 2,727 | HP | 3 | 0 | 3 | Medium BH | 4.3 | 32 | 867 |
| | SERENGETI | 5 | Kono | 1,690 | HP | 2 | 1 | 3 | Medium BH | 0 | 44 | 750 |
| | SERENGETI | 6 | Motukeri | 3,364 | HP | 4 | 2 | 6 | Deep BH | 0 | 45 | 1,500 |
| | SERENGETI | 8 | Makundusi | 4,187 | HP | 4 | 3 | 7 | Deep BH | 22 | 64 | 2,671 |
| | SERENGETI | 13 | Burunga | 3,694 | HP | 4 | 0 | 4 | Deep BH | 14.5 | 42 | 1,536 |
| | SERENGETI | 15 | Kyambahi | 1,407 | HP | 2 | 1 | 3 | Deep BH | 0 | 53 | 750 |
| | SERENGETI | 23 | Matare | 3,436 | Rehabilitated Piped S.MP | 1 | | 1 | BH | 23 | 83 | 2,854 |
| | SERENGETI | 27 | Monuna | 3,029 | HP | 4 | 4 | 8 | Medium BH | 4.98 | 71 | 2,151 |
| | SERENGETI | 28 | Nyambureti | 4,055 | HP | 4 | 0 | 4 | Medium BH | 17 | 42 | 1,689 |
| | SERENGETI | 30 | Kenyana | 3,504 | HP | 4 | 1 | 5 | Medium BH | 8.19 | 44 | 1,537 |
| | SERENGETI | 34 | Magange | 2,836 | HP | 4 | 1 | 5 | Medium BH | 0 | 44 | 1,250 |
| | SERENGETI | 35 | Nyamitita | 2,914 | HP | 4 | 2 | 6 | Medium BH | 6.05 | 58 | 1,676 |
| | SERENGETI | 37 | Busawe | 2,076 | HP,Spring | 3 | | 3 | Deep BH | 0 | 73 | 1,516 |
| | SERENGETI | 38 | Nyamakobiti | 4,771 | HP | 6 | 3 | 9 | Medium BH | 0 | 47 | 2,250 |
| | SERENGETI | 42 | Nyiboko | 4,700 | HP | 5 | 1 | 6 | Medium BH | 22 | 54 | 2,534 |
| | SERENGETI | 46 | Mesaga | 4,090 | HP | 4 | 2 | 6 | Medium BH | 26 | 63 | 2,564 |
| | SERENGETI | 50 | Bisarara | 3,530 | HP | 3 | 0 | 3 | Medium BH | 25 | 46 | 1,633 |
| | SERENGETI | 54 | Merenga | 5,348 | HP | 6 | 2 | 8 | Medium BH | 8.2 | 46 | 2,439 |
| | SERENGETI | 62 | Kwitete | 3,644 | HP | 4 | 6 | 10 | Medium BH | 14.6 | 83 | 3,032 |
| | SERENGETI | 66 | Nyansurura | 5,333 | HP | 3 | 6 | 9 | Deep BH | 4.72 | 47 | 2,502 |
| | SERENGETI | 67 | Kebancha | 8,615 | HP | 4 | 3 | 7 | Deep BH | 6.2 | 27 | 2,284 |
| | SERENGETI | 72 | Bonchugu | 8,375 | HP | 10 | 0 | 10 | Medium BH | 0 | 30 | 2,500 |
| | SERENGETI | 76 | Nyamatare | 3,930 | HP | 4 | 1 | 5 | Medium BH | 11.22 | 43 | 1,691 |
| | SERENGETI | 78 | Nyamatoke | 4,487 | HP | 4 | 2 | 6 | Medium BH | 27.4 | 61 | 2,729 |

## 5.4 Design Criteria of Water Supply Plan

Since the design criteria of the water supply plan are the same as the preliminary design for the priority project, they are presented in Chapter 6. The design year of the piped scheme for the water supply plan is basically 2015, but the capacity of some facilities such as transmission pipelines will focus on 2020 from an economic aspect. In any event, the final completed year of the overall water supply plan is the year of 2025.

## 5.5 Water Supply Development Plan

### 5.5.1 Cost Estimation for Water Supply Plan

The estimated project cost for water supply plan is summarized in Table 5.5-1 in consideration with the compositions, conditions, and the feature of types.

Table 5.5-1: Summary of Project Cost for Water Supply Plan

| P/J No. | Type of plan | Construction cost (US$) | Engineering service (15%) | Administration expenses* (5%) | Contingency (10%) | Total (US$) | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | Priority Project (Piped scheme and HP) | 15,156,000 | 2,273,000 | 151,000 | - | 17,580,000 | 45 villages (289 wells and 8 piped schemes) |
| 2 | Medium & Deep Wells with Hand Pump | 20,231,000 | 3,035,000 | 1,011,000 | 2,023,000 | 26,300,000 | 1580 wells |
| 3 | New Installed Piped Schemes using Lake Victoria water | 35,309,000 | 5,296,000 | 1,765,000 | 3,530,000 | 45,900,000 | 54 piped schemes |
| 4 | New Installed Piped Schemes using Groundwater | 756,000 | 113,000 | 37,000 | 75,000 | 981,000 | 3 piped schemes |
| 5 | Rehabilitation and expansion plan for the existing piped schemes | 107,580,000 | 16,137,000 | 5,379,000 | 10,758,000 | 139,854,000 | 56 piped schemes |
| | Total amount | 179,032,000 | 26,854,000 | 8,343,000 | 16,386,000 | 230,615,000 | |

Source: Ministry of Water for % of "Engineering service", "Administration expeses" and "Contigency"

Note: Assuming that prioritized project is carried out by Japanese asistance, administration expenses and contingency are not included in its project.
*The rate of administration expenses of Priority Project is estimated for 1% of Construction Cost.

### 5.5.2 Implementation Plan

The donors and NGO projects are required for the achievement of the implementation plan. The MoW requested the implementation of the priority project to the government of Japan. If this project is accepted, it is expected to commence in 2007. The MoW executes the NRWSSP based on the support of WB, IDA and AfDB which is budgeted with 150 and 80 million USD respectively for the four years starting from the year 2006. The prospects for the other donors in the Mwanza and Mara regions are that AFD, EU, UNICEF, GEF, SIDA, IFAD, and et al. are expected for the investment requirement in consideration with the results of the past conditions of support.

The implementation schedule is shown in Table 5.5-2 in accordance with the prediction of the total budget with donor and GoT in Tanzania.

Table 5.5-2: Implementation Schedule for Water Supply Plan

| Type of Scheme | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Priority Project | | | | | | | | | | | | | | | | | | | |
| Medium & Deep Well with HP | | | | | | | | | | | | | | | | | | | |
| Newly Installed Piped Scheme from Lake | | | | | | | | | | | | | | | | | | | |
| Newly Installed Piped Scheme from BH | | | | | | | | | | | | | | | | | | | |
| Expanded & Rehabilitated Piped Scheme | | | | | | | | | | | | | | | | | | | |

The planned implementation project for the water supply plan contributes to the achievement of water supply coverage in Tanzania's strategy. The priority project will be implemented by the year 2009, and the other implementation schedules are discussed regarding the possibility of the project in the Mwanza and Mara regions in terms of the overall budget in Tanzania.

### 5.5.3 Financial Plan

External and internal sub-RWSS sector funding is identified for 2005-2008, as shown in Table 5.5-3. The funding of sub-sectors for rural water supply increased from 15.3 million USD in fiscal year (FY) 2005/2006 to 24.4 million USD in FY 2007/2008. As shown in the table below, the donor's budget is showing a rising tendency from 2005.

Table 5.5-3: Summary of Funding Identified for NRWSS Sub-Projects Plan (UNIT:USD)

| Source | 2005/2006 | 2006/2007 | 2007/2008 | Total |
|---|---|---|---|---|
| GoT | 1,968,000 | 5,672,000 | 6,239,200 | 13,879,200 |
| Donors | 11,570,000 | 14,013,000 | 15,414,300 | 40,997,300 |
| NGO | 1,800,000 | 2,400,000 | 2,700,000 | 6,900,000 |
| Total | 15,338,000 | 22,085,000 | 24,353,500 | 61,776,500 |

Financial resources for the Project will be derived from the government budget and financial assistance from foreign countries and/or international lending institutions. The annual disbursement schedule of the project costs has been finalized in Table 5.5-4 in each type. The MoW has a draft plan for the funding of External Support Agencies (ESAs) until FY 2009/2010 and indicates the Investment Requirement Plan from 2007 to 2025 in NRWSSP 2006. Based on such ideas, the expected financing of ESAs is shown in Table 5.5-4 in parallel and the expected funding in the Mwanza and Mara regions is also estimated by the rate of investment in the Mwanza and Mara regions, which is approximately 12% of the entire investment in Tanzania. In any event, external assistance in term or loans will be necessary to be covered by the entire foreign currency portion (about 78% suggested in Table 5.5-3).

The initial plan was formulated for the water supply plan with 2015 as the year of completion. However, it is impossible to complete the implementation of the water supply plan by 2015 due to the high expenses for the implementation of the initial plan within the planned time frame (2015). Therefore progressive payment is needed of the necessary funds into the payment schedule until 2025 in terms of the annual disbursement of the project cost in the Mwanza and Mara regions.

Table 5.5-4: Annual Disbursement Schedule and Expected Financing of Donor, NGO and GoT (unit: USD million)

| Type of Scheme | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Priority Project | | | | | | | | | | | | | | | | | | | | |
| Medium & Deep Well with HP | | | | | | | | | | | | | | | | | | | | |
| Newly Installed Piped Scheme from Lake | | | | | | | | | | | | | | | | | | | | |
| Newly Installed Piped Scheme from BH | | | | | | | | | | | | | | | | | | | | |
| Expanded & Rehabilitated Piped Scheme | | | | | | | | | | | | | | | | | | | | |
| Type of Scheme | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | Total |
| Priority Project | | 17.6 | | | | | | | | | | | | | | | | | | 17.6 |
| Medium & Deep Well with HP | | 2.7 | 1.85 | 1.85 | 2.4 | 2.8 | 2.1 | 2.1 | 1.85 | 1.73 | 1.73 | 1.73 | 1.73 | 1.73 | | | | | | 26.3 |
| Newly Installed Piped Scheme from Lake | | | 2.59 | 7.27 | 7.27 | 4.3 | 1.93 | 1.93 | 1.93 | 3.73 | 3.73 | 3.73 | 3.73 | 3.73 | | | | | | 45.9 |
| Newly Installed Piped Scheme from BH | | | 0.98 | | | | | | | | | | | | | | | | | 0.98 |
| Expanded & Rehabilitated Piped Scheme | | 5.28 | 2.42 | | | 2.72 | 5.96 | 5.96 | 6.51 | 9.01 | 9.01 | 9.01 | 9.01 | 9.01 | 13.2 | 13.2 | 13.2 | 13.2 | 13.2 | 139.90 |
| Total (Excluding Priority Project) | | 7.98 | 7.84 | 9.12 | 9.67 | 9.82 | 9.99 | 9.99 | 10.3 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 13.2 | 13.2 | 13.2 | 13.2 | 13.2 | 230.7 |
| Expected Financing of External Support Agencies & NGO **(USD million)** by NRWSSP | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | |
| Assumed to be implemented as JGA | | 17.6 | | | | | | | | | | | | | | | | | | |
| WB & IDA | 20 | 20 | 20 | | | | | | | | | | | | | | | | | |
| AfDB | 20 | 20 | 20 | | | | | | | | | | | | | | | | | |
| AFD, EU, UNICEF, GEF, SIDA, IFAD & Others | 18 | 19 | 20 | 73 | 78 | 78 | 78 | 78 | 78 | 121 | 121 | 121 | 121 | 121 | 110 | 110 | 110 | 110 | 110 | |
| Plan International & Others | 3 | 3 | 3 | | | | | | | | | | | | | | | | | |
| GOT | 6.2 | 6.7 | 7 | | | | | | | | | | | | | | | | | |
| Total | 67 | 69 | 70 | | | | | | | | | | | | | | | | | |
| Expected Financing of External Support Agencies & NGO in Mwanza and Mara Regions **(USD million)** | 7 | 8 | 8 | 9 | 10 | 10 | 10 | 10 | 10 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 13.2 | 13.2 | 13.2 | 13.2 | 13.2 | |

## 5.6 Operation and Maintenance Plan of Villages and Piped Schemes

### 5.6.1 Establishment of Institutional Frameworks

The institutional frameworks for the water supply plan of the Study have been formulated with due consideration of the national policy and strategies.

At regional level, the RWST will be formulated as a coordination body to provide support and guidance for water and sanitation promotion in the region. At district level, the DWST will be formulated to oversee implementation of the project within the district. DWEs will act as coordinators at the DWST. At community level, community-based water supply organizations such as VWCs, WUGs, and WUAs will be formulated for operation and maintenance of the water supply facilities. For hand pump facilities, a WUG shall be formulated at each water point under supervision of the relevant VWC. For piped schemes, a WUA should be established for each piped scheme for the overall management of the scheme, and a tap committee will be formulated under the WUA.

Roles and responsibilities of responsible bodies for operating and maintaining water facilities shall be clarified and understood at regional, district and community levels.

### 5.6.2 Cost Estimation for Operation and Maintenance

Operation and maintenance (O&M) costs include the costs for O&M workers (e.g. pump attendants), spare parts and various supplies for periodical operation and maintenance and replacement of the equipment and facilities.

There are 4 categories of water supply facilities in the proposed plan: i.e. (a) protected springs; (b) boreholes with hand pumps; (c) newly designed piped schemes; and (d) rehabilitation and expansion of the existing piped schemes. O&M costs for these categories are: (a) Tsh 12; (b) Tsh 338 to 526; (c) Tsh 1,806 to 4,023; and (d) Tsh 1,208 to 4,255 per household per month, respectively.

### 5.6.3 Cost Collection Methods/Modes of Payment

#### a. Suggested Collection Methods for Water Fee

There are many options for the practical management of users` payments. Collection methods depend on local circumstances and the type of water supply facilities. Modes of payment can be categorized into: (i) payment per bucket at water point; (ii) payment per month per household; (iii) annual or semi-annual payment per household. For both piped schemes and hand pump facilities, the modes of payment need to be carefully decided with timing of cash income in communities.

#### b. Water Fee Collection and Management

Water users` organizations such as VWCs, WUGs and WUAs are responsible for the collection of water fee for the recovery of O&M costs. In the case of protected spring or hand pump facilities, users will pay a water fee to a water fee collector or a treasurer of a WUG, who will manage the water fee and make monthly reports to the relevant VWC on the WUG's financial status.

For the piped scheme facility, in the case of payment per bucket, water users will pay a water fee to a water fee collector of the tap committee at a domestic point, and the treasurer of the WUA will manage the water fee and make monthly reports to the relevant VWC on the WUA's status. In the case of flat rates such as monthly, semi-annual and annual payments,

the water fee will be collected by a treasurer of the respective tap committee, and the treasurer of the WUA will manage the water fee and make a report to the relevant VWC on the WUA's status.

### 5.6.4 Community Awareness Plan

In due consideration of the fact that the existing community-based water supply organizations such as VWCs and WUGs have failed to meet expected roles and responsibilities due to the immature sense of ownership of water users, and limited support from the DWE offices, a structured community awareness plan has been formulated to strengthen the sense of ownership of the water users, and to increase awareness of the same on the benefits of using safe water.

One of the components for the proposed plan is the capacity development for water supply facility management to raise awareness among villagers on the benefits of using water supply facility and management through appropriate operation and maintenance as well as formulation and strengthening community water supply organizations. This component includes the training to be conducted at community level for strengthening managerial as well as technical capacity of community water supply organizations such as VWCs, WUGs and WUAs.

Another component is the awareness raising on the use of safe water and sanitary/hygiene practices. This component aims to foster the awareness on the benefits of using safe water based on the on-going PHAST approach promoted by the MoH in cooperation with water sector across the nation.

It is recommended to implement the community awareness plan before the commencement of the construction works of the water supply facilities.

## 5.7 Evaluation of Water Supply Plan

### 5.7.1 Economic Evaluation

Economic Project costs are composed of the investment costs, comprising of the costs for construction of water supply facilities, administration, engineering services and physical contingency and recurrent costs, consisting of annual operation, maintenance and replacement costs for the equipment and facilities. On the other hand, economic benefits include the saved time benefits for water fetching and health improvement benefits.

As a result of comparison between the economic costs and benefits, the EIRR is calculated as 13.8 %, exceeding the opportunity cost of capital (10%), the NPV is positive and the B/C exceeds 1.0. Therefore the water supply plan in the Mwanza and Mara regions is economically feasible.

### 5.7.2 Financial Aspects

In regard to the financial sources for the project, the total capital costs are allocated in the annual disbursement schedule based on the expected financing of ESAs and NGO and the investment requirement plan by NRWSSP. The allocation for funding by ESAs, NGO and GoT is planned in consideration with the past tendency of funding. About 12% of the entire investment in Tanzania is occupied in that of the Mwanza and Mara regions depending on the investment requirement of the Tanzanian government by NRWSSP. The annual capital cost allocated is relevant in comparison with the expected funding of investment in the Mwanza and Mara regions.

The beneficiaries in the target communities are expected to organize their water supply organizations to conduct periodical operation and maintenance works and to collect water fees for the recovery of the operation and maintenance expenses. The water fee to be collected in each community is estimated at Tsh 0.50 or Tsh 1.00 per liter depending on the kind of the facilities. In the case of the recovery of O&M costs, a water rate of Tsh 0.50 per liter or Tsh 10 per bucket will be sufficient to cover the required OMR costs.

### 5.7.3 Organization/Institution Evaluation

For the solution of current organizational/institutional issues in the Study area, the organizational/ institutional plan has been suggested. The plan includes: (1) Establishment of a coordination body for water and sanitation promotion to provide support and guidance at the regional level, (2) Clarification of the responsibilities of DWST to provide technical and financial support to communities in the villages and operating and maintaining water facilities, (3) Strengthening the capacity of District Water Department /District Water Engineer Office, and (4) Establishment of the responsible bodies of community water organizations, which are shown in the NRWSSP.

From those suggestions above the institutional/organizational plan is judged to be relevant and can be evaluated for the adequate and feasible plan in terms of the objectives of the national water policy.

### 5.7.4 Natural/Social Environment Evaluation

An IEE study was conducted in order to consider the impact of project implementation on the natural and social environment. As the primary objective of the water supply plan is to improve water problems, it in essence should not have any negative environmental or social impact.

Although there are water venders in cities and towns near Lake Victoria, there are few such venders in villages. Therefore, the construction of facilities in the water supply plan is not likely to have a big impact on water venders.

There are also many benefits due to the construction of water supply facilities, particularly in regard to the gender issue of water fetching, which is the responsibility of women and children. The time and money saved by the construction of water facilities within villages will increase the opportunity to use such resources for other social activities, and so on. The facility construction by this water supply plan is not likely to have any negative impact in terms of the natural and social environment.

### 5.7.5 Technical Aspects

In the case of the water supply plan from a technical point of view, it is necessary to consider not only “hard” factors, such as facility construction and equipment, but also “soft” factors, such as operation and maintenance. The piped schemes using lake water require filtration devices such as filters, and the technical monitoring and supervision of such devices will be an important technical issue. The repair of hand pumps, with the exception of breakdowns requiring major repairs, is generally easy and inexpensive. The operation and maintenance of hand pumps is also simple and as they have been used in the past, the implementation of hand pumps is appropriate. However regarding the piped scheme, it is necessary to conduct the technical support for the operation and maintenance of facility.

# Chapter 6

*Priority Project*

# 6 Priority Project

## 6.1 General

Finally 45 villages were selected as priority projects of which include 43 villages and 1 existing piped scheme containing 2 villages. The implementation of the Water Supply Plan for this priority project is supposed to be implemented by the Japanese Grant Aid Project

## 6.2 Selection and Criteria for Priority Project

### 6.2.1 Selection Process

The process of the selection of villages and existing piped schemes for the priority project is executed separately, as shown in Figure 6.2-1.

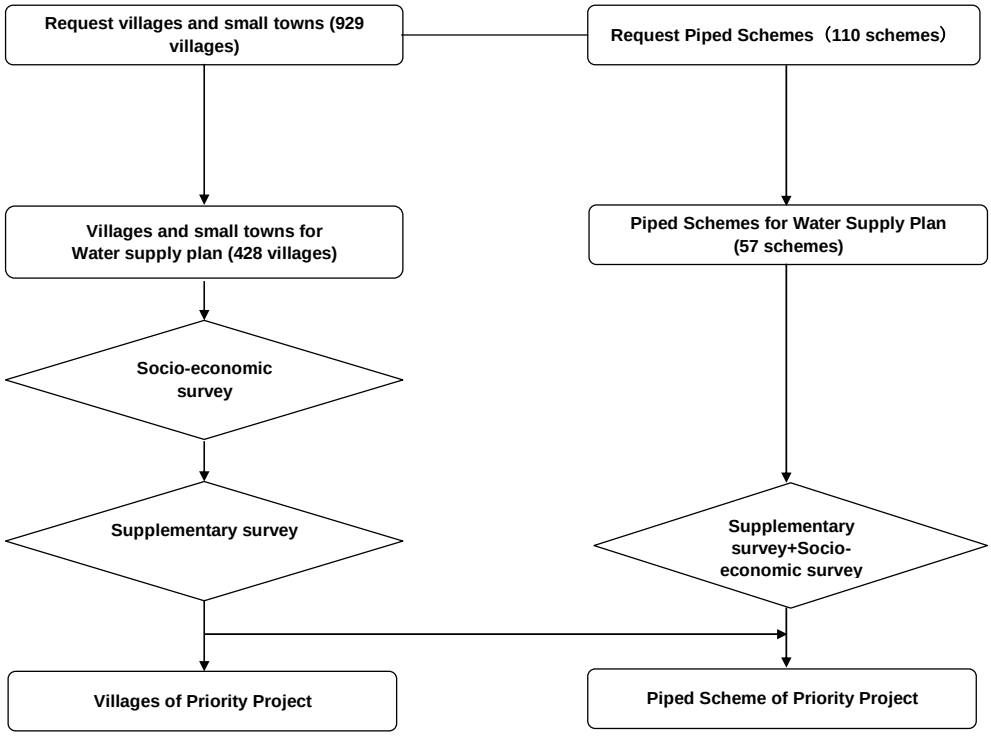



Figure 6.2-1: Schematic Selection Flow of Priority Project for Village and Piped Scheme

### 6.2.2 Selection Criteria

#### a. Village Selection

Seven criteria, categorized into three major points of; 1) the advantage of support for water supply, 2) better access to safe water, and 3) existence of unknown factors, were applied to screen the requested 929 villages down to 428 villages.

Then the 428 villages were narrowed down to 205 villages by scoring and prioritizing based on conditions such as; 1) accessibility to safe water, 2) effectiveness of project implementation, and 3) willingness and/or availability to participate in the water supply project. A socio economic survey was conducted in the 205 villages followed by a supplementary survey of 100 villages.

The 43 villages for the priority project were selected by the criteria of; 1) existence of O&M system, 2) Willingness to pay, 3) capacity to pay, 4) project experience, 5) capacity of DWD with some consideration of accessibility and potential of water source.

**b. Piped Scheme Selection**

The five selection criteria were applied to the 110 piped schemes for screening. The criteria are; 1) at least one village exists in the requested 929 villages, 2) at least one village classified as being in the rural area, 3) not included in on-going or proposed projects, 4) In villages where the population supplied by water using shallow and deep wells is less than 50% of the administrative population, the piped schemes should cover at least one village, and 5) Existing piped schemes that have been excluded by recent mid-to-large scale rehabilitation projects. The 57 villages were selected by such five criteria.

The 17 targets of the piped water scheme for the supplementary survey were selected by using criteria, such as functioning, partially functioning, changing pump after the year 2000, replacement of pipe after completion, served population (more than 50%), and the existence of inaccurate data.

1 piped which includes 2 villages for the priority project was selected by criteria such as demand for improved supply water, O&M capability of community, financial capability, and willing to pay from the result of the supplementary survey of socio-economy and O&M survey. The list of the selected priority projects is shown in Table 6.2-1 and the served population rate of the piped schemes and priority villages in 2015 is shown in Table 6.2-2. The location of the priority projects is presented in Figure 6.2-2.

The priority project of the water supply plan for 428 villages and 57 piped schemes is selected. It is impossible to confirm the next grant aid schedule which is assumed to be implemented by Japanese Government at this point in time. However, if the next priority project is planned, there is a high possibility that the remaining of 100 villages and 17 piped schemes from the supplementary survey may be selected for the next priority project.

Table 6.2-1: List of Piped Schemes and Wells with Hand Pumps for Priority Project

| REGION | DISTRICT | Scheme Name | No. by District | Village | Population in 2015 =Served population | Type of piped scheme (MP=Motor pump) | Number of MP | Water Sources |
|---|---|---|---|---|---|---|---|---|
| MWANZA | MISUNGWI | Busongo | 25 | Busongo | 5,590 | Newly Piped Scheme MP | 2 | Deep BH |
| | MISUNGWI | Ngaya | 28 | Ngaya | 4,371 | Newly Piped Scheme | | Lake V. |
| | SENGEREMA | Buswelu | 75 | Buswelu | 3,780 | Newly Piped Scheme MP | 2 | Deep BH |
| | SENGEREMA | Nyamiswi | 99 | Nyamiswi | 3,264 | Newly Piped Scheme | | Lake V. |
| | SENGEREMA | | 100 | Nyakasasa | 5,709 | Newly Piped Scheme | | Lake V. |
| | SENGEREMA | Nyakahako | 44 | Nyakahako | 7,384 | Newly Piped Scheme | | Lake V. |
| | KWIMBA | Hungumalwa | 22 | Hungumalwa | 7,113 | Newly Piped Scheme MP | 3 | Deep BH |
| | Ukerewe | Bukonyo | 45 | Bukonyo | 2,290 | Existing Piped Scheme | | Lake V. |
| | Ukerewe | | - | Namilembe | 3,793 | Existing Piped Scheme | | Lake V. |
| MARA | MUSOMA | Saragana | 35 | Saragana | 4,641 | Newly Piped Scheme MP | 2 | Deep BH |

| REGION | DISTRICT | No. by District | Village | Population in 2015 | Type of well (HP=Hand pump) | No of Deep BH | No of Additional Medium BH | Total BH No | Total Covered Population Rate(%) | Served Population in 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| MWANZA | SENGEREMA | 13 | Sogoso | 5,739 | Deep & Medium HP | 6 | 3 | 9 | 39 | 2,250 |
| | SENGEREMA | 67 | Sotta | 4,403 | Deep & Medium HP | 5 | 2 | 7 | 40 | 1,750 |
| | SENGEREMA | 69 | Isole | 5,021 | Deep & Medium HP | 5 | 2 | 7 | 53 | 2,644 |
| | SENGEREMA | 83 | Busekeseke | 3,420 | Deep & Medium HP | 4 | 3 | 7 | 51 | 1,750 |
| | SENGEREMA | 84 | Katoma | 4,046 | Deep & Medium HP | 5 | 3 | 8 | 49 | 2,000 |
| | SENGEREMA | 86 | Magulukenda | 5,092 | Deep & Medium HP | 6 | 2 | 8 | 39 | 2,000 |
| | SENGEREMA | 96 | Nyancheche | 7,677 | Deep & Medium HP | 5 | 4 | 9 | 29 | 2,250 |
| | KWIMBA | 71 | Mhulya | 3,067 | Deep & Medium HP | 4 | 4 | 8 | 65 | 2,000 |
| | MAGU | 75 | Kijereshi | 7,401 | Deep & Medium HP | 8 | 2 | 10 | 42 | 3,122 |
| | GEITA | 17 | Bugulala | 9,030 | Deep & Medium HP | 5 | 6 | 11 | 30 | 2,750 |
| | GEITA | 18 | Kasota | 10,216 | Deep & Medium HP,Spring | 5 | 4 | 9 | 39 | 3,984 |
| | GEITA | 22 | Kamena | 8,655 | Deep & Medium HP | 5 | 3 | 8 | 23 | 2,000 |
| | GEITA | 24 | Ndelema | 4,371 | Deep & Medium HP | 3 | 7 | 10 | 57 | 2,500 |
| | GEITA | 25 | Nyashishima | 2,065 | Deep & Medium HP | 2 | 3 | 5 | 61 | 1,250 |
| | GEITA | 26 | Bogogo | 10,380 | Deep & Medium HP | 6 | 2 | 8 | 32 | 3,349 |
| | GEITA | 27 | Ikina | 2,494 | Deep & Medium HP | 2 | 5 | 7 | 70 | 1,750 |
| | GEITA | 42 | Ibondo | 7,667 | Deep & Medium HP | 7 | 6 | 13 | 42 | 3,250 |
| MARA | BUNDA | 33 | Mcharo | 1,295 | Deep & Medium HP | 4 | 1 | 5 | 100 | 1,295 |
| | MUSOMA | 6 | Sirorisimba | 3,997 | Deep & Medium HP | 4 | 4 | 8 | 50 | 2,000 |
| | MUSOMA | 8 | Ryamisanga | 4,769 | Deep & Medium HP | 6 | 2 | 8 | 60 | 2,858 |
| | MUSOMA | 21 | Kisamwene | 4,427 | Deep & Medium HP | 6 | 5 | 11 | 62 | 2,750 |
| | MUSOMA | 33 | Bugoji | 5,450 | Deep & Medium HP | 7 | 3 | 10 | 68 | 3,699 |
| | MUSOMA | 55 | Isaba | 4,145 | Deep & Medium HP | 3 | 7 | 10 | 80 | 3,329 |
| | TARIME | 24 | Nyankunguru | 5,772 | Deep & Medium HP | 5 | 4 | 9 | 39 | 2,250 |
| | TARIME | 44 | Kiwanja | 5,177 | Deep & Medium HP | 4 | 1 | 5 | 48 | 2,492 |
| | TARIME | 71 | Bisarwi | 3,684 | Deep & Medium HP | 3 | 5 | 8 | 71 | 2,612 |
| | TARIME | 94 | Kisumwa | 2,690 | Deep & Medium HP | 2 | 3 | 5 | 62 | 1,656 |
| | TARIME | 112 | Nyankonge | 2,071 | Deep & Medium HP | 2 | 3 | 5 | 60 | 1,250 |
| | TARIME | 129 | Masike | 3,319 | Deep & Medium HP | 5 | 6 | 11 | 83 | 2,750 |
| | TARIME | 131 | Bukama | 5,225 | Deep & Medium HP | 4 | 7 | 11 | 53 | 2,750 |
| | TARIME | 144 | Oliyo | 4,543 | Deep & Medium HP | 5 | 4 | 9 | 50 | 2,250 |
| | TARIME | 157 | Tatwe | 5,315 | Deep & Medium HP | 5 | 6 | 11 | 52 | 2,750 |
| | SERENGETI | 37 | Busawe | 1,663 | Deep HP,Spring | 3 | | 3 | 100 | 1,663 |
| | SERENGETI | 66 | Nyansurura | 4,124 | Deep & Medium HP | 3 | 6 | 9 | 59 | 2,445 |
| | SERENGETI | 67 | Kebancha | 6,899 | Deep & Medium HP | 4 | 3 | 7 | 32 | 2,178 |

Table 6.2-2: Served Population Rate of Priority Project in 2015

| Region | District | Hand Pump (HP) | HP +Spring | Piped Schem e (BH) | Piped Scheme (Lake) | Total Number | Served Population in 2015 | Administrative Population of Priority Villages in 2015 | Covered Population Rate (%) of Priority Village in 2015 | Administrativ e Population of District in 2015 | Covered Population Rate (%) of District in 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MWANZA | MISSUNGWI | | | 1 | 1 | 2 | 9,961 | 9,961 | 100.0% | 304,874 | 3.3% |
| | SENGEREMA | 7 | | 1 | 3 | 11 | 34,781 | 55,535 | 62.6% | 799,082 | 4.4% |
| | KWIMBA | 1 | | 1 | | 2 | 9,113 | 10,180 | 89.5% | 454,104 | 2.0% |
| | MAGU | 1 | | | | 1 | 3,122 | 7,401 | 42.2% | 545,368 | 0.6% |
| | GEITA | 7 | 1 | | | 8 | 20,833 | 54,878 | 38.0% | 1,115,502 | 1.9% |
| | UKEREWE | | | | 2 | 2 | 6,083 | 6,083 | 100.0% | 385,198 | 1.6% |
| | **SUB TOTAL** | **16** | **1** | **3** | **6** | **26** | **83,893** | **144,038** | **58.2%** | **3,604,128** | **2.3%** |
| MARA | BUNDA | 1 | | | | 1 | 1,295 | 1,295 | 100.0% | 330,359 | 0.4% |
| | MUSOMA | 5 | | 1 | | 6 | 19,277 | 27,423 | 70.3% | 434,049 | 4.4% |
| | TARIME | 9 | | | | 9 | 20,760 | 37,796 | 54.9% | 693,313 | 3.0% |
| | SERENGETI | 2 | 1 | | | 3 | 6,286 | 12,686 | 49.6% | 266,693 | 2.4% |
| | **SUB TOTAL** | **17** | **1** | **1** | **0** | **19** | **47,618** | **79,200** | **60.1%** | **1,724,414** | **2.8%** |
| | **GRAND TOTAL** | **33** | **2** | **4** | **6** | **45** | **131,511** | **223,238** | **58.9%** | **5,328,542** | **2.5%** |

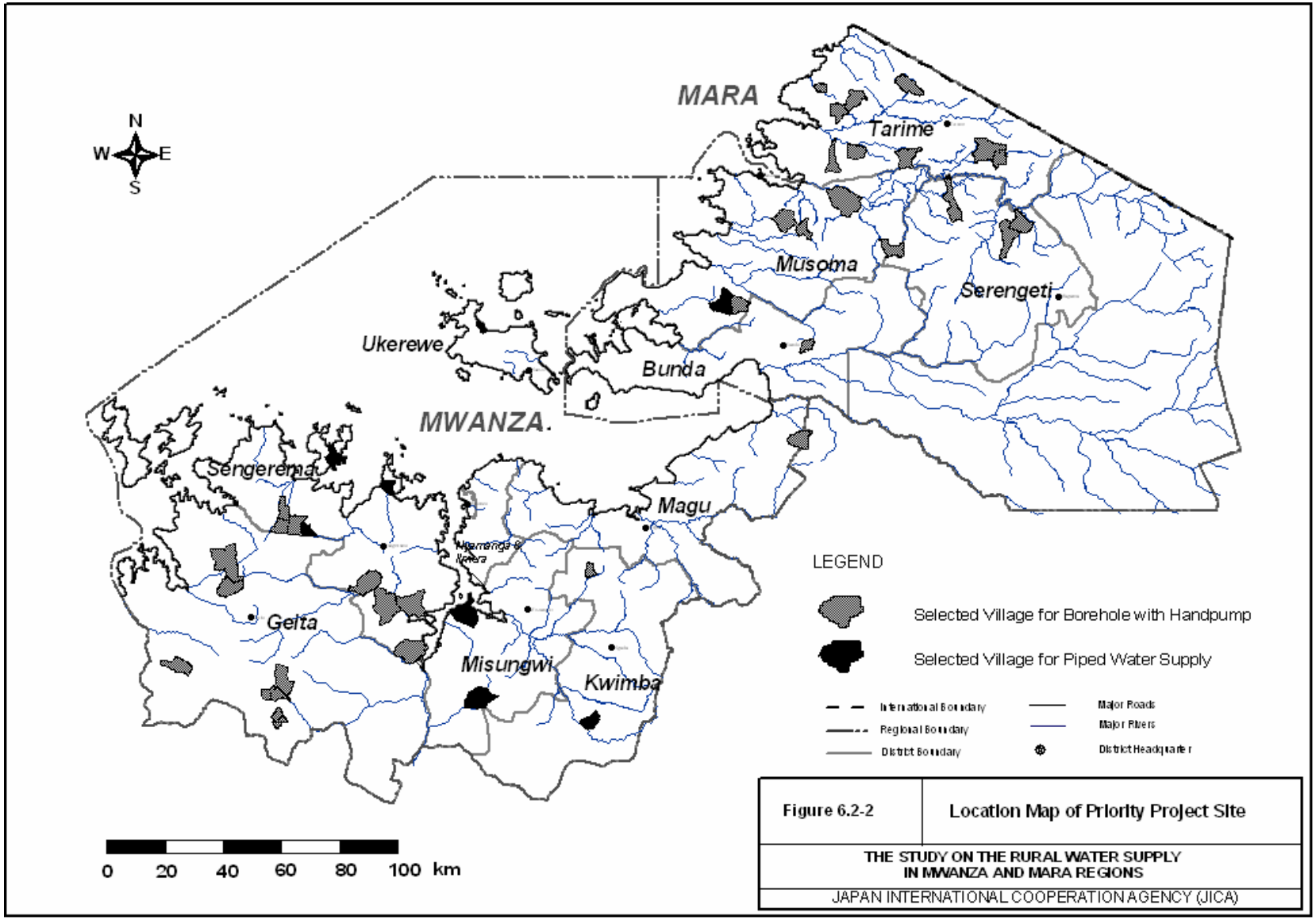



Figure 6.2-2 Location Map of Priority Project Site

THE STUDY ON THE RURAL WATER SUPPLY
IN MWANZA AND MARA REGIONS
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

## 6.3 Preliminary Design of Water Supply Facilities

### 6.3.1 General Notion of Preliminary Design

The water sources of piped schemes are lake water and groundwater. In the case of lake water, simple purification facilities such as slow sand filtration are proposed, and in the case of groundwater, only disinfection using chlorine is proposed. The water to be stored in service reservoirs using rising pumps will be supplied to dwellers by gravity.

### 6.3.2 Water Demand

Future water demand is based on domestic use and institutional use such as school, health center, etc. This is explained in Chapter 5 of the Main report.

### 6.3.3 Design Manual for Preliminary Design

Since the "Design Manual for Water Supply and Waste Water Disposal, Volume 1 July 1997" was applied for conventional water supply projects in Tanzania, this is also applicable for a preliminary design of water supply facilities in principle.

### 6.3.4 Design Criteria

The common conditions, such as service population covered by hand pump, etc. are as follows and the design criteria applied to the preliminary design are shown as follows.

- Service population: 250persons/placet
- Lift capacity of a hand pump: 0.015m3/min (7.2m3/day in pump lifting time of 8 hours a day)

In terms of the piped schemes, the common conditions, such as design flow, etc. for preliminary design are as follows.

- Public tap operation hours: 8hours
- Unaccounted for water : 20% of daily water demand
- Daily average flow: daily water demand + uncounted amount of water
- Daily maximum. flow: 120% of daily average flow
- Hourly maximum. flow: 360% of daily average flow (based on tap operation time of 8 hours a day)

In addition, the design criteria for piped schemes is categorized into intake, purification, transmission and distribution facilities and summarized in Table 6.3-1

Table 6.3-1: Design Criteria of Piped Scheme

| Facilities | | Specification | Design factor | Design criteria |
|---|---|---|---|---|
| Intake | Water source | Groundwater or lake water | | |
| | Intake pump | Submersible for groundwater and lake sources | Daily operation hours | 12 hours |
| | | | Capacity | Daily Max. flow※1 (m3/day)/12 hours |
| | Power source | Generator with diesel engine | | |
| | Intake chamber | Concrete circular | Capacity | 12 hours of Daily Max. flow※1 (m3/day) |

| | | | | |
|---|---|---|---|---|
| | Pipes | Polyethylene | Design flow | Daily Max. flow※1 (m3/day)/12 hours |
| Purification | Sedimentation basin | Plain sedimentation, Concrete | Capacity | Daily Max. flow (m3/day) |
| | Filtration | Slow sand filter | Capacity | Daily Max. flow (m3/day) |
| Transmission | Pump sump | Concrete circular | Capacity | 12 hours Daily Max. flow (m3/day) |
| | Rising pump | Surface pump | Daily operation hours | 12 hours |
| | | | Capacity | Daily Max. flow (m3/day)/12 hours |
| | Booster pump | Surface pump | Daily operation hours | 12 hours |
| | | | Capacity | Daily Max. flow (m3/day)/12 hours |
| | Power source | Generator with diesel engine | | |
| | Pipes | GI or DIP | Design flow | Daily Max. flow (m3/day)/12hours |
| Distribution | Service reservoir | Ground type: Stone masonry or concrete block | Capacity | 16 hours of Daily Max. flow (m3/day) |
| | | Riser type: Steel | Capacity | 16 hours of Daily Max. flow (m3/day) , Max. 50m3, Height: 15m or less |
| | Pipes | GI or PVC | Design flow | Hourly Max. flow |
| | Water point | Mainly double taps (Public taps) | Number of water points | About 580 dwellers per water point |

※1: An amount of 10% for washing use is included.

### 6.3.5 Facility Plan

Each water supply facility is designed based on the Design Manual. The specification of each water supply facility is summarized in Table 6.3-2 and Table 6.3-3. The main facilities, such as layouts of piped scheme are shown in Figure 6.3-1 to Figure 6.3-8.

#### a. Lake Victoria

Intake points should be located at least about 80m from the shore line of the lake and at least 3m from the water surface in depth to avoid the contamination from pollution. Slow sand filtration is proposed for the filtration of the water. The type of service reservoir (ground or riser) is proposed based on the topographic conditions. Galvanized pipes are used for both transmission and distribution facilities for ease of maintenance.

#### b. Groundwater

Groundwater can be used for the water supply facilities of boreholes with hand pumps and piped schemes. Specification of the facilities is according to hand pump and piped scheme system. Springs are protected to avoid contamination, and basically distributed by gravity.

## Table 6.3-2: Facility Specifications of the Priority Project

| No. | District | Village or Scheme | Water sources | | Intake facility | | | Filtration facility | | Transmission facility | | | Distribution facility | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lake water | Groundwater [1] (BH depth) | Conveyance pipes | Pump | Chamber | Sedimentation | Filter | Pump sump | Pump | Pipes | Service [2] reservoir | Pipes | Double Public taps |
| **Borehole with hand pump** | | | | | | | | | | | | | | | |
| 1-35 | | 35 villages | - | 225 (100m) | - | - | - | - | - | - | - | - | - | - | - |
| **Newly piped scheme** | | | | | | | | | | | | | | | |
| 36 | Misungwi | Ngaya | 1 | - | Φ50㎜×300m | 9.3m3/hr×20m$^{H}$×1.5kW×1Ls. | V=60m3 | Q=4.3m3/hr | Q=4.3m3/hr | V=60m3 | 8.5m3/hr×60mH×3.7kW | Φ80㎜×1,100m | V=70m3(G) | Φ150㎜×3,300m | 15Ls. |
| 37 | Sengerema | Nyamiswi | 1 | - | Φ80㎜×300m | 32m3/hr×20m$^{H}$×3.7kW×1Ls. | V=190m3 | - | Q=16m3/hr | V=190m3 | 29m3/hr×70mH×11kW | Φ150㎜×3,500m | V=150m3(G) | Φ40㎜×3,200m<br>Φ80㎜×3,850m | 35Ls. |
| | | | | | | | | | | | | | V=50m3(R) | Φ100㎜×700m<br>Φ150㎜×2,650m | |
| 38 | Sengerema | Nyakahako | 1 | - | Φ80㎜×300m | 20m3/hr×20m$^{H}$×2.2kW×1Ls. | V=90m3 | Q=9.2m3/hr | Q=9.2m3/hr | V=190m3 | 18m3/hr×50mH×5.5kW | Φ150㎜×2,000m | V=150m3(G) | Φ150㎜×3,800m | 29Ls. |
| 39 | Misungwi | Busongo | - | 2 (100m) | Φ50㎜×100m | 17m3/hr×60m$^{H}$×1.5kW×2Ls. | - | - | - | V=100m3 | 17m3/hr×94mH×1.5kW | Φ150㎜×4,000m | V=140m3(G) | Φ40㎜×2,700m<br>Φ50㎜×6,300m<br>Φ80㎜×500m<br>Φ100㎜×900m<br>Φ150㎜×800m | 21Ls. |
| 40 | Sengerema | Buswelu | - | 2 (100m) | Φ50㎜×100m | 11m3/hr×60m$^{H}$×3.7kW×2Ls. | - | - | - | V=75m3 | 11m3/hr×93mH×5.5kW | Φ100㎜×2,891m | V=90m3(G) | Φ40㎜×2,100m<br>Φ50㎜×700m<br>Φ80㎜×2,900m<br>Φ100㎜×400m | 13Ls. |
| 41 | Kwimba | Hungmalwa | - | 2 (100m) | Φ50㎜×100m | 18m3/hr×60m$^{H}$×5.5kW×2Ls. | - | - | - | V=110m3 | 18m3/hr×66mH×5.5kW | Φ150㎜×7,583m | V=90m3(G)<br>V=90m3(R) | Φ80㎜×5,900m<br>Φ100㎜×400m<br>Φ150㎜×1,100m | 20Ls. |
| 42 | Musoma | Saragana | - | 2 (100m) | Φ50㎜×100m | 14m3/hr×60m$^{H}$×5.5kW×2Ls. | - | - | - | V=90m3 | 14m3/hr×61mH×5.5kW | Φ80㎜×803m | V=120m3(G) | Φ40㎜×1,500m<br>Φ50㎜×700m<br>Φ80㎜×2,600m<br>Φ100㎜×500m | 12Ls. |
| **Rehabilitation and Expansion piped scheme** | | | | | | | | | | | | | | | |
| 43 | Ukerewe | Bukonyo | 1 | - | Φ50㎜×300m | 16m3/hr×20m$^{H}$×1.5kW×1Ls. | V=90m3 | - | Q=7m3/hr | V=90m3 | 14m3/hr×64mH×5.5kW | Φ100㎜×3,500m | V=110m3(G) | Φ40㎜×800m<br>Φ50㎜×200m<br>Φ80㎜×2,400m<br>Φ100㎜×1,400m<br>Φ150㎜×1,800m | 17Ls. |

N.B.
1. See Table on the borehole numbers with hand pump for each village, and this number was accumulated considering drilling success rate.
2. (G):Ground type reservoir,(R):Riser tank

Table 6.3-3: Borehole Structure

| Item | Borehole with hand pump | Borehole for piped scheme |
|---|---|---|
| Borehole depth | 100m | 100m |
| Diameter for drilling | 8 inches 3/4 | 10 inches |
| Casing and screen diameter | 5 inch | 6 inch |
| Casing and screen pipe material | PVC | GI |
| Filling between borehole and casing | Cementing in casing section<br>Gravel packing in screen | Cementing in casing section<br>Gravel packing in screen |
| Cylinder depth of hand pump | Less than 50m | - |
| Submersible pump position | - | Varies (Depends on operating water level) |

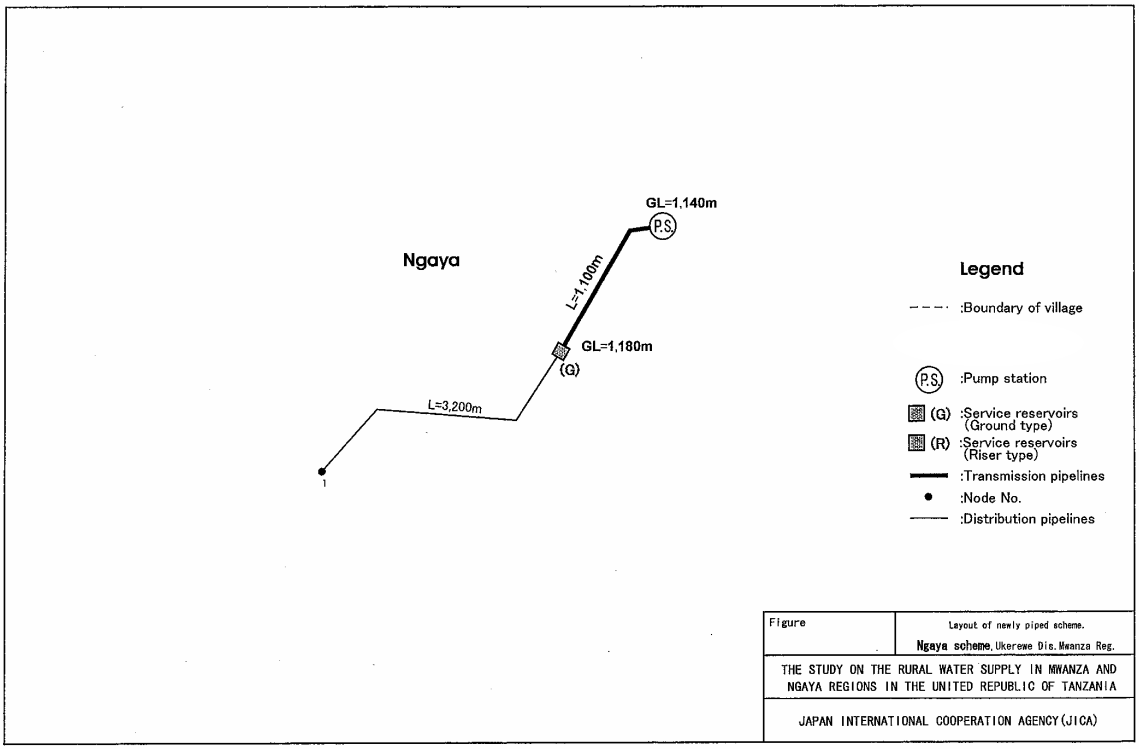



Figure 6.3-1: Layout of Newly Installed Piped Scheme (Ngaya Scheme)

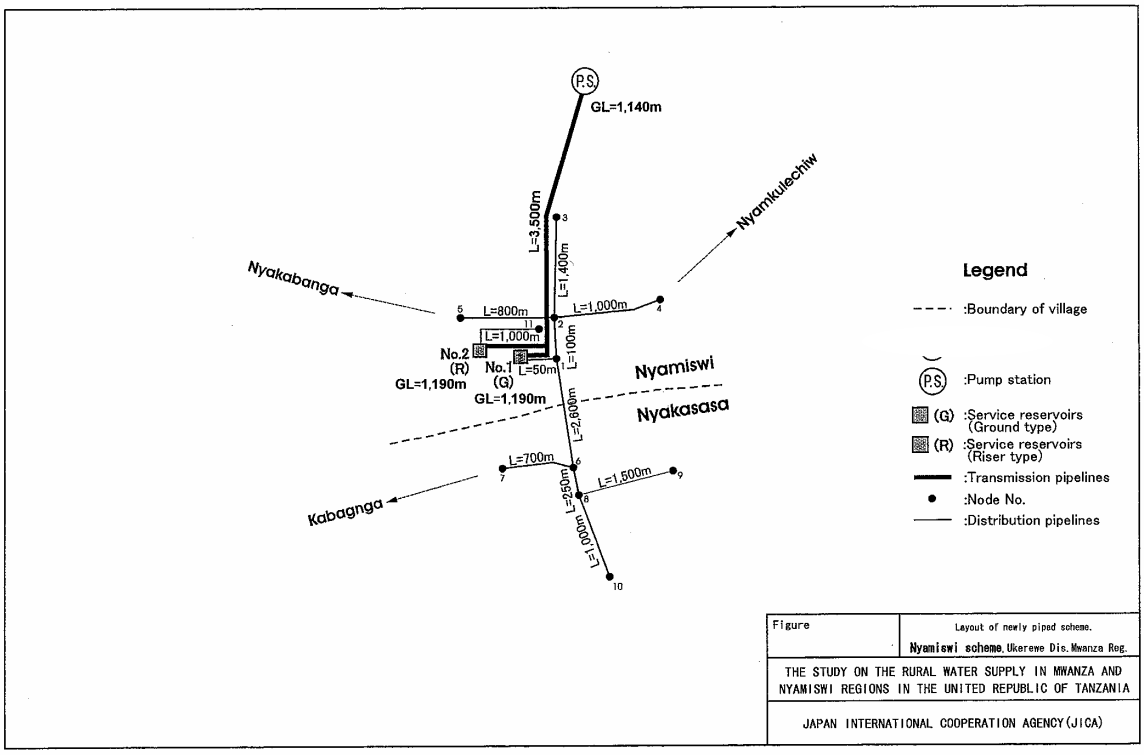



Figure 6.3-2: Layout of Newly Installed Piped Scheme (Nyamiswi Scheme)

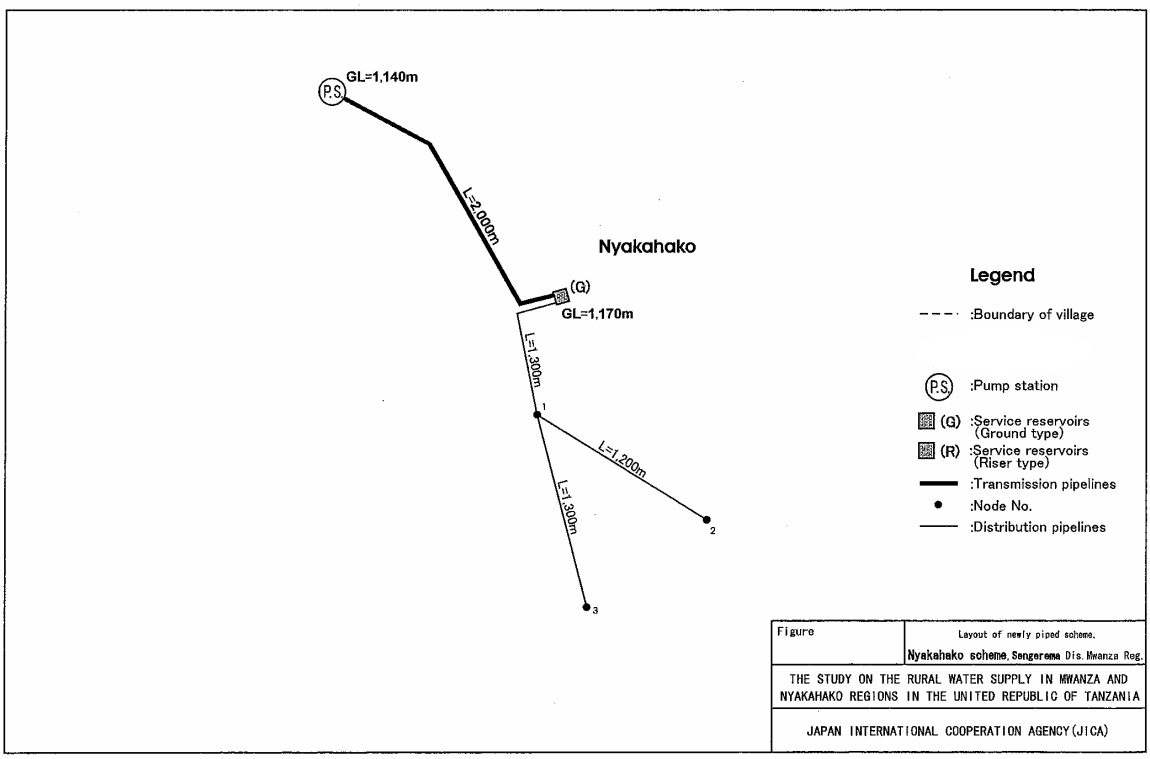



Figure 6.3-3: Layout of Newly Installed Piped Scheme (Nyakahako Scheme)

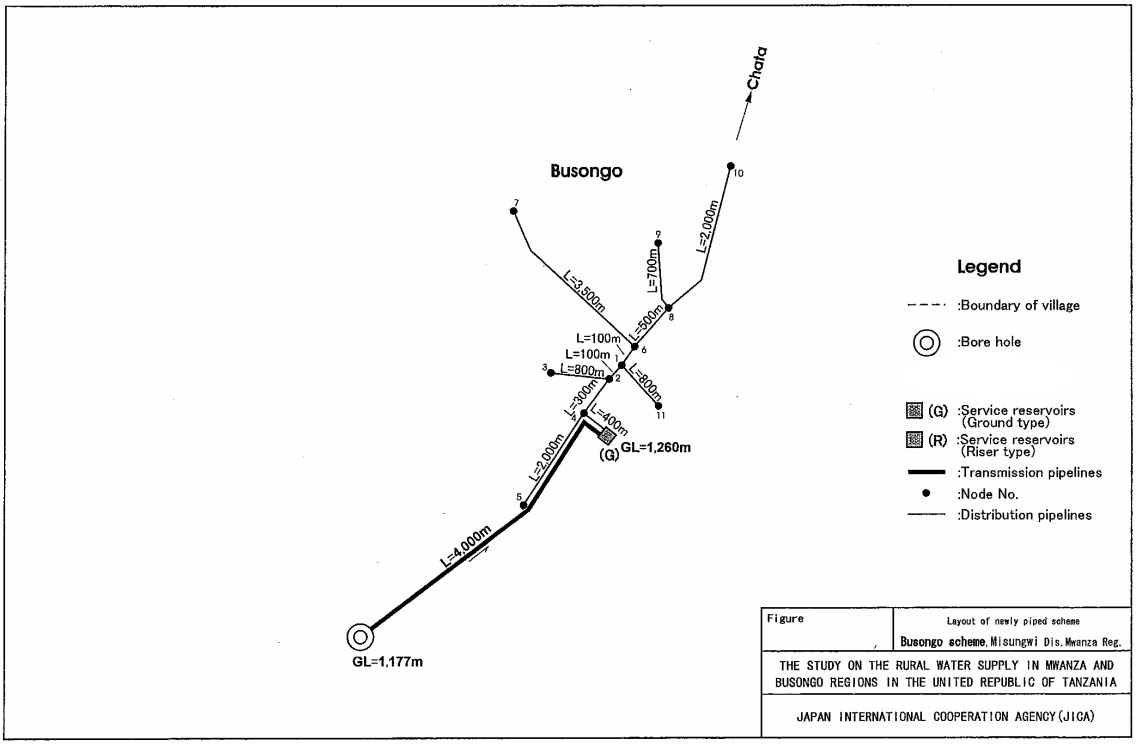



Figure 6.3-4: Layout of Newly Installed Piped Scheme (Busongo Scheme)

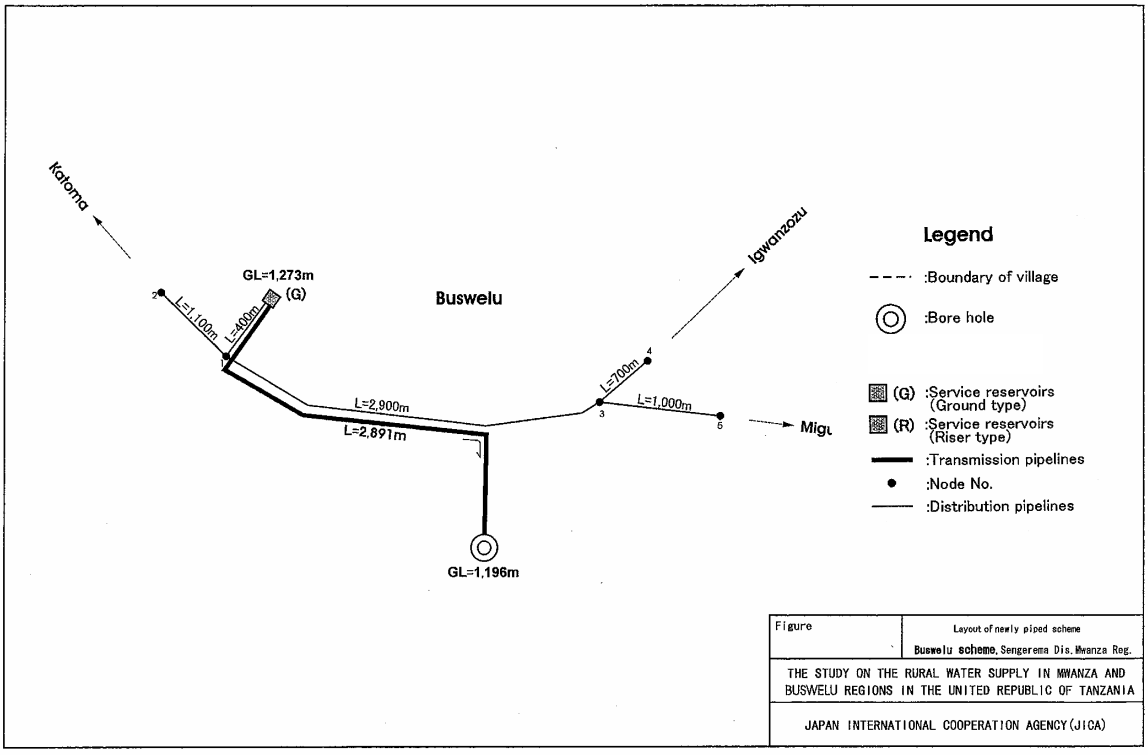



Figure 6.3-5: Layout of Newly Installed Piped Scheme (Buswelu Scheme)

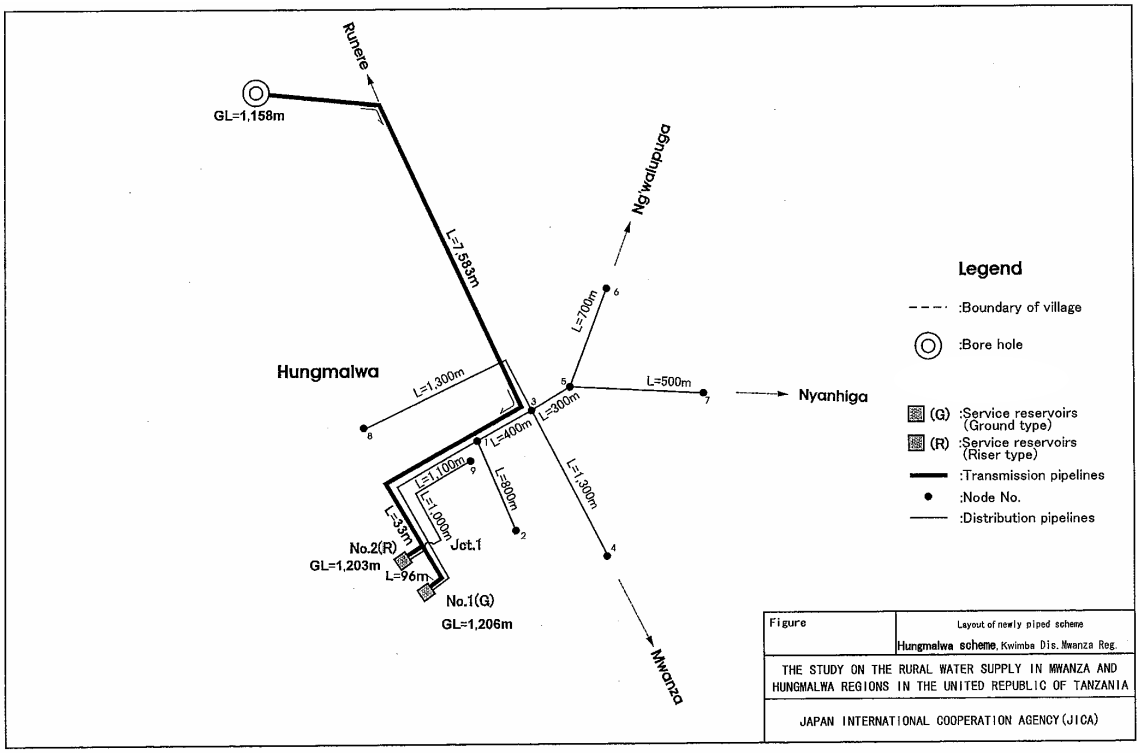



Figure 6.3-6: Layout of Newly Installed Piped Scheme (Hungmalwa Scheme)

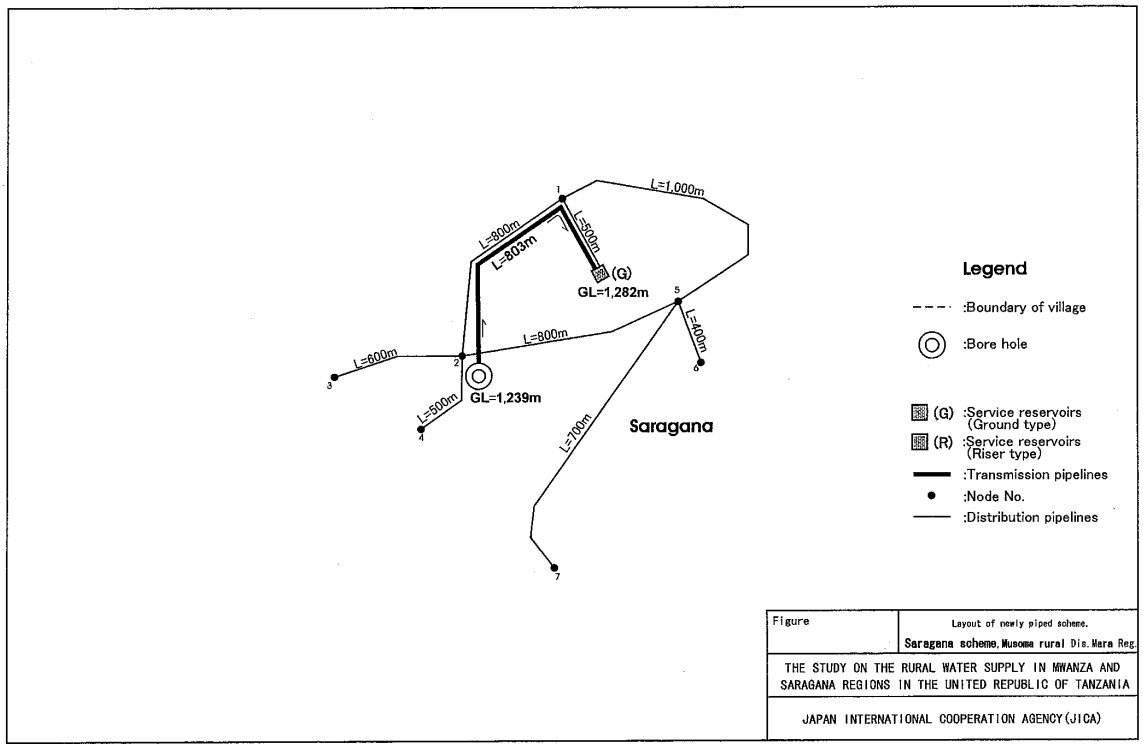



Figure 6.3-7: Layout of Newly Installed Piped Scheme (Saragana Scheme)

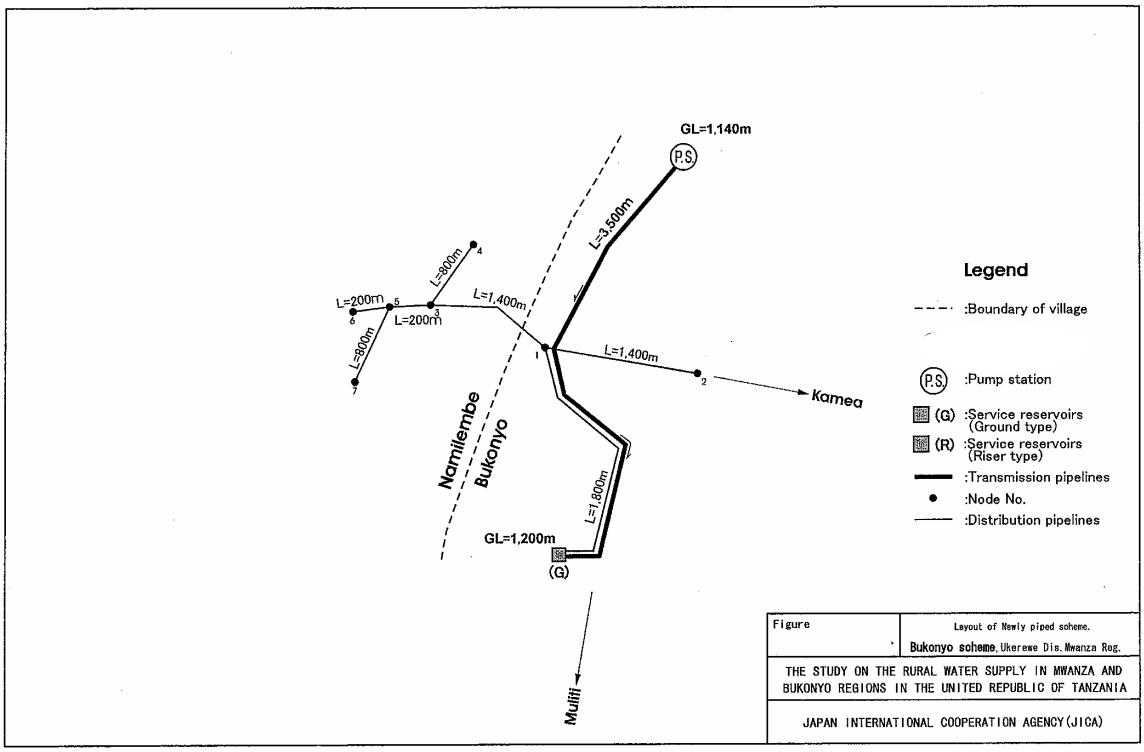



Figure 6.3-8: Layout of Newly Installed Piped Scheme (Bukonyo Scheme)

## 6.4 Cost Estimation for Priority Project

The construction cost was briefly estimated based on the implementation was supposed to be implemented by the Japanese Grant Aid Project. The total project cost including the engineering expenses of the priority project is estimated at approximately USD17.6 million. The project costs are summarized in Table 6.4-1.

Table 6.4-1: Cost Estimation of Priority Project

Unit: USD

| Water supply system | Construction cost | Engineering expenses (15%)+others | Project cost | Remarks |
|---|---|---|---|---|
| Borehole with hand pump | 5,116,000 | 818,000 | 5,934,000 | 35villages, two spring protections are included |
| Newly piped scheme | 8,788,000 | 1,406,000 | 10,194,000 | 7 schemes (8 villages) |
| Rehabilitation and expansion piped scheme | 1,252,000 | 200,000 | 1,452,000 | 1 scheme (2 villages) |
| **Total** | **15,156,000** | **2,424,000** | **17,580,000** | |

# Chapter 7

*Project Plan*

# 7 Project Plan

## 7.1 General

The project plan, including the construction and implementation plan was formulated with the consideration of natural and social conditions for the priority project in this Chapter.

## 7.2 Construction Plan

### 7.2.1 Natural Conditions

The period of the rainy season is November to April in the Study area. During this season, several obstructions shall be considered such as bad accessibility to the site and swampy site conditions. Undulation of the topography such as granite ridges shall also be carefully examined for the pipe layouts in relation with the intake point of lake water extraction.

As most of the well targets the deep fissure water, further surveys shall be conducted, such as geophysical sounding and lineament interpretation to locate the most promising site for groundwater extraction. Due to the possibility of various contaminations from toxic materials, the water quality of the source shall be carefully examined before the utilization of the water.

### 7.2.2 Socio-economic Conditions

The result of the Socio-economic and O&M survey confirmed that the establishment of village water committees will be initiated soon, and contribution of the users` workforce at the construction stage has also been confirmed. Therefore, the involvement of the villagers at the facility construction stage will be realized.

### 7.2.3 Machinery and Material

Conventional machinery and construction materials are utilized for ease of spare parts procurement to realize the sustainable operation and maintenance by the users. If the materials are imported, they should contact the local agent of such foreign manufactures.

### 7.2.4 Local Contractor

There are five types of contractors; Civil Works, Building, Mechanical, Electrical, and Specialist Contractor, registered in the “Contractor Registration Board (CRB)”. Those contractors are classified into local and foreign contractors. Moreover, there are seven classes for civil works, building, mechanical, and electrical contractors. For specialist contractors, there are only three classes.

### 7.2.5 Implementation Schedule

Assuming that the prioritized project is carried out for three years, the following time schedule shown in Table 7.2-1 is proposed.

Table 7.2-1: Implementation Schedule of Priority Project

| Facility | Region | District | Name of Scheme | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| Borehole with hand pumps | Mwanza | Sengerema | - | | | |
| | | Kwimba | - | | | |
| | | Magu | - | | | |
| | | Geita | - | | | |
| | Mara | Bunda | - | | | |
| | | Musoma (R) | - | | | |
| | | Tarime | - | | | |
| | | Serengeti | - | | | |
| Piped schemes | Mwanza | Misungwi | Ngaya | | | |
| | | Misungwi | Busongo | | | |
| | | Sengerema | Nyamiswi | | | |
| | | Sengerema | Nyakahako | | | |
| | | Sengerema | Buswelu | | | |
| | | Kwimba | Hungumalwa | | | |
| | | Ukerewe | Bukonyo | | | |
| | Mara | Musoma (R) | Saragana | | | |

### 7.2.6 Financial Plan for the Priority Project

The total project cost for the priority project is calculated as 17.6 million USD in the three year term as shown in the following table which is supposed to be implemented by the Japanese Grant Aid Project.

Table 7.2-2: Annual Disbursement for Priority Project (Unit: USD)

| Facility | District | Amount | | | |
|---|---|---|---|---|---|
| | | Total | 2007 1st | 2008 2nd | 2009 3rd |
| Borehole with hand pumps | Sengerema | 1,273,000 | 1,273,000 | | |
| | Kwimba | 162,000 | 162,000 | | |
| | Magu | 261,000 | 261,000 | | |
| | Geita | 1,364,000 | | 1,364,000 | |
| | Bunda | 142,000 | | 142,000 | |
| | Musoma (R) | 972,000 | | | 972,000 |
| | Tarime | 1,385,000 | | | 1,385,000 |
| | Serengeti | 375,000 | | 375,000 | |
| | **Sub Total** | **5,934,000** | **1,696,000** | **1,881,000** | **2,357,000** |
| Piped scheme | Missungi | 2,687,000 | | 2,687,000 | |
| | Sengerema | 4,681,000 | 4,681,000 | | |
| | Kwimba | 2,165,000 | | 2,165,000 | |
| | Ukerewe | 1,452,000 | | | 1,452,000 |
| | Musoma (R) | 661,000 | | | 661,000 |
| | **Sub total** | **11,646,000** | **4,681,000** | **4,852,000** | **2,113,000** |
| **Total** | | **17,580,000** | **6,377,000** | **6,733,000** | **4,470,000** |

The entire project which was formulated in the Study as the Water Supply Plan other than the priority project shall be executed by the fund prepared by the MoW and concerned donors and NGOs. The expected budget allocation to the Mwanza and Mara Water Supply Plan was formulated in reference with the budget of NRWSSP as shown in Table 7.2-3.

Table 7.2-3: Planed Budget for Rural Water Supply

| Type of Scheme | 2007 | 2008 | 2009 |
|---|---|---|---|
| Priority Project | ■ | ■ | ■ |
| Medium & Deep Well with HP | | ■ | ■ |
| Newly Installed Piped Scheme from Lake | | | ■ |
| Newly Installed Piped Scheme from BH | | | ■ |
| Expanded & Rehabilitated Piped Scheme | | ■ | ■ |
| Expected Financing of External Support Agencies & NGO (**USD million**) by NRWSSP | 2007 | 2008 | 2009 |
| Assumed to be implemented as JGA | | 17.6 | |
| WB & IDA | 20 | 20 | 20 |
| AfDB | 20 | 20 | 20 |
| AFD, EU, UNICEF, GEF, SIDA, IFAD & Others | 18 | 19 | 20 |
| Plan International & Others | 3 | 3 | 3 |
| GOT | 6.2 | 6.7 | 7 |
| Total | 67 | 69 | 70 |
| Expected Financing of External Support Agencies & NGO in Mwanza and Mara Regions (**USD million**) | 7 | 8 | 8 |

# Chapter 8

*Organization and Institutional Plan*

# 8 Organization and Institutional Plan

## 8.1 General

Overall institutional framework for the water supply plan in the Study is suggested in Chapter 5 (Water Supply Plan), considering future institutional frameworks proposed by the NAWAPO and NRWSSP, and current organizational problems in the Study area, and along the institutional frame work, the expected roles of responsible bodies for operation and maintenance at regional, district and community level are also clarified.

The Study on the Organization and Institution Plan in this chapter is carried out to formulate organizational and institutional arrangements for conducting appropriate operation and maintenance activities of the water supply facilities in the priority villages.

Analysis is given to the current activities for water supply in the priority villages in terms of organizational institutional arrangement, and the Organization and Institution plan is prepared taking consideration of the current conditions and problems relating to water supply facility management revealed by the supplementary field surveys and required tasks for practical operation and maintenance.

## 8.2 Current Activities for Water Supply at Community (45 Priority Villages)

As a result of the supplementary survey, all of the priority villages have already established either a Village Water Committee (VWC) or a Water User Group. In particular, the VWCs have been established in 91% of the priority villages, and it was observed that the VWC is the most diffused community water organization in the priority villages. Almost all of the current VWCs and WUGs have the issues on financial and managerial capacity in order to carry out community based facility management. However, as for the maintenance of the existing hand pump facilities, the basic concepts underlying the HESAWA WUG such as the sense of ownership and community based water facility management remain active and diffused into some of the priority villages. The high diffusion rate and the central role of the current VWC in the priority villages are advantageous, although the activeness of the VWCs vary from community to community.

## 8.3 Organizational and Institutional Arrangement of Responsible Bodies

### 8.3.1 The Overviews of Suggested Organizational and Institutional Arrangment

To establish appropriate institutional and organizational settings with key stakeholders in the priority villages, the basic principles underlying the arrangement are established: (1) Strengthening supporting systems to communities on community mobilization and technical maintenance by public offices (e.g. District Water Department); (2) Increasing self-help capacity on management, operation and maintenance by users at community level in order to sustain water facilities.

Based on the above understanding, the overall institutional framework and expected roles of the responsible bodies proposed in Chapter 5, advantages and issues on current community water organizations, the responsible bodies and relationship between the key institutions are suggested in the following tables and figures.

As for the hand pump facilities in the priority villages, a WUG shall be established at each hand pump facility and become the responsible body for operation and maintenance. A respective VWC, District Water Department and DWST in the targeted area will support the WUG based facility management as shown in Figure 8.3-1. After the newly established WUG receive training on community mobilization, management and technical repair and

maintenance from the public offices, the WUG take the responsibilities of the collection of water fees and water funds, repair and maintenance of the facility and other activities. To overcome the issue of the misuse of water funds within the village government, the financial management shall be independent from the VWC, but the WUG will report the financial status to the VWC for financial accountability. The District Water Department provides mainly technical support with the WUG and monitors the activities.

As for the piped scheme facilities, a tap committee shall be established at each domestic water point, and compose a WUA at each piped scheme (refer to Figure 8.3-2). The WUA will become a responsible body for operation and maintenance, and a respective VWC, the District Water Department and DWST will support the WUA based facility management. However, the current respective VWC in the priority village might take responsibilities of various operation and maintenance activities, until the newly established WUA functions substantially.

Figure 8.3-2 shows an institutional arrangement for a piped scheme covering more than one village. After the responsibilities are transferred from the VWC to the WUA, the WUA will submit financial reports to the VWC ensuring accountability. In the case of operation and maintenance of the piped scheme, the DWE and the water technician of the respective District Water Department especially provide training on technical aspects of the O&M, periodical monitoring of the facilities including pump, generator, and filtration, and data management of the facility conditions.

As for both types of the water supply facility, the regional coordination body shall support the community based facility management indirectly, by providing technical advice and support to the District Water Department, and coordinating trainings at the district level efficiently.

**Hand Pump Facility**

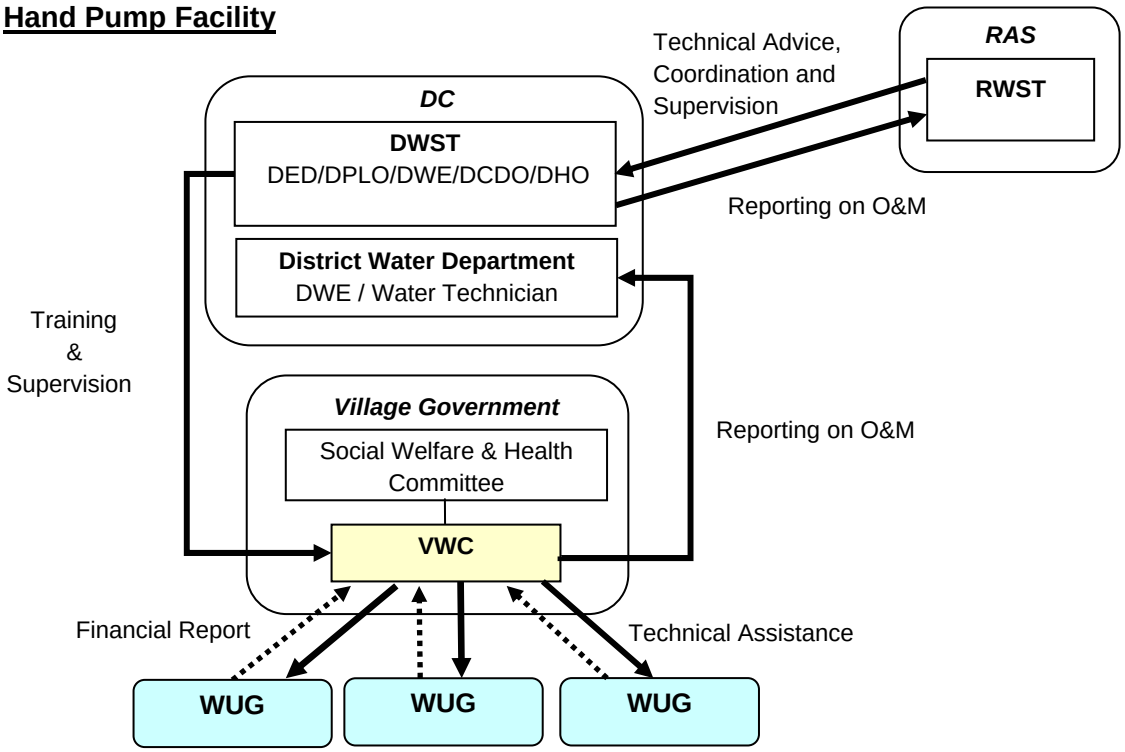



Figure 8.3-1: Institutional Arrangement for O&M of the Hand Pump in the Priority Villages

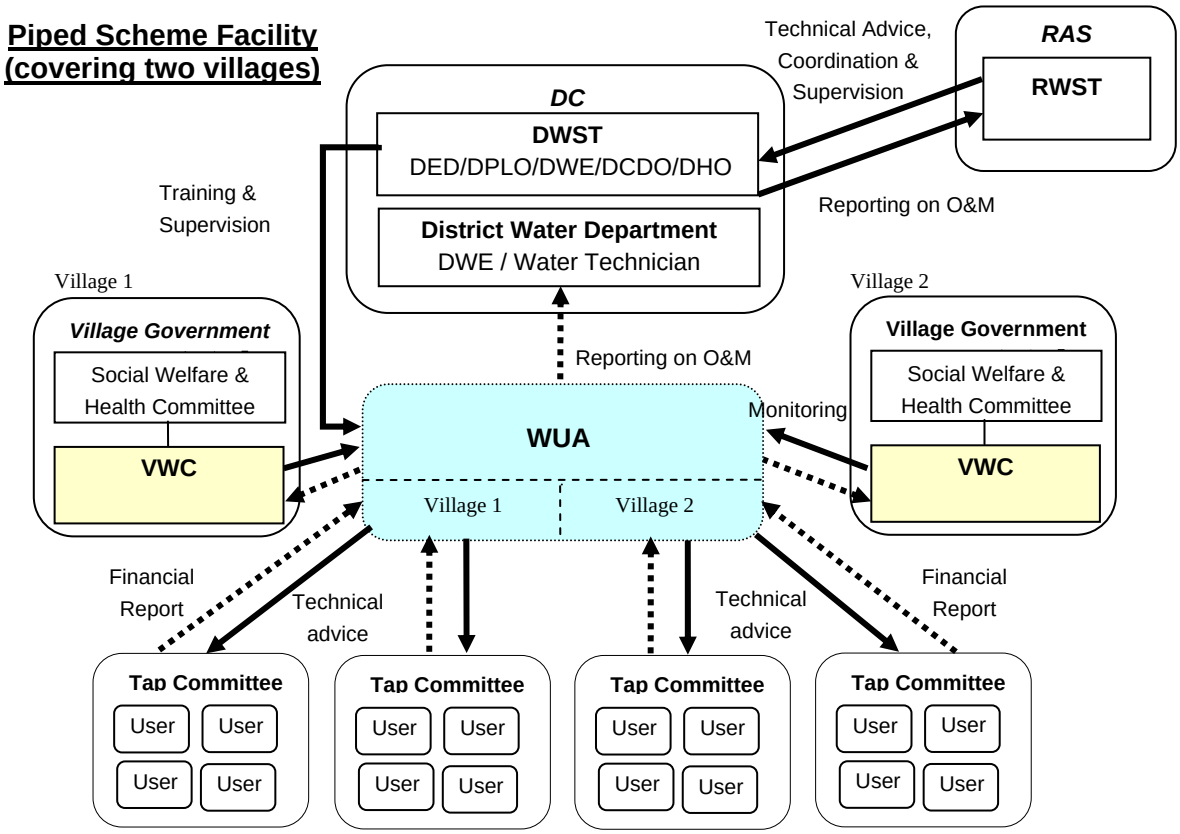



Figure 8.3-2: Suggested Institutional Arrangement for O&M on Piped Scheme in the Priority Villages

### 8.3.2 Village Level

As shown in Figure 8.3-1 andFigure 8.3-2, three types of community based water supply organizations, namely WUG, WUA, or VWC are required appropriately in the 45 priority villages. Institutional development of the responsible organizations at the community level is a key to operate and maintain the facilities in the priority villages in an effective and sustainable manner. The patterns of organizational development are various from the establishment of the organization to the entitlement of water right and legal status. Different institutional development patterns of the community based water supply facility management are identified for the priority villages by types of water supply facilities. As improvement plans to solve the common organizational issues at the community level, training on community mobilization skill, financial and technical skill for the facility management shall be along the institutional development.

### 8.3.3 District Level

To support community water organizations and sustain water supply facilities in the priority villages, organizational arrangement and training of personnel related to water supply and sanitation activities in the District Water Department are crucial. Based on the preventive maintenance manner, which expects and prevents trouble with the facility or machinery before it occurs, the following measures to be taken: (1) establishment of the periodical monitoring system for preventive maintenance at the community level, (2) training on water supply planning and data management targeted to the DWE, technical skills of the DWT, and

community awareness, gender and PHAST (Participation Hygiene and Sanitation Transformation) to all personnel of the District Water Department and the DWST to facilitate the priority villages.

### 8.3.4 Regional level

At the regional level, a coordination body for water and sanitation promotion shall be established to support all responsible bodies entirely in order to provide technical advice on operation and maintenance activities in the priority villages and will become a coordinator to promote water and sanitation activities in all districts. As for the PHAST programme, the regional organizations need to receive training programmes as a future facilitative organization.

# Chapter 9

*Operation and Maintenance and Community Awareness Plan*

# 9 Operation and Maintenance and Community Awareness Plan

## 9.1 Operation and Maintenance Plan

The following examines in detail the O&M cost by water facility types for 45 villages, water fee collection, methods of facility repairs, and spare parts procurement. The exchange rate applied in this chapter is based on the rate of May 2006 (1USD= Tsh 1,181, 1USD=JY 114.58).

### 9.1.1 Operation and Maintenance Cost

The O&M costs for hand pump facilities include personnel expenses of O&M workers, and the costs of spare parts and supplies for periodical O&M activities. The same costs for piped scheme include: running costs, personnel expenses of O&M workers, and various supplies for periodical operation and maintenance activities, and the future replacement cost of the water supply facilities.

There are 4 categories of water supply facilities in the proposed plan: i.e. (a) protected springs; (b) boreholes with hand pumps; (c) newly designed piped schemes; and (d) rehabilitation and expansion of the existing piped schemes. O&M costs for these categories are converted into a monthly O&M amount to be covered by the water users, i.e. (a) Tsh 12; (b) Tsh 924; (c) Tsh 1,019 to 2,503; and (d) Tsh 1,775, respectively, per household per month.

### 9.1.2 Cost Collection

There are many options for the practical management of users` payments. Collection methods depend on local circumstances and the type of water supply facilities. Modes of payment can be categorized into: (i) payment per bucket at water point; (ii) payment per month per household; (iii) annual or semi-annual payments per household. For both piped schemes and hand pump facilities, the modes of payment need to be carefully decided with the timing of cash income in the communities.

The following table illustrates different options for methods of collection/payment and timing of cash income for hand pumps and piped schemes of the priority project.

Table 9.1-1: Suggested Water Fee for the Priority Project

| Type of facility | No. of villages classified by timing of cash income | | Minimum amount for recovery of O&M costs | | Suggested water fee | | Mode of payment |
|---|---|---|---|---|---|---|---|
| | all year round | seasonal (e.g. tree crops) | Tsh per month per HH | Tsh per bucket | Tsh per month per HH | Tsh per bucket | |
| 1. Hand pump | | 32 villages | 924 | 4.4 | 1,000 | 5 | Monthly, annual or semi-annual |
| 2. Hand pump | 3 villages | | 924 | 4.4 | 1,000 | 5 | Payment per bucket or per month |
| 3. Piped scheme | | 7 villages | 1,775 to 2,503 | 8.4 to 11.9 | 1,800 to 2,500 | 10 or 15 | Monthly, annual or semi-annual |
| 4. Piped scheme | 3 villages | | 1,019 to 1,887 | 4.8 to 8.9 | 1,000 to 2,000 | 5 or 10 | Payment per bucket or per month |

### 9.1.3 Collection Structure of Water Fee

Water users organizations such as VWCs, WUGs and WUAs are responsible for the collection of water fees for the recovery of O&M costs. For hand pump facilities, a WUG will be formulated at each water point under the supervision of the relevant VWC. For piped schemes, the existing VWCs will be responsible for the management of the piped schemes at the initial stage of the project implementation. In future, however, it is recommendable that a WUA should be established for each piped scheme for the overall management of the scheme. In the piped schemes, a tap committee will be formulated under the VWC or WUA.

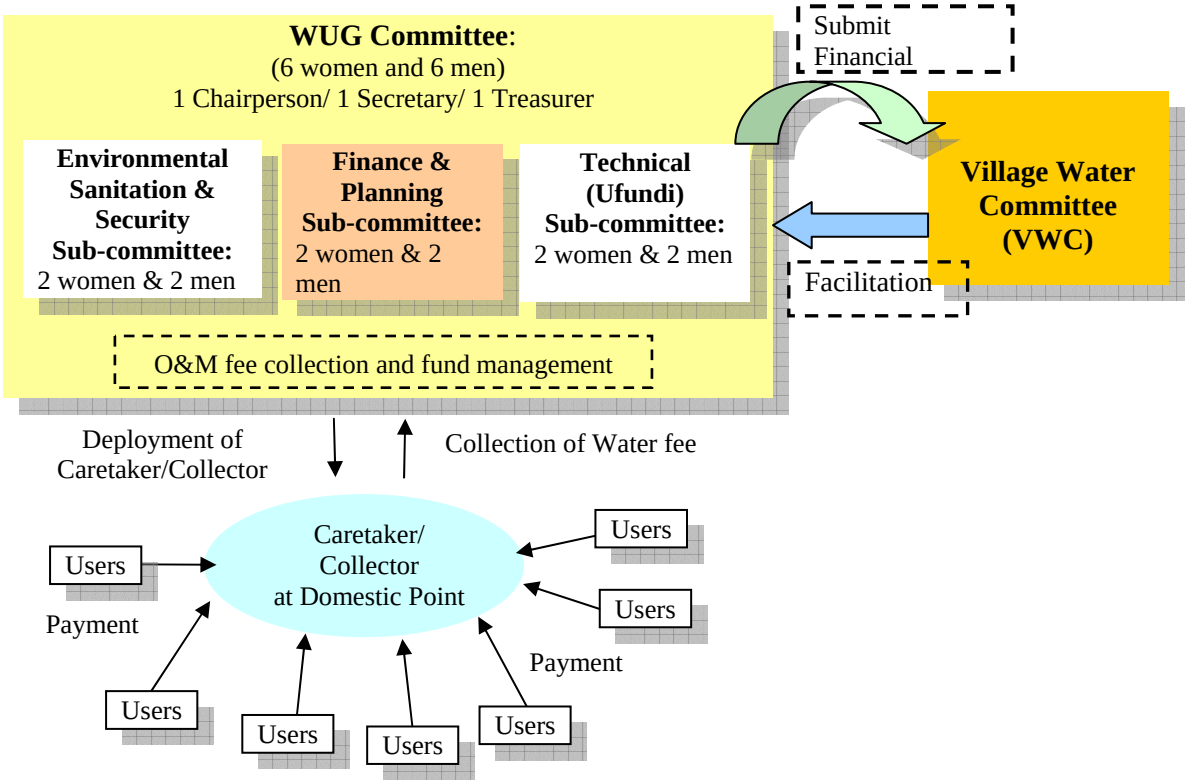



Figure 9.1-1: Suggested Collection Structure of Water Fee for Hand Pump Facility

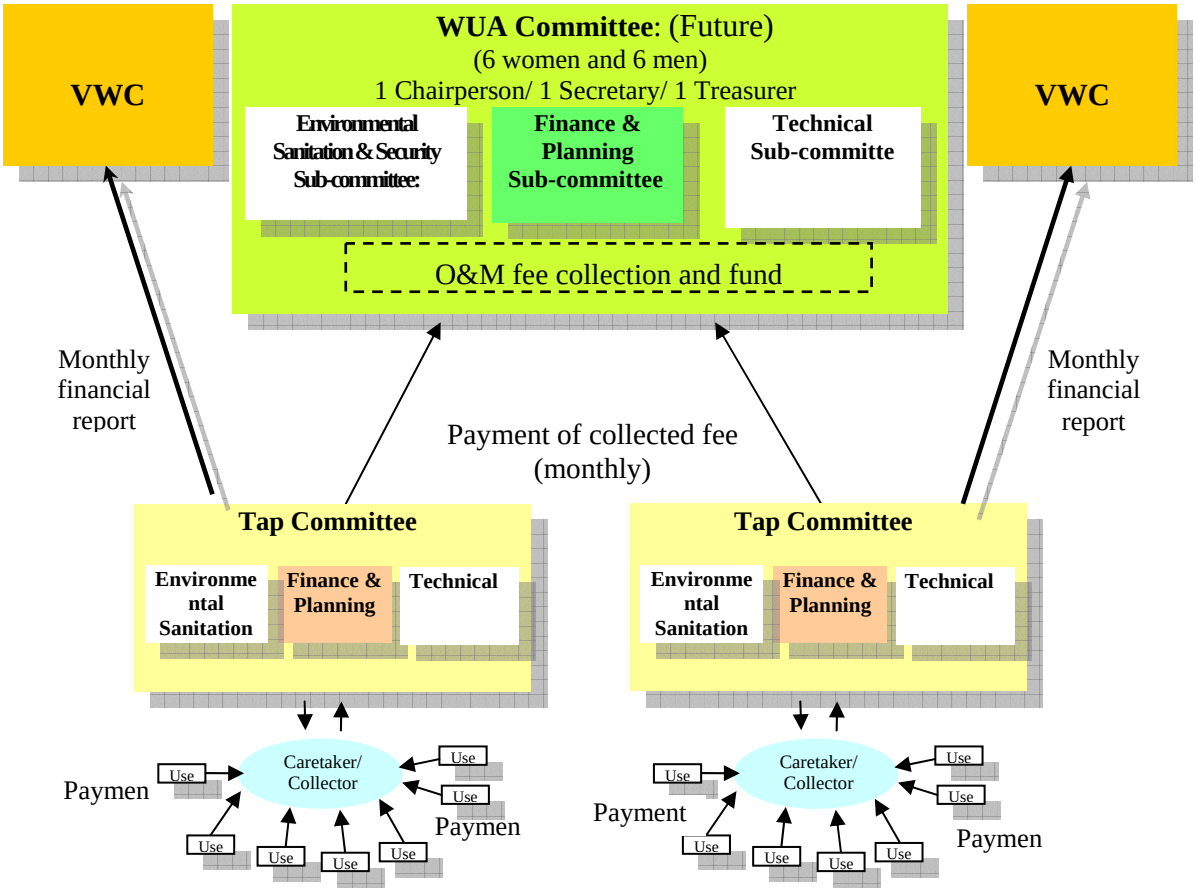



Figure 9.1-2: Suggested Collection Structure of Water Fee for Piped Scheme

### 9.1.4 Method of Repairing Facilities

Major repairs for communal water supply facilities, regardless of the type of technology used or type of water supply facility, are currently assisted by the Water Technician of the district water engineer office in response to requests from the community. On the other hand, minor repairs are supposed to be carried out by the water users themselves.

For enabling minor repair works of the water supply facilities by the water users, provision of a technical training program would be needed for the O&M personnel of the VWCs, WUGs or tap committees. Provision of a tool kit for each O&M personnel is also required.

The estimated training cost for technical maintenance for 45 villages will be approximately Tsh 25,456,000 (=USD 21,555).

### 9.1.5 Method of Spare Parts Delivery and Procurement System

It is recommended that a 'Spare Parts Centre for O&M' be established by using the O&M funds collected from water users organizations such as VWCs and WUGs.

It is suggested that about 5% of the collected water funds shall be saved and contributed for the fund to establish the spare parts centre. The spare parts centre shall be in fact started by using empty containers which are readily available from the district water department; therefore the cost of establishment is only for the spare parts to start with.

It is possible that villagers would make an order for spare parts by phone or letter to the DWEO (district spare parts centre) and they can receive the items by the DWEO sending

them. In delivery, such as Mohamed Trans, private bus company which widely covers the Mwanza and Mara regions can be used as a delivery option. All the WUGs are supposed to open their bank accounts; therefore payment by cheque would be possible for them.

## 9.2 Community Awareness Plan

### 9.2.1 Objectives

The community awareness plan can be categorized into two components, i.e. 1) capacity development for water supply facility management; and 2) awareness raising on use of safe water and sanitary/hygiene practices.

The objectives of the former component are to: (i) strengthen O&M capacity at district and community levels; (ii) strengthen the sense of ownership by community for water supply facility; (iii) operate and maintain water supply facility appropriately; and (iv) increase villagers' access to safe water.

The objectives of the latter component are to: (i) raise awareness on importance and benefit of using safe water at community; (ii) increase use of safe water from water supply facility; (iii) collect water fee as designed and planned; (iv) improve hygiene and sanitary practices among villagers; (v) decrease incidence of water-borne diseases; and (v) improve health standard among villagers.

### 9.2.2 Outputs of Community Awareness Plan

Direct outputs to be produced through implementation of the Community Awareness Plan are summarized in the following table.

Table 9.2-1: Direct Outputs to Be Achieved

| Components | Outputs |
|---|---|
| Capacity Development for Water Supply Facility Management | • VWC, WUA and WUG, are organized and activated<br>• Their articles and by- laws are defined<br>• Demarcation of roles/tasks among all the stakeholders are identified and fulfilled<br>• (VWC, WUG, WUA, DWST, RWST)<br>• Daily check-up, maintenance and repair of water supply facility shall be implemented in appropriate manner<br>• Fee collection, financial record keeping and cash management shall be implemented by Water Committees in appropriate and timely manners<br>• Procurement of necessary fuels and spare parts shall be implemented in appropriate and timely manners |
| Awareness Raising on Use of Safe Water and Sanitary/Hygiene Practices | • Use of safe water among villagers is increased, so as to villager using unprotected water is decreased.<br>• User of water supply facility is increased.<br>• Water fee is collected as planned.<br>• Knowledge of hygiene/sanitation is increased among villagers. |

### 9.2.3 Capacity Development at Community Level

Capacity development for water supply facility management will include: (i) establishment of village water facility organization (before construction), (ii) general guidance (before construction); (iii) financial management training (during construction); (iv) O&M technical training for hand pump (after construction); and (v) O&M technical training on the piped

scheme facilities (after construction). General technical guidance will be conducted for the water users in general. Financial management training will be conducted for the leaders of the water supply organizations such as secretaries and treasurers. Technical training on the O&M activities will mainly be conducted for the technical personnel (e.g. pump attendants) in the water supply organizations.

### 9.2.4 Awareness Raising on Use of Safe Water and Sanitary/Hygiene Practices

Major activities of this component are:

- Delivery of information and training on the benefits of safe water, appropriate water use and hygiene/sanitary practices
- The benefits of new water supply facility shall be acknowledged by villagers through organizing training.
- Awareness creation of the importance of the O&M activities for water supply facility management in order to sustain the benefits of the water supply facility, use of safe water and hygiene/sanitary practice

### 9.2.5 Suggested Trainings

Suggested training items for the two components are summarized in the following table.

Table 9.2-2: Needs for Training and Target of the Training at Village Level

| Types of Training | | Target | Required Duration | Training Content | Responsible Bodies forCapacity Development/Training | |
|---|---|---|---|---|---|---|
| Management | 1) VWC | a Village Assembly | 0.5 Day | ● General guidance | DWST | |
| | | b VWC members | 2 Days | ● Community Mobilization intra-village<br>□ Finance | | |
| | 2) WUG for hand pump | a WUG Assembly | 0.5 Day | ● General guidance | | ●･･･ Community Development Dep.<br>□･･･ Water Dep. |
| | | b WUG Committee (12) | 3 Days | ● Community Mobilization<br>□ Finance | | |
| | 3) WUA for piped scheme | a WUA Assembly | 0.5 Day | ● General guidance | | |
| | | b WUA Committee (12) | 3 Days | ● Community Mobilization intra-village & inter-villages<br>□ Finance | | |
| Technical Repair & Maintenance | 1) Boreholes with Hand Pump | a WUG Committee(All)+VWC | 1 Day | □ General technical guidance<br>O&M of borehole with hand pump | | □･･･ Water Dep. |
| | | b WUG Committee (Technical sub-committee)(4) | 3 Days | | | |
| | 2) WUA for Piped Scheme | a WUA Committee(All)+VWC | 1 Day | □ General technical guidance<br>O&M of piped scheme | | |
| | | b WUA Committee (Technical sub-committee)(4) | 3 Days | | | |
| PHAST | 1) Environmental Health | a Village Assembly | 0.5 Day | ● General guidance | | ◎･･･ Health Dep.<br>●･･･ Community Development Dep.<br>□･･･ Water Dep. |
| | | b VWC, Village Government, WUG and WUA committee (9+12) | 3 Days | ◎<br>● PHAST workshop<br>□ | | |

### 9.2.6 Manuals for Community Awareness

Based on the existing manuals, revised manuals shall be prepared for the respective training needs. However, there are no guidelines and manuals for WUA formulation and technical maintenance for piped scheme water facilities. Therefore it is necessary to make them newly for mobilizing community and sustain the piped scheme facility to ensure sustainability of the piped scheme facility and community based management group for the piped scheme facility.

# Chapter 10

*Evaluation of Priority Project*

# 10 Evaluation of Priority Project

## 10.1 General

The priority project is evaluated based on the economical conditions, financial aspects, organization /institutional situations, natural/social conditions, and technical aspects of Tanzania.

## 10.2 Economic Evaluation

### 10.2.1 Benefit Cost Analysis

The viability of the priority project has been evaluated in terms of the benefit cost analysis on the basis of the economic costs and benefits.

**a. Basic Assumptions**

Basic assumptions used for the benefit cost analysis include: (i) the official exchange rate as of May 2006, i.e. US$ 1.00 = Tsh 1,181 = 114.58 Yen; (ii) project life of 20 years; (iii) inclusion of only direct and tangible benefits; (iv) opportunity cost of capital at 10 %; and (v) exclusion of transfer payments such as interest and taxes.

**b. Economic Project Cost**

The Economic Project costs include the investment costs and recurrent costs. The investment costs comprise the costs for the construction of water supply facilities and engineering services. Recurrent costs consist of annual operation, maintenance and replacement costs for the equipment and other facilities. Taxes and price contingency are not included in the economic costs.

**c. Economic Benefits**

Out of several economic benefits of the Project, only saved time benefits for water fetching and health improvement benefits have been included in the calculation of economic benefits.

**c.1 Saved Time Benefits of Water Fetching**

The average time spent for water fetching under the “without the Project” situation is 3.7 hours per household per day, while the same under the “with the Project” situation is estimated at 2.1 hours per day. The saved time between “with” and “without” the Project is equivalent to Tsh 73,000 (USD 61.80) per household per year in terms of economic labor cost. The save time value is multiplied by the total number of beneficiary households to obtain the annual benefits of the saved time.

**c.2 Health Improvement Benefits**

The health improvement benefits are derived as a result of improvement in water quality and increased supply of water. The benefits can be measured from the difference of medical expenses between “with” and “without” installation of improved water supply systems. It is estimated that the provision of a clean water supply will lead to 20% reduction in medical expenses every year in the target communities. The saved amount of medical expenses is estimated at Tsh 42,598 (USD 36.07) per household per year.

### 10.2.2 Result of Economic Evaluation

Three economic indicators have been calculated as a result of the benefit cost analysis, i.e.

Economic Internal Rate of Return (EIRR) – 10.5 %; Net Present Value (NPV) - USD 467,416 and Benefit Cost Ratio (B/C) - 1.03. These results indicate that the proposed Project is economically feasible as the EIRR exceeds the opportunity of capital, the NPV is positive and the B/C is more than 1.0.

### 10.2.3 Financial Evaluation

One of the most important issues mentioned in the National Water Policy 2002 is full cost recovery for operation and maintenance by the water users. The beneficiaries in the target communities are expected to organize the water supply organizations to conduct periodical operation and maintenance works and to collect water fees for the recovery of the operation and maintenance expenses. The results of the Socio-economic Survey in 2005 indicated that 41 villages out of the 45 target villages in the Priority Project showed a willingness to pay a water fee of Tsh 10 or more per bucket of 20 liters. The comparison of the expected water fee to be collected from the water users at Tsh 10 per bucket and the amount of operation, maintenance and replacement (OMR) costs required each year has indicated that the former exceeds the latter every year. The computation also indicates that even if the water fee recovery rate will be 55 %, the collected water fee will be sufficient to cover the annual OMR costs. It is concluded that the proposed Project is financially feasible in terms of recovery of OMR costs.

## 10.3 Organization /Institutional Evaluation

For conducting the priority projects effectively and sustaining the facilities, the organizational and institutional plan has been proposed. The plan includes: (i) institutional arrangement and relations of responsible bodies according to each type of technologies applied to the priority projects, (ii) organizational arrangement of the Water User Group (WUG), the Water User Association (WUA), and the Village Water Committee (VWC) as responsible bodies of operation and maintenance at community level, (iii) trainings for the district water department on managerial and technical capacity, (iv) establishment of regional coordination body to support community based facility management.

It is expected that the roles and responsibilities of the stakeholders at regional, district and communal levels will be clarified, leading to a well established organizational network for effective and sustainable management of the improved water supply systems in the target communities. The proposed plan is therefore adequate in terms of attainment of the national water policy objectives.

## 10.4 Natural /Social Environment Evaluation

Based on the application submitted to NEMC, it was concluded that the applied project would not have any major adverse impact on targeted areas and the study team was not required to conduct any further EIA study. NEMC, however, requested the study team to prepare a checklist of social and environmental criteria concerning the listed environmental factors.

It is required by NEMC that close monitoring of ambient environmental conditions in the project area be securely conducted regularly with the focus on environmental items by implementing agent / organization and findings be reflected on the revision of the implementation plan to be more technically and environmentally sound.

The water supply plan for the priority project will contribute, in all aspects, to the improvement of the water situation by implementation of the proposed activities.

## 10.5 Technical Aspects

The proposed water supply facilities in this priority project consist of boreholes with hand pumps and piped schemes using ground water, and lake water. Technical appropriateness is essential when considering not only the “hard components” but also the “soft components”. Namely, technical appropriateness was evaluated by components such as construction, operation & maintenance, and material procurement. For building both boreholes with hand pumps and piped schemes, there are no special issues such as construction, etc., because such systems, with the exception of filtration facilities, have already been used in the target area. However regarding piped scheme, it is necessary to conduct the technical support for the operation and maintenance of facility.

# Chapter 11

*Conclusion and Recommendation*

# 11 Conclusion and Recommendation

## 11.1 Conclusion

(1) The 2002 population census indicated that the biggest region by population size was Mwanza with a population of about 3 million including 712 villages, Mara was ranked 13th among the 21 regions in the country with a population of about 1.4 million including 414 villages.

(2) Economic activities were mainly conducted in the agricultural sector including crop farming, livestock, forestry and fishery and the GDP of Mwanza region ranks in the top 5 in Tanzania (2003, Mara ranks 12th).

(3) The water sources to be used for water supply consist of groundwater with medium and deep wells, lake water from Lake Victoria, and springs from three points of view, for example 1) Sustainability for water use, 2) Availability throughout the year and 3) Safety of water quality. The water quality is safe in general; however lake water shall be simply treated and filtered for potable purposes.

(4) The water supply plan was formulated for the 428 villages and 57 existing piped schemes were selected from the requesting villages and the existing piped schemes in accordance with the selection criteria. The spring protection, medium and deep wells with hand pumps, and new and existing piped schemes were planned as scheme types.

(5) The total number of the medium and deep wells with hand pumps including two springs is 1,869 wells of which the served population will be 581,100 people with 247 villages in 2025.

(6) In regard to the piped scheme, a total of 64 newly installed piped schemes are planned in 98 villages, and a total of 57 expanded and rehabilitated piped schemes will be installed in 270 villages. The served population by piped schemes will be 1,265,900 in total in 2025.

(7) In regard to the target year of the Tanzanian side for the water supply plan, the increase of the coverage of water supply has three time-specific goals: 65% coverage by 2010, 74% coverage by 2015, and 90% coverage by 2025 (NRWSSP, 2006). The initial plan was formulated for the water supply plan with 2015 as the year of completion. However, it is impossible to complete the implementation of the water supply plan by 2015 due to the high expenses for the implementation of the initial plan within the planned time frame (2015). Therefore progressive payment is needed of the necessary funds into the payment schedule until 2025. If the water supply plan is implemented completely, it will improve the served ratio for water supply which will contribute to the target strategy of Tanzanian side in 2025.

(8) Out of 428 villages and 57 existing piped schemes, 45 villages including 289 wells with hand pumps and 8 piped schemes were selected for the priority project which is assumed to be implemented by the Japanese Grant Aid project. The total cost for priority project is estimated at approximately USD17.6 million including the engineering expenses..

(9) Financial resources for the project costs of the water supply plan shall be derived from not only the government budget, but financial assistance from foreign countries and/or international lending institutions. According to the assistance of donor and the Investment Requirement Plan on NRWSSP 2006, it is probably possible to be realized with the annual disbursement schedule of the project costs. In any event, the final

completed year of water supply plan is the year of 2025.

(10) The frameworks of organization/institutional conditions in each facility were clarified and the O&M plan was formulated by the clarification of the role of each institutional level, such as region, district, and community, in particular, VWC, WUA, and WUG.

(11) The water fee, composing of the operation and maintenance cost and replacement cost, was calculated for piped schemes facilities, which were equivalent to about 1.5% of the project cost. An economic evaluation was carried out based on this idea, and the NPV was positive and the B/C exceeds 1.0. Therefore, the priority project is economically feasible.

(12) The water fee to be collected within the range of the willingness to pay and the affordability in the villages exceeds the recovering of O&M and replacement costs in priority project villages. Thus the priority project is financially feasible

(13) Based on the application submitted to NEMC, it was concluded that the applied project would not have any major adverse impact on targeted areas and the study team was not required to conduct any further EIA study. In any case the water supply plan for the priority project will contribute, in all aspects, to the improvement of the water supply condition by implementation of the proposed follow-up activities.

## 11.2 Recommendation

### (1) Institutional Development and Supervising Structure

In the implementation of rural water supply works, among the Local Government Authorities （LGAs）, the District Council (DC) in particular will have an important role in the provision of technical support to villages. The NRWSSP strongly urges the establishment of a District Water Supply and Sanitation Team (DWST) as a subordinate organ of the DC, and the establishment of such teams will be a key institutional issue. The DWST will serve as the direct contact with villages and play an important role in community development, education, health (hygiene), rural planning and rural water supply, and its establishment will put in place a supervising structure for villages. Among the members of the DWST, the District Water Engineer (DWE) will play a leading technical role in terms of water supply and management of water supply works. The DWE should also play a central role in strengthening the link with village communities through coordinating with education and hygiene officers within the DWST and establishing a comprehensive system for the operation and maintenance of rural water supply works. Here, therefore, the recommendation for institutional structure is indicated that the DWE should be strengthened through injecting manpower into the DWE. Also, it is important that the DWST has power through legal, institutional and budgetary support.

### (2) Establishment of Basic System for Water Resources Management

The National Water Policy (2002) mentions data and information as one of the policy issues of water resources management. For an effective integrated Water Resources Management System, accurate and timely information on water volume, water quality and water resource use must be provided. To achieve the goals of the water supply coverage, formation of a Water Supply Plan is essential. However, if accurate information on the critical issue of water supply coverage cannot be obtained, the formation of a plan is unlikely. Therefore, it is recommended that the well inventory information, etc. of each village be managed on a database, with new data updated one by one as it is obtained. LGAs do not have the capacity

to input the information onto a computer quickly enough under the present system. Therefore, initially a system for preparing handwritten documents should be established in the DWE's Office, etc. That data should then be periodically collected and input into a database by computer in the DWE gradually. The input data should be stored in files at the MoW. The files should be updated every half year or annually. The first step to implement this should be the creation of a Database Management Team in the MoW. In any case, a conscious effort needs to be made to strengthen organization at the central level.

### (3) For Formation of Yearly Plan for Water Supply

Implementation of the goal to achieve a water supply coverage of 90% by 2025 in rural area is to be begin soon. The district level will play a leading role in implementation. The role of the DWE is particularly important and it is necessary to raise the level of DWE personnel. In the implementation of the water supply plan, it is necessary for the DWE to obtain technical support from the Water Engineer of RAS. Guidance at the central level and the securing of personnel capable of providing guidance is also strongly recommended. Fundamental tasks also need to be implemented. In the implementation of water supply plans, such fundamental works will be necessary. Although the formation of programs and strategies is important, measures to implement such programs and strategies also need to be examined. The DWE' role here is also vital. It is not too much to say that the securing of DWE personnel will determine the feasibility of the water supply plans. Therefore, DWE personnel should be immediately secured.

### (4) At the Time of Water Supply Plan Implementation

The Initial Plan was formulated for the Water Supply Plan as the final completed year of 2015. However, it was found that expenses to complete the Initial Plan were too high referring to the expected internal and external budget plan mentioned in the NRWSSP in 2006. Therefore, the Team suggests the implementation schedule of the Water Supply Plan to achieve the final year of 2025 in accordance with the annual disbursement for the project cost in the Mwanza and Mara regions. However, the following alternative items will be considered and suggested in consideration with the condition of Tanzanian side.

1) Increase the budget by double or 2.5 times the size for the two regions from 2007 to 2015, so that the achievement of the coverage rate in 2015 shall be about 68% (428 villages).

2) Start with the water supply plan, and review the achievement of the coverage rate in 2015 and implementation schedule. Take necessary measures by the NRWSSP and make necessary discussions (amendment) to achieve the National Millennium Target.

3) After formulating the Water Supply Plan, the study team investigated three water supply concepts. The three concepts are (1) Sustainability for water use, (2) Availability throughout the year, and (3) Safety of water quality. These concepts conform to Tanzania's National Water Policy. However, in practice, the Tanzanian side is also in support of the protected shallow well and Charcos Dam which, from the previously mentioned concepts, is discouraged as water sources by the Japanese side. These water sources will not be used in this Water Supply Plan, however the Tanzanian side is not prohibited from using these sources in addition to the potential sources in this plan.