No.

The Republic of Yemen
Ministry of Water and Environment
General Authority for Rural Water Supply Projects

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR RURAL WATER SUPPLY
IN
THE REPUBLIC OF YEMEN

OCTOBER 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

J A P A N T E C H N O C O . , L T D .
EARTH SYSTEM SCIENCE CO., LTD.

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Exchange rate employed in the Study

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May, 2009

PREFACE

Japan International Cooperation Agency (JICA) conducted the preparatory survey on the Project for Rural Water Supply in the Republic of Yemen.

JICA sent to Yemen a survey team from 6th March to 8th May, 2009.

The team held discussions with the officials concerned of the Government of Yemen, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Yemen in order to discuss a draft outline design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Yemen for their close cooperation extended to the teams.

October, 2009.

Kikuo Nakagawa
Director General
Global Environment Department
Japan International Cooperation Agency

October, 2009

LETTER OF TRANSMITTAL

We are pleased to submit to you the preparatory survey report on the Project for Rural Water Supply in the Republic of Yemen.

This survey was conducted by the Consortium of Japan Techno Co., Ltd. and Earth System Science Co., Ltd., under a contract to JICA, during the period from February, 2009 to October, 2009. In conducting the survey, we have examined the feasibility and rationale of the project with due consideration to the present situation of Yemen and formulated the most appropriate outline design for the project under Japan's Grant Aid scheme.

Finally, we hope that this report will contribute to further promotion of the Project.

Very truly yours,

Shoichi Yokogi
Project manager,
Preparatory Survey team on
the Project for Rural Water Supply
in the Republic of Yemen
The Consortium of Japan Techno Co., Ltd.
and Earth System Science Co., Ltd.

SUMMARY

SUMMARY

1. Overview of the Country

The Republic of Yemen (hereinafter Yemen) is located in the southwestern part of the Arabian Peninsula and bounded by Saudi Arabia to the north, Oman to the east, the Red Sea to the west and the Arabian Sea to the south. The long coastline is one of the geographic characteristics of the country. The area of the country is 555,000 km^2, approximately 1.5 times the area of Japan. A watershed with elevation of over 3,000m runs in the north-south direction in the middle of the country. Agricultural areas are located along this highland. In the summer, wet air blowing from the Red Sea toward the central watershed brings annual precipitation of 500 to 1,000 mm to some mountains areas. This precipitation has supported traditional rain-fed agriculture in the highland and the agricultural activities practiced in limited plain areas along wadis which run to the east and west from the mountains eroding the mountain slopes.

Temperature varies greatly with seasons and elevation. Temperature changes within a range between 19 and 40 °C in the coastal plain along the Red Sea and within a range between 0 and 34 °C in the highland in which the City of Sana'a is located.

The population of the country was estimated at 19.72 million(in 2004, Census). The population continues growing at a high rate, above 3%.

GNI and *per capita* GNI of Yemen were US$ 1.94 billion and US$ 870, respectively, in fiscal year 2007 (World Bank, 2007). The main industry is petroleum production, which accounts for 90 % of export and more than 60 % of the government revenue. However, the production of petroleum has been on a decline in recent years. The production of 300,000 to 350,000 barrels per day (in 2008) is incomparably smaller than that in the neighboring oil producing Gulf countries. The World Bank predicts that the petroleum resources in Yemen will have been exhausted around 2017. Natural gas resource is being explored and production of 6.7 million tons of liquefied natural gas (LNG) per year is expected to begin in 2009. However, some view that the production of LNG will not be able to compensate for the decrease in revenue derived from the decreased petroleum production. In order to guarantee employment opportunities, development of non-energy industries (such as fishery and tourism) is urgently required.

A report of UNDP ranks the Human Development Index (HDI) of the country at as low as 153rd among 177 countries (in 2007). Rural people engaged in agriculture account for 70% of the total population of the country. Because of the poor health service in rural areas, many children are dying

of diarrhea and other diseases. Thus, the under-five mortality rate in Yemen is extremely high (78.2/1,000 in 2007, WHO). Therefore, poverty reduction in rural areas is a major issue of the country.

2. Background and Summary of the Project

The water issue is recognized as the most important issue in Yemen and rural water supply remains one of the priority areas in the Third Development Plan for Poverty Reduction (2006 – 2010), in which the Third Five-year Plan and Poverty Reduction Strategy Paper were integrated. Nonetheless, development of water supply systems in rural areas has not advanced much as the percentage of the population with access to safe water is reported at approximately 45% (the national average in 2007).

Under such circumstances, the Ministry of Water and Environment (MWE) formulated National Water Sector Strategy and Investment Program (2008 – 2015) (NWSSIP) aiming at enhancing the percentage of access to safe water from 45% to not less than 72% by 2015.

The government of Japan implemented a development study for "Water Resources Management and Rural Water Supply Improvement in the Republic of Yemen" (Development Study) from 2005 to 2007. On the basis of the findings in Development Study, the Government of Yemen has formulated a groundwater-based potable water supply project in mountainous areas with a severe shortage of safe potable water. In July 2007, the Government of Yemen submitted a request for Grant Aid Cooperation to the Government of Japan for the implementation of this project, entitled "Rural Water Supply Project." The request consists of construction of water supply facilities at 20 sites in five governorates located in rural areas.

The percentages of the population with access to safe and stable water supply in the five governorates in the Project Area remain at 49% or below (in 2008). Many villages are scattered in mountainous areas and they do not have sufficient water supply facilities. Since the price of water provided by water tankers operated by water venders is three to four times higher than the ordinary water charges, only few villagers can afford to such water. The others depend on unhygienic water including water from hand-dug shallow wells, a very limited amount of water seeping out at the bottom of valleys and puddles of rainwater for their domestic use. Such a condition has caused increases in morbidities of water-borne diseases and burden of labor on women and children who are forced to spend more than an hour to draw water from the bottom of valleys. These are examples of serious adverse effects on local residents in various aspects of life, including economic activities, education and health, caused by the poor water supply.

Taking such conditions into consideration, the request by the Government of Yemen for the

implementation of a study at the 20 sites in the five governorates was accepted.

As one site in the original request was removed because of a security reason, the number of the project sites is 19 in the five governorates.

3. Summary of the Results of the Study and Contents of the Project

In response to the request on the basis of the results and background of Development Study, the Japan International Cooperation Agency (JICA), implemented a field study by dispatching a preparatory study team to Yemen from March 6th to May 8th, 2009 to confirm the contents of the requests and to study the current conditions of the requested sites.

After the field study, the data obtained as the results of the field study were used in the analysis in Japan and preparation of a draft Outline Design of this Project. The study team used the results of the said study in preparation of the Outline Design Report. An Outline Design Explanation Team was dispatched to Yemen from August 7th to August 16th, 2009, to explain the contents of the above-mentioned Outline Design to and to hold discussion with the counterpart organization.

In this Project, stable supply of safe water to the direct beneficiary population of approximately 168,000 inhabitants will be established by constructing piped water supply facilities at the above-mentioned 19 sites in the five governorates. In addition, "Soft Component" will be implemented as activities to support operation and maintenance of these water supply facilities. The table below shows the summary of the Outline Design.

Summary of the Outline Design	
Project sites	19 sites in five governorates (Al Mahweet, Sana'a, Dhamar, Ibb and Taiz Governorates)
Project summary	- Construction and rehabilitation of groundwater–based piped water supply facilities at the 19 sites in the five governorates - Support to the establishment of organization of Water User Associations (WUAs) by residents at the sites, support in developing the operation and maintenance capacity and educational activities in sanitation
Direct beneficiary population	168,000 (in the Project target year 2019)

The main components of the project are as follows:

1) Construction of water supply facilities

The Project will include implementation of construction and rehabilitation of groundwater-based water supply facilities. The facilities are a set of water supply system in which deep well pit, machinery

house, distribution reservoirs and public taps are connected with water transmission and distribution pipelines. Deep wells constructed by the Government of Yemen will be used as the water sources of such facilities.

Main components of the water supply facilities

Component and specifications of the work	Stage 1	Stage 2	Stage 3	Total
	Details of the work (Quantity)	Details of the work (Quantity)	Details of the work (Quantity)	Details of the work (Quantity)
Construction of machinery house 26 nos.	3 nos. 0.3 nos.	12 nos. 0.7 nos. 0.5 nos.	9 nos. 0.5 nos.	26 nos.
Construction of reservoirs 25 nos. (25-100 m^3)	4 nos. 0.3 nos.	8 nos. 0.7 nos. 0.5 nos.	7 nos. 0.5 nos.	21 nos.
Installation of distribution and transmission pipelines 17 sites	2 sites 0.5 site 0.4 site	7 sites 0.5 site 0.6 site 0.5 site	5 sites 0.5 site	17 sites
Installation of public taps	13 taps	24 taps	8 taps	45 taps
Rehabilitation work (machinery house, reservoirs, etc.)	0.3 site	5 sites 0.7 site	0	6 sites
Equipment facility work 19 sites	2 sites 0.3 site	8 sites 0.7 site 0.5 site	7 sites 0.5 site	19 sites
Tests, test operation, etc.	2 sites	9 sites	8 sites	19 sites

* A figure less than 1 in the columns of "Details of the work" indicates that work at a site or on a facility will be implemented in more than one stage.

2) Soft Component

Soft Component will be implemented in the Project with the purpose of providing support required for the establishment of resident-led operation and maintenance systems and educational activities in sanitation. Local NGOs/consultants will be used for development and strengthening of the operation and maintenance systems and the educational activities in sanitation at the Project sites.
The summary of the "Soft Component" activities is as follows:

Activities in Soft Component

Aim	Activity
Development and strengthening of the operation and maintenance systems and educational activities in sanitation for the residents at the Project sites	1 Phase of Participatory Planning
	1-1 Explanation of options for organizational systems for the participatory operation and maintenance to the residents at the Project sites, consensus-building on the organizational systems and identification of training needs
	1-2 Establishment of WUAs and rules concerning the organization and facility operation
	2 Phase of establishment and corporate registration of WUAs
	2-1 Consensus-building on rules of WUAs at general assemblies of WUAs and election of the executives of WUAs
	2-2 Corporate registration of WUAs
	2-3 Establishment of the Monitoring (Audit) Committees
	3 Phase of capacity building of WUAs in the operation and maintenance
	3-1 Training for the executives and the Monitoring Committees (guidance in organization management, accounting and finances, operation and repair)
	3-2 Technical training to operators (including pump operators, fees collectors and meter readers)
	3-3 Training to become peer educators(*) in participatory education in sanitation

(*) Peer education: a teaching method in which some residents are trained to be providers of educational activities in sanitation and play a role of teacher for other residents as their peers (*i.e.* neighbors or friends) in such activities

4. Work Period of the Project

The Project will be implemented as a Grant Aid Cooperation Project. Its implementation schedule is as follows:

【Detailed Design】

1) Exchange of Notes (E/N)
2) Grant Agreement (G/A)
3) Consultant agreement for the detailed design
4) Detailed design study
5) Preparation and approval of bidding documents

【Project Implementation】

1) Exchange of Notes (E/N)
2) Grant Agreement (G/A)
3) Consultant agreement for the implementation supervision
4) Bidding and signing of contract with the contractors
5) Construction of rural water supply facilities and soft component
6) Completion and delivery

The implementation schedule of the Project consists of 6.5 months for the Implementation Design and 33.5 months for the Project Implementation including bidding-related work, "Soft Component," rehabilitation of deep wells, installation and rehabilitation of pumping and booster equipment, construction and rehabilitation of machinery house and distribution reservoirs, installation and rehabilitation of pipelines. The table below shows the tentative implementation schedule.

i.	Conclusion of E/N (for the Implementation Design), conclusion of G/A, consultant agreement, Implementation Design, work related to the comparison of BD/DD and preparation of bidding documents		6.5 months
ii.	Conclusion of E/N (for the Project Implementation), conclusion of G/A, consultant agreement, announcement of bidding, general works concerning the bidding, contract with a contractor, etc.		3.5 months
iii.	Work at water sources, machinery house, distribution reservoirs, pipelines, public taps, technical cooperation, final inspection, "Soft Component" and delivery		30 months (from the commencement)
		Stage 1:	7.0 months
		Stage 2:	12.0 months
		Stage 3	11.0 months
Total			40.0 months

5. Verification of the Relevance of the Project

Implementation of the Project is expected to realize the following effects and improvement:

1) Construction of groundwater-based water supply facilities will enable stable supply of safe water to 168,193 inhabitants (as of the Project Year 2019) at the 19 Project sites in five governorates.
2) The established water supply facilities will be able to supply 20 to 40 l/capita/day of water to each of the 168,193 inhabitants at the Project sites.
3) Stable supply of safe water to the residents in mountainous areas, where shortage in potable water is more serious than the other areas, will alleviate the work of water drawing.
4) Implementation of "Soft Component" will lead to appropriate operation and maintenance of the water supply facilities by WUAs at the Project sites. It will also improve behaviors of the beneficiaries in water use and sanitation.

Improvement in effectiveness and efficiency of the implementation of the Project may require paying attention to the following issues and proposals.

1) Villagers-based operation and maintenance system for water supply facility
   In Yemen, in establishing operation and maintenance system for the rural water supply, the following subjects are necessary through the dialogue with villagers; to clarify each responsibility for the operation and maintenance, to strengthen beneficiary's sense of ownership toward facility,

to build beneficiaries based operation and maintenance system, and to develop their abilities.

2) Building of supporting and supervision structure from the Yemeni Governmental Institution to the WUAs

   Concerning the capacity on the facilities operation and maintenance, finance and technical issues, it is necessary the support from the Implementing Agency, the General Authority for Rural Water Supply Projects (GARWSP) headquarter and branches, as well as from the Local Authorities(Governorates and Districts). Therefore, it is expected that GARWSP headquarter and branches as well as the Local Authorities build a structure for the continuous support to the WUAs.

3) Implementation structure for the groundwater conservation

   GARWSP, through the periodical report submitted by the WUAs, will verify its contents on the appropriate usage of deep well, if there is no new deep well constructed in the groundwater interference zone of the Project deep well and the record of water level monitoring. Also, it is expected that GARWSP will take necessary measures for the regulation on the groundwater resources development and monitoring of the existing water supply facilities for the conservation of the groundwater through close coordination with the target Governorates and Districts of the Project area.

Under the Project, construction and rehabilitation of water supply facilities in 19 sites in 5 Governorates will bring stable and safe water supply and improvement of life and sanitation environment to approximately 168 thousand inhabitants in the rural area. As mentioned above, the Project will contribute to the achievement of overall goal of National Water Sector Strategy and Investment Program, which is expected that will improve various aspects of the residents such as economic activity, education and health. Therefore, the necessity of the cooperation is high.

Under this circumstance, it is justified to implement the Project under the Japan grand aid by the following respects.

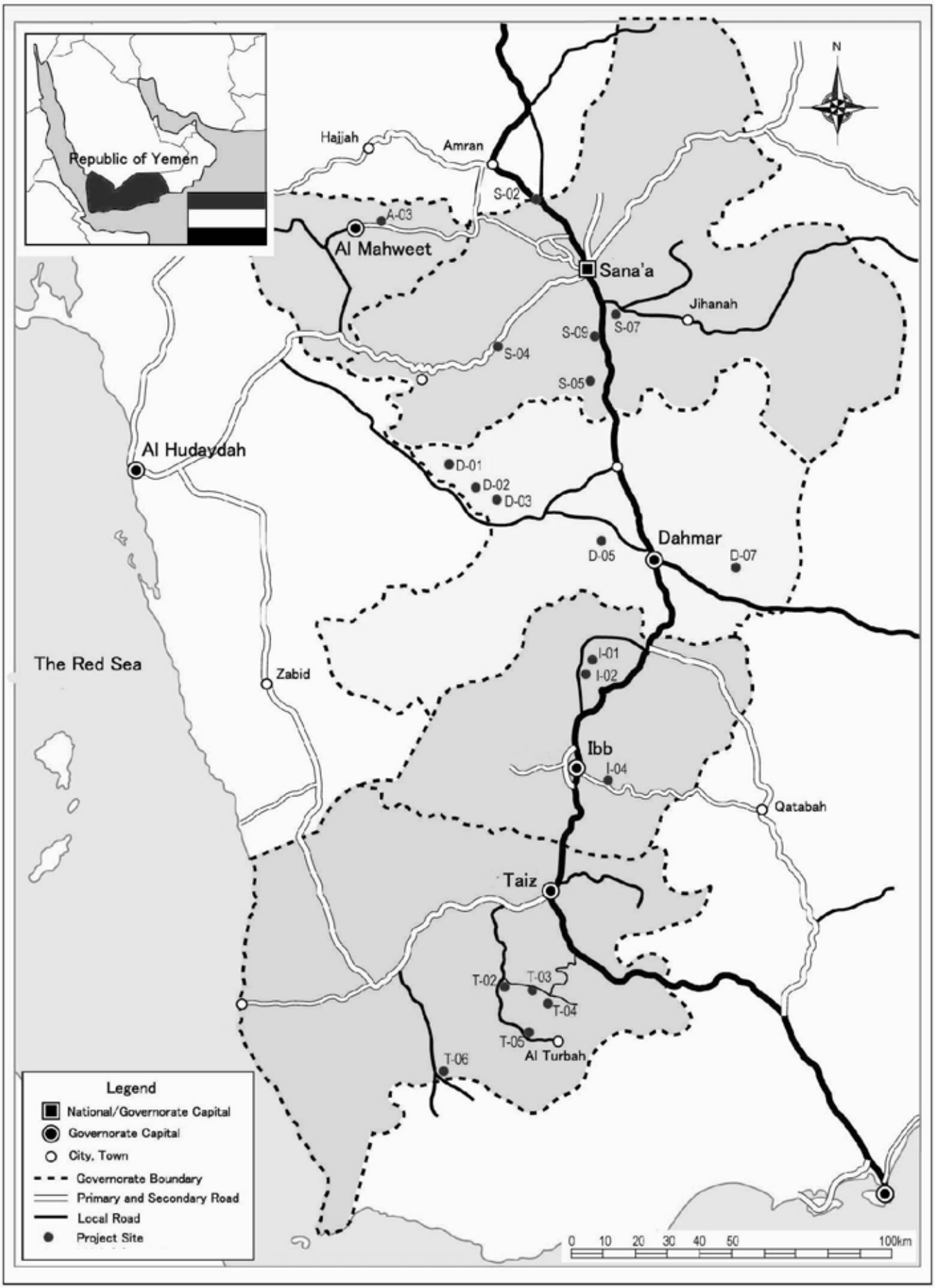
1) Construction water supply facilities in 19 sites in 5 Governorates will enable approximately 16.8 thousand inhabitants (Target Year 2019) to access to the safe and stable water.
2) Women's and children's burden in water fetching, which takes 3.8hour per day on average, will be reduced.
3) The Project will contribute to fulfilment of National Water Sector Strategy and Investment Program (2008 – 2015) setting the goal to improve water coverage rate.
4) With the implementation of "Soft Component", will be formed the WUAs which will lead to appropriate operation and maintenance of the water supply facilities. Also, after the commencement of supply of safe water, for the appropriate use of water, the structure of community sensitization on sanitation by the residents will be implemented.
5) The water supply facilities will be constructed in the mountainous area and rural local area where

the large numbers of people leave at the poverty level. After completion of the facilities construction, a minimum amount of water fee will be charged based on the operation and maintenance of the facilities which includes fuel, salary, spare parts and renewal costs. It is not profitable and is an amount that will be possible to be paid by the actual villagers income.

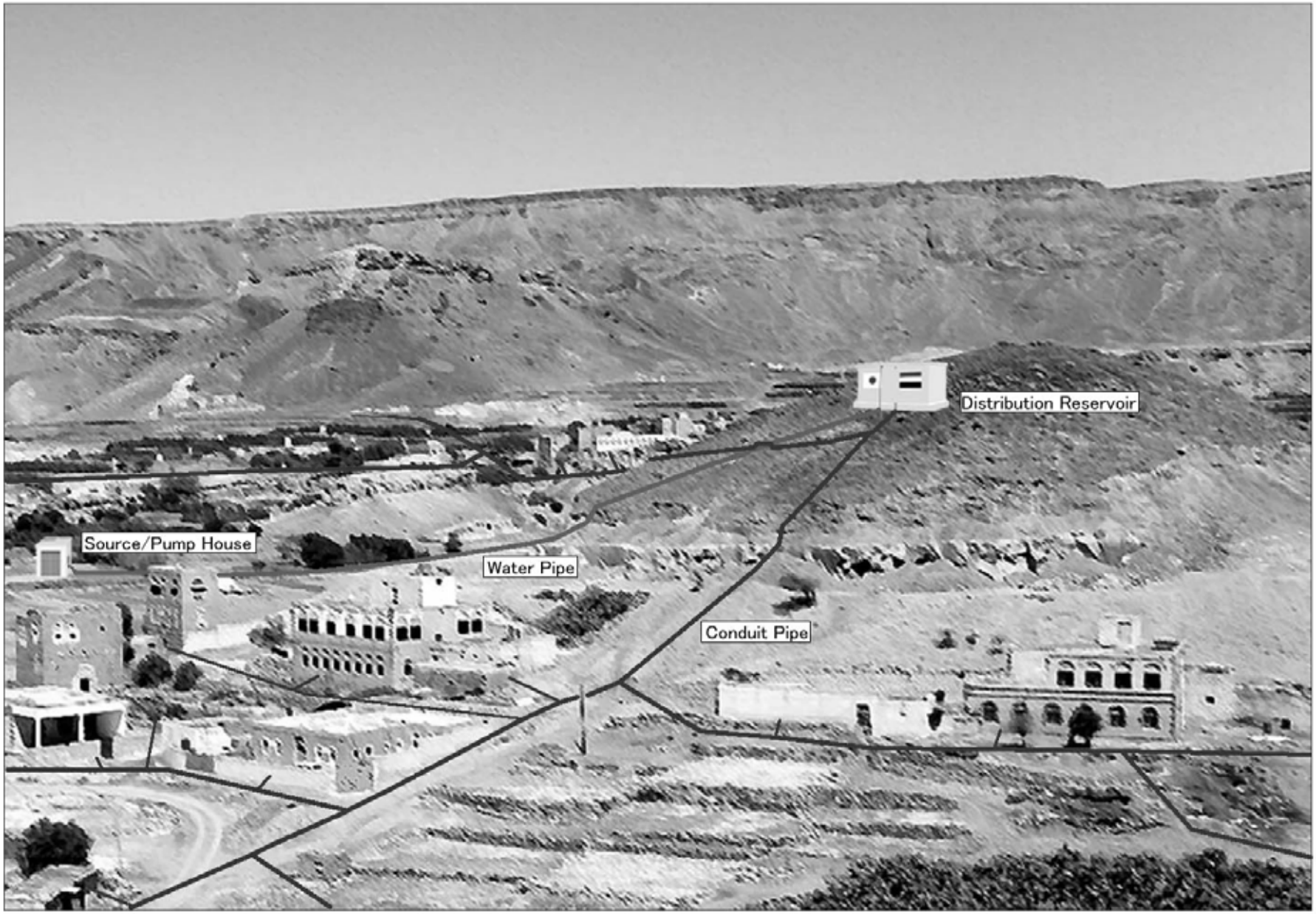
6) The water supply facilities to be constructed under the Project are of small scale so that they will not give considerable negative impact on environment.
7) The Project will be implemented smoothly without any particular difficulties under the scheme of Japanese grant aid.

This Project, will construct and rehabilitate water supply facilities in Yemen for the purpose of supplying stable and safe water to the inhabitants in the rural areas. Thereby, will contribute for the improvement of water coverage ratio in the rural areas, and also to improve the living standard, economic activity, education, and health of the residents in the mountainous area, which is one of the aims of the Government of Yemen. Therefore, it can be judged that the present Project be implemented as a Grant Aid Assistance of Japan. Moreover, with the “Soft Component” activity, community led WUAs will be forming and strengthening, and with the implementation of sensitization to the residents, a continuous and sanitary operation and maintenance of the constructed water supply facility will be built.

CONTENTS



LOCATION MAP OF THE PROJECT SITE



COMPLETION DRAWING: THE PROJECT FOR RURAL WATER SUPPLY IN THE REPUBLIC OF YEMEN

LIST OF FIGURES AND TABLES

LIST OF ABBREVIATIONS

CBO	Community-based organization
DLDSP	Decentralization and Local Development Support Program
DRA	Demand Responsive Approach
EIA	Environmental Impact Assessment
E/N	Exchange of Notes
EPA	Environmental Protection Authority
G/A	Grant Agreement
GAREW	General Authority for Rural Electricity and Water
GARWSP	General Authority for Rural Water Supply Projects
GRA	Governorate Rural Water Supply and Sanitation Authority
IEE	Initial Environmental Examination
JICA	Japan International Cooperation Agency
LA	Local Authority
MAI	Ministry of Agriculture and Irrigation
MDGs	Millennium Development Goals
MEW	Ministry of Electricity and Water
MLA	Ministry of Local Administration
MWE	Ministry of Water and Environment
NGO	Non-governmental Organization
NWRA	National Water Resources Authority
NWSA	National Water and Sanitation Authority
NWSSIP	National Water Sector Strategy and Investment Program
OJT	On-the-job training
PHAST	Participatory Health and Sanitation Transformation
PIU	Project Implementation Unit
PMU	Project Management Unit
PPP	Public Private Partnership
PRSP	Poverty Reduction Strategy Paper
PSP	Private Sector Participation
PWP	Public Works Project
RWSSP	Rural Water Supply and Sanitation Project
RWSS-TA	Rural Water Supply and Sanitation- Technical Assistance
SFD	Social Fund for Development
SMT	Social Mobilization Team
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WTP	Willing to Pay
WUA	Water User Association

CHAPTER 1
BACKGROUND OF THE PROJECT

Chapter 1 Background of the Project

1-1 Current Conditions and Problems in the Sector Concerned

1-1-1 Current Conditions and Problems

The government of the new republic was formed by unification of the former North Yemen and South Yemen after the civil war in the 1980's. The new republican government has considered development and management of water resources, whose shortage and exhaustion has become eminent in the entire country, as one of the major policy issues for the economic development and improvement of the life of its citizens and has taken measures for it. The main target of the First Five-Year Plan made public in 1994 was measures to overcome "water crisis." Rural water supply remains a priority area in the Third Development Plan for Poverty Reduction (2006 - 2010) in which the Third Development Plan and Poverty Reduction Strategy Paper (PRSP) were consolidated for the achievement of the Millennium Development Goals (MDGs).

However, in the 1990's, the new republican government did not have established policy-making and implementation systems in the area of water resources development and conservation and, thus, was unable to implement consistent and strategic water resources development and conservation. Instead, each ministry and agency made its own policies and implemented its own projects independently. Under such circumstances, the National Water Resources Authority (NWRA) was established in 1996 and the water resources administration was unified with NWRA as the only administrative organ to control the national water resources management. Following the enactment of Water Law in 2002, the Ministry of Water and Environment (MWE) was established in 2004 in accordance with a decree (Decree No. 218 of 2004 establishing Ministry of Water and Environment, hereinafter called MWE) to reorganize the administration in the water sector. Under this reorganization, the jurisdiction over the implementing agency of this Project, General Authority for Rural Water Supply Projects (GARWSP), was transferred from the Ministry of Agriculture and Irrigation to MWE in 2004.

During the transition period of the sector reform between 2001 and 2004, the Government of Yemen suspended the administrative activities of GARWSP on improvement of rural water supply. During the same period, as political stability had been established in the country, various donor countries and international organizations including the World Bank (WB) started large-scale assistance in improving rural water supply systems. While the Government of Yemen did not have an established administrative system for the improvement of rural water supply systems, international organizations including WB established an independent Project Implementation Unit (PIU) in the Ministry of Economy and Planning for each of development projects including those for improving rural water

supply systems to implement rural water supply improvement projects. At present, though GARWSP, the national institution responsible for the improvement projects, has established its administrative system, the above-mentioned implementation system continues being used in parallel with that of GARWSP. Consequently, the Social Fund for Development (SFD), the Public Works Project (PWP) and the Rural Water Supply and Sanitation Project (RWSSP) are implementing their own rural water supply projects independently as administrative support organizations.

The coexistence of multiple organizations implementing rural water supply projects had enhanced the need for coordination and efficient and strategic development investment in the water sector, which had led MWE to prepare the National Water Sector Strategy and Investment Program, 2005 - 2009, (NWSSIP) in 2005 with the assistance mainly from the Government of the Netherlands. MWE took the lead in the preparation of NWSSIP in consultation with governmental and international organizations and donors involved in water resources development and management. Since the relevant organizations have adopted NWSSIP, they are required to implement and coordinate their development assistance in accordance with the said strategy and investment program. An updated version of NWSSIP, which provided the strategy and investment program in development of rural water supply systems up to 2015, was prepared in 2009.

Meanwhile, the percentage of the population with access to safe water in rural areas has remained at a low level in Yemen. The percentages in the five governorates in the project area, in particular, remain at 49% or less (in 2008). Many villages are scattered in mountainous areas and they do not have sufficient water supply facilities. Since the price of water provided by water tankers operated by water venders is three to four times higher than the ordinary water charges, only few villagers can afford to buy such water. The others depend on unhygienic water including water from hand-dug shallow wells, a very limited amount of water seeping out at the bottom of valleys and puddles of rainwater for their domestic use. Such a condition has caused increases in the morbidities of water-borne diseases and burden of labor on women and children who are forced to spend more than an hour to draw water from the bottom of valleys. These are examples of serious adverse effects on the residents in various aspects of life, including economic activities, education and health, caused by the poor water supply.

A report of UNDP ranks Yemen's Human Development Index (HDI) at as low as 153rd among 177 countries in 2007. Rural people engaged in agriculture account for 70% of the total population of the country. Because of the poor health service in the rural areas, many children are dying of diarrhea and other diseases. Thus, the under-five mortality rate in Yemen is extremely high (78.2/1,000 in 2007, WHO). Therefore, improvement of social infrastructure in rural areas is a major task of the country.

1-1-2 The Development Plan

As mentioned above, the water issue is recognized as the most important issue in Yemen and rural water supply is considered as one of the priority areas in the Development Plan. However, improvement of water supply systems in rural areas has not advanced much and it was reported that the percentage of the population with access to safe water in the entire country was approximately 45% in 2007.

To improve such conditions, NWSSIP prepared by MWE aims at increasing the percentage of access to safe water in rural areas from 45% to 72% or above by 2015.

The table below shows the targets (2008 - 2015) in the rural water supply and sanitation sector provided in the updated NWSSIP.

Table 1-1 Targets of NWSSIP in the rural water supply and sanitation sectors

Year	Population with access to safe water in rural areas	Population with access to sanitation in rural areas	Number of people with access to safe water in rural areas	Number of people with access to sanitation systems in rural areas	Total rural population
2002	25%	20%	3.40 million	2.80 million	13.80 million
2007	45%	21%	6.80 million	3.14 million	17.50 million
2015	>72%		14.00 million		20.90 million

Source: NWSSIP (revised version)

Attention has to be paid to maintaining consistency of this Project with NWSSIP. However, GARWSP has prepared a development investment program taking into account the implementation of rural water supply projects under this Project. The investment program is also included in the revised NWSSIP. For these reasons, this Project is considered well coordinated in the relevant sector.

1-1-3 Social-economic Conditions

The area of Yemen is 555,000 km^2, and it is composed by 21 governorates. The population of the country was estimated at 19.72 million (in 2004, Census) and it is continuously growing at a high rate, above 3%. It is presumed that 42% of people living in the rural areas lives below the poverty line(World Bank), caused mainly by the economic stagnation and degradation of infrastructure.

GNI and *per capita* GNI of Yemen were US$ 1.94 billion and US$ 870, respectively, in fiscal year 2007 (World Bank, 2007). The main industry is petroleum production, which accounts for 90 % of

export and more than 60 % of the government revenue. However, the production of petroleum has been on a decline in recent years. The production of 300,000 to 350,000 barrels per day (in 2008) is incomparably smaller than that in the neighboring oil producing Gulf countries. The World Bank predicts that the petroleum resources in Yemen will have been exhausted around 2017. Natural gas resource is being explored and production of 6.7 million tons of liquefied natural gas (LNG) per year is expected to begin in 2009. However, some view that the production of LNG will not be able to compensate for the decrease in revenue derived from the decreased petroleum production. In order to guarantee employment opportunities, development of non-energy industries (such as fishery and tourism) is urgently required.

1-2 Background and Summary of the Request for Grant Aid Cooperation

As mentioned in "1-1-1 Current Conditions and Problems" and "1-1-2 The Development Plan" above, the water issues is recognized as the most important issue in Yemen.
However, the percentage of the population with access to safe water in rural areas has remained at a low level and the percentages in the five governorates in the Project area have remained at 49 % or less (in 2008). These low percentages have led to heavy burden of labor of water drawing on women and children. Many villages are scattered in mountainous areas. Since these villages do not have sufficient water supply facilities, residents of these villages have to rely on either expensive water provided by water tankers operated by water venders or unhygienic water such as water from hand-dug shallow wells, a very limited amount of water seeping out at the bottom of valleys or puddles of rainwater if they cannot afford the water sold by the venders.

Japan has assisted Yemen in improving rural water supply facilities since 1976 with Yen Loan project (at 42 sites) and Grant Aid Cooperation projects (at 29 sites in eight phases). Japan has also implemented a development study, "Water Resources Management and Rural Water Supply Improvement in the Republic of Yemen" from 2005 to 2007. In this study, a plan for a water supply improvement project at 23 sites in the five governorates, Al Mahweet, Sana'a, Dhamar, Ibb and Taiz, and an implementation plan for capacity building at the head office and governorate branch offices of GARWSP were prepared. In July 2007, the Government of Yemen submitted a request for Grant Aid Cooperation to Japan for the implementation of water supply facility improvement project at 20 sites out of the 23 sites, excluding the three sites at which facilities had been constructed in the pilot project in the development study. In response to the request, JICA dispatched a preparatory study team to Yemen from March 6th to May 8th, 2009, for the field study to confirm the details of the request and studied the current conditions of the requested project sites.

As one site in the original request has been removed because of a security reason, the number of the project sites is 19 in the five governorates.

1-3 Trends of Assistance of Japan

Yen loan, Grant Aid and Technical Cooperation projects in groundwater development and water supply sector have been implemented in Yemen since 1996. The tables below show summaries of these projects.

Table 1-2 Technical Cooperation and Yen Loan projects of Japan in the past
(in the water resources development/water supply sector)

Type of assistance	Implementation period	Project name, etc.	Summary
(1) Development Study	2005- 2007	Water Resources Management and Rural Water Supply Improvement in the Republic of Yemen	Preparation of a practical rural water supply development project and preparation of a master plan and capacity development for water resources management in the Sana'a Basin
(2) Follow-up Cooperation	2005	Follow-up Cooperation of Rural Water Supply Project in the Southern and Eastern Governorates	Study on the current conditions of the water supply facilities constructed with the Grant Aid Cooperation of Japan and procurement of equipment required for emergency measures
(3) Yen Loan	1976 - 1983	Rural Water Supply Project	Construction of water supply facilities in 42 rural areas The actual work was implemented in the period between 1980 and 1983.

Table 1-3 Grant Aid Cooperation Projects of Japan in the past (in the water supply sector)

(Unit: 100 million yen)

Implementation period	Project name	Amount of Grant	Summary
1981 – 1983	Rural Water Supply Project	16.00	Construction of rural water supply facilities at 12 sites
1986 – 1988	Rural Water Supply Project	21.95	Construction of rural water supply facilities at eight sites
1991 - 1994	Rural Water Supply Project	16.60	Construction of rural water supply facilities at five sites
1997 - 1999	Rural Water Supply in the Southern and Eastern Governorates	20.28	Construction of rural water supply facilities at four sites in the southern and eastern governorates

1-4 Trends of Assistance of Other Donors

The table below shows the summaries of the recent projects implemented by other donor countries and international organizations which have implemented cooperation projects in the water supply/sanitation sectors in rural areas in Yemen.

Table 1-4 Assistance of other donor countries and international organizations in the past (in the water resources development area)

(Unit: thousand US$)

Implementation period	Donor	Project name	Budget	Form of assistance	Summary
2005	The Government of the Netherlands	Rural water supply and Sanitation Technical Assistance Project	7,152.0	Grant	Capacity building at the head office and four branch offices of GARWSP, construction of water facilities at 34 sites and procurement of materials and equipment
2006 - 2008	*Ditto*	Rural water supply improvement project	23,100.0	Grant	Construction and repair of water supply facilities at 221 sites
2001 - 2011	The World Bank	Rural water supply and sanitation project	29,400.0	Grant	Construction of level-3 water supply facilities in six governorates
2007 - 2011	UNICEF	Rural water supply program and capacity building of staff members of GARWSP	7,000.0	Grant	Construction of rural water supply facilities, installation of fluoride removal systems and educational activities in health and sanitation
2004 - 2008	SFD	Rural village water supply project	60,000.0	Grant	Construction of small scale piped water supply systems, construction of low-cost water supply facilities such as those for rainwater harvesting, training in the operation and maintenance and introduction of education in health and sanitation

GARWSP (General Authority for Rural Water Supply Projects)
SFD (Social Fund for Development)
UNICEF (The United Nations Children's Fund)

1-5 Natural Conditions

1-5-1 Geological and hydrogeological features

(1) Geological features

The bed rock of Yemen is made up mainly of Precambrian granite, gneiss and schist, over which is distributed younger strata from a variety of geological periods.

In the center of Yemen is located the Sana'a Plateau, along the northern edge of which extends a vast lava field of basalt from volcanic activity in the Quaternary Period. Similar lava fields can also be seen around Dhamar, Taiz and Aden. In these areas of Quaternary Period lava fields, volcanic cinder cones thrown up in fissure eruptions retain more or less their original shape.

Another Quaternary Period stratum is a sedimentary layer containing Aeolian sand, distributed extensively throughout the coastal plain and the desert region. These sedimentary layers form alluvial fans over 100m thick on the fringes of the Western Highlands. Alluvial zones along the wadis are shallow, with a thickness of 5 to 10m.

The volcanic rock of Yemen is widely distributed in the mountainous region to the south of Sana'a, and reaches a thickness that is in excess of 2,000m.

The geological stratigraphy of Yemen is shown in Table 1-5. Fig 1-2 is a geological map of the country.

Table 1-5 Geological stratigraphy of Yemen

Period		Stratum	Thickness	Geology
Quaternary	Holocene Pleistocene	Quaternary deposits	5-100m	Aeolian sand, sand, gravel
		Quaternary volcanic rocks	100-500m	Basalt lava and scoria
Tertiary	Miocene Eocene	Yemen volcanic rocks	+2,000m	Basalt, rhyolite and dacite Welded tuff and pyroclastic deposits
		Tawilah Group	300m	Sandstone, conglomerate, clay, limestone, dolomite
Cretaceous				
Jurassic	Upper	Amran facies	+600m	Limestone, sandstone interbedded in marl and shale
	Lower	Kohlan facies	300m	Sandstone and conglomerate interbedded in green shale
Ordovician		Wajid sandstone	250m	Occasionally gravelly sandstone showing cross bedding
Precambrian		Precambrian	?	Pegmatite and quartz veins interbedded in granite, gneiss, schist, quartzite, shale, meta-andesite

(2) Hydrogeological features

Yemen's groundwater comprises unconfined groundwater and confined groundwater.

Table 1-6 Types of groundwater in Yemen

Type of groundwater	Definition	Remarks
Confined groundwater	Mostly fissure water flowing through crevices and cracks	Drawn from deepwells
Unconfined groundwater	Shallow groundwater in the Quaternary sediments of sand and gravel along the wadis. This layer is very porous, with pressure generally in the range of 3 to 5m. During the dry seasons the water level can fall drastically.	Groundwater is drawn from hand-dug wells, but during the dry seasons many of these dry up.

The deepwells on the Project site draw water from the artesian aquifers in the Tertiary volcanic rock and the Cretaceous Tawilah Group. Some of the deepwells have been constructed in wadi beds, and these tap water from deep-fissure aquifers.

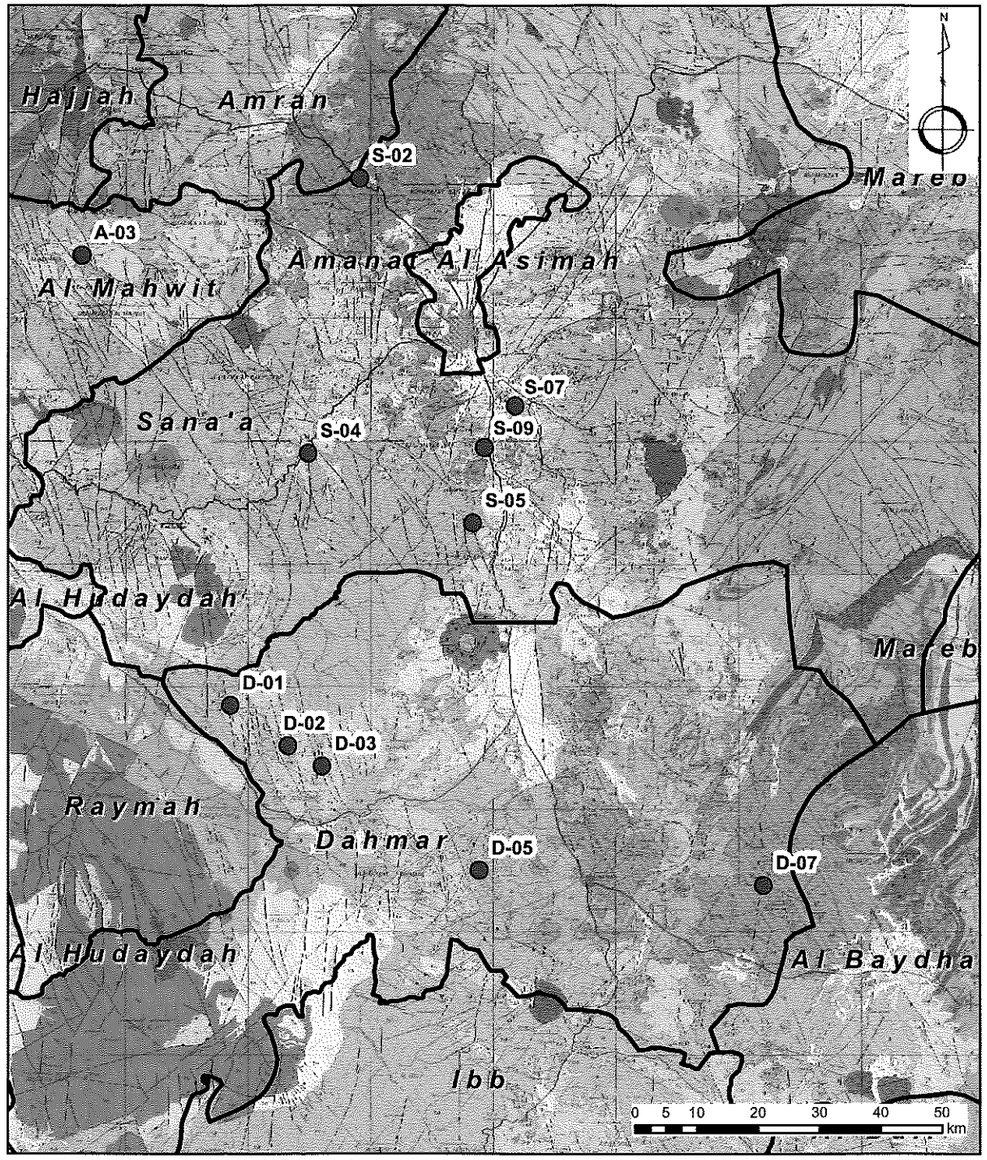
The water-bearing stratum in the Tertiary volcanic rock is classified as a medium-producing aquifer, while that in the Tawilah Group is classified as a high-producing aquifer.

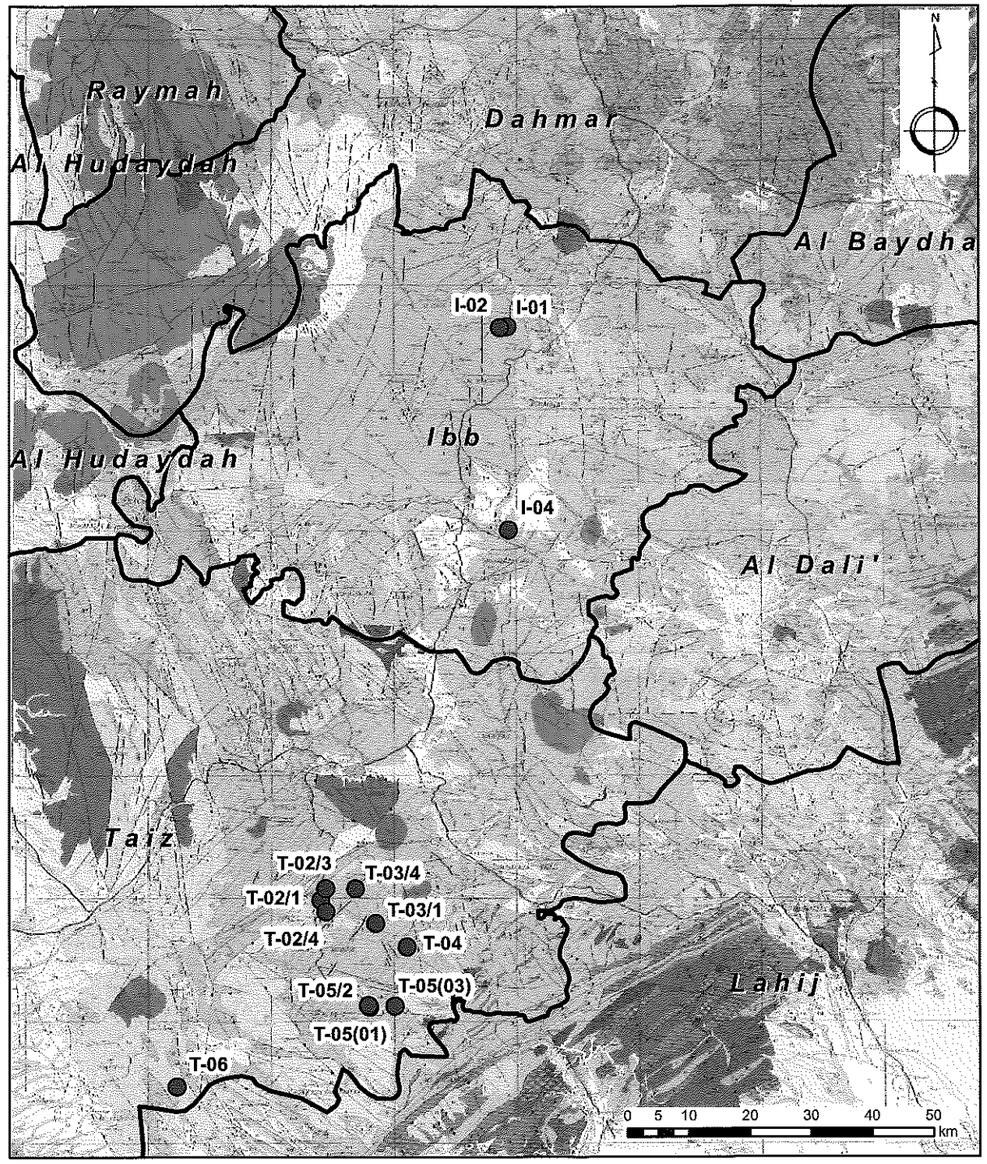
Table 1-8 shows the hydrogeological features of the Project site. Fig. 1-3 is a hydrogeological map of the site and surrounding areas.

Table 1-7 Hydrogeological features of the Project

Stratum	Lithology	Hydrogeological Features	Target site
Quaternary sediments	Alluvium, sand and gravel	Generally unconfined aquifer, with semi-confined aquifer here and there. Originally a high-producing aquifer, but recently a drop in the water level in the alluvial aquifer has been observed. Rainfall has a swift effect on the groundwater levels.	Not applicable
	Gravel on bare rock lowland, gravel plains and alluvial fans		Not applicable
	Loess and old sandhills : Aeolian soil and sand (Generally speaking, the land is fertile)		S-07, S-09
Quaternary volcanic rocks	Trachyte flows and domes	The lithology is similar to the volcanic rocks of the Tertiary Period, but with less weathering and poor porosity. Groundwater offers limited potential and is localized.	S-02, D-07
	Basalt lava		

Tertiary volcanic rocks	Gabbro	(Tertiary period intrusive rock; no groundwater)	Not applicable
	Welded tuff and pyroclastic sediments	Fragmented over a wide area. Groundwater is present in the bedding plains of the pyroclastic sediments and tuff, in the fragmented parts of lava flows and on the boundaries between the lava flows and major fault zones. In the Dhamar region productivity is particularly high. The rhyolite aquifers are particularly productive. Overlays the Tawilah Group.	S-04, D-01, D-02, D-03, D-05, T-02, T-06
	Rhyolite and dacite		Not applicable
	Trachyte		I-04
	Basalt		S-04, S-05, S-09, D-01, D-02, D-05, I-01, I-02, I-04, T-03, T-04, T-05
Tawilah Group	Sandstone with veins of limestone	Fine-grained sandstone of white, yellow and red. In general a productive aquifer, but extremely anisotropic.	A-03
(Mukalla — Hajjah Stratum)			T-05
Amran facies / Nafar and Hajur strata	Bituminous limestone, dolomitic marl and sand	Fragmented zones and inconsistent bedding planes, an aquifer with low productivity.	Not applicable





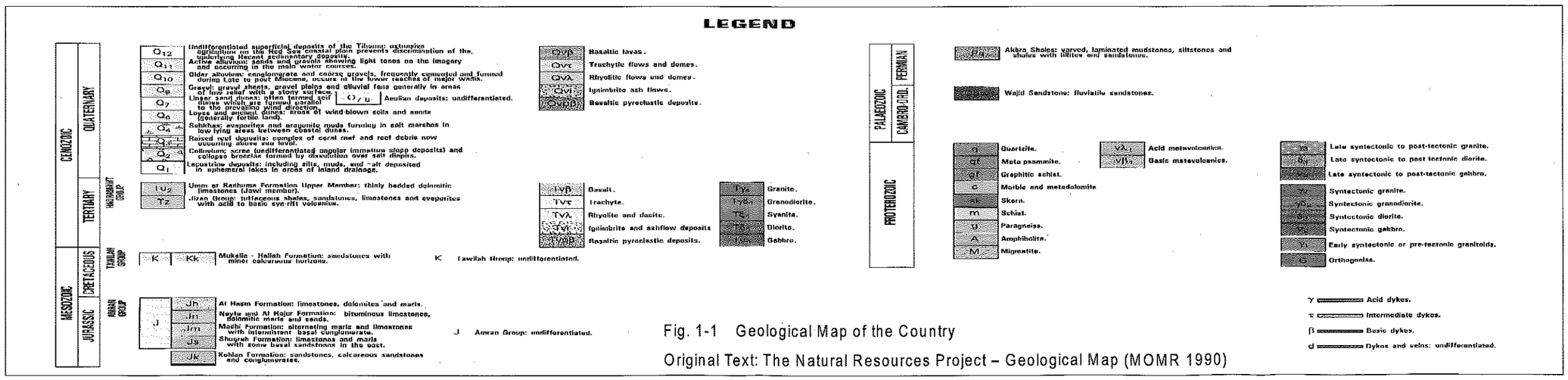
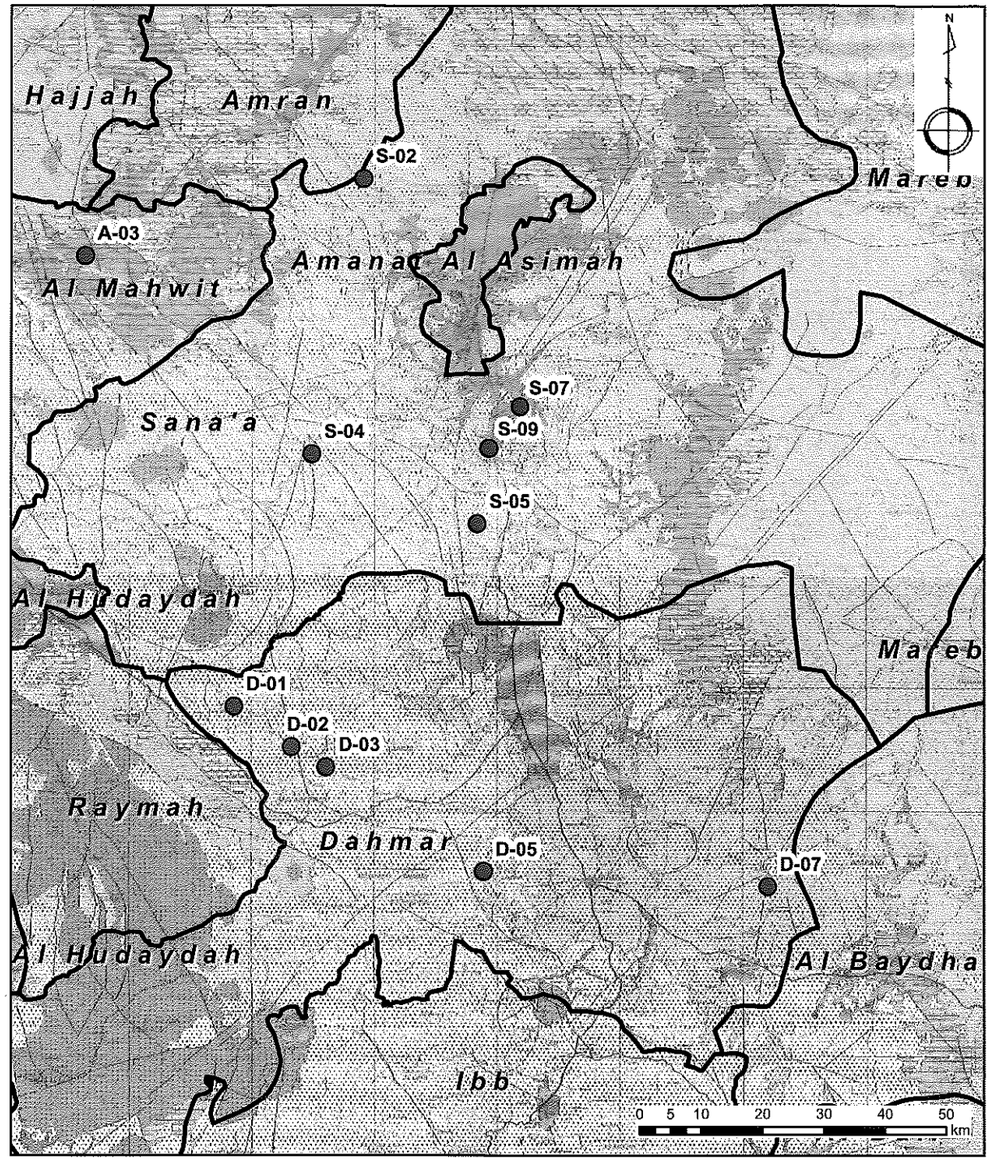
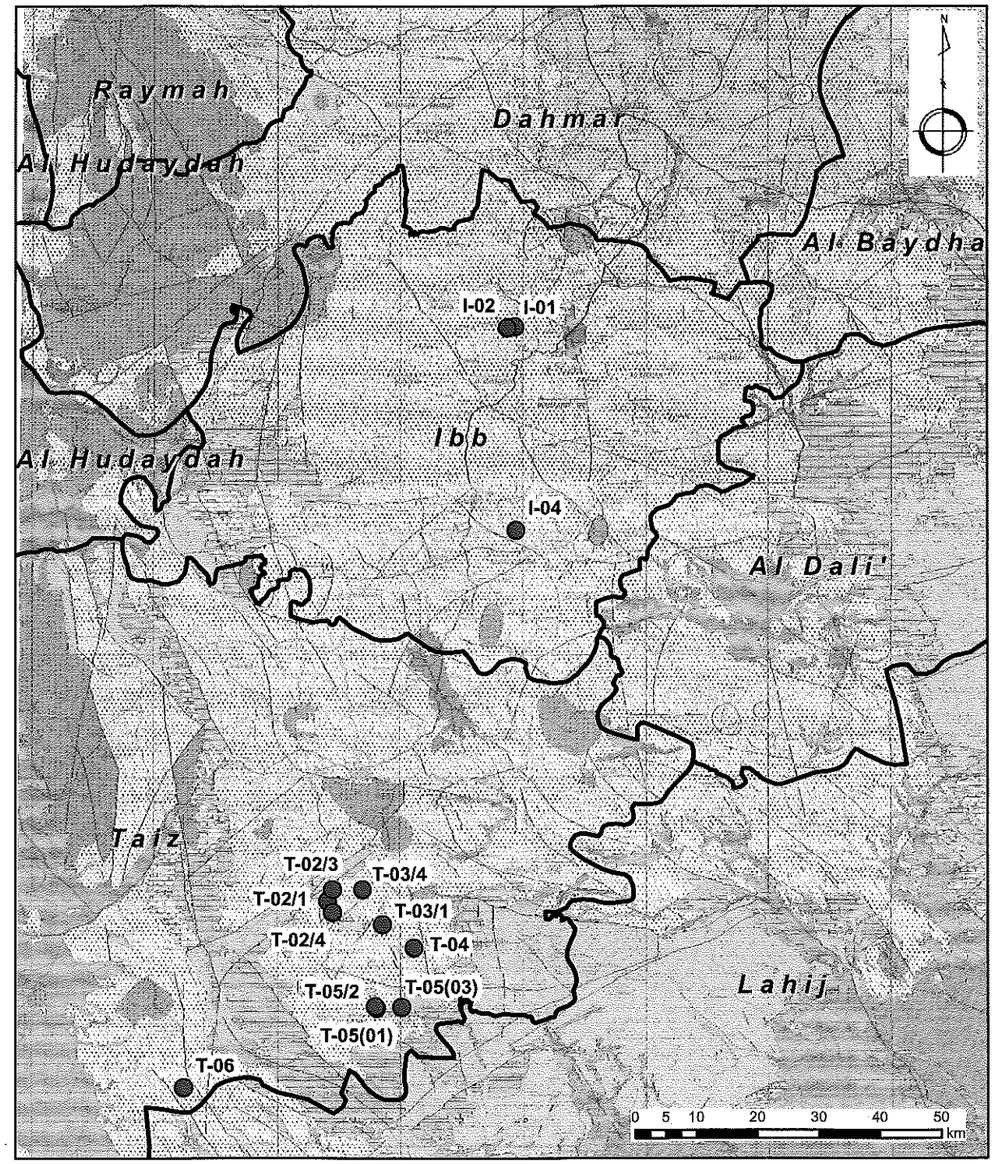


Fig. 1-1 Geological Map of the Country

Original Text: The Natural Resources Project – Geological Map (MOMR 1990)





LEGEND

1. **Aquifers in which intergranular flow is dominant:**
   - a) **Highly productive aquifers**
     - Quaternary alluvial deposits
     - Sabkha
   - b) **Moderately or poorly productive aquifers**
     - Quaternary alluvial deposits
     - Jurassic Kohlan Sandstone
     - Ordovician Wajid Sandstone
2. **Aquifers in which fissure flow is dominant:**
   - a) **Highly productive aquifers**
     - Cretaceous Tawilah Group
   - b) **Moderately or poorly productive aquifers**
     - Tertiary volcanics
     - Upper Jurassic Amran Group
3. **Regions without significant groundwater resources:**
   - a) **Strata with local and limited groundwater resources**
     - Quaternary volcanics
     - Basement Complex
   - b) **Strata with essentially no groundwater resources**
     - Superficial marine and aeolian deposits
     - Miocene Baid Formation
     - Tertiary intrusives
     - Permian Akbra Shales

Fig. 1-2 Hydrogeological Map of the Site and Surrounding Areas

Original Text: The Natural Resources Project – Hydrogeological Map (MOMR 1990)

(3) Groundwater potential

The water source to be used in this Project will be from deepwells constructed by the Yemeni side. In order to assess the groundwater potential of these deepwells, pumping tests were carried out and an assessment was made to determine the groundwater potential by means of an analysis of the water balance from the permeability coefficient, the water level recovery rate and depth of the water table, as well as the ratio of the planned volume of water to be drawn to the estimated recharge volume. The groundwater assessments were classified by level of potential.

(4) Water quality

The water quality standards that GARWSP applies to water supplies follow the WHO's water quality guidelines. The water quality of the water sources to be used for this Project is for the most part good, as the results of the analysis carried out at the time of the development study, listed in the table below, show. The detailed results of the water quality analysis are shown in the attached materials.

Table 1-8 Water quality test results for planned water sources

Governorate	Site code	Name of site	Water source code	Assessment
Al Mahweet	A-03	Ozlat Al Jaradi	A-03	Good
Sana'a	S-02	Jarban	S-02	Good
	S-04	Qamlan-Bait Al Najrani	S-04	Good
	S-05	Afesh	S-05	Good
	S-07	Bait Al Hadrami	S-07	Good
	S-09	Ruhm	S-09	Good
Dahmar	D-01	Elow Al Mikhlaf	D-01	Good
	D-02	Hamal Bait Al Jabar	D-02	Good
	D-03	Hegrat Al A'asham	D-03	Good
	D-05	Mayfa'at Yaer	D-05	Good
	D-07	Al Asakera	D-07	Good
Ibb	I-01	Asfal Bani Saba	I-01	Good
	I-02	Al Sana	I-02	Good
	I-04	Al Jahlah & Al Meshraq	I-04	Good
Taiz	T-02	Bani Al Suror	T-02/1	Good
			T-02/3	Good
			T-02/4	Good
	T-03	Sheb Humran	T-03/1	Good
			T-03/4	Good
	T-04	Yafoq Bani Hamad	T-04	Good
	T-05	Al Azaez	T-05/1	Good
			T-05/2	Good
			T-05/4	Good
	T-06	Al Khunha	T-06	Good

* At the time of the development study it was planned to use T05/1 and T05/4 as water sources, but in this Project these water sources were switched to T-05(01) and T-05(03).

Source: 「Rural Water Supply Component of the Study for Water Resources Management and Rural Water Supply Improvement in the Republic of Yemen」

1-5-2 Climate

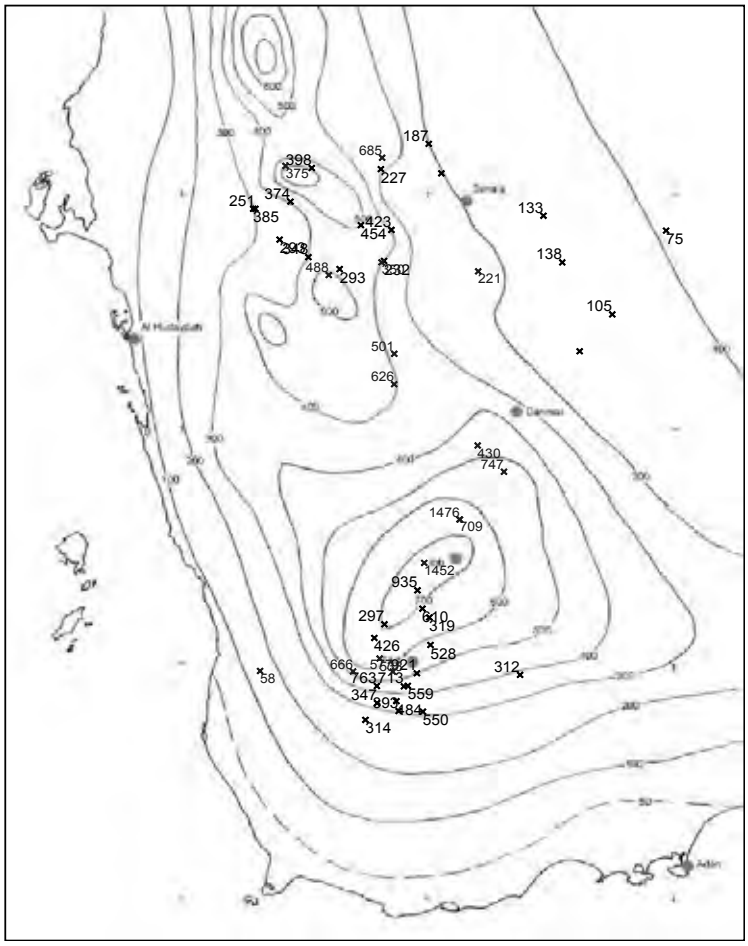
Yemen is located between latitudes 12°30′ north and 17°30′north. This latitude puts it in the tropical to subtropical zone; but most of the area covered by this Project lies in highlands with an altitude of over 2,000m, which makes it cooler and more pleasant than the latitude would suggest. However, the topography changes radically within a narrow strip less than 300km wide east to west, and the climate varies markedly depending on the topography. In general, there are two rainy seasons each year, from March to May and from July to September; the rainy seasons occur when moist air blowing in from the west or southwest of the country hits the central highland zone, causing heavy rainfall.

The coastal plain has a climate that is hot and humid in summer, and mild in winter. In the highlands and mountainous areas the summer is mild; in the winter temperatures are low at night and in the early morning, and mild during the day.

Table 1-9 Climatic features of Yemen

Region	Annual average temperature (^{o}C)	Average annual rainfall (mm/year)	Year-round humidity (%)
Coastal plain	25 - 40	0 – 200	80+
Western Highlands	35 (daytime), 20 (nighttime); can fall below freezing in winter.	100 - 1,000	
Eastern Mountain Region	30 (daytime), 9 (nighttime)	100 – 400	35 – 54
Desert	22 – 28	0 – 200	Approx.15

The isohyets in Fig. 1-4 show that Ibb has the highest level of rainfall, and over the long term Al-Mahweet has the same amount of rainfall as Taiz and Ibb. Nevertheless, the measured average rainfall indicated values that were slightly lower than those on the isohyets chart; this is due to the fact that the average rainfall is changing year on year.



Source : NWRA, TDA, Report WRAY-35 (The water resources of Yemen, 1995)

Fig. 1-3 Isohyets chart of the Project area

1-6 Environmental and social considerations

The result of the Basic Design Study shows that the Project would make some negative impacts following the JICA's guideline of social and environmental considerations. In order to mitigate the impact, the following measure will be taken by the Yemeni side.

(1) Mitigation measures on the environmental and social impact

Table 1-10 Mitigation measures on the environmental and social impact

Item	Mitigation measures
Water rights	Toa void water disputes within the community in the Project sites, GARWSP shall obtain a consent in written form from a community concerning the following matters: - To use a Project deepwell only for the planned water supply facility

	- Not to authorize to develop any new deep wells within the interference area of a Project deep well The consent in written form shall be prepared during Detailed Design Study.
Groundwater	In order to conserve groundwater of the Project sites, GARWSP will instruct a community not to develop any new deepwells within the interference area of the Project deep well, and to operate the pump within the designed discharge rate. When a water supply facility of the Project starts to operate, a water level of the Project deep well shall be monitored by the WUA of the Project site.

(2) Monitoring Plan

The above mentioned mitigation measures shall be monitored as follows:

Table 1-11 Monitoring of environmental and social impacts

Item	Methodology	Frequency
Water rights	A WUA monitors any plans to develop new deep wells within an interference area of a Project deep well and reports to GARWSP(branch).	Monthly
Groundwater	The WUA will measure periodically the water level of the Project deep wells and the result is reported to GARWSP branch office monthly. All the WUAs of the Project sites will receive training to monitor the water levels of the Project deep wells during the construction stage.	Monthly

CHAPTER 2
CONTENTS OF THE PROJECT

CHAPTER 2 CONTENTS OF THE PROJECT

2-1 Basic Concept of the Project

2-1-1 Overall Goal and Project Purpose

Out of the watershed located over 3,000m of elevation, precipitation is scarce, and perennial rivers are rare. In Yemen, water issue has always been on top of the government's agenda, and the Third Poverty Reduction Development Plan (2006 to 2010) which combine the Third Five-Year Plan and Poverty Reduction Strategy Papers (PRSP), continues to underscore rural water supply as one of the priority sectors. Improvement of rural water supply, however, significantly fell behind schedule and the safe water coverage rate in rural areas has reportedly been hovering at a low level of about 45% (average of the country in 2007).

In such a situation, the MWE issued the NWSSIP which aimed at increasing the water coverage in the rural areas to more than 72% in 2015. This Project is one of the part of the NWSSIP, as the GARWSP, the Implementing Agency of the Project, had incorporated into the NWSSIP its development investment program anticipating the implementation of targeted projects including the present one. Accordingly, this Project is regarded as one of targets for the improvement of water sector within the context of the national program.

The Project is aimed at constructing water supply facilities using groundwater as a source, to supply safe water in a sustainable manner to the rural population of 19 sites in 5 Governorates.

2-1-2 Project Summary

To attain the above goal, the Project will construct and rehabilitate water supply facilities in 19 sites of five Governorates. Also, activities concerning operation and maintenance and sanitation promotion to the villagers will be implemented (See table below). The Project will contribute to improving the current conditions of water supply in the Project area through supply of safe and stable water.

① Facilities Construction: New water supply facilities construction (13 sites) and rehabilitation of existing water supply facilities (6 sites) for a total of 19 sites in 5 Governorates (Al-Mahweet, Sana'a, Dhamar, Ibb and Taiz). The Project target sites are listed in the table 1-1.

② Technical Support: Organization of Water User Association and provision of sanitation promotion activities

The initial request included 20 sites in 5 Governorates, but due to the Japan International Cooperation Agency's (JICA) safety regulation, the site of S-11 Al Hesn-Al Abyad (Jehana District, Sana'a Governorate) was removed from the target site.

Taking the aforementioned Project background into account, the indicators and methods to measure and to evaluate the overall goal, the Project objective, outputs, activities and achievement, are presented in the Project Design Matrix(PDM) as shown in table 2-2.

Table 2-1 List of Project Target Sites

	Code	Governorate	Site Name	Population (2006)	Growth Rate (%)	Population (2019)
1	A-03	Al-Mawheet	Ozlat Al Jaradi	20,786	2.87	30,028
2	S-02	Sana'a	Jarban	1,611	2.07	2,103
3	S-04		Qamlan-Bait Al Najrani	629	2.07	821
4	S-05		Afesh	3,680	2.07	4,804
5	S-07		Bait Al Hadrami	2,550	2.07	3,329
6	S-09		Ruhm	4,567	2.07	5,961
7	D-01	Dahmar	Elow Al Mikhlaf	926	3.04	1,367
8	D-02		Hamal-Bait Al Jabar	2,475	3.04	3,654
9	D-03		Hegrat Al A'asham	1,592	3.04	2,350
10	D-05		Mayfa'at Yaer	1,515	3.04	2,237
11	D-07		Al Asakera	1,944	3.04	2,870
12	I-01	Ibb	Asfal Bani Saba	9,311	2.47	12,787
13	I-02		Al Sana	6,026	2.47	8,276
14	I-04		Al Jahlah & Al Meshraq	10,467	2.47	14,375
15	T-02	Taiz	Bani Al Suror	9,385	2.47	12,889
16	T-03		Sheb Humran	23,732	2.47	32,591
17	T-04		Yafoq Bani Hamad	6,844	2.47	9,399
18	T-05		Al Azaez	11,784	2.47	16,183
19	T-06		Al Khunha	1,579	2.47	2,169
Total				121,403	Ave. 2.54	168,193

Table 2-2 LOGICAL FRAMEWORK OF THE PROJECT（Project Design Matrix: PDM）

Project Title: the Project for Rural Water Supply in the Republic of Yemen
Target Area: 19 sites in 5 Governorates (Al-Mahweet, Sana'a, Dahmar, Ibb and Taiz)
Target Group : Residents of the target sites 168,193 persons (2019)
Period：Nov. 2009 – Jan. 2013
Ver. 1.0
Developed on July 2009

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal			
□ Health and Hygiene conditions of the residents in Yemen are improved.	□ Rural water supply coverage rate will increase from 45%(2007) to 72% (2015) □ Rate of occurrence of water borne diseases in target area is decreased.	□ Statistical report □ Statistical report	
Project Purpose			
Safe and sustainable water is supplied to the residents of the Project area.	□ The water coverage rate in the target area will increase from 49%(2008) to 51% at the Project target year (2019). □ The water consumption by the 168,000 inhabitants (in 2019) will be 20 to 40 lit/cap/day, through the facilities constructed under the Project. □ The water quality of the constructed facilities will be within the guidelines of Yemen throughout the year.	□ Monitoring reports of Implementing Agency □ Record of operation and maintenance by the Water User Association □ Interview survey	□ The operation and maintenance structure of the constructed water supply facilities will be maintained by Yemen.
Outputs			
1. Water supply facilities will be constructed in the target sites.	1-1 Till de completion of the Project (in 2013), in all the Project target site, water supply facilities will be constructed or rehabilitated.	□ Completion report	□ Groundwater condition in the target area are not deteriorated more than expected.
Outputs by Software Component Programme			
2. Appropriate operation and maintenance of the water supply facilities will be done by the Water User Association at the target sites,.	2-1 Water User Association will be formed in all sites. 2-2 The operation and maintenance fee will be fully paid by the users. 2-3 All the facilities constructed under the Project, will be operational continuously. 2-4 The water level in the deep well will be monitored and the facility will be operated continuously based on appropriate pumping rate. 2-5 No new deep well will be developed within the interference area of the Project deep well.	□ Registration of Water User Association □ Record of account □ Record of facility operation □ Record of facility operation □ Monitoring report from the Implementing Agency	□ Water quality of its sources is not deteriorated. □ Social and economic conditions around the target group are not deteriorated suddenly.
3. The habit of the residents in the target area will be improved, in terms of hygiene and usage of water.	3-1 All the villagers will not use unsanitary traditional unprotected water sources. 3-2 All the villagers will pay and make use of the water supplied from the constructed facility. 3-3 The number of villagers who applies the knowledge of water source protection, appropriate use of water and habit of washing hand will improve comparing with before the Project implementation.	□ Software component programme reports, monitoring report □ Software component programme reports, monitoring report □ Software component programme reports, monitoring report	

Activities

【Construction of Facility and Procurement of Equipment】

1-1 Construction of new water supply facilities in 13 sites
1-2 Rehabilitation and expansion of existing water supply facilities in 6 sites

【Technical support by the software component programme】

2-1 Formation of water user association and training on strengthening the operation and maintenance skills.
2-2 Activity on sanitation promotion.

Inputs

【Japanese Side】

Personnel;
Basic design study team members, Detail design study team Consultant members, supervision engineer during construction, expert for software component programme, construction company.

Equipments;
Vehicles for construction work, construction equipments, materials

Funds;
General Grant Aid

【Yemeni side】

Personnel;
Counterpart engineer from headquarter,
Counterpart engineer from GARWSP branch,
Social Mobilization Team

Equipment/material;
Secure land for the facility construction
House connection pipeline and water meter
Others necessary items to be adjusted based on the field survey results

Funds;
Local cost
(Access road preparation, land for facility construction, banking commissions)

Precondition

□ Importation and custom clearance procedure will be carried out smoothly.