SUMMARY STAKEHOLDER ANALYSIS

Water Supply and Sanitation Services
ADB TA 7240-UZB

September 2009

ACRONYMS

ADB	Asian Development Bank
AR	Appraisal Report
CIA	Cumulative Impact Assessment
CMU	Contracts Monitoring Unit
DMF	Design and Monitoring Framework
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
ECA	Environmental Consequences Assessment
EMDF	Ethnic Minority Development Framework
EMP	Environmental Management and Monitoring Plan
EMU	Environmental Monitoring Unit
GOU	Government of Uzbekistan
GPS	Global Positioning System
HH's	Households
IA's	Implementation Agencies
IEA	Initial Environmental Assessment
IEE	Initial Environmental Examination
IFI	International Financing Institutions
IPDP	Indigenous Peoples' Development Plan
IRTM	Inter Regional Trunk Main
KPI	Key Performance Indicators
LAR	Land Acquisition and Resettlement
LARF	Land Acquisition and Resettlement Framework
LARP	Land Acquisition and Resettlement Plan
MIS	Management Information System
MOE	Ministry of Economy
MOF	Ministry of Finance
MOU	Memorandum of Understanding
MFF	Multi-Tranche Financing Facility
NRW	Non Revenue Water
O&M	Operation and Maintenance (costs of)
PIU	Program Implementation Unit
PPP	Public Private Partnership
PPTA	Project Preparation Technical Assistance
PPMU	Project Preparation Management Unit
REA	Rapid Environmental Assessment
SCNP	State Committee for Nature Protection
SES	Sanitary and Epidemiological Services
SESU	PPMU's Social and Environment Subunit
SIEE	Summary Initial Environmental Examination
SNIP	Uzbekistan Regulatory Standards
SPRSS	Summary Poverty Reduction and Social Strategy
TA	Technical Assistance
UCSA	Uzbekistan Communal Services Agency
UTS	Urban Type Settlement
WDU	Water Distribution Unit
WHO	World Health Organisation
WSS	Water Supply and Sanitation
WYGI	White Young Green International (PPTA lead company)

Table of Contents

1 Introduction 5
1.1 Stakeholder Analysis Table 5
1.2 Results and conclusion of stakeholder analysis 5
2 Description of the main stakeholder groups 8
2.1 Government Administration and Related Structures 8
2.1.1 Cabinet of Ministers 8
2.1.2 Regional Administration 8
2.1.3 District Administration 8
2.1.4 City Administration 8
2.1.5 Mahalla Committee 8
2.1.6 Street Elders 9
2.1.7 Senior women counsellors / female assistants to women's advisor 9
2.2 Executing agency and related structures 9
2.2.1 Uzbekistan Communal Services Agency (UCSA) 9
2.2.2 Oblast Vodokanal 9
2.2.3 District Centre Vodokanal 9
2.2.4 Directorate of Interregional Trunk Mains – DITM (under UCSA) 10
2.2.5 Program Steering Committee, PMU and PIU's 10
2.3 Government Ministries 11
2.3.1 Ministry of Finance 11
2.3.2 Ministry of Economy 11
2.3.3 Ministry of Labour and Social Security 11
2.3.4 Ministry of Agriculture and Water Resources 11
2.3.5 Ministry of Health 11
2.3.6 Oblast Department of Health and District Department of Health 12
2.3.7 State Sanitary and Epidemiology Inspectorate (SSEI) 12
2.3.8 State Committee on Geological and Mineral Resources (SCGMR) (Goskomgeologiya) 12
2.3.9 Ministry of Public Education (MOPE) 12
2.3.10 Ministry of Higher and Secondary Specialized and Professional Education (MHSSPE) 12
2.3.11 State Committee for Architecture and Construction (SCAC) (Goskomarkhiekstroy) 12
2.3.12 State Committee for Environment and Nature Protection (SCENP) (Goskompriroda) 13
2.3.13 Ministry of Energy (UZBEKENERGO) 13
2.4 Water users 13
2.4.1 Households 13
2.4.2 Private sector enterprises and businesses 13
2.4.3 Local building contractors 13
3 Representatives for public consultation and participation 13
3.1 Public consultation 14
3.2 Sub-project monitoring groups 14
3.3 Types of participation 15
4 Description of NGOs and assessment of their roles 16

4.1 Federation for the Protection of Consumer Rights 16
4.2 Women's Committee of the Republic of Uzbekistan 16
4.3 The Institute for Studies of Civil Society (IIGO) 16
4.4 National Association of NGOs of Uzbekistan (NANNOUZ) 17
4.5 Association of Women's NGOs in Uzbekistan (MEHR) 17
4.6 Business Women's Association (BWA) (Tadbirkor ayol) 17
4.7 Youth Foundation (KAMOLOT) 17
4.8 ECOSAN 17
4.9 The Red Crescent Society 17
4.10 UNICEF 18
5 The role of the local media 18

1 Introduction

An analysis of the stakeholders of the proposed WSSS Improvement Investment Program has identified the individuals, groups and organizations that will be influenced by and affected by the water supply and sanitation services sub-projects.

These stakeholders include:

- government ministries and agencies,
- provincial organizations,
- town residents at household-level
- the private sector.

The analysis reviewed secondary data, household survey data, key informant interview transcripts and focus group reports, identified the stakeholders considered to be the key players and determined their interests in relation to the program. Their capacities and mandates have been analysed and their influence on the viability of the program has been assessed according to whether their level of influence is high, medium or low. The analysis has identified the potential participants and the method of their involvement. Care was taken to ensure that the voice of stakeholders with less influence such as poor households in urban communities was properly represented.

1.1 Stakeholder Analysis Table

The table below illustrates stakeholders included in the design of the Program and the relative importance and influence of each group is assessed. Primary stakeholders are those groups, people and institutions who will be affected either positively (direct beneficiaries) or negatively (those involuntarily resettled). Secondary stakeholders are defined as the important intermediaries involved in Program delivery such as the Government of Uzbekistan and the lender.

1.2 Results and conclusion of stakeholder analysis

In order to ensure that the primary stakeholders (households and the private sector) who are not readily able to influence the effectiveness of the proposed Program, mechanisms for public consultation and community participation have been recommended. The details are given below.

Stakeholder	Primary[1]	Secondary[2]	Stakeholders' interest in the program	Level of influence on proposed Program
Government of Uzbekistan: Inter-ministerial steering committee chaired by the Cabinet of Ministers comprising representatives from UCSA, MOF, MOE, MOH, Ministry of Public Education, State Committee for Nature Protection; State Sanitary and Epidemiological Inspection; State Committee for Geology and Mineral Resources; State Committee for Architecture and Construction; State Inspectorate for Supervision of Safety Implementation of the Works in Industry, Mining and Communal Sectors; Samarkand and Bukhara Oblast governments and other concerned Oblast agencies		♦	Has a strong interest in improving water supply and sanitation services in the country and in reducing poverty Responsible for policy coordination, guidance, review of Program and ensuring that all aspects relevant to achieving Program objectives and for sustaining the improved services to the required level are dealt with at the central and Oblast level and district centre levels through direct communication within the GOU administration, ministries and agencies	High
Asian Development Bank		♦	Strong interest in assisting the Government of Uzbekistan achieve its poverty reduction and development goals	Medium
Executing Agency (EA): UCSA, PMU and PIU's		♦	Strong interest in successfully implementing the WSSS Program Responsible for Program coordination and liaison with ADB and Government ministries The EA has experience and expertise in rehabilitating water systems and sanitation services and is currently implementing similar WSSS programs with ADB in other Oblasts.	High
Oblast and District Centre Vodokanals: Bukhara, Navoi Oblasts and Termez City Vodokanal	♦		Very strong interest in improving the water supply and sanitation services to its clients and in improving its capacities as effective and efficient agencies and service providers through training and increased resources Very strong interest in improving water fee collection and improving financial management skills	High

[1] Primary stakeholders: people, groups and institutions affected positively (beneficiaries) or negatively (involuntarily resettled) by the proposed program
[2] Secondary stakeholders: people, groups and institutions that are important intermediaries in the program delivery process (e.g. ADB, government line agencies, NGOs)

Oblast and targeted district level administrations and makhallas of Bukhara, Navoi, and Termez City	♦		Strong interest in receiving investments in the Oblasts to achieve poverty reduction targets and improve living standards of the local population Responsible for ensuring sustainable management and operation of completed sub-projects. Will have leading roles in the consultation and monitoring of sub-projects	Medium
Households, families, individuals	♦		Very high interest in receiving increased and improved supply of piped water to their homes and in improving their standard of living and quality of life	Low
Construction contractors, local builders		♦	Very high interest in bidding for work and participating in construction and rehabilitation of water supply networks and wastewater treatment facility (Termez)	Low
Local technicians / plumbers	♦		Very high interest in increased work opportunities related to the installation of water meters and household water pipeline repairs	Low
Unemployed people	♦		Very interested in taking advantage of increased job opportunities related to construction work in sub-projects	Low
Affected persons and families	♦		Very high interest among persons and families affected by the sub-projects for adequate and fair compensation from GOU related to temporary impact and/or for loss of assets related to construction work	Low
School, hospitals	♦		Very high interest among public institutions to receive adequate water supply and sanitation services to improve the quality of service to school students and hospital patients and to conform to norms and standards for operations	Low
Private enterprises	♦		Very high interest among private enterprises which depend on a reliable supply of good quality water in order to operate their businesses, such as those involved in catering, baking, food processing, public baths, hairdressing etc.	Low

2 Description of the main stakeholder groups

The following section describes the mandates and roles of the main stakeholders of the proposed Program.

2.1 Government Administration and Related Structures

2.1.1 Cabinet of Ministers

The Cabinet of Ministers plays a major role in the program and is responsible for the approval of relevant documents, for negotiations with the ADB and for the supervision of UCSA and partner agencies of the Oblast administrations. Its mandate includes the development of regional economies and the improvement of living standards, which this Program will support. It is the executive body of the Government of Uzbekistan and has the overall responsibility for monitoring the effectiveness of the economy and social spheres, including communal services and it controls the activities of all ministries, government and semi-government organizations including UCSA.

2.1.2 Regional Administration

Each Oblast is headed by a governor (Khokim) who represents the Government at the Oblast level. The Khokim is appointed or dismissed by the President of Uzbekistan and confirmed by the Counsel of Peoples' Deputies of the respective Oblast. The executive body at the regional level is the Oblast Hokimiyats comprising the Hokimiyat apparatus and ministry line departments. The Hokimiyat structure includes the Khokim and four deputies: Agriculture and Water Resources; Construction, Communication and Communal Services; Economy and Social Issues; and Women. Usually the first deputy Khokim represents the main economic sector / activity of the Oblast.

2.1.3 District Administration

The district Hokimiyat is headed by a Khokim who reports to the Oblast Hokimiyat. The Hokimiyat has a leading role in the public administration of the country. Approval, support and participation of the district Hokimiyat is important for every development activity in the respective rayon. The rayon Hokimiyat is appointed and dismissed by the Oblast Khokim and confirmed formally by the appropriate Council of Peoples' Deputies. The apparatus structure of each district consists of district Khokim, 3 deputy Khokims (economic issues, spirituality and enlightenment and women's issues); the main specialists, organizational and control group and chancellery. All of the target district Hokimiyats fully cooperate and extend their full support to the proposed Program.

2.1.4 City Administration

The role of the city Hokimiyat is the public administration body in the country with a role similar to the role of the rayon Hokimiyat, to which the city Hokimiyat is subordinated. The head of the city Hokimiyat is the Khokim who is the highest official on the territory. City Hokimiyats usually include several urban makhallas.

2.1.5 Mahalla Committee

The mahalla committee is the lowest organ of local self-government and the one linked directly to households. The committee is made up of four members: the chairperson who is elected by the mahalla households for 2.5 years, the secretary who is selected by the chairperson, the 'posbon' who is responsible for security and is appointed by the district Department of the Interior, and the women's advisor who is nominated by the District Women's Committee. The mahalla committee is directly accountable to the district Hokimiyat. In urban-type settlements, the mahalla committee is supported by volunteers who have been selected by the local people jointly with the mahalla committee. In each mahalla committee, several sub-committees may be established to support the work of the mahalla committee, such as for youth, crime prevention, municipal / land improvement etc. In practice, committees are established based on the actual needs and priorities of the respective mahalla and usually deal with the resolution of family conflict, pension distribution, resolving women's issues,

organizing weddings, funerals and other social events. The mahalla committees that were contacted during the Program preparation activities and data collection expressed their interest and full cooperation in the proposed Program.

2.1.6 Street Elders

The street elder / head is a respected person who lives on one of the streets in the neighbourhood. She/he organizes the traditional events. These people know all the families on the territory and are able to provide valuable support for example in identifying households who could be in difficulty for the payment of water bills. The can also play a useful role in organizing meetings, disseminating information about the sub-project and can support trainers involved in the sanitation promotion program. The street elders that were contacted by the social survey teams expressed their full cooperation in the proposed sub-projects.

2.1.7 Senior women counsellors / female assistants to women's advisor

Senior women counsellors are selected by the households of the territory together with the mahalla committee from those local women who are the most respected, active and educated. They act as a link between the women of the neighbourhood and the mahalla committee / women's advisor. They focus on solving issues concerning women, children and vulnerable people, organizing traditional events, supervision of children and participating in the distribution of social support. They are also involved in informing women about official notices and information. The female counsellors that were met by the social development team expressed interest in the proposed sub-projects and their willingness to cooperate. During implementation of the sub-project, these women could play a major role in the different components and activities, particularly in disseminating information.

2.2 Executing agency and related structures

2.2.1 Uzbekistan Communal Services Agency (UCSA)

UCSA emerged from the dismantling of the former Ministry of Communal Services and has the overall task of improving water supply services in the country. Its main goal is to set up financially viable urban and district water supply and communal services. The Cabinet of Ministers nominates UCSA's Director General and the First Deputy Director General. UCSA's main tasks include providing regulatory advice to support reforms in the communal services sector; monitoring the compliance of local authorities and commercial entities with sector policies, and attracting foreign investment into the water supply and sanitation sector. UCSA, as the executing agency of the Program, is a key stakeholder and has a primary interest as a specialized Government authority responsible for the development and implementation of the water supply policy. The role of UCSA will be a leading one in planning, implementation and monitoring of the Program at all stages.

2.2.2 Oblast Vodokanal

The Vodokanals are the service provider for drinking water responsible for the construction, operation and maintenance of the water supply to ensure an uninterrupted supply of clean water to clients in the Oblast. The Oblast Vodokanal coordinates and monitors the activities of the district Vodokanals within the Oblast. The district Vodokanals report to the Oblast Vodokanals and submit periodic financial and operational reports such as income statements, cash flow, balance sheet as well as production and consumption data. The Oblast Vodokanal consolidates these reports for submission to the Oblast Hokimiyat.

2.2.3 District Centre Vodokanal

The district centre Vodokanal operates and maintains the water supply system in the district centres and the adjacent settlements. Its activities are coordinated by the Oblast Vodokanal. The district centre Vodokanal submits monthly and annual reports to the Oblast Vodokanal. The district centre Vodokanal is fully responsible for the provision of clean drinking water to all clients on its territory. It is also responsible for addressing and responding to issues raised by clients and their representatives and has the right to collect water fees for providing water as per contracts with its clients. Activities

include the operation of the water supply systems and the maintenance of the water pipe connections. They must also resolve situations of conflict regarding water supply and payments. They are the most interested stakeholders in the Program and play a key role in achieving its results and outcomes.

2.2.4 Directorate of Interregional Trunk Mains – DITM (under UCSA)

The responsibility for construction, operation and maintenance of interregional water transmission pipelines lies with the Directorate of Interregional Trunk Mains. These mains distribute water to urban centres, which are responsible for operating the local distribution networks. The DITM has also established regional water supply systems, which distribute water and collect fees from clients.

2.2.5 Program Steering Committee, Project Management Unit and Project implementation Units

UCSA will be the executing agency of the Program with overall responsibility for coordination, implementation and liaison with the ADB and with government ministries and departments. It is directly responsible for the planning, design, development and rehabilitation of water supply systems under the Program. UCSA is headed by a Director General who is assisted by two deputies and 65 professional management and technical staff. Currently UCSA is the executing agency for other similar ADB-supported projects. The existing PMU for ADB-projects will be responsible for the implementation of the WSSS Program. It will manage and coordinate the work of the PIUs in Bukhara and Navoi Oblasts.

Policy coordination and guidance for the Program will be carried out by an inter-ministerial steering committee (PSC) which will be chaired by the Cabinet of Ministers. The PSC will review reports submitted by the PMU and will provide guidance and instructions as necessary to the PMU and PIU's and will comprise representatives from:

- UCSA,
- the Ministry of Finance,
- the Ministry of Economy,
- Ministry of Agriculture and Water Resources,
- Ministry of Health,
- Ministry of Public Education,
- State Committee for Nature Protection,
- State Sanitary and Epidemiological Inspection,
- State Committee for Geology and Mineral Resources,
- State Committee for Architecture and Construction, State Inspectorate for Supervision of Safety Implementation of the Works in Industry, Mining and Communal Sectors,
- Bukhara and Navoi Oblast governments and other related agencies.

The PMU will coordinate the implementation of the Program including procurement of goods, works and services and the awarding of contracts in coordination with the PIUs at the two Oblast centres. The PMU will recruit consultant staff in the fields of sub-project implementation, engineering, financial management, procurement, community participation and capacity building. The PIUs will coordinate and manage all activities for program implementation and will report directly to the PMU.

Under the guidance of the PMU, the PIUs will be responsible for all aspects of sub-project implementation and will coordinate closely with the technical departments concerned and agencies at the Oblast level. The PIUs will initiate and coordinate key implementation activities including community consultations, sub-project review, preparation of detailed designs, tender documents, construction supervision, monitoring and quality control, maintenance of project accounts and clearance for environmental examinations.

Each PIU will be supported by teams of design specialists recruited for the preparation of design and tender documents and supervision of construction activities. Each PIU will have staff members responsible for project implementation to be recruited as consultants in the field of engineering, construction supervision, accounting and community development. The Government will also provide

adequate technical staff in consultation with ADB and as needed by the PIUs to assist in the implementation of the sub-projects.

2.3 Government Ministries

2.3.1 Ministry of Finance

The Ministry of Finance is under the supervision of the Cabinet of Ministers and approves the tariffs for communal services including water supply. There are several areas of interest for the MOF in the program including facilitating regional development through new investments, setting up tariffs at cost-recovery levels and supporting a transparent and accountable system of financial management. The MOF will be responsible for the repayment of the ADB Multi-tranche Financing Facility (MFF) including coordinating its processing.

2.3.2 Ministry of Economy

The Ministry of the Economy is under the supervision of the Cabinet of Ministers and coordinates the activities of national ministries, state organizations and local government authorities in the fields of information production and statistical data, identifying the socioeconomic development goals of the country and regulating the economy. The MOE will play a major role in coordinating Program activities, particularly monitoring, and making recommendations regarding the effective utilization of the MFF. The Program cannot be launched without the approval of the Ministry of Economy.

2.3.3 Ministry of Labour and Social Security

The main tasks of the MLSS are:

- to establish and implement a single social policy dedicated to maintaining stable and progressive improvements in the material welfare of the people,
- strengthening social protection in the context of further liberalization of the economy,
- undertaking effective policies for the formation of the labour market and for maintaining full employment especially for youth,
- drawing up measures for regulating labour relations,
- implementing activities for the maintenance of social security for pensioners, the disabled, large families and poor families,
- organizing and administering social guarantees such as providing medical – social services to the disabled.

The possible interest of the MLSS in the Program concerns the creation of additional non-skilled work opportunities for local people. The MLSS could also participate in discussions concerning the planning of social benefits for socially vulnerable groups and particularly in discussions concerning water tariffs for vulnerable groups.

2.3.4 Ministry of Agriculture and Water Resources

MAWR is responsible for implementing agricultural policy in the country and for the country's surface water. Its aim is to introduce modern systems of farming, water usage and agro-technology. MAWR's interest in the Program could be in the context of interacting with Vodokanals on the usage of water resources for drinking purposes.

2.3.5 Ministry of Health

MOH is under the supervision of the Cabinet of Ministers and is responsible for implementing government policy related to improving the health of the population and the development of sanitation norms and rules as well as the monitoring of controls. MOH is one of the major stakeholders of the Program and it could play an important role at local levels in developing and implementing the proposed Sanitation and Hygiene Promotion Program to reduce the incidence of water-borne disease especially in children.

2.3.6 Oblast Department of Health and District Department of Health

These departments control and manage the activities of local medical institutions and facilities and provide information and support on health, hygiene and sanitation. They are important Program stakeholders as they control the quality of water and the incidence of epidemics on the territory.

2.3.7 State Sanitary and Epidemiology Inspectorate (SSEI)

The SSEI is chaired by the chief state Sanitary Doctor who is equivalent to a Deputy Minister of Health. The SSEI provides the procedural guidelines and supervision of the Sanitary Epidemiological Stations. The SSEI undertakes sanitary inspections on behalf of the Government to ensure compliance with norms and standards for sanitary and hygiene rules. It has the right to inspect all institutions, organizations and private businesses. The SSEI is responsible for the implementation of sanitary and epidemiological measures and sanitary controls including control of drinking water supplies.

2.3.8 State Committee on Geological and Mineral Resources (SCGMR) (Goskomgeologiya)

SCGMR is a special government body responsible for underground water and is under the supervision of the Cabinet of Ministers. It participates in the environmental assessment of sites under construction and the rehabilitation of large industrial and agricultural facilities. The SCGMR organizes the regional chain of surveys necessary for the exploration of underground water.

2.3.9 Ministry of Public Education (MOPE)

MOPE is responsible for formulating the country's education policy and for the management of public education in the country. MOPE could have an important role to play in the development and implementation of the proposed Sanitation and Hygiene Promotion Program and in disseminating information to schools and the public. The Program also envisages the introduction of improved latrines in secondary schools, which has a direct link with MOPE. MOPE could also introduce courses in schools dealing with water conservation and hygiene education.

2.3.10 Ministry of Higher and Secondary Specialized and Professional Education (MHSSPE)

The role and interests of MHSSPE are similar to those of MOPE. MHSSPE is responsible for formulating state policy in the field of higher and middle-level specialised education in the context of the current socioeconomic climate. This includes developing and increasing the efficiency of scientific research and training specialists to meet international requirements.

2.3.11 State Committee for Architecture and Construction (SCAC) (Goskomarkhiekstroy)

The main objectives of SCAC are:

- to implement state policy in the sphere of urban planning and development,
- to enforce the law, norms and standards of urban planning in the planning and building of towns and rural settlements,
- to enforce the procedures for organizing tenders, to develop and implement a system of performance indicators,
- to monitor the execution of contractual obligations assumed in competitive tendering and
- to monitor the execution of contractual obligations assumed in competitive tendering as well as overseeing the quality and deadlines of construction works.

2.3.12 State Committee for Environment and Nature Protection (SCENP) (Goskompriroda)

The State Committee for Environment and Nature Protection is under the supervision of Oliy Majlis (Parliament) and is responsible for carrying out government policy on environmental management and inspection for the protection of the environment and the use of natural resources. SCENP is responsible for developing and implementing the state policy on nature protection and the protection of resources. It undertakes environmental assessments for every project and is responsible for ensuring the compliance of sub-projects with national environmental standards. SCENP is also responsible for monitoring the execution of the five-year development plans on nature protection as well as assessing the impact on the environment during the implementation of sub-projects.

2.3.13 Ministry of Energy (UZBEKENERGO)

The power industry of Uzbekistan operates within the framework of the State Joint Stock Company 'Uzbekenergo' that was established as an open joint stock company (including coal industry enterprises) in 2001. The company supplies energy to the national economy and the population and sells thermal energy to industrial and domestic consumers in cities throughout the country. Uzbekenergo's primary interest is in the provision of a reliable supply of electrical power for pumping stations and other water supply facilities.

2.4 Water users

2.4.1 Households

Households in the target areas currently need to supplement the water that they receive from the water mains, with water that is mainly collected by women and children from standpipes and other sources elsewhere in the town. They economize on water consumption to save water and to reduce costs. They will therefore benefit from an improved water supply and their workload will be reduced. The rights and responsibilities of households regarding the water metering, tariffs and services will be stipulated in their contracts with the Vodokanals.

Survey findings have shown that hospitals and schools in the target areas currently do not have adequate supplies of water. The patients and staff of hospitals and clinics, and the teachers, staff and pupils of schools, kindergartens and colleges will directly benefit from an increased supply of water. Schools in particular will then be able to promote hygiene education messages to their pupils and to the wider community.

2.4.2 Private sector enterprises and businesses

In all the sub-project towns, there are a range of privately owned businesses that rely on a regular supply of good quality water for their activities and products. These include caterers, cafes, bakeries, and confectioners, as well as public bathhouses, barbers shops, hairdressers, dentists, etc. The private sector will be positively impacted by the Program and improved water supplies will directly contribute to the growth and improved profitability of these businesses.

2.4.3 Local building contractors

There are significant numbers of local people in sub-project towns who are vocationally trained as builders, electricians and mechanics. The sub-projects could provide them with job opportunities in the future for maintenance and local repair work to the water supply network at mahalla-level.

3 Representatives for public consultation and participation

During the implementation of the Investment Program's activities, different types of stakeholder participation will take place. These will include information sharing, consultation and feedback from

stakeholders, collaborative decision-making and empowerment of beneficiaries through shared development decisions.

3.1 Public consultation

Consultations will involve representatives from households, institutions (schools, clinics, local businesses and enterprises), the Vodokanal as well as other stakeholders from government organizations and from the private sector. The media (local TV, press and radio) can play a valuable role in disseminating information and communicating feedback in a timely way.

The stakeholders listed below will be able to participate in public consultations dealing with planning, design and implementation of the sub-project; in addition, they will be able to discuss improvements in the provision of water services, water tariffs and environmental protection:

Stakeholder	Representative
Government and community representatives	Hokimiyat Deputies responsible for construction at Oblast and district centre levels
	Hokimiyat Deputies for Women's Affairs at Oblast and district centre levels
	Oblast and district centre level Vodokanal specialists
	Department for Environmental Protection
	Oblast and district centre level Ministry of Health
	Oblast and district centre level Department of Education
	Oblast and district centre level Sanitary and Epidemiological Service (SES)
	Chairmen and 'maslakhatchi' of Mahalla committees
Private sector and NGOs	Oblast and district centre level women's committee representatives
	Oblast and district centre Chamber of Commerce and Industries representatives
	Oblast and district centre level Federation for Consumers' Rights Protection representatives
	Oblast and district centre level KAMOLOT representatives
	Oblast and district centre level ECOSAN representatives
	Oblast and district centre level Red Crescent Society representatives

3.2 Sub-project monitoring groups

Sub-project monitoring groups will be established at Oblast, district centre and mahalla level in those localities where a sub-project will be implemented. These groups will play a leading role in the

participation process and will monitor progress and facilitate the resolution of problems and issues as they arise during planning, implementation and after completion of sub-project infrastructure.

At local level, monitoring groups will be made up of the chairperson of the mahalla committee, the mahalla advisor, neighbourhood and condominium representatives and local school and health representatives. Problems that cannot be resolved locally will be raised at either district or Oblast level. At Oblast level, the Deputy Khokim for construction to be responsible for the infrastructural activities of the sub-projects, and the Deputy Khokim for Women's Affairs to be responsible for consultation and participation activities. Other group members will include a representative from the PIU, representatives from relevant line ministries and from the private sector and civil society (Federation for the Protection of Consumers' rights), NGOs women's groups and others. This structure will be replicated at district centre level.

3.3 Types of participation

The consultations will improve the access to decision-making about the local water supply; increase participation in the planning, implementation and monitoring of drinking water supply, increase the level of monitoring of O&M of the water supply systems and increase the capacity and competence of consumers to address and take up issues related to local water supply. The following table indicates the type of participation activity in which each stakeholder groups will be involved:

Stakeholder	Activity
Customers & consumers (households, schools, hospitals, enterprises etc)	This group of stakeholders will be kept informed about the progress in implementation of the sub-project. Representatives will participate in local monitoring groups The stakeholders will be kept informed of progress in the activities of the Sanitation and Hygiene Promotion Program, targeting schools and the wider community. There will be awareness-raising activities amongst consumers of the rights and responsibilities of consumer contracts with the service provider Contact details of local technicians and plumbers who are able to carry out domestic repairs will be distributed.
Vodokanal / local contractors / plumbers	Will be involved in raising awareness of clients' needs and rights Will be kept informed about the progress of sub-project implementation and progress of the Sanitation and Hygiene Promotion Program Will receive capacity building training relating to the changing role of service providers, respect for clients and customers, responding to complaints, how to provide key messages to clients on the maintenance of the system and water conservation Will prepare a database of local plumbers available to provide services and undertake minor repairs at the local level
Local leaders and sub-project monitoring groups	Will be kept informed about the progress of implementation of the sub-project and Sanitation and Hygiene Promotion Program Will participate in the sub-project monitoring group at rayon and mahalla levels Will facilitate dialogue between stakeholders and facilitate implementation Will facilitate the resolution of conflicts between clients and service providers
Local trainers / disseminators	Will facilitate the implementation of communication, participation, information and education activities Will monitor changes in attitudes and practices of stakeholders

	Will implement information, dissemination and awareness raising activities in the sub-projects

4 Description of NGOs and assessment of their roles

The following section assesses the roles of national and international non-governmental organizations and other civil society groups to determine the extent to which they could be involved in the design and implementation of the Program. They are interest groups that are able to promote the requirements of the beneficiaries.

4.1 Federation for the Protection of Consumer Rights

The Federation for the Protection of Consumer Rights has 200 societies / associations and over 300,000 members. Their aim is to increase awareness of consumers' rights. Their main activities include defending consumers' rights, monitoring the quality of services and goods to consumers such as those related to condominiums, water, heat and electricity supply. In addition, they have developed a system for consumer education via 14 hours of classes in the school program, and making recommendations to the Government with regard to improving health services.

The Federation has its head office in Tashkent and the regional Association of the Societies for the Protection of Consumer Rights at Oblast level. At district level, there are societies for the Protection of Consumers' Rights as well as Trust Centres. The staff of the Society at the district level includes the chairperson, specialist, lawyer and accountant, supported by a team of volunteers that ranges from 11 to 86 people. The Federation has experience in defending consumers' rights in communal services including water supply and could be a useful partner in the Program.

4.2 Women's Committee of the Republic of Uzbekistan

The Women's Committee of Uzbekistan was founded in 1991 and is registered as a non-governmental or 'social' organization. It is subsidized by the Government and acts as a government agency for women-related issues and policies. It is chaired by the Deputy Prime Minister for Women's Issues. The Committee has branches at Oblast, district and town levels. The deputy Khokims for women's issues at regional and district level act as chairs of the women's committees at their respective levels.

Its mandate includes developing and implementing national policies in the sphere of social and legal protection of women and the application of measures to protect women's health and improve women's employment and work and study conditions, particularly for entrepreneurial activities in rural areas. In makhallas with more than 500 households, there is a salaried 'maslakhatchi' who is a female member of the mahalla committee and who reports regularly to the district deputy Khokim on women's issues.

She has a direct link with the households in her mahalla through regular contacts with the 'kutcha kayvonas' i.e. the street level women's advisors. With its mandate and extensive network at household level, the Women's Committee is an important partner for the Program and will be able to support activities and cooperate with the implementers particularly for disseminating information and raising awareness of the sub-projects amongst households.

4.3 The Institute for Studies of Civil Society (IIGO)

The Institute is a non-governmental and non-profit organization established in 2003. It has branches in the Oblasts and the salaries of the Institute staff are paid for by the Government. The Institute's mandate is to undertake applied research on social, humanitarian and economic aspects of society. It provides consultancy and advisory services to support the establishment and development of civil society institutions, to improve the rights and roles of civil society, and to strengthen the process of democratization. The main areas of its activities include analysing the problems of young people, promoting freedom of speech and political and civil freedom, as well as issues related to the

parliamentary electoral system and the functioning of NGOs. The Institute could play an active role in sub-project activities by collaborating in participatory monitoring activities and liaising with the local media to raise awareness- and disseminate information.

4.4 National Association of NGOs of Uzbekistan (NANNOUZ)

NANNOUZ was created in 2005 and its mandate is to improve the role of non-profit organizations in the process of democratization by raising the level of participation of citizens in building civil society. An NGO support fund has been established to provide financial support to new and existing sustainable civil society institutions. NANNOUZ has 200 members made up of NGOs in Uzbekistan and through the participation of its members at local level could play a role in the sub-project activities.

4.5 Association of Women's NGOs in Uzbekistan (MEHR)

MEHR is an umbrella organization for women's NGOs, created in 2003. The founder members include the Association of Women Lawyers, the Association of Business Women and the Association of Women Scientists. Its main office is in Tashkent, the 45 staff are volunteers and it has assisted in the creation of several women's NGOs. Its main activities include cooperating with and assisting national non-governmental and state organizations concerned with protecting the interests and rights of women, exchanging information and networking. It has implemented training of women leaders, in business promotion and in training Oblast level maslakhatchi. It could play a role in the Program by building the capacity of local women to monitor sub-project impacts.

4.6 Business Women's Association (BWA) (Tadbirkor ayol)

There are BWA offices at Oblast level and their main activities are to provide training for unemployed women and women entrepreneurs. BWA cooperates with the World Bank and with UNDP on poverty reduction activities by providing training and access to microcredit. Their main strength is in capacity building and they could potentially assist in training community facilitators in raising awareness of gender sensitivity.

4.7 Youth Foundation (KAMOLOT)

The National Movement of Uzbek Youth 'Youth League KAMOLOT' was registered as a public association in May 2001 and membership is voluntary. The main aims are the development and integration of youth in civil society activities, the protection of youths' rights and assistance to talented youths in education and employment. The KAMOLOT network is nationwide at national, Oblast, rayon and mahalla levels and there are KAMOLOT representatives in universities, schools, public organizations and larger enterprises. KAMOLOT could potentially have a role to play in the Program by assisting with various education and information campaigns related to the sub-projects.

4.8 ECOSAN

The International Organization of Ecology and Health was established in 1992 as a non-commercial, non-governmental organization whose main purpose is to unite the efforts of governmental, non-governmental and international organizations in addressing pressing ecological problems. ECOSAN has representative offices in cities nationwide and in district Hokimiyats. It is currently involved in issues related to drinking water at Oblast level and could make a valuable contribution during the planning and implementation of sub-projects as well as after sub-project completion.

4.9 The Red Crescent Society

The Red Crescent Society of Uzbekistan is a humanitarian organization, which has several branches throughout the country and 42,000 volunteers and 200,000 staff in partner organizations such as makhallas, schools and large enterprises. The Red Crescent Society is potentially an important partner particularly for raising awareness and for education in water use, hygiene and sanitation as part of Program activities.

4.10 UNICEF

UNICEF has been involved in educational programmes and technical assistance activities in the country together with the World Bank and ADB since 2000. They have addressed the problem of poor water quality and poor environmental sanitation and have encouraged the adoption of better hygiene practices by the beneficiaries. Water conservation, a cleaner environment and the proper use and maintenance of water systems are the messages used for mobilizing communities and schools in particular into adopting safer sanitation and hygiene practices. UNICEF would be an ideal partner for support to the proposed Sanitation and Hygiene Promotion Program.

5 The role of the local media

Local press and TV media in Bukhara and Navoi Oblasts could play a useful role in the Program by raising the awareness of activities amongst the public, and by reporting and monitoring the progress of the implementation of a sub-project.

Additional issues that could be covered by local media include reporting on the current levels of satisfaction amongst the public with water supply services, water rates, water metering as well as any feedback from customers regarding the sub-project interventions.

Through items on TV news, talk shows and question & answer sessions, information about the sub-projects could be disseminated on a regular basis, and the issues arising during implementation and after sub-project completion could be analysed.

Republic of Uzbekistan

Uzbek Agency "UZKOMMUNHIZMAT"

ADB TA 7240: Water Supply and Sanitation Services Improvement Program (WSSSIP)

Wastewater Management Appraisal Report

Sub Project 04

Termez City

August 2009

Acronyms

AC	Asbestos Cement (pipe)	MIS	Management Information System
ACS	Automatic Control System	MOE	Ministry of Economy
ADB	Asian Development Bank	MOF	Ministry of Finance
AR	Appraisal Report	MOU	Memorandum of Understanding
BCR	Benefit-Cost Ratio	MFF	Multi-Tranche Financing Facility
bgl	Below Ground Level	NFS	National Feasibility Studies
CIA	Cumulative Impact Assessment	NPSH	Net Pressure Suction Head
BOD	Biochemical Oxygen Demand	NRW	Non Revenue Water
CMU	Contracts Monitoring Unit	OM	Operations Manual
COD	Chemical Oxygen Demand	O&M	Operation and Maintenance (costs of)
DMF	Design and Monitoring Framework	PIU	Program Implementation Unit
EA	Executing Agency	PFR	Periodic Financing Request
EARF	Environmental Assessment and Review Framework	PPP	Public Private Partnership
ECA	Environmental Consequences Assessment	PPTA	Project Preparation Technical Assistance
EIRR	Economic Internal Rate Of Return	PPMU	Project Preparation Management Unit
EMDF	Ethnic Minority Development Framework	PVC	Polyvinylchloride
EMP	Environmental Management and Monitoring Plan	REA	Rapid Environmental Assessment
EMU	Environmental Monitoring Unit	RRP	Report and Recommendation to the President
ENPV	Economic Net Present Value	SCNP	State Committee for Nature Protection
EOCC	Economic Opportunity Cost of Capital	SERF	Shadow Exchange Rate Factor
FIRR	Financial Internal Rate of Return	SES	Sanitary and Epidemiological Services
FNPV	Financial Net Present Value	SESU	PPMU's Social and Environment Subunit
FMAQ	Financial Management Assessment Questionnaire	SIEE	Summary Initial Environmental Examination
FMICRA	Financial Management Internal Control and Risk Assessment	SNIP	Uzbekistan Regulatory Standards
GOU	Government of Uzbekistan	SNPC	State Nature Protection Committee
GPS	Global Positioning System	SOE	Statement of Expenditure
Haz-Mat	Hazardous Material	SPRSS	Summary Poverty Reduction and Social Strategy
HDPE	High-Density Polyethylene	STP	Simplified Technical Proposal
HH's	Households	SWRF	Shadow Wage Rate Factor (unskilled labour)
IA's	Implementation Agencies	TA	Technical Assistance
IEA	Initial Environmental Assessment	TDS	Total Dissolved Solids
IEE	Initial Environmental Examination	UCSA	Uzbekistan Communal Services Agency
IFI	International Financing Institutions	UTS	Urban Type Settlement
IKS	ISLOHOTKONSALTSERVIS (responsible for the completion of the NFS)	WACC	Weighted Average Cost of Capital
IPDP	Indigenous Peoples' Development Plan	WDU	Water Distribution Unit
IRTM	Inter Regional Trunk Main	WHO	World Health Organisation
KPI	Key Performance Indicators	WSS	Water Supply and Sanitation
LAR	Land Acquisition and Resettlement	WWMS	Wastewater Management System
LARF	Land Acquisition and Resettlement Framework	WWTP	Wastewater Treatment Plant

LARP	Land Acquisition and Resettlement Plan	WYGI	White Young Green International (PPTA lead company)

Glossary of terms

Invert	Floor or bottom of the internal cross section of a closed conduit, such as a sewer or drain (inverted arch used to form the bottom of a sewer or tunnel);
p.e.	Defines “population equivalent” as a BOD5 of 60g/capita/day and is based on the average load to the WWTP
sewage	Sewage is water-carried wastes, in either solution or suspension that flow away from a community.
sewer	An underground conduit for carrying away drainage water and waste matter Sewer may refer to: a system for transporting sewage;
sanitary sewer	System of pipes used to transport sewage
sewerage or sewerage system	The provision of drainage by sewers. The system of sewers is called sewerage or sewerage system

Table of Contents

1. BACKGROUND 6
1.1 Introduction 6
1.2 Project Location and Background 6
1.3 Scope of Work 7

2. OBJECTIVES OF THE APPRAISAL REPORT 7

3. EXISTING WASTEWATER MANAGEMENT SYSTEM 8
3.1 Existing Sewer System 8
3.1.1. Present Collection Situation 8
3.1.2. Condition of Present Sewerage Collection System 8
3.1.3. City's Water Supply 9
3.2 Existing Wastewater Treatment Plant (WWTP) 9
3.2.1. General Description 9
3.2.2. Effluent Discharge 11
3.2.3. Current Wastewater Treatment Plant Condition 11
3.2.3.1. Main Pumping Station 11
3.2.3.2. Sand – grit chamber 12
3.2.3.3. Aeration tanks with capacity 10,000 m3/day 12
3.2.3.4. Aeration tanks with capacity 25,000 m3 /day 13
3.2.3.5. Sludge Concentration tanks / Anaerobic digestion 13
3.2.3.6. Air blower Compressors and Compressor Building 14
3.2.3.7. Sludge drying beds 14
3.2.3.8. Laboratory 15
3.2.3.9. Water Supply system on-site 15
3.2.3.10. Offices, Workshop and other Buildings 16
3.2.3.11. Communication and Monitoring System 16
3.1.3.12. Power Supply 16
3.3 Current Effluent Quality 17

4. OPTIONS AND RECOMMENDATIONS 17
4.1 Sewerage System 18
4.1.1 Master Plan, Hydraulic Modelling and Design 18
4.1.2 Construction of new sewerage collection 19
4.1.3 Purchase of sewerage maintenance equipment 19
4.1.4 Design Criteria for Phases 1 and 2 19
Design Criteria 20
4.2 Wastewater Treatment Options 21
4.2.1 Aerated lagoons 21
4.2.2 Design and Construct of a new mechanical WWTP 21
4.2.3 Rehabilitation of the existing WWTP 21
4.2.4 Conclusion 22
4.3 Proposed Rehabilitation Works 22
4.3.1 Approach 22
4.3.2 Phase 1: Rehabilitation of 10,000 m^3/day WWTP 22
4.3.2.1 Design Phase 22
4.3.2.2 Main Pump Station 23
4.3.2.3 New Measurement devices 23
4.3.2.4 Sand / Grit catchers / chambers 23
4.3.2.5 Block of Tanks with capacity 10,000 m^3/day 23
4.3.2.6 Air Blower Compressors and Compressor Building 24
4.3.2.7 Disinfection Unit 24
4.3.2.8 Sludge drying beds 24
4.3.2.9 Laboratory 25
4.3.2.10 Water Supply system 25
4.3.2.11 Offices, Workshop and other Buildings 25
4.3.2.12 Communication and Monitoring System 25

4.3.2.13 Power Supply Phase 1 25
4.3.3 Phase 2: Rehabilitation of 25,000 m3/day WWTP 25
4.3.3.1 Main Pump Station 26
4.3.3.2 Block of tanks with capacity 25,000 m^3 /day 26
4.3.3.4 Air Blower compressors 27
4.3.3.5 Power Supply Phase 2 27
4.3.3.6 Fences, Entrance, Roads and Landscaping 27
4.4 PRELIMINARY COST ESTIMATE 27

5. RELATED ENGINEERING SERVICES 27
5.1 Detailed Design 27
5.2 Construction Supervision 28

6. CONCLUSION AND RECOMMENDATIONS 29
6.1 Sewerage Collection System 29
6.2 Waste Water Treatment Plant 30

7. DUE DILIGENCE 31
7.1 Land Acquisition and Resettlement 31
7.2 Socioeconomic Profile 31
7.3 Institutional Strengthening and Capacity Development 31
7.4 Economic and Financial Analysis 31
7.5 Initial Environmental Examination 32
7.6 Earthquake Zone 32

APPENDIX 1: DRAWING OF THE CITY WITH OVERVIEW OF THE SEWERAGE SYSTEM 33

APPENDIX 2: PRELIMINARY COST ESTIMATES 34

APPENDIX 3: LAND ACQUISITION AND RESETTLEMENT - DUE DILIGENCE REPORT 36

APPENDIX 4: SOCIOECONOMIC PROFILE 36
1. Summary 37
2. Introduction 37
3. Demographic Information 38
4. Health infrastructure 39
5. Educational infrastructure 39
6. Employment levels 40
7. Incomes and Living Standards – Termez City 40
8. Access to water supply and sanitation services 40

APPENDIX 5: INSTITUTIONAL STRENGTHENING AND CAPACITY DEVELOPMENT 42
A. Introduction 42
B. Assessment of the Existing Institutional Capacity 43
C. Conclusions 47
D. Recommendation 48

APPENDIX 6: ECONOMIC AND FINANCIAL ANALYSIS 53
A. Introduction 53
B. Financial Performance of Termez Vodokanal 53
C. Cost-Benefit- Analysis 54
D. Least-Cost Analysis 55
E. Tariff affordability 56

F. Financial Management Assessment of Termez Vodokanal **56**
Projected Financial Statements, FIRR and Sensitivity Analysis for Subproject **57**

APPENDIX 7: ENVIRONMENTAL ASSESSMENT **61**
I. INTRODUCTION **62**
II. DESCRIPTION OF THE PROJECT **63**
III. DESCRIPTION OF THE ENVIRONMENT **67**
IV. Potential Environmental Impacts and Their Mitigation **72**
V. INSTITUTIONAL ARRANGEMENTS AND ENVIRONMENTAL MONITORING PLAN **75**
VI. PUBLIC CONSULTATIONS AND INFORMATION DISCLOSURE **78**
VII. FINDINGS AND RECOMMENDATIONS **80**
VIII. CONCLUSIONS **80**
Appendix 1 ..... **81**
Appendix 2 ..... **84**
Appendix 3 ..... **92**
Appendix 4 ..... **94**
Appendix 5 ..... **95**

1. BACKGROUND

1.1 Introduction

The water supply and sewerage systems in most of the towns and cities of Uzbekistan are in various stages of disrepair and require rehabilitation, upgrading and expansion. The total financing needs identified for the sector are estimated at $3.2 billion. ADB's proposed Investment Program will finance up to $375 million (including $75 million Government Funding). The proposed Multi-tranche Financing Facility program (Investment Program) will be undertaken in four Tranches from 2009 to 2018. As envisaged at project preparation, each tranche will focus on three different provinces. The Executing Agency (EA) for the Investment Program is the Uzbekistan Community Services Authority (UCSA), which is responsible for implementing externally financed projects in the sector.

Operation of the Inter-regional transmission mains (IRTM's) is the responsibility of UCSA. Delivery, operation and maintenance (O&M) of water supply and sewerage (WSS) services are the responsibility of province (oblast) and district (rayon) Vodokanals. All Vodokanals are potentially eligible to apply for inclusion under the Investment Program, but will be evaluated against the established eligibility criteria, particularly the commitment of the Vodokanals to institutional and financial reforms. The aim is for full sustainability after the facilities have been upgraded.

Under Tranche 1 of the Investment Program, 13 subprojects have been identified as being most in need of rehabilitation and eligible:

- Damkhodja IRTM water intake facility
- 11 District Centre/city water supply and distribution systems
- Termez City sewage collection system and wastewater treatment plant

Of these, four subprojects, confirmed as meeting the eligibility criteria, have been appraised in sufficient detail to confirm physical works, cost estimates, O&M costs, environmental and social safeguards and economic and financial sustainability. They will be used as samples for the succeeding subprojects in Tranches 1-4.

The four sample projects are the Damkhodja ITRM Water Intake Facility, the water supply and distribution systems in Karmana (Navoi Oblast) and Galaasiya (Bukhara Oblast), and the Termez (Surkhandarya Oblast) wastewater system.

This appraisal report is for the Termez wastewater management sub-project.

1.2 Project Location and Background

Termez City is the capital and administrative, cultural and tourist centre of Surkhandarya Oblast. Termez is the most southerly city of Uzbekistan, about 490 km southwest from Tashkent (by road - 708 km), and is located close to the border with Afghanistan.. The city is situated on the right bank of Amudarya River, at the confluence of Amudarya and Surkhandarya rivers. As of January 1, 2009 the population was 127,400. At the projected/design year of 2025, the estimated population will be 142,500 persons.

Formatted: Not Highlight

The climate in the Surkhandarya region is continental. Average annual temperature is between 14^0C to 17^0C. The coldest month is January with a minimum temperature - 4^0C. The hottest month is July with maximum temperatures above 40^0C. The annual amount of precipitation is only 170 mm/year.

The Wastewater treatment facilities are located about 500 m downstream from Termez city And the effluent is discharged into the Amudarya River. The satellite map in the Figure 1 shows the general view of Termez city.

Location of WWTP

Figure 1 General view of Termez city

1.3 Scope of Work

The main goal of the Termez subproject is improvement of the health, sanitation and living conditions of the residents of Termez city.

To achieve this goal, the project's objectives are:

(1) Construction of new sewage collectors and rehabilitation of damaged trunk sewers;

(2) Rehabilitation of the existing wastewater treatment plant (WWTP)

2. OBJECTIVES OF THE APPRAISAL REPORT

The main objectives of the Appraisal Report are to:

- Identify the current wastewater management problems;
- Identify the wastewater collection and treatment problems;
- Provide recommendations for investment requirements to improve wastewater management in Termez;

- Provide recommendations for physical works to improve the wastewater treatment plant, ensuring that effluent quality complies with Uzbekistan Environmental Standards;
- Develop preliminary cost estimates (at pre-design-level);
- Provide conclusions of the appraisal with recommendations.

It is anticipated that implementation of the project will resolve most problems of sewage collection and drainage in the city, extend the current service coverage from only 39% of the population, and improve the operation of the WWTP to meet effluent standards before discharge to the Amudarya River.

3. EXISTING WASTEWATER MANAGEMENT SYSTEM

3.1 Existing Sewer System

3.1.1. Present Collection Situation

Wastewaters from the urban population, institutional and municipal establishments and industrial wastewater are discharged into the municipal sewerage system. The wastewater is collected by the gravity sewer system in the South – Western part of the city and flows under gravity through the collector sewers to the main pumping station, situated at the WWTP.

The existing 69.5 km[1] of sewerage pipes consists of:

- pipe diameter 500 – 1000 mm, about 18.5 km of ceramic, asbestos cement, cast iron, reinforced concrete;
- pipe diameter 150 – 400 mm about 51 km, of asbestos cement and ceramic pipe.

The proportion of the population connected to the sewerage system is 39% some 49,700 inhabitants. The remainder of the urban population are still using water closets with seepage pits or septic tanks. The theoretical capacity of the existing sewerage system is 35,000 m^3 /day. The current influent to the sewerage system is estimated at 15,900 m^3 /day[2]:

urban population:	6,010 m^3 / day,
institutional organizations:	6,800 m^3 / day,
industrial enterprises:	3,090 m^3 / day

3.1.2. Condition of Present Sewerage Collection System

Reinforced concrete pipelines constructed in 1986:

- the top of the pipes are prone to corrosion problems (Hydrogen Sulphide (H_2S) gas), holes and gaps can be found frequently; sometimes the whole pipe collapses (as occurred in 2008 on a busy road);

Asbestos cement and ceramic pipelines constructed in the 1980s:

- joint failures and broken joints are common;

Concrete manholes and manhole-covers:

- concrete corrosion damage due to sewer gasses (H_2S), corrosion of manhole covers, many damaged covers due to heavy traffic.

[1] Total network length according to Termez Vodokanal
[2] Source; Termez Vodokanal

House connections:

- many house connections are broken and disconnected and seepage pits or homemade septic tanks are used instead.

Sections of the current wastewater collection system are incomplete and others are obsolete. Due to the existing low gradients in the gravity system, plus a lack of funds, equipment and knowledge for flushing and repairs, most of the sewer pipelines are heavily silted.

The sewerage network is a separate system, rather than a combined one incorporating storm drainage, which generally comprises open channels along the streets discharging into irrigation canals. Therefore, flushing of the foul sewers by rainfall, does not happen and this has contributed to the build up of sediment.

In summary, there are four main factors resulting in poor operating performance of the wastewater network or which justify the need for a rehabilitation programme:

1. Poor structural condition arising from corrosion of the pipelines;
2. Lack of sufficient volumes and velocities of water (from rainfall) for self-cleansing of the network resulting in sedimentation;
3. Joint failures; this allows root intrusion, infiltration of water and ex-filtration of wastewater.
4. The existing network is undersized for the flows that will be generated when the connection rate is greater than 90%.

3.1.3. City's Water Supply

At present, the water supply in the city is irregular and, according to the city records, sometimes being available for only six hours per day. This results in irregular wastewater inflow to the wastewater collection system and the WWTP, which disrupts the plants' biological process through a combination of lack of biological load and excessive, or shock, loading.

An upgrading of the water supply system is under way (ADB loan No. 2466-UZB: "Surkhandarya Water Supply and Sanitation Project") and it is envisaged that Termez City will have a 24 hour per day water supply following implementation of this project between 2010 and 2013.

The position of the water table ranges from 4.80 to 7.80 m below ground level (bgl), depending on location, with the highest levels observed in July – August at 3,20 to 6,30m bgl. As most of the sewerage collection pipes are at a depth between 1.50 m to 6.00 m bgl, no infiltration is expected, but because of the existing poor condition of the pipes, there is seepage of wastewater to the groundwater.

3.2 Existing Wastewater Treatment Plant (WWTP)

3.2.1. General Description

The existing WWTP is located 500m from the southern part of Termez city and was first put into operation in 1984 (Design documents, 1976).

The city's wastewater collection system discharges to the WWTP through a main trunk sewer comprising a 1000mm diameter reinforced-concrete pipe. The depth of this trunk sewer is about 7.00m bgl at the WWTP. The influent is pumped by the WWTP's main pumping station,

equipped with five pumps; none were working at the time of the PPTA Consultant's site visit June 2009.

A scheme with a design capacity of 10,000 m^3 /day was constructed in 1984. :

Item	No of units	Description
Main pumping station	5	pumps specified as SD-400/22,5
Pre-treatment		Mechanical treatment through screening in influent receiving tank
Pre-treatment	2	sand catchers / grit chambers with diameter 6.00 m
Biological treatment	2	Aeration tanks / mixer tanks
Secondary clarifiers	2	: Rectangular tanks for further biological sludge sedimentation
Disinfection		Chlorination station (chlorine cylinders with gas manifold) for effluent disinfection
Sludge processing		Sludge disposal to sludge drying beds
Ancillary buildings		Power transformer station, workshop, laboratory, heating station and office

In 1989 an additional 25,000 m^3 /day treatment facilities were constructed, increasing the design capacity to 35,000 m^3 /day:

Item	No of units	Description
Primary clarifiers	4	Rectangular tanks for sludge and silt sedimentation
Biological treatment	4	Aeration tanks / mixer tanks
Secondary clarifiers	2	Rectangular tanks for further sludge sedimentation
Aerobic sludge stabilizer	2	Rectangular tanks for sludge stabilisation (before transfer to sludge drying beds)

As part of the original design, construction of an additional post-treatment / tertiary option (as a pilot project) was started in order to filter the effluent through a large sand filter (up flow pressure) to polish the effluent before discharge into the river. This concrete structure (about 20 m x 80 m and 6 m depth) was never finished because of luck of funds and the partially completed structure has been abandoned (see Figure 2 below).

Figure 2. Uncompleted sand filter

Currently, the quantity of wastewater treated is 15,900 m^3 /day. However, as there are no measuring devices/meters installed at the WWTP, the estimated quantity of influent wastewater is based on the running time of the pumps, the number of connections and water consumption, which suggests that any treatment figures quoted, are not verifiable.

3.2.2. Effluent Discharge

The present quality of the effluent discharge into the Amudarya River does not comply with the Uzbekistan effluent quality standard. The water quality of this river is of particular importance as the river is a trans-boundary river with Afghanistan whose quality has to be protected by Uzbekistan under the International Convention of Trans-boundary Rivers.

The partly treated effluent is discharged to a floodplain beside the Amudarya River via a wetlands[3].. This area is outside of the perimeter of the WWTP and right up to the border with Afghanistan.

About 40 km downstream of the effluent discharge point, the Amudarya River water is used for irrigation and drinking purposes in the Muzrobod district. Improvements of the wastewater treatment plant will reduce the pollution of the river water.

3.2.3. Current Wastewater Treatment Plant Condition

3.2.3.1. Main Pumping Station

At the time of the site visit (June 15, 2009), all wastewater pumps were damaged or inoperative. However, two new pumps, just recently delivered ("Flyght" manufacture) were ready to be installed (see Figure 3 below).

Figure 3. New pumps

The bar screens are completely corroded and ineffective. Netting is used to collect screenings from the wastewater manually. The pump station building is rundown and needs complete overhaul. Columns, beams, roof slabs are of pre-cast structural concrete and all are dilapidated. The ladders to the pump room, about 6 m deep, are rusted and unstable, which is dangerous for the operators.

[3] an area overgrown with reeds

Formatted: English (U.S.)

3.2.3.2. Sand – grit chamber

Two circular sand traps with a diameter of 6.00 m are in use. Both sand traps are corroded and the concrete is heavily damaged (see Figure 4 below).

Figure 4. Circular sand traps.

The sand/grit is collected at the bottom of the sand catchers and, normally, this sand is air-lifted away by using the blower pumps. However, due to malfunction of these blowers removal of sand and grit is completed manually.

3.2.3.3. Aeration tanks with capacity 10,000 m3/day

Most of the concrete of the tanks is damaged; the steel walkway bridges are corroded and dangerous to use and all steel pipelines are corroded (see Figure 5 below).

Figure 5. Aeration tanks (10,000 m3/day)

Aeration tanks: Aeration system is not working due to malfunction of the air compressors and aeration pipes.

Secondary settlers / clarifiers: Sludge removal pumps are not working. No return activated sludge.

3.2.3.4. Aeration tanks with capacity 25,000 m3 /day

Most of the concrete tanks are damaged, the steel walkway bridges are corroded and dangerous to use and all steel pipelines are corroded. At the time of the PPTA visit only 2 of the 4 aeration units could be used, however due to malfunction of the influent pumps, those units were also not active (See Figure 6 below).

Figure 6. Aeration tanks (25,000 m^3/day)

Primary settlers /clarifiers: The tanks are full of sludge and silt. The sludge removal system is not working. Sludge is removed manually.

Aeration Tanks: Aeration system is not working due to malfunction of the air compressors and aeration pipes.

Secondary settlers /clarifiers: Sludge removal pumps are not working. No return of activated sludge.

Aerobic stabilizer: Concrete structure is damaged and possibly corroded by gasses, i.e. concrete parts have broken off and reinforcement bars are visible and corroded. There is the possibility of leakage from the tanks; mechanical sludge removal is not possible (only manually and occasionally using shovels).

3.2.3.5. Sludge Concentration tanks / Anaerobic digestion

These are unused tanks originally intended to treat sludge (digesters). However, the construction is not finished, no pumps are installed and the digesters have never been used.

3.2.3.6. Air blower Compressors and Compressor Building

This building is in reasonable condition. At the time of visit, all the blower compressors (4 off) were not working and not in use. The compressors are outdated. Currently one compressor is repaired with parts of another compressor (see Figure 7 and 8 below).

Figure 7. Air blower Compressors

Figure 8. Air connection pipes

Even when the air blower compressors are in operable condition, another problem is there are frequent power cuts; there is no standby generator. Because of these power cuts, there is no aeration in the biological treatment tanks; biological solids (activated sludge) settle to the bottom and die. Therefore, quality of the biological treatment is unsatisfactory and the treatment efficiency is less than 45%.

3.2.3.7. Sludge drying beds

The sludge drying beds have not been used for years. They are overgrown with grass, plants and bushes. The bottom liner is probably damaged by plant and bush roots. The drainage system is most probably blocked by sand, dust and roots (see Figure 9 below).

Figure 9. Sludge drying beds

3.2.3.8. Laboratory

The laboratory is not in use. The buildings are old but in reasonable condition. The existing laboratory equipment is completely outdated and has not been used for years (see Figure 10 below).

Figure 10. Outdated laboratory equipment

According to the local operator, wastewater quality checks are done by a local laboratory, however this could not be confirmed.

3.2.3.9. Water Supply system on-site

The water supply on-site is unreliable and frequently not available. This causes hygiene hazards for the operators resulting in health problems. Also flushing and cleaning of tanks, pumps, equipment and pipes is not possible.

3.2.3.10. Offices, Workshop and other Buildings

The offices are dilapidated and there are no furnishings (see Figure 11 below). The heating system does not work in winter.

Figure 11. Heating station

The workshop is non-operational and no maintenance equipment is present.

3.2.3.11. Communication and Monitoring System

There are no communication lines and there is no monitoring system on site.

3.1.3.12. Power Supply

The power sub-transformer station building remains is in a reasonable condition; however, it needs renovation (roof leaks, etc.).

Figure 12. Sub-transformer station

There is only one power supply line (which comes from another transformer station about 2.5 km off site) and there is no power back-up system. If the electricity is cut-off, the whole WWTP stops, including the pumps, and wastewater builds up in the city's sewerage system. This acts as

a "buffer reservoir" and is one of the causes of the heavy siltation. No second power line is connected and there is no standby power-generator.

Conclusion:

The malfunction of the WWTP - especially the mechanical parts (e.g. pumps, air blower compressors, etc.), the damaged concrete and power problems, are reasons that partially or untreated wastewater is discharged into the Amudarya River. During malfunction of the WWTP, the wastewater builds up in the city's sewerage system, causing lower flow velocities, resulting in sedimentation, decomposition of organic material, gas generation and corrosion in the sewers.

Consequently, the PPTA team recommend the rehabilitation of the existing WWTP or construction of a new wastewater treatment facility with the best available and lowest cost option. An option analysis is provided in Section 4 of this report.

3.3 Current Effluent Quality

The current influent and effluent quality is given in the table below. This information was received from the State Nature Protection Committee Provincial Office in Termez. No date for the analysis is given.

Table 3.3: Influent and effluent water Quality at the existing wastewater treatment plant Termez city

Parameters	Units	MPC[4] for fishing waters	Values	
			Influent	Effluent
Colour			Grey	Light grey
Smell			Sewer smell	slightly sewer smell
Turbidity	NTU		3	10
Total Suspended Solids	mgr/l	15	120	35
Sediment Volume	mgr/l		0,5	0,02
Dissolved solids	mgr/l		1200	1080
pH		6-8	7,9	7,8
Oxygen	mgr/l		54	33
COD	mgr O_2/l	9	130	82
BOD_5	mgr O_2/l	3	78	36
BOD_{20}	mgr O_2/l	6	101	47
ammonia nitrogen	mgr/l	0,5	5,0	1,9
Nitrites	mgr/l	0,02	0,1	0,02
Nitrates	mgr/l	9,1	-	0,6
Chlorides	mgr/l	300	96	92
Sulphate	mgr/l	100	390	388
dissolved oxygen	mgr/l	6	-	2,2
Iron	mgr/l	0,5	0,12	0,1
Phosphates	mgr/l	0,1	0,4	0,35
oil products	mgr/l	0,01	0,08	0,04

4. OPTIONS AND RECOMMENDATIONS

[4] MPC = Maximum Permissible Concentration

4.1 Sewerage System

At present only 39% of the city's population is connected to the sewerage system. Part of the existing collection system is obsolete and has many blockages, build up of silt and solids, corrosion and damage due to collapsing pipes. To counteract these problems a two-phase approach was developed. Phase 1, addresses the most urgently needed improvements and which can be undertaken almost immediately while the more complicated Phase 2 works are planned. A summary of the proposed works in each phase is as follows:

Phase 1:

a) Construction of about 5.0 km new collection system including about 500 new household connections and 1 sewage lift pump station;
b) Purchase of sewerage maintenance equipment (one vacuum sludge tanker with high pressure water cleaning) and health and safety equipment;
c) Data collection, digitalization of the sewer system, metering and hydraulic modelling of the whole city, preparation of a sewerage master plan through 2025, feasibility study and detailed designs for the work for Phase 2;

Phase 2[5]:

a) Rehabilitation of about 9.5 km sewer mains
b) Construction of about 5.0 km new main trunk sewers in the city
c) Construction of about 13.0 km new collection system in parts of the city currently not connected to the sewerage including adding about 3000 new house connections
d) Construction of three new sewage lift stations

In Phase 1, the following 3 initial actions have been identified:

4.1.1 Master Plan, Hydraulic Modelling and Design

The existing sewerage network records need to be developed to enable the preparation of a detailed rehabilitation plan. An outline map for the entire network needs to be developed with invert levels of existing sewers. A systematic inspection of the network is needed to verify that consumers are correctly connected (using. CCTV inspection).

A systematic digitized drawing using AutoCAD (or equivalent) of the city's sewer system is essential and a master plan should be developed which confirms the extent of the problems. Firstly, a detailed inventory is required including preparation of a Hydraulic Model of the entire city[6] . This should identify the most critical parts of the system and system problems to develop a prioritized program of work. It will also be essential at this stage to investigate the occurrence of H_2S gas (which causes corrosion of the concrete structures) and initiate a program for flushing/cleaning of sewers where there is a build up of solids.

Accurate flow measurement of the wastewater volume and of sewerage flows is vital to determine the hydraulic performance of the sewer network. PPTA recommend conducting flow measurements at several points in the existing sewerage system. Flow monitors should be installed in the sewers using either simple to install Parshal flumes or other flow recorders based on depth of flow and velocity. These will record flow by continuously automated data recorders.

[5] from the master plan study in Phase 1c
[6] e.g. sewerage system software model "Mike URBAN" This is software available for sewer design using hydraulic modelling calculations

Analysis of the wastewater should be confirmed using automatic samplers to take composite samples on a programmed schedule.

4.1.2 Construction of new sewerage collection

To help demonstrate the benefits of an improved wastewater management system to the local residents of the city, an initial section of about 5.0 km of new secondary and lateral sewers has been identified to connect about 500 new households.

4.1.3 Purchase of sewerage maintenance equipment

Currently, the city Vodokanal has no maintenance equipment for the wastewater system. Most of the problems, for example blockages and sedimentation, are solved by manual removal of the sedimentation. This means that personnel of the Vodokanal have to go into the sewers and try to remove the blockages or they have to dig up that particular section to remove the blockage. According to the city Vodokanal, every day there are one or two emergencies due to blockages. It is obvious that entering the sewer system, even a large diameter pipe is dangerous, firstly because of H_2S gas and secondly due to the risk of collapse of the pipe. A better option is to provide equipment and training for the use of hydraulic flushing to resolve such issues. Until this can be procured, PPTA recommend the purchase of the following Health and Safety (H&S) equipment:

- Gas testing apparatus (minimal Oxygen, H_2S, explosive gasses);
- Safety harnesses for entering the sewers;
- Hygiene and safety kits - gloves, boots, helmets etc

The wastewater system is heavily silted due to low gradients, low flow velocities and no flushing mechanism. A regular program for cleaning should be included in a rehabilitated system. Therefore, in the first phase, the purchase of sewer cleaning equipment is proposed. A specially assembled truck, a “Combi-Sewer Cleaning” truck, is proposed:

- heavy-load truck;
- superstructure of a sludge tank 6,000 ltr;
- superstructure of a clean water tank of 3,000 ltr;
- vacuum pump driven by a PTO (Power Take-off) to the truck’s engine;
- high pressure water pump, variable 50 bar to 125 bar, driven by PTO to the truck’s engine;
- durable vacuum sludge hoses ;
- sewer cleaning hose, high pressure quality, 120 m long on a reel;
- hydraulics system;
- additionally required safety tools.

4.1.4 Design Criteria for Phases 1 and 2

The project will increase the system coverage from 39% to about 60% of the9.

An important requirement is for the completion of a complete digitalisation of the city’s sewer system. There are no digital (AutoCAD) drawings available, nor data about gradients/slopes, depths of sewer lines, condition of the sewers or silt accumulation.

A basic premise is that the sewerage system should be designed to take into account the hydraulics of the average daily and peak flows. The basic design criterion is in the table below:

Table 4.1.3: parameters for preparation of accurate and efficient designs

Parameters	To International norms		UCSA projections	
	Year 2009	Year 2025	Year 2009	Year 2025
Population Termez	127,000	142,500	127,000	142,500
Connected to the sewerage	39%	60%	39%	60%
Ltr/cap/day to sewerage	125	125	240	240
m^3/day to sewerage	6,350 m^3	10,500 m^3	12,192 m^3	20,500 m^3
Institutions m^3/day	3,000 m^3 (*)	6,000 m^3	3,000 m^3	6,000 m^3
Industry m^3/day	5,000 m^3 (*)	8,000 m^3	5,000 m^3	8,000 m^3
Total influent to WWTP m^3/day	14,350 m^3 (**)	24,500 m^3	20,192 m^3	34,500 m^3

(*) Note: these flows were not measured; based on information from Termez Vodokanal.
(**) Note: total influent is most likely lower due to leakages in the sewer system and ex-filtration of wastewater into the soil.

Design Criteria

The city should be divided up into 4 or 5 main catchment areas, based on topography (levels) and major drains. The present and planned availability of water supply to these catchment areas is critical to the design. Establishing the flow of wastewater is essential to determine the required minimum gradients - to ensure flushing velocities in the sewers. The projected population is needed for assessing the biological load on the sewage treatment plant. Design parameters for the sewage treatment plant are adopted using local practice and experience. An important parameter is the BOD and COD (biological loading) and sulphate ratio that determine whether the gas evolved from anaerobic sewage/sludge digestion will be corrosive or not. The general design criteria proposed for the WWTP process design is given in the following table, summarizing the expected characteristics of the wastewater (however, samples of raw sewage should be checked before detailed design):

Table 4.1.4: summary characteristics wastewater

Organic Loading	60 gm/capita/day
BOD_5	270 mg/l
COD	400 mg/l
TSS	400 mg/l
Design horizon	2025
Design population Termez city	142,500 persons
Design p.e (Population equivalent)	1 p.e. = 60 gr BOD5 / day / person
Rate of Water Supply	150 lpcd
Waste Water Flow projected	125 lpcd
Minimum and maximum flushing velocity	0.60 m / sec to 1.50 m / sec (depending on diameter)

gravity slopes in the sewer system	Minimal 1:500 (0.002% to 0.2 %)
Minimum sewer diameter	150 mm
Maximum distance between manholes	50m interval in general and at every junction, change in slope, direction or diameter.
Minimum depth of cover	1.0 m below ground level.

The above estimates need to be verified during the Phase 1 initial planning of the system and should be modified accordingly during detailed design.

4.2 Wastewater Treatment Options

The existing WWTP is based on the **Activated Sludge process.**

A technical-economic evaluation of various sewage treatment technologies taking into account capital investment, O&M requirements, land area requirements, treatment efficiencies, etc. has been completed. The main purpose of the evaluation of the various treatment options is to establish a preferred/least cost process option, which is sustainable from a long-term perspective, incorporates the existing facilities and to meet the Uzbekistan effluent discharge standards.

Given the present state (June 2009) of the WWTP, three options were considered:

1. Aerated Lagoons (with pre- and post treatment);
2. New WWTP including Best Available Technology (BAT)
3. Rehabilitation and upgrading of the existing WWTP

Short Description of the options:

4.2.1 Aerated lagoons

These are simple biological reactors where mechanical aerators act as contact mixers to oxygenate the wastewater from air. The depth of such a lagoon system would be 4-5 m, with a required area of about 6,000 to 8,000 m^2.

4.2.2 Design and Construct of a new mechanical WWTP

This has the advantage of incorporating the newest available technologies (e.g. Modular Structures, a Rotating Biological Contactor (RBC), use of a Fluidized Aerobic Bed (FAB) Reactor or Up-flow anaerobic sludge blanket (UASB). However, the investment costs for a new plant are comparatively high, though energy consumption would be lower.

4.2.3 Rehabilitation of the existing WWTP

This option has the advantage that the impact on the present treatment system can be minimized by completing the work in 2 phases. It is necessary to keep the present treatment plant operating (as far as possible) and to prepare proper designs for its future extension (with the option to utilise the first phase mechanical and electrical equipment). Although most facilities at present are obsolete and inoperative, investment in rehabilitation has less capital cost than construction

of a new WWTP. In addition, it is vital to have the WWTP in operation as soon as possible. However, the operational and maintenance cost will be higher than for the other two options.

4.2.4 Conclusion

Although the best option is the construction of a completely new WWTP, the high investment costs cannot be met by the Government. Therefore, the conclusion is to rehabilitate and extend the existing WWTP. The rehabilitation of the existing WWTP is proposed in two phases, to assure continuity of the wastewater treatment and to gather more detailed data of the wastewater quantities and pollution loads.

4.3 Proposed Rehabilitation Works

4.3.1 Approach

Rehabilitation of the existing WWTP should be completed in two phases to ensure continuity of wastewater treatment and to enable the preparation of designs for the future expansion of the plant. Since most facilities are inoperative at present, investment in rehabilitation to enable the treatment plant to operate effectively should be undertaken as soon as possible.

It is proposed that the following rehabilitation and improvement work be undertaken at the WWTP:

Phase 1 from 2011 to 2012
Rehabilitation of the 10,000 m^3 /day treatment process[7]

Phase 2: from 2013 to 2014.
Rehabilitation of the existing 25,000 m^3 /day treatment process

The activities are described separately for each phase. The activities and timing for phase 2 may be adjusted according to actual flow measurements, engineering designs and the more detailed data gathered during the implementation of phase 1.

4.3.2 Phase 1: Rehabilitation of 10,000 m^3/day WWTP

4.3.2.1 Design Phase

Collection of accurate data should commence as soon as possible and include hydraulic modelling of the city's sewerage system. A master plan should be developed detailing population and wastewater production predictions to 2025. For proper design and operation the BOD_5, COD, SS of the influent sewage are the key parameters. An analysis program has to be established to determine the biological load. Usually the p.e. (population equivalent)[8] is used to define the pollution loads of a WWTP.

[7] the capacity of 10,000 m^3/day should be sufficient for the following two or three years, as leakage from the corroded collection system means less wastewater is received at the WWTP. However after the sewage collection rehabilitation works, more wastewater will enter the WWTP

[8] p.e. = population equivalent (in waste-water monitoring and treatment) refers to the amount of oxygen—demanding substances whose oxygen consumption during biodegradation equals the average oxygen demand of the waste water produced by one person. For calculations, it is assumed that one unit equals 60 grams of BOD_5 per 24 hours.

Formatted: English (U.S.)

The first priority is the design for Phase 1 works followed by the design of phase 2 as data becomes available. The design of phase 2 will be done in parallel with the rehabilitation of the existing facilities of the WWTP.

The following rehabilitation works are necessary to keep the wastewater treatment plant in operation[9].

4.3.2.2 Main Pump Station

Cleaning and repair of the influent tank of the pumping station - new bar screens to be installed, with an automatic rake, for the removal of coarse solids such as sticks, bottles, rags and other debris in untreated wastewater.

Two new pumps will be installed, similar to the recently installed "Flygt" pumps. Monitoring and control equipment will be installed for fully automatic operation.

The existing piping system will be replaced with new corrosion protected pipes, to current standards.

Complete overhaul of the main pumping station, including repairs to concrete structures and replacement of ladders, bridges, lifting equipment, electrical connections and related valves, meters, controls, fixtures and fittings.

4.3.2.3 New Measurement devices

There are no measurement devices to measure quantities of influent and effluent. This means that any design of equipment and power consumptions would depend on many assumptions. Therefore, PPTA recommend the immediate installation of two measurement devices, (e.g. a "Parshall Flume" is very convenient and quickly installed). One should be installed between the WWTP influent pumps and the sand / grit catchers (with easy access) and one just after the disinfection tanks and before the discharge pipe into the river (but within the perimeter of the site).

4.3.2.4 Sand / Grit catchers / chambers

Two units: complete repair of the concrete structures and new installation to remove sand and grit. One option is to install steel catchers instead of concrete, which have the advantage of a quicker installation.

Separate screw pumps[10] will be installed instead of the blower air compressor system for removal of the grit and sand. Screw pumps have much lower energy and O&M requirements.

4.3.2.5 Block of Tanks with capacity 10,000 m^3/day

Notes:

1. Existing concrete structures and tanks to be tested for earthquake resistance requirements to Uzbekistan standards prior to rehabilitation measures ;

[9] mechanical and electrical equipment will be designed to fit into the Phase 2 works, so that there is no wastage

[10] a screw pump is special designed pump to transport sludge and sand.

2. Structural Survey on tanks: the block of tanks should be inspected by a specialist structural engineer to assess the structural conditions.

a: Aeration tanks, 2 units:

Similar to primary settling tanks: complete overhaul of the concrete structures is required.
Installation of new aeration piping system with new connection pipelines to the blowers.

b: Secondary settlers / clarifiers, 2units:

The tanks should be cleaned of sludge and silt. Complete overhaul of the concrete structures is required. An option is to construct new reinforced walls inside the existing tanks.
Sludge removal pumps to be installed including pipelines system.
Replace all the steel gangways and replace with new gates.

4.3.2.6 Air Blower Compressors and Compressor Building

New air blower compressors to be installed, designed to minimise power consumption. It would be possible to install two new blower compressors at this stage and make provisions for future extension for a further two blower compressors. The compressed air is transported to the aeration tanks and the amount of oxygen has to be calculated according to the pollution load of the wastewater and the hydraulic volume.

All the piping system should be renewed with anti-corrosion pipes.

The existing building is in reasonable condition, however repair to roofs, windows and electric cabling is required.

4.3.2.7 Disinfection Unit

The present chlorination unit is outdated and may be hazardous to the health and safety of the operators; particularly working with the gas chlorine cylinders could cause hazards. UCSA has indicated that they plan to install gas chlorinators under the Investment Program. However, considering the weak technical capacity and lack of O&M funds, gas chlorination may be too complicated and potentially dangerous. The capacity of vodokanals to operate and maintain gas chlorinators, even after capacity building and training should be reviewed carefully by UCSA during detailed design.

Alternatively, the PPTA consultants recommend the introduction of a safer disinfection method using 6% sodium or calcium hypochlorite solution. All applicable production, safety and health equipment will be selected in accordance with calculations of designer engineers corresponding to normative requirement standards of Uzbekistan.

The contact tanks need rehabilitation of the concrete structure and pipelines.

4.3.2.8 Sludge drying beds

All the sludge-drying beds must be cleaned. A complete repair/replacement of the bottom liners and drainage system is required. The sludge distributing pipe system including the distribution valves has to be completely replaced.

4.3.2.9 Laboratory

The building needs to be completely renovated, but a better option would be to construct a new building, including the WWTP offices (see section 4.3.2.11).

A full set of new laboratory equipment is needed to analyse wastewater at each stage in the plant (e.g. before and after the clarifiers to adjust activated sludge flow and to adjust oxygen demand quantity). Influent and effluent have to be measured twice daily to determine the air-flows and to control the effluent quality before discharge into the River.

4.3.2.10 Water Supply system

Restore the water supply line for proper utility water supply. PPTA recommend installation of a small water reservoir on site, or drilling new boreholes for groundwater supply.

4.3.2.11 Offices, Workshop and other Buildings

The buildings for offices, workshop and heating station should be completely renovated. Roofs, windows, walls, floors and sanitation should be rehabilitated and refurbished. Water supply, heating system and electric wiring should be connected properly according to national safety regulations.

4.3.2.12 Communication and Monitoring System

A complete automatic monitoring and control system should be installed in the renovated offices. A SCADA (Supervisory Control and Data Acquisition) software system is recommended which permits the addition of more software in the future. The city's sewage collection system can be added in the software including monitoring of the new lifting pump station in the city.

4.3.2.13 Power Supply Phase 1

There is only one power transmission line (above ground). This power line is prone to disruptions from broken lines and vandalism (theft of the cables). An additional power transmission line is required (if possible underground). According to Uzbekistan requirements, the WWTP is a 1st Category facility where it is compulsory to have double-feed transmission lines.

The regional power supply is interrupted several times per day; therefore, an on-site power back-up system is required. PPTA recommend the installation of a standby power generator set, with sufficient capacity to provide power to blower compressors[11] and pumps.

The substation building needs complete rehabilitation and a second transformer substation is required.

4.3.3 Phase 2: Rehabilitation of 25,000 m3/day WWTP

[11] if the blower compressors are cut off, the aeration stops and the bacteria begin to die, upsetting the biological processes

Formatted: English (U.S.)

After completion of the phase 1 the WWTP will operate at its design capacity and will provide treatment for the present wastewater flows. However, since the expansion of the sewerage system in the city will be completed concurrently, the WWTP capacity needs to be expanded.

The design study from Phase 1 will facilitate the accurate design for each component. This report only describes the main rehabilitation works; the detailed design will be completed after the design study of phase 1. It is also important to have the city's sewerage system hydraulic model available to determine extensions of the sewerage system up to 2025.

The following works are proposed:

4.3.3.1 Main Pump Station

Following the phase 1 design parameters, quantity predictions and data, two new influent pumps will be installed. The capacity of the pumps would be based on flow projections calculated in phase 1.

4.3.3.2 Block of tanks with capacity 25,000 m^3 /day

2a: Primary settlers / clarifiers: 4 units

The existing primary clarifiers have to be cleaned of sludge and silt. The concrete walls and floors have to be rehabilitated or new reinforced concrete walls and floors have to be installed.

New sludge pumps have to be installed to transport the sludge to the sludge stabilizer (see item 4.9) or to the sludge drying beds.

2b: Aeration Tanks: 4 units

The existing aeration tanks have to be cleaned of sludge and silt. The concrete walls and floors have to be rehabilitated or new reinforced concrete walls and floors have to be installed.

A new aeration system has to be installed with new piping connections from the air blower compressor station. The capacity of the blower station has to be determined in combination of the pollution load (BOD) and the hydraulic flow.

2c: Secondary settlers / clarifiers: 4 units

The existing aeration tanks have to be cleaned of sludge and silt. The concrete walls and floors have to be rehabilitated or new reinforced concrete walls and floors have to be installed.

New sludge pumps and piping systems have to be installed to transport activated sludge return to the aerator tanks and the superfluous sludge to the sludge stabilizer (see further item 4.9) or to the sludge drying beds.

New gangways and railings have to be installed including new gates.

2d: Aerobic stabilizer: 2 units

The two unit tanks should be cleaned of sludge and silt. The concrete walls and floors have to be rehabilitated and a new aeration system has to be installed with connecting pipes to the blowers.

However, if anaerobic digesters will be used in the future, this function could be abolished and no further rehabilitation is needed (see next item 4.3.3.4). This has to be confirmed during the detailed design phase.

Advantages of anaerobic digesting are: a) no blowers (less electricity usage) and b) the possibility to use biogas (methane) for heating and other purposes.

4.3.3.4 Air Blower compressors

Follow on from phase 1: to install two new air blower compressors to the detailed design. It is possible to install only one air blower compressor adding the second later depending on the oxygen demand. This should be confirmed during the detailed design phase. It is also important to decide whether aerobic or anaerobic sludge digesters will be used.

4.3.3.5 Power Supply Phase 2

Follow on from phase 1: upgrading the power supply system to match the new equipment and new additional installed pumps and compressors.

4.3.3.6 Fences, Entrance, Roads and Landscaping

The fence around the perimeter to be repaired and/or renewed where it is non-existent; particular care has to be taken for the fence length along the Uzbekistan-Afghanistan border.

The entrance should be rehabilitated to prevent trespassers accessing the WWTP. The entrance should also be wider to allow access for heavy trucks to collect dried sludge and deliver equipment, chemicals, etc. As there will be more traffic on site, the roads must be upgraded for use by heavy trucks.

Landscaping is necessary to avoid problems with people living nearby. A green belt along the perimeter will be planted including maintenance on the existing green areas. A proper drainage system will be constructed.

4.4 PRELIMINARY COST ESTIMATE

The preliminary cost estimates for Termez sub-project activities works is about US$ 16,1m. The detailed breakdown of the costs based on this preliminary data is indicated in **Appendix 2**.

The actual cost for Termez sub-project activities will be identified during the detail design.

5. RELATED ENGINEERING SERVICES

5.1 Detailed Design

In the detailed design phase, a Technical Description will be prepared based on the National Feasibility Studies to include the following:

1. **Wastewater collection system:**
   - Technical description of the collecting system: design capacity and hydraulic terms;

- Description of existing installations and their integration into the future system;
- Population and institutional wastewater already connected to collecting systems;
- Detailed design of new connections
- Detailed design for rehabilitation of existing sewers;
- Detailed cost estimate:
- Monitoring system

2. **Wastewater treatment plant:**
   - Wastewater characteristics;
   - Design capacity in terms of pollution load: BOD_5 and in terms of hydraulic capacity;
   - Technical description of the treatment technology: primary, secondary (and tertiary if required following feasibility study)
   - Description of existing installations for wastewater treatment and their integration into the future system;
   - Sludge handling treatment and disposal;
   - Detailed cost estimate;
   - Monitoring system

3. **Management:**
   - Availability of (technical) personnel for O&M;
   - Training of operational personnel;
   - Health and Safety management;
   - Management system in Vodokanal (Institutional)
   - Public awareness campaigns;

4. **Implementation Plan:**
   - Bar Chart showing the implementation schedule
   - Timing of Key events related to the implementation
   - A schedule of human resources inputs

5.2 Construction Supervision

During implementation of the works, constant supervision will be required. A consultant shall be appointed to manage and supervise the works contract, from the design checking up to the end of the Defects Liability Period.

The services will cover the following three main phases:

1. pre-construction phase
2. construction phase
3. post-construction phase

The Pre-construction Phase

Following the tendering and subsequent award of the contracts, the Consultant shall set up a proper and functional supervision organisation to undertake all the preparatory work allowing a fast and efficient phase-in of the day-to-day supervision activities.

The Construction Phase

The Consultant shall provide full supervisory services and shall set up a supervision organisation a contract management and monitoring system meeting the demands for an efficient construction

supervision and contract administration, i.e. quality control, quantity control, monitoring of progress, health and safety, liaison with statutory authorities and other interested parties, cost control and contractual administration of the works contracts.

The Post Construction Phase
After completion of the work, the Consultant shall inspect the works periodically in order to secure a proper monitoring of the works performance over the defects notification period.

6. CONCLUSION AND RECOMMENDATIONS

The following conclusion and recommendations are given for the different parts of the subproject.

6.1 Sewerage Collection System

Table 6.1: Sewerage collection system appraisal and recommendations

Conclusion Appraisal	Recommendation	Year of implementation
1. The present wastewater collection system in the city is obsolete. It is obvious from the many collapses and repairs everyday that the existing sewers have to be replaced. A detailed survey is required to investigate the most vulnerable sections.	**1**. Perform a city sewerage survey, prepare a long term Master Plan, digitise roads and sewer system of the whole city, prepare a Hydraulic Model for the whole city's sewer system, prepare detailed design for the most urgent sections for rehabilitation and add new sewer sections according to the findings of the survey and hydraulic Model.	2011
2. Only 39% of the population is connected to the wastewater system. Firstly, households with catch pits and septic tanks will be connected to improve health and sanitation and for environmental benefit.	**2**. Construction of a new sewer system for about 500 new house connections with a length of 5.0 km, at the same period of executing of recommendation no. 1 (demonstrates immediate positive effect to the population).	2012
3. Termez has no maintenance equipment for the system. Maintenance and repair is mainly manual, which means high health risks and occupational hazards (collapsing sewers) for the workers. No maintenance results in silt accumulation inside the sewer pipes.	**3.** Purchase of sewerage maintenance equipment. PPTA proposal combination sewer cleaning truck with a sludge vacuum tank and a high-pressure water-cleaning tank. Purchase of other health and safety equipment.	2012

4. Obsolete sections as confirmed by the surveys in item 1, will need rehabilitation. Health, sanitation and hazards due to collapsing sewers are present in the city.	**4**. Rehabilitation and renewal of old obsolete sewers consistent with the results from the surveys from item 1. It is anticipated that at this stage 9.5 km of the main sewer will be rehabilitated.	2013
5. Only 39% of the population is connected to the sewer system. In combination with the construction of a new water supply system (expected to start in 2010 – 2011) new additional sewers will be needed. Households with catch pits and septic tanks will be connected first for health and sanitation reasons and environmental benefits.	**5**. Construction of about 18.0 km new sewers in the city based on the results from the Master plan and the Hydraulic Model of the city from item 1; including about 3,000 new household connections.	2014

6.2 Waste Water Treatment Plant

Table 7.2: Wastewater treatment appraisal and recommendations

Conclusion Appraisal	Recommendation	Year of implementation
1. Flow measurements do not exist and therefore no data about quantities is available and the analyses from influent and effluent are not reliable	**1**. Survey the existing plant including measuring quantity and quality of the influent and effluent. Prepare a detailed design for Phase 2 to expand the existing plant according to the results of the Master Plan Table 7.1 item 1.	2011
2. The existing wastewater treatment plant is outdated and not working properly. Many structures are obsolete and pumps are not working; the power supply system is not working effectively and there are several power outages each day. The wastewater treatment plant should be rehabilitated as soon as possible.	**2**. To start with the rehabilitation of the first 10,000 m^3 tanks and all related items pumps, compressors and power system of the plant immediately to secure proper treatment to the required standards.	2012
3. The expected wastewater flows because the work Table 7.1 items 2 and 5, will mean that the plant will operate at its design capacity. Expansion is available on site using the 25,000 m^3 tanks of but the tanks and ancillary equipment are obsolete.	**3.** Rehabilitate and renew the 25,000 m^3 tanks including primary and secondary clarifiers and aeration tanks. New anaerobic sludge digesters are proposed for proper sludge processing. Rehabilitation of the sludge drying beds is required.	2014

7. DUE DILIGENCE

7.1 Land Acquisition and Resettlement

Land Acquisition and Resettlement (LAR) – this report was prepared as part of the Investment Program and report confirms that Termez subproject has no negative social impacts associated with LAR and that the current project will benefit nearly 60% of 127,000 residents of Termez city by providing better sewage treatment facility.

The complete report is presented in the **Appendix 3**.

7.2 Socioeconomic Profile

The social aspects of the Termez subproject have been analysed to understand the social context of the investment program and the socioeconomic conditions of the area. The appropriateness of the proposed interventions has been assessed, as well as the potential positive and negative impacts, if any, that will be brought about. Actions to maximize the positive social impact or to mitigate any negative impacts have also been identified. Any vulnerabilities that could undermine the program's objectives or affect the program's benefits to clients and beneficiaries have also been examined such as cost recovery measures which could potentially reduce access to water supply services for some poorer groups through increases in tariffs for water supply or user connection charges.

No risk of negative social impact by has been identified. The complete report is presented in **Appendix 4.**

7.3 Institutional Strengthening and Capacity Development

An initial assessment of current institutional structure and capacities of the Termez city Vodokanal was conducted as part of the Investment Program. Main objectives of the initial assessment were to:

(i) identify role, responsibility, obligations, property rights, and legal obligations of all stakeholders;
(ii) review production objectives, schedules, monitoring and control systems as well as technical training requirements;
(iii) review current institutional capacity of the Vodokanal;
(iv) determine training needs for personnel and/or staff reorganization;
(v) ascertain needs for equipment and other supplies to improve productivity and develop a procurement action plan; (
(vi) identify potential managers who would benefit from having a personnel development plan and ascertain training needs program for such staff;
(vii) identify potential trainers able to train their colleagues within an organization; (
(viii) analyze current incentives schemes (if available) in the Vodokanal;
(ix) determine major drawbacks in performance of Vodokanal, particularly in planning and management;
(x) ascertain water supply and sanitation tariff calculation and approval procedures.

The complete report is presented in **Appendix 5.**

7.4 Economic and Financial Analysis

A cost-benefit- analysis for the subproject was undertaken to determine subproject financial viability. The main viability parameters used are FIRR and FNPV for financial analysis.

The results of the analysis show that subproject is financially viable with FIRR at 3.4% and FNPV of Sum 123 million. Financial sensitivity scenarios showed that the subproject is the most sensitive to reduction of revenue. Under other scenarios the subproject remained relatively robust.

The complete report is presented **in Appendix 6**.

7.5 Initial Environmental Examination

An Initial Environmental Examination (IEE) study for the Termez subproject was carried out following the Environment Policy (2002), and Environmental Assessment Guidelines (2003), of the ADB and relevant environmental policies and guidelines of the Government of Uzbekistan (GoU). The IEE involved:

- gathering baseline information available on the physical, chemical, biological, and socio-economic environment of the sub-project area and subcomponent sites and understanding the technical, social, and institutional aspects of the sub-projects;
- public consultation and field visits;
- screening of potential issues, concerns, and impacts relative to location, design, construction, and operation to distinguish those that are likely to be significant for a particular subcomponent and warranting further study;
- recommending measures to mitigate adverse issues, concerns, and impacts, particularly to the project design team;
- preparing an Environmental Management Plan (EMP) indicating impact areas, recommended mitigation measures, method of monitoring the impacts and responsible persons;
- proposing the institutional set up for implementation of the EMP.

Based on the indication of the Rapid Environmental Assessment and the findings of the IEE, the classification of the Termez subproject as Category “B” was confirmed, and no further special study or detailed EIA will be necessary to comply with the environmental policies of the ADB.

The complete IEE report is presented in the **Appendix 7.**

7.6 Earthquake Zone

The Termez subproject area is located in a designated Earthquake Zone 7(Richter Scale). The project design will incorporate strengthening of structures based on the relevant international or Uzbekistan standards, whichever are the more conservative.

APPENDIX 1: DRAWING OF THE CITY WITH OVERVIEW OF THE SEWERAGE SYSTEM

APPENDIX 2: PRELIMINARY COST ESTIMATES

			Totals Including Contingencies ('000 US$)						
	Unit	Unit Cost	2010	2011	2012	2013	2014	2015	Total
I. Investment Costs									
A. Rehabilitation of treatment facilities									
Rehabilitation of sewage lift station	amnt		-	-	24.5	57.7	40.7	-	122.9
Rehabilitation of 6 grit chambers	amnt		-	-	77.6	183.1	129.2	-	390.0
Dismantling works	amnt		-	-	41.3	97.4	68.7	-	207.5
Rehabilitation of tanks	amnt		-	-	210.8	497.2	350.9	-	1,058.9
Sedimentation basins	amnt		-	-	162.6	383.5	270.6	-	816.8
Concentration tanks	amnt		-	-	64.9	153.1	108.0	-	326.0
Pumping station for secondary sedimentation basins	amnt		-	-	12.8	30.1	21.3	-	64.2
Rehabilitation of reservoir for technical water	amnt		-	-	0.5	1.1	0.8	-	2.3
Rehabilitation of reservoir for excessive sludge	amnt		-	-	0.5	1.1	0.8	-	2.3
Rehabilitation of 5 sludge banks	amnt		-	-	101.0	238.3	168.1	-	507.4
2 sediment banks	amnt		-	-	0.3	0.6	0.4	-	1.3
Chlorination unit	amnt		-	-	8.1	19.0	13.4	-	40.5
Air ventilation for chlorination unit	amnt		-	-	3.1	7.2	5.1	-	15.4
Chlorination equipment	amnt		-	-	75.6	178.3	125.8	-	379.7
Rehabilitation of air blowing and pumping sections of the station	amnt		-	-	23.1	54.4	38.4	-	115.8
Rehabilitation of 2 contact reservoirs	amnt		-	-	2.4	5.6	3.9	-	11.8
Drilling of borehole	amnt		-	-	7.5	17.7	12.5	-	37.8
Borehole pumping station	amnt		-	-	3.1	7.4	5.2	-	15.8
Pressure piping of the borehole	amnt		-	-	5.1	12.0	8.5	-	25.6
Water tower	amnt		-	-	12.4	29.3	20.7	-	62.4
Technological services/communications	amnt		-	-	124.1	292.8	206.6	-	623.5
4 booster sewage lift stations	amnt		-	-	19.3	45.5	32.1	-	96.9
Power supply of the site	amnt		-	-	213.3	503.3	355.1	-	1,071.8
Power supply of the pumping stations	amnt		-	-	6.7	15.9	11.2	-	33.8
Power supply equipment	amnt		-	-	109.4	258.2	182.2	-	549.8
Gateway reconstruction	amnt		-	-	1.0	2.3	1.6	-	4.9
Capital repair of lab building	amnt		-	-	29.9	70.6	49.8	-	150.4
Capital repair of workshop and garage	amnt		-	-	4.8	11.3	8.0	-	24.1
Fencing and gate	amnt		-	-	4.1	9.7	6.8	-	20.7

			Totals Including Contingencies ('000 US$)						
	Unit	Unit Cost	2010	2011	2012	2013	2014	2015	Total
Landscaping	amnt		-	-	12.4	29.1	20.6	-	62.1
Pumping equipment	amnt		-	-	182.9	431.5	304.5	-	918.8
Equipment for treament facilities	amnt		-	-	746.6	1,761.6	1,243.1	-	3,751.4
Subtotal			-	-	2,291.4	5,406.3	3,814.9	-	11,512.6
B. Construction and rehabilitation of collectors	**m**	**206,843**	**-**	**-**	**800.9**	**1,889.7**	**1,333.5**	**-**	**4,024.1**
C. Detailed design	**amnt**		**149.7**	**225.6**	**-**	**-**	**-**	**-**	**375.3**
D. Maintenance equipment	**amnt**		**-**	**137.6**	**59.1**	**-**	**-**	**-**	**196.6**
Total			**149.7**	**363.2**	**3,151.4**	**7,296.0**	**5,148.3**	**-**	**16,108.5**

APPENDIX 3: LAND ACQUISITION AND RESETTLEMENT - DUE DILIGENCE REPORT

A. Introduction

1. This subproject will rehabilitate the waste water treatment plant and install a water sewage system in one section of Termez to improve the overall waste water treatment of the city.

2. The Executing Agency (EA), Uzbekistan Communal Services Agency (UCSA) has carried out an Initial Poverty and Social Assessment (IPSA), in accordance with ADB's policy on Involuntary Resettlement for the first Tranche of the MFF to assess the land acquisition and involuntary resettlement impacts. A Land Acquisition and Resettlement Framework (LARF) was developed which will be applicable for the entire MFF in accordance with Uzbekistan Land Code and ADB's Involuntary Resettlement Policy. The following paragraphs address the LAR issues with respect of Termez WWT subproject consistent with the approved LARF.

B. Land Acquisition and Resettlement Implications

3 All improvement works and installation of new sewage pipes will be carried out within existing rights of way or the land of the WWT plant covering 8.56 ha. A new pumping station will be installed over 25 m^2, on Government land beside the road connecting to the WWT plant. Sewer lines will also be constructed along about 6 km of existing roads to connect the households with the WWT plant. Therefore, no land acquisition is envisaged. The location for these improvement and construction works has been identified and adequate land, free of all encumbrances, is already in the possession of City of Termez *Hokimyat*. The details are given in Table 1.

Table 1: Details of Land Availability

Component	Area / Length of land	Ownership status
Improvement of WWT	8.56 ha	City of Termez *Hokimyat*
Construction of pumping station	25 m^2	City of Termez *Hokimyat*
Construction of sewer lines	5.0 km	City of Termez *Hokimyat*

4 The proposed activities do not involve any new acquisition of land therefore have no LAR impacts. The initial assessment has revealed that all the land required belongs to Government and lie within existing right-of-way. There is no involuntary resettlement impact as far as potential loss of assets, livelihood or productive crops is concerned. Potential adverse impacts, if any, will be limited to minor temporary disturbances during the construction phase of sewer network and pumping station. The EA will address such issues through appropriate conditions in the civil works contract. The civil works contracts will require, for example, the contractors to obtain approval of respective City / Oblast Government before they temporarily occupy any land for the purpose of material storage, equipments or building of construction site. The contractors will also be required to negotiate and reach an agreement with the owners of such land before those are used for temporary material storage/site construction. The condition of occupancy of such land with prior agreement will be clearly specified in the civil works contract.

C. Conclusion

5. The Due Diligence Report confirms that Termez DS subproject under the tranche 1 of the MFF Water Supply and Sanitation Services Improvement Program: Uzbekistan has no negative social impacts associated with LAR and that the project will benefit nearly 60% of 127,000 residents of Termez city by providing better sewage treatment facilities.

APPENDIX 4: SOCIOECONOMIC PROFILE

1. Summary

The findings from the social analysis confirm that the proposed investment program is highly appropriate and will contribute to a reduction of poverty in sub-project areas. In the areas covered by the program, the proportion of households living below the poverty line is approximately 25%. Poverty in these areas is due to factors such as a lack of employment opportunities and an inadequate supply of water for even basic needs. There will be several positive benefits from the water supply sub-projects such as time-saving and reduced workload particularly for women and children; improved household and personal hygiene; improved health status of children particularly a reduction in the incidence of diseases related to consumption of unclean water such as worm infestations, hepatitis and diarrhoea. The main positive benefits to households from the sanitation services sub-project will be a reduction in household expenditure on septic tanks and an improvement in the quality of life.

Social benefits from both the water supply and sanitation sub-projects will flow to both poor and non-poor consumers, and no poor or vulnerable groups are likely to be excluded from program benefits. Initial results from consultations and focus groups indicate that the majority of households are able and willing to absorb water tariff increases if the water supply improves and the quantity of water available to them is increased. The positive impacts of the water supply and sanitation sub-projects will be enhanced through information campaigns and awareness raising activities with beneficiary communities.

No risk of negative social impact by any of the sub-projects has been identified.

Specific gender and resettlement issues of the investment program have been addressed in separate reports, and a separate consultation and participation plan has been designed to ensure stakeholder participation in sub-project implementation.

2. Introduction

Termez is the southern-most city of Uzbekistan and is located near the border with Afghanistan, approximately 490 km southwest from Tashkent. It is situated on the north-east bank of the Amudarya River, at the confluence of the Amudarya and Surkhandarya rivers. As of January 1, 2009 the population of Termez was 127,480. By 2025, the estimated population will be 142,500 persons. There are two project phases proposed for Tranche 1 Wastewater sewerage management Termez.

Phase 1 involves the construction of approximately 5 km of new collection system including approximately 500 new household connections and one sewage lift pump station; the purchase of sewerage maintenance equipment and health and safety equipment; data collection, digitalization of the sewer system, metering and hydraulic modelling of the whole city and the preparation of a sewerage master plan through 2030, feasibility study and detailed designs for the works for the successive phase.

Phase 2 involves the rehabilitation of approximately 9.5 km of sewer mains he construction of approximately 5 km of new main trunk sewers in the city; the construction of approximately 13 km new collection system in parts of the city currently without sewerage including adding approximately 3000 new house connections and the

construction of three new sewage lift stations as per the findings in Phase 1. The Termez sub-project is estimated to increase the sewerage system coverage from 39% to approximately 60% of the city's population.

3. Demographic Information

As of 01 January 2009 the population of Termez City was 127,400 made up of 24,800 households. The population density is 4300 persons / sq km. According to the mahalla committees, the total number of families is 30,400. On average, there are 5.2 persons per household, and the average size of the family is 4.3 persons (see Table below).

Number of people in each mahalla of Termez City at 01 January 2009

Mahalla	Population size, (number of people)	Share of females, %	Number of households	Average size of a household (number of people)	Number of families	Average family size
Termez City	**127414**	**51,0**	**24807**	**5,2**	**30413**	**4,3**
A. Navoi	4393	44,0	1004	4,4	1041	4,2
A. Jomiy	6006	51,5	982	6,1	1054	5,7
Alpomish	3284	48,1	854	3,8	864	3,8
Amu Sohillari	3062	50,4	638	4,8	1015	3,0
Bainalminal	2706	40,8	611	4,4	958	2,8
Bogishamol	3286	50,5	667	4,9	770	4,3
Buston	2645	44,1	650	4,1	706	3,7
Garm	3178	55,7	794	4,0	943	3,4
Guliston	5033	56,8	520	9,7	726	6,9
Dustlick	5671	47,9	970	5,8	1190	4,8
Jaikhun	5488	47,6	1102	5,0	1332	4,1
Juyjangal	5734	50,7	1024	5,6	820	7,0
Ibn Sino	2495	51,7	542	4,6	620	4,0
Ishchilar	2715	47,0	363	7,5	621	4,4
Katta bog	3710	49,4	628	5,9	620	6,0
Marifat	7130	55,6	1300	5,5	1473	4,8
Mekhrobod	4950	55,3	756	6,5	876	5,7
Navruz	4619	59,3	622	7,4	1035	4,5
Ozodlick	5045	56,1	1003	5,0	1378	3,7
Pattackesar	5395	50,2	1055	5,1	1235	4,4
R. Uzokov	3717	52,1	703	5,3	1293	2,9
Surkhon sohili	2853	46,4	401	7,1	518	5,5
Termir yulchi	3245	51,7	432	7,5	808	4,0
Termez shakhring 2500 yilling	3449	50,6	691	5,0	768	4,5
Tuprokkurgon	5932	49,9	1752	3,4	1800	3,3
Uzbekisaton	3551	48,8	800	4,4	864	4,1
Uchkun	5712	53,6	1175	4,9	1437	4,0
Shodlick	2969	56,3	780	3,8	996	3,0
Shifokor	3404	51,4	490	6,9	580	5,9
Farkhod	2280	48,4	228	10,0	590	3,9
Yulduz	5757	47,1	1270	4,5	1482	3,9

Source: City Statistics Office, mahalla committees

The population of Termez City is ethnically diverse. Uzbeks account for 57% of the total population, Tajiks account for 24% and there are significant numbers of Turkmen people i.e. 11% of all families. Slavic nationalities (including Russians, Ukrainians, Byelorussians and others) account for 1.8% of all families. The ethnic groups are scattered across the city makhallas: Tajiks live mainly in A. Jomiy, Ibn Sino, Ishchilar, Mehrobod and Farkhod, while Turkmen people live mainly in Juijangal, Amu Sohillari and Paatakesar. The Slavic population is concentrated in Jaikhun, Katta Bog, Ozodlick, Farhod and Tuprokkurgan (see Table below).

Ethnic composition of Termez

	Number of families	Ethnic groups, %				
		Uzbeks	Tajiks	Turkmen	Slavic	Others

Termez city	**30413**	**57,2**	**23,8**	**10,9**	**6,3**	**1,8**
A. Navoi	1041	70,9	22,2	1,2	3,1	2,6
A. Jomiy	1054	33,7	36,1	26,6	3,5	0,1
Alpomish	864	86,5	6,3	0,9	6	0,3
Amu Sohillari	1015	21,7	13,6	49,5	10,3	4,9
Bainalminal	958	74,6	15,7	8,7	0,6	0,4
Bogishamol	770	78,3	14,7	1,9	4,5	0,5
Buston	706	74,1	12	7,1	3,4	3,4
Garm	943	60,7	38,2	0,8	0	0,3
Guliston	726	69,5	29,8	0,7	0	0
Dustlick	1190	69,7	26	0,2	3,6	0,5
Jaikhun	1332	45	30	0,9	22,5	1,6
Juyjangal	820	4,1	8,3	81,3	2,9	3,4
Ibn Sino	620	38,4	51	1,9	8,4	0,3
Ishchilar	621	66	33,2	0,3	0	0,5
Katta bog	620	72,6	6,5	5,2	14,5	1,2
Marifat	1473	71,3	14,3	3,6	0	10,8
Mekhrobod	876	49,8	34	6,1	9,9	0,2
Navruz	1035	70	20	10	0	0
Ozodlick	1378	43,5	32,7	9,3	14,5	0
П Pattackesar	1235	32,8	12	49,8	3,7	1,7
R. Uzokov	1293	50,3	38,7	1,1	9,5	0,4
Surkhon sohili	518	70,3	19,5	10,2	0	0
Termir yulchi	808	73,4	15,2	3,5	3	4,9
Termez shakhring 2500 yilling	768	60,6	28,9	6,4	3	1,1
Tuprokkurgon	1800	56,7	27,1	2,2	12,8	1,2
Uzbekisaton	864	57,9	30,6	5,4	5,6	0,5
Uchkun	1437	66,7	12,2	11,5	8,8	0,8
Shodlick	996	64	23,1	3,2	6,3	3,4
Shifokor	580	48,6	30,2	7,8	6,7	6,8
Farkhod	590	52,5	33,9	0,4	13,2	0
Yulduz	1482	58,1	24,8	12,8	2,6	1,7

Source: Data obtained from makhalla committee chairmen, June 2009

4. Health infrastructure

Health care facilities in Termez City include 16 clinics with 2650 beds including a Tuberculosis clinic, two clinics for infectious diseases, oncology and ophthalmology clinics, a maternity hospital and eight polyclinics for adults and children. There are several private dental clinics and pharmacies. All health care facilities have piped water, but six of them do not have sewage system such as the TB clinic, the neurological and addiction clinic, and the emergency health care station (see Table below).

Health care facilities in Termez as of July 2009

	Number of facilities	Number of beds	Number of facilities connected to piped water supply	Number of facilities connected to sanitation system
Clinics (hospitals and maternity hospitals)	16	2650	16	12
Polyclinics	8	-	8	6

5. Educational infrastructure

	Number of facilities	Number of pupils	Number of facilities connected to piped water supply	Number of facilities connected to sanitation system
Kindergartens	27	2800	27	18
Schools	16	19667	16	13
Colleges and lyceums	11	14 400	10	6

Institutes	1	7 866	1	-

6. Employment levels

According to statistics at 01 January 2008, the working population of Termez City made up of men between 16-60 years and women aged 16-55 years was 55.7% of the total population of the city; females represent more than 53% of the population. The employment rate is quite high at 79% of the working population. Employment figures for women slightly lower at 73%, and the female share of the employed is about half at 49.5%. The proportion of people seeking work is 3% of the working age population; this figure is the same for both males and females. The number of people who are formally registered as unemployed is low at 2% of the working population, while for women it is lower at 1.3%. The share of population which is not economically active is 19%. Amongst women it is 26% (see the following Table).

Employment figures for Termez City, July 2009

	Total (persons)	Including females, (persons)
Able-bodied population	72053	38307
Number of employed	56770	28100
Those seeking work	2150	1227
Unemployed, registered at the Employment Office	1472	497

7. Incomes and Living Standards – Termez City

For Termez City the average (2008) per capita monthly income is 161 200 sums. The wage rate in 2008 was 236,700 sums per month, which was almost the same as average figures across the country.

There is no official data on current poverty levels or livelihoods. However, according to the information provided by the makhallas in June 2009, 4875 families (16% of all families) received low-income allowances, while 332 families (1.1%) received financial assistance. 2800 families (9.2%) received benefits for children under the age of 18 years, and 1725 families (5.7%) received allowances for non-working mothers caring for children under 2 years.

In Termez City there are 2310 people registered as disabled (including 986 disabled children) who receive disability benefit.

8. Access to water supply and sanitation services

According to the City Vodokanal, as of 01 January 2009, the majority of households in Termez City (i.e. 96%) are connected to the water supply network but only 39% of households are connected to the centralized sewerage system. The centralized sewerage system covers the following makhallas: Alpomish, Buston, Termez shakhring and 2500 yilling. Regarding water supply, the worst situation is in Katta bog, A. Jomiy, Ishchilar and Jayhun, where water supply is not available for 48%, 18% and 9%

respectively of the makhallas. Less than 10% of households are connected to the sewage system in every third mahalla (see Table).

Access of Termez households to water supply and sanitation systems

	Number of households	Percentage of households connected to water supply, %	Percentage of households connected to sanitation, %
Termez city	**24807**	**96**	**43**
A.Navoi	1004	97	97
A.Jomi	982	82	9
Alpomish	854	100	100
Amu Sohillari	638	100	0
Bainalminal	611	93	7
Bogishamol	667	95	53
Buston	650	100	95
Garm	794	97	91
Guliston	520	96	12
Dustlik	970	94	33
Jaikhun	1102	91	91
Juyjangal	1024	100	0
Ibn Sino	542	100	13
Ishchilar	363	91	0
Katta bog	628	52	0
Marifat	1300	96	41
Mekhrobod	756	100	26
Navruz	622	100	35
Ozodlik	1003	100	80
Pattakesar	1055	100	0
R.Uzokova	703	100	15
Surkhon sokhili	401	100	0
Temir yulchi	432	100	0
Termez shakhring 2500 yilling	691	97	97
Tuprokkurgon	1752	100	88
Uzbekiston	800	99	86
Uchkun	1175	100	4
Shodlik	780	100	34
Shifokor	490	100	0
Farkhod	228	96	7
Yulduz	1270	100	32

Source: Termez City Vodokanal

APPENDIX 5: INSTITUTIONAL STRENGTHENING AND CAPACITY DEVELOPMENT

A. Introduction

1. Water supply and sanitation service utilities should provide high-quality, reliable and affordable services that also generate sufficient revenue for sustainable delivery. The achievement of these targets hinges on capacities of individuals, organizations and societies to transform, to reach their development objectives. While financial resources, including external development assistance, are vital, they are not enough to promote sustainable human development. Without supportive laws, policies, strategies and procedures, well-functioning organizations, and educated and skilled people, utilities lack the foundation to plan, implement and review their local development strategies.

2. Capacity development is the process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time. To support this process effectively requires identifying what key capacities already exist and what additional capacities are needed to reach these objectives. This is the purpose of a capacity assessment. It is the analysis of desired capacities against existing, which generates an understanding of capacity assets and needs from which a development program can be developed

3. The process of WSS sector reform in Uzbekistan started in the late 1990's. The first steps were the decentralization of the water sector and transformation of water utilities into municipal enterprises. These actions were taken without the appropriate tariff and institutional reforms being in place. The old concept of water as a purely a social service was abolished and the municipal water industry was expected to be a key player in the transition process to a market economy. At the same time, the government phased out direct subsidies to water utilities, which became self-financed companies. This "shock-therapy" reform appears to have largely failed, and more reforms are now urgently needed.

4. While the level of connection to water supply and sanitation remains high in the country, the actual quality of service provided is continuing to deteriorate, as is the general condition of the infrastructure. Failures in the distribution network are increasing in many places, while continuity of service is decreasing and the quality of drinking water remains low.

5. The deterioration of water quality that accompanies a deteriorating infrastructure, results in levels of water borne diseases remaining at significantly higher levels. In Uzbekistan, more than one-third of the population uses drinking water that does not meet hygiene standards. The deterioration of water services and the associated impacts on public health and the environment are likely to accelerate in the future as the deterioration of the infrastructure is expected to worsen. This means that the situation could change significantly in a very short time; this should be borne in mind when analysing the data provided in this report.

6. Reports and analysis on WSS by International Financing Institutions (IFI) point out that the public utilities do not always meet the requirements of a modern infrastructure due to limited funds and institutional capacity. In particular, a government priority is "Strengthening institutional capacity of public utility companies in water supply and sanitation sector". The abilities of engineering and technical, financial and managerial personnel could be enhanced by intensive training programs and provision of adequate information technology. Expected outcomes are far reaching and include best available technology, more effective and stable operation, reduce energy consumption, significant improvement of commercial and technical practices of public utility companies.

7. Overarching goals are to improve level of services for existing consumers, expand services in line with requirements of municipal and other government objectives and to meet consumer demand. Weakness in and inadequacy of the institutional capacity and human resources of water supply and sanitation companies presents significantly impede development of the water supply and sanitation sector and ensuring their viability and sustainability. These shortcomings apply not only to Oblast, city and district water supply and sanitation companies, but also to UCSA, IRTM operators and relevant national and local authorities.

8. The main goal of this work is an assessment of the current institutional structure and capacity of Liability Limited Company the Production Enterprises "Suvokova" of Termez City (Termez City Vodokanal) included into project area, and prepare programs for development of institutional structure and capacities.

9. Main objectives of the initial assessment were to:

i) identify role, responsibility, obligations, property rights and legal obligations of all stakeholders;
ii) review production objectives, schedules, monitoring and control systems as well as operational manuals;
iii) review current institutional capacity of Vodokanal;
iv) determine training needs for personnel development and/or staff reorganization;
v) ascertain needs for equipment and other supplies that influence productivity and develop and procurement action plan;
vi) identify potential managers who can benefit from being included into personnel development plan and ascertain needs for a training program for such staff;
vii) identify potential trainers able to train their colleagues within an organization;
viii) analyze current incentives schemes (if available) in Vodokanal;
ix) determine major drawbacks in performance of Vodokanal, especially, in planning and management;
x) ascertain water supply and sanitation tariff calculation and approval procedures VodokanalVodokanalVodokanal;

B. Assessment of the Existing Institutional Capacity

10. General Information: Termez is the capital of Surkhandarya Oblast and is the administrative, cultural and tourist centre of the Oblast. Termez is the most southerly city in Uzbekistan and is located near the border with Afghanistan, about 490 km southwest from Tashkent (by road - 708 km). The city is situated on the North-East bank of Amudarya River, at the confluence of Amudarya and Surkhandarya rivers.

11. Population of the Termez city is 127,400 people; water availability for the city population is 96 %, rate of connection to wastewater networks for city population is 39%. Daily water consumption totals 90.0 thousand m^3 /day. Water consumption rate is 93.9 litre/per person a day. By 2025, the estimated population will be 142,500. There is the Friendship Bridge near Termez city — the only bridge of connecting Uzbekistan with Afghanistan.

Figure 1 View of Termez City

12. **Main role and objective:** The main role of Termez City Vodokanal is to extract, prepare, supply, distribute and sell potable water to city's consumers as well as to dispose and treat wastewater from the city. The main obligation of the Vodokanal is to provide the population and commercial organizations of

the city with potable water, treat wastewater from city and generate income from collecting service fees. Under control of Termez City Vodokanal, there are 56 water intake wells and 160, km of water supply mains. The Vodokanal is responsible for water supply to 83 % of the city's population, 17 % of population is supplied potable by other organizations which have own water intake wells and mains.

13. **Legal status:** Termez City Vodokanal is a liability limited company and 51 % is owned by the Surkhandarya Oblast Branch of the State Property Committee. Full legal title is the Production Enterprise "Suvokava" of Termez City, Ltd. It was established in line with RCM No. 97, 26 March and Order of the Surkhandarya Oblast Branch of State Property Committee No. 87 May 2004. Based on the Minute of general meeting of the Vodokanal of Termez City No. 21, June 2006, the Charter of the Vodokanal was developed and registered by Hokimyat of Termez City in June 30, 2005, with register No: 269. The Company's legal address is: 33, Sharof Rashidov Street, Termez City, Uzbekistan

14. As indicated in the Charter the Termez City Vodokanal is an independent company and government authorities and its agencies have no rights to interfere in its activities. The Company is considered an independent economic entity to maintain water and sewage pipelines, supply potable water to consumers, and dispose of and treat wastewater.

15. Termez City Vodokanal controls two water intakes to extract water. It also includes the following facilities: network maintenance service, garage, two laboratories for testing potable water and wastewater, a water treatment unit, a municipal wastewater treatment plant, a dispatcher services unit, an emergency services unit for water supply networks, emergency services for wastewater networks, two booster pumping stations.

16. In 2008, Termez City Vodokanal pumped up 5642.0 thousand m^3 of potable water and supplied 5014.0 thousand m^3 of water to all consumers, losses and wastage amounted to 616.0 thousand m^3 of water, i.e. 10.9 % of total produced water volumes. Total water supply networks and facilities balance-sheet value amounts to 224107.0 thousand Uzbek sums (valuation as of 01.01.2009).

17. The Termez City Vodokanal reports periodically to the following state organizations about its production and operational activities:

- Hokimyat of Termez City (reports, information notes, information regarding various spheres of activity);
- Surkhandarya Oblast Vodokanal (in case of necessity, information notes and information regarding different activities);
- Oblast Branch of State Property Committee (annually reports, minutes of stakeholders meeting, reports on allocation annual dividends and etc);
- City Tax Committee (balance sheets, economic and financial statements);
- City Sanitary and Epidemiology Stations (PSES) (water quality test results, sanitary conditions of installations and facilities)
- City State Committee for Nature Protection (SCNP) (on completion of nature protection measures at jurisdictional installations and facilities);
- City State Statistics Committee (SSC) (reports about water pipes and piped water supply structure performance reports (statistical reporting forms TP-1 -Vodhoz, and Form 1 water supply);
- Local Branches of the Ministry for Emergency Situations (MES) (reports on completion of protection, safety, and safekeeping measures at water supply installations in emergency situations);
- Local Branches of State Technical Boiler Inspection, Trade Union and Fire Safety Department (reports on completing labour protection and occupational safety measures as well as fire safety instructions at jurisdictional installations and facilities);
- When necessary to UCSA (information notes and information regarding different activities)
- Surkhandarya Oblast Department of Finance (PDF) (estimates of calculation of production costs to declare potable water tariffs for potable water supply and wastewater management services).

18. the establishment of Termez City Vodokanal should be 119 employees, but the actual number of staff is 112. City Vodokanal managerial staff consists of 17 persons. Manager – Shamirov A.T. (tel: (+998-76) 22-3-61-31), Chief Engineer– Baratov N. (tel: (+998-76) 22-3-61-39), Chief Accountant Kuznetcova Irina Vasilievna ((tel: (+998-76) 22-3-61-31 and 520-78-19 mobile), The organisational structure of Termez City Vodokanal and its managerial structure are shown in Figures 2 and 3:

Figure 2 Termez City Vodokanal Subdivision Structure

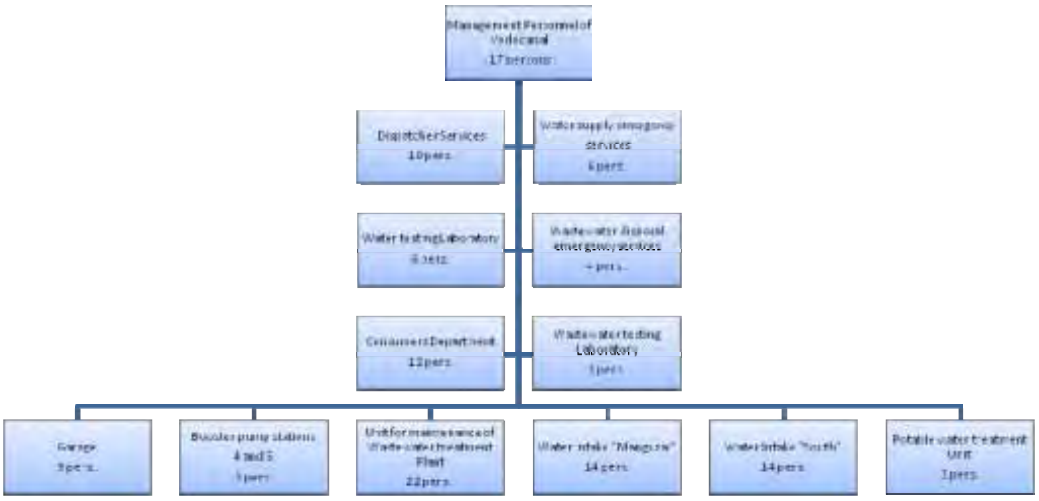
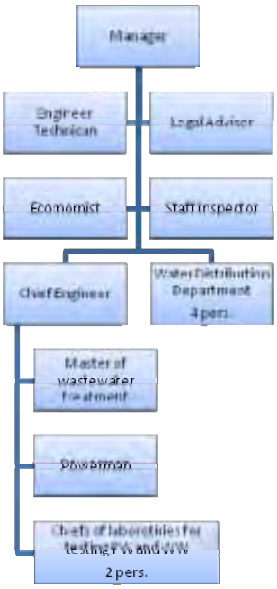


Figure 3 Management Structure of Termez City Vodokanal



19. Termez City Vodokanal has sufficient qualified staff for production, financial, personnel management, planning and other tasks. Nevertheless, managers and key specialists at the Vodokanal require intensive training to acquire advanced skills and methods of production management.

20. There are eight vehicles, but only three are in working order. A list of Termez City Vodokanal vehicles and equipment is shown in Table 1 below.

Table 1. A List Vehicles of Termez City Vodokanal

No.	Name	Model	Quantity	Technical Condition
A. Vehicles:				
1	Light car	GAZ-24	1	In working order
2	Lorry	ZIL-130	1	Out of order
3	Lorry	GAZ-53	2	Out of order
4	Lorry	GAZ-52	1	In working order
5	Lorry	UAZ-3303	1	Out of order
6	Tractor with Trailer	T-28x4	1	In working order
7	Excavator	YuMZ	1	Out of order
8	Excavator	EO-1011	1	Out of order

21. The management of Termez City Vodokanal use two personal computers, a printer and a copier. Operational and technical documentation are kept carelessly. Document filing and archiving systems exist, but computer use is rare. There is no reliable database or adequate record keeping of water consumers and sewage system users. Vodokanal is not customer focussed they do not keep reliable records of water produced, consumption, leaks, and unaccounted-for-water.

22. The management staff comprises mainly skilled employees with long experience of working for this institution. Employee salaries that are lower than the average salary rate fixed in the country therefore and it is difficult to attract young and skilled specialists. The management of the Vodokanal, which has about 15 % young specialists on staff, can in some cases use continuity schemes and ensure career development for young specialists.

23. Although Termez City Vodokanal has skilled and qualified specialists with long experience, they lack teaching skills. They agree that it would be best to arrange training at the UCSA's Training Courses Centre.

24. An average salary of Termez City Vodokanal staff is below average monthly wage fixed in the country, at 70-168 thousand sums a month. Vodokanal employees are not paid bonuses or rewards. Some employees who collect ferrous metal scrap are paid one additional salary, if they bring the planned amount. No reimbursement for transportation or meals is provided.

25. Major drawbacks in the Vodokanal planning and management are:

- Lack of a centralized authority responsible for standardization of planning, reporting, monitoring and control;
- Extremely low salaries and lack of incentives to boost effectiveness and improve performance.
- Lack of adequate computer and IT skills and experience.
- Shortage of vehicles and machinery for maintenance, repair and servicing water supply pipelines and facilities;
- Employees responsible for production planning have not received career development training for a long time.

26. **Tariff setting procedure:** The procedure for tariff setting and approval water supply and wastewater management service at the Termez City Vodokanal is similar to that of other Vodokanals. Termez City Vodokanal submits a calculation for tariffs to Surkhandarya Oblast Department of Finance. Subsequently, the Department of Finance after verification and review presents them as statement of increases in tariffs to the Ministry of Finance of Uzbekistan for consideration. Newly introduced tariffs are approved by MOF letter and registered with Surkhandarya Oblast Department of Finance.

Termez City Vodokanal also submits the same calculation to Oblast Department of Finance. The current tariffs for Termez City Vodokanal for water supply and sanitation services were approved on 15 March 2009. They came into force on 1 April 2009 are:

- water supply for population 1 m^3 - 53,0 sums;
- water supply for budget-funded organizations 1 m^3 - 53,0 sums(without VAT);
- water supply for other organizations 1 m^3 - 53,0 sums(without VAT)

- wastewater from for population 1 m^3 - 32,0 sums;
- wastewater from state/Oblast organizations 1 m^3 - 32,0 sums(without VAT);
- wastewater from other organizations 1 m^3 - 32,0 sums(without VAT)

27. The tariff setting procedures are inadequate and negatively affecting sector investment. Local authorities are responsible for the provision of water supply services, but the control of tariff levels resides with central government - MOF. This institutional set-up poses further obstacles to adequate and transparent tariff setting, given the potentially diverging (political) interests of municipalities and central government. Rules and procedures for tariff setting remain poorly developed. Consequently, tariff setting is perceived as unpredictable and lacking transparency. It is prone to politically motivated decisions rather than sound economic sector management, which is a major impediment to sector investment.

28. Current tariffs still do not reflect the real cost of the services and fail to cover not only sector investment, but in many cases operational costs. This delay in reforms becomes costly for the sector and for society when accounts receivable and payable to the sector reached the level that may destroy the financial stability of the Vodokanal. Another problem is that water supply system of Termez was built in 1960and the infrastructure is 30 years old. As proper maintenance and operation was not possible during the last 10 to15 years, a substantial portion of the facilities and network is in poor condition. Failures in the system are ten times higher than in developed countries, and this gap is progressively widening. Without quick action, local governments may soon need enormous investment simply to replace existing facilities; most of that demand will occur at once.

29. As a reaction to the stringent economic situation, lack of funds and low ability of consumers to pay, the Vodokanal reduced their operational costs by *reducing-necessary* maintenance, e.g., reduced level of operation and service and insufficient treatment of discharges. The result is rapid deterioration of the network and equipment and increased leakage and waste of water resources.

30. Under the current institutional setting and as a local government operator, the Vodokanal has little incentive for efficient operation. An arbitrary set of bonuses and penalties provides weak motivation for efficient work. This makes the regulation process artificial or affected by the popular agenda of the owner, especially when the tariff and investment decision process is linked to the election cycle or macroeconomic performance of the government.

C. Conclusions

31. Termez City Vodokanal water supply and sewage networks and the water and wastewater treatment facilities are worn out and require almost complete rehabilitation. Providing high quality potable water, improvement life and health of population remains the main objective of the organization, but they are facing with many problems: worn-out infrastructure, outdated development and planning of the field, standards not matched to the current requirements, limited financial resources and weak institutional structure and capacity.

32. Solutions to the long-term problems and demands of the sector include:

i) strategic planning, managing financial resources and determining priority of spending;
ii) selection, training and allocation of managerial staff;
iii) monitoring activities of rural district Vodokanals;
iv) expanding involvement of private sector and introduction of public private partnership
v) introduction of fair and transparent tariff policy;
vi) development technical equipment and information technology

33. During this assessment, it became clear that managers and key specialists of the Vodokanal have neither the opportunity for regular instruction or training nor the exchange of valuable experience with their peers. The Vodokanal has outdated employee job descriptions, equipment and facility operational and maintenance guidelines, schedule and log books of regular inspections, technical service and repairs of material parts are lacking.

34. In the Vodokanal, record keeping and technical documentation are not done properly. An established system of filing, storing archive documentation as well as proper usage of Information Technology is not present. There is no reliable database; proper registration of water consumers and sewerage system users is missing. Although the Vodokanal presents a lot of data and information to different authorities, very little of them is reliable or represents the real situation. The practice of presenting “good news” instead of accurate and precise data is widespread.

35. The vodokanal’s activities are not oriented to the satisfaction of needs of the service consumers. Public awareness and customer care services have not been established. There is no correct reporting of

production, consumption, leakage and wasteful losses of water. The weakness and insufficiency of the institutional capacity in the vodokanal is the main obstacle for WSS development and providing viability and sustainability of the company.

36. Tariff setting and approval procedure are not adequate and in reality ignore actual expenditures of the vodokanal. The company continues to be loss-making because it routinely overspend revenues and prevailing tariff rules do not allow for actual cost recovery, which would include the cost of capital investments. Furthermore, tariff structures do not encourage the company to reduce costs or conserve resources. There is little incentive for the company to become efficient, and/or reduce costs because it will be penalized for under spending (cost savings) as tariff level are based on cost assumption rather than actual cost.

Formatted: Font: (Default) Arial, 10 pt, (Asian) Chinese (PRC), (Other) English (U.K.)

Formatted: Font: (Default) Arial, 10 pt, (Asian) Chinese (PRC), (Other) English (U.K.)

37. Poor commercial performance leaves the company with a severe cash shortage. Many consumers are not registered, and are not billed; many who are registered and billed do not pay on time, This leads to defaults on rapidly accumulating taxes and electricity costs. The company's bank accounts are then frozen, leaving it poorly funded to operate and maintain the assets or pay salaries. This Critical situation means the Vodokanal cannot pay rewards or bonuses, or even pay wages regularly.

38. Reliable information essential for analysing the company's performance is unavailable due to lack of equipment (district and consumer meters, laboratory equipment, etc) or of staff trained to carry out analysis and measurements. Consumer satisfaction survey has not been undertaken, consumer complaints are rarely registered and complaint response times are not measured. The few existing performance targets derived from "technical norms" that were largely defined in the Soviet era are stringent, difficult to measure and unrealistic.

39. In order to address the above issues adequately, an institutional strengthening and capacity building program will be implemented taking into consideration the needs of not only Termez City Vodokanal but also whole WSS system of the country. The Vodokanal needs for an intensive training program for managerial and operational personal were defined, in addition an upgrade its fleet of vehicles and equipment were defined, as were substantial improvements to communication and information systems.

D. Recommendation

39. Suggested actions for institutional strengthening and capacity development at central and regional government levels:

i) Establish central coordination for water supply system: Government should establish or appoint an agency to be responsible for WSS sector reforms. The Agency should also be given sufficient budget to coordinate and supervise sector reform tasks, performance monitoring, investment planning and a series of actions to achieve financial viability for water supply and sanitation service providers, involving private sector and private public partnership. Because many of problems in local Vodokanals are common, it would be sensible to have a central agency to develop standard forms of contracts, manuals, guidance and other operational documentation. The Agency should be given responsibility to coordinate the activities of local Vodokanals, collect information, conduct reliability and quality control, provide intensive training and technical assistance and share good practice and lessons learned.

ii) Establish a performance monitoring system: The agency should focus first on launching a performance monitoring system by selecting and defined key performance indicators (benchmarking system) for the WSS sector, collecting baseline data and monitoring the progress/impact of reform. Technical assistance, training and incentives may be given to the water supply and sanitation service providers to provide accurate and reliable information.

1. **iii) Establish central funding** Government should pool and manage the central and regional government's budgets and International Financial Institutions loans and grants for technical assistance and investment financing. The Fund would be allocated in a competitive manner. It might initially provide financing for the implementation of computerized information gathering system (e.g. performance monitoring systems, commercial information systems, network information systems, etc) and medium-term capital investment planning. Because of the insufficiency of funding, the Government might consider selecting pilot regions or cluster of regions for reforms in the WSS sector. **iv)Strengthening WSS sector regulatory and supervisory institutions.**

2. It is crucial to strengthen the regulatory and supervisory capacity at all levels of service providers and government institutions. UCSA can be strengthened to provide more proactive and effective support to reform efforts on regional and local levels of WSS system. Regional vodokanals could improve their capacity to monitor and facilitate municipal WSS service provider performance, particularly in increasing the coverage of the population connected to a water supply, increasing the access of the population to sanitation, decreasing the rate of unaccounted-for-water, leakage and improving the quality of services

and consumer satisfaction. Regional vodokanals could support a public awareness campaign and increase consumer awareness about the benefits of timely payments and conservation of resources. Regional Financial Departments and Regional Branches of the Anti-monopoly State Committee could be strengthened and be authorized to review and approve tariffs for municipal (natural monopoly companies) WSS service providers.

v) Strengthen legal and regulatory framework. Despite some development of the legal and regulatory framework for key elements of WSS sector services to define the general direction of reform and outline the principles, their implementation has been patchy. The detailed regulations and procedures are either not developed, or when they have been written, are not well understood by service providers and even the regulators or are simply poorly written. The Government should review these regulations and rules with the assistance of international and regional experts to make them more transparent, simple and understandable. .

vi) Promote exchange of information, experience and tools. The Agency, with assistance of the regional vodokanals, should share local and international lessons of good practice, including specific methods and tools. Topics would include loss-reduction programs, energy optimization, and monitoring and control of water consumption, commercial performance improvements (bill collection, incentive programs), computerized information systems (commercial, accounting, network information models, etc), and financial projection/simulation models. 40. The PPTA recommend an intensive training program for managerial and operational personnel for Institutional strengthening and capacity building. Specifications for the recommended training courses for managerial and key personnel and their cost estimates are given in Tables 2, 3 and 4 below:

Table 2. Recommended training courses for managerial and key personnel of Vodokanal Termez City

Group/ Course	Specification of courses	Managerial and key personnel
1	**Business & Investments Planning**	
1a	Business Planning	Senior Manager, Financial Manager, Economist
1b	Tariff Setting	Financial Manager and Economist
1c	Assets Management	Financial Manager and Economist
1d	Financial Management	Financial Manager and Economist
1e	ADB Loan and grant applications, polices and procedure	Senior Manager, Chief Accountant, Economist
2	**Management**	
2a	People Management/Decision Making, Leadership and Motivation	Senior Manager
2b	Risk Management	Senior Manager
2c	Performance targets, monitoring and control. Management Information systems	Senior Manager
2d	Presentation and Report writing	Manager, Chief Engineer, Deputy Manager
2 e	Project Management under ADB Loan	Financial Manager and PIU staff
3	**Commercial**	
3a	Billing and Collection, water balance-Commercial losses	Financial Manager and Water distributions spst
3b	Accounting to International Standards	Financial Manager and Chief Accountant
3c	Customer relations	Deputy Manager
4	**Operations**	
4a	Energy Optimization, Monitoring and control of energy consumption	Powerman
4b	Water supply management (demand, leakage, metering)	Chief Engineer
4c	Monitoring and control quality of water	Deputy Manager and Water quality control spst
4d	Wastewater collection, treatment and disposal, Management of WWTP	Manager and Chief Engineer
5	**Human Resources Management and Development**	
5	Human Resources. Staff training, Recruitment process	Deputy Manager and HRM specialist

Table 3. Recommended training courses for Operational personnel of Vodokanal Termez City

Group/ Course	Specification of courses	Operational personnel
3	**Wastewater treatment operations**	
	Energy Optimization, Monitoring and control of energy consumption	Chief Engineer and Powerman

	Arrangement emergency works on WWTP	Responsible Engineer
	O&M reservoirs, pipelines and other equipments on WWTP	Chief Engineer and Responsible Engineer
	Standard Package of Documentation on WWTP	Manager and Responsible Engineer
	Wastewater quality control & testing operations	Manager and Wastewater quality control spst
	Labour Protection and safety technique on WWTP	Labour Protection Specialists
	Safety handling with chlorine and other chemicals	Water quality control specialist and Chief Eng.
4	**Vehicles and motor equipment fleet operations**	
	O&M Vehicles and Motor Fleet	Garage Manager
	Labour Protection and safety technique on WWTP	Labour Protection Specialists
	Safety handling with chlorine and other chemicals	Garage Manager

Table 4: Cost estimates for Implementing Training Program for Managerial and Operational Personnel of Termez city Vodokanal

No	Training Courses Topics	Number of attendants	Cost per Unit (US$)	Total Cost (US$)
1	Business & Investments Planning	5	215	1075.0
2	Management	10	215	2150.0
3	Commercial	6	215	1290.0
4	Common operations	4	215	890.0
5	Human resources development	2	215	430.0
6	Wastewater treatment operations	10	220	2200.0
7	Vehicles and motor equipment fleet operations	2	220	440.0
8	Project Management & Reporting	4	230	1720.O
	Total		**USD**	**10 195.0**

41. To upgrade the technical performance and capacity of Termez City Vodokanal requires the following additional vehicles and equipment:

Table 5. A List of Vehicles and Equipments Required for Termez City Vodokanal

No.	Name	Tentative Specification Parameters	Quantity
A. Vehicles:			
1	Light car	Engine volume 1,200-1,500 cm^3	1
2	Minibus for personnel	With number of seats 10-12	1
3	Wastewater network repair truck	On a medium truck chassis, similar KO-514	1
4	Vacuum Cesspool Tank Truck	Tank capacity 3.0 m^3	2
5	Water network repair truck	On a medium truck chassis	2
6	Auto crane with a telescopic jib	Lifting capacity up to 16 tons	1
7.	Water truck	With volume of water tank 6,0 – 8,0m3	1
B. Equipment:			
8	Mobile Sucking Pumps	Similar to “Andizhanets” pump	2
9	Welding machine	Similar to ASD (asynchronized synchronous motor) device	3
10	Mobile Compressor	Similar to compressor type of PR-6m	1
11	Wheeled excavator	With bucket 0,5 m3	2
12	Motorcycle	with sidecar or rear car payload 350-500kg	1

Table 6: Cost estimates of Required Vehicles and Equipment for Strengthening Capacity of Termez city Vodokanal

No	Training Courses Topics	Required Number	Cost per Unit (US$)	Cost of spare parts for 3 year (+ 10%)	Total Cost (US$)
1	Light car	1	9 500.0	95.0	9 595.0
2	Minibus for personnel	1	16 500.0	165.0	16 665.0
3	Wastewater network repair truck	1	90 000.0	900.0	90 900.0

4	Vacuum Cesspool Tank Truck	2	50 000.0	1 000.0	51 000.0
5	Water network repair truck	2	90 000.0	1 800.0	91 800.0
6	Auto crane with a telescopic jib	1	150 000.0	1 500.0	151 500.0
7	Water truck	1	45 000.0	450.0	45 450.0
8	Mobile Sucking Pumps	2	4 000.0	40.0	4 040.0
9	Welding machine	3	4 500.0	45.0	4 545.0
10	Mobile Compressor	1	45 000.0	450.0	45 450.0
11	Wheeled excavator	2	45 000.0	450.0	45 450.0
12	Motorcycle	1	2 500.0	25.0	2 525.0
	Total			**USD**	**558 920.00**

42. Strengthening the functional and managerial capacities of Termez City Vodokanal also requires technical support for procurement of additional computer and office equipment. A list of equipment required is shown in Table 6 below:

Table 7. A List of Computer and Office Equipments Required for OD IRTMD

No.	Name	Minimum Required Parameters	Quantity
A. Computers:			
1	File server	Analogue of IBM-Netfinity-5100	1
2	Strummer	Analogue of 20/40GB DDS/4 4mm Internal	1
3	Additional file server	Analogue of IBM-Netfinity-5100	1
4	Personal Computers	Desktop with Monitor 17”	10
5	Professional Printer	Analogue of LaserJet HP 4100	1
6	Office Printer	Analogue of LaserJet 1100 or 1200	3
7	Copy Machine	Analogue of ASF or Canon 6317	1
8	Fax Machine	Analogue of Panasonic Plan Paper Fax	2
9	Ink-jet printer	Analogue of HP-656C	1
10	Scanner	Analogue of HP-5400C	1
11	Projector with screen	Analogue of CTX EzPro 615H c XGA	1
12	UPS	Analogue of UPS APC	12
13	Local Area Network (LAN)	Installation Local Area Network (LAN) for 16 ports	1 area
14	Telephone set	Digital type	8
B. Office equipments			
15	Set of office Furniture	For Managerial personnel	2
16	Computer Desks	For office personnel	14
17	Chairs	For office personnel	30
18	Book shelves	For storing and keeping files of Documents	14
19	Air conditioner	Analogue of LG-Electronics 2700W	4
B. Computer software			
20	Software for server	Window-2009 Server	2
21	Software for server	Client / Server CAL-2009	14
22	Software for server	Exchange 5.5 Server - 2009	1
23	Software for server	Exchange Client	6
24	Software for server	Firewall software	1
25	Software	MS Project 2009 Win-32	1
26	Antivirus software	Norton Security or Kaspersky	12

Table 8: Cost estimates of Computer Equipments for Strengthening Capacity of Termez city Vodokanal

No	Training Courses Topics	Required Number	Cost per Unit (US$)	Total Cost (US$)
1	File server	1	1 800.0	1 800.0
2	Strummer	1	450.0	450.0
3	Additional file server	1	1 800.0	1 800.0
4	Personal Computers	10	500.0	5 000.0
5	Professional Printer	1	450.0	450.0
6	Office Printer	3	250.0	750.0
7	Copy Machine	1	1 300.0	1 300.0

8	Fax Machine	2	420.0	840.0
9	Ink-jet printer	1	150.0	150.0
10	Scanner	1	80.0	80.0
11	Projector with screen	1	1 000	1 000.0
12	Uninterruptible Power Supply units	12	60.0	720.0
13	Installation of Local Area Network (LAN)	1 area	2 800.0	2 800.0
14	Telephone set	8	50.0	400.0
15	Set of office Furniture	2	1 500.0	3 000.0
16	Computer Desks	14	120.0	1 680.0
17	Chairs	30	60.0	1 800.0
18	Book shelves	14	120.0	1 680.0
19	Air conditioner	4	450.0	1 800.0
20	Software for server Window-2009 Server	2	1 300.0	2 600.0
21	Software for server Client / Server CAL-2009	14	100.0	1 400.0
22	Software for server Exchange 5.5 Server - 2009	1	120.0	120.0
23	Software Exchange Client	6	120.0	7 20.0
24	Software for server Firewall	1	120.0	120.0
25	Software MS Project 2009 Win-32	1	100.0	100.0
26	Antivirus software Norton Security or Kaspersky	12	60.0	720.0
27	Contingences	1	1 500	1 500.0
	Total			**34 780.0**

43. For reconstruction and capital repairs to the office and ancillary buildings of the Vodokanal and implentation of basic working conditions for managerial and operational personnel it is necessary to allocate funding and include in the project. Initial cost estimation for renovation and repair buildings and premises of the Vodokanal is **30 000.0 USD**.

Table 9: Summary of Costs For the Capacity Building Program for Termez city Vodokanal

Type of Capacity Building Measures	US$
Training of Managerial and Operational Personnel	**10 195.00**
Procurement vehicles and equipment	**558 920.00**
Renovation and repair works on office building	**30 000.00**
Procurement hardware and software for Development IT	**34 780.00**
TOTAL	**633 895.00**

APPENDIX 6: ECONOMIC AND FINANCIAL ANALYSIS

A. Introduction

1. This financial and economic analysis was undertaken for Termez subproject of Tranche 1 investment. The financial analysis consists of two parts: (i) determination of appropriate wastewater tariffs for the subproject, and (ii) preparation and assessment of financial projections for the subproject. The projections consist of annual financial statements (income statement, sources and applications of funds statement, balance sheet), key performance indicators, and operating and financial data for the 2010–2020 period.

2. **Financial Objectives.** The proposed tariff rates for the subproject were designed to (i) fully recover operation and maintenance (O&M) costs and (ii) recover all subproject costs of servicing the debt, and (iii) generate a financial internal rate of return (FIRR) greater than the weighted average cost of capital (WACC), wherever feasible.

3. **Operating Revenues.** Operating revenues include payments for wastewater. Future wastewater sales were calculated based on water demand and projected waste water tariff levels.

4. **Operating Expenses.** Annual O&M costs were projected separately for each subproject over the entire forecast period by major expense item (salary, electricity, chemicals, maintenance, social charges, selling and administration expenses). Depreciation allowance was calculated on an average asset life of 20 years using the straight-line method. Income tax was assumed a 10% plus 8% infrastructure development tax.

B. Financial Performance of Termez Vodokanal

5. Termez City Vodokanal is located in capital city of Surkhandarya province. The Vodokanal supplies water to and treats waste water of Termez city. In general, Vodokanal makes a loss from water supply operations and profit from waste water treatment. In 2008 Vodokanal realized SUM 1 mln total income made up of Sum 7 mln loss from water supply and Sum 8 mln profit from waste water treatment.

6. Throughout 2006-2008 Vodokanal's net sales grew steadily and Gross Profit Margin remained at 14-15% level. Net Income ranged from Sum 0.2 to 1.2 mln. Current ratio remained high at 3-4% and quick ratio ranged from 0.26 to 0.69. Operating expense ratios from 2006 and 2008 ranged from 99% to 100%.

Table 1: Termez Vodokanal - Financial Highlights

			Sum' 000
Description	**2006**	**2007**	**2008**
Net Sales	235,267	301,075	362,155
Operating Expenses	(237,027)	(302,714)	(358,373)
Other Operating Revenue	5,286	1,084	-
Operating Income (Loss)	3,526	(555)	3,782

Description	2006	2007	2008
Non-operating items	(2,948)	759	(2,484)
Net Income	578	204	1,298
Cash and Cash Equivalent	14,363	11,523	8,852
Current Assets	88,676	98,582	129,281
Current Liabilities	20,747	27,825	33,705
Total Equity	305,890	301,515	320,081
Total Assets	326,637	329,340	353,786
Current ratio	4.27	3.54	3.84
Quick ratio	0.69	0.41	0.26
ROA	0.00	0.00	0.00
ROE	0.19%	0.07%	0.41%
Gross profit margin	13.3%	13.9%	15.5%
Operating expense ratio	100.7%	100.5%	99.0%
Accounts Receivable Turnover Ratio (customers)	34.31	37.33	39.55
Accounts Payable Turnover Ratio (suppliers)	2.01	19.79	14.87

C. Cost-Benefit- Analysis

7. A cost-benefit- analysis for the subproject was undertaken to determine the subproject's financial viability. The main viability parameters used are FIRR and FNPV for financial analysis. The subproject is financially viable if FIRR is greater than the weighted average cost of capital WACC at 3.3%, and FNPV is positive. In the financial analysis, net revenues were compared with capital and O&M costs and the resulting net cash flows were discounted at the WACC. The subprojects were subjected to sensitivity analysis to assess the effects of adverse circumstances on viability. The sensitivity scenarios for the financial analysis include: a 20% increase in capital cost, a 20% increase in O&M cost, a 20% decrease in revenues and 1-year delay of project completion.

8. The results of the analysis show that subproject is financially viable with FIRR at 3.4% and FNPV of Sum 123 million. Financial sensitivity scenarios showed that the subproject is the most sensitive to reduction of revenue. Under other scenarios, the subproject remained relatively robust. The combined results are given in Table 2.

Table 2: Summary Economic and Financial Analysis Results

Particulars	Change	FIRR	FNPV	FIRR SV
Base Case		3.4%	123	
Investment Cost	+20%	2.3%	- 2 640	1.0%
O&M Cost	+20%	2.7%	- 1 385	1.6%
Revenues	-20%	1.1%	- 4 459	0.5%
Implementation	1 yr delay	2.8%	- 1 305	0.3%

SV = Switching Value

9. Termez Vodokanal is projected to generate net income from 2016 and net cash is projected to be positive during the projection period. Return on Net Fixed Assets will range from 1.83% to 33% from 2014 to 2020. DSR will be greater than 1.2 during the projection period.

D. Least-Cost Analysis

10. The least cost evaluation was most relevant for the evaluation of options for the subproject (improving wastewater and sanitation services for Termez city). The choices of options were dependent on: (i) technical and physical feasibility; (ii) unit supply costs based on incremental investment and operating and maintenance costs. After analysis and consultation with government, the most suitable option was chosen for project design. A summary of the least cost analysis of the technical options for Termez is shown in the table below.

Table 3: Least Cost Analysis of Termez Wastewater Scheme

No.	Option	Capital Cost	O&M costs	Remarks	NPV at 12%
1.	**Lagoon Plant** Construction of lagoon wastewater treatment system near to the existing treatment plant.	US$8.1 m	US$0.77 m per year. Electricity 250 MWh per month	Will involve land acquisition and resettlement, which will delay the implementation process and maybe increase costs.	$12.8 million
2.	**New Modular Plant** Construction of new modern modular plant on site of existing plant.	US$25 m	US$0.69 m per year. Electricity 175MWh per month.	Construction of modern wastewater treatment plant with potential for increase in capacity by adding more units to meet future demand. Has lower operating costs and is the best long-tern solution for wastewater treatment.	US$26.4 million
3.	**Rehabilitate Existing Plant** Rehabilitate and modernize the WW plant.	US$16.1 m	US$0.78 m per year. Electricity 500MkWh per month	Rehabilitation and modernization will extend the life of the plant but its inherent design deficiencies contribute to high ongoing O&M costs.	US$18 million

11. The rehabilitation and modernization of the existing wastewater treatment plant was selected as the most viable option. Although the development of a lagoon treatment scheme is

a feasible alternative the almost inevitable delays and complications involved with land acquisition and resettlement were expected to delay implementation. Option 2, the construction of a new modular treatment plant was ruled out because of its higher capital costs and NPV, although this option does represent the best long run solution due to the lower O&M costs and the option to expand capacity in line with increased demand in the future. It should be noted that the WWTP's location on the banks of the Amudarya River, which forms the border with Afghanistan, precludes significant land acquisition at that location. This militates against any option that requires land acquisition.

E. Tariff affordability

12. The viability of subproject operation ultimately depends on household capacity to pay for their monthly water dues. As Termez City is part of Surkhandarya Water Supply and Sanitation Project, which aims to extend water service to the poor within the community, the proposed tariffs for water supply and sewerage services were tested against the average income of the low-income household. The affordability analysis shows the proposed tariffs to range from 0.3% to 4% of the average income of the low-income group.

F. Financial Management Assessment of Termez Vodokanal

13. Termez Vodokanal satisfies the ADB's minimum financial management requirements for an IA. Termez Vodokanal current financial management system is adequate to (i) record required financial transactions and balances, (ii) provide regular and reliable financial statements and monitoring reports during project implementation, (iii) safeguard the financial assets, and (iv) subject required financial documents to an audit acceptable to ADB. The following findings and observations were prepared based on interviews and consultations with Termez Vodokanal during the Water Supply And Sanitation Services Improvement Program (WSSSIP) preparation.

14. Termez City Vodokanal is a Limited Liability Company with its own charter. The Vodokanal provides water supply and wastewater treatment services for Termez city. Termez City Vodokanal is the part of SWSSP.

15. **Funds Flow.** Funds flow arrangement (ADB loan funds) for the WSSSIP will follow the same set-up as in the UWSP, the KNWSSSP and the SWSSP. A new project account will be opened by the Vodokanal/PIU in a commercial bank acceptable to ADB. Government counterpart funds will be disbursed through this account. The counterpart funds flow will follow the existing government set-up.

16. **Staffing.** Vodokanal's accounting department has a chief accountant, deputy chief accountant and materials accountant, all of whom have high educational attainment. None of the staff is familiar with ADB financial and disbursement procedures.

17. **Accounting Policies and Procedures.** The Vodokanal uses an accounting system that allows for appropriate recording of financial operations including cost distribution.

18. **Budgeting System.** Vodokanal prepares its budget and submits it to Provincial Government and Surkhandarya Province Vodokanal planning department. Actual expenditures are monitored monthly and are compared with budget. Budget variations are analyzed on annual basis.

19. **Payments**. Processing of the project payments include comparison of quantities, prices and terms as shown in the purchase orders. All project payments are made using bank checks or bank transfers.

20. **Cash and Bank.** The Vodokanal maintains an up-to-date cashbook. Cash receipts are deposited on the same day they are received. Cash and bank balance are reconciled on a monthly basis.

21. **Safeguard over Assets**. Vodokanal maintain record of its physical assets with a copy to the Surkhandarya Province Vodokanal. Records are reconciled quarterly and. Inventory is done annually.

22. **Internal Audit.** The Vodokanal does not have an established internal audit unit.

23. **External Audit.** Vodokanal's financial accounts are audited by external auditors on an annual basis. The external auditor is a private company. According to Uzbek legislation, the companies are obliged to change their auditors every three years.

24. **Reporting and Monitoring.** Vodokanal's financial reporting follows the National Accounting Standards procedures and requirements. Financial statements are prepared monthly, quarterly and annually. Finance department monitors the variation between the budget and actual figures thoroughly. Variation analysis, although being prepared on primitive basis, provides reasonable explanations to cost variations.

25. **Information Systems.** The Vodokanal does not have an integrated computerized MIS and uses a computer spreadsheet program to prepare its reports.

Projected Financial Statements, FIRR and Sensitivity Analysis for Subproject

(Sum million, current prices)

Table 4: Key Performance Indicators

	Projected										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Operating Data											
Waste Water Billed	15.82	15.82	15.82	15.82	16.66	19.87	20.03	20.18	20.34	20.51	20.67
Population Served (Thousand)	45.46	46.01	46.56	47.11	47.68	70.30	71.14	71.99	72.85	73.72	74.60
Actual Waste Water Treatment (1000	15.82	15.82	15.82	15.82	16.66	19.87	20.03	20.18	20.34	20.51	20.67
Non Revenue Water (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Waste Water Generation (lpcd)	133	133	133	133	148	148	149	149	149	149	149
Average Tariffs (Sum/m3 - current prices)											
Expressed on Basis of Waste Water generated:											
Accrual Basis	44.80	62.72	87.88	122.93	171.97	232.34	313.88	423.44	571.24	771.72	1 042.56
Cash Basis	39.55	55.07	78.41	111.46	161.64	220.83	298.27	402.30	542.60	732.88	989.88
Cost Recovery & Profitability											
Operating Ratio (%)	88%	75%	66%	84%	119%	108%	82%	64%	56%	47%	40%
Working Ratio (%)	71%	60%	49%	36%	31%	30%	25%	22%	25%	24%	24%
Return on Equity	7.4%	15.7%	13.2%	3.6%	-7.9%	-6.8%	3.1%	14.8%	22.8%	29.4%	34.0%
Collection Performance											
Average Collection Performance (%)	89%	88%	90%	92%	94%	95%	95%	95%	95%	95%	95%
Accounts Receivable (Days Worth of	100	100	100	100	100	80	70	65	60	60	60
Cost Efficiency & Effectiveness (Sum/m3 - current prices)											
Cash O&M	0.03	0.03	0.03	0.04	0.05	0.07	0.08	0.08	0.09	0.10	0.11
Depreciation Expense	0.01	0.01	0.01	0.05	0.14	0.17	0.17	0.17	0.17	0.17	0.16
Liquidity & Cash Flow											
Cash (Days Worth of Cash O&M)	303	504	858	1 425	1 392	1 449	2 148	3 140	3 874	4 837	6 110
Cash (Days Worth of Cash Obligation	292	457	728	1 285	1 392	1 449	2 148	2 875	1 442	1 722	2 046
Current Ratio	6.4	8.7	10.2	13.5	20.5	29.5	37.4	6.4	8.0	10.3	13.4
Debt - Asset Ratio	0.28	0.48	0.71	0.76	0.78	0.79	0.78	0.76	0.70	0.63	0.53

Table 5: Projected Financial Statements

	Projected										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Income Statements											
Operating Revenue	229.2	320.6	458.5	654.8	983.1	1 601.6	2 180.2	2 963.8	4 029.1	5 485.4	7 468.2
Operating Expenses	157.1	173.7	191.9	212.8	306.6	483.2	549.5	605.5	673.1	756.2	859.7
Depreciation	38.1	49.3	76.6	312.7	861.1	1 244.5	1 244.5	1 244.5	1 244.5	1 244.5	1 244.5
Operating Income	34.0	97.6	190.1	129.2	(184.6)	(126.1)	386.2	1 113.8	2 111.5	3 484.7	5 364.0
Operating Subsidies	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Non-Operating Expenses	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest & Other Financial Expenses	0.0	0.0	0.0	0.0	192.6	228.9	228.9	228.9	224.2	304.1	290.5
Income Tax	6.1	17.6	34.2	23.3	0.0	0.0	0.0	55.8	339.7	572.5	913.2
Net Income	27.9	80.0	155.9	106.0	(377.2)	(355.0)	157.3	829.1	1 547.6	2 608.1	4 160.2
Cash Flow Statements											
Sources											
Internal Cash	66.0	129.3	232.4	418.7	676.5	1 118.4	1 630.7	2 302.5	3 016.3	4 156.6	5 695.2
Debt	177.0	431.7	3 734.7	8 681.7	6 053.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity Contributions	46.9	113.9	987.9	2 287.1	1 613.9	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	289.9	674.9	4 955.0	11 387.5	8 343.4	1 118.4	1 630.7	2 302.5	3 016.3	4 156.6	5 695.2
Applications											
Capital Investments	223.9	545.5	4 722.5	10 968.8	7 666.9	0.0	0.0	0.0	0.0	0.0	0.0
Working Capital Increase (Decrease)	(36.9)	20.1	20.9	38.8	145.8	140.5	85.4	99.6	61.4	180.9	238.7
Interest	0.0	0.0	0.0	0.0	192.6	228.9	228.9	228.9	224.2	304.1	290.5
Debt Repayment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	794.9	794.9	794.9
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	187.0	565.6	4 743.5	11 007.6	8 005.3	369.4	314.4	328.6	1 080.5	1 279.9	1 324.2
Cash Changes	103.0	109.3	211.5	379.8	338.1	749.0	1 316.3	1 973.9	1 935.8	2 876.7	4 371.0
Ending Cash Balance	130.4	239.6	451.2	831.0	1 169.1	1 918.1	3 234.4	5 208.4	7 144.2	10 020.9	14 391.9
Balance Sheets											
Assets											
Current Assets	213.3	349.6	601.2	1 037.3	1 518.6	2 415.9	3 838.4	5 936.5	8 020.2	11 151.5	15 866.0
Net Fixed Assets	186.0	360.6	829.6	5 239.4	15 347.1	21 769.5	20 525.0	19 280.6	18 036.1	16 791.6	15 547.1
Work in Progress	223.9	545.5	4 722.5	10 968.8	7 666.9	0.0	0.0	0.0	0.0	0.0	0.0
Other Assets	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Total	623.6	1 256.2	6 153.7	17 245.9	24 533.0	24 185.8	24 363.8	25 217.5	26 056.6	27 943.4	31 413.5
Liabilities and Equity											
Current Liabilities	33.1	40.1	59.2	76.6	74.1	81.9	102.6	922.1	1 008.6	1 082.2	1 186.9
Long Term Debt	177.0	608.7	4 343.4	13 025.0	19 078.1	19 078.1	19 078.1	18 283.1	17 488.2	16 693.3	15 898.4
Equity	413.5	607.4	1 751.1	4 144.2	5 380.9	5 025.8	5 183.1	6 012.2	7 559.8	10 167.9	14 328.1
Total	623.6	1 256.2	6 153.7	17 245.9	24 533.0	24 185.8	24 363.8	25 217.5	26 056.6	27 943.4	31 413.5
Financial Ratios											
Cost Recovery Ratio	1.3	0.6	0.3	0.4	0.5	1.2	2.5	3.0	1.9	2.1	2.4
Debt Service Ratio	NA	NA	NA	NA	3.5	4.9	7.1	10.1	3.0	3.8	5.2
Debt - Asset Ratio	0.3	0.5	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.6	0.5

Table 6: FIRR and Sensitivity Analysis

Year	Revenue	Costs					Base Case	Capital	O & M	Revenue	1 Year Delay
		Capital	Capital Replacement	O & M	Residual Value	Total	Net	20%	20%	-20%	in Completion
2010	0.00	186.33	0.00	0.00		186.33	-186.33	-223.59	-186.33	-186.33	-186.33
2011	0.00	416.48	0.00	0.00		416.48	-416.48	-499.77	-416.48	-416.48	-416.48
2012	0.00	3330.50	0.00	0.00		3330.50	-3330.50	-3996.60	-3330.50	-3330.50	-3330.50
2013	0.00	7162.56	0.00	27.46		7190.02	-7190.02	-8622.53	-7195.51	-7190.02	-7190.02
2014	30.08	4657.16	0.00	102.67		4759.83	-4729.75	-5661.18	-4750.28	-4735.76	-4759.83
2015	186.84	0.00	0.00	164.32		164.32	22.52	22.52	-10.34	-14.85	-134.24
2016	249.63	0.00	0.00	173.67		173.67	75.96	75.96	41.23	26.04	13.18
2017	332.73	0.00	0.00	190.24		190.24	142.48	142.48	104.43	75.94	59.39
2018	443.08	0.00	0.00	232.89		232.89	210.20	210.20	163.62	121.58	99.84
2019	590.39	0.00	0.00	270.27		270.27	320.12	320.12	266.07	202.04	172.82
2020	786.03	0.00	0.00	319.88		319.88	466.15	466.15	402.18	308.95	270.51
2021	1005.56	0.00	0.00	374.78		374.78	630.78	630.78	555.83	429.67	411.25
2022	1285.58	0.00	0.00	442.61		442.61	842.97	842.97	754.45	585.85	562.94
2023	1644.56	0.00	0.00	527.26		527.26	1117.30	1117.30	1011.85	788.39	758.33
2024	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1011.68
2025	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2026	2102.43	0.00	787.65	632.88		1420.53	681.90	681.90	555.32	261.41	681.90
2027	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2028	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2029	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2030	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2031	2102.43	0.00	787.65	632.88		1420.53	681.90	681.90	555.32	261.41	681.90
2032	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2033	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2034	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2035	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2036	2102.43	0.00	787.65	632.88		1420.53	681.90	681.90	555.32	261.41	681.90
2037	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2038	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2039	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2040	2102.43	0.00	0.00	632.88		632.88	1469.55	1469.55	1342.97	1049.06	1469.55
2041	2102.43	0.00	787.65	632.88		1420.53	681.90	681.90	555.32	261.41	681.90
2042	2102.43	0.00	0.00	632.88	0.00	632.88	1469.55	1469.55	1342.97	1049.06	1469.55
						FIRR	**3.40%**	**2.31%**	**2.72%**	**1.09%**	**2.79%**
WACC	**3.35%**					**NPV**	**123**	**(2 640)**	**(1 385)**	**(4 459)**	**(1 305)**
				Switching Value		**FIRR**		0.99%	1.58%	0.47%	0.27%
						FNPV		0.89%	1.63%	0.54%	0.27%

APPENDIX 7: ENVIRONMENTAL ASSESSMENT

Map 1 of Uzbekistan showing sub-project location

Map of Termez City

I. INTRODUCTION

Purpose of the Report and Project Background

2.This report presents the findings of an initial environmental examination (IEE) of the proposed sub-project; i.e., the rehabilitation and upgrading of the sewerage system for Termez City. This is one of four proposed core sub-projects of Tranche 1of the Investment Project (MFF) which is Sector Project. The other three proposed sub-projects of Tranche 1 are Damkhodja IRTM water intake facility, Galaasiya City Water Supply System and Karmana City Water Supply System.

3. The proposed MMF Investment Project will improve access to safe, reliable and sustainable WSS for about 3 million residents in provincial capitals and district towns in in Uzbekistan. Through institutional strengthening and capacity development components in each sub-project, the Investment Program will provide targeted assistance to Uzbekistan Communal Services Agency (UCSA), State Committee for De-monopolization and Supporting Competition and Entrepreneurship, local governments, and town level Vodokanals (water supply companies), focusing on financial, managerial, and technical performance.

4. This sub-project addresses the sanitary-epidemiologic situation and the health of the people living in Termez City of Surkhandarya Oblast. Implementation of the sub-project will help to solve the current problems associated with wastewater treatment and sludge processing at the Termez wastewater treatment facilities as well as adding to the collection capacity of the sewer system. The aim is to improve the quality of the effluent to Uzbek standards to prevent further pollution of the Amudarya River[12]. This IEE study was conducted during the sub-project preparation period to identify the impacts of the proposed sub-project on the environment and to recommend measures to mitigate adverse impacts.

5. In Uzbekistan, water sector developments are governed by the national list of priority investment projects (proposals) prepared for implementation with the involvement of international financial institutions and donor countries in accordance with Presidential Decree No 969 dated 02-10-2008. The proposed sub-project is one of the projects in the investment plan updated for 2009.

Extent of the IEE Study

6. The IEE study for the sub-project was carried out by the Project Preparatory Technical Assistance (PPTA) consultants, following the Environment Policy (2002), and Environmental Assessment Guidelines (2003), of the Asian Development Bank (ADB) and the relevant environmental policies and guidelines of the Government of Uzbekistan (GoU). Environmental Specialists of the PPTA consultants visited the sub-project site and carried out public

[12] the effluent is presently disposed into the River and will be disposed after rehabilitating and upgrading of the wastewater treatment plant (WWTP).

Formatted: English (U.S.)

consultations prior to preparation of this report. Moreover, information provided by consultants carrying out feasibility studies [13] was used in this IEE. The IEE involved the following activities:

- gathering of baseline information available on the physical, chemical, biological, and socio-economic environment of the sub-project area and subcomponent sites and understanding the technical, social, and institutional aspects of the sub-projects;
- public consultation and field visits;
- screening of potential issues, concerns, and impacts relative to location, design, construction, and operation to distinguish those that are likely to be significant for a particular subcomponent and warranting further study;
- recommending measures to mitigate adverse issues, concerns, and impacts, particularly to the project design team;
- preparing an Environmental Management Plan (EMP) indicating impact areas, recommended mitigation measures, method of monitoring the impacts and responsible persons ; and
- proposing the institutional set up for implementation of the EMP.

7. Findings of site reconnaissance, results of social surveys, results of water quality tests and analyses, technical descriptions based on the engineering designs contained in the Draft Feasibility Reports, and outcomes of discussions with officers of the relevant agencies and the people who attended the public consultations are integrated in this IEE Report.

II. DESCRIPTION OF THE PROJECT

Type of Project

8. As noted, this is one sub-project within the first tranche of a Multi-tranche Financial Facility (MFF) Investment Project, which is a Sector Project. This IEE is for one of four proposed core sub-projects of the first tranche of the MFF.

9. The sub-project will rehabilitate and improve the sanitary sewerage system of Termez City. The sub-projects will have three major inter-related components;

(i) rehabilitation and improvement of WWTP components and sewers,
(ii) capacity development and institutional strengthening, and
(iii) investment program management.

Environmental Category of Project

10. Based on a Rapid Environmental Assessment (REA) and preliminary IEE conducted for a previous, related project [14], this sub-project is classified as a Category “B” project in accordance

[13] Wastewater Management Appraisal Report Sub Project 4 Termez City, July 2009 – PPTA consultant
PPTA consultant report on Termez City water supply system Pre-feasibility study report - prepared by local design institute “O’zbekkomunalloyihaqurilish”

with the Environment Policy of the ADB. Adverse impacts that will arise from the implementation of all the components will generally be minor or moderate; measures to mitigate them can be provided and instituted without difficulty. The Environmental Policy of the ADB requires that Category "B" projects are subjected to an IEE.

11. The Uzbekistan law on nature protection enabled in 1992 outlines the legal and institutional requirements for the conservation of the environment and the rational use of natural resources. The law empowers the State Committee for Nature Protection (*Goskompriroda)* as the agency responsible for implementing that law.

12. Preparation of the review reports and approval of projects on environmental grounds is regulated by the Decree of the Cabinet of Ministers No 491 dated 31.12.2001–Approval of the Regulation of the State Environmental Expertise. This regulation stipulates four categories of projects. According to this regulation, the proposed sub-project is a Category III project because it involves wastewater at a capacity less than 50,000 m^3/day [15].

Need for the Project

13. All the component parts of the WWTP fail to function as intended, partly due to their design, partly due to their materials, and partly due to their age. Consequently, treatment efficiency has dropped to about 45% and the resulting effluent quality does not meet national standards (Appendix 3 refers). Specifically, the following defects are noted:

- The plant is overloaded (approximately 15,960 m^3/d flows into the nominally functional older part of the plant built in 1985 that has design capacity of 10,000 m^3/d; the newer part of the plant constructed in 1989 with design capacity of 25,000 m^3/d reportedly never functional as intended;
- Only two of five raw sewage pumps are operational;
- Single electrical supply without stand-by power supply results in numerous power failures;
- Primary and secondary treatment is reduced to 70% and 53% respectively mainly as a result of the capacity of the dilapidated grit removal facilities and aeration tanks being limited to 12.5 m^3/d and non-functional return sludge pumps;
- The disinfection system is inoperative;
- Sludge drying beds reportedly have not been used for years and have deteriorated.

[14] TA4807-UZB: *Surkhandarya Water Supply and Sanitation Project*, June 2008

[15] For Category III projects, requirements include preparation of an Initial Environmental Assessment (IEA), which is similar to ADB's IEE. The Provincial Directorate for State Ecological Expertise *(Gosecoexpertisa)* under the provincial level of National Protection Committee *(Oblkompriroda)* approves Category III projects. However, after considering the IEA report, the *Oblkompriroda* may request an Environmental Consequences Assessment (ECA) to be carried out before the project commences operation. The IEA and, if required, the ECA, will be prepared by the PPTA consultant in the Uzbekistan official language for Government approval. Based on the indications of the REA and the results of this IEE, the PPTA consultant believes that is it highly unlikely that *Gosecoexpertisa* will request an ECA.

14. Downstream of the wastewater discharge point, water from the Amudarya River is used for irrigation and as a source of drinking water in Muzrobod district (40 km downstream). As such the improvements to the wastewater treatment facilities will bring health benefits by minimizing the pollution of Amudarya River water. This is of particular importance since the Amudarya is a trans-boundary river and Uzbekistan is a signatory to the International Convention of Trans-boundary Rivers.

15. The Surkhandarya water supply project implemented with ADB financing can only realize its full benefits if there is a good sewage system to remove increased wastewater resulting from the new supply. The expansion of the sewage system to meet this demand is already under consideration. Any expansion of the sewage collection network should be preceded by upgrading of the WWTP.

16. The malfunctioning WWTP facilities have forced some people with connections to the sewage system to use alternative means such as septic tanks. People also complain that such alternative systems give rise to flies and smells, making a nuisance in the area. The rehabilitation and upgrading of facilities would facilitate proper utilization of the sewage collection system, proper functioning of the sewage treatment system and the WWTP effluent meeting national environmental standards.

Project Location

17. Termez is the most southerly city of Uzbekistan located on the right bank of the Amudarya River, on the border with Afghanistan at its confluence with Surkhandarya River. Termez is located 490 km southwest of Tashkent and it is the administrative, cultural, and tourist centre of Surkhandarya Oblast. The WWTP is located about 500 m from Termez City and its effluent discharges into the Amudarya River. Project location is shown in Map 1.

Magnitude of Operation

18. Sewage from households, public and municipal establishments and effluent from industrial enterprises in Termez City are collected in the sewer system and then flow into the WWTP by gravity. The population served by the sewerage services is about 50,000 persons, or approximately 39 % of the urban population of Termez City.

19. Design capacity of the existing sewage collection facilities is 25,000 m^3/d but at present sewage flow to the WWTP is only 15,960 m^3/d, comprised of approximately 4,530 m^3/d domestic, 8,590 m^3/d commercial/municipal and 2,840 m^3/d industrial.

20. Design capacity of the WWTP is 35,000 m^3/d in two sections, 10,000 m^3/d and 25,000 m^3/d but the latter was never completed nor has it ever been functional. At present, the inflow into the treatment facilities is estimated to be 15,960 m^3/d. Present ratio of wastewater production to water supply is about 53%.

Description of the Project

21. The sub-project will include rehabilitation of all sewage treatment facilities and construction of disinfection facilities using hypochlorite in a contact tank. Plant effluent discharges into a collector drain that runs parallel to the Amudarya River for 15 to 20 km before joining the flow. The river and collector are about 2.5 km apart and the area in between is overgrown with reeds; it has become a wetland for some purification of effluents from other sources (e.g. meat factory) who also release their effluent into the same collector downstream. The area between the collector and river is no-man's land of the Trans-boundary River and access is prohibited by the Government.

22. The existing facilities were constructed in two stages: Stage 1 in 1984 and Stage 2 in 1989. The following is a list of major components to be rehabilitated and upgraded:

Stage 1 (design capacity 10 ML/d)

- raw sewage pump station (5)
- bar screens
- circular grit chambers/sand traps (2)
- rectangular primary clarifiers (3)
- aeration tanks, diffused air (3)
- rectangular secondary clarifiers (3)
- return sludge pumps (3)
- gas chlorination plant
- chlorine contact tank
- sludge drying beds

Stage 2 (design capacity 25 ML/d)

- rectangular primary clarifiers (4)
- aeration tanks, diffused air (4)
- rectangular secondary clarifiers (4)
- sludge thickener tanks (2 – partially constructed)
- sand filter (partially constructed)

23. It is proposed to rehabilitate and upgrade the existing Termez WWTP treatment units to restore the plant to its original design of a conventional activated sludge process consisting of the following unit processes:

- raw sewage pumps
- bar screens
- grit tanks
- primary clarifiers
- diffused air aeration tanks
- secondary clarifiers
- return sludge pumps

- sludge thickeners
- disinfection via gaseous chlorine
- chlorine contact chamber
- sludge drying beds
- the utilization of the sand filter will be determined during detail design

III. DESCRIPTION OF THE ENVIRONMENT

Physical Resources

24. Surkhandarya is a 20,100 km^2 oblast located in the Southeast of Uzbekistan. Termez is the most southerly city of Uzbekistan and the administrative, cultural, and tourist centre of Surkhandarya Oblast located on the right bank of the Amudarya River, on the border with Afghanistan at the confluence with Surkhandarya River. Termez City WWTP effluent discharges into the Amudarya River.

Atmosphere

25. There are 233 sources that have negative impact on the atmosphere of the Termez City. Two of them are category I, 33 are category II, 184 are category III, and are 14 category IV[16]. The major sources of air pollution in Surkhandarya province are vehicle exhausts (44,400 tons CO_2 and NO_X in 2008) and industry (3,852 tons in 2008), the main contributors being the "Surkhonoziqovqatsanoat", "Jarqurgonoiltreatment", "Surhondrilling", and "Surhoncotton production".

Climate

26. **Climate in Surkhandarya Oblast.** Average annual air temperature is +15.5°C. The coldest month is January with a minimum temperature of -10°C. The hottest month is July with a maximum temperature of 45°C. Annual rainfall is 170 mm. Prevailing wind direction is southeast to east. Soils can freeze down to 0.5–0.6 m.

27. **Climate in Termez City.** The maximum temperature occurs in July +45°C and minimum at -10 °C. The average annual temperature is +16.7°C. The annual average wind speed is 2.9 m/s and the average relative humidity is 55%.

Topography and Soils

28. Surkhandarya Oblast consists of plains; hills; valleys of the rivers Surkhandarya, Sherabaddarya, Sangardaka, and Tupolang; and right banks of the rivers Amudarya and Kafarnigan. In the north and the east, Surkhandarya Oblast borders with Tajikistan, in the

[16] Classification is done according to Resolution of the Cabinet of Ministers of Republic Uzbekistan No 491 of 31 December 2001. The resolution categorizes activities into four categories depending on potential environmental impact; with Category I for projects with activities likely to cause the greatest environmental impact and Category IV for projects with essentially no environmental impact.

northwest with Kashkadarya Oblast, in the west with Turkmenistan, and in the south with Afghanistan along the Amudarya River. The project site's elevation is 310 m. At the site, soils are classified as soils of type 1 of subsidence. Thickness of subsidence layer is 0.4 to 4.8 m.

Water Resources

29. The main waterways of the Oblast are Surkhandarya and Amudarya Rivers. The rivers are fed by snow and glaciers. Surkhandarya River is formed by the confluence of the Tupolang and Karatag Rivers with an average flow of 75 m^3/s. It joins the Amudarya River at Termez.

30. Termez City's groundwater resources are in two zones: South Surkhandarya; and Amudaryo aquifers. The safe yield from these sources is an estimated 81,300 m^3/day (Manguzar–I:51,800 m^3/day, Manguzar–II: 20,200 m^3/day, North: 9,300 m^3/day). The first drinking water well was developed in 1939 and groundwater was used up to 1973; after that, piped water was derived from surface water from theAmudarya River. Because of industrial discharges that deteriorated the water quality, potable water was sourced again from groundwater in "North' and "Manguzar".

31. There are four water reservoirs in the Oblast: Tupolang, Yujnyi Surkhan, Uchkyzyl, and Aktepa. The four main irrigation canals, Sherabad, Zang, Kumkurgan, Amu-Zang discharge about 35 m^3/s annually, with a maximum of 90 m^3/s. The canals are operational from March to October. Water from the area of Zang Canal basin is drained to the Amudarya River. Total dissolved solids (TDS) in drainage water in collectors is ranges from 1.5 to 10 g/L.

32. Underground water level varies from 1 m to 20 m. Aquifer recharge derives from large natural water currents, as well as from ex-filtration losses from irrigation canals and run-off from irrigated fields. Underground water is characterized by diverse mineralization and different levels of corrosiveness. At the site of the WWTP, underground water level is 3.2 to 7.8 m from the surface.

Geology/Seismology

33. Most of the Oblast is mountainous, with intermountain valleys. The slopes of Surkhandarya River tributaries consist of coarse-grain gravel to pebbly material. Foothill plain on the left bank of the Surkhandarya River is layered with sandy and loamy sediments. The floodplain of Surkhandarya River is composed of pebbles, and near to its mouth, sandy material. The project site is composed of back-filled soil to a depth of 0.4 m, with a brown loamy soil layer of 0.6 to 4.8 m below. Further below is a sand layer with a depth of over 10 m.

34. The oblast has seismic activity of 7 to 8 on the Richter scale and at the site, 7 on the Richter scale. All structural and mechanical design specifications will take account of this.

Ecological Resources

35. The city territory covers about 3,000 ha, most of which is occupied by settlement (buildings, gardens, roads, etc). The city's Zoo is located on the left bank of Surkhandarya River

and covers 22 ha, houses about 400 animal species; it is administered by the oblast's Cultural Department. Elsewhere in the city, wild fauna are common species and includes rodents, reptiles, insects and arachnoids.

36. There are more than 20 species of mammals including striped hyena, badger, mountain sable, jeyran, and wild boar in the Oblast, more than 70 species of birds including black and white stork and partridge, and 15 reptile species (two amphibians). However, there are no endangered, threatened, endemic or protected flora and fauna species within the project area. The most common domestic animals in the rayon are cows, sheep, goats and poultry.

37. Fish are abundant in Amudarya River, e.g. barbell, White Amur, carp and scapharingus. Because of the very small volume flow[17] that the Termez City WWTP will add to the river, minimal impact on fish is expected. About 20 km northwest of Termez, Paygambar Island is located in the Amudarya River channel and a State Reserve has been established there, measuring 3,009 ha. Paygambar will not be affected measurably by the sub-project because any expected increase in WWTP effluent volumeswill be offset by its expected better quality; i.e., the expected waste load on the river will be less. Paygambar Island is located inside the trans-national border zone, and is therefore not accessible to ascertain neither the reserve boundaries nor its nature values (plant and animal species). There are no other protected nature areas or wildlife habitats of national or local importance reported within or near the perimeter of Termez City.

38. There is, a state forest reserve "Surhon" in Surkhandarya province, approximately 20 km from Termez City. It was established in 1987 in the east part of the Kugitanga foothills and covers more than 24,000 ha. More than one third of the area is pine tree forest. The highest point is Ayribobo Mountain (3,137 m). There are more than 600 plant species in the "Surhon" reserve, 20 of them are included in the Red Book (Red List)[18] of Uzbekistan, including surhan tulip, onion anzur, red astragalus, baysun's astragalus, wild onion, and some types of dog rose. In addition to pine trees, there are bitter almond, alder, hawthorn, mountain ash etc..

39. The high summer temperature minimizes the potential for natural forestry but under irrigation, heat-loving subtropical plants like cotton, persimmon, and even sugar-cane, mandarin, and lemon are grown.

40. Ephemeras are the most dominant in plant diversity on the flat part of the Oblast; Ephemer-cereal is predominant on the mountains and various tipchak-grass on the high subalpine mountain peaks. On the slopes, pine trees, Greek nuts, almond trees, maple, and ash grow while pistachio trees grow on the Babatag Mountains. In the Amudarya valley, tugay is common. Open mountainsides are covered by astragalus, mint, sainfoin, rhubarb, wormwood Etc.

[17] Approximately 0.03% of Amudarya River dry weather flow (Source: IEE, Surkhandarya Water Supply and Sanitation Project)

[18] The Red Book of Uzbekistan is equivalent to IUCN's definition of a Red List, which is a tool used for categorization of endangered flora and fauna species, by dividing the species into 5 categories related to their extinction potential.

Economic Development

Industries

41. There are the following industries in Termez City

industrial and processing enterprises

- ***JV Ajanta Pharma Ltd, manufacturer of pharmaceuticals***
- ***Mahally Sanoat, manufacturer of consumer goods***
- ***Industrial trading–commercial enterprise, manufacturer of construction hardware***
- ***Surkhandarya Main Electric Networks***
- ***Termez Telecommunication Centre***

food-processing industry enterprises

- ***Asalchilik (honey products)***
- ***Oltin Boshok, manufacturer of macaroni and bakery products***
- ***Surjhangushtsanoatsavdo, manufacturer of meat products***
- ***Termezsut (dairy products)***
- ***Khoshim, manufacturer of mineral water***

Construction materials manufacturing

- ***Surkhontemirbeton, manufacturer of concrete.***

Processing agricultural products

- ***Agrofirm Sokhibkor, manufacturer of agricultural products***

42. Cotton cultivation generates industrial activity including cotton-jinning, cotton-processing. Large industry enterprises in the Oblast include: the administration of Djarkurganneft, Denau oil-extracting plant, Baisun experimental silk-weaving factory, Sariasia stone-sorting mill, Shurchi flour grinding combine, Djarkurgan spinning-weaving mill, Termez garment factory, Shargun coal enterprises, Khodjaikon salt enterprises, Sherabad plant of ceramic artistic wares and others.

43. Several joint ventures and 452 small enterprises operate in the Oblast. The joint ventures with Afghanistan Namaf and Afruz manufacture consumer goods. The Indian-Termez joint venture manufactures drugs from local herbs; the Turkish-Termez joint-venture Pulat manufactures carpets. At present, more small enterprises are being created.

44. Regarding the industries discharging their effluent into the sewerage system, SNPC confirmed that there are no hazardous industries among them, which could pollute the effluent from WWTP with heavy metals or chemicals.

Infrastructure

45. City buildings consist of multi-storey commercial and housing units and individual houses. New residential districts with multi-storey buildings are located in the northern part of the city. The city is well planted with trees and has several landscaped parks.

46. Centralized hot water supply is distributed from city and district boiler-houses. The city also has a centralized natural gas supply.

47. Potable water supply capacity to the city from all water intakes totals 30,000 m^3/d.

48. There is a centralized sewerage system in Termez City. Sewage collection, treatment, and disposal as well as collection of service fees are the responsibility of Termez City Vodokanal. In 2008, the PRC-funded feasibility study "Reconstruction of Sewage Treatment Facilities of Termez City" envisaging reconstruction of treatment facilities via PRC loan, but the work is now suspended.

Transportation

49. Termez is a large transport crossroads in the south of Uzbekistan. The major Uzbek Highway connects Termez with Tashkent. The only Central Asian international river port is located on the Amudarya River. There are modern airports at Termez and Sariasia. Termez airport can accept heavy transport cargo planes. There are regular flights to Tashkent and other cities in Uzbekistan.

50. The most densely populated and economically developed districts are connected by railway with a length more than 300 km and there are more than 3,000 km of main roads. The Friendship Bridge near Termez City is the only bridge from Uzbekistan to Afghanistan, connecting Termez with the city of Hajraton (60 km to Mazar-i-Sharif).

Land use

51. There are 6,800 farmers in Surkhandarya Oblast. The main crops are wheat and cotton. The farming lands are 345,000 ha of which 120,000 ha are under cotton and the balance wheat. In the mountainous districts of the Oblast, horticulture and viticulture are developed. In farms cattle, sheep (astrakhan and fat-tailed Gissar breeds), goats, herd horses, poultry and rabbits are reared. In Surkhandarya Oblast astrakhans "Surkhan suri" are produced.

52. The main branches of agriculture are cotton-growing, horticulture, lemon-growing, and sericulture. Cotton is one of the main sowing crops in 13 districts of the Oblast. The highest amount of the thin-fibred cotton in Uzbekistan is cultivated in Surkhandarya. Dry-weather crops are harvested on the foothills (mainly wheat and barley).

Social and Cultural Resources

53. Termez City is the capital of Surkhandarya Oblast. There are 14 administrative districts in the oblast: Altynsay, Angor, Boysun, Bandyhan, Denau, Djarkurgan, Kumkurgan, Kizirik, Muzrabad, Sariasyo, Termez, Uzun, Sherabad, and Shurchi. There are also 8 cities, 7 urbanized settlements, and 5 district centres. In 2007, the population of the Oblast was 1,944,280 people, 441,074 urban dwellers and 1,503,206 rural. As of 1 January 2009, Termez City population was 127,480 with a population density of 4,160 persons per km^2. In 2020, the projected population will be 147,040 persons. Per-capita income is low and poverty prevails. The local governance is structured in Assemblies of Rural Citizens (ARC; *Makhalla*). In Termez city, there are 33 makhallas. The ethnic composition in the city is dominated by Uzbek. Reportedly, the rural population in the sub-project area is 69.6% Uzbek, 20% Tajik, and 3.8% others. There are several historical monuments of importance within or near the city territory such as: *Al khakim at Termiziy*, *Sultan-Saodat*, *Kirkkiz*, and *Kokildor ota;* however, it is expected that the sub-project will not impact these monuments.

IV. Potential Environmental Impacts and Their Mitigation

54. Screening of potential issues, concerns and impacts relative to location, design, construction, and operation was carried out following ADB's Environmental Guidelines (2003).

Potential Impacts due to Location

55. The WWTP is located about 500 m away from the residential area of Termez. All the facilities are within a large plant site owned by the Vodokanal, which is also the owner of these facilities. All WWTP rehabilitation and upgrading work will all be within the existing site. Some process units may be extended or added; however, such additions will all be contained within the existing site. Some areas on the site not occupied by process units and support facilities are used to grow cotton. Since the WWTP rehabilitation and upgrading will occur entirely on the existing site, there will be no issue with local government land use planning,

56. The WWTP is located about 2.5 km from the Amudarya River, which is the closest sensitive ecosystem. Subproject components will have no potential impacts on forests or environmentally sensitive areas. It will not interfere with cultural, historical and religious sites of mainstream and minority Uzbeks and will have no aesthetic impact. The sub-project facilities are unlikely to impact on the natural drainage pattern and thereby on local flooding. As such, the site for the proposed sub-project will have no permanent incremental environmental impacts. Any impacts due to normal construction activities will be mitigated or resolved during design and construction in accordance with the EMP.

57. The access road to the WWTP is adequate for project construction-related purposes but is very close to residential dwellings. Consequently, heavy construction-related traffic should be confined to an alternative access road, to minimize dust and noise nuisance to population living next to the normal access road, and to limit the risk of traffic accidents, all in accordance with the

EMP. Electricity is also available for the construction purposes. No significant impacts related to basic infrastructure required for project construction will be encountered.

58. Reportedly, the existing sludge drying beds have not been used for the last 10 years and require rehabilitation.

59. The sub-project includes the extension of the sewage collection system. This will be accomplished by pipe-laying along the existing roads. The only impacts will be noise and dust issues, as well as a slight increase in traffic caused by construction-related vehicles during the construction period. Since the site for pipe-laying includes working along the roads in inhabitated areas, environmental impacts, such as noise and dust emissions, and access to properties will have to be mitigated by thorough environmental management and traffic control in accordance with the EMP.

Potential Environmental Impacts Related to Design

60. The project design is for the rehabilitation and upgrading of an existing WWTP and the rehabilitation of, and addition to, an existing sewage collection system. The PPTA consultant has developed a preliminary design that is based on the conventional activated sludge process and is considered the most cost-efficient option of three considered[19]. There are no significant differences between the options considered from an environmental impact point of view.

61. No environmental implications are expected from the improvements to the WWTP. Temporary impacts during construction and potential impacts during operation will be mitigated in accordance with the EMP. Sewers will be installed along existing roads and will be of non-metallic pressure piping recommended for sewage and complying with international standards. Non-metallic pipes are characterized by long lasting durability and resistance to corrosion. Steel pipes will be used only crossing of rivers and canals. Asbestos cement pipes will not be used for any purpose.

62. The proposed new chlorination facilities will utilize hypochlorite solution rather than gas, thereby eliminating the potential of serious hazards created by the failure of the gaseous chlorine system.

63. The risk of fire will be minimized by proper selection of fire-resistant or -retardant materials and an adequately designed power supply system that includes grounding of all sub-systems, appropriate insulation and circuit breakers.

64. All structures in contact with the ground will be designed incorporating anti-corrosion measures for mitigation of negative impact on ground water and all structures will be designed to withstand seismic activity up to 8 on the Richter scale.

65. In summary, adverse impacts due to the subproject design are not expected.

[19] The three options considered were (i) aerated lagoons, (ii) New WWTP including the newest technologies (BAT: Best Available Techniques), and (iii) refurbished and upgraded existing activated sludge plant.

Potential Environmental Impacts during Construction

Land use

66. The WWTP work will be limited to the existing site and additional sewers will be laid along existing roads.

Increased Traffic and use of Machinery

67. Traffic (heavy trucks employed for the transportation of construction materials) will increase temporarily during construction of the sub-project. Other temporary environmental concerns relate to the use of excavators, cranes, compressors, and other machinery during the construction works will include: (i) noise and dust from construction sites, and (ii) safety for workers and inhabitants. Measures will be taken in accordance with the EMP to limit dust and noise levels and enforce strict observance of safety rules at main road crossings, along main roads, along the mahalla streets and near sub-project construction sites. Where sensible, temporary traffic lights will be installed at road crossings and temporary traffic diversions will be utilized by the contractors, under the supervision of the PIU. Traffic police control will be intensified in makhallas during the rehabilitation/construction period and adequate warning will be provided to enhance measures of prudence among school children. The contractor and the PIU will inform the public via media announcement about temporary road closings and traffic diversions.

Solid and Liquid Waste Management

68. At the sub-project sites, various types of solid waste, including wood, waste concrete, steel waste, discarded old equipment, oil filters, plastic and cartons from equipment packaging will be produced. Measures, based on the EMP, will include the provision of containers for refuse collection and collection of used oil , with further removal to specially allocated disposal and reclamation sites designated by the Hokimyat. After completion of rehabilitation and construction works, all jobsites will be cleaned and landscaped to approximate original contours. Maintenance of machinery will be done exclusively within the premises of gasoline stations specifically equipped for the storage of used oils and other liquid contaminants. No on-site maintenance of equipment will be authorized.

If groups of workers are to remain at the work sites for extended periods, it will be necessary to construct adequate temporary sanitary facilities including provision for the evacuation of wastewater in selected sites.

69. Regulations on environmental protection, safety and hygiene shall be fully complied with in all phases of constructing the sub-project. Moreover, workers involved (especially, but not limited to, the on-site Work Supervisors) should be made aware of, and trained/guided in standard environmental protection requirements and the IEE recommendations. Contractors will be contractually required to include environmental monitoring as part of their management of the project.

Potential Environmental Impacts during Operation

70. The rehabilitation of the sewer system using appropriate construction methods will assure that leakage to the groundwater is reduced to minimal levels. After completion of the sub-project, effluent from the WWTP will be of much better quality conforming to government standards, thereby minimizing the current negative impacts on the Amudarya River and downstream dwellers.

71. There are no threats of hazardous industrial waste/effluent discharge into the sewerage system as such sources are not connected and other industries connected to the sewers are controlled by regulations necessitating effluent pre-treatment before discharge to the municipal sanitary sewerage system. In addition, the Vodokanal will monitor for any unexpected negative influences to the waste water treatment process and track potential harmful connections back to the source.

72. The drainage system of the refurbished sludge drying beds will be designed and constructed to eliminate adverse impacts on groundwater due to leachate percolating to the groundwater table, which is only a few meters below the ground surface at the WWTP site.

73. Dried sludge and grit produced at site will be disposed of at a site designated by the Sanitary and Epidemiological Service (SES). Some or all of the dried sludge may be utilized as soil conditioner for on-site cultivation.

74. To minimize potential impacts related to O&M, WWTP staff should be adequately trained in the proper operation of the wastewater treatment facilities. Preventive checks and timely repair works should also be ensured to eliminate accidental risks.

Environmental Management and Monitoring Plan

75. Appendix 2 contains the Environmental Management and Monitoring Plan (EMP) which lists potential environmental impacts, mitigation measures, required environmental monitoring activities to ensure implementation of mitigation measures, and entities responsible for carrying out those activities together with estimated costs in excess of the construction contract.

V. INSTITUTIONAL ARRANGEMENTS AND ENVIRONMENTAL MONITORING PLAN

Institutional Arrangements

76. The Uzbekistan Communal Services Agency (UCSA) will be the Executing Agency (EA) of the sub-project. A Central Project Preparatory Management Unit (PPMU) has been established within UCSA to manage and monitor all implementation activities of the sub-project. The PPMU will include representatives from the agencies involved in the National Steering

Committee (NSC). The participating provincial government will be the Implementing Agency (IA).

77. The sub-project will recruit consultants to assist both the EA and IA with the implementation for the duration of the sub-project. These consultants will be attached to the PPMU and PIU. Relevant provincial agencies will provide assistance to the PIU.

78. The supervision and monitoring of sub-project-related resettlement and environmental activities, particularly prior to, and during, construction, is one of the many specified functions of the PPMU. In line with this, it is proposed that an Environmental Monitoring Unit (EMU) be set up within the PPMU to be responsible for environmental management and monitoring. The major responsibilities of the EMU are to ensure that:

- the mitigation measures and monitoring activities are carried out as set out in the IEE Report; and
- reporting is performed in compliance with ADB and relevant Government of Uzbekistan requirements.

79. The EMU should be headed by an appropriately qualified person from those assigned full time (including project Consultants) to the PPMU. At least one technical support staff and if possible one administrative person shall be assigned to the EMU. Relevant agencies will designate their respective representatives to assist the EMU. These will include the State Committee for Nature Protection of the Republic of Uzbekistan (Goskompriroda), State Committee for Geology and Mineral resources of the Republic of Uzbekistan (Goskomgeologiya), Centre of Hydro-meteorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (Uzgidromet), Sanitary and Epidemiological Service (SES) of the Ministry of Health, and if possible and acceptable, NGO's.

80. If appropriate, the PIU will engage a local consultant (an Environmental Specialist) to provide assistance in environmental management and monitoring. Alternatively, if the subproject is not too large to warrant engagement of a consultant, the PIU will nominate Sanitation Engineer or Environmental Engineer to serve as the "focal person", with whom the EMU head will be closely coordinating, particularly for reporting the monitoring results by the focal person.

81. Project Implementation Assistance (PIA) consultants provided during implementation include Environmental Specialists (national and international) who will impart expert advice and guidance and conduct capacity building on environmental management and monitoring, particularly to the members of the EMU and Construction Supervisors.

82. To ensure that ADB environmental requirements and all applicable Government of Uzbekistan environmental laws, regulations, and standards are met prior to start of construction and during construction and operation, an Environmental Management and Monitoring Plan has been prepared (Appendix 2) and this will be implemented by the EMU together with Construction Supervisors.

83. The EMP and functions of the EMU will apply mainly during the pre-construction and construction periods. Environmental monitoring during operation of water supply schemes will be largely the responsibility of the O&M staff attached to the local municipality (under oblast Vodokanals) governed by Oblast Governors with the technical support of the UCSA. However the following agencies also have a role in regular monitoring of water quality:

- State Committee for Geology and Mineral Resources of the Republic of Uzbekistan (*Goskomgeologiya*), which is responsible for monitoring the quality of ground water sources;
- Centre of Hydro-meteorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (*Uzgidromet*), which is responsible for monitoring the state of the rivers, lakes, water reservoirs, pollution of atmospheric air, and land;
- Ministry of Agriculture and Water Management, which monitors quality of collector-drainage waters (by 2 to 4 indicators of mineralization);
- Sanitary and Epidemiological Services (SES) of the Ministry of Health, which monitors water quality of water sources and water in pipelines from centralized drinking water intakes;
- Wastewater quality monitored by the vodocanal and the national Environment Protection Committee

84. Arrangements will be made to receive complaints and comments from the public (members of the makhallas) directly through either the EMU or other relevant representatives if any unexpected impacts occur. The relevant communities will be made aware of this process, their right to complain and necessity to protect the environment. EMU will arrange for this awareness creation, which should include public announcements and signposting at the construction sites, at the very stage of construction. Contractors will be required to register incoming complaints and how complains have been mitigated and report this to the PIU.

Environmental Monitoring Plan

85. The Environmental Monitoring Plan, which is embedded in the EMP, is the framework within which environmental monitoring will be conducted. It will guide the PIU and the EMU in determining if the recommended mitigation measures prior to construction and during construction and operation are being implemented effectively. The EMP is in Appendix 2.

Reporting of Environmental Monitoring Results

86. Environmental monitoring results will be documented to ensure that signs of adverse impacts are detected at the earliest possible time. Monitoring results prior to construction and during construction will have to be reported monthly by the designated “focal person” of PIU to the EMU. A year-end report or an end-of-monitoring phase report, (end of pre-construction phase or end of construction phase), whichever is applicable, will be prepared jointly by the “focal persons” of each PIU and the EMU for submission to PMU head, who will in turn submit it to the provincial Environment Protection Committee for endorsement and to the ADB for approval.

87. The format for the monthly and annual environmental monitoring report will be developed during project implementation by the consultant appointed for the Project Implementation. The format may have to be refined during implementation to incorporate all monitoring findings and lessons learned. Environment compliance reports on implementation of the EMP will be prepared by the PIU every six months and submitted to the ADB for approval after review by the PPMU.

Budget for Environmental Monitoring

88. The cost of environmental monitoring will be that required for the remuneration of staff involved in EMP activities and their travelling expenses as well as any direct cost for monitoring activities. If any NGO members are involved, they will be from the area and therefore, no cost for their involvement but voluntary participation is considered.

89. The nature of the projects and the project locations do not necessitate any specific measurements, such as noise level or quality of water in waste receiving water bodies, during the construction phase. However, if any unexpected impact arises, it is recommended that EMU take necessary action in coordination with the PIU. For such needs, it is recommended that the EMU will employ the existing laboratory facilities of PIU/EMU member agencies.

90. It is estimated that the required investment for Environmental management would be $260,000 for upgrading laboratory facilities (for analysis of influent, effluent and sludge quality) and $55,000 for training the OMP staff on proper operation of upgraded facilities, particularly with respect to environmental sanitation. Other costs of implementing the EMP will be covered elsewhere in the sub-project budget.

VI. PUBLIC CONSULTATIONS AND INFORMATION DISCLOSURE

Consultation and Participation Process

91. PPTA Consultants carried out the following activities:

(i) Initial discussions were held with the representatives of Mayor's Office, Nature Protection Committee and Suvoqova regarding the four proposed sub-projects (see Appendix 3) of Tranche 1, including this sub-project.

(ii) In the Province, formal consultation was conducted on 30 June 2009 following a newspaper advertisement. At this public consultation, discussions were held with the representatives of the relevant Government Agencies and peoples' representatives (see Appendix 4).

(iii) Reconnaissance surveys of the sub-project sites were carried out. The surveys were done by a composite group of members of the PPTA Consultants together with the O&M staff of the WWTP.

(iv) On-site discussions with relevant officials and the O&M staff provided the PPTA team with information on the physical and environmental resources and opportunities and constraints relevant to the proposed sub-project.

92. On 30 June 2009, a public consultation was held with 28 participants at the conference hall of the Meridian Hotel in Termez. Participants included representatives of provincial and city water distribution companies; representatives of 7 local Mahallas (Navruz, Amu sohil, Jomiy, Uchqur, Shifokor, Pattakesar, and Garm); representatives of Termez City's Nature protection committee; local government (Hokimyat); Ministry of Health; and legal advisors. The first speech was made by the representatives of Hokimyat, the head of department of external affairs Bahtiyor Uldashev. PPTA Experts explained the purpose of the consultation and made a presentation, which comprised three sections: (i) sub-project description, (ii) brief account of the results of the environmental assessment, and (iii), a summary of the social assessment.

93. After presentation, the participants were invited to take part in an open discussion. The main concerns and issues raised by the participants are listed below.

(i) Residents of Termez said that the present wastewater system does not function satisfactorily and as a result, some people have closed down their connection and are using alternative systems. They note that private, home-built sewage collection systems often result in bad smells and breeding of flies. They insisted on the need for proper connection and proper operation of the sewerage system.

(ii) Representatives of mahallas that are not connected to the sewerage system noted that they wanted to be connected and insisted that when pipes are laid, backfilling and resurfacing should be properly completed so that the road use will not be impacted. They also enquired whether future projection of population and more connection are considered in the design for expansion.

(iii) Vodokanal staff involved in O&M of WWTP asked about the possibility for them to see properly functioning systems abroad and to develop their skills. They also highlighted the need for a system, which is efficient in energy use, can be operated and maintained easily to reduce the cost of O&M while delivering a better service for a better recovery of cost.

Information Disclosed

94. The consultation disclosed sub-project-related information to the relevant agencies. Further, submission of IEA Report to the Provincial Nature Protection Committee will ensure the disclosure of environmental concerns to the relevant authority.

95. The following is the information disclosed to date by the PPTA team.

(i) Objectives of the sub-project as well as ADB environmental policies and procedures were disclosed to the relevant provincial and district representatives during the initial consultation by PPTA Consultants.

(ii) The environmental categories of the sub-project per ADB and Government policies were disclosed to the Nature Protection Committee.

96. Environmental issues pertaining to sub-project locations and designs, proposed mitigation measures, and forms of possible institutional set up for environmental monitoring will be disclosed to the relevant provincial authorities after completion of the IEE Reports.

VII. FINDINGS AND RECOMMENDATIONS

97. This IEE shows that the implementation of the Upgrading of Termez City Wastewater Treatment Facilities sub-project is unlikely to cause significant adverse impacts on the environment during construction and operation in the short-, medium- or long term. Any minor impacts can be mitigated in accordance with The EMP. Importantly, the proposed sub-project is intended to improve the quality of life and the quality of effluent presently discharged into the Amudarya River, which is a trans-border river and a source of drinking water downstream. The benefits will include availability of better facilities for sewer discharge into the sewage network with potential for future expansion of the network. This is of particular importance since the increased water supply to Termez City provided by the Surkhandarya water supply project will result in increased sewage generation.

98. Threats for human health are expected to be small during the construction and operational phases.

99. It is recommended to implement and revise, when appropriate, the proposed EMP.

VIII. CONCLUSIONS

100. Based on the indication of the Rapid Environmental Assessment in Appendix 1 and the findings of the IEE, the classification of the sub-project as Category “B” is confirmed, and no further special study or detailed EIA will be necessary to comply with the environmental policies of the ADB. Also the Government of Uzbekistan requirements do not require an EIA study as this sub-project is a Class III due to its capacity of less than 50,000m^3/d.

101. The sub-project aims at improving the health of many of the residents of Termez City through the provision of additional sewer connections to a rehabilitated and upgraded WWTP. Any negative impacts that arise during construction and operation can be easily mitigated. The development scheme adopted represents the least cost and environmentally sound solution. The non-implementation of the sub-project would most probably lead to deterioration in the health and increased poverty of the population. The IEE with the recommended institutional arrangements and monitoring program given in the Environmental Management Plan would become the completed Environmental Assessment or the EIA.

Appendix 1

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST
MUNICIPAL WASTEWATER TREATMENT

Instructions:

- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: Uzbekistan / Water Supply and Sanitation TA No: 7240-UZB

Sector Division: Termez City Wastewater Treatment Facilities

Dates Conducted: 31-Jun-09 (Wipula Elkaduwa, Madina Khalmirzaeva, Environmental Specialists)
30-Jul-09 (Morten Jensen, Madina Khalmirzaeva, Environmental Specialists)

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the project area…			
Densely populated?	■	☐	WWTP is not located in densely populated area, but network improvements will take place inside the city. Any temporary impact can be mitigated by EMP requirements
Heavy with development activities?	☐	■	

SCREENING QUESTIONS	Yes	No	REMARKS
Adjacent to or within any environmentally sensitive areas?	☐	■	
Cultural heritage site	☐	■	
Protected Area	☐	■	
Wetland	■	☐	Treated waste water will still be discharged to the area overgrown with reeds between the WWTP and the river. The environmental impact will be less compared to present situation after improvements to the WWTP facilities.
Mangrove	☐	■	
Estuarine	☐	■	
Buffer zone of protected area	☐	■	
Special area for protecting biodiversity	☐	■	
Bay	☐	■	
B. Potential Environmental Impacts Will the Project cause…			
Impairment of historical/cultural monuments/areas and loss/damage to these sites?	☐	■	
Interference with other utilities and blocking of access to buildings; nuisance to neighbouring areas due to noise, smell, and influx of insects, rodents, etc.?	■	☐	Can interfere temporarily during construction, but will be mitigated through EMP requirements – after finishing construction work – there will be no impact
dislocation or involuntary resettlement of people	☐	■	Several families that have located very close to sludge drying beds may complain after WWTP rehabilitation
impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?	■	☐	Rehabilitated and upgraded WWTP will discharge effluent to Uzbek national norms
overflows and flooding of neighbouring properties with raw sewage?	☐	■	
environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?	☐	■	
noise and vibration due to blasting and other civil works?	■	☐	Temporarily during construction work, but will easily be mitigated through EMP requirements
discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?	☐	■	

SCREENING QUESTIONS	Yes	No	REMARKS
inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?	☐	■	
social conflicts between construction workers from other areas and community workers?	☐	■	
road blocking and temporary flooding due to land excavation during the rainy season?	☐	■	Surkhandarya province has little precipitation
noise and dust from construction activities?	■	☐	Temporarily during construction work, but will easily be mitigated through EMP requirements
traffic disturbances due to construction material transport and wastes?	■	☐	Temporarily during construction work, but will easily be mitigated through EMP requirements
temporary silt runoff due to construction?	☐	■	
hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?	☐	■	
deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?	☐	■	
contamination of surface and ground waters due to sludge disposal on land?	☐	■	Sludge drying beds and drainage system will be rehabilitated
health and safety hazards to workers from toxic gases and hazardous materials which may be contained in sewage flow and exposure to pathogens in sewage and sludge?	■	☐	Facilities will be designed to mitigate adverse impact. Workers will receive regular training on the handling of hazardous materials, including chlorine, and general health and safety training. Workers will be provided with necessary Personal Protective Equipment

Appendix 2

Table 1: Environmental Management Plan

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Entity Responsible	Cost Estimate ($)
Pre-construction Project Stage				
Accidents during operations	Risk of accidents after completion causing damage to facilities and workers due to inadequate designs	- Building design with a second category of fire resistance where all elements are made of fireproof or not-easy-to-burn materials; - Design structures to withstand seismic forces in accordance with Uzbek Construction Norms and Regulations (CNR) 2.01.03-96 "Civil Works within seismic areas"; - Ensure unhindered access to the facilities and availability of roads to them in case of emergencies;	PPTA consultants provide conceptual design incorporating mitigation measures; Design-build contractors, if any, provide detail design incorporating mitigation measures; PIU reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Required structures will be items included in costing of the construction budget
WWTP operations causing raw sewage leaks	Pollution of soil and groundwater by untreated sewage at the WWTP during operations	- All buried facilities designed on earth fill with a reliable water sealing installation in accordance with CNR. - Pipes used in the WWTP should be corrosion-proof and have a long service life; - Adherence to CNR 2.01.03-96 and 3.04.02-97 "Corrosion Protection of Buildings" to prevent negative effects on the quality of ground water; - Provide observation wells and monitor groundwater quality	PPTA consultants provide conceptual design incorporating mitigation measures; Design-build contractors, if any, provide detail design incorporating mitigation measures; PIU reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Required structures will be items included in costing of the construction budget
Pipe-laying for new extensions	No expected resettlement, but if it becomes relevant, the land acquisition and resettlement framework (LARF) will be reviewed and amended as necessary to ensure no adverse environmental impact from resettlement.	- Resettlement is addressed in the land acquisition and resettlement framework (LARF) - Review LARF (if any) to ensure environmental aspects of resettlement are considered and addressed.	Monitoring of implementation of LARF by PIU, EMU and PPTA Consultants; Review of PPMU progress Reports By PIU and LARF Committee	No expected re-settlement cost involved in this phase of extension of sewage system
Location of Hazardous Materials (Haz-Mat)	Health hazard and nuisance to people living in proximity to facilities	- Design layout of facilities, which includes ample buffer distance (per CNR) to households living in close proximity to facilities and to worker facilities.	PPTA consultants provide conceptual design incorporating mitigation measures;	Cost of consultants covered in the project budgets Required structures will be

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Entity Responsible	Cost Estimate ($)
storage and of noisy equipment and operations	and to workers on the site	- Include acoustical assessments to determine if noise mitigation at source (noise barriers) is required to prevent nuisance to nearby households or the workers on the facility. - If predicted noise level at neighbouring households is expected to exceed ADB/IFC guidelines, include acoustic barriers in design.	Design-build contractors, if any, provide detail design incorporating mitigation measures; PIU reviews conceptual and detail designs for compliance with mitigation measures	items included in costing of the construction budget
Gas chlorination at WWTP	Impacts on workers health and surrounding environment during operations	- Design chlorination facilities with equipment and facilities to ensure the protection of environment and workers - For safe handling of chlorination, following design features should be considered as a minimum: - Separate room for chlorination equipment will be provided. The room will be located downwind of the facilities, away from entrances, windows, louvers and walkways. - The room will be equipped with ventilating fans with the capacity to provide one complete air exchange per minute when the room is occupied. The fan will discharge the air to the outside of the building and will not be connected to other exhaust system. - The room will have shatter-resistant inspection window mounted in the door or exterior wall. - The room will have locks so that it can be kept inaccessible to staff other than the operator of the equipment. The room door will open outward for easy exit in case of emergency. - Separate light and fan switches will be provided outside the room. - The room floor will have a non-slip surface and floor drains. - A safety shower and eyewash will be provided near the chlorination room entrance. - The chlorination room will have continuous leak detection equipment with sound and visual warnings that can be heard and seen throughout the treatment plant.	PPTA consultants provide conceptual design incorporating mitigation measures; Design-build contractors, if any, provide detail design incorporating mitigation measures; PIU reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Required structures will be items included in costing of the construction budget
Construction Project Stage				
Contractor or workers not following contractual environmental requirements	No or insufficient environmental controls implemented	- Ensure specific contractual requirement, e.g. withholding of payment or penalty clauses, to ensure contractors' implementation of environmental mitigation measures. - Contracts to require contractor to have designated staff to oversee environmental issues and mitigation - Contracts to include the requirement for the contractor to provide environmental induction training to all staff	PIU to ensure monitoring of environmental requirements – by delegation to Environmental Specialist who is the Environment Focal Point of the PIU	Cost should be covered by contract sum, as it will be part of the contract requirements to avoid environmental impact.

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Entity Responsible	Cost Estimate ($)
Machines, equipment, and vehicles used for construction and transport	Emissions from construction equipment exhaust; Dust from vehicles, land clearing, grading, excavation, etc; Noise and vibration from transport vehicles	- Excavated or stockpiled soil and sand shall be watered before loading, if there is a risk of dust generation, e.g. if it is fine materials or under windy conditions. - Soil, sand and other construction materials on transport vehicles shall be covered. - Speeds of such vehicles shall be limited, particularly on unpaved areas. - All heavy equipment and machinery shall be fitted in full compliance with the national (SNPC) and local regulations with regards to emissions and noise. - Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions. - Smoke-belching vehicles and equipment shall not be allowed and shall be removed from the project sites. - Traffic management plan to be developed to mitigate impact on local traffic conditions during construction. - Heavy construction related traffic shall be confined to alternative access road to the WWTP, to avoid accidents and nuisance to dwellers along the road ; - Require the owners of the transport vehicles to only use properly registered and well-maintained vehicles with mufflers to mitigate noise and emissions; - All vehicles shall be well maintained and fitted in full compliance with the national (SNPC) and local regulations. - As a rule, the operation of heavy equipment shall be conducted in the time span 7am-7pm only unless otherwise agreed with local residents. - During night time (10pm to 7am) noise impact on sensitive areas, such as residential areas or hospitals shall not be more than 3dB above background noise levels, as measured at the nearest sensitive receiver (Leq15minutes) two weeks prior to the commencement of works. - Construction equipment, which generates excessive noise, such as compressors, jackhammers shall be enclosed to prevent noise nuisance. - Near sensitive locations, e.g. hospitals, schools, mosques and schools, discuss and agree with the EMU-PIU and the principals of the facilities the agreed time for operating noisy machinery. - Minimize transportation during high traffic periods (e.g., when students are entering or leaving school) to minimize potential traffic accidents	Contractor's Site Supervisor - ensures compliance with EMP - visually inspects safety equipment use, observes vehicle noise levels, etc., - check trucks entering site to assess emissions and licensing; - etc PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	$5,000 for contractor's additional activities; Cost of supervision included in contract cost estimate Cost of supervision included in contract cost estimate

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Entity Responsible	Cost Estimate ($)
Site preparation	Erosion from site clearing, grading and excavation resulting in sedimentation of water bodies;	- Preserve existing ground cover wherever possible, and provide approved ground cover where necessary; - Use appropriate stabilizing techniques to prevent cave-ins or landslides in excavated areas. - Constructing buildings and facilities following the land protection activities stipulated in CNR 3.01.01-97 and CNR 3.05.03-97. - If construction needs to take place during periods with expected rain, additional plan how to mitigate erosion and sedimentation must be agreed with EMU-PIU prior to the work commences.	Contractor's Site Supervisor - ensures compliance with EMP PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	$10,000 for contractors additional activities; Cost of supervision included in contract cost estimate
Revegetation and landscaping	Erosion and sedimentation to water bodies, due to excessive clearing of vegetation or extended periods without vegetation	- Prior to any clearing of vegetation, make a species inventory of the area to be cleared. Use vegetation inventory to identify appropriate local plant species to be used for revegetation. - Avoid tree removal unless justified on engineering, safety, and environmental grounds. - Store topsoil separately from other soil and re-use for revegetation upon completion of works. - Monitor revegetation regularly, especially during initial growth to ensure stable growth and lasting groundcover; - After completion of the construction activities at the WWTP, plant a green belt of local tree and brush species along the perimeter of the facility to provide amenity to the area and to the neighbouring dwellers. Maintain green belt until fully established.	Contractor's Site Supervisor - ensures compliance with EMP PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	
Excavation for pipe-laying; Road use for transport of material and equipment	Damages to utilities by excavation; Temporary access cut-off to properties; Current access roads in poor condition may become worse due to construction vehicles.	- Require contractors to carry out a utility survey before construction and take action during construction to minimize impact on utilities and attend to any damage; - Provide temporary access during construction, if required; - Contractor and PIU to ensure that coordination meetings are held and agreement has been obtained from Hokimyat; prior to any construction beginning on the site (Appendix 5 is a sample agreement form) - Obtain permission for road use from relevant authorities and agreement to repair damages immediately after construction;	Contractor's Site Supervisor - coordinates with PIU and relevant authorities and agencies. - receives and records public complaints and resolves them PIU-Environment Focal Point monitors contractor's complaint resolution procedures and compliance with all provisions of the EMP	10,000 USD for contractors additional activities not covered by contract cost;; Cost of supervision included in contract cost estimate of the contract budget
Wastewater generated at construction site	Site rainwater runoff can wash away residues, garbage, leaves, grease, etc., thereby potentially polluting nearby surface water	- Store all liquid/solid waste properly above ground to avoid spills/ leaks; - Store Haz-Mat, e.g. fuels, chemicals and hazardous waste, in special areas to avoid leaks escaping to the ground or nearby surface waters. Provide ample natural ventilation - Develop spill response procedures provide spill response kits	Contractor's Site Supervisor - periodic visual observation of run-off from construction sites PIU-Environment Focal Point - monitors contractor's compliance with all provisions	10,000 USD for proper disposal of waste and wastewater; Cost of supervision included in cost estimate of the contract budget

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Entity Responsible	Cost Estimate ($)
		at all Haz-Mat storage areas and work sites.	of the EMP	
Solid Waste generated by construction activities	Construction materials (wood, steel bar, cement, etc.), paper, packing, domestic/human waste from work sites causing environmental pollution and adverse aesthetic impact	- Prior to start of construction, develop an inventory of waste fractions expected to be generated during construction for approval of disposal routes and sites by Hokimyat and SES - Provide refuse collection containers and used oil collection containers at all construction sites and labor camps. - Sell paper, resin, iron, and steel and other recyclable waste fractions to other enterprises for recycling. - Dispose inorganic solid waste (concrete, bricks, etc.) properly after approval by Hokimyat and SES. - After completion of civil works, collect all garbage and waste construction materials from the sites, and dispose in specially designated places agreed by the SES <u>Asbestos cement pipe</u> - Leave all asbestos cement and other redundant pipes in the ground where possible. Any asbestos cement pipe that requires removal will be removed safely and in line with provisions agreed with SES and Hokimyat.	Contractor's Site Supervisor - monitors waste stream to ensure maximum recycling. - Ensures proper disposal PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	
Nuisance from Construction - complaints	Nuisance and impacts from the construction activities to neighbouring activities and households.	- Include in contract clauses to reflect this, including the contractor's responsibility to mitigate nuisances, noise, vibration, and dust impacts and other nuisances to neighbours. - Ensure that contractor incorporates good construction management practices - Ensure that contractor liaises with local community on approach to mitigation. - Clarify by signboards on construction sites and/or stickers on equipment outlining how affected parties can lodge complaints. - Ensure that contractor records complaints, response and resolution monitoring and includes complaints registration in regular progress reports.	Contractor's Site Supervisor - ensures good construction management PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	No additional cost, for contract. Monitoring cost already in project budget
Use of labour for construction	Improper handling of waste from construction workers	- Provide temporary water supplies (trucked in) and portable/temporary toilets on-site during construction.	Contractor's Site Supervisor - ensures adequate sanitary conditions PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	
Use of labour from	Inadequate living	- Labour camps, if any	Contractor's Site Supervisor	Cost is included in the labour

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Entity Responsible	Cost Estimate ($)
outside areas	facilities for non-local workers	- Provide adequate sanitary facilities, potable water supply, waste collection, etc. - Test potable water supplies per Uzbek regulation - Ensure that locations of all labour camps are approved by EMU-PIU; - Maximize use of local labour to minimize the need for temporary camps, and also to ensure socioeconomic benefit for the local population.	- ensures good construction management PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	cost of the construction budget
Use of labour from outside areas	Non-local construction crews may generate increased demand for camp followers, illegal drugs, gambling, etc.	- Maximize use of local labourers who will live at home during construction.	Contractor's Site Supervisor - ensures use of local labour PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	No cost involved
Workers' Safety	Inadequate safety during work	- Contractor shall be required to use appropriate stabilizing techniques during excavations, especially during excavations for trenches, which will be down to 6 m depth, to avoid cave-ins. - Education and training of workers on regulations on work safety and risk prevention and to obey them - Workers exposed to noise impact greater than 85 Db(A) shall wear hearing protection. - Contractor shall make available all Personal Protection Equipment needed for workers, e.g. safety shoes, hard hats, safety glasses, and hearing protection,	Contractor's Site Supervisor - ensures safe trenching methods - ensures workers' safety PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	Cost of supervision included in cost estimate of the contract budget
Operation & Maintenance Project Stage				
Toxic material released to environment	Damage to the environment and to people handling chlorine	- Store all Haz-Mat in special areas, with ample ventilation. - Develop spill response procedures and provide spill response kits at all Haz-Mat storage areas. - Include routine training in proper handling of chlorine and other Haz-Mat in the O&M staff training, which covers the full range of technical and management skills required to safely operate the WWTP; - Regularly inspect all chlorine dosing equipment, storage facilities and safety equipment. - Monitor all chlorine storage and dosing equipment and storage facilities for chlorine leaks.	Vodokanal plant manager - ensures safe Haz-Mat handling and storage - develops spill response procedure and provides spill response kits - ensures that O&M staff receives training in chlorination safety procedures from PIA PIU-Environment Focal Point - monitors plant manager's compliance with all provisions of the EMP	Operational cost and training cost included in annual recurrent budget of PIA; After rehabilitation for initial training of O&M staff 10,000 UBD included in project cost

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Entity Responsible	Cost Estimate ($)
Sludge handling at the WWTP	Unsafe disposal of sediments and sludge from WWTP into water ways or the environment	- Solid wastes that are captured in the grit chamber must be disposed in specially designated areas agreed by the SES and Hokimyat; - Sand captured by the sand trap must be disposed in a safe site agreed by the SES and Hokimyat; - Sediment processed in sludge drying bed can be used for fertilizing agricultural land, if analysis of samples confirm non-presence of toxic substances. - If analysis show toxic contents making it unsuited for fertilizing agricultural land, alternative disposal sites needs to be identified by agreement with Hokimyat and SES.	Vodokanal plant manager - ensures safe grit, sand, and sludge disposal - ensures that O&M staff receives training in sludge handling procedures from PIA PIU-Environment Focal Point - monitors plant manager's compliance with all provisions of the EMP	Cost included in the annual recurrent budget of the implementing agency (Vodokanal) New laboratory facilities for the WWTP at 260,000 USD included in sub-project cost
Effluent discharge from the WWTP	Water quality of the WWTP effluent receiving water body (Amudarya River) impacted	- Ensure effluent quality complies with standards specified by the National Nature Protection Committee and as per ADB/IFC guidelines.	Vodokanal plant manager - ensures that plant effluent is analyzed in compliance with pertinent CNR and the requirements of the State Nature Protection Committee PIU-Environment Focal Point - monitors plant manager's compliance with all provisions of the EMP	Effluent quality monitoring cost included in annual budgets of respective agencies; New laboratory facilities for the WWTP at $260,000 included in sub-project cost
Accidents	Risks to workers and facilities due to hazards related to fire and other disasters	- Establish comprehensive safety regulations; - Train and equip all O&M staff to follow the regulations on occupational safety and risk prevention; - Install proper alarm systems; - Ground all electrical equipment and provide circuit breakers - Provide back-up water supplies for fire fighting. - Provide fire extinguishers at strategic locations around the site and monitor them for functionality	Vodokanal plant manager - ensures that O&M staff receives training in occupational safety from PIA PIU-Environment Focal Point - monitors plant manager's compliance with all provisions of the EMP	Cost involved in the annual budget of the implementing agency (Vodokanal) After rehabilitation for initial training of O&M staff $10,000 included in project cost
Contingency planning	Emergency measures as to what options are available and what measures are to be followed if the effluent quality from the WWTP does not meet requirements or WWTP starts to malfunction	- PIA team will be available on short notice to identify a suitable solution to rectify the problem; When problem is identified and a solution is agreed upon, PIA will help find qualified specialists who can deal with the problem.	O&M staff and PIA (technical specialists) jointly with relevant local authorities dealing with Health/ Science and Technology	PIA Contingency expenses: If reserve O&M funds are insufficient, PIA staff will work with the local authorities to meet supplemental funding.

EMP = environmental monitoring plan, HRD = human resources development, O&M = operation and maintenance, PIA = project implementation agency, PIU = project implementation unit, PPTA = project preparatory technical assistance, SES = Sanitary and Epidemiological Services, WWTP = wastewater treatment plant.

Table 2: Environmental Monitoring

Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency	Responsibilities	Cost
Pre-Construction Phase						
Improvement to treatment facilities at WWTP	Parameters in accordance with SNPC WWTP effluent norms	Effluents released from the aeration tank	Laboratory analysis of samples at NPC Laboratory	Once a month	Provincial Nature Protection Committee	This is one of routine activities of the NPC already contracted by Vodokanals (PIA) with budgets
Construction Phase						
Control of impacts of construction on people and environment	Dust, noise, transport, waste disposal, land clearing, utilities and traffic impacts	All construction sites	Visual observation and complaints by public	Regularly during construction for compliance with the EMP requirements	Work supervisors of the PIU and EMU	Work supervisors are under project budgets for construction
Operation & Maintenance Phase						
Adequate treatment of wastewater before discharge	Parameters in accordance with SNPC WWTP effluent norms[a] and ADB/IFC	Effluents released from the chlorine contact tank	Laboratory analysis of samples at NPC and WWTP Laboratory	In accordance with standard set by NPC and standard operating procedures	Provincial Nature Protection Committee and the Vodokanals (PIA)	There will be adequate laboratory facilities at WWTP after project completion for effluent analysis, NPC has budgets for routine work on effluent quality measurement in their budget
Assurance of quality of sludge for use as soil conditioner for agricultural land	Heavy metal and any other suspected toxic substance	Sludge drying beds	Stabilized dried sludge samples	Once for every batch of dried sludge and before use as soil conditioner for agricultural land	Vodokanals (PIA) Heavy metal analysis by specialized laboratory in Toshkent	There will be adequate laboratory facilities at WWTP after project completion for the analysis of sludge and other parameters

ADB = Asian Development Bank, EMU = Environmental Monitoring Unit, IFC = International Finance Corporation, NPC = Nature Protection Committee, PIA = project implementation agency, SNPC = State Nature Protection Committee, WWTP = wastewater treatment plant.

Note:

[a] O'z RH 84.3.5: 2004 (Uzbekistan Regulation 84.3.5: 2004) – Guidelines for calculating maximum allowable pollutants discharged to water bodies (includes Section 5.12 pertaining to Municipal Wastewater Treatment Plants)

Appendix 3

PUBLIC CONSULTATION

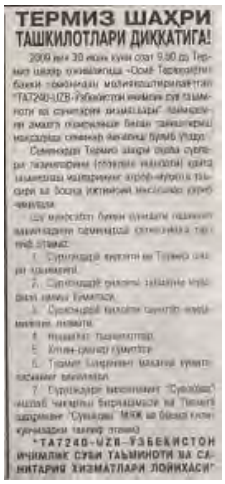
LIST OF PEOPLE ATTENDING THE FIRST PUBLIC CONSULTATION IN TERMEZ CITY

	Name	Position	Date of Consultation
1	Saparov Jura	Deputy Mayor of Surkhandarya province	15 June 2009
2	Tursunov Qahramon	Mayor of Termez City	15 June 2009
3	Khudoynazarov Abdukarim Ortiqovich	Head of Surhkanadryo province branch of "Suvoqova"	15 June 2009
4	Eshboev Rustam	Deputy Mayor of Termez City	15 June 2009
5	Abdusattorov Abdulmannop	Deputy head of Surhkanadryo province branch of "Suvoqova"	15 June 2009
6	Shamiov Alijon	Head of Termez city of "Suvoqova"	15 June 2009
7	Ruzigul Tuhtaevna	Head of Surhkandarya province Natural Protection Committee (NPC)	16 June 2009
8	Holyarov Bahtiyor	Head of environmental department of NPC	16 June 2009
9	Amirov Rustam	Waste water treatment master	16 June 2009
10	Tangirov Davron	Head air, water, soil monitoring department NPC	16 June 2009
11	Ziyeev Eshburi	Head of water inspection NPC	16 June 2009
12	Norahmatova Jumagul	Waste water treatment plant worker	16 June 2009

Figure 1: Public Consultation held on 30 June 2009


Ўзбекистон—келажаги буюк давлат

СУРХОН ТОНГИ


ТЕРМИЗ ШАҲРИ ТАШКИЛОТЛАРИ ДИҚҚАТИГА!

«Термез» шахри окова сувларини тозалаш иншоотларининг кайта таъмирлаш ишларига багишланган семинар катнашчиларнинг

РУЙХАТИ

№	Катнашувчининг фамилияси ва исми-шарифи	Иш жойи ва лавозими	Имзоси
1	2	3	4
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			

Appendix 4

QUALITY OF INFLUENT TO AND EFFLUENT FROM THE WWTP WITH EXISTING TREATMENT FACILITIES

Indicators of pollution	Unit	MPC for fishery water	Composition of sewage at Termez City WWTP	
			Intake	Discharge
Colour			Grey	Light grey
Smell			excrement	Light excrement
Transparency			3.00	10.00
Suspended solids	mg/L	15.00	120.00	35.00
Sediment Volume	mg/L		0.50	0.02
Total dissolved solids	mg/L		1,200.00	1,080.00
pH	$\log_{10}[H^+]^{-1}$	7.50	7.90	7.80
COD	mg/L	9.00	130.00	82.00
BOD_5	mg/L		78.00	36.00
BOD_{20}	mg/L	6.00	101.00	47.00
Ammonia nitrogen	mg/L	0.50	5.00	1.90
Nitrites	mg/L	0.02	0.10	0.02
Nitrates	mg/L	9.10	-	0.60
Chlorides	mg/L	300.00	96.00	92.00
Sulphate	mg/L	100.00	390.00	388.00
Iron	mg/L	0.50	0.12	0.10
Phosphates	mg/L	0.10	0.40	0.35
Oily products	mg/L	0.01	0.08	0.04

[a] PPTA consultant report on Termez City water supply system.

Notes:

1. Low SS and BOD of the raw sewage indicates that it is weak (or diluted)
2. Quality of effluent after "treatment" does not meet the SES requirements of the MOH

Appendix 5

FORM USED TO COORDINATE AND AGREE BY DIFFERENT ENTITIES PRIOR TO COMMENCING UNDERGROUND WORKS IN TERMEZ CITY

Термиз шахар «Коммунал хужалик» бошкармаси
Объектларда ер ости (усти) мухандислик тармокларини утказиш хукукини берувчи ордер олган субъектга куйиладиган

ТАЛАБЛАР

1. Ер ости мухандислик коммуникацияларини очишда ва ётишда бош бошкарманинг (бундан буён бошкарма) вакилини иштирокини таъминлаш.
2. Конунчиликда белгиланган тартибда туловларни амалга ошириш.
3. Таъмирлаш ёки бошка курилиш монтаж ишлари тугатгандан сунг ишлар амалга оширилган худудда ободончилик ишларини амалга ошириш.
4. Таъмирлаш ва курилиш-монтаж ишлари бажарилётган худудда техника хавфсизлигига риоя этиш.
5. Серкатнов кучаларда амалга ошириладиган ишларда хавфсизликка риоя этиш.
6. Бошка мухандислик коммуникацияларга шикаст етказмаслик шикаст етказган такдирда уз хисобидан тиклаб бериш.
7. Ишларни белгиланган муддатда тугатиш.
8. Иш тугагандан сунг бошкармага хабар бериш.
9. Ордер олувчи бошкарма хисоб ракамига пул утказиш ёки загасига белгиланган энг кам иш хакининг икки бараварида пул утказади ёки кирим килади.

Изох: Ушбу ишларнинг барчаси субъект томонидан амалга оширилади.

Тэнишдим _____

Ер ости (усти) мухандислик тармокларини Утказиш хукукни берувчи

ОРДЕР № _____

Манзил: Термиз шахар _____
Мухлат: «____»_____200__йил
Тармоклар номи_____
Бухортмачи _____
Пудратчи _____
Ишни назорат килувчи_____

Техник хужжатлар келишиб олинди

1. Термиз шахар архитектура ва шахарсозлик бошкармаси _____
2. Шахар электр тармоклари _____
3. Шахар «Сувокова» корхонаси _____
4. Шахар газлаштириш корхонаси _____
5. Шахар алока бошкармаси _____
6. Шахар иссиклик манбаи и/ч корхонаси_____
7. Шахар ДАН _____
8. Термиз шахар Хокимияти _____

Ордер ишни назорат килувчида сакланиши ва талаб килинганда курсатилиши шарт.
Ордер берилган вакти «____»_____200__йил

Термиз шахар «Коммунал хужалик» бошкармаси:

* The entities that have to be included and accept the works are:

(i) Administration of Architecture and Town Planning of Termez City
(ii) City Power Supply network
(iii) City “Suvokava” entity
(iv) City Natural Gas Supply Company
(v) City Communications Administration
(vi) City Heating Source and Production entity
(vii) City Traffic Police
(viii) Termez City Hokimiyat

Republic of Uzbekistan

Uzbek Agency "UZKOMMUNHIZMAT"

ADB TA 7240: Water Supply and Sanitation Services Improvement Program (WSSSIP)

Water Supply Appraisal Report

Sub Project 1

Damkhodja Water Intake Facility Development

August 2009

Acronyms

AC	Asbestos Cement (pipe)
ACS	Automatic Control System
ADB	Asian Development Bank
AR	Appraisal Report
BCR	Benefit-Cost Ratio
CIA	Cumulative Impact Assessment
CMU	Contracts Monitoring Unit
DMF	Design and Monitoring Framework
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
ECA	Environmental Consequences Assessment
EIRR	Economic Internal Rate Of Return
EMDF	Ethnic Minority Development Framework
EMP	Environmental Management and Monitoring Plan
EMU	Environmental Monitoring Unit
ENPV	Economic Net Present Value
EOCC	Economic Opportunity Cost of Capital
FIRR	Financial Internal Rate of Return
FNPV	Financial Net Present Value
FMAQ	Financial Management Assessment Questionnaire
FMICRA	Financial Management Internal Control and Risk Assessment
GOU	Government of Uzbekistan
GPS	Global Positioning System
Haz-Mat	Hazardous Material
HDPE	High-Density Polyethylene
HH's	Households
IA's	Implementation Agencies
IEA	Initial Environmental Assessment
IEE	Initial Environmental Examination
IFI	International Financing Institutions
IKS	ISLOHOTKONSALTSERVIS (responsible for the completion of the NFS)
IPDP	Indigenous Peoples' Development Plan
IRTM	Inter Regional Trunk Main
KPI	Key Performance Indicators
LAR	Land Acquisition and Resettlement
LARF	Land Acquisition and Resettlement Framework
LARP	Land Acquisition and Resettlement Plan
MIS	Management Information System
MOE	Ministry of Economy
MOF	Ministry of Finance
MOU	Memorandum of Understanding
MFF	Multi-Tranche Financing Facility
NFS	National Feasibility Studies
NPSH	Net Pressure Suction Head
NRW	Non Revenue Water
OM	Operations Manual
O&M	Operation and Maintenance (costs of)
PIU	Program Implementation Unit
PFR	Periodic Financing Request
PPP	Public Private Partnership
PPTA	Project Preparation Technical Assistance
PPMU	Project Preparation Management Unit
PVC	Polyvinylchloride
REA	Rapid Environmental Assessment
RRP	Report and Recommendation to the President
SCNP	State Committee for Nature Protection
SERF	Shadow Exchange Rate Factor
SES	Sanitary and Epidemiological Services
SESU	PPMU's Social and Environment Subunit
SIEE	Summary Initial Environmental Examination
SNIP	Uzbekistan Regulatory Standards
SNPC	State Nature Protection Committee
SOE	Statement of Expenditure
SPRSS	Summary Poverty Reduction and Social Strategy
STP	Simplified Technical Proposal
SWRF	Shadow Wage Rate Factor (unskilled labour)
TA	Technical Assistance
TDS	Total Dissolved Solids
UCSA	Uzbekistan Communal Services Agency
UTS	Urban Type Settlement
WACC	Weighted Average Cost of Capital
WDU	Water Distribution Unit
WHO	World Health Organisation
WSS	Water Supply and Sanitation
WYGI	White Young Green International (PPTA lead company)

Table of Contents

1. BACKGROUND 4

1.1 Introduction 4

1.2 Project Location 5

1.3 Scope of Work 5

1.4 Appraisal report 6

1.5 Detailed and Preparation of Documents for Approval of Government of Uzbekistan 7

2. EXISTING WATER SUPPLY SYSTEM 7

2.1 Existing Water Supply Operation 7

2.2 Existing Operational Problems 8

2.2.1. Borehole Operating Performance 8

2.2.2. Collector Main Operation 9

2.2.3. Source Protection 9

2.2.4. Kurpa Water Distribution Unit 9

2.2.5. Navoi Water Distribution Unit 10

2.3 Current Water Quality 10

3. APPRAISAL REPORT CRITERIA 11

3.1 Pipeline Hydraulics 12

3.1.1. Sizing 12

3.1.2. Hydraulic Calculation 12

4. Increased WATER Production 12

5. PROPOSED IMPROVEMENT WORKS 12

5.1 Option 1 Part 1 - Borehole Rehabilitation 13

5.2 Option 1 Part 2 - Water Source Protection 13

5.3 Option 1 Part 3 - Rehabilitation of Kurpa and Navoi WDUs 13

5.4 Option 2 Part 1 – Telemetry 14

5.5 Option 2 Part 2 – IRTM Flow & Pressure 14

5.6 Option 3 – Stage 1 of Gallery Water Abstraction Scheme at Damkhodja 14

5.7 Option Recommendations 14

5.8 Preliminary Cost Estimates 15

5.9 Improvement Benefits 15

5.9.1. Levels of Service 15

5.9.2. Operating Costs and Income 15

6. DUE Diligence 15

6.1 Land Acquisition and Resettlement 15
6.2 Social Analysis 16
6.3 Institutional Strengthening and Capacity Development 16
6.4 Economic and Financial Analysis 16
6.5 Initial Environmental Examination 16
6.6 Earthquake Zone 17
Appendix 1 – Preliminary Cost Estimates 18
Appendix 2: The Schematic Layout of Damkhodja IRTM 20
Appendix 3: Layout of Boreholes at Damkhodja Water Source 21
Appendix 4: Drawing of Kurpa Water Distribution Unit 22
Appendix 5: Drawing of Navoi Water Distribution Unit 23
Appendix 6: Resettlement - Due Diligence Report 24
Appendix 7: Institutional Strengthening and Capacity Development 26
Appendix 8: Damkhodja Economic & Financial Analysis 43
Appendix 9: Environmental Assessment 51

Formatted: Bullets and Numbering

BACKGROUND

1.1 Introduction

The proposed Multitranche Financing Facility program (Investment Program) is planned to be undertaken in 4 Tranches over the period 2009 to 2018. The water supply and sewerage systems in most of the towns and cities across the 12 provinces of Uzbekistan are in various stages of disrepair and require rehabilitation, upgrading and expansion. The total financing needs identified for the sector are estimated at $3.2 billion. ADB's proposed Investment Program will finance up to $375 million (including $75 million Government's contribution) as a time scale of this requrement. As envisaged at project preparation, each tranche will focus on 3 different provinces. The Executing Agency for the Investment Program is the Uzbekistan Community Services Agency (UCSA), which is responsible for implementing externally financed projects in the sector.

Where the local groundwater resources are inadequate to supply the needs of the developed areas water supply is supplemented through a series of inter-regional trunk mains (IRTMs) and regional trunk mains (RTMs). There are currently 6 IRTMs and 3 RTMs under the operational management of UCSA. These systems supply bulk water to some vodokanals for distribution throughout communities.

Operation of the Inter-regional transmission mains (IRTMs) is the responsibility of UCSA.. Delivery and operation and maintenance (O&M) of water supply and sewerage (WSS) services are the responsibility of province (oblast) and district (rayon) vodokanals. All vodokanals are potentially eligible to apply for inclusion under the Investment Program, but will be evaluated against the eligibility criteria established with the Government. Commitment by the vodokanals to institutional and financial reforms is an important aspect of eligibility, with a view to full sustainability after the water and sewerage facilities have been upgraded.

Under Tranche 1 of the Investment Program 13 subprojects have been identified as being eligible including:

- Damkhodja IRTM water intake facility,
- 11 District Centre/city water supply and distribution systems, and
- Termez City sewage collection system and wastewater treatment plant.

Of these, four subprojects confirmed as meeting the eligibility criteria have been appraised in sufficient detail to confirm physical works, cost estimates, O&M costs, environmental and social safeguards, and economic and financial sustainability. They will be used as samples for the succeeding subprojects in Tranches 1-4. The four sample projects are the Damkhodja ITRM Water Intake Facility, the water supply and distribution systems in Karmana (Navoi Province) and Galaasiya (Bukhara Province), and the Termez (Surkhandarya province) sewerage system.

This appraisal report is for the **Damkhodja water intake facility and associated Kurpa and Navoi Water Distribution Units (WDU) sub-project.**

1.2 Project Location

Damkhodja water intake facility, consisting of 94 boreholes, is situated in the valley of the Zarafshan river in Samarkand Province adjacent to the Karadarya River, downstream of the confluence of the Zarafshan, Akdarya and Karadarya Rivers. The area relates to Zarafshan trans-mountains and is a part of the Zarafshan river water basin. Underground water is in an unconfined aquifer of the water bearing formations of the quaternary shale, hydrologically linked with the flow of the Zarafshan river. Schematic layout of Damkhodja IRTM is indicated in the Appendices3, 4 and 5. The Kurpa WDU is located close to the Damkhodja boreholes, the Navoi WDU is located some 69 km from the Kurpa WDU.

Figure 1: Damkhodja subproject location

The water intake facility, collection, treatment, storage and then conveyance to Kurpa and Navoi WDUs are operated and maintained by the Operational Office of Damkhodja IRTM.

1.3 Scope of Work

The scope of work for the development of the Damkhodja appraisal report is indicated below:

- Improve the water supply production from the existing Damkhodja boreholes.
- Improve water supplies and water quality to existing customers supplied from IRTM in the provinces of Samarkland, Navoi and Bukhara,
- Undertake detailed site visits to Damkhodja, Kurpa and Navoi WDU to verify data, identify new data requirements and determine, from discussions with IRTM

management, how the current water supply abstractions and water supply distribution infrastructure operates and the problems encountered operating the supply system.

- Evaluate the Damkhodja proposal against the agreed eligibility criteria for participating in Investment Program;
- Review all UCSA reports and recommendations for the water sector in Uzbekistan and in particular for Damkhodja IRTM operation.
- Prepare identification of the improvements required to increase raw water production from the existing Damkhodja boreholes.
- Develop options for delivering the identified improvements to the Damkhodja infrastructure.
- Analysis and selection the preferred option available to delivery the improvements to the Damkhodja water intake facility based on value engineering and least cost principles, while meeting design and service standards.
- Development of pre-design cost estimates.
- Preparation of an initial environmental examination (IEE), including an environmental management plan (EMP), to mitigate identified impacts. Related costs have been included as a line item in the subprojects costs estimates;
- Initial screening for resettlement requirements and preparation of a resettlement plan if required. Related costs have been included as specific line item in the subproject costs estimates;
- Preparation of economic and financial analysis;
- Incorporation of social and gender action plans including a program to improve hygiene in local schools, health clinics and hospitals;

Projected revenue requirements, budget, and cost recovery plan including analysis of current and projected water tariff requirements, financing of gaps in revenue versus costs.

1.4 Appraisal report

The main objectives of this stage of the project are:

- Identification of the operational problems relating to the Damkhodja boreholes, Kurpa and Navoi WDUs.
- Identification of water demand projections, including adequate provision for fire fighting according to Uzbekistan Standards.
- Development of the water production improvement options.

- Provide recommendations for the investment requirements to improve water. production at Damkhodja water intake facility, Kurpa and Navoi WDUs.
- Development of pre-design improvement cost estimates.
- Development of criteria for use in the future Feasibility/ Design and Tender phase.
- Ensuring that water quality provided to the city complies with Uzbekistan Standards.

1.5 Detailed and Preparation of Documents for Approval of Government of Uzbekistan

After Government and ADB approval of the Investment Program, this work will be carried out by UCSA and their consultants, to include:

- Field surveys using GPS instruments, satellite images, latest maps and supplementary field surveys.
- Topographical maps for all proposed pipelines including all reference points.
- Use of hydraulic network model to confirm pre-feasibility rising main and pipeline diameters and flows.
- Detailed review of existing water supply system including operation of all 94 boreholes, their pumps, pipes, fittings, chlorination unit, and etc.
- Production of final design report and cost estimates.
- Production of tender documents and procurement process.

Formatted: Bullets and Numbering

EXISTING WATER SUPPLY SYSTEM

1.6 Existing Water Supply Operation

The Damkhodja water production operation contains a total of 94 boreholes, these are boreholes ranging from 61 to 62 metres in depth. The boreholes are located in 3 groups on both sides of the Karadarya River, they are drilled in the river gravels and the majority of the discharge is from the river flows. However, flows from the individual boreholes vary and the current production data is listed below in **Table 1.**

Table 1: Information on flows from the individual boreholes in Damkhodja

Borehole Reference Number	Borehole Depth m	Borehole Flow l/sec	Individual Daily Production at Mean Flow Rate
1 to 15	61-62	45 to 60	4492.8
16 to 25	61-62	30 to 40	3024
26 to 34	61-62	30 to 40	3024

Borehole Reference Number	Borehole Depth m	Borehole Flow l/sec	Individual Daily Production at Mean Flow Rate
35	61-62	45 to 60	4492.8
36 to 49	61-62	30 to 40	3024
50 to 60	61-62	15	1296
61	61-62	30 to 40	3024
62 to 84	61-62	15	1296
85 to 94	61-62	30 to 40	3024

Using the individual borehole submersible pumps the water is pumped through two 1400mm diameter raw water collector pipes directly to the 2 x 5000m3 storage reservoirs at Kurpa WDU.

Following chlorination of the water at the Kurpa WDU the water is discharged by gravity into the 1400 diameter twin mains which operate in the first section of the IRTM. The Navoi WDU is located some 69 kms from Kurpa, at the unit the water from the IRTM is discharged into 2x5000m3 storage reservoirs. Following 2nd stage gas chlorination, the water is discharged by gravity into a single 1400 mm diameter main to supply vodokanals and industrial supplies in Navoi and Bukhara Provinces.

The IRTM is only metered on the outlet mains from Kurpa and Navoi WDUs. No water meters are installed on the individual borehole outlets or the raw water collector pipes.

The Damkhodja water production was designed to supply 210 Ml/day; the plant and IRTM are managed by the IRTM – OMA. The current maximum water production is 150Ml/day; this can be reduced to 114 Ml/day during the summer and autumn period. A total of 123 exports are provided from the Damkhodja IRTM, each of the export points should be metered, the importer of the water is responsible for the bulk meter maintenance.

Formatted: Bullets and Numbering

1.7 Existing Operational Problems

The Damkhodja Water Intake Facility is currently experiencing many water supply production problems, the key ones are indicated below:

2.2.1. Borehole Operating Performance

(a) The operating life of the individual submersible pumps is very poor with an operating life on average of only 8 months before the need for rehabilitation or replacement. Before finalising any borehole rehabilitation the reasons for this very high failure rate should be fully investigated, regular borehole dipping and CCTV inspection of all existing boreholes should be undertaken, together with a full study of the ground water management plan and strategy.

(b) The overall efficiency of the submersible pumps is poor.

(c) Up to 30% of the 94 existing boreholes can be non – operational on a regular basis. The IRTM management believe the problems are caused by:

- Sand in pumps
- Old and poor quality submersible pumps
- Electricity surges

No evidence was available to support the claims and other possible causes had not been investigated.

(d) There is no regular water quality monitoring upstream of the quality in the rivers

(e) Borehole numbers 19, 20, 28, 37, 56, 63, 64, 74, 75, 93 and 94 are currently out of operation and require major rehabilitation. (The existing boreholes are a maximum of 250/300 m apart, the impact on the operation and water quality of existing operational boreholes should be fully assessed prior final rehabilitation approval)

(f) A further 45 boreholes require cleaning and re-equipping with new pumps, pipe work, fittings and meters.

(g) There are no dipping pipes installed in the boreholes and no evidence that regular monitoring of pumping and standing water levels is being undertaken.

(h) There are frequently electricity supply failures to the boreholes caused by transformer failures.

(i) The borehole headwork's are in poor condition with no air valves, non-return valves or water meters

(j) Currently the water production from Damkhodja is insufficient to provide the current water demands at the 123 export points.

2.2.2. Collector Main Operation

(a) Leakage is occurring on sections of the 300 mm outlet pumping mains from the boreholes to the collector main.

(b) No water meters are installed on the individual boreholes, output is calculated using pump duty and pump hours run. The accuracy of the production data is not reliable. Hydraulically the use of individual submersible pumps discharging into common collector pipes is not an efficient process.

(c) The only water meter is located on the outlet mains from Kurpa WDU at the start of IRTM.

2.2.3. Source Protection

(a) The wire fence erected to protect the boreholes from pollution has been removed; the boreholes are very shallow and are at risk by this action.

(b) The potential water quality from the rivers supplying the recharge to the boreholes is of concern due to the farming activities upstream of the boreholes. It would appear that no regular water sampling is being undertaken to monitor the quality, if quality problems are determined a new Water Treatment Plant may be required or re-drilling boreholes at new locations.

2.2.4. Kurpa Water Distribution Unit

(a) The chlorination units at the distribution unit is in poor condition and requires urgent replacement. Chlorine cylinder storage should be improved.

(b) The vents on the 5000 m3 water storage at the unit require rehabilitation.

(c) No water meters installed on the inlet to the service reservoirs.

(d) The local use pumping stations were pump and pipe work rehabilitation.

(e) Inlet and outlet electrical actuators on the sluice valves not operational.

(f) The health and safety equipment requires full replacement, together with operator use training.

(g) Administration buildings need rehabilitation

2.2.5. Navoi Water Distribution Unit

(a) The chlorination units at the distribution unit is in poor condition and requires urgent replacement. Chlorine cylinder storage should be improved.

(b) The vents on the 5000 m3 water storage at the unit require rehabilitation.

(c) No water meters installed on the inlet to the service reservoirs.

(d) The local use pumping stations were pump and pipe work rehabilitation.

(e) Inlet and outlet electrical actuators on the sluice valves not operational.

(f) The health and safety equipment requires full replacement, together with operator use training.

(g) Administration buildings need rehabilitation.

(h) The pressure in the outlet IRTM between Navoi and Bukhara is insufficient to provide adequate and consistent water supplies to the vodokanal downstream of the Navoi WDU. If the vodokanal sub-projects for water supply and distribution rehabilitation are to be successful in the period 2010 to 2015 this key issue must be addressed.

Formatted: Bullets and Numbering

1.8 Current Water Quality

The current key water quality indicators from the Damkhodja water sources supplying the IRTM are indicated in Table 2 below:

Table 2 – Damkhodja Water Quality Information

	Damkhodja Water Quality Analysis			
Component	**Unit**	**WHO**	**Uzbek Standard 950:2000**	**Damkhodja**
PH	Units	6.5-8.5	6-9	7.6
TDS	mg/l	1000	1000 (1500)	525
Calcium Ca	mg/l	200		N/c
Sodium Na	mg/l	200		N/c
Chloride Cl	mg/l	250	250	16.4
Sulphate SO4	mg/l	400		N/c

	Damkhodja Water Quality Analysis			
Component	**Unit**	**WHO**	**Uzbek Standard 950:2000**	**Damkhodja**
Nitrate NO3	mg/l	50	45	4.3
Hardness Ca+Mg	Mg*ecv/l	500	7/10	6.4
Turbidity	NTU		1.5/2.0	0.12
Ammonium NH4	mg/l	0.5		N/a
Polyphosphate Phosphorus	mg/l		3.5	N/c
Fluoride F	mg/l	1.5	0.7	N/c
Nitrite NO2	mg/l	3	3	N/a
Iron Fe	mg/l	0.3	0.3	0.06
Manganese Mn	mg/l	0.5	0.1	N/a
Copper Cu	mg/l	1	1	N/a
Lead Pb	mg/l	0.01	0.03	N/c
Chromium Cr	mg/l	0.05	0.05	N/c
Cadmium Cd	mg/l	0.003	0.001	N/c
Zinc Za	mg/l	3	3	N/c
Nickel Ni	mg/l	0.07	0.1	N/c
Arsenic As	mg/l	0.01	0.05	N/c
Alpha	Bq/l	0.1	0.1	N/c
Beta	Bq/l	1	1	N/c
Aluminium Al	mg/l		0.2(0.5*)	N/c
Beryllium Be	mg/l		0.002	N/c
Boron B	mg/l		0.5	N/c
Cadmium Cd	mg/l		0.001	N/c
Molybdenum Mo	mg/l		0.25	N/c
Mercury Hg	mg/l		0.0005	N/c
Lead Pb	mg/l		0.03	N/c
Selenium Se	mg/l		0.01	N/c
Strontium Sr	mg/l		7	N/c
Benzol C_6H_6	mkg/l		10	N/c
Benzpyrene	mkg/l		0.01	N/c
Polyakrilamid	mkg/l		2	N/c
Total Coliforms	MPN/100ml	Not Allowed	<100	N/c
E Coli	MPN/100ml	Not allowed	<3	<3
Free Chlorine	mg/l		0.2 – 0.3	0.11

N/c –Not conducted (Analysis)
N/a – Not available

APPRAISAL REPORT CRITERIA

Formatted: Bullets and Numbering

The criteria used in this appraisal report to determine the characteristics of the proposed raw water mains are indicated below. These will be further checked and expanded in the future full feasibility study, design and tender preparation stage.

Formatted: Bullets and Numbering

1.9 Pipeline Hydraulics

3.1.1. Sizing

Pipelines will be sized to meet the maximum specified flow rate to achieve the defined levels of service.

3.1.2. Hydraulic Calculation

Hydraulic calculations will be conducted using the Hazen Williams Equation for the calculation of friction loss; the roughness factor applied for HDPE is 100.

In the future design stage the hydraulic calculations should be conducted using Water Cad software.

Formatted: Bullets and Numbering

INCREASED WATER PRODUCTION

The Table 3 below indicates the projected water production increase from the borehole rehabilitation project; the projection is based on flow rates from each of the rehabilitated boreholes in the range 30/40 l/sec. The detailed Feasibility Study will accurately forecast the expected sustained flows from the newly drilled and newly refurbished boreholes and new submersible pumps.

11 Boreholes Rehabilitated and 45 cleaned B/H Numbers indicated in Section 5.1	
Potential Flow Rates	**Production Ml/day**
30 l/sec	25.92
35 l/sec	30.24
40 l/sec	34.56
52 l/sec	44.92
15 l/sec	12.96

The current production is 150 Ml/day, it is anticipated that once re-drilling and cleaning of boreholes is completed together with installation of new pumps the output will be at the middle of the 30/40 l/s range. This will allow increase of production to around 180 Ml/day for the 11 Tranche1redrilled boreholes.

The completion of cleaning, refurbishment and installation of new pumps, fittings and collector pipelines will produce a similar increase, making the total production 210 Ml/day. However this projection is based on the resting of some of the other boreholes.

Formatted: Bullets and Numbering

PROPOSED IMPROVEMENT WORKS

Due to the extensive deterioration of the existing system only the most urgent and major components can be replaced under this subproject/Investment Program. Continued improvement of the systems will be need to be carried out even after this intervention by UCSA [IRTMs] The technical capacities will have been strengthened under the Investment Program. However if further evaluations reveal that more work is required now to attain targets of improved service/

water production, UCSA could consider such follow-on works under later tranches of the Investment Program.

Indicated below are three options for improvement in water production at Damkhodja, option 1 is in three parts, as indicated in Sections 5.1, 5.2 and 5.3 below.

1.10 Option 1 Part 1 - Borehole Rehabilitation

Formatted: Bullets and Numbering

It is proposed that the following borehole rehabilitation is undertaken:

(a) Re-drill and rehabilitate existing boreholes numbers 19, 20, 28, 37, 56, 63, 64, 74, 75, 93 and 94. The potential increase in water production is indicated in Table 3 in Section 4 above.

(b) Install 150mm EM water meters on the outlet from each borehole, together with new sluice valves, non-return valves and air valves.

(c) Install solid and slotted borehole linings on each re-drilled borehole. [It is recommended that CCTV inspections are undertaken prior and after the B/H rehabilitation]

(d) Install 200mm steel rising mains and 25mm dipping tubes in each rehabilitated borehole.

(e) Install new high efficiency submersible pump in each rehabilitated borehole.

(f) Replacement of selected sections of the 300mm pumping mains from rehabilitated boreholes to the collector pipe.

(g) Replacement of 25 - 250kw transformers at boreholes, 1 electrical sub-station and 3km of power lines.

(h) Undertake cleaning of 45 existing boreholes and install 45 new submersible pumps.

(i) Purchase stock of standby submersible Pumps (2 for each pump duty flow/head)

1.11 Option 1 Part 2 - Water Source Protection

Formatted: Bullets and Numbering

It is proposed that the following rehabilitation work is undertaken:

(a) Replacement of 19 km of fencing around the existing borehole fields.

(b) Installation of automatic raw water quality monitor upstream of borehole abstractions.

1.12 Option 1 Part 3 - Rehabilitation of Kurpa and Navoi WDUs

Formatted: Bullets and Numbering

It is proposed that the following rehabilitation and improvement work be undertaken at the Kurpa and Navoi WDUs:

(a) Reconstruction of the chlorination facility to provide separate storage for chlorine drums and chlorination equipment.

(b) Installation of duty and standby chlorinator units at 50 kg/hr on both outlet mains and health and safety equipment.

(c) Replacement of vents on existing 5000 m3 storage reservoirs (2 at each WDU).

(d) Refurbishment of Local Use Pumping Stations and pipe work (1 at each WDU)

(e) Renewal of electrical actuators on existing control valves (6 at each WDU).

(f) Renewal of outlet water meters.

(g) Installation of inlet water meters at each service reservoir.

(h) Rehabilitation of administration buildings.

(i) Provision of security lighting.

1.13 Option 2 Part 1 – Telemetry

Formatted: Bullets and Numbering

It is proposed that the following new management control system be introduced:

(a) Telemetry [SCADA] monitoring and control system for the Damkhodja Boreholes, Kurpa and Navoi WDUs.

1.14 Option 2 Part 2 – IRTM Flow & Pressure

Formatted: Bullets and Numbering

It is proposed that the following management control systems be introduced:

(a) Installation of 6 insertion points on the 1400mm IRTM for use with mobile insertion meters for flow measurement surveys.

(b) Purchase of ultrasonic flow meter for flow measurement surveys and meter audit checks.

(c) Installation of pressure sustaining valves on the 1400mm IRTM downstream of Navoi WDU. These are essential to maintain adequate export pressures at the vodokanal import points.

1.15 Option 3 – Stage 1 of Gallery Water Abstraction Scheme at Damkhodja

Formatted: Bullets and Numbering

It is proposed that the following additional water source be designed and constructed:

(a) Stage 1 of survey, design and construction of a gallery water abstraction point adjacent to the Damkhodja Boreholes. The survey would include a full study of the ground water management resources plan and strategy; this would determine the future reliable yields from the proposed gallery scheme and the impact on the existing boreholes which would operate in conjunction with the gallery to provide long-term water supplies.

1.16 Option Recommendations

Formatted: Bullets and Numbering

The following recommendations are made:

(a) Option 1 Parts 1 to 3 should be included in the project proposals.

(b) Option 2 Part 1 should be rejected until a full Telemetry Management Plan is developed by IRTM Management. Currently only very limited outstations, signals and controls would be available. A basic system using mobile telephone technology may be a better option for controlling borehole pumping.

(c) Option 2 Part 2 should be included in the project proposals.

(d) Option 3 should be included in the project, providing the Groundwater Resources Management and Strategy Plan indicates reliable yields at the quantities required, in conjunction with the existing boreholes, for to supply the calculated 2025 water demands.

1.17 Preliminary Cost Estimates

The preliminary cost estimates for Damkhodja subproject activities works is $11,185,000. The detailed breakdown of the costs based on preliminary data is indicated in **Appendix 1**.

The actual cost for Damkhodja subproject activities will be identified during the detail design.

1.18 Improvement Benefits

Formatted: Bullets and Numbering

The following benefits are expected from the improvement works:

5.9.1. Levels of Service

(a) On completion of the proposed improvements at Damkhodja increased flows in the range 30.24 to 34.56 Ml/day will be available from Kurpa WDU.

(b) Water quality supplied will comply with Uzbekistan water quality standards.

5.9.2. Operating Costs and Income

(a) The real and apparent water losses in the IRTM are estimated to be a maximum of 22% and therefore and additional 27 Ml/day would be available from the boreholes for resale to the existing 123 export points. If the gallery project, stage 1, is implemented this quantity would double.

(b) There will be a decrease of 9% annum in electricity costs for operation of the new submersible pumps, due to use of submersible pumps and motor with high overall efficiencies.

Formatted: Bullets and Numbering

DUE DILIGENCE

1.19 Land Acquisition and Resettlement

Land Acquisition and Resettlement (LAR) – Due Diligence report was prepared as part of the Investment Program. This report confirms that Damkhodja subproject has no negative social impacts associated with LAR and that the project will benefit the provinces of Navoi and Bukhara by providing adequate safe drinking water supply.

The complete Die Diligence report is presented in **Appendix 6.**

1.20 Social Analysis

The proposed Damkhodja water intake sub-project will not directly impact on a social community or settlement in the near vicinity to the facility, and has not therefore been the focus of social analysis.

1.21 Institutional Strengthening and Capacity Development

An initial assessment of current institutional structure and capacities of the Damkhodja IRTM was conducted as part of the Investment Program. Main objectives of the initial assessment were to: (i) identify roles, responsibilities, obligations, property rights, and legal obligations of all stakeholders; (ii) review production objectives, schedules, monitoring and control systems as well as technical training requirements; (iii) review current institutional capacity of operational department; (iv) determine needs for training to develop a personnel training and/or staff reorganization; (v) ascertain needs for equipment and other supplies to improve productivity and develop and procurement action plan; (vi) identify potential managers who can benefit from being included into personnel development plan and ascertain needs for a training program for such staff; (vii) identify potential trainers able to train their colleagues within an organization; (viii) analyze current incentives schemes (if available) in the directorate; (ix) determine major drawbacks in performance of directorate, especially, in planning and management; (x) ascertain water supply tariff calculation and approval procedures for wholesale customers.

The complete report is presented in the **Appendix 7**.

1.22 Economic and Financial Analysis

Benefit-cost analysis for the subproject was undertaken to determine subproject economic and financial viability. The main viability parameters used are the BCR, EIRR and ENPV for economic analysis, and FIRR and FNPV for financial analysis. The proposed subproject is economically viable if the resulting BCR is greater than 1.0, EIRR exceeds the economic opportunity cost of capital EOCC at 12%, and ENPV is positive. Similarly, the subproject is financially viable if FIRR is greater than the weighted average cost of capital WACC at 3.3%, and FNPV is positive.

The complete Economic and Financial Analysis report is presented in the **Appendix 8**.

1.23 Initial Environmental Examination

An Initial Environmental Examination (IEE) study for Damkhodja subproject was carried out following the Environment Policy (2002), and Environmental Assessment Guidelines (2003), of the ADB and relevant environmental policies and guidelines of the Government of Uzbekistan (GoU).

The IEE involved the activities of: (i) gathering of baseline information available on the physical, chemical, biological, and socio-economic environment of the sub-project area and subcomponent sites and understanding the technical, social, and institutional aspects of the sub-projects; (ii) public consultation and field visits; (iii) screening of potential issues, concerns, and impacts relative to location, design, construction, and operation to distinguish those that are likely to be significant for a particular subcomponent and warranting further study; (iv) recommending measures to mitigate adverse issues, concerns, and impacts, particularly to the project design team; (v) preparing an Environmental Management Plan (EMP) indicating impact

areas, recommended mitigation measures, method of monitoring the impacts and responsible persons; and (vi) proposing the institutional set up for implementation of the EMP.

Based on the indication of the Rapid Environmental Assessment and the findings of the IEE, the classification of the Damkhodja subproject as Category "B" was confirmed, and no further special study or detailed EIA will be needed to be carried out to comply with the environmental policies of the ADB.

The complete the IEE report is presented in the **Appendix 9**.

Formatted: Bullets and Numbering

1.24 Earthquake Zone

THE DAMKHODJA SUBPROJECT AREA IS LOCATED IN A DESIGNATED (RICHTER SCALE) EARTHQUAKE ZONE 7. PROJECT DESIGN WILL INCORPORATE STRENGTHENED OF STRUCTURES BASED ON THE RELATED INTERNATIONAL OR UZBEKISTAN STANDARDS, WHICHEVER ARE MORE CONSERVATIVE.

Deleted: ¶

APPENDIX 1 – PRELIMINARY COST ESTIMATES

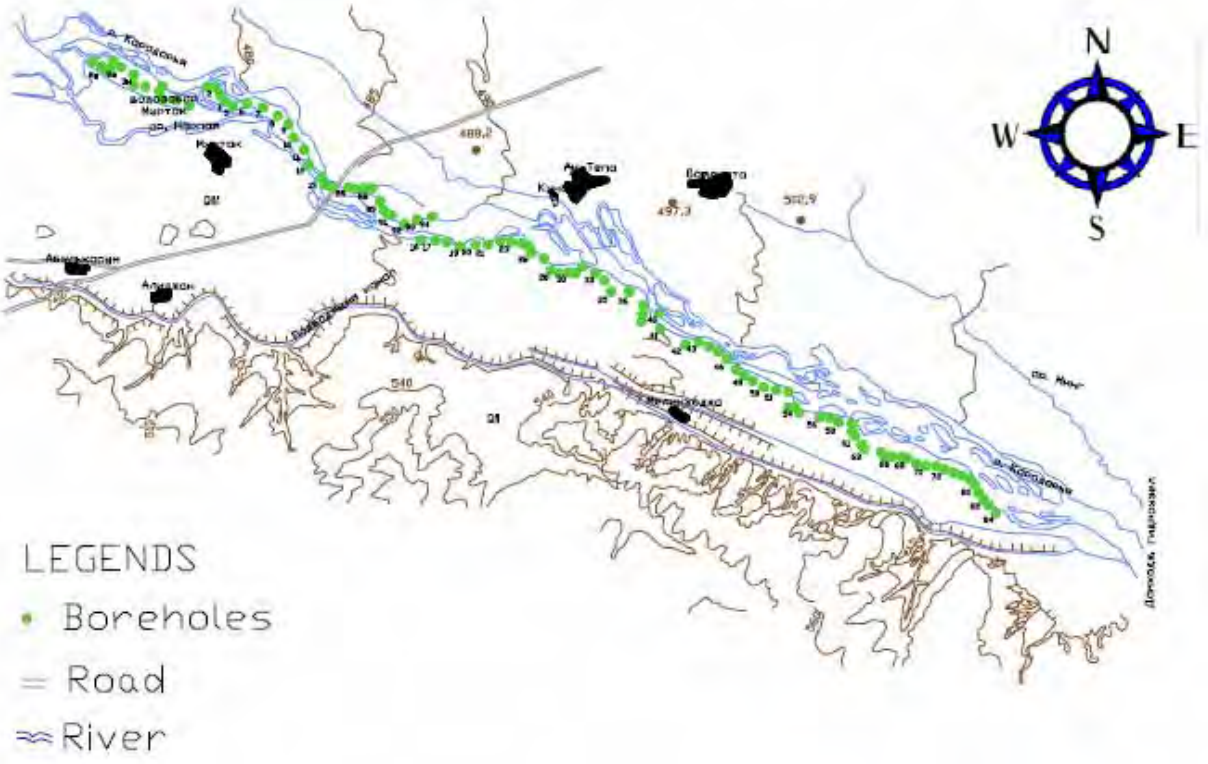
	Unit	Unit Cost	Totals Including Contingencies ('000 US$) 2010	2011	2012	2013	2014	2015	Total
I. Investment Costs									
A. Rehabilitation of water source									
Demolition works	amnt		-	-	11,7	6,9	-	-	18,7
New borehole pumping stations	amnt		-	-	1 351,2	796,7	-	-	2 147,9
Equipment for pumping station	amnt		-	-	828,6	488,6	-	-	1 317,2
Installation of ultrasonic water meters	amnt		-	-	29,7	17,5	-	-	47,2
Installation of electric drives for valves	amnt		-	-	7,0	4,1	-	-	11,1
Power supply	amnt		-	-	475,4	280,3	-	-	755,7
Reconstruction of operators' houses	amnt		-	-	192,9	113,7	-	-	306,6
SCADA for boreholes	amnt		-	-	947,8	558,8	-	-	1 506,6
Fencing	amnt		-	-	46,0	27,1	-	-	73,1
Hydrogeoligical works	amnt		-	-	798,0	470,5	-	-	1 268,5
Pilot gallery	amnt		-	-	260,3	153,5	-	-	413,8
Subtotal			-	-	4 948,5	2 917,9	-	-	7 866,4
B. Rehabilitation of Navoi WDP									
Reconstruction of chlorination units	amnt		-	-	129,6	76,4	-	-	206,0
Equipment for chlorination	amnt		-	-	143,1	84,4	-	-	227,4
Pumping station for own needs	amnt		-	-	11,2	6,6	-	-	17,9
Equipment for pumping station	amnt		-	-	14,6	8,6	-	-	23,2
Technical services/communications	amnt		-	-	46,2	27,2	-	-	73,5
Absorbing filters for reservoirs	amnt		-	-	7,3	4,3	-	-	11,6
Electric drives for valves	amnt		-	-	17,5	10,3	-	-	27,8
Lab equipment	amnt		-	-	22,9	13,5	-	-	36,4
Rehabilitation of tarnsformer substation	amnt		-	-	7,1	4,2	-	-	11,3
Power supply	amnt		-	-	16,3	9,6	-	-	25,8
Security lighting	amnt		-	-	3,0	1,8	-	-	4,8
Administrative office repairs	amnt		-	-	63,1	37,2	-	-	100,3
Subtotal			-	-	481,9	284,1	-	-	766,0
C. Rehabilitation of Kurpa WDP									
Reconstruction of chlorination units	amnt		-	-	129,6	76,4	-	-	206,0
Equipment for chlorination	amnt		-	-	143,1	84,4	-	-	227,4
Pumping station for own needs	amnt		-	-	11,2	6,6	-	-	17,9
Equipment for pumping station	amnt		-	-	14,6	8,6	-	-	23,2
Technical services/communications	amnt		-	-	46,2	27,2	-	-	73,5

	Unit	Unit Cost	Totals Including Contingencies ('000 US$) 2010	2011	2012	2013	2014	2015	Total
Absorbing filters for reservoirs	amnt		-	-	7,3	4,3	-	-	11,6
Electric drives for valves	amnt		-	-	7,7	4,6	-	-	12,3
Lab equipment	amnt		-	-	22,9	13,5	-	-	36,4
Power supply	amnt		-	-	39,2	23,1	-	-	62,4
Security lighting	amnt		-	-	3,0	1,8	-	-	4,8
Administrative office	amnt		-	-	94,7	55,8	-	-	150,5
Other equipment (auxillary) /a	amnt		-	-	381,9	225,2	-	-	607,0
Subtotal			-	-	901,5	531,6	-	-	1 433,1
D. Detailed design	amnt		70,9	106,8	-	-	-	-	177,7
E. Maintenance equipment	amnt		-	659,0	282,8	-	-	-	941,8
TOTAL			**70,9**	**765,8**	**6 614,8**	**3 733,6**	**-**	**-**	**11 185,1**

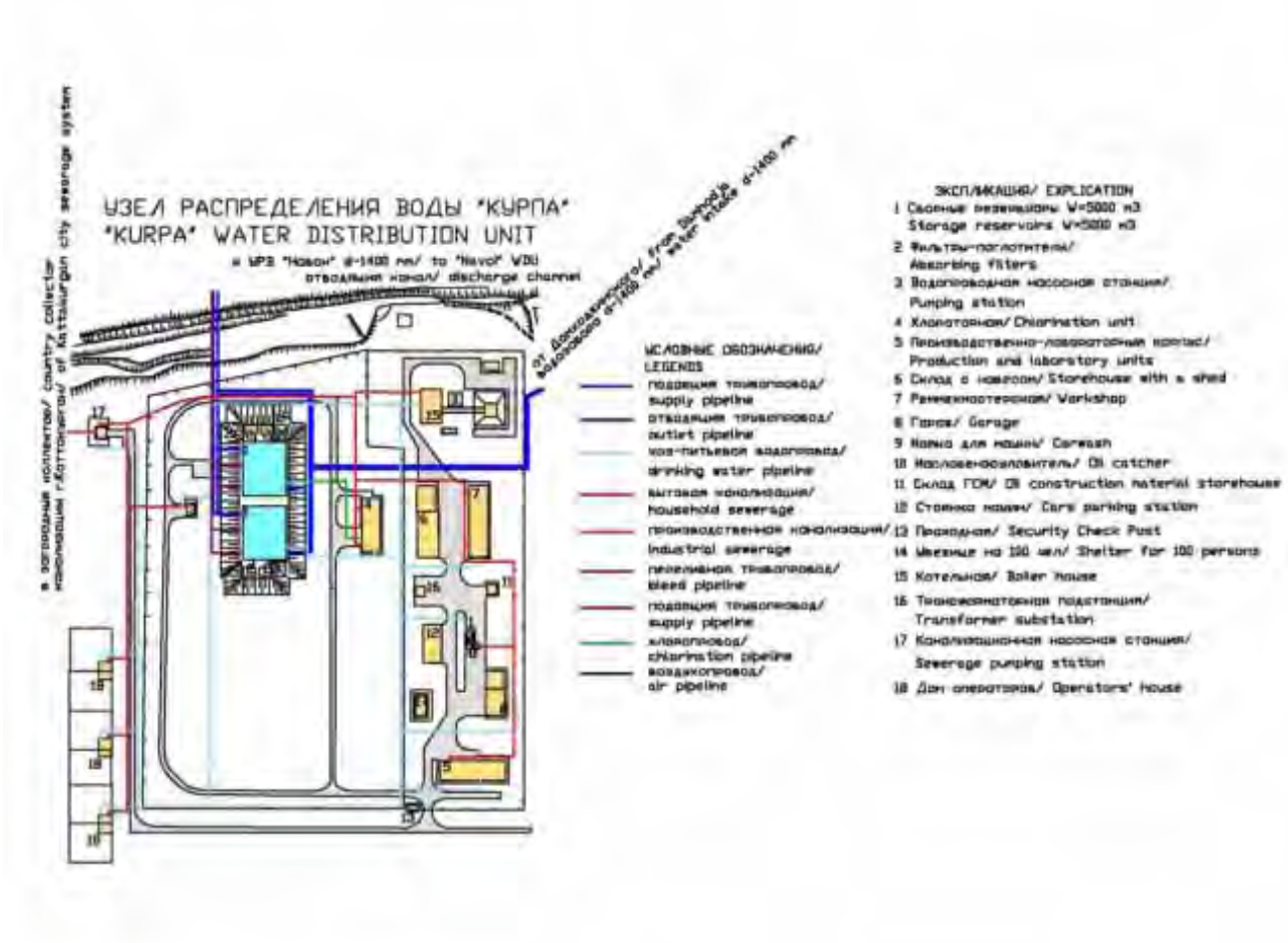
APPENDIX 2: THE SCHEMATIC LAYOUT OF DAMKHODJA IRTM

APPENDIX 3: LAYOUT OF BOREHOLES AT DAMKHODJA WATER SOURCE

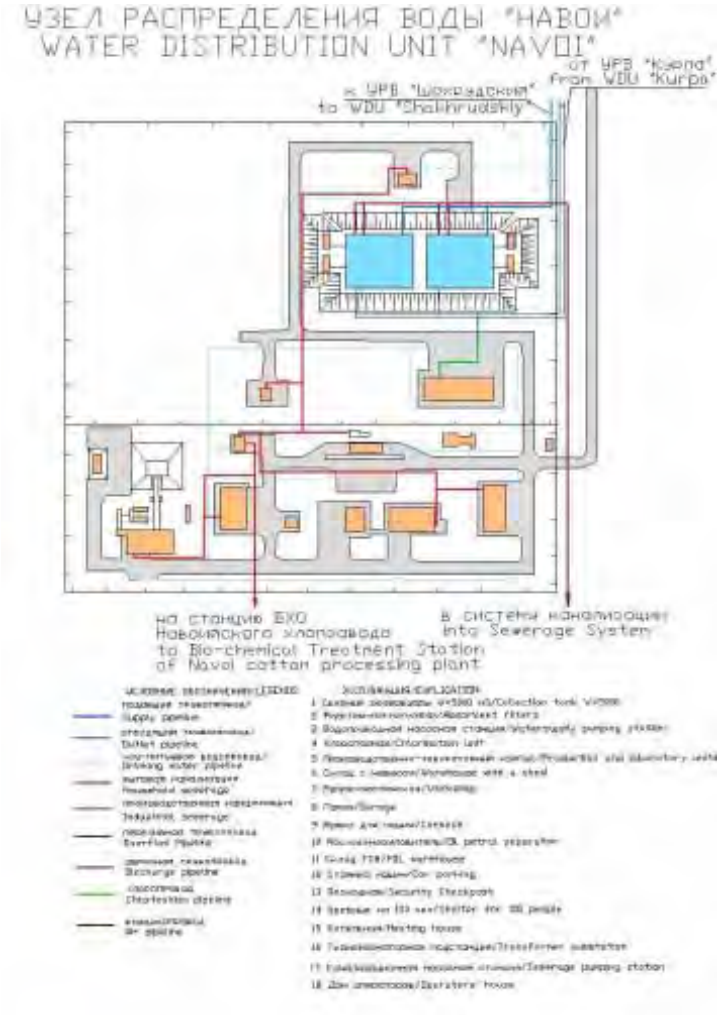
Схема расположения скважин на Дамходжинском водозаборе/
Boreholes at Damkhodja water source



APPENDIX 4: DRAWING OF KURPA WATER DISTRIBUTION UNIT



APPENDIX 5: DRAWING OF NAVOI WATER DISTRIBUTION UNIT



APPENDIX 6: RESETTLEMENT - DUE DILIGENCE REPORT

LAND ACQUISITION AND RESETTLEMENT - DUE DILIGENCE REPORT

Tranche 1, Damkhodja WSD Subproject

A. Introduction

1. Under Water Supply and Sanitation Services Improvement Program: Uzbekistan Damkhodja subproject has been developed for rehabilitation of boreholes at the source of groundwater supply and improve water distribution system spread over the provinces of Bukhara and Navoi. It is proposed that the boreholes located in Samarkand province adjacent to Karadarya river downstream will be rehabilitated and rehabilitation of “Kurpa” and “Navoi” water supply units will increase the access to quality drinking water that will serve around 670,000 population of Bukhara and Navoi provinces.

2. The Executing Agency (EA), Uzbekistan Communal Services Agency (UCSA) has carried out an Initial Poverty and Social Assessment (IPSA), in accordance with ADB’s policy on Involuntary Resettlement for the first Tranche of MFF in order to assess the land acquisition and involuntary resettlement impacts. One Land Acquisition and Resettlement Framework (LARF) was also developed which will be applicable for the entire MFF in accordance with Uzbekistan legislation and ADB’s Involuntary Resettlement Policy. Following paragraphs address the LAR issues with respect of Damkhodja WSD subproject in keeping with approved LARF.

B. Land Acquisition and Resettlement Implications

3. All borehole rehabilitation and water supply distribution network works will be carried out along the territory which was earlier provided by province Khokimiyat in the possession of Damkhodja Inter Regional Trunk Main Authority. Therefore, there is no land acquisition foreseen so far. The details are given in Table 1.

Table 1: Details of Land Availability

Component	Area / Length of land	Ownership status
Damkhodja Boreholes rehabilitation, including the well-drilling, well cleanup and new pumps installation	150 ha	Works will be carried out on the territory which was earlier transferred by province Khokimiyat in the possession of Damkhodja Inter Regional Trunk Main Authority
Basic repairs of Power Supply Substation, transmission line rehabilitation, transformers replacement, rehabilitation of fencing around distribution unit	19 km (perimeter)	
“Kurpa” and “Navoi” Water Distribution units rehabilitation, including installation of new chlorination equipment, rehabilitation of pump station, laboratory and office, etc.	16 ha	

4 The proposed activities do not involve any additional acquisition of land therefore do not have any LAR impacts. Initial social assessment has showed that all the land required was earlier provided to the possession of Damkhodja Inter Regional Trunk Main Authority. There will not be any negative impact due to project implementation. While reaching an agreement for rehabilitation works; no special conditions concerning land acquisition and resettlement, along with obtaining approval of Province Administration of using such land for both, temporary alienation and permanent land acquisition and in agreement with other authorities will be required.

C. Conclusion

5 The Due Diligence Report confirms that Damkhodja WSD subproject under the tranche 1 of the MFF Water Supply and Sanitation Services Improvement Program: Uzbekistan will have no negative social impacts associated with LAR and that the project will benefit residents of the provinces of Navoiy and Bukhara by providing adequate safe drinking water supply.

APPENDIX 7: INSTITUTIONAL STRENGTHENING AND CAPACITY DEVELOPMENT

Damkhodja Water Intake Facility Development Subproject 1

A. Introduction

1. Water supply and sanitation service utilities should provide high-quality, reliable, and affordable services that also generate revenue sufficient for sustainable delivery. The achievement of these targets hinges on capacities of individuals, organizations and societies to transform, to reach their development objectives. While financial resources, including external development assistance, are vital, they are not enough to promote sustainable human development. Without supportive laws, policies, strategies and procedures, well-functioning organizations, and educated and skilled people, utilities lack the foundation to plan, implement and review their local development strategies.

2. Capacity development is the process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time. To support this process effectively requires identifying what key capacities already exist and what additional capacities are needed to reach these objectives. This is the purpose of a capacity assessment. It is the analysis of desired capacities against existing which generates an understanding of capacity assets and needs, from which a development program can be developed.

3. The process of WSS sector reform started in Uzbekistan in the late 1990s. The first steps were the decentralization of the water sector and transformation of water utilities into municipal enterprises. These actions were taken without the appropriate tariff and institutional reforms being in place. The old concept of water as a purely a social service was abolished, and the municipal water industry was expected to be a key player in the transition process to a market economy. At the same time, the government phased out direct subsidies to water utilities, which became self-financed companies. This “shock-therapy” reform appears to have largely failed, and more reforms are now urgently needed.

4. While the level of connection to water supply and sanitation remains high in the country, the actual quality of service provided is continuing to deteriorate, as is the condition of infrastructure in general. Failures in the distribution network are increasing in many places, while continuity of service is decreasing and the quality of drinking water remains low.

5.The deterioration of water quality that goes with a deteriorating infrastructure result in levels of water borne diseases remaining at significantly higher levels. In the country more than one-third of the population uses drinking water that does not meet hygiene standards. The deterioration of water services and associated impacts on public health and the environment are likely to accelerate in the future given that the state of deterioration of the infrastructure is expected to worsen, . This means that the situation could change significantly in a very short time; this should be borne in mind when analysing the figures provided in this report.

6. Reports of financing institutions including reports of World Bank as of May 2007 “Uzbekistan’s Municipal Services Sector Review Note” and as of 16 April 2009 “Uzbekistan’s Water Supply and Sanitation Sector Review” point out that on a number of occasions, the state utilities sector does not meet requirements of modern infrastructure due to limited funds and institutional capacity.

7. In particular, a government priority is “Strengthening institutional capacity of public utility companies in water supply and sanitation sector”. The abilities of engineering and technical, financial and managerial personnel could be enhanced by intensive training programs and the provision of adequate information technology. Expected outcomes are far reaching and include best available technology, more effective and stable operation, reduce energy consumption, significant improvement of commercial and technical practices of public utility companies.

8. Overarching goals are to improve level of services for existing consumers, expand services in line with requirements of municipal and other government objectives and to meet consumer demand.

9. Weakness in and inadequacy of the institutional capacity of water supply utilities significantly impedes the development of the water supply and sanitation sector and ensuring their viability and sustainability. These shortcomings apply not only with Oblast, municipal, and district and town water supply companies, but also to UCSA, the Interregional trunk mains operators and relevant national and local authorities.

10. The main goal of this work is an initial assessment of the current institutional capacity of the Operation Directorate of Interregional Trunk Mains DamkhodjaDamkhodja (OD IRTMD) and to prepare programs for institutional strengthening and capacity building based on PPTA findings. The water supply system has to provide safe and affordable water to their customers; this means that they have to be able to comply with the appropriate standards. Water Supply Company needs adequate capability in three distinct but interrelated areas: technical, managerial, financial.

11. On-site visits were completed during June and July 2009 to assess the current status of organizational structure and institutional capacities of the OD IRTMD. A list of managers and key specialists whom the consultant met and interviewed is provided in Annex 1.

12. PPTA's main objectives were to: i) identify roles, responsibilities, obligations, property rights, and legal obligations of all stakeholders; ii) review production objectives, schedules, monitoring and control systems as well as documentation; iii) review current institutional capacity of operations; iv) determine training needs for personnel and/or staff reorganization; v) ascertain needs for equipment and other supplies that influence productivity and develop a procurement action plan; vi) identify potential managers who would benefit from being included into personnel development plan and ascertain training program needs for a for such staff; vii) identify potential trainers able to train their colleagues within the organization; viii) analyze current incentives schemes (if available); ix) determine major drawbacks in performance of directorate, especially, in planning and management; x) ascertain water supply tariff calculation and approval procedures for wholesale customers;

B. Assessment of Existing Institutional Capacity

13. **General Information:** The Operation Department of Interregional Trunk Mains Damkhodja was established in 1994 for operation and maintenance a water intake with 94 wells and trunk mains with a total length of 317 km build to supply potable water to residential areas in three Oblasts of the country (~ 210 thousand m^3/day):

- Bukhara Oblast: Bukhara City, Bukhara, Vobkent and Gijduvan rural districts in the Oblast (~ 110 thousand m^3/day);
- Navoi Oblast: Navoi City, Kanimekh, Kiziltepa, Karmana, Navbakhor, Khatirchi rural districts in the Oblast (~ 170 thousand m^3/day);
- Samarkand Oblast: Ishtikhan, Kattakurgan, Narpai and Pakhtachi rural districts in the Oblast (~ 20 thousand m^3/day);

14. The inter-regional trunk main Damkhodja consists of a water intake facility to extract water from groundwater sources, water distribution units "Kurpa", "Navoi" and "Bukhara-Shakhrud" and a central dispatching control centre in Bukhara City for the entire system.

15**. Role:** A main role of the OD-IRTMD is to extract, prepare, supply, distribute and sell potable water to wholesale consumers in Bukhara, Navoi, and Samarkand Oblasts. Main wholesale consumers of potable water sold by the OD-IRMD are vodokanals in cities, districts, and other residential areas in the three Oblasts, Navoi Mining and Smelting Plant and other enterprises.

16. **Responsibilities:** The main responsibility of the OD-IRTMD is to provide wholesale consumers in the three Oblasts with high quality potable water and generate income through collection of service fees.

Figure 1. Location Water Intake Facilities of Damkhodja Interregional Trunk Mains

17. **Property Rights and Legal Obligations**: OD-IRTMD is a state-owned enterprise and its property belongs to the government. Full legal title of OD-IRTMD is the Operational Directorate of Inter-Regional Trunk Mains Damkhodja. OD-IRTMD was established by Resolution No. 215 of the Cabinet of Ministers of the Republic of Uzbekistan as of 16 October 2006 and UCSA Order No. 87 as of 21 October 2006. The department is part of UCSA and acts on the basis of its Charter. The Directorate is an independent economic entity, which includes water intake, three water distribution units and garage as subdivisions.

18. OD-IRTMD is a legal entity with its own balance sheet, fixed and current assets. OD-IRTMD uses everything on the balance sheet and maintains itself by receipts from operation, O&M of water intake and inter-regional trunk mains, production and supply of potable water to wholesale consumers, rendering other services to customers.

20**. Performance Objectives:** Implementation of basic performance indicators of OD-IRTMD are shown in Table 1.

Table 1. OD-IRMD's Performance Indicators for Past Three Years:

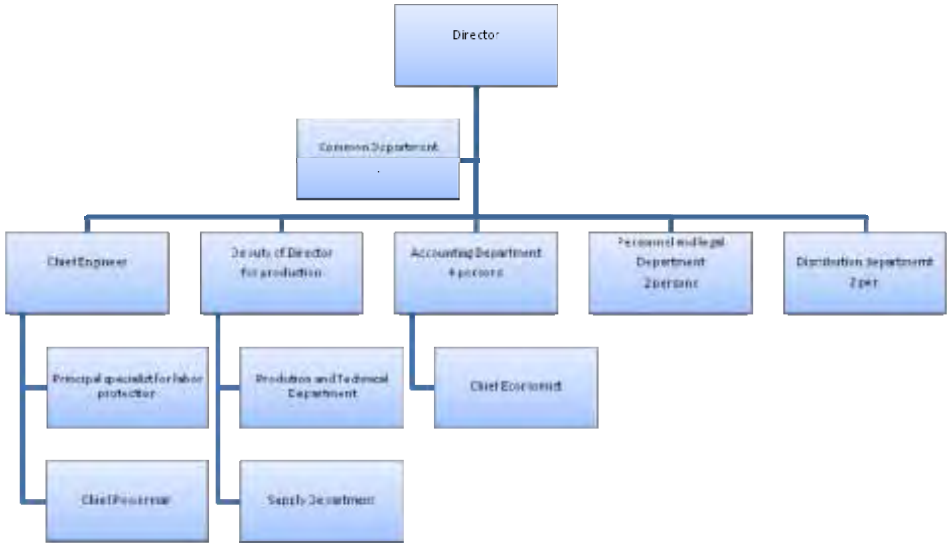
1	Indicators	Unit of Measure	2006	2007	2008
1	Produced Water	thousand m^3	57 800.0	48 394.1	51 100.0
2	Water Sold to Consumers	thousand m^3	47 294.0	41 543.1	41 911.0
3	Non-revenue water & water losses	thousand m^3	10 506.0	6 851.0	9 188.0
	Water sold to:				
1	**Samarkand Oblast – Total**	**m^3**	**1 841 557.0**	**1 783 073**	**1 804 278.0**
	Vodokanals	m^3	821 710.0	803 620	1 058 230.0
	Other consumers	m^3	1 019 847.0	979 414	746 048.0
2	**Navoi Oblast – Total**	**m^3**	**30 475 664.0**	**28 394 543**	**23 479 262.0**
	Vodokanals	m^3	2 210 503.0	1 759 568	1 079 147.0
	Other consumers	m^3	28 265 161.0	26 639 975	22 400 115.0
3	**Bukhara Oblast – Total**	**m^3**	**14 977 150.0**	**11 365 517**	**16 627 879.0**
	Vodokanals	m^3	14 610 192.0	11 082 298	16 079 617.0
	Other consumers	m^3	366 958.0	283 219	548 263.0
	TOTAL (1+2+3)	**m^3**	**47 294 371.0**	**41 543 094**	**41 911 419**

21. **Monitoring and Control System**: OD-IRTMD reports periodically about economic activity outcomes to the following:

- UCSA (balance sheets, production and financial reports, letters of information, information about various activities);
- Bukhara Oblast Tax Committee (balance sheets, reports on financial and economic activities);
- Sanitary and Epidemiology Stations in the three Oblasts (water quality test results, sanitary conditions of installations and facilities)
- Oblast State Committee for Nature Protection (on completion of nature protection and bank protection (water intake area in bank side of Karadarya River) measures at jurisdictional installations and facilities;
- Oblast State Statistics Committee (reports about water supply activities and achieved performance indicators reports (statistical reporting forms TP-1 -Vodkhoz, and Form 1 Water Supply);
- Local Branches of the Ministry for Emergency Situations (reports on completion of protection, safety, and safekeeping measures at water supply installations in emergency situations);
- Local Branches of State Technical Boiler Inspection, Trade Union and Fire Safety Department (reports on completing labour protection and occupational safety measures as well as fire safety instructions at jurisdictional installations and facilities);
- When necessary, Oblast, municipal and district administration where potable water is supplied from owned water mains (letters of information and data regarding allocation of water, status of accounts receivable in relevant Oblast, municipal, and district vodokanals).
- Ministry of Finance (MOF) through UCSA (estimates of calculation of production costs to declare potable water tariffs for two categories of wholesale consumers: vodokanals and other organizations).

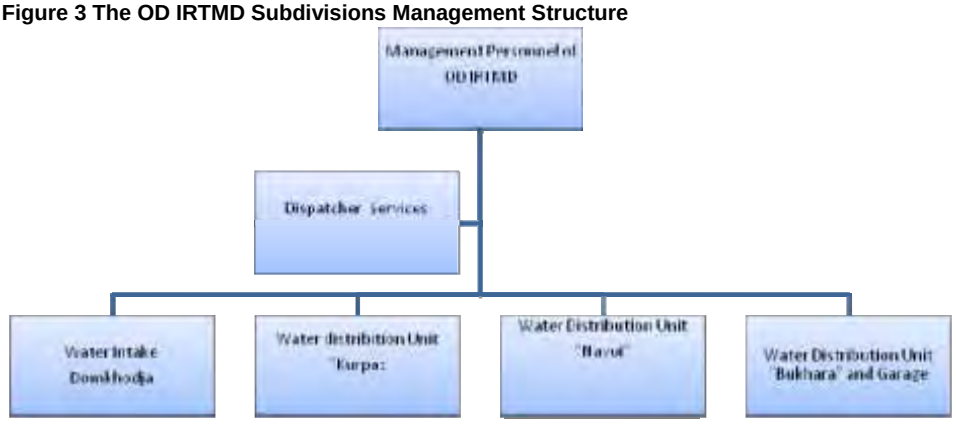
22. the establishment of OD-IRTMD is 231 employees, but there are 208 employees employed currently. OD-IRTMD management consists of 18 employees. Director - Jamolov Kodir Ramazanovich (8-595-600-72-66), Chief Engineer – Akhtamov Hakim Uktamovich. the management structure is shown in figures 2 and 3.

Figure 2 Management Structure of the Operational Directorate of Interregional Trunk Mains Damkhodja



Note: *Limited number of managerial staff is 18 persons.

Figure 3 The OD IRTMD Subdivisions Management Structure



23. The OD-IRMD has sufficient qualified staff for production, financial, and personnel management, planning and other tasks. Nevertheless, managers and key specialists at OD-IRMD have not taken specialized refresher courses over past two or three years except for some technical specialists who took courses conducted by the State Technical Boiler Inspection (labour protection and safety measures). The managers and key engineering and technical staff at OD-IRMD require intensive training courses to acquire advanced operational and management skills and methods.

24. There are over 30 vehicles and other equipment on the balance sheet of OD IRTM; 11 are technically out of order and are to be written off. A list of vehicles and equipments and their technical condition is shown in Table 2 below:

Table 2. A List of Vehicles and Equipments of OD-IRTMD (at June 2009)

№	Name	Brand	Year of Manufacture	Quantity	Technical Condition
A. Vehicles:					
1	Light car	GAZ-3102	2008	1	in working order
2	Light car	GAZ 3110	2000	1	in working order
3	Light car	VAZ -2106	2000	1	in working order
4	Light car	Daewoo "Tico"	2000	1	in working order
5	Light car	Daewoo "Tico"	2001	1	in working order
6	Light car	Daewoo "Damas"	2002	1	in working order
7	Light car	UAZ-31512	1992	1	to be written off
8	Light car	UAZ-469	1987	1	to be written off
9	Bus for personnel	Kamaz-4301	1991	1	to be written off
10	Lorry	UAZ-39094	2007	1	in working order
11	Lorry	GAZ-5327	1989	1	in working order
12	Dump Truck	MAZ-5551	1992	1	in working order
13	Auto crane	MAZ-KS 3577	1999	1	in working order
14	Auto electro technical laboratory	GAZ-5201	1965	1	to be written off
15	Vacuum tank truck	GAZ-ANM-53	1993	1	to be written off
16	Maintenance Truck	GAZ-5312	1992	1	to be written off
17	Tractor	MTZ-80	1992	1	in working order
18	Tractor	T-28x4	1992	1	to be written off
19	Tractor	T-25	1993	1	to be written off
20	Wheeled loader	-	1991	1	to be written off
21	Bulldozer	B-170	1992	1	in working order
22	Excavator	EO-3211	1993	1	to be written off
B. Equipment:					
23	Welding Machine	SAK	1992	1	in working order
24	Welding Machine	D-144	1993	1	to be written off
25	Compressor	PR-10	1993	1	in working order
26	Pump	"Andizhanets"	1992	1	to be written off
27	Lathe Tool	-	1993	1	in working order
28	Lathe Tool	-	1992	1	to be written off
29	Sharpening Machine	-	1993	1	in working order
30	Sledge Hammer	-1993	1993	1	to be written off

25. There are nine computers of different ages and sophistication, four printers and one copier, four of the computers are to be written off.

21. The offices of OD-IRTMD are at 9, Nizomi Street, Bukhara City and occupy a three-storey building. The first and second floors are occupied by staff of OD-IRMD and the third floor is rented out.

22. The OD IRTMD has operational instruction manuals, as well as job descriptions for the staff. The job descriptions were approved in 1999; they have not been updated since. The chlorine handling regulations "Rules of Production Safety, Storage, Transportation, and Acceptance of Chorine" of 1996 by Uzkhimprom, are observed (РД-06-24-22-95).

23. Management staff of OD IRTMD is mainly skilled with long experience of working for this organization. Low salaries or their late payment, lack of any schemes to provide incentives to increase labour productivity do not attract young, skilled and qualified professionals. Nevertheless, there are several young employees, but schemes to ensure continuity planning and career development do not exist. Therefore, PPTA suggest, in coordination with the management of the department, to identify a pool of prospective employees, that a detailed training program be developed to ensure their career development within the organization.

24. Although management staff of OD-IRTMD has skilled and qualified specialists with long experience, they lack teaching skills. They believe that it is best to organize training at the Training Complex of a former the Bukhara Oblast Territorial Association of Communal Utilities.

25. Prior to 1994, the activities of the OD-IRTMD were subsidized by the government of Uzbekistan through UCSA and the OD-IRTMD staff used to receive bonuses (up to 75% a month) for achieving specified maintenance indicators and an annual bonus based om year-end outcomes. In addition, the OD IRTMD could afford to pay rewards to employees on holidays or other special dates. Once subsidies stopped, bonuses and rewards were no longer paid.

26. Because of debts of a number of their wholesale consumers, OD-IRTMD staffare not paid bonuses. In extreme cases, when necessary, employees can receive financial aid amounting to 2 or 3 minimal wages (approximately – 57.0 -85.0 thousand Uzbek soum). Average monthly salary of the employees is 118.92 thousand sums. Twenty employees involved in metal scrap collection, providing they fulfil their planreceive an additional one month's salary.

27. Major drawbacks in OD-IRTMD planning and management are:

- The critical financial status of most wholesale consumers of OD- IRTMD (district and town vodokanals), means they are unable to pay for supplied water on time. These vodokanals are unable to pay for services for months and sometimes for years. Consequently, this hinders forecasting, planning, and management of production at OD-IRTMD and generates debts for electric power supply and other services. This further complicates the situation.

- Lack of adequate skills and experience in using modern information technologies and systems to optimize planning and management.

Operational and production planning and management staff have not had training for a long time. They are familiar, only in general terms with positive experiences and innovative ideas in the area of water supply 28. **Tariff setting procedure**: To approve tariffs for water supply services, OD IRTMD submits calculations of its forthcoming expenses and incomes to UCSA. UCSA, following detailed verification of the calculations submits them for consideration to the Ministry of finance (MOF). Tariffs are issued as approved by MOF and agreed with UCSA. OD-IRTMD declares tariffs on the sale of water to two types of wholesale consumers, Vodokanals and other commercial entities.

29. To calculate service tariffs for the next financial year, OD-IRTMD submits the following data to UCSA and MOF:

- Draft estimates of expenses and incomes of the organization for the planning period with an indication of actual expenses and incomes for previous year;
- A detailed calculation of a tariff price to provide one cubic meter of water;
- A suggestion regarding an increase in the wholesale price (selling) for services for the two categories of consumers;
- Description of direct costs on labour to calculate selling price of water;
- Range of service in kind;
- Description of material and labour inputs and overhead costs related to production;
- Description of expenses during the period due to financial activity and required return on declared services;
- Description of performance indicators related to sale of water.

30. Current OD-IRTMD tariffs for services related to the sale of potable water were approved on March 13, 2009 (Register ET/15-04-Uz-1-09/3) and put into effect on April 1, 2009. Agreed wholesale tariffs for services to water supply services are:

- City, town and district Vodokanals 1 m^3 – 36.0 sums; (excluding VAT)
- Other commercial entities 1 m^3 – 54.0 sums (excluding VAT)

31. Actual tariff setting procedures are inadequate and negatively affect investment in the sector. Local authorities are responsible for the provision of water supply services, but the control of tariff setting

resides with central government - MOF. This institutional set-up poses further obstacles for adequate and transparent tariff setting, given the potentially diverging (political) interests of municipalities and central government. Rules and procedures for tariff setting remain poorly developed. As a consequence tariff setting is perceived as unpredictable and lacking transparency, and prone to politically motivated decisions rather than sound economic sector management, which is a major impediment to sector investment.

32. Current tariffs still do not reflect the real cost of the services provided and fail to cover not only investment, but in many cases operational costs. This delay in reforms becomes costly for the sector and for society when accounts receivable and payable to the sector reached the level that may destroy the financial stability of OD IRTMD.

33. As a reaction to the stringent economic situation, lack of funds and low ability of wholesale consumers of district and city vodokanals to pay, the OD IRTMD reduced their operational costs by *reducing necessary* maintenance, e.g., reduced level of operation and service and insufficient treatment of discharges. The result of such a practice is rapid deterioration of the network and equipment, increased leakage and waste of water resources.

C. Conclusions:

34. Solutions for the long-term problems and demands of the OD IRTMD such as: i) strategic planning, managing financial resources and determining priority of spending; ii) selection, training and allocation of managerial staff; iii) monitoring operational activities of water intake, mains and other facilities; iv) expanding involvement of private sector and introduction of public private partnership in this sector; v) introduction of fair and transparent tariff policy; vi) development technical equipment and information technology and many others continue to lack proper attention.

35. Assessment of current institutional capacities of OD IRTMD has identified that managers and key specialists of the Directorate, rarely have any possibility of experiencing regular instruction or trainings or the exchange of valuable experience with their peer group. The Directorate has outdated employee job descriptions, equipment and facility operational and maintenance manuals and procedures; it lacks schedule and log books of regular inspections, technical service and repairs of material parts.

36. In the OD IRTMD record keeping and technical documentation are done carelessly. Three is no effective management of documentation or usage of IT. There is no reliable database; proper registration of water consumers and sewerage system users is missing. Although, the OD IRTMD presents a lot of data and information to different authorities, only very small part is reliable or represents the real situation. The practice of presenting “good news” instead of accurate and precise data is widespread.

37. The OD IRTMD is not consumer focussed. Public awareness and customer care services do not exist. There is no established method to estimate production, consumption, leakage and wasteful losses of water correctly. Weakness and lack of institutional capacity in the OD IRTMD, absence of benchmarking and monitoring systems and an internal incentive scheme are the main obstacles working against the development of water supply services and providing for viability and sustainability of the company.

38. Tariff setting and approval procedure are not adequate and in reality ignore the actual expenditures of the OD IRTMD. The company continues to be loss-making because it routinely overspends tariff levels and the prevailing tariff rules do not allow for actual cost recovery, which would include capital investment costs. Furthermore, tariff structures do not encourage the company in cost reduction or resource conservation. There is little incentive for company to become efficient, and/or reduce costs because it will be penalized for under spending (cost savings) as tariff level are based on cost assumptions rather than actual cost.

39. Poor commercial performance leaves the company with a severe cash shortage. Many consumers (city, district and town vodokanals) do not pay on time due to their poor financial state. This leads to defaults on rapidly accumulating taxes and electricity costs. The company’s bank accounts are then frozen , leaving it poorly funded to operate and maintain the assets or pay salaries. This critical situation means the OD IRTMD cannot pay rewards or bonuses, or even pay wages regularly.

40. Reliable information, essential for improving the company's performance, is unavailable due to lack of equipment (water distribution unit and consumer meters, laboratory equipment, etc) or of staff trained to carry out analysis and measurements.

41. Consumer satisfaction survey has not been undertaken, wholesale consumer complaints are rarely registered, and complaint response times are not measured. The few existing performance targets derived from "technical norms" that were largely defined in the Soviet era, are stringent, difficult to measure, and unrealistic.

42. In order to address the above issues adequately, an institutional strengthening and capacity building program will be implemented taking into consideration the needs not only the OD IRTMD also whole WSS system of the country The Operational Directorate needs for an intensive training program for managerial and operational personal were defined, In addition an upgrade its fleet of vehicles and equipment were defined, as were substantial improvements in communication and IT systems, together with numbers and costs.

D. Recommendation

43. Suggested actions for institutional strengthening and capacity development at central and regional government levels:

i) **Establish central coordination for water supply system**: Government should establish or appoint an agency to be responsible for WSS sector reforms. The Agency should also be given sufficient budget to coordinate and supervise sector reform tasks, performance monitoring, investment planning and actions to achieve financial viability or water supply and sanitation service providers, involving private sector and private public partnership. Because many of problems in local vodokanals are common, it would be sensible to have a central agency to develop standard forms of contracts, manuals, guidance and other operational documentation. The Agency should be given responsibility to coordinate the activities of local vodokanals, collect information, conduct reliability and quality control, provide intensive training and technical assistance, and share good practice and lessons learned.

ii) **Establish a performance monitoring system:** The agency should focus first on launching a performance monitoring system by selecting and defined key performance indicators (benchmarking system) for the WSS sector, collecting baseline data and monitoring the progress/impact of reform. Technical assistance, training, and incentives may be given to the water supply and sanitation service providers to provide accurate and reliable information.

iii) **Establish central funding:** Government should establish WSS sector reform Fund to pool central and regional government's budgets and International Financial Institutions loans and grants for technical assistance and investment financing. The Fund would be allocated in a competitive manner. The Fund could initially provide financing for implementation interregional computerized information gathering system (e.g. performance monitoring systems, commercial information systems, network information systems, etc) and medium-term capital investment planning. Because of scarcity of funding, the Government may consider selecting pilot regions or a cluster of regions to boost reforms in the WSS sector.

iv) **Strengthening WSS sector regulatory and supervisory institutions.** The strengthening regulatory and supervisory capacity at all level of service providers and government institutions is crucial for WSS sector. UCSA could be strengthened to provide more proactive and effective support to reform efforts on regional and local levels of WSS system. Regional vodokanals may improve their capacity to monitor and facilitate municipal WSS service provider performance, especially the coverage of the population with water supply, access to sanitation, rate of unaccounted-for-water, leakage, quality of services and consumer satisfaction. Regional vodokanals could support a public awareness campaign and increase consumer awareness about the benefits of timely tariff payments and resource conservation. Regional Financial Departments and Regional Branches of the Anti-monopoly State Committee could be strengthened and also be authorized to review and approve tariffs for municipal natural monopoly companies such as WSS service providers.

v) **Strengthen legal and regulatory framework.** Despite some developments in the legal basis of the regulatory framework for key elements of WSS sector services. However, their implementation has been patchy, because the detailed regulations and procedure are either not written, or when they are written, not well understood by service providers and even the regulators, or are simply not well designed. The Government should review these regulations and rules with the assistance of international and regional experts to make them more transparent, simple and understandable.

vi) **Promote exchange of information, experience, and tools.** The Agency, with assistance of regional vodokanals, may share local and international good practice lessons, including specific methods and tools. Some topics and tools may include loss-reducing programs, energy optimization, and monitoring and control water consumption, commercial performance improvements (bill collection, incentive programs), computerized information systems (commercial, accounting, network information models, etc), and financial projection/simulation models.

44. For purpose strengthening managerial, functional and technical capacities of the OD IRTMD it is recommended that a training program for managerial and operational personnel be developed. The specifications of recommended training courses for managerial and operational personnel of OD IRTMD are shown in Table 3 and 4 below:

Table 3. Recommended training courses for managerial and key personnel of the OD IRTMD

Group/ Course	Specification of courses	Managerial and key personnel
1	**Business & Investments Planning**	
1a	Business Planning	Senior Manager, Financial Manager, Economist
1b	Tariff Setting	Financial Manager and Economist
1c	Assets Management	Financial Manager and Economist
1d	Financial Management	Financial Manager and Economist
1e	ADB Loan and grant applications, polices and procedure	Senior Manager, Chief Accountant, Economist
2	**Management**	
2a	People Management/Decision Making, Leadership and Motivation	Senior Manager
2b	Risk Management	Senior Manager
2c	Performance targets, monitoring and control. Management Information systems	Manager, chief engineer, deputy of manager
2d	Presentation and Report writing	Manager, Chief Engineer, PIU staff
2 e	Project Management and reporting	Financial Manager and PIU staff
3	**Commercial**	
3a	Billing and Collection, water balance-Commercial losses	Financial Manager and Water distributions spst
3b	Accounting to International Standards	Financial Manager and Chief Accountant
3c	Customer relations	Deputy Manager
4	**Operations**	
4a	Energy Optimization, Monitoring and control of energy consumption	Powerman
4b	Water supply management (demand, leakage, metering)	Chief Engineer and water distribution spst
4c	Monitoring and control quality of water	Deputy Manager and Water quality control spst
5	**Human Resources Management and Development**	
5	Human Resources. Staff training, Recruitment process	Deputy Manager and HRM specialist

Table 4. Recommended training courses for Operational personnel of the OD IRTMD

Group/ Course	Specification of courses	Operational personnel
1	**Potable water well field Operations**	**Water Intake Facility Damkhodja**
	Energy Optimization, Monitoring and control of energy consumption	Manager and Powerman
	Operation, maintenance and repair function on water equipment	Manager and Crew Foreman
	Package of O&M documentation (logs, manuals, guidance)	Manager and Responsible Engineer
	Water Pumps, gates, valves and metering control operations	Responsible Engineer and Crew foreman
	Labor Protection and safety technique on water Intake facility	Labor Protection Specialists
2	**Water pumping, treatment and distribution operations**	**Water Distribution Units (Kurpa, Navoi, Bukhara)**
	Energy Optimization, Monitoring and control of energy consumption	Manager and Powerman
	Arrangement emergency repair works on water mains	Manager and Crew Foreman
	Water Pumps, gates, valves and metering control operations	Manager and Crew Foreman
	Arrangements O&M works on water reservoirs, mains and etc.	Manager and Crew Foreman

	Package of O&M documentation (logs, manuals, guidance)	Manager and Crew Foreman
	Basic water quality control and testing operations	Water quality control specialist
	Labor Protection and safety technique on water Intake facility	Labor Protection Specialists
	Safety handling with chlorine and other chemicals	Water quality control and laboratory specialists
3	**Vehicles and motor equipment fleet operations**	**Garage**
	O&M Vehicles and Motor Fleet	Garage Manager
	Labor Protection and safety technique on garage	Labor Protection Specialists
	Safety handling with chlorine and other chemicals	Garage Manager

Table 5: Cost estimates for Implementing Training Program for Managerial and Operational Personnel of the OD IRTMD

No	Training Courses Topics	Number of attendants	Cost per Unit (US$)	Total Cost (US$)
1	Business & Investments Planning	5	215	1075.0
2	Management	10	215	2150.0
3	Commercial	6	215	1290.0
4	Common operations	4	215	890.0
5	Human resources development	2	215	430.0
6	Water pumping, treatment and distribution operations	40	220	8800.0
7	Potable water well field Operations	10	220	2200.0
8	Vehicles and motor equipment fleet operations	6	220	440.0
9	Project Management & Reporting	4	230	1720.O
	Total		**USD**	**18 995.00**

45. The strengthening of the functional and technical capacities the OD-IRMD also requires upgrading its subdivisions' vehicles and equipment. A list of vehicles required and equipments is shown in Table 6:

Table 6. A List of Required Vehicles and Equipment for Upgrading Garages of OD-IRMD

№	Name	Estimated Specification Parameters	Quantity
A. Vehicles:			
1	Light car	Engine volume 1200-1500 cm3	1
2	Lorry	Truck capacity 10-12 tons	1
3	Lorry	Truck capacity 5-6 tons	1
4	Vacuum tank truck	Tank capacity 3.0 m3	2
5	Fuel tank truck	Tank capacity 6-8 m3	1
6	Power Line Maintenance Truck	On medium truck chassis	2
7	Water Pipeline Maintenance Truck	On medium truck chassis	4
9	Telescopic Derrick	Basket outreach 12-18 meters	1
10	Mobile water quality testing laboratory	On minibus chassis	1
11	Mobile Power Station	On medium truck chassis	1
11	Auto crane with a telescopic jib	Lifting capacity 14-16 tons	2
12	Boring Machine	Similar to drilling machine type URB	1
13	Dump Truck	Truck capacity 10-12 tons	4
14	Excavators	Bucket capacity 0.5 m3	2
15	Excavators	Bucket capacity 0.25—0.3 m3	2
16	Tractor-Trailer	Similar to MTZ-82 or MTZ-82	4
17	Bulldozer	Engine capacity 170-200 h.p.	1
18	Mobile Pumping Station	On medium truck chassis	2
B.	**Equipment**		
19	Pumps	Similar to GNOM pumps	10
20	Compressors	Similar to PR-10	2
21	Turning Lathe	To be specified	1
22	Milling Machine	To be specified	1

23	Short Wave Radio Sets	Parameters of Len-B1 P 218-3 type	35
24	Long Wave Radio Sets	Parameters of Yaesu-FP-757HD type	1

Table 7: Cost estimates of Required Vehicles and Equipment for Strengthening Capacity of the OD IRTMD

No	Training Courses Topics	Required Number	Cost per Unit (US$)	Cost of spare parts for 3 year (+ 10%)	Total Cost (US$)
1	Light car	1	9500.0	950.00	10450.00
2	Lorry	1	50 000.0	5000.00	55000.00
3	Lorry	1	25 000.0	2500.00	27500.00
4	Vacuum tank truck	2	90 000.0	18000.00	198000.00
5	Fuel tank truck	1	60 000.0	6000.00	66000.00
6	Power Line Maintenance Truck	2	120 000.0	24000.00	264000.00
7	Water Pipeline Maintenance Truck	4	120 000.0	48000.00	528000.00
8	Telescopic Derrick	1	140 000.0	14000.00	154000.00
9	Mobile water quality testing laboratory	1	80 000.0	8000.00	88000.00
10	Mobile Power Station	1	10 000.0	1000.00	11000.00
11	Auto crane with a telescopic jib	2	90 000.0	18000.00	198000.00
12	Boring Machine	1	95 000.0	9500.00	104500.00
13	Dump Truck	4	40 000.0	16000.00	176000.00
14	Excavator Bucket capacity 0.5 m3	2	60 000.0	12000.00	132000.00
15	Excavator Bucket capacity 0.25—0.3 m3	2	45 000.0	9000.00	99000.00
16	Tractor-Trailer	4	30 000.0	16000.00	176000.00
17	Bulldozer	1	260 000.0	26000.00	286000.00
18	Mobile Pumping Station	2	2 800.0	560.00	6160.00
19	Pumps	10	2 400.0	2400.00	26400.00
20	Compressors	2	45 000.0	9000.00	99000.00
21	Turning Lathe	1	25 000.0	2500.00	27500.00
22	Milling Machine	1	8 000.0	800.00	8800.00
23	Short Wave Radio Sets	35	120.0	490.00	5390.00
24	Long Wave Radio Sets	1	350.0	35.00	385.00
	TOTAL				**2 747 085.00**

47. The strengthening of the functional and managerial capacities the OD IRTMD also requires technical support for procurement additional computer and office equipment. A list of equipment required is shown in Table 8:

Table 8. A List of Computer and Office Equipments Required for OD IRTMD

No.	Name	Minimum Required Parameters	Quantity
A. Computers:			
1	File server	Analog of IBM-Netfinity-5100	1
2	Strummer	Analogue of 20/40GB DDS/4 4mm Internal	1
3	Additional file server	Analogue of IBM-Netfinity-5100	1
4	Personal Computers	Desktop with Monitor 17”	16
5	Professional Printer	Analogue of LaserJet HP 4100	1
6	Office Printer	Analogue of LaserJet 1100 or 1200	6
7	Copy Machine	Analogue of ASF or Canon 6317	2
8	Fax Machine	Analogue of Panasonic Plan Paper Fax	2
9	Ink-jet printer	Analogue of HP-656C	2
10	Scanner	Analogue of HP-5400C	2
11	Projector with screen	Analogue of CTX EzPro 615H c XGA	1
12	UPS	Analogue of UPS APC	18
13	Local Area Network (LAN)	Installation Local Area Network (LAN) for 16 ports	1 area

14	Telephone set	Digital type	10
B.	**Office equipments**		
15	Set of office Furniture	For Managerial personnel	3
16	Computer Desks	For office personnel	16
17	Chairs	For office personnel	40
18	Book shelves	For storing and keeping files of Documents	20
19	Air conditioner	Analogue of LG-Electronics 2700W	10
B.	**Computer software**		
20	Software for server	Window-2009 Server	2
21	Software for server	Client/Server CAL-2009	16
22	Software for server	Exchange 5.5 Server - 2009	1
23	Software for server	Exchange Client	8
24	Software for server	Firewall software	1
25	Software	MS Project 2009 Win-32	2
26	Antivirus software	Norton Security or Kaspersky	18

Table 9: Cost estimates of Computer Equipments for Strengthening Capacity *of* the OD IRTMD

No	Training Courses Topics	Required Number	Cost per Unit (US$)	Total Cost (US$)
1	File server	1	1 800.0	1800.00
2	Strummer	1	450.0	450.00
3	Additional file server	1	1 800.0	1800.00
4	Personal Computers	16	500.0	8000.00
5	Professional Printer	1	450.0	450.00
6	Office Printer	6	250.0	1500.00
7	Copy Machine	2	1 300.0	2600.00
8	Fax Machine	2	420.0	840.00
9	Ink-jet printer	2	150.0	300.00
10	Scanner	2	80.0	160.00
11	Projector with screen	1	1 000	1000.00
12	Uninterruptible Power Supply units	18	60.0	1080.00
13	Installation of Local Area Network (LAN)	1	2 800.0	2800.00
14	Telephone set	10	50.0	500.00
15	Set of office Furniture	3	1 500.0	4500.00
16	Computer Desks	16	120.0	1920.00
17	Chairs	40	60.0	2400.00
18	Book shelves	20	120.0	2400.00
19	Air conditioner	10	450.0	4500.00
20	Software for server Window-2009 Server	2	1 300.0	2600.00
21	Software for server Client / Server CAL-2009	16	100.0	1600.00
22	Software for server Exchange 5.5 Server - 2009	1	120.0	120.00
23	Software Exchange Client	8	120.0	960.00
24	Software for server Firewall	1	120.0	120.00
25	Software MS Project 2009 Win-32	2	100.0	200.00
26	Antivirus software Norton Security or Kaspersky	18	60.0	1080.00
27	Contingences	1	2 000.0	2000.00
	Total			**47 680.00**

37. For reconstruction and capital repairs to the office and ancillary buildings of the OD IRTMD and installation of basic working conditions for managerial and operational personnel it is necessary to

allocate funding and include in the project.. Initial cost estimation for renovation and repair buildings and premises of the OD IRTMD is **80 000.0 USD**.

Table 10. Summary of Costs for the Capacity Building Program for OD IRTMD

Type of Capacity Building Measures	US$
Training of Managerial and Operational Personnel	18 995.00
Procurement vehicles and equipment	2 747 085.00
Renovation and repair works on office building	80 000.00
Procurement hardware and software for Development IT	47 680.00
TOTAL USD	**2 893 376.00**

Annexes and Photos

Annex 1

LIST

Managers and Key Specialists of OD IRTM Damkhodja interviewed by the Consultant

1. Director – Jamolov Kodir Ramazanovich;
2. Chief Engineer – Akhtamov Hakim Uktamovich;
3. Chief Mechanic – Odilov Kudratillo Kurbanovich;
4. Production and Technical Department Manager – Jurakulov Nasirillo Sadulayevich;
5. Head of Human Resources Department – Halikova Amina Rakhmatullayevna;
6. Sales Department Manager – Avezov Ismoil;
7. Manger of Water Distribution Unit “Kurpa” – Ashurov Ulmac;

PHOTOS OF BUILDINGS AND FACILITIES OF VODOKANALS

Photo 1. Entrance to office building of the Operational Directorate of Interregional Trunk Mains Damkhodja

Photo 2. Office building of the “Kurpa” Water Distribution Unit of the Operational Directorate of Interregional Trunk Mains Damkhodja

Photo 3. Workshop for repairing of pumps of the Water Distribution Unit “Kurpa”

Photo 4. Workshop for repairing of pumps of the Water Distribution Unit “Kurpa”

Photo 5. Workshop of the Water Distribution Unit “Kurpa” a pile of failed well pumps

APPENDIX 8: DAMKHODJA ECONOMIC & FINANCIAL ANALYSIS

Introduction

1. This financial and economic analysis was undertaken for Damkhodja sample subproject of Tranche 1 investment. The financial analysis consists of two parts: (i) determination of appropriate water tariffs for the subproject, and (ii) preparation and assessment of financial projections for the subproject entity. The projections consist of annual financial statements (income statement, sources and applications of funds statement, balance sheet), key performance indicators, and operating and financial data for the 2010–2020 period.

2. **Financial Objectives.** The proposed tariff rates for the subproject were designed to (i) fully recover operation and maintenance (O&M) costs and (ii) recover all subproject debt service, and (iii) generate a financial internal rate of return (FIRR) greater than the weighted average cost of capital (WACC), wherever feasible.

3. **Operating Revenues.** Operating revenues include water sales payments. Future water sales were calculated on the basis of water demand and projected water tariff levels.

4. **Operating Expenses.** Annual O&M costs were projected separately for each subproject over the entire forecast period by major expense item (salary, electricity, chemicals, maintenance, social charges, selling and administration expenses). Depreciation allowance was calculated on an average asset life of 20 years using the straight-line method. Income tax was assumed to be 10% plus 8% infrastructure development tax.

5. Damkhodja IRTM supplies water to other 11 Subprojects.

B. Financial Performance of Damkhodja IRTM

6. Damkhoja IRTM was incorporated in 1993. IRTM mainly provides water to Regional Vodokanals of three provinces: Bukhara, Navoi and Samarkand. Table 1 below shows the financial highlights of Damkhoja IRTM. In general IRTM generates revenues barely enough to cover O&M expenses. O&M expenses make 100% of revenues from water sales. Net income is generated mainly from sales of scrap metals, for instance in 2006 net income was realized in the amount of Sum 7.5 million, which was generated from the sales of scrap metals. But in 2007 and 2008 net income level decreased dramatically due to increase of costs related to repairs of pumps and to spare parts (from Sum 132 mln in 2006 to Sum 218 mln in 2008). 76% of production costs are related to electricity and labor costs (49% and 27% respectively).

7. IRTM's current ratio is higher than 2 throughout 2006-2008. Accounts Receivable Turnover decreased steadily and significantly, while Accounts Payable Turnover has increased insignificantly.

Table 1: Damkhodja IRTM - Financial Highlights

Sum' 000

Description	2006	2007	2008	2009 II-QTR
Net Sales	939 488	1 084 450	1 437 798	808 275
Operating Expenses	(967 966)	(1 080 584)	(1 444 691)	(809 981)
Other Operating Revenue	41 042	3 422	17 808	8 562
Operating Income (Loss)	12 564	7 288	10 915	6 856
Non-operating items	(5 095)	(7 282)	(10 085)	(6 511)
Net Income	7 469	6	830	345
Cash and Cash Equivalent	10 269	3 129	7 196	6 941
Current Assets	664 802	543 918	790 545	863 859
Current Liabilities	131 366	97 445	182 270	264 821
Total Equity	3 581 920	3 649 736	3 831 456	3 831 802
Total Assets	3 713 286	3 747 181	4 013 726	4 096 623
Current ratio	5.06	5.58	4.34	3.26
Quick ratio	0.08	0.03	0.04	0.03
ROA	0.20%	0.00%	0.02%	0.01%
ROE	0.21%	0.00%	0.02%	0.01%
Gross profit margin	12.1%	15.7%	16.6%	16.7%
Operating expense ratio	103.0%	99.6%	100.5%	100.2%
Accounts Receivable Turnover in Days (customers)	200.96	138.41	59.58	59.31
Accounts Payable Turnover in Days (suppliers)	15.00	11.24	12.97	14.85

C. Benefit-cost analysis

8. Benefit-cost analysis for the subproject was undertaken to determine subproject economic and financial viability. The main viability parameters used are the BCR, EIRR and ENPV for economic analysis, and FIRR and FNPV for financial analysis. The proposed subproject is economically viable if the resulting BCR is greater than 1.0, EIRR exceeds the economic opportunity cost of capital EOCC at 12%, and ENPV is positive. Similarly, the subproject is financially viable if FIRR is greater than the weighted average cost of capital WACC at 3.3%, and FNPV is positive. In the economic analysis, the quantifiable benefits related to incremental and non-incremental water that result into resource cost savings were compared with capital and O&M costs that have been converted from financial costs using shadow pricing and after elimination of transfer payments. The resulting cash flows were discounted at the EOCC. In the financial analysis, net revenues were compared with capital

and O&M costs and the resulting net cash flows were discounted at the WACC. The subprojects were subjected to sensitivity analysis to assess the effects of adverse circumstances on viability. The sensitivity scenarios for the economic and financial analyses include: a 20% increase in capital cost, a 20% increase in O&M cost, a 20% decrease in benefit (revenues)

.

9. The results of the analysis show that the subproject is economically viable with BCR at 1.1. EIRR is calculated at 15.3% and an ENPV of SUM 1 932 million for the base case. The subproject is also found financially viable with FIRR at 6.6% and an FNPV of SUM 5 229 million. Economic and financial sensitivity scenarios showed that the subproject is the most sensitive to reduction of benefits (revenue). Under other scenarios the subproject remained relatively robust. The combined results are given in Table 2.

Table 2: Summary Economic and Financial Analysis Results

Particulars	Change	EIRR	ENPV	EIRR SV	FIRR	FNPV	FIRR SV
Base Case		15.3%	1 932		6.6%	5 229	
Investment Cost	+20%	11.8%	-119	19%	5.0%	3 127	41.9%
O&M Cost	+20%	13.7%	966	41%	4.1%	1 174	26.4%
Benefit (Revenues)	-20%	9.5%	-1 471	11%	1.7%	- 2 188	13.3%
Implementation	1 yr delay	12.1%	53	11%	5.1%	3 193	5.4%

SV = Switching Value

D. Average Incremental Cost and Cost Recovery

10. In assessing the appropriate water charge to attain the required level of cost recovery, both average economic and financial incremental costs were calculated. AIC is an approximation of long term marginal costs and AIEC is the appropriate target for tariff setting. Subproject AIEC and AIFC are at Sum 35 and Sum 48 respectively.

11. Damkhodja IRTM is projected to generate net income and positive net cash flow throughout the whole project period. Return on Net Fixed Assets will range from 2.6% to 20.5% from 2014 to 2020. DSR will be greater than 1.2 during the projection period.

E. Tariff affordability

12. The viability of subproject operation ultimately depends on household capacity to pay for their monthly water dues. Damkhodja IRTM mainly supplies water to other vodokanals and commercial organizations. As the Project aims to extend water service to the poor within the community served by those vodokanals, the proposed tariff was tested against the average income of the low-income household. The affordability analysis shows the proposed tariffs are lower than 4%.

F. Financial Management Assessment of Damkhodja IRTM

13. Damkhodja IRTM satisfies the ADB's minimum financial management requirements for an IA. Damkhodja IRTM current financial management system is adequate to (i) record required financial transactions and balances, (ii) provide regular and reliable financial statements and monitoring reports during project implementation, (iii) safeguard the financial assets, and (iv) subject required financial documents to audit acceptable to ADB. The following findings and observations were prepared based on interviews and consultations

with Damkhodja IRTM during the Water Supply And Sanitation Services Improvement Program (WSSSIP) preparation.

14. Damkhoja IRTM is a state-owned entity with its own charter (ustav) and is controlled by and reports to UCSA.

15. **Funds Flow.** Funds flow arrangement (ADB loan funds) for the WSSSIP will follow the same set-up as in the UWSP, the KNWSSSP and the SWSSP. However, funds flow to Damkhoja will be controlled by PPMU, not PIU. A new project account will be opened by the IRTM/PPMU in a commercial bank acceptable to ADB. Government counterpart funds will be disbursed through this account. The counterpart funds flow will follow the existing government set-up.

16. **Staffing.** IRTM's finance department has an establishment of 6 personnel. The finance function is very narrow in scope and is confined to accounting for and reporting upon the financial transactions. All the finance staff is based at the head office. The Economist, who works closely with the finance department and is responsible for compiling the budget reports separately direct to the Director. Most of the staff has high educational attainment. None of the staff is familiar with ADB financial and disbursement procedures.

17. **Accounting Policies and Procedures.** IRTM's accounting transactions and reporting are guided by National Accounting Standards and local legislation.

18. **Budgeting System.** IRTM prepares its budgets on quarterly basis. Budgets are produced at summary level for the entity. Actual expenditures reports are produced quarterly and compare budgeted and actual results.

19. **Payments**. Processing of the project payments include comparison of quantities, prices and terms as shown in the purchase orders. All project payments are made using bank checks or bank transfers.

20. **Cash and Bank.** IRTM maintains an up-to-date cashbook. IRTM's customer base mainly comprises budget and commercial organizations which pay their bills via bank transfers. This provides minimal cash transactions. Cash receipts from population are deposited on the same day they are received. Cash and bank balance are reconciled on a monthly basis and reconciling items are reviewed by a responsible official.

21. **Safeguard over Assets**. IRTM maintains adequate safeguards to protect its assets. Both fixed asset and stores sub ledgers are maintained but their content could be improved. Physical checks are made annually. However, assets are not covered by insurance.

22. **Internal Audit.** IRTM, at present, does not have an established internal audit unit.

23. **External Audit**. External audits are conducted annually with the report being produced in a timely manner. The external auditor is a private company. According to Uzbek legislation the companies are obliged to change their auditors every three years.

24. **Reporting and Monitoring.** IRTM prepares its financial reports under Uzbekistan National Accounting Standards. Financial statements are prepared monthly, quarterly and annually. Financial recording is done using a manual system. Spreadsheets, using MS Excel, are used to produce the final accounts. There is an opportunity for benchmarking. IRTM uses an old payroll system but depends on external support for software maintenance. There are adequate controls over payroll production. Whilst the staff compliment enables some segregation of duties there were some lingering doubts about appropriate levels of control. Invoice processing and payment processes are adequate. Paid invoices are

stamped accordingly. Bank reconciliations are completed by the Chief Accountant who also approves payments.

25. **Information Systems.** IRTM does not have an integrated computerized MIS. IRTM uses a spreadsheet computer program to prepare its reports.

Projected Financial Statements, FIRR and Sensitivity Analysis for Subproject
(Sum million, current prices)

Table 3: Key Performance Indicators

	Projected										
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Operating Data											
Water Sold	110.78	111.05	173.55	178.18	178.18	178.18	178.18	178.18	178.18	178.18	178.18
Population Served (Thousand)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Actual Water Production (1000 m3/d)	130.33	130.65	204.18	209.62	209.62	209.62	209.62	209.62	209.62	209.62	209.62
Non Revenue Water (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Water Consumption (lpcd)	0	0	0	0	0	0	0	0	0	0	0
Average Tariffs (Sum/m3 - current prices)											
Expressed on Basis of Water Consumed:											
Accrual Basis	49.27	53.71	58.56	63.81	69.54	75.82	82.66	90.08	98.16	107.02	116.68
Cash Basis	43.81	31.60	54.14	61.40	66.92	74.38	81.10	88.38	96.31	105.00	114.48
Cost Recovery & Profitability											
Operating Ratio (%)	114%	112%	82%	90%	94%	91%	87%	84%	81%	78%	75%
Working Ratio (%)	101%	101%	74%	71%	70%	69%	67%	65%	64%	62%	61%
Return on Equity	-6.4%	-6.7%	12.5%	5.6%	1.2%	3.7%	6.2%	8.5%	10.6%	11.9%	13.3%
Collection Performance											
Average Collection Performance (%)	89%	89%	92%	96%	96%	98%	98%	98%	98%	98%	98%
Accounts Receivable (Days Worth of	50	50	50	50	50	50	50	50	50	50	50
Cost Efficiency & Effectiveness (Sum/m3 - current prices)											
Cash O&M	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05
Depreciation Expense	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Liquidity & Cash Flow											
Cash (Days Worth of Cash O&M)	82	71	174	300	392	505	642	792	899	1 019	1 157
Cash (Days Worth of Cash Obligation	82	71	172	291	389	495	621	757	743	838	945
Current Ratio	3.6	3.2	4.5	7.3	12.1	14.9	18.1	9.0	10.1	11.5	12.9
Debt - Asset Ratio	0.02	0.21	0.58	0.63	0.63	0.62	0.60	0.58	0.54	0.50	0.46

Table 4: Projected Financial Statements

	Projected										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Income Statements		9%	78%	16%	9%	11%	9%	9%	9%	9%	9%
Operating Revenue	1 766.8	1 930.6	3 429.5	3 993.5	4 351.9	4 837.7	5 274.3	5 747.6	6 263.5	6 828.8	7 445.1
Operating Expenses	1 790.3	1 951.0	2 515.9	2 750.3	3 022.8	3 264.9	3 426.7	3 595.9	3 772.7	3 957.4	4 150.2
Depreciation	215.5	220.7	278.1	773.6	1 058.3	1 058.3	1 058.3	1 058.3	1 058.3	1 058.3	1 058.3
Operating Income	(238.9)	(241.1)	635.5	469.5	270.8	514.5	789.2	1 093.5	1 432.5	1 813.1	2 236.5
Operating Subsidies	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Non-Operating Expenses	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest & Other Financial Expenses	0.0	0.0	0.0	0.0	162.3	162.3	162.3	162.3	158.9	215.6	206.0
Income Tax	0.0	0.0	27.2	84.5	19.5	63.4	112.8	167.6	229.3	287.5	365.5
Net Income	(238.9)	(241.1)	608.3	385.0	88.9	288.8	514.1	763.5	1 044.4	1 309.9	1 665.0
Cash Flow Statements											
Sources											
Internal Cash	(23.4)	(20.3)	886.4	1 158.6	1 309.5	1 509.4	1 734.7	1 984.2	2 261.6	2 583.8	2 929.3
Debt	84.9	918.9	7 939.9	4 582.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity Contributions	21.1	228.1	1 970.1	1 112.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	82.6	1 126.6	10 796.4	6 852.7	1 309.5	1 509.4	1 734.7	1 984.2	2 261.6	2 583.8	2 929.3
Applications											
Capital Investments	106.1	1 147.0	9 910.0	5 694.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Working Capital Increase (Decrease)	(424.0)	3.1	65.2	99.8	162.0	79.5	61.5	42.9	46.1	54.6	53.9
Interest	0.0	0.0	0.0	0.0	162.3	162.3	162.3	162.3	158.9	215.6	206.0
Debt Repayment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	563.6	563.6	563.6
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	(318.0)	1 150.1	9 975.2	5 793.9	324.3	241.8	223.8	205.2	768.6	833.7	823.4
Cash Changes	400.6	(23.4)	821.2	1 058.9	985.3	1 267.5	1 510.9	1 779.0	1 493.0	1 750.1	2 105.9
Ending Cash Balance	403.7	380.2	1 201.4	2 260.3	3 245.6	4 513.1	6 024.0	7 803.0	9 296.0	11 046.1	13 152.0
Balance Sheets											
Assets											
Current Assets	801.0	816.1	1 859.4	3 018.2	4 089.7	5 467.1	7 063.3	8 924.1	10 505.6	12 352.0	14 562.3
Net Fixed Assets	3 007.7	2 892.5	3 761.4	12 897.8	17 533.7	16 475.4	15 417.1	14 358.8	13 300.5	12 242.2	11 183.9
Work in Progress	105.5	1 147.0	9 910.0	5 694.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Assets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	3 914.2	4 855.6	15 530.8	21 610.1	21 623.4	21 942.5	22 480.4	23 282.8	23 806.1	24 594.2	25 746.2
Liabilities and Equity											
Current Liabilities	220.2	255.7	412.6	412.7	337.0	367.4	391.2	993.7	1 036.1	1 077.9	1 128.4
Long Term Debt	84.9	1 003.8	8 943.7	13 525.8	13 525.8	13 525.8	13 525.8	12 962.2	12 398.7	11 835.1	11 271.5
Equity	3 609.1	3 596.1	6 174.5	7 671.6	7 760.5	8 049.3	8 563.4	9 326.9	10 371.3	11 681.2	13 346.3
Total	3 914.2	4 855.6	15 530.8	21 610.1	21 623.4	21 942.5	22 480.4	23 282.9	23 806.1	24 594.2	25 746.2
Financial Ratios											
Cost Recovery Ratio	1.2	0.7	0.9	1.0	1.2	1.4	1.4	1.4	1.3	1.3	1.4
Debt Service Ratio	NA	NA	NA	NA	8.1	9.3	10.7	12.2	3.1	3.3	3.8
Debt - Asset Ratio	0.0	0.2	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5

Table 5: FIRR and Sensitivity Analysis

Year	Revenue	Costs					Base Case	Capital	O & M	Revenue	1 Year Delay
		Capital	Capital Replacement	O & M	Residual Value	Total	Net	20%	20%	-20%	in Completion
2010	3.67	88.25	0.00	1.31		89.56	-85.90	-103.55	-86.16	-86.63	-89.56
2011	20.02	875.61	0.00	7.16		882.78	-862.76	-1037.88	-864.19	-866.76	-879.11
2012	919.95	6988.89	0.00	317.48		7306.37	-6386.42	-7784.20	-6449.92	-6570.41	-7286.35
2013	1066.14	3718.23	0.00	512.18		4230.41	-3164.27	-3907.91	-3266.71	-3377.50	-3310.46
2014	1116.78	0.00	0.00	579.91		579.91	536.87	536.87	420.89	313.52	486.24
2015	1212.70	0.00	0.00	603.21		603.21	609.49	609.49	488.85	366.95	513.57
2016	1306.63	0.00	0.00	630.92		630.92	675.71	675.71	549.53	414.38	581.78
2017	1410.26	0.00	0.00	661.30		661.30	748.96	748.96	616.70	466.91	645.33
2018	1525.48	0.00	0.00	694.99		694.99	830.50	830.50	691.50	525.40	715.27
2019	1654.58	0.00	0.00	729.78		729.78	924.80	924.80	778.84	593.88	795.70
2020	1798.66	0.00	0.00	771.54		771.54	1027.12	1027.12	872.82	667.39	883.04
2021	1958.85	0.00	0.00	817.71		817.71	1141.14	1141.14	977.60	749.37	980.96
2022	2138.15	0.00	0.00	869.05		869.05	1269.10	1269.10	1095.29	841.47	1089.80
2023	2340.18	0.00	0.00	926.47		926.47	1413.71	1413.71	1228.42	945.68	1211.68
2024	2567.03	0.00	0.00	990.57		990.57	1576.46	1576.46	1378.34	1063.05	1349.61
2025	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1553.08
2026	2664.82	0.00	583.55	1013.95		1597.50	1067.32	1067.32	864.53	534.36	1067.32
2027	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2028	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2029	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2030	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2031	2664.82	0.00	583.55	1013.95		1597.50	1067.32	1067.32	864.53	534.36	1067.32
2032	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2033	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2034	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2035	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2036	2664.82	0.00	583.55	1013.95		1597.50	1067.32	1067.32	864.53	534.36	1067.32
2037	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2038	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2039	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2040	2664.82	0.00	0.00	1013.95		1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
2041	2664.82	0.00	583.55	1013.95		1597.50	1067.32	1067.32	864.53	534.36	1067.32
2042	2664.82	0.00	0.00	1013.95	0.00	1013.95	1650.87	1650.87	1448.08	1117.91	1650.87
						FIRR	**8.98%**	**7.31%**	**7.52%**	**5.23%**	**7.54%**
WACC	**3.3%**					**NPV**	**10 464**	**8 365**	**7 485**	**3 081**	**8 398**
				Switching Value		**FIRR**		67.55%	77.45%	30.06%	9.52%
						FNPV		99.69%	70.26%	28.35%	12.34%

Summary Economic Analysis for Subproject

Table 6: Conversion of Financial Costs to Economic Costs

(SUM million - constant prices)

Particulars	Financial Costs	Conversion factor	Economic Costs
A. Capital Costs[/a]			
Traded componenets (SERF)	2 891	1.00	2 891
Non-traded compoments:			
Domestic M&E (SWRF)	11 460	1.00	11 460
Unskilled labour (SWRF)	398	0.80	318
Skilled labour (SERF)	44	1.00	44
Land acquisition (SERF)	0	1.00	0
Taxes and duties	1 865	0.00	0
Subtotal (A)	16 657		14 713
B. Operation and Maintenance Costs[/b]	610	0.95	580

/a Capital costs excluding IDC & replacements
/b O&M cost in 2014, year of full operation

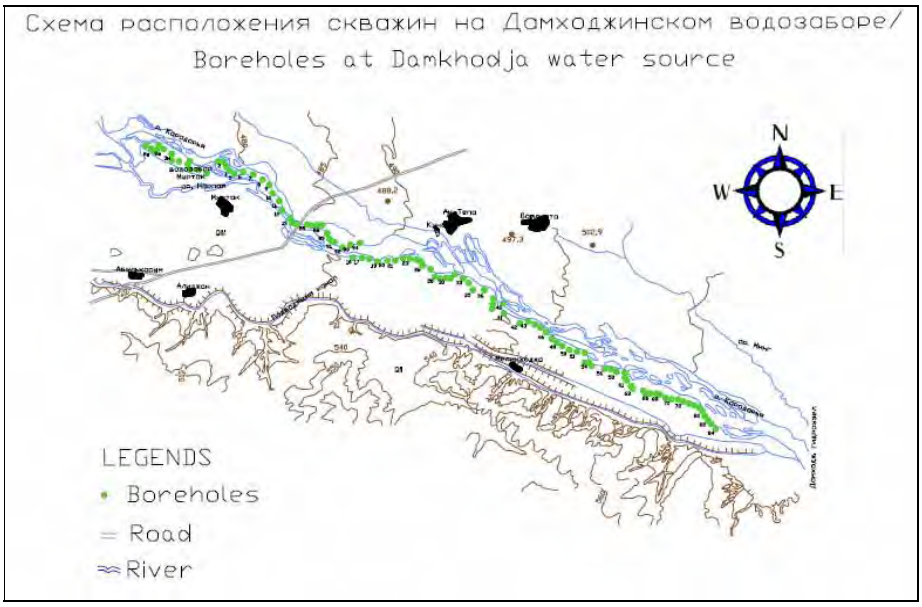
Table 7: EIRR and Sensitivity Analysis

Year	Benefit	Economic Cost			Net Benefit (Cost)				1-yr Delay in Benefit
		Investmt	O&M	Total	Base Case	Investmt 20%	O&M 20%	Benefit -20%	
	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill
2010	0	93	1	94	(94)	(112)	(94)	(94)	(94)
2011	0	1 001	7	1 008	(1 008)	(1 208)	(1 010)	(1 008)	(1 008)
2012	2 579	8 649	317	8 967	(6 388)	(8 118)	(6 452)	(6 904)	(8 967)
2013	2 647	4 970	512	5 482	(2 835)	(3 829)	(2 937)	(3 364)	(2 903)
2014	2 647	0	580	580	2 067	2 067	1 951	1 538	2 067
2015	2 647	0	603	603	2 044	2 044	1 923	1 515	2 044
2016	2 647	0	631	631	2 016	2 016	1 890	1 487	2 016
2017	2 647	0	661	661	1 986	1 986	1 854	1 457	1 986
2018	2 647	0	695	695	1 952	1 952	1 813	1 423	1 952
2019	2 647	0	730	730	1 918	1 918	1 772	1 388	1 918
2020	2 647	0	772	772	1 876	1 876	1 721	1 346	1 876
2021	2 647	0	818	818	1 830	1 830	1 666	1 300	1 830
2022	2 647	0	869	869	1 778	1 778	1 604	1 249	1 778
2023	2 647	0	926	926	1 721	1 721	1 536	1 191	1 721
2024	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2025	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2026	2 647	196	991	1 186	1 461	1 422	1 263	932	1 461
2027	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2028	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2029	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2030	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2031	2 647	153	991	1 144	1 504	1 473	1 305	974	1 504
2032	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2033	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2034	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2035	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2036	2 647	120	991	1 111	1 537	1 513	1 339	1 007	1 537
2037	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2038	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2039	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2040	2 647	0	991	991	1 657	1 657	1 459	1 127	1 657
2041	2 647	94	991	1 085	1 563	1 544	1 365	1 033	1 563
2042	2 647	460	991	1 450	1 197	1 105	999	668	1 197
		Discount Rate @ 12%		EIRR	15.9%	12.2%	14.3%	9.9%	12.5%
				ENPV	2 214	163	1 305	-1 189	335
		Sensitivity Indicator		EIRR		4.7	2.0	7.7	7.9
				ENPV		4.6	2.1	7.7	7.7
		Switching Value		EIRR		21%	50%	13%	13%
				ENPV		22%	49%	13%	13%

APPENDIX 9: ENVIRONMENTAL ASSESSMENT

Map 1: Uzbekistan showing subproject location

Map 2: Boreholes at Damkhoja water source



INTRODUCTION

Purpose of the Report and the Project Background

2. This report presents the findings of an Initial Environmental Examination (IEE) of the proposed subproject; i.e., Damkhoja Water Supply System in Samarkand Oblast under the TA: 7240-UZB Preparing the Water Supply and Sanitation Services. This is one of four proposed core subprojects that are representative of a multi-subproject Sector Project that is Tranche 1 of a Multi-tranche Financial Facility (MFF) Investment Program. The other three proposed sub-projects of Tranche 1 are Galaasiya Water Supply System, Karmana City Water Supply System, and Termez City Wastewater Treatment Facilities. IEE was conducted during the subproject preparation period to identify the impacts of the proposed subproject on the environment and to recommend measures to mitigate adverse impacts arising from its implementation.

3. The proposed MMF Investment Program will improve access to safe, reliable, and sustainable water supply and sanitation (WSS) by about 3 million residents in several provincial capitals and district towns in about eight oblasts (provinces) in Uzbekistan. Through institutional strengthening and capacity development components in each subproject, the Investment Program will provide targeted assistance to Uzbekistan Communal Services Agency (UCSA), State Committee for De-monopolization and Supporting Competition and Entrepreneurship, local governments, and town level vodokanals (water supply companies), focusing on financial, managerial, and technical performance.

4. This subproject is designed to improve the water supply production from the existing Damkhoja boreholes, to improve water supplies to existing customers supplied from the Inter Regional Trunk Main [IRTM] in the Oblasts of Samarkand, Navoi, and Bukhara. The project executing agency is the Uzbekistan Communal Services Agency (UCSA) and the Implementing Agency is the participating provincial government. The project will also improve the sector performance by assistance in Investment Program management and capacity development for the enforcement sector regulations, improved financial management and revenue mobilization and developing efficient and accountable service providers.

5. In Uzbekistan, water sector developments are governed by the national list of priority investment projects (proposals) prepared for implementation with the involvement of international financial institutions and donor countries in accordance with Presidential Decree No 969 dated 02-10-2008. The proposed sub-project is one of the projects in the investment plan updated for 2009. The project will contribute to the Government's long-term program of providing Uzbekistan’s population with drinking water, which was approved by resolution of the Cabinet Ministry. Furthermore, this is also a priority project of the Government focusing on the elimination of existing water supply problems and improving the sanitation and epidemiological situation for 2009 - 2010 by Presidential Resolution No. 890 dated 10-06-2008 to provide rural population and cities with drinking water.

Extent of the IEE Study

6. The IEE study for the sub-project was carried out by the Project Preparatory Technical Assistance (PPTA) consultants, in accordance with the Environment Policy (2002)

and Environmental Assessment Guidelines (2003) of the Asian Development Bank (ADB) and relevant environmental policies and guidelines of the Government of Uzbekistan (GoU). Environmental Specialists of the PPTA consultants visited the sub-project site and also carried out public consultations prior to preparation of this report. Moreover, information provided by consultants carrying out related feasibility studies[1] was used in this IEE. The IEE involved the following activities:

- gathering of baseline information available on the physical, chemical, biological, and socio-economic environment of the sub-project area and subcomponent sites and understanding the technical, social, and institutional aspects of the sub-projects;
- public consultation and field visits;
- screening of potential issues, concerns, and impacts relative to location, design, construction, and operation to distinguish those that are likely to be significant for a particular subcomponent and warranting further study;
- recommending measures to mitigate adverse issues, concerns, and impacts, particularly to the project design team;
- preparing an Environmental Management Plan (EMP) indicating impact areas, recommended mitigation measures, method of monitoring the impacts and responsible persons ; and
- proposing the institutional set-up for implementation of the EMP.

7. Findings of site reconnaissance, results of water quality tests and analyses, technical descriptions based on the engineering designs contained in the Draft Appraisal Reports, and outcomes of discussions with officers of the relevant agencies and the people are integrated in this IEE Report.

DESCRIPTION OF THE PROJECT

Type of Project

8. As noted, this is a Multi-tranche Financial Facility (MFF) Investment Program and the first tranche is a Sector Project. This IEE is for one of four proposed core sub-projects of the first tranche (Project 1) of the MFF.

9. The subproject will have three major inter-related components to provide a reliable supply of potable water for communities that are connected to the interregional transmission main (IRTM): (i) Water Supply Development (upgrade existing water supply intake boreholes, and rehabilitate some, replace sections of existing raw water pumping mains and the existing chlorination facilities); (ii) Capacity Development and institutional strengthening; and (iii) Investment Program Management. The physical components are subject to environmental assessment.

[1] Water Supply Appraisal Report Sub Project 1 Damkhodja Water Intake Facility Development, July 2009 – PPTA consultant. Pre-feasibility study report - prepared by local design institute "O'zbekkomunalloyihaqurilish".

Environmental Category of Subproject

10. Based on a Rapid Environmental Assessment (REA) in Appendix 1 carried out by the PPTA Consultant, this sub-project is classified as a Category "B" project in accordance with the Environment Policy (2002) and Environmental Assessment Guidelines of the ADB. Adverse impacts that may arise from the implementation of all the components will generally be minor and measures to mitigate them will be provided and instituted without difficulty. The Environmental Policy of the ADB requires that Category "B" projects are subjected to an IEE.

11. The Uzbekistan law on nature protection enabled in 1992 outlines the legal and institutional requirements for the conservation of the environment and the rational use of natural resources. The law empowers the State Committee for Nature Protection (Goskompriroda) as the agency responsible for implementing that law.

12. Preparation of the review reports and approval of projects on environmental grounds is regulated by the Decree of the Cabinet of Ministers No 491 dated 31.12.2001–Approval of the Regulation of the State Ecological Expertise (Glavgosecoexpertisa). This regulation stipulates four categories of projects. According to this regulation, the proposed sub-project is technically a Category II project because it involves inter-regional or inter-provincial water supply. Category II projects require the preparation of an Environmental Impact Assessment (EIA) report that is approved by the National Directorate for State Ecological Expertise. Based on (i) the indications of the REA, (ii) the results of this IEE, and (iii) that all of the subproject is located in one oblast, the PPTA consultant believes that is it highly unlikely that Glavgosecoexpertisa will require an EIA. Instead, the PPTA consultant firmly believes that the subproject will be treated as a Class III project that only requires the preparation of an Initial Environmental Assessment (IEA), which is similar to ADB's IEE, and is approved by the Provincial Directorate for State Ecological Expertise. The IEA and, if required, an Environmental Consequences Assessment (ECA), will be prepared by the PPTA consultant in the Uzbekistan official language for Government approval.

13. Damkhoja water extraction and supply system is currently experiencing many water supply production problems, some of which are related to borehole operating performance, some to collector main operation, some to source security, and some to the Kurpa Water Distribution Unit (WDU).

(i) Borehole operating performance
- The service intervals of the 94 individual submersible well pumps are very short, averaging only 8 months before the need for rehabilitation or replacement, resulting in up to 30% non–operational pumps on a regular basis
- The pumps and motors are very inefficient
- There are frequent electricity supply failures caused by transformer problems
- Current well yield totals about 150 ML/d and reduces to about 114 ML/d during the dry summer and autumn seasons

(ii) Collector main operation

- Sections of the 300 mm diameter outlet pumping mains from the boreholes to the collector main leak
- No water meters are installed on the individual boreholes, rendering the accuracy of the production data unreliable
- The only water meter is located on the outlet main from the Kurpa WDU at the start of the IRTM

(iii) Source security
- The wire fence that was erected to protect the boreholes has been removed
- Nearby dikes on the Karadarya River are occasionally breached, with the potential for surface water to enter the well casings
- The water quality from the rivers supplying the recharge to the boreholes is of concern due to the farming activities upstream of the boreholes and pollution, especially heavy metals, originating in countries upstream
- Insufficient monitoring and sampling[2]

(iv) Kurpa Water Distribution Unit
- The chlorination facilities are in poor condition and require urgent replacement
- The 1,000 m3 water storage tank at the WDU requires rehabilitation

14. The proposed subproject would ameliorate the situation and would bring the following benefits:

(i) On completion of the proposed improvements at Damkhoja, increased flows in the range of 215 m3/d will be available from the Kurpa WDU[3]
(ii) Water quality supplied will comply with Uzbekistan drinking water quality standards
(iii) When the increased output from Damkhoja is made available following the completion of Phase 1 of the network rehabilitation and after adjustment for real water losses in the transmission and distribution networks, real network water losses will be reduced in Karmana and Galaasiya cities, overall real losses in the distribution network are estimated to exceed 30% in 2011, and billed water volumes will be increased significantly after 2011.
(iv) There will be a significant decrease in electricity costs for operation of the new submersible pumps, due to their higher pump and motor efficiencies.

Project Location

15. The Damkhoja boreholes are located in Samarkand Province adjacent to Karadarya River as shown on Map 1.

16. There are 84 boreholes on the left bank of the river and 10 on the right bank. Water is pumped to the Kurpa WDU located about 3 km from the boreholes. The Kurpa WDU

[2] If quality problems are determined during the course of detail design, it may be necessary to construct a Water Treatment Plant or to relocate the boreholes.
[3] On 29 September 2003, the State Committee of Uzbekistan for Geology and Mineral Resources (Goskomgeologiya), chaired by its president, guaranteed a minimum abstraction rate of 215 ML/d for the Damkhoja inter-provincial water supply scheme.

consists of a water storage tank, a pump station with meter, chlorination facilities, and an administration building with outdated laboratory facilities.

Magnitude of Operation

17. The subproject is expected to generate an increased water flow in the range 30 to 40 L/s from each of the rehabilitated boreholes, resulting in an expected production capacity of the Damkhoja well field of 215 ML/d. Based on current production data these flows could reduce during the summer period.

Descriptions of the Project

18. The 94 Damkhoja boreholes are located in Samarkand Province adjacent to Karadarya River. These boreholes are about 60 m deep with a static level of about 5 m below the surface. They are connected to the deep aquifer via sealed pipes to an impervious layer separating the shallow aquifer from the deeper, source aquifer. The boreholes are located in 3 groups on both sides of the Karadarya River, drilled through the river gravels and a discontinuous impervious layer, resulting in some of the groundwater originating in the high mountains at the junction of Turkestan and Zarafshan mountain ranges in Tajikistan and some in the Zarafshan River, depending on location and dynamic groundwater levels.

19. Water from the submersible well pumps discharges through a 1,400 mm diameter collector system to the two 500 m3 storage reservoirs at the Kurpa WDU. Following chlorination of the water at the Kurpa WDU, the water is discharged by gravity into the 1,400 mm diameter twin mains at the start of the IRTM.

20. The following borehole rehabilitation is proposed:

- Re-drill and rehabilitate 11 boreholes or as determined during detail design
- Raise all well casings above flood level (in case of dike failures or other reasons)
- Install a new high efficiency submersible pump in each rehabilitated borehole
- Install a new high efficiency submersible pump in each of 45 existing boreholes
- Install a 150 mm water meter on the outlet of each well pump
- Install 200 mm steel rising main in each rehabilitated borehole
- Replace 300 mm pumping mains from rehabilitated boreholes to the collector pipe
- Replace 19 km of fencing around the existing borehole well fields site to prevent access by livestock and trespassers
- Consider electronic surveillance of well heads and control houses

21. The following rehabilitation and improvement work is proposed at the Kurpa WDU:

- Reconstruct the gas chlorination facility to provide separate storage for chlorine drums and chlorination equipment
- Install duty and standby chlorinator units on both outlet mains
- Replace vents on the two existing 500 m3 storage reservoirs
- Replace ten 250 kW transformers at boreholes
- Install SCADA telemetry system for effective monitoring

Section 4 DESCRIPTION OF THE ENVIRONMENT

Physical Resources

22. The Samarkand Oblast is located along the Zarafshan River, with a total area of 16,700 km2. The population is 2.9 million people (2007), with a population density of 142 persons per km2. In the East, Samarkand Oblast borders the Republic of Tajikistan; in the South, Kashkadarya Oblast; in the West, Navoi Oblast; and to the North-east, Djizzak Oblast.

Climate

23. Climate data from the Kattakurgon meteorological station, which is the closest station to Damkhoja, is shown below. This shows that the majority of the rainfall occurs during the cooler winter season with extreme drought conditions during summer. July is the hottest month when average daily temperatures reach 35.7oC while February is the coldest month when daily temperatures average -2.4oC. Humidity reaches a maximum 80% during the winter months and declines to 41% during the hottest month of July. Wind factor is relatively constant throughout the year but March to May have slightly more wind. While no evaporation figures are available, significant moisture deficit can be expected during the summer period.

Table 1: Average meteorological data of Kattakurgon meteorological station (1961–1990)

Month	Rainfall (mm)	Temperature °C max	min	Humidity %	Wind run km/month
Jan	42.3	22.4	-29.7	74	6.357
Feb	34.4	24.6	-24.7	72	6.475
Mar	61.9	30.7	-24.4	72	7.522
Apr	50.1	38.5	-5.9	64	7.036
May	23.6	39.9	0.2	54	6.846
Jun	2.4	42.9	8.4	43	6.268
Jul	2.2	45.8	11.2	42	6.246
Aug	0.3	43.3	8.3	44	6.409
Sep	1.8	40.0	-0.2	46	6.423
Oct	15.2	34.2	-6.6	57	6.433
Nov	24.2	29.5	-14.1	66	6.304
Dec	41.1	25.0	-21.6	74	6.242
Totals	**299.5**				**78.560**

Topography and Soils

24. Light sierozem soils prevail on the flat part of Samarkand Oblast (in irrigated areas they are combined with meadow soils). There are also sandy, takir, grey-brown, and solonchak (salty soil) soils in desert zones. Dark sierozem, brown and chestnut soils are found on the foothills and lower part of the mountain ranges.

Water Resources

25. The Zarafshan River is the main water course in Samarkand Oblast and it supplies the major canals. The main oblast collectors are Qorasuv, Siab, and Yangi-Dargom. There are two large water reservoirs in the oblast; namely, Kattakurgon and Akdarya. The river is 576 km long and starts from glaciers in the high mountains at the junction of Turkestan and Zarafshan mountain ranges in Tajikistan. The Zarafshan River flow is controlled by the Kattakurgon reservoir. The total area of the Zarafshan River basin is 143,000 km2, of which 131,000 km2 is in Uzbekistan.

26. The River is subjected to negative influences from other countries. Upstream pollution and run-off from the mountains carrying silt and detritus are observed downstream. Toxic metals, such as mercury and cadmium, can be leached from the soil into the river. Pollution from industrial, municipal, and agricultural practices can further damage this source of drinking water; however, water quality tests carried out for the boreholes have not shown any traces of any toxic materials or heavy metal in the water (See Appendix 4).

Geology/Seismology

27. The soils contain loams with sands and gravel to depths of 2–40 m, with the water bearing shale deposits below. Groundwater level varies from 3 to 4 m to more than 20 m. The groundwater inflow from Zarafshan and Karadarya rivers recharges the ground water aquifer. The normal ground water quality has a high composition of minerals, which causes the water to be aggressive to concrete and metals. There are some confined groundwater pockets where the quality of water is very good.

28. The region is in a seismic zone classified as 7 to 8 points on the Richter Scale and structural designs will incorporate this.

Ecological Resources

29. The total area of state-owned forest land is about 8.6 million ha, 18% of the total area of the Republic. Compared with 1996, the total area of the state forest reserve has been reduced by more than 1 million ha.[4] Natural vegetation occupies 85% of the desert and steppe area. 13% of the area consists of mountains, valleys, and floodplains. In the floodplains, which were originally well covered with flora, now only 2% of the original flora remains. In Uzbekistan flora is represented by at least 4,500 species of vascular plants belonging to 650 genera and 115 families. About 400 of the species are endemic[5]; however, there are no endemic species in the vicinity of the Damkoja borehole site, where only scant patches of grass is growing and no significant flora and fauna are encountered.

30. Uzbekistan has prepared lists of rare and endangered flora and fauna; some 302 species of plants and 3 species of fungi have been classified as rare and endangered. The Red Book[6] of the Republic of Uzbekistan (2006) lists 44 types of plants from the Red Book grow

[4] Source: NPC, 2005.
[5] Source: Uzbekistan Academy of Science, 2006.
[6] The Red Book of Uzbekistan is equivalent to IUCN's definition of a Red List, which is a tool used for categorization of endangered flora and fauna species, by dividing the species into 5 categories related to their extinction potential.

in the Samarkand Oblast out of which one, Hedysarum amancutanicum, is listed as Category 0. 15 other species are listed as Category 1, 24 are listed as Category 2, and 5 are listed as Category 3. Some 48 species of fauna are listed in the Red Book of which 31 species are Category 2, 12 are Category 3, and 5 are of Category 1. Uzbekistan has addressed the problem of declining flora and fauna by creating protected areas at both the national and provincial level.

Economic Development

31. Samarkand Oblast is mainly a livestock-producing area, in addition to textile, food, manufacturing, and construction industries. In the last three years, about 40% of produced goods were from food production, 35% from light industry, 7% from machine building and metal treatment, and 2% related to petro chemicals and oil. According to 2007 statistics, the average monthly income in Samarkand Oblast was about $125; outside the city of Samarkand, monthly incomes range from $60 to $70.

Social and Cultural Resources

32. Areas and populations of the rayons in Samarkand Oblast are shown in Table 2 below. The total area of Samarkand Oblast is 16,700 km2, 6.3% of the area of Uzbekistan. The population of Samarkand Oblast is 2.9 million people. The oblast is divided into 14 administrative districts, or rayons. The capital is Samarkand with a regional population of 269,900 people.

Historical and Cultural Heritage Area

33. Samarkand is one of the important cities of the ancient world, along with Rome, Athens, and Babylon and is the most popular tourist centre in Uzbekistan and Central Asia. The history of Samarkand is closely connected to famous scientists, poets, and philosophers such as Abu Ali ibn Sino, Rudhaki, Omar Khayam, Navoi, al-Khorezmi. Samarkand with its unique historical and architectural monuments, age-old traditions, and secrets of Asian cuisine attracts many visitors. There are many sites of historical importance including; Amir Temur Palaces and Madrassahs, Mausoleum of the Prophet Daniel, Rukhobad Mausoleum, Ak-Saray Palace (15th Century.), Gur-Emir Mausoleum, Chapan-ata Mazar, Ulugbek Observatory (15th Century), Bibi-Khanym Mosque (14–15th Century), Hazret-Hyzr Mosque (19th Century), Shakhi-Zinda Necropolis (11–15th Century), The Registan Square (15–17th Century), Imam al-Bukhari Memorial Complex (20th Century) etc. None of the above sites are located near the project sites.

Table 2: Samarkand Oblast

No	Rayon	Area (km^2)	Population
1	Akdarya	370	113,700
2	Bulungur	770	140,600
3	Jambay	550	127,000
4	Ishtihan	720	183,000
5	Kattakurgan	1,390	207,000
6	Koshrabat	2,160	97,500
7	Narpay	440	161,700
8	Nurabad	4,860	109,200

9	Payarik	1,290	193,000
10	Pastadorgom	870	262,200
11	Pahtachiy	1380	118,000
12	Samarkand	480	269,900
13	Taylak	280	145,100
14	Urgut	1120	362,000
	Totals	**16,680**	**2,489,900**

Section 5 Potential Environmental Impacts and Mitigation

34. Screening of potential issues, concerns and/or impacts relative to siting, design, construction, and operation was carried out following ADB's Environmental Guidelines (2003).

Impacts due to Location

Water Supply Facilities

35. Upgrading the capacity of Damkhoja water supply will be by additional abstraction from the Kashkadarya water intake, located on the right bank of the Kashkadarya river, approximately 2.2 km from Damkhoja hydro-electric dam complex located upstream on the river. The borehole site is about 20 km long with a width of 100 to 500 m. The land is state-owned and it is occupied by natural tugai plants and borders irrigated areas of Akdarya and Ishtikhan regions. A detailed geological survey of deposits was carried out by "Uzbekgidrogeologiya" in 1991-1994. Site selection is not an issue as all work will be carried out in existing sites. Lands for facilities are owned by the Government and no resettlement or land acquisition is involved.

36. The proposed sites for upgrading and rehabilitating water supply structures have negligible adverse environmental impacts. Any adverse impacts can easily be mitigated or resolved in design, construction, and operation by implementing the measures outlined in the EMP – Appendix 2.

37. The access roads to all the sites of facilities are adequate for project construction purposes. There are plans to renew some of the electricity transmission lines for the facilities, but no significant impacts related to basic infrastructure required for project facilities is expected.
None of the subproject component sites are near pristine ecosystems and cultural, historical, or religious sites and will therefore not impact any sensitive sites. The sites will not interfere with the cultural use of lands by minorities nor impair any aesthetics.

38. The subproject facilities are unlikely to impact on the natural drainage pattern of the land and thereby on local flooding. The structures in flood-prone areas will be protected from floods by constructing higher protection and providing adequate drainage around the structure. These interventions would not impact the local area flooding conditions as construction will be in the river valley.

Water Sources

39. Site selection for water abstraction is based upon the availability of adequate quantities of good quality water. All water abstraction will be from existing sites. In case additional sources are necessary, as determined during detail design, the selection process that will be followed will be in accordance with the relevant guidelines/regulations and policies of the GOU and State Nature Protection Committee with respect to water quality and source access.

40. Aquifers in Karadarya, located between two tributaries of the Zarafshan River; i.e., Akdarya and Karadarya rivers, are connected to the Damkhoja aquifer from the East. Boreholes are in varying depths of well rounded pebbles with sand and gravel filler at a depth of about 0.9 m below ground surface. Static water level in the boreholes varies from 5 to13 m. Deposits based on the level of difficulty belong to group 1, according to classification of groundwater deposits.[7]

41. Hydrological data support the long term availability of adequate water resources throughout the year to meet the full demand including that of dry season demand. Any impacts on nearby groundwater users are unlikely as nearby irrigation is supplied from upstream diversion from the rivers. Any significant impact on river flow due to increased abstraction from the groundwater source is unlikely. Whereas the river flow is subject to upstream regulation by the reservoir, the availability of the design abstraction rate from the aquifer of 215 ML/d was guaranteed by Protocol No. 4 of the meeting on 29 September 2003 of the State Committee of Uzbekistan for Geology and Mineral Resources, chaired by the president of that Committee.

Impacts Related to Design

42. The project design is basically the rehabilitation and upgrading of an existing water supply system. The PPTA consultant, assisted by IKS[8], has developed a preliminary design that is based on the existing facilities, which is considered the most cost-efficient option of meeting the objectives of this subproject.

43. Well casings will be protected from the effects of surface run-off pollution, which could lead to unsafe water.

44. Chlorine gas receiving, storing, handling, feed, and safety facilities will be designed so that, with improper O&M, workers will be protected.

45. The risk of fire will be minimized by proper selection of fire-resistant or -retardant materials and an adequately designed power supply system that includes grounding of all sub-systems, appropriate insulation, and circuit breakers.

[7] Source: State Committee on Geology and Mineral Resources - "Classification of operating ground water sources", 1994.

[8] IKS–ISLOHOTKONSALTSERVIS or IKS Group of Companies is a local consulting company which specializes in provision of consulting services in Uzbekistan and other developing countries.

46. All structures in contact with the ground will be designed incorporating anti-corrosion measures for mitigation of negative impact on ground water and all structures will be designed to withstand seismic activity up to 8 on the Richter scale.

47. In summary, adverse impacts due to the subproject design are not expected. Temporary impacts due to construction and potential impacts during operation will be mitigated in accordance with the EMP (Appendix 2).

Impacts during Construction

Land use

48. There will be very little clearing, grading, or excavation activities, so emissions from the constructions will be minimal.

Increased Traffic and Use of Machinery

49. Traffic of heavy trucks employed for the transportation of construction materials will increase temporarily during construction of the subproject. Other temporary environmental concerns relate to the use of excavators, cranes, compressors, and other machineries during the construction works will include: (i) noise and dust from construction sites, and (ii) safety for workers and inhabitants. Measures will be taken in accordance with the EMP to limit dust and noise levels and enforce strict observance of safety rules at main road crossings, along main roads, and near subproject construction sites. Temporary traffic lights at road crossings where sensible and temporary traffic diversions will be installed and implemented by the contractors, under the supervision of the PIU. The contractor and the PIU will inform the public via media announcement about temporary road closings and traffic diversions.

Solid and Liquid Waste Management

50. At the subproject sites, various types of solid waste, including wood, waste concrete, steel waste, discarded old equipment, oil filters, plastic and cartons from equipment packaging will be produced. Measures, based on the EMP, will include the provision of refuse collection containers and used oil collection containers, with further removal to specially allocated disposal and reclamation sites designated by the Hokimiyat. After completion of rehabilitation and construction works, all jobsites will be cleaned and landscaped. Maintenance of machinery will be done exclusively within the premises of gasoline stations specifically equipped for the storage of used oils and other liquid contaminants. No on-site maintenance of equipment will be permitted. If groups of workers are to remain at the work sites for extended periods of time, it will be necessary to construct adequate temporary sanitary facilities including provision for the disposal of wastewater to sites approved by the Hokimiyat.

51. Regulations on environmental protection, safety, and hygiene shall be fully complied with in all phases of constructing the subproject. Moreover, involved workers (especially, but not limited to, the on-site Work Supervisors) should be made aware of, and trained/guided in, standard environmental protection requirements and the IEE recommendations. Contractors will be contractually required to include environmental monitoring as part of their management of the project.

Biological Environment

52. Run-off, if any, from construction sites into nearby water bodies will be controlled in accordance with the EMP so as to eliminate any detrimental effect downstream to aquatic flora and fauna. Impact on local flora and fauna will be minimal.

Socio-Economic Environment

53. Only minimal impacts on land use are expected, since sites are typically located on lands not used for any other purpose or in built-up areas. However, the contractor will produce a plan showing the impacts of pipe-laying affecting some utilities and/or trees established within the road allowances.

54. Regulations on environmental protection, safety, hygiene shall be fully complied with in all phases of constructing the subproject. Moreover, involved workers (especially but not limited to the on-site Work Supervisors) should be made aware of, and trained/guided, in standard environmental protection requirements and the IEE recommendations. Contractors will be contractually required to include environmental monitoring as part of their management of the project.

55. In summary, adverse impacts due to the construction of the subproject will be temporary and will be mitigated in accordance with the EMP.

56. Low to moderate positive impacts include short-tem employment of local population (skilled and unskilled workers) in construction and some increased earnings in micro-enterprises in the vicinities of construction areas.

Impacts during Operation

57. No significant impacts of water supply schemes on air quality are expected. Noise and vibration nuisance from pumping stations will not impact as the sites are away from human habitats.

58. The expected increase in consumption will give rise to similar higher levels of wastewater generated in beneficiary cities and towns that abstract water from the IRTM. While wastewater is often recycled in gardens, the collection and disposal of grey water (from washing dishes, etc.) or black water (human and animal waste) in the municipalities benefiting from the improved water supply facilities at Damkhoja must be managed by those municipalities.

59. Delivery of unsafe water to consumers resulting from inadequate chlorination, lack of chlorine residual monitoring could cause problems but is unlikely to occur with improved O&M management. Storage and distribution reservoirs must be checked regularly for leaks and ingress that may affect the quality of treated water for distribution. Also land run off from farming must be prevented from entering the boreholes. Standard operating procedures must be followed to ensure that all hazards associated with the use of chlorine gas are minimized and controlled.

60. The proposed subproject will bring about significant socio-economic benefits of access to potable water that will far outweigh any adverse impacts:

- Access to adequate quantity of good quality water at affordable cost (both for drinking and sanitation)
- Reduced lost work days for adults resulting increased income, and lost school days for children with attendant educational benefits due to reduced incidences of water-related diseases
- Saving of time spent for fetching water from distant sources and/or money spent for buying water from vendors
- Induced socio-economic growth in various sectors

Environmental Management Plan

61. The Environmental Management Plan in Appendix 2 summarizes the anticipated environmental impacts, mitigation measures, and required environmental monitoring activities, and lists the entities responsible responsibility for carrying out those activities together with estimated costs in excess of the construction contract.

Section 6 INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN

Institutional Arrangements

62. The Uzbekistan Communal Services Agency (UCSA) will be the Executing Agency of the subprojects that will be implemented in the four Oblasts. A central Project Management Unit (PMU) has been established at the UCSA to manage and monitor all implementation activities of subprojects. The PMU will include representatives from the agencies involved in the National Steering Committee (NSC). The participating provincial government will be the Implementing Agency (IA).

63. The Project will recruit consultants to assist both the Executing and Implementing Agencies with project implementation for the duration of the Project. These Consultants will be attached to the PPMU and PIUs respectively. Relevant provincial agencies shall provide assistance to the PIUs.

64. The supervision and monitoring of subproject-related resettlement and environmental activities, particularly prior to and during construction, is one of the many specified functions of the PPMU. In line with this, it is proposed that an Environmental Monitoring Unit (EMU) be set up within each of the PIU to be responsible for environmental management and monitoring. The major responsibilities of the EMU are to ensure that:

(i) mitigation measures and monitoring activities are carried out as discussed in the IEE Report; and
(ii) reporting is performed in compliance with ADB and Government of Uzbekistan requirements.

65. The EMU shall be headed by qualified full time staff. At least one technical support staff, and if possible one administrative staff, shall be assigned to the EMU. In each oblast relevant agencies (such as the State Committee for Nature Protection of the Republic of

Uzbekistan (Goskomprirodi), State Committee for Geology and Mineral resources of the Republic of Uzbekistan (Goskomgeologiya), Centre of Hydro-meteorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (Uzgidromet), Sanitary and Epidemiological Service of the Ministry of Health) and if possible acceptable NGOs will designate their respective representatives to assist the EMU.

66. If warranted, the PIU will engage a local consultant (Environmental Specialist) to provide the EMU technical assistance in environmental management and monitoring. If not, an alternative is a Specialist at PMU to assist all PIU. The PIU will post a Sanitation Engineer or Environmental Engineer to serve as the "focus person" with whom the EMU head will be closely coordinating, particularly for reporting the monitoring results by the focal person.

67. Project Implementation Assistance (PIA) consultants (expatriate and local) will impart expert advice and guidance and conduct capacity building on environmental management and monitoring, particularly to the members of EMU's and Construction Supervisors.

68. To ensure those ADB environmental requirements and all applicable Government of Uzbekistan's environmental laws, regulations and standards are met prior to start of construction and during construction and operation; an Environmental Management Plan has been prepared (Appendix 2) that will be implemented by the EMU together with Construction Supervisors.

69. The EMP activities of the EMU will pertain mainly during the preconstruction and construction periods. Environmental monitoring during operation of the water supply scheme will be largely the responsibility of the local Municipalities governed by regional Governors with the technical support of the UCSA. However the following agencies also have a role in regular monitoring of water quality:

(i) State Committee for Geology and Mineral Resources of the Republic of Uzbekistan (Goskomgeologiya) which is responsible for monitoring the quality of ground water sources;
(ii) Center of Hydro-meteorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (Uzgidromet) responsible for monitoring the state of the rivers, lakes, water reservoirs, pollution of atmospheric air and land;
(iii) Ministry of Agriculture and Water Management monitoring quality of collector-drainage waters (by 2–4 indicators of mineralization);
(iv) Ministry of Health monitoring quality of water in water sources and water in pipelines from centralized drinking water intakes; and
(v) Wastewater quality monitored both by the owners of enterprises and the national Protection Committee.

70. Arrangements will be made to receive complaints and comments from the public (members of the communes) either through other relevant staff or directly to the EMU members. The relevant communities will be made aware of this process, their right to complain and necessity to protect the environment. EMU will arrange for public awareness creation at the construction stage.

Environmental Monitoring Plan

71. The Environmental Monitoring Plan (EMP) is primarily the framework within which environmental monitoring will be conducted. It will guide the PIU in determining if the recommended mitigation measures prior to construction and during construction and operation are being implemented effectively. The basic framework for EMP monitoring is provided in the Table 2 of Appendix 2.

Reporting of Environmental Monitoring Results

72. Environmental monitoring results will be documented to record that signs of adverse impacts are detected at the earliest time. Monitoring results prior to construction and during construction will have to be reported monthly by the designated "focus person" of PIU to the EMU. A year-end report (or an end-of-monitoring phase report, e.g., end of pre-construction phase or end of construction phase), will be jointly prepared by each PIU and the EMU for submission to PPMU head, who will in turn submit to National Protection Committee of respective oblast for endorsement and to the ADB.

73. The format for the monthly and annual environmental monitoring report will be developed during project implementation by the Consultant appointed for the Project Implementation and that may have to be refined during implementation to incorporate all monitoring findings and lessons learned which may be specific to each site.

Budget for Environmental Monitoring

74. The cost of environmental monitoring will be that required for the remuneration of staff involved in EMP activities and their traveling expenses as well as any direct cost for monitoring activities. NGO involvement will be from the project location and at NGO cost to the project.

75. The nature of the projects and their locations do not necessitate any specific measurements, such as noise level or quality of water in waste receiving water bodies, during the construction phase. However, if any unexpected impact arises it is recommended that EMU take the necessary action in coordination with the PIU. For such needs, it is recommended that the EMU employ the existing laboratory facilities of PIU member Agencies if required. If feasible and more practicable, PIUs will have to set up a working arrangement with the agencies dealing with Science and Technology; and Health to use their facilities and/or equipment in taking samples for analyses and/or in the analyses, whichever is/are applicable.

Section 7 PUBLIC CONSULTATIONS AND INFORMATION DISCLOSURE

Consultation and Participation Process

76. Following a newspaper advertisement in the oblast, a formal public consultation with 19 participants was held at the Kurpa WDU office of the Vodokanal on 1st July 2009 and discussions took place with representatives of relevant government agencies and makhallas. The following summarizes comments received.

(i) It was questioned why water is taken from Damkhoja to supply outside area such as Bukhara and Navoi Oblasts.
(ii) It was explained by the Vodokanal that water is a common national resource and should be available to the people irrespective of their location.
(iii) It was suggested that excessive abstraction of water at Damkhoja borehole site may lead to land subsidence, unless geological investigations are carried out to identify issues with that aquifer.
(iv) It was noted that after Damkhoja boreholes started operation, the agricultural potential of adjacent land had increased due to lowering of water table from the areas adjacent to the boreholes.

Information Disclosed

77. The submission of Environmental Protection Commitment Report to NPC will ensure the disclosure of environmental concerns to the relevant authority. The process of information disclosed to date by the PPTA team, include the following:

(i) The objectives of the subproject as well as ADB environmental policies and procedures were disclosed to the relevant provincial/ District representatives and representatives of makhallas during the public consultation by PPTA Consultants.
(ii) Objectives and subproject locations were disclosed to the beneficiaries.
(iii) Project's environmental category per ADB & GOV policies were disclosed to the Provincial Nature Protection Committee responsible for environmental clearance

78. Environmental issues relating to subproject location and design, proposed mitigation measures, forms of possible institutional set up for environmental monitoring will be disclosed to the relevant provincial authorities after completion of the IEE report.

Section 8 FINDINGS AND RECOMMENDATIONS

79. Based on the environmental screening carried out for the IEE study, the proposed subproject is unlikely to cause significant, irreversible adverse impacts on the environment. More importantly, the proposed subproject is intended to improve the living standards of the communities connected to the IRTM.

80. The benefits will include:
(i) improved availability of safe and reliable supply of water at a reasonable cost, both for drinking and sanitation;
(ii) better health and environmental sanitation resulting in marked improvement in community health indicators (e.g., reduced frequency of water related diseases);
(iii) reduced lost work days for adults (increased income),
(iv) reduced lost school days for children (improved educational benefits) due to reduced incidences of diseases;
(v) saving of time spent for fetching water from distant sources and/or money spent for buying water from vendors;

(vi) and induced socio-economic growth, (promotion of economic growth in various sectors),
(vii) performance of water supply headwork will be enhanced; and
(viii) O&M costs will be reduced.

81. The potential adverse impacts that are associated with design, construction, and operation of the proposed subproject will be of low magnitude and localized, and can be mitigated to acceptable levels without difficulty through proper engineering design and incorporation or application of recommended mitigation measures and procedures in all stages. The impacts during constructions will be temporary and can be minimized by following the construction management and supervision proposed in the Environmental Management Plan. It is recommended to

- finalize the EMP during detail design,
- submit finalized EMP to ADB for non-objection,
- include non-objected EMP in bidding documents, and
- include the finalized EMP in the contract documents

82. All subproject activities prior to construction, during construction, and during operation will be monitored in accordance with relevant Government of Uzbekistan regulations.

CONCLUSIONS

83. Based on the indication of the Rapid Environmental Assessment in Appendix 1 and the findings of the IEE, the classification of the subproject as Category "B" is confirmed, and no further special study or detailed EIA will be needed to comply with the environmental policies of the ADB. Technically, components of this water supply scheme are inter-provincial, which would make it a Class II project that requires an EIA study to be produced in the Uzbek official language. It is the opinion of the PPTA consultant, however, that the subproject is a Class III because it is entirely located in one province and in any case, as the REA and this IEE have documented, will have negligible environmental impact and only during construction when it can be easily mitigated in accordance with the EMP. Accordingly, the IEE with the recommended institutional arrangements and monitoring program given in the Environmental Management and Monitoring Plans would become the completed Environmental Assessment, or the EIA.

APPENDIX 1

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST
WATER SUPPLY

Instructions:

- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: **PPTA No: 7240–UZB: Water Supply and Sanitation**
Upgrading of Damkhoja Water Supply and Distribution System

Sector Division: **CWRD/CWUS**

Dates Conducted: 01-Jul-09 (WipulaElkaduwa, Madina Khalmirzaeva, Environmental Specialists)
30-Jul-09 (Morten Jensen, Madina Khalmirzaeva, Environmental Specialists)

SCREENING QUESTIONS	Yes	No	REMARKS
A. PROJECT SITING IS THE PROJECT AREA…	☐	☐	
▪ DENSELY POPULATED?	☐	■	Project sites – water boreholes area locates far from settlements, only 5 households are around Kurpa Water Distribution Unit
▪ HEAVY WITH DEVELOPMENT ACTIVITIES?	☐	■	
▪ ADJACENT TO OR WITHIN ANY ENVIRONMENTALLY SENSITIVE AREAS?			
• CULTURAL HERITAGE SITE	☐	■	
• PROTECTED AREA	☐	■	
• WETLAND	☐	■	
• MANGROVE	☐	■	
• ESTUARINE	☐	■	

SCREENING QUESTIONS	Yes	No	REMARKS
• BUFFER ZONE OF PROTECTED AREA	☐	☐	
• SPECIAL AREA FOR PROTECTING BIODIVERSITY	☐	☐	
• BAY	☐	☐	
B. POTENTIAL ENVIRONMENTAL IMPACTS Will the Project cause…			
▪ pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?	☐	☐	
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?	☐	☐	
▪ hazard of land subsidence caused by excessive ground water pumping?	☐	☐	The site has a groundwater abstraction permit from the State Hydrogeological Enterprise for extraction of ground water at the rate of 250 ML/d. The State Hydrogeological Enterprise monitors the abstraction of ground water to ensure that extraction volumes do not exceed permitted volumes, which exceed the sub-project design rate of 215 ML/d
▪ social conflicts arising from displacement of communities ?	☐	☐	
▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	☐	☐	
▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	☐	☐	
▪ delivery of unsafe water to distribution system?	☐	☐	
▪ inadequate protection of intake works or wells, leading to pollution of water supply?	☐	☐	Subproject design will include measures to protect wells from flood waters and contamination
▪ over pumping of ground water, leading to salinization and ground subsidence?	☐	☐	The site has a groundwater abstraction permit from the State Hydrogeological Enterprise for extraction of ground water at the rate of 250 ML/d. The State Hydrogeological Enterprise monitors the abstraction of ground water to ensure that extraction volumes do not exceed permitted volumes, which exceed the sub-project design rate of 215 ML/d

SCREENING QUESTIONS	Yes	No	REMARKS
▪ excessive algal growth in storage reservoir?	☐	■	
▪ increase in production of sewage beyond capabilities of community facilities?	☐	■	
▪ inadequate disposal of sludge from water treatment plants?	☐	■	
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?	☐	■	
▪ impairments associated with transmission lines and access roads?	☐	■	
▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	☐	■	
▪ health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?	■	☐	Workers will receive regular training on how to handlehazardous materials, including chlorine, and general health and safety training. Workers will be provided with necessary Personal Protective Equipment
▪ dislocation or involuntary resettlement of people	☐	■	
▪ social conflicts between construction workers from other areas and community workers?	☐	■	
▪ noise and dust from construction activities?	■	☐	Temporarily during construction work, but will be easily mitigated through EMP requirements
▪ increased road traffic due to interference of construction activities?	■	☐	Temporarily during construction work, but will be easily mitigated through EMP requirements
▪ continuing soil erosion/silt runoff from construction operations?	■	☐	Temporarily during construction work, but will be easily mitigated through EMP requirements
▪ delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	☐	■	
▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	☐	■	Project design includes only plastic pipes

SCREENING QUESTIONS	Yes	No	REMARKS
▪ accidental leakage of chlorine gas?	☐	■	Facilities will include standard chlorine safety equipment. Workers will receive regular training on how to handle hazardous materials, including chlorine, and general health and safety training. Workers will be provided with necessary Personal Protective Equipment
▪ excessive abstraction of water affecting downstream water users?	☐	■	The site has a groundwater abstraction permit from the State Hydrogeological Enterprise for extraction of ground water at the rate of 250 ML/d. The State Hydrogeological Enterprise monitors the abstraction of ground water to ensure that extraction volumes do not exceed permitted volumes, which exceed the sub-project design rate of 215 ML/d
▪ competing uses of water?	☐	■	
▪ increased sewage flow due to increased water supply	■	☐	There will be no increase in sewage flow on this site, but as it delivers water through the IRTM, an increase in the volume of water will have the potential of creating increased sewage flow in receiving cities. It is an issue, which each local vodokanal will have to survey to make sure that its existing sewerage system has enough capacity to deal with the increased sewage flow, and if it does not, plan for upgrading. As part of the upgrading activities in the local distribution nets, in other sub-projects, installation of water meters is a feature, which will at least partly b counteract the increased sewage flow by reducing water usage.
▪ **increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant**	■	☐	There will be no increase in sullage or sludge on this site, but as it delivers water through the IRTM, an increase in the volume of water will have the potential of creating increased sullage and sludge in receiving cities. It is an issue, which each local vodokanal will have to survey to make sure that its existing sewerage system has enough capacity to deal with the increased volume of sullage, and if it does not, plan for upgrading. As part of the upgrading activities in the local distribution nets, in other sub-projects, installation of water meters is a feature, which will at least partly counteract the increased sullage production by reducing water usage. Sludge volumes should not increase as they are a function of population, not unit water use.

APPENDIX 2
ENVIRONMENTAL MANAGEMENT PLAN FOR DAMKHOJA WATER SUPPLY SUBPROJECT

Table A2.1: Summary of Impacts and Proposed Mitigation Measures

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation
Pre-construction phase				
Selection of borehole sites and pipes	Inability to meet WQ standards by produced water	- Borehole selection based upon the availability of adequate quantity of good quality water; - Avoid steel pipes in vulnerable situations like raw water / soil properties could corrode pipes;	PPTA consultants - provide conceptual design incorporating mitigation measures; Design-build contractors, if any, -provide detail design incorporating mitigation measures; PIU - reviews conceptual and detail designs for compliance with mitigation measures	Cost included in cost of feasibility study
Selection of borehole sites and development of borehole	Unexpected changes in groundwater availability; Pollution at intake by surface run-off;	- Geo-hydrological investigations of the borehole sites; - Protection of intake (as well as ground storages) from flooding/ surface runoff in design; - Adequate buffer zone around intake	PPTA consultants - provide conceptual design incorporating mitigation measures; Design-build contractors, if any, -provide detail design incorporating mitigation measures; PIU - reviews conceptual and detail designs for compliance with mitigation measures	Responsibility of the design team
Chlorination at WDU	Impacts on workers health and surrounding environment during operations.	• Design chlorination facilities with equipment and facilities to ensure the protection of environment and workers • For safe handling of chlorination, following design features should be considered as a minimum: • Separate room for chlorination equipment will be provided. The room will be located on the downwind side of the facilities, away from entrances, windows, louvers, and walkways. • The room will be equipped with ventilating fans with the capacity to provide one complete air exchange per minute when the room is occupied. The fan will	PPTA consultants • provide conceptual design incorporating mitigation measures; Design-build contractors, if any, • provide detail design incorporating mitigation measures; PIU reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Required structures will be items included in costing of the construction budget

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation
		discharge the air to the outside of the building and will not be connected to other exhaust system. • The room will have shatter-resistant inspection window mounted in the door or exterior wall. • The room will have locks so that it can be kept inaccessible to staff other than the operator of the equipment. The room door will open outward for easy exit in case of emergency. • Separate light and fan switches will be provided outside the room. • The room floor will have a non-slip surface and floor drains. • A safety shower and eyewash will be provided near the chlorination room entrance. • The chlorination room will have continuous leak detection equipment with sound and visual warnings that can be heard and seen throughout the treatment plant.		
Construction Phase				
Contractor or workers not following contractual environmental requirements	insufficient environmental controls implemented	Ensure specific contractual requirement, e.g. withholding of payment or penalty clauses, to ensure contractors' implementation of environmental mitigation measures. Contracts to require contractor to have designated staff to oversee environmental issues and mitigation. - Contracts to include the requirement for the contractor to provide environmental induction training to all staff.	PIU - ensure monitoring of environmental requirements by delegation to Environmental Specialist who is the Environment Focal Point of the PIU	Cost should be covered by contract sum, as it will be part of the contract requirements to avoid environmental impact.
Machines and equipment use for construction and transport	Emissions from Construction vehicle and equipment exhaust; Dust from vehicles, land clearing, grading, excavation, etc;	- Excavated or stockpiled soil and sand shall be watered before loading, if there is a risk of dust generation, e.g. if it is fine materials or under windy conditions. - Soil, sand and other construction materials on transport vehicles shall be covered. - Speeds of such vehicles shall be limited, particularly on unpaved areas. - All heavy equipment and machinery shall be fitted in full compliance with the national (SNPC) and local regulations with regards to emissions and noise. - Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions. - Smoke-belching vehicles and equipment shall not be	Contractor's Site Supervisor - ensures compliance with EMP - visually inspects safety equipment use, observes vehicle noise levels, etc., - check trucks entering site to - assess emissions and licensing; - etc PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	$5,000 for contractors' additional activities; Cost of supervision included in contract cost estimate

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation
		allowed and shall be removed from the project sites. - Develop Traffic Management Plan to mitigate impact on local traffic conditions during construction. - Confine heavy construction related traffic to the least sensitive access roads to the construction sites to avoid accidents and nuisance to dwellers along the road and other road users; - Require the owners of the transport vehicles to only use properly registered and well-maintained vehicles with mufflers to mitigate noise and emissions; - All vehicles shall be well-maintained and fitted in full compliance with the national (SNPC) and local regulations. - As a rule, the operation of heavy equipment shall be conducted in the time span 7am-7pm only unless otherwise agreed with local residents. - During nighttime (10pm to 7am) noise impact on sensitive areas, such as residential areas or hospitals shall not be more than 3dB above background noise levels, as measured at the nearest sensitive receiver (Leq15minutes) two weeks prior to the commencement of works. - Construction equipment, which generates excessive noise, such as compressors, jackhammers shall be enclosed to prevent noise nuisance. - Near sensitive locations, e.g. hospitals, schools, mosques, and schools, discuss and agree with the PIU – Environment Focal Point and the principals of the facilities the agreed time for operating noisy machinery. • - Minimize transportation during high traffic periods (e.g., when students are entering or leaving school) to minimize potential traffic accidents		
Site preparation	Erosion from site clearing, grading and excavation resulting in sedimentation of water bodies;	- Preserve existing ground cover wherever possible, and provide approved ground cover where necessary; - Use appropriate stabilizing techniques to prevent cave-ins or landslides in excavated areas. - Construct Buildings and facilities following the land protection activities stipulated in CNR 3.01.01-97 and CNR 3.05.03-97. - - If construction needs to take place during periods with expected rain, additional plan how to mitigate erosion and sedimentation must be agreed with PIU –	Contractor's Site Supervisor - ensures compliance with EMP PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	$10,000 for contractors additional activities; Cost of supervision included in contract cost estimate

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation
		Environment Focal Point prior to the work commences.		
Revegetation and landscaping	Erosion and sedimentation to water bodies, due to excessive clearing of vegetation or extended periods without vegetation.	- Prior to any clearing of vegetation, make a species inventory of the area to be cleared. Use vegetation inventory to identify appropriate local plant species to be used for revegetation. - Avoid tree removal unless justified on engineering, safety, and environmental grounds. - Store topsoil separately from other soil and re-use for revegetation upon completion of works. - - Monitor revegetation regularly, especially during initial growth to ensure stable growth and lasting groundcover;	Contractor's Site Supervisor - ensures compliance with EMP PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	Cost should be covered by contract sum, as it will be part of the contract requirements to avoid environmental impact.
Excavation for pipe-laying; Road use for transport of material and equipment	Damages to utilities by excavation; Temporary access cut-off for properties; Current access roads in poor condition may become worse due to construction vehicles.	• Require contractors to carry out a utility survey before construction and take action during construction to minimize impact on utilities and attend to any damage; • Provide temporary access during construction, if required; • Obtain permission for road use from relevant authorities and agreement to repair damages after construction;	Contractor's Site Supervisor -coordinates with PIU and relevant authorities and agencies. -receives and records public complaints and resolves them PIU-Environment Focal Point -monitors contractor's complaint resolution procedures and compliance with all provisions of the EMP	$10,000 for contractors' additional activities not covered by contract cost;; Cost of supervision included in contract cost estimate of the contract budget
Wastewater generated at construction site	Site rainwater runoff will wash away residues, garbage, leaves, grease, etc., thereby potentially polluting nearby surface water	- Store all liquid/solid waste properly above ground to avoid spills/ leaks; - Store Haz-Mat, e.g. fuels, chemicals, and hazardous waste, in bunded areas to avoid leaks escaping to the ground or nearby surface waters. Provide ample natural ventilation - Develop spill response procedures and provide spill response kits at all Haz-Mat storage areas and work sites.	Contractor's Site Supervisor -periodic visual observation of run-off from construction sites PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	$10,000 for proper disposal of waste and wastewater; Cost of supervision included in cost estimate of the contract budget
Solid Waste generated by construction activities	Construction materials (wood, steel bar, cement, etc.), paper, packing, domestic/human waste from work sites causing environmental pollution and adverse aesthetic l impact	- Prior to start of construction, develop an inventory of waste fractions expected to be generated during construction for approval of disposal routes and sites by Hokimiyat and SES - Provide refuse collection containers and used oil collection containers at all construction sites and labor camps. - Sell paper, resin, iron, and steel and other recyclable waste fractions to other enterprises for recycling.	Contractor's Site Supervisor - monitors waste stream to ensure maximum recycling. - Ensures proper disposal PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation
		- Dispose inorganic solid waste (concrete, bricks, etc.) properly after approval by Hokimiyat and SES. - After completion of civil works, collect all garbage and waste construction materials from the sites, and dispose in specially designated places agreed by the SES Asbestos cement pipe - Leave all asbestos cement and other redundant pipes in the ground where possible. Any asbestos cement pipe that requires removal shall be removed safely and in line with provisions agreed with SES and Hokimiyat. -		
Nuisance from Construction - complaints	Nuisance and impacts from the construction activities to neighboring activities and households.	- Include in contract clauses to reflect this, including the contractor's responsibility to mitigate nuisances, noise, vibration, and dust impacts and other nuisances to neighbors. - Ensure that contractor incorporates good construction management practices - Ensure that contractor liaises with local community on approach to mitigation. - Clarify by signboards on construction sites and/or stickers on equipment outlining how affected parties can lodge complaints. - Ensure that contractor records complaints, response and resolution monitoring and includes complaints registration in regular progress reports. -	Contractor's Site Supervisor - ensures good construction management PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	No additional cost, for contract. Monitoring cost already in project budget
Use of labor for construction	Improper handling of waste from construction workers	- Provide temporary water supplies (trucked in) and portable/temporary toilets on-site during construction. -	Contractor's Site Supervisor - ensures adequate sanitary conditions PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	Cost is included in the labor cost of the construction budget
Use if labour from outside areas	Inadequate living facilities for non-local workers	Labor camps, if any - Provide adequate sanitary facilities, potable water supply, waste collection, etc. - Test potable water supplies per Uzbek regulation - Ensure that locations of all labor camps are approved by PIU - Environment Focal Point; - Maximize use of local labor to minimize the need for temporary camps, and also to ensure socioeconomic	Contractor's Site Supervisor - ensures good construction management PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	Cost is included in the labor cost of the construction budget

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation
		benefit for the local population.		
Use if labour from outside areas	Non-local construction crews may generate increased demand for camp followers, illegal drugs, gambling, etc.	• Maximize use of local labourers who will live at home during construction.	Contractor's Site Supervisor - ensures use of local labor PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	No cost involved
Workers' Safety	Inadequate safety during work	- Contractor shall be required to use appropriate stabilizing techniques during excavations, especially during excavations for trenches, which will be down to 6 m depth, to avoid cave-ins. - Educate and train workers on regulations on work safety and risk prevention and to obey them - Workers exposed to noise impact greater than 85 Db(A) shall wear hearing protection. - Contractor shall make available all Personal Protection Equipment needed for workers, e.g. safety shoes, hard hats, safety glasses, and hearing protection,	Contractor's Site Supervisor - ensures safe trenching methods - ensures workers' safety PIU-Environment Focal Point - monitors contractor's compliance with all provisions of the EMP	Cost of supervision included in cost estimate of the contract budget
Operation & Maintenance Phase				
Toxic material released to environment	Damage to the environment and to people handling Haz-Mat, e.g. chlorine.	- Store all Haz-Mat in bunded areas, with ample entilation. - Develop spill response procedures and provide spill response kits at all Haz-Mat storage areas. - Include routine training in proper handling of chlorine and other Haz-Mat in the O&M staff training, which covers the full range of technical and management skills required to safely operate the Water Production Facilities; - Regularly inspect all chlorine dosing equipment, storage facilities and safety equipment. - Monitor all chlorine storage and dosing equipment and storage facilities for chlorine leaks. -	Vodokanal plant manager - ensures safe Haz-Mat handling and storage - develops spill response procedure and provides spill response kits - ensures that O&M staff receives training in chlorination safety procedures from PIA PIU-Environment Focal Point - monitors plant manager's compliance with all provisions of the EMP	Operational cost and training cost included in annual recurrent budget of PIA; After rehabilitation for initial training of O&M staff $10,000 included in project cost
Accidents	Risks to workers and facilities due to hazards related to fire and other disasters	- Establish comprehensive safety regulations; - Train and equip all O& M staff to follow the regulations on occupational safety and risk prevention; - Install proper alarm systems; - Ground all electrical equipment and provide circuit breakers - Provide back-up water supplies for fire fighting. Provide fire extinguishers at strategic locations around the	VodoKanal plant manager - ensures that O&M staff receives training in occupational safety from PIA PIU-Environment Focal Point - monitors plant manager's compliance with all provisions of the EMP	Cost involved in the annual budget of the implementing agency (Vodokanal) After rehabilitation for initial training of O&M staff $10,000 included in project cost

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation
		ite and monitor them for functionality		
Source protection	Pollution of ground water through open or abandoned well heads,	- Ensure that all well head protection is maintained and well heads are protected from flooding. - Inspect and maintain fence to keep out trespassers and livestock. - - Ensure proper sealing of abandoned wells, unless wells can be safely used for monitoring wells.	VodoKanal plant manager - develops procedure for regular inspection and maintenance of flooding protections and fencing. PIU-Environment Focal Point - monitors plant manager's compliance with all provisions of the EMP	Source protection
Production of water	Quality of produced water not complying to water quality (WQ) standards; Algae development in produced water	• Standard system management and regular O&M with well-developed skills of the O&M Staff; • Protection of produced water from sunlight in storage tanks	Periodic WQ tests by O&M Staff; Training of O&M staff by HRD of PIA Also Agency -III responsibility	Cost of WQ testing and O&M are covered in the annual recurrent expenditure of the PIA; other agencies attend to WQ, their expenses in respective agency annual budgets
Transmission of water	Breaking of pipes causing leaks, swampy areas and if not sufficiently pressurized poor quality water entering the pipe to contaminate produced water of good quality	• Proper installation of good quality pipes during the construction phase; • Operation of the system at designed capacities; • Regular inspection of distribution system to detect leaks and possible contamination points in the system	VodoKanal plant manager - develops procedure for regular inspection and maintenance distribution netork. PIU-Environment Focal Point - monitors plant manager's compliance with all provisions of the EMP	Cost included in annual budget of PIA
Emergency Measures (contingency planning)	Contaminated water posing a health risk to consumers.	Establish emergency procedures, which include warning procedures in case contaminated water (which poses a health risk to the population) is identified. - PIA team to be available on short notice to identify a suitable solution to rectify the problem;	Vodokanal plant manager - develops emergency for warning consumers of health risks due to contaminated water. - Ensure training of O&M staff in responsibilities in case of emergencies. PIU-Environment Focal Point - monitors plant manager's compliance with all provisions of the EMP PIA provides - support to plant manager in the development of emergency procedures. - emergency Assessment support.	PIA Contingency expenses: If reserve O&M funds are insufficient work with the local authorities to meet supplemental funding.

PIU = Environment Focal Point - Staff within PIU with designated responsibility for environment, HRD = Human Resources Development, PIA = Project Implementing Agency (pCERWASS)

Note:
Agency - I: State Committee for Geology and Mineral Resources of the Republic of Uzbekistan (Goskomgeologiya) which is responsible for monitoring the quality of ground water sources;
Agency - II: Center of Hydro-meteorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (Uzgidromet) responsible for monitoring the state of the rivers, lakes, water reservoirs, pollution of atmospheric air and land;
Agency - III: Ministry of Health monitoring quality of water in water sources and water in pipelines from centralized drinking water intakes

Table A2.2: Environmental Monitoring Plan for Damkoja Water Supply Subproject

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation
Construction Phase				
Control of impacts of construction on people and environment	Dust, noise, transport, waste disposal, land clearing, utilities and traffic impacts	All construction sites	Visual observation and complaints by public	Regularly during construction for compliance with the EMP requirements
Operation & Maintenance Phase				
Adequate treatment of water prior to distribution.	Parameters shall be in accordance with Uzbekistan Standards for Water Supply O'z DSt 950:200	Monitoring locations shall be in accordance with Uzbekistan Standards for Water Supply O'z DSt 950:200	Laboratory analysis of samples at WDU laboratory facilities and SES laboratory, as per specifications in Uzbekistan Standards for Water Supply O'z DSt 950:200	Frequences for testing and analysis shall be as per Uzbekistan Standards for Water Supply O'z DSt 950:200.

PIU-Environment Focal Point - Staff within PIU with designated responsibility for environment
HRD = Human Resources Development,
PIA = Project Implementing Agency

CONSULTATION MEETINGS HELD IN THE OBLAST

Fidoyilik –
Vatanga xizmat demak!

2009-yil 30-iyun, seshanba

Zarafshon

... баланд тоғ чўққисига чиқиш нечоғлик қийин бўлса, ҳақиқий журналистнинг меҳнати ҳам шундай оғир ва машаққатли эканини ўзимга яхши тасаввур қиламан.
Иолом КАРИМОВ.

1913-yil aprel oyidan chiqa boshlagan ● №79 (21610) ● E-mail: Zarafshony@bk.ru ● www.Zarnet.uz ● ISSN 2010-8672

КАТТАҚЎРҒОН ШАҲРИ ТАШКИЛОТЛАРИ ДИҚҚАТИГА!

Шу йил 1 июл куни соат 14.00 да «Кўрпа» сув тақсимлаш иншоотининг маъмурий биносида Осиё Тараққиёт Банки томонидан молиялаштирилаётган **«TA7240-UZB-Ўзбекистон ичимлик сув таъминоти ва санитария хизматлари»** лойиҳасини амалга оширилиши билан таништириш мақсадида семинар бўлиб ўтади.

Семинарда Каттақўрғон шаҳри сув таъминоти тизимини қайта таъмирлаш ишларининг атроф-муҳитга таъсири ва бошқа ижтимоий масалалар кўриб чиқилади. Шу муносабат билан қуйидаги ташкилот вакилларини семинарда қатнашишга таклиф этамиз:

1. Каттақўрғон шаҳар ҳокимлиги.
2. Табиатни муҳофаза қилиш қўмитаси Каттақўрғон шаҳар бўлими.
3. Давлат санитария-эпидемиология назорати хизмати.
4. Нодавлат ташкилотлар.
5. Хотин-қизлар қўмитаси.
6. Каттақўрғон шаҳар маҳалла қўмиталарининг вакиллари.
7. Каттақўрғон шаҳар «Сувоқова» ишлаб чиқариш корхонаси ва бошқа қизиқувчилар.

«TA7240-UZB-Ўзбекистон ичимлик сув таъминоти ва санитария хизматлари» лойиҳаси.

ВНИМАНИЮ ЗАИНТЕРЕСОВАННЫХ ОРГАНИЗАЦИЙ г.КАТТАКУРГАНА!

1 июля 2009 года в 14.00 в административном здании водораспределительного узла «Курпа» Дамходжинского межрегионального водопровода состоится рабочий семинар по реализации проекта Азиатского банка развития (АБР) «Модернизация Дамходжинского межрегионального водопровода с подключением к нему районных центров и сельских населенных пунктов Самаркандской, Бухарской и Навоийских областей» финансируемого за счет средств займа Азиатского банка развития (АБР). Подготовка ТЭО этого проекта осуществляется за счет средств фонта технического содействия АБР (ТА 7240-UZB «Услуги водоснабжения и санитарии Республики Узбекистан»). На семинаре планируется обсуждение социальных вопросов и вопросов, связанных с воздействием деятельности по реконструкции канализационных сетей и очистных сооружений на окружающую среду.

На семинар приглашаются представители:

1. Хокимията г. Каттакургана.
2. Неправительственных организаций.
3. Районного представительства по охране природы.
3. Районного комитета женщин.
5. Санитарно-эпидемиологической службы.
6. Представители сельских сходов граждан и махаллинских комитетов г.Каттакургана.
7. ГПУ «Сувоқова» г.Каттакургана и других заинтересованных сторон.

Проект «Услуги водоснабжения и санитарии в Узбекистане TA7240-UZB

Курпа УРВде сув таъминоти тизмини кайта таъмирлаш ишларига
багишланган семинар катнашчиларнинг

РУЙХАТИ

№	Катнашувчининг фамилияси ва исми-шарифи	Иш жойи ва лавозими	Имзоси
1	2	3	4
1	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]
3	[illegible] Р.	водозабор инж-энерг.	[illegible]
4	[illegible]	[illegible]	[illegible]
5	[illegible]	Зам директор [illegible]	[illegible]
6	Хакимов Неъматулло	„Сувоқова" нач водозабор	[illegible]
7	Одилов [illegible]	„Кичик Қурпа" маҳалла	[illegible]
8	[illegible]	туман „Сувоқова" бошлиғи	[illegible]
9	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible] маҳалла [illegible]	[illegible]
11	[illegible]	[illegible] маҳалла [illegible]	[illegible]
12	[illegible]	[illegible] маҳалла [illegible]	[illegible]
13	[illegible]	[illegible] маҳалла [illegible]	[illegible]
14	[illegible]	[illegible] маҳалла [illegible]	[illegible]
15	[illegible]	[illegible] маҳалла [illegible]	[illegible]
16	[illegible]	[illegible] маҳалла [illegible]	[illegible]
17	[illegible]	[illegible] маҳалла [illegible]	[illegible]
18	[illegible]	[illegible] маҳалла [illegible]	[illegible]
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			

Public Consultation held on 02 July 2009

WATER QUALITY STANDARDS OF UZBEKISTAN

Table A4.1: Chemical analysis of pilot water wells

Indicators	Allowed (mg/L)	Mean Value observed	Deviation
Total solids	1,000.00	380.00	No
Cl^-	350.00	16.00	No
SO_4^{-2}	500.00	165.00	No
Fe	300.00	-	-
Mn	1,000.00	26.00	No
Cu	-	-	-
Zn	5.00	0.20	No
Al	500.00	150.00	No
PO_4^{-2}	0.50	0.25	No
Total hardness	7.00	5.90	No
pH	6.50-8.50	8.00	No
Be	0.2	0.09	No
Mo	500.00	32.00	No
As	50.00	1.00	No
NO_3^-	45.00	15.00	No
Pb	100.00	10.00	No
Sn	2.00	0.55	No
$Uranium_{238}$	1,700.00	0.03	No
Rd			-
F	0.70	0.50	No

Table A4.2: Water quality of Akdarya River

Name of component	Unit (mg/L) or as noted	Concentration in source water
Suspended solids (SS)		310.00
Total dissolved solids (TDS)		410.00
Biological oxygen demand (BOD_5)		3.70
Chemical oxygen demand (COD)		4.10
Cl		38.00
Sulphates		140.00
Ammonium nitrogen		0.20
Nitrite nitrogen		0.10
Nitrate nitrogen		2.50
Cr^{+6}		0.005
Cr^{+3}		0.01
Ni		0.002
Phenols		0.0025
Fe		0.01
Cu		0.016
Surface active matters		0.10
Oil products		0.10
Zn		0.01
Ca		47.00
K+Na		13.00
smell		No smells
Clarity	ball	9.00
pH	$\log_{10}[H^+]^{-1}$	7.00
Alkalinity	mg-ekv/L	6.00
Dissolved oxygen (DO)		10.50

Table A4.3: Water quality of Zarafshan River

Parameter	Average concentration Karadarya - Sdarya water (mg/L)	Concentration in source water (mg/L)
Total dissolved solids (TDS)	310.90	1,000.00
Biological oxygen demand (BOD_5)	0.58	6.00
Chemical oxygen demand (COD)	3.75	
Ammonium nitrogen	0.01	0.50
Nitrite nitrogen	0.007	0.02
Nitrate nitrogen	1.84	9.10
Fe	1.30	1.00
Cu	3.50	10.00
Phenols	0.00	0.001
Oily products	0.01	0.05
Surfactants	0.00	0.10
DDT	0.00	0.00
Alpha GHCG	0.00	0.00
Gamma GHCG	0.00	0.00
Cr^{+6}	0.50	1.00
F	0.15	0.75
As	0.90	50.00
K+Na	10.19	
Dissolved oxygen (DO)	1.84	9.10

Republic of Uzbekistan

Uzbek Agency "UZKOMMUNHIZMAT"

ADB TA 7240: Water Supply and Sanitation Services Improvement Program (WSSSIP)

Water Supply Appraisal Report

Sub Project 02

Karmana Water Intake Facility Development

August 2009

Acronyms

AC	Asbestos Cement (pipe)
ACS	Automatic Control System
ADB	Asian Development Bank
AR	Appraisal Report
BCR	Benefit-Cost Ratio
CIA	Cumulative Impact Assessment
CMU	Contracts Monitoring Unit
DMF	Design and Monitoring Framework
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
ECA	Environmental Consequences Assessment
EIRR	Economic Internal Rate Of Return
EMDF	Ethnic Minority Development Framework
EMP	Environmental Management and Monitoring Plan
EMU	Environmental Monitoring Unit
ENPV	Economic Net Present Value
EOCC	Economic Opportunity Cost of Capital
FIRR	Financial Internal Rate of Return
FNPV	Financial Net Present Value
FMAQ	Financial Management Assessment Questionnaire
FMICRA	Financial Management Internal Control and Risk Assessment
GOU	Government of Uzbekistan
GPS	Global Positioning System
Haz-Mat	Hazardous Material
HDPE	High-Density Polyethylene
HH's	Households
IA's	Implementation Agencies
IEA	Initial Environmental Assessment
IEE	Initial Environmental Examination
IFI	International Financing Institutions
IKS	ISLOHOTKONSALTSERVIS (responsible for the completion of the NFS)
IPDP	Indigenous Peoples' Development Plan
IRTM	Inter Regional Trunk Main
KPI	Key Performance Indicators
LAR	Land Acquisition and Resettlement
LARF	Land Acquisition and Resettlement Framework
LARP	Land Acquisition and Resettlement Plan
MIS	Management Information System
MOE	Ministry of Economy
MOF	Ministry of Finance
MOU	Memorandum of Understanding
MFF	Multi-Tranche Financing Facility
NFS	National Feasibility Studies
NPSH	Net Pressure Suction Head
NRW	Non Revenue Water
OM	Operations Manual
O&M	Operation and Maintenance (costs of)
PIU	Program Implementation Unit
PFR	Periodic Financing Request
PPP	Public Private Partnership
PPTA	Project Preparation Technical Assistance
PPMU	Project Preparation Management Unit
PVC	Polyvinylchloride
REA	Rapid Environmental Assessment
RRP	Report and Recommendation to the President
SCNP	State Committee for Nature Protection
SERF	Shadow Exchange Rate Factor
SES	Sanitary and Epidemiological Services
SESU	PPMU's Social and Environment Subunit
SIEE	Summary Initial Environmental Examination
SNIP	Uzbekistan Regulatory Standards
SNPC	State Nature Protection Committee
SOE	Statement of Expenditure
SPRSS	Summary Poverty Reduction and Social Strategy
STP	Simplified Technical Proposal
SWRF	Shadow Wage Rate Factor (unskilled labour)
TA	Technical Assistance
TDS	Total Dissolved Solids
UCSA	Uzbekistan Communal Services Agency
UTS	Urban Type Settlement
WACC	Weighted Average Cost of Capital
WDU	Water Distribution Unit
WHO	World Health Organisation
WSS	Water Supply and Sanitation
WYGI	White Young Green International (PPTA lead company)

Table of Contents

1. BACKGROUND 4
1.1 Introduction 4
1.2 Project location 4
1.3 Scope of Work 5
1.4 Appraisal report (Technical) 6
1.5 Design and Preparation of Documents for Approval of Government of Uzbekistan 6
2. EXISTING WATER SUPPLY & DISTRIBUTION SYSTEM 7
2.1 Existing Network Operation 7
2.2 Existing Operational Problems 8
2.2.1. Karmana Bulk Water Distribution Centre 8
2.2.2. Transmission and Distribution Network 8
2.3 Current Water Quality 9
3. APPRAISAL REPORT CRITERIA 10
3.1 Peak Flow Factors 11
3.2 Pipeline Hydraulics-detailed design 11
3.2.1. Sizing 11
3.2.2. Hydraulic Calculation 11
3.2.3. Proposed System Layout 11
4. WATER DEMANDS 12
5. PROPOSED IMPROVEMENT WORKS 12
5.1 Option 1 Part 1 Intake from IRTM 13
5.2 Option 1 Part 2 Transmission Main Extension 14
5.3 Option 1 Part 3 Rehabilitation of Distribution Network 14
5.4 Option 2 - Rehabilitation of Existing Water Distribution Unit 14
5.5 Option Recommendations 15
5.6 Preliminary Cost Estimates 15
5.7 Improvement Benefits 15
5.7.1. Levels of Service 15
5.7.2. Operating Costs and Income 15
5.8 Pipeline Materials 16
5.9 Civil and Mechanical Works 16
5.9.1. Storage Reservoir 16
5.9.2. Booster Pump 16

5.9.3. Chlorination 17
6. DUE Diligence 18
6.1 Land Acquisition and Resettlement 18
6.2 Social Analysis 18
6.3 Institutional Strengthening and Capacity Development 19
6.4 Economic and Financial Analysis 19
6.5 Initial Environmental Examination 19
6.6 Earthquake Zone 20
Appendix 1 - Design criteria for projected consumption through to 2025 21
Appendix 2 – Preliminary Cost Estimates 23
Appendix 3: Drawing of the proposed Karmana Water Distribution Unit 25
Appendix 4: Layout of Karmana Water Distribution Network 26
Appendix 5: Land Acquisition and Resettlement - Due Diligence Report 27
Appendix 6: Social Analysis 29
Appendix 7: Institutional Strengthening and Capacity Development 36
Appendix 8: Economic & Financial Analysis 49
Appendix 9: Environmental Assessment 59

1. BACKGROUND

1.1 Introduction

The proposed Multi-tranche Financing Facility program (Investment Program) is planned to be undertaken in four Tranches over the period 2009 to 2018. The water supply and sewerage systems in most of the towns and cities across the 12 provinces of Uzbekistan are in various stages of disrepair and require rehabilitation, upgrading and expansion. The total financing needs identified for the sector are estimated at $3.2 billion. ADB's proposed Investment Program will finance up to $375 million (including $75 million Government Funding) As envisaged at project preparation, each tranche will focus on three different provinces. The Executing Agency for the Investment Program is the Uzbekistan Community Services Agency (UCSA), which is responsible for implementing externally financed projects in the sector.

Operation of the Inter-regional transmission mains (IRTMs) is the responsibility of UCSA. Delivery and operation and maintenance (O&M) of water supply and sewerage (WSS) services are the responsibility of province (oblast) and district (rayon) vodokanals. All vodokanals are potentially eligible to apply for inclusion under the Investment Program, but will be evaluated against the eligibility criteria agreed with the Government. Commitment by the vodokanals to institutional and financial reforms is an important aspect of eligibility, with a view to full sustainability after the water and sewerage facilities have been upgraded.

Under Tranche 1 of the Investment Program 13 subprojects have been identified as being most in need of improvement including:

- Damkhodja IRTM water intake facility,
- 11 District Centre/city water supply and distribution systems, and
- Termez City sewage collection system and wastewater treatment plant.

Of these, four subprojects confirmed as meeting the eligibility criteria have been appraised in sufficient detail to confirm physical works, cost estimates, O&M costs, environmental and social safeguards, and economic and financial sustainability. They will be used as samples for the succeeding subprojects in Tranches 1-4. The four sample projects are the Damkhodja ITRM Water Intake Facility, the water supply and distribution systems in Karmana (Navoi Province) and Galaasiya (Bukhara Province), and the Termez (Surkhandarya province) sewerage system.

This appraisal report is for the **Karmana** water supply subproject.

1.2 Project location

Karmana City is situated in Navoi Province a short distance north of Navoi City and just downstream of the Navoi water distribution unit (Figure 1). The proposed subproject covers the urban area of Karmana. Water Supply Systems of rural area also need rehabilitation and improvement. But, as Investment Program covers water supply improvement of urban population, therefore rural settlements are not considered under this project. At the same time 6 small rural settlements, adjacent to Karmana city are supplied by water supply network of Karmana city. Hence, while calculating capacity of water distribution unit for Karmana city,

water demands of those settlements, with population around 6 000 people, are taken into consideration.

Figure 1: Karmana subproject location

1.3 Scope of Work

The scope of work for the development of the Karmana appraisal report is:

- Undertake site visits to Karmana vodokanal to verify data. Identify new data requirements and determine, from discussions with vodokanal management, how the current water supply and distribution infrastructure operates and the problems encountered in operating the system;
- Evaluate the Karmana proposal against the agreed eligibility criteria for participating in Investment Program;
- Review all UCSA reports and recommendations for the water sector in Uzbekistan and, in particular, for Karmana vodokanal;
- Identify the improvements required to bring the water supplyinfrastructure in Karmana vodokanal to Uzbekistan water service standards;
- Develop options for delivering the identified improvements to the Karmana vodokanal infrastructures;
- Analyse and select the preferred option available to deliver the improvements to the Karmana urban water distribution network, based on value engineering and least cost principles, while meeting design and service standards;

- Develop pre-design cost estimates;
- Provide criteria, general specifications, to be used for the later detailed design, tendering and construction;
- Prepare an initial environmental examination (IEE), including an environmental management plan (EMP), to mitigate identified impacts. Related costs are included as a line item in the subproject's costs estimates;
- Initial screening for resettlement requirements and preparation of a resettlement plan if required. Related costs are included as specific line item in the subproject's costs estimates;
- Prepare an economic and financial analysis;
- Develop social and gender action plans including a program to improve hygiene in local schools, health clinics and hospitals;
- Project revenue requirements, budget, and cost recovery plan including analysis of current and projected water tariff requirements, financing of gaps in revenue versus costs.

1.4 Appraisal report (Technical)

The main objectives of the appraisal report are:

- Identify the operational problems currently impacting on the provision of adequate water supplies to customers of the Karmana urban water supply, transmission and distribution system.
- Identify projections of water demand to include adequate provision for fire fighting according to Uzbekistan standards.
- Develop options to improve water supply and distribution.
- Provide recommendations for the investment requirements to improve water supplies to the Karmana urban area.
- Develop pre-design cost estimates.
- Develop criteria for use in the detailed designs of the Karmana city infrastructure improvements.
- Ensure that water quality provided to the city complies with Uzbekistan standards.

1.5 Design and Preparation of Documents for Approval of Government of Uzbekistan

After Government and ADB approval of the Investment Program, this work will be carried out by UCSA and their consultants, to include:

- Carry out field surveys using GPS, satellite images, latest maps and supplementary field surveys.

- Generate topographical maps and profile drawings for all proposed pipelines including all reference points, with details inset for hydrants, valves, meters, service connections, and other appurtenances.
- Confirm water production demand, water quality, pumping and network operating pressures
- Use hydraulic network model to confirm pre-feasibility pipeline diameters and flows.
- Produce final design report, specifications, and cost estimates.
- Produce tender documents and support to UCSA with the procurement process.

2. EXISTING WATER SUPPLY & DISTRIBUTION SYSTEM

2.1 Existing Network Operation

The total population of the urban and semi urban area is 28,344 of which 22,300 are covered by the urban water distribution network. In semi urban area a population of 6,045 are covered by the urban water distribution system. There are an estimated 7,699 domestic, 45 /institutional and 166 commercial/light industrial connections.

Bulk water supply to Karmana urban areas is provided from 2 sources:

- Import from the 1,400 mm diameter IRTM 820 m^3/day
- Bulk water supply from the Navoi Mining Plant provides 3,280 m^3/day.

The bulk supply distribution unit for Karmana is located 2.8 km from the Damkhodja IRTM; the import point is metered. A 400 mm steel pipeline connects the IRTM to the distribution unit, which then feeds the bulk supply main into the distribution network. From the distribution unit the transmission mains supply a blended IRTM and Navoi Mining water supply to the distribution network. The bulk distribution unit consists of a 250 m^3 storage reservoir and booster pump. There is currently no chlorination system in operation, but the IRTM supply is chlorinated at Navoi water distribution unit located just above Karmana and sufficient residual chlorine remains to disinfect drinking water if Karmana. During detailed design, it will be decided if a dedicated chlorine system will be required at Karmana.

The inlet water pressure at the IRTM import point is a maximum of 0.5 bar (5.1 meters of head (mh)); the feeder main to the distribution unit operates by gravity from the intake point, as the booster pump, located at the import point, is not working.

The bulk import from the Navoi Mining Plant source is supplied directly to the 250m^3 storage reservoir at the Karmana bulk distribution centre.

A series of 400 and 300 mm transmission mains transfers the water from the distribution unit to the Karmana distribution network which has a total network length of 148 km. The majority of the network (103.5 km) has unlined steel pipes with diameters ranging from 50 mm to 400 mm ; the distribution network also contains 4.2 km of asbestos cement and 24.1 km of cast iron piping, all installed between 1961-1966. From 1998 to date, 16.2 km of polythene pipe has been installed.

2.2 Existing Operational Problems

The city is currently experiencing many water supply and distribution problems. The key ones are:

2.2.1. Karmana Bulk Water Distribution Centre

(a) The water pressure at the import point is maximum of 0.5 bar (5.1mh), the 400 mm feeder main, which also is connected directly into the distribution network, operates by gravity and can only provide limited flows to the storage reservoir at the water distribution unit.

(b) The existing 250 m^3 storage reservoir is in poor condition, with leakage from the walls and floor joints; but currently the reservoir is in operation.

(c) The booster pump is out of order and disconnected from the operating system, resulting in limited bulk supply estimated at 840 m^3/day, due to the low pressure and a non operational pump.

(d) No chlorination of the water is currently undertaken; the Vodokanal relies on the chlorination of the Damkhodja water undertaken at the Navoi Distribution Centre which is located close to the Karmana water intake from the IRTM.

(e) The Karmana's import point has an old mechanical water meter; the imported water supply total is based on this existing meter, it is unlikely that it is accurate,

(f) The Vodokanal also purchases about 3,200 m^3/day of water from the Navoi Mining Plant at 90 soum/m^3 ($0.06) and sells it to the Karmana consumers at 60 soum/m3 ($0.04). This bulk supply is metered near the existing distribution unit.

(g) The IRTM supply is scheduled for two hours every second day. However, the supply from the mining company is much more regular enabling water supply to be scheduled for eight hours operation per day in two periods (06.00 – 10.00 and 17.00 – 21.00). More than 30% of domestic connections are metered and the Vodokanal uses the metered data to develop litres/connection/day or litres/capita/day information for comparison with current norms and calculation of future water demand.

(h) Due to the low operating pressure at the Damkhodja IRTM import point (0.5 bar), the existing bulk water distribution unit is located at the wrong location in relation to the water transmission and distribution network and should be located at a point adjacent to the IRTM off take. The low pressure also means that consumers at the extremities of the distribution system receive no water supplies.

2.2.2. Transmission and Distribution Network

(a) A total of 70% (103.5km) of the distribution network consists of unlined steel pipe which is approximately 40 years old. These water mains have a high level of deterioration and corrosion and are the cause of major network water losses with non revenue water (NRW) is expected to be >60%, including authorised non billed, real and apparent water losses. Insufficient data is available to confirm the network losses; however it is likely that the real and apparent water losses will exceed 45%. (Vodokanals tend to use normative values for estimating water losses,

and in the absence of accurate meters, these normative values are used for reporting water supply and calculating losses)

Key Performance Indicators, for assessing the need for water mains renewal and rehabilitation program are not available. These include:

- NRW (m^3/km/day)
- Pipe Repairs (Number/km/year)
- NRW (litres/connection/day)
- Bacteriological Failures (number/km/year)
- Chemical Failures (Number/km/year)
- Customer Complaints (Number/km/year)
- Pressure testing and leakage detection

However, most of this information is not currently tracked by the vodokanals (their assessment of rehabilitation requirements is based on the age of pipes). The need for rehabilitation recommended in this report is based on physical condition of sample pipes(were seen) from previous repairs, the estimated losses and experience of the vodokanals. More detailed evaluations of the internal and external condition of the water mains. Network flow and, pressure testing will be carried out as a part of the detailed design.

(b) The combination of water losses in the network, high degree of deterioration of the cast iron and steel pipelines, limited supply schedules/hours of operation and low operating pressures means that all connected customers receive poor service, much below Uzbekistan standards. In the majority of cases no water is available above the ground floor in multi-story buildings, nor is there sufficient flow to meet fire protection standards.

2.3 Current Water Quality

The water quality indicators for the Karmana WDU supply are in Table 1 below; based on this data the Karmana WDU water supply is of satisfactory quality and well within Uzbekistan standards.

Table 1 – Karmana Water Quality Information

Component	Karmana Water Quality Analysis			
	Unit	**WHO**	**Uzbek Standard 950:2000**	**Karmana WDU**
pH	Units	6.5-8.5	6-9	7.6
TDS	mg/l	1000	1000 (1500)	525
Calcium Ca	mg/l	200		N/c
Sodium Na	mg/l	200		N/c
Chloride Cl	mg/l	250	250	16.4
Sulphate SO4	mg/l	400		N/c

Component	Karmana Water Quality Analysis			
	Unit	WHO	Uzbek Standard 950:2000	Karmana WDU
Nitrate NO3	mg/l	50	45	4.3
Hardness Ca+Mg	Mg*ecv/l	500	7/10	6.4
Turbidity	NTU		1.5/2.0	0.12
Ammonium NH4	mg/l	0.5		N/a
Polyphosphate Phosphorus	mg/l		3.5	N/c
Fluoride F	mg/l	1.5	0.7	N/c
Nitrite NO2	mg/l	3	3	N/a
Iron Fe	mg/l	0.3	0.3	0.06
Manganese Mn	mg/l	0.5	0.1	N/a
Copper Cu	mg/l	1	1	N/a
Lead Pb	mg/l	0.01	0.03	N/c
Chromium Cr	mg/l	0.05	0.05	N/c
Cadmium Cd	mg/l	0.003	0.001	N/c
Zinc Za	mg/l	3	3	N/c
Nickel Ni	mg/l	0.07	0.1	N/c
Arsenic As	mg/l	0.01	0.05	N/c
Alpha	Bq/l	0.1	0.1	N/c
Beta	Bq/l	1	1	N/c
Aluminium Al	mg/l		0.2(0.5*)	N/c
Beryllium Be	mg/l		0.002	N/c
Boron B	mg/l		0.5	N/c
Molybdenum Mo	mg/l		0.25	N/c
Mercury Hg	mg/l		0.0005	N/c
Selenium Se	mg/l		0.01	N/c
Strontium Sr	mg/l		7	N/c
Benzol C_6H_6	mkg/l		10	N/c
Benzpyrene	mkg/l		0.01	N/c
Polyakrilamid	mkg/l		2	N/c
Total Coliforms	MPN/100ml	Not Allowed	<100	N/c
E Coli	MPN/100ml	Not allowed	<3	<3
Free Chlorine	mg/l		0.2 – 0.3	0.11

N/c –Not conducted (Analysis)
N/a – Not available

3. APPRAISAL REPORT CRITERIA

The general design criteria used in this appraisal report to determine the operating pressure, main and pipe diameter and related operational fittings (valves, meters, air valves, non return valves and fire hydrants) for the proposed transmission and distribution mains are summarized below. While the Uzbekistan standards for minimum pressure, fire fighting and hours of supply have been followed, these will be further checked and expanded in the detailed design stage.

3.1 Peak Flow Factors

Uzbekistan standards have been used to calculate the multiplying factor for the peak day flow rate. This varies from 1.1 to 1.3 the daily average demand. Moreover, the peak hourly rate, which could occur twice per day, should be higher the peak day flow rate from 1.4/24 or 6.3/24 hours, depending on improvement and number of population. This takes into account the 10 l/sec additional flow required to be provided for fire fighting purposes, for a two hour eventuality as per the SNIP (Uzbekistan regulatory standards). Also while making calculations, additional increase of specific water demand to 25% for development of project region zone.

3.2 Pipeline Hydraulics-detailed design

3.2.1. Sizing

Pipelines will be sized to meet the maximum specified flow rate and to achieve the defined levels of service. Inlet mains from bulk supply to the bulk distribution storage will not be required to meet the full peak flow rates.

3.2.2. Hydraulic Calculation

Hydraulic calculations using the Hazen Williams Equation for the calculation of friction loss; the roughness factor applied for HDPE is 100[1].

In the later detailed design stage it is recommended the hydraulic calculations be conducted using Water Cad or similar computer software.

3.2.3. Proposed System Layout

Generally, the final design of the water supply and distribution layout will depend on the following factors, to be incorporated in the detailed design:

- Quantities of water to be pumped, based on peak hour and fire flows
- Operating Pressure
- Reliability of supply
- Good access for maintenance
- Location of valves, air/vacuum relief valves and washouts.
- Adverse ground conditions and difficult terrain.
- Pipe materials and corrosion protection systems in aggressive grounds for ductile iron or steel pipe.
- Crossing of railways and water courses
- Depth of frost penetration
- Rights of way/Private ground.
- Traffic loading

[1] This is a conservative figure – HDPE can be rated at up 140, but doing do makes little difference to pipe diameters

- Location of other utilities equipment
- Ease of operation

After all the above points have been taken into consideration, site investigations undertaken and agreement reached with other utility (telephone, gas, electrical, cable, etc) operators, the most appropriate pipeline route can be selected. Usually the replacement of, and installation of new water mains and distribution pipes, will follow existing road, street and other utility rights of way.

4. WATER DEMANDS

From the data available for analysis the water demands for the period 2009 to 2025 is indicated in Table 2 below:

Table 2 – Water demands for the period of 2009 to 2005

Water Demand Factors	2009	2015	2025
Total Population of Karmana Urban Area	22,600	23,530	25,230
Total Population of rural area supplied	6,050	6,670	7,590
Total population connected	93%	100%	100%
Number of Domestic Water Connections form Karmana water supply.	24,406	27265.2	29480.4
Domestic Water Consumption – l/c/day	106	150(R115)	150(R115)
Daily Domestic Water Demand –m3/day	**2,587**	**3,959**	**4,273**
Commercial and Industrial Consumption – m^3/day	3,305	4,751	5,342
Total Daily Water Demand – m3/day	**2,2578**	**5000**	**5400**
Expected Daily Water Availability – m^3/day [Damkhodja/Mining Plant]	**3,562**	**4,751**	**5,342**
Distribution Losses – %	7%	30%	30%
Water Available for Resale – Domestic and Industrial – m^3/day	3,312	3,326	3,739

5. PROPOSED IMPROVEMENT WORKS

Due to the extensive deterioration of the existing system only the most urgent and major components can be replaced under this subproject/Investment Program. Continued improvement of the systems will need to be carried out even after this intervention by the provincial PIU's and/or vodokanals. Their technical capacities will have been strengthened under the Investment Program. The tariff reform, reduced leakages and improved energy efficiency will lead to increasing revenues enabling the Karmana vodokanal to conduct its own leakage detection and repair, meter maintenance and expansion to connect new consumers as the population increases. If further evaluations reveal that more work is required now to attain targets of improved service/leakage reduction, UCSA could consider such follow-on works under later tranches of the Investment Program.

There are two options to improve the water supplies to Karmana City; option 1 is in three parts, described in Sections 5.1, 5.2 and 5.3 and option 2 in Section 5.4:

5.1 Option 1 Part 1 Intake from IRTM

It is proposed that the following rehabilitation and improvement work be undertaken at the bulk supply import point:

(a) Installation of 400 mm ultrasonic flow meter (US) at the import point from the IRTM.

(b) Construct new Karmana Water Distribution Unit adjacent to the import point from the IRTM, consisting of two 1,500 (total 3,000) m^3 capacity reinforced concrete (RC) storage reservoirs, to meet peak water and fire fighting demands. (Drawing of the proposed Karmana Water Distribution Unit is shown in the **Appendix 3**).

(c) If, after the Damkhodja IRTM rehabilitation, the vodokanal continues to purchase water from the mining company, even on an emergency basis, (e.g. in case of failure with the IRTM water, fire at district center), the existing 250 m^3 storage reservoirs and booster pumps should be rehabilitated as a standby source for the town (See Option 2 in Section 5.4 below). (

(d) Construction of booster pump building and electrical room with design capacity to be determined during detailed design.

(e) Installation of duty and standby variable speed booster pump,

The schematic layout for these improvement works is presented below.

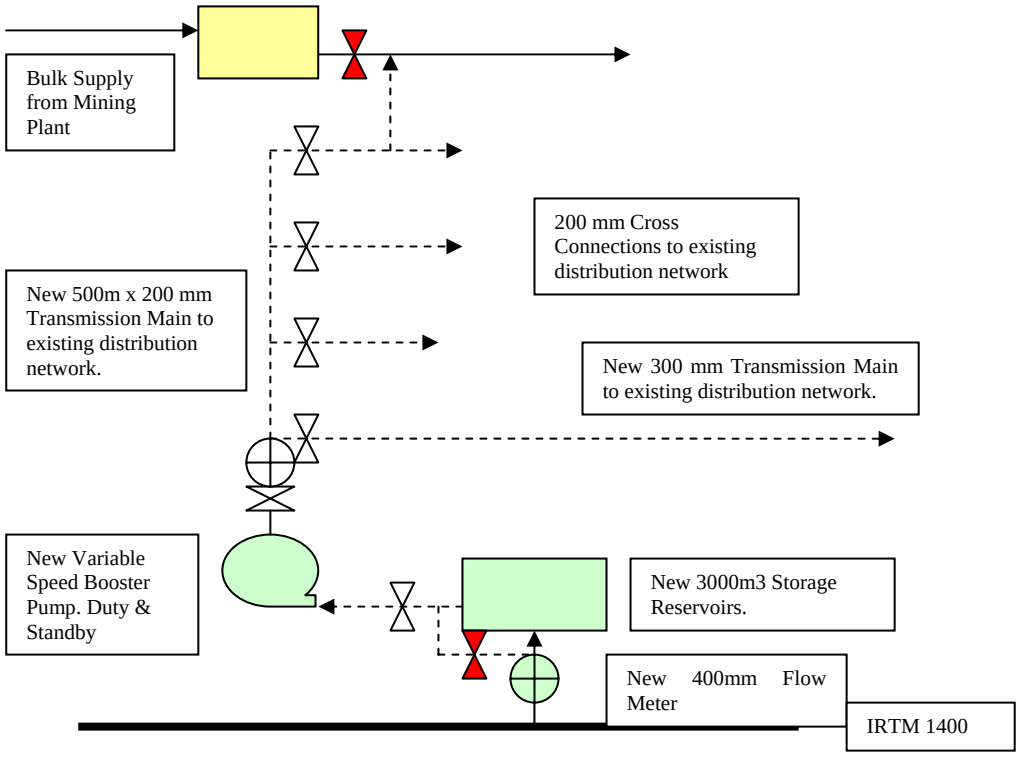


Figure 2. Proposed Karmana Transmission Layout

5.2 Option 1 Part 2 Transmission Main Extension

It is proposed that the following rehabilitation and improvement work be undertaken in the transmission system:

(a) Installation of new 400 mm IRTM connection and 400 mm transmission mains from a new variable speed booster pump at the IRTM to the existing connections into the Karmana water distribution network, as indicated in Sketch above. The existing feeder main to the service reservoir will be abandoned as it is too deteriorated to handle the new operating pressures.

The transmission main lengths and diameters are indicated in **Appendix 2**.

5.3 Option 1 Part 3 Rehabilitation of Distribution Network

It is proposed that the following rehabilitation and improvement work be undertaken in the water distribution system[2]:

(a) New construction of 5.8 km of 100, 150, 200, 300 mm and 400mm transmission and distribution mains to rehabilitate the existing Karmana water distribution network and connect into the existing distribution mains. Note: (Final new construction quantities will be based on the evaluation of the existing system during detailed surveys and analysis of the detailed design).

(b) Rehabilitation of 24.99 km of 76 mm - 300 mm diameter sections of the existing distribution network, including replacement of 5,600 house connections to the new distribution system. Installation of valves and water meters to each service connection. (Note: while there currently about 7,500 connections to the Karmana water supply, 1,900 of these are in the rural areas, improvement of which are not included in the subproject).

The distribution network main lengths, diameters, material type and phasing proposals are indicated in **Appendix 2**

5.4 Option 2 - Rehabilitation of Existing Water Distribution Unit

If the existing Water Distribution Unit is to be retained as a standby source for Karmana the following rehabilitation and improvement works will be required:

(a) Construction of chlorination unit and building;

(b) Construction of a new 3000 m^3 storage reservoirs;

(c) Installation of new booster pumps with pipes, meters, controls and related electrical equipment.

[2] The proposals are based on information from the vodokanals, from site inspections, and UCSA inputs

5.5 Option Recommendations

Based on the development proposals indicated in Sections 5.1, 5.2 and 5.3 and the financial loss of 30 soums/m^3 [96,000soum/day] incurred by Karmana Vodokanal when purchasing bulk water supplies from the Mining Company, **it is recommended that all parts of Option I are accepted and Option 2 be rejected.**

The related information on costs for rehabilitation of the existing Karmana WDU is indicated in **Appendix 2.**

5.6 Preliminary Cost Estimates

The preliminary cost estimates for Karmana subproject activities works is $4,091,950. The detailed breakdown of the costs based on preliminary data is indicated in **Appendix 2**.

The actual cost for Karmana subproject activities will be identified during the detail design.

5.7 Improvement Benefits

The following benefits are expected from the improvement works:

5.7.1. Levels of Service

On completion of the proposed improvement works scheduled water supplies will be available to all existing customers with increased l/c/d from 53 to 150 in the period 2010 to 2018; it is further intended with additional pipeline replacements and expansion to the distribution system to increase flows to a minimum of 150 l/c/d by the year 2025, in accordance with Uzbekistan requirements. System operating pressures will be a minimum of 10 m of head.

Water quality supplied to comply with Uzbekistan water quality standards.

5.7.2. Operating Costs and Income

(a) Initially billed income will increase when the new system becomes operative as consumers will have access to water 24 hrs/day compared with the current eight hours per day. Furthermore supply will continue to improve in stages between 2012 and 2018, due to reduction in real network water losses as the rehabilitation is completed and leakage detection and repair programs are introduced in the vodokanal, along with increased output from the Damkhodja IRTM, the new feeder main system, reservoir storage and booster pumps.

(b) The real water losses in the distribution network are expected to be reduced by a minimum of 15%, when the proposed distribution system rehabilitation work is completed.

(c) Cost of materials and leakage repairs will be reduce as the numbers of defects reduces after the completion of the sub-project works.

(d) There will be an increase in electricity costs for operation of the new booster pump, compared to the existing pump (when it is working); however the new variable speed pump will have high efficiency and will have a low operating head. The existing pump is obsolete and has

low efficiency, estimated at less than 60%. The new pumps and motors will have a combined efficiency of > 80%.

(e) The estimated O&M costs of the rehabilitated system, including effective chlorination systems, will be determined in conjunction with the vodokanal, after the return design site visit, and any changes to the scope of the sub-project has been agreed with UCSA.

(f) With the improvements in the Karmana transmission and distribution infrastructure and the increase production from Damkhodja IRTM Sub- Project, the current bulk supply purchased from the Navoi Mining Plant could be stopped with a saving, at current prices, of 30 soum/m^3. However, following the major improvements and reinforcement of the Damkhodja IRTM, its bulk water cost may increase, the current cost savings is approximately 96,000 soum/day.

(g) Based on current water tariff of 54 soum/m^3, the projected revenue for the Karmana water system at 2015 will be 54 x 5576 (from table 2)=301,104 soum/day ($215).

5.8 Pipeline Materials

The transmission and distribution mains up to and including 300 mm diameter will be of HDPE Class PE 80-90 and PN 6.0 (or equivalent).

Considering ground aggressiveness and near location of ground water it is recommended to use stop valve from unlined ductile iron with instalment reinforced concrete manholes with intensified hydro isolation.

It is also worthwhile to mention, that indicated materials(polyethylene and polypropylene pipes and fittings) are produced by local and joint companies, to no need in export.

5.9 Civil and Mechanical Works

5.9.1. Storage Reservoir

The reservoir will be constructed from reinforced concrete, the storage capacity will be 3000 (2x1500) m^3, there will be an inlet main with ball valve, DN 400 mm outlet main with valve, DN 400 mm with valve to a washout main and DN 400 mm overflow pipe. The discharge from the overflow and washout pipe will be discharged to a local drain.

Two access points to the reservoir will be provided in the roof slab, with access ladders internally and externally at the access points. DN 100 mm vents and roof drainage system will be installed.

Ultrasonic flow meter D 400 mm EM water meter will be installed between the import point and the inlet to the storage reservoir.

A reservoir water level indication gauge will be installed in the pumping station building.

5.9.2. Booster Pump

The distribution network system has no water storage, therefore for efficient operational management, particularly at times of low or high demands; variable speed pumps will be used to

pressurize the system. These pumps have lower energy demands as they automatically adjust their output to match variations in system pressure.

Velocity in the variable speed pump manifold will be designed to be around 1.0 m/s to improve the NPSH (net pressure suction head) available at the pumps. The pump discharge velocity should in general be less than 1.5 m/s to minimize hydraulic losses. The standby pump capacity will be 100% of the operational requirement.

The pump efficiency will be > 83%, based on a single stage centrifugal pump with horizontal split casing driven through a flexible coupling. The electric motor will be continuously rated at least 15% above the power adsorbed by the pump at the duty pump, the motor efficiency shall not be less than 96%. The combined efficiency will be >79%.

5.9.3. Chlorination

(a) Considering the weak technical capacity and lack of O&M funds, gas chlorination may be too complicated and potentially dangerous, especially for the smaller less skilled vodokanals. The capacity of vodokanals to O&M gas chlorinators, even after capacity building and training should be reviewed carefully by UCSA during detailed design. The chlorination building will have 2 separate rooms, one for the gas cylinders and the second one for the chlorine feed equipment. Both doors into the building must open outwards.

Along with that it is proposed to use more safe method of disinfection, using 6% sodium or calcium hypochlorite solution. All equipment used for production, health and safety will be chosen in accordance with projections of designer engineers according to standards of Uzbekistan/

It is worthwhile to mention, that using ready modern complete equipment for disinfection (production and dosing hypochlorite), which is more space saving (container facilities and etc.) does not require construction of additional rooms.

5.9.4 Plant and Equipment for O&M

PPTA consultants in conjunction with PPMU and vodokanal will determine and agree the following:

- A list of equipment required for the vodokanal to maintain after the rehabilitated works;
- Vehicles and excavators
- O&M maintenance equipment,
- Emergency pipe stocks based on usage and diameter.
- Pipe stocks for network extensions and diversions.
- Fittings for replacing and installing /new service connections,
- Joints and VJ repair clamps for mains and service repairs.
- Safety equipment.

- Computers and office equipment.
- Replacement of domestic water meters
- Spare parts for electrical/mechanical equipment will be added to the supply contracts sufficient for 3 or 5 years usage.
- Hach equipment for on site water quality testing.
- Leakage detection equipment

6. DUE DILIGENCE

6.1 Land Acquisition and Resettlement

Land Acquisition and Resettlement (LAR) – Due Diligence report was prepared as part of the Investment Program. This report confirms that Karmana subproject has no negative social impacts associated with LAR and that the project will benefit nearly 24,000 residents of Karmana city by providing adequate safe drinking water supply.

The complete Die Diligence report is presented in **Appendix 5.**

6.2 Social Analysis

No risk of negative social impact by the water sub-project in Karmana UTS (urban type settlement) has been identified. People's need for an increased and improved supply of potable water was found to be critical and urgent. More than 67% of households need to fetch water from sources outside the home for household purposes, and in 61% of Karmana households this is the predominantly the responsibility of women and children. The majority of households must currently fetch water from elsewhere at least once a day. The high level of demand for the proposed sub-project is also illustrated by beneficiaries' stated willingness and capacity to pay for connection fees and user charges, and to contribute to the cost of service provision if necessary. The proposed sub-project will therefore directly address this need for improved water supply.

It is clear that households, local enterprises and institutions have the necessary capacity to use and maintain the proposed improved water service. Water metering is also seen by beneficiaries as an equitable system and a way of rationalising the use of piped water, and no objections to this have been raised. In order to increase awareness of the sub-project however, it would be beneficial to conduct information campaigns in the local neighbourhoods, schools and hospitals to explain the work that will be carried out and the expected results from the sub-project. The beneficiary communities possess sufficient technical knowledge and skills which will contribute to the sustainability of sub-project benefits, and there is significant evidence of current participation and co-operation in local self-help activities related to local water supply.

There are significant levels of social capital in local neighbourhoods as indicated by the degree of social cohesion and support mechanisms within the community. Parents bring containers of water in their cars to their children's schools in order to alleviate the shortage of clean water in

schools. Communities strive towards settling internal disputes concerning water distribution and towards building consensus. An analysis of current expenditure, time and effort in purchasing water from water vendors and from fetching water from distant sources, indicates that the cost and quality of improved water supply will compare favourably with current costs.

The complete report is presented in **Appendix 6**.

6.3 Institutional Strengthening and Capacity Development

An initial assessment of current institutional structure and capacities of the Karmana vodokanal was conducted as part of the Investment Program. Main objectives of the initial assessment were to: (i) identify role, responsibility, obligations, property rights, and legal obligations of all stakeholders; (ii) review production objectives, schedules, monitoring and control systems as well as technical training requirements; (iii) review current institutional capacity of the vodokanal; (iv) determine training needs for personnel and/or staff reorganization; (v) ascertain needs for equipment and other supplies to improve productivity, and develop a procurement action plan; (vi) identify potential managers who can benefit from having a personnel development plan and ascertain training needs program for such staff; (vii) identify potential trainers able to train their colleagues within an organization; (viii) analyze current incentives schemes (if available) in vodokanal; (ix) determine major drawbacks in performance of vodokanal, particularly in planning and management; (x) ascertain water supply and sanitation tariff calculation and approval procedures.

The complete report is presented in the **Appendix 7**.

6.4 Economic and Financial Analysis

Benefit-cost analysis for the subproject was undertaken to determine subproject economic and financial viability. The main viability parameters used are the BCR, EIRR and ENPV for economic analysis, and FIRR and FNPV for financial analysis. The proposed subproject is economically viable if the resulting BCR is greater than 1.0, EIRR exceeds the economic opportunity cost of capital EOCC at 12%, and ENPV is positive. Similarly, the subproject is financially viable if FIRR is greater than the weighted average cost of capital WACC at 3.3%, and FNPV is positive.

The complete report is presented in **Appendix 8**.

6.5 Initial Environmental Examination

An Initial Environmental Examination (IEE) study for the Karmana subproject was carried out following the Environment Policy (2002), and Environmental Assessment Guidelines (2003), of the ADB and relevant environmental policies and guidelines of the Government of Uzbekistan (GoU).

The IEE involved: (i) gathering baseline information available on the physical, chemical, biological, and socio-economic environment of the sub-project area and subcomponent sites and understanding the technical, social, and institutional aspects of the sub-projects; (ii) public consultation and field visits; (iii) screening of potential issues, concerns, and impacts relative to location, design, construction, and operation to distinguish those that are likely to be significant for a particular subcomponent and warranting further study; (iv) recommending measures to

mitigate adverse issues, concerns, and impacts, particularly to the project design team; (v) preparing an Environmental Management Plan (EMP) indicating impact areas, recommended mitigation measures, method of monitoring the impacts and responsible persons; and (vi) proposing the institutional set up for implementation of the EMP.

Based on the indication of the Rapid Environmental Assessment and the findings of the IEE, the classification of the Karmana subproject as Category "B" was confirmed, and no further special study or detailed EIA will be needed to be carried out to comply with the environmental policies of the ADB.

The complete IEE report is presented in the **Appendix 9**.

6.6 Earthquake Zone

The Karmana subproject area is located in a designated (Richter Scale) Earthquake Zone 7. Project design will incorporate strengthened of structures based on the related international or Uzbekistan standards, whichever are more conservative.

APPENDIX 1 - DESIGN CRITERIA FOR PROJECTED CONSUMPTION THROUGH TO 2025

Normative water consupmtion rate for Karmana / Нормативное водопотребление Кармана **Table 1/ Таблица 1**

Consumers (2025)/ Наименование потребителей (2025)	Unit/Един. измер	Quantity/Кол-во	Average water consumption 1 person. Litres/day/ Удельн. питьевое водопотребление 1чел.	Number of working hours/ Кол-во час. работы	Average daily supply, m3/day/Сред.сут расход для населения, $м^3$/сут	Industry development (20%), m3/day/Развитие промышленности (20%), м3/сут	Average daily supply, m3/day/Общий сред.сут расход, $м^3$/сут	Daily inequality coefficient/ Коэф. сут нерав. Ксут.мах	Hours inequality coefficient/ Коэф. час. нерав. Кч.мах	Comsumption/ Расходы			
										max.daily m3/day/макс.сут $м^3$/сут	average hour m3/hour / сред.час $м^3$/час	max.hours m3/hour/макс.час $м^3$/час	calculation per second l/sec/расч.сек. л/с
City/городское	people/чел.	24892	150	24	3734	747	4481	1.20	1.42	5377	224	317	88.12
Rural/сельское	people/чел.	7591	115	24	873	175	1048	1.20	1.42	1257	52	74	20.60
Total/ Общее	**people/чел.**	**32483**			**4607**	**921**	**5528**	**1.20**	**1.42**	**6634**	**276**	**391**	**108.72**

Footnote:/ Примечание:

2. Hours inequality coefficient Кч. мах =1,2x1.18=1,42 Kdaily.=1,2

Qdaily.aver.=N x qaver.x K/1000 / Qсут.ср.=N x qуд.x K/1000

Qdaily.max=Qdaily.aver.x Kdaily.мах. / Qсут.мак=Qсут.ср.x Ксут.мак.

qhour.aver.=Qdaily.max / 24.qчас.ср.=Qсут.мак/24

qhour.max=qour.aver.x Khour.мах. / qчас.мак=qчас.ср.x Кчас.мак.

qsec=qhour.max/3,6 / qсек=qчас.мак/3,6

2. Коэффициент часовой неравномерности Кч. мах =1,2x1.18=1.42 Ксут.=1,2

Calculation of Storage Reservoir Volume / Райцентр Кармана . Расчет емкости резервуаров Table 2/ Таблица 2

Item/ Наименование	Daily Demandm3/day/ Суточный расход Qсут, $м^3$/сут	Max Hour m3/hr/ Максим часовой расход q, $м^3$/час	Average Hour m3/hr/ Средний часовой расход, $м^3$/час	CoefficientHourly /Коэф-т час. неравн. Кч	Кн	Volume m3/Регулирующий объем, $м^3$	Emergency Volume m3/Аварийный объем воды, м3	Неприкосновенный пожарный запас, м3	Reservoir Volume m3/Объем резервуара, м3
Karmana / Кармана	6634	391	276	1.42	1.00	845	1548	561	2953

$Wрег=Qсут[1-Кн+(Кч-1)(Кн/Кч)^{Кч/(Кч-1)}]$

Wemergeny =Qaverage hour * 0.7 * T+ Qпром авар*T / Wавар.=Qср.ч*0.7*T + Qпром авар*T

Емкость (регулируемая/ активная) Кн = Coefficient of nonregular flow (of daily flow) Кн= коеффициент нерегулярного стока (от суточного стока)

Qсут = Daily Flow/ Qсут= суточный объём стока Кч = Coefficient of nonregular flow (of hourly flow) Кч коеффициент нерегулярного стока (от час. стока)

T = Emergency time - 8 hours/T - время ликвидации аварии = 8 часс

Adopt 2 reservoirs each volume 1500 m3 total 3000 m3/ Принимаем 2 резервуара емкостью по 1500м3 каждый,общей емкостью 3000м3.

1. According to ШНК 2.04.02.-97 п.2.12 if fire 2 externals - 10 l/sec= total 2o l/sec; 2. Length of fire extinguishing according to ШНК 2.04.02.-97 п.2.24 - 3 hours.
/1.Расчёт расхода согласно ШНК 2.04.02.-97 п.2.12 при пожаре 2 наружних - по 10 л/сек = итого 20л/сек 2.Продолжительность тушения пожара согласно ШНК 2.04.02.-97 п.2.24 принимается -3часа

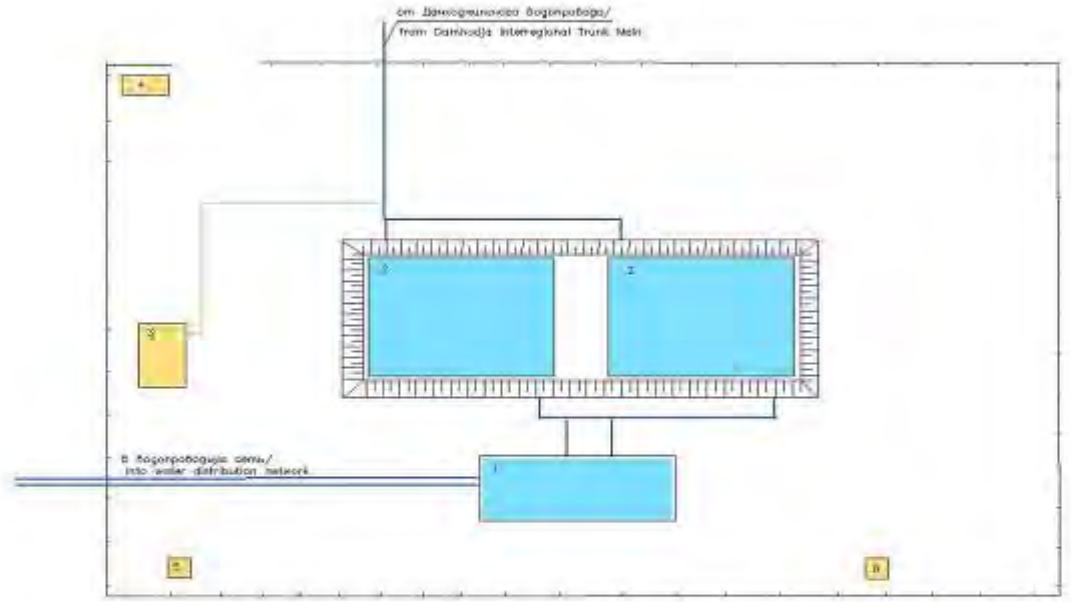
Note: Pipe flow characteristics will be determined accurately during detailed design phase.

APPENDIX 2 – PRELIMINARY COST ESTIMATES

	Unit	Unit Cost	Totals Including Contingencies ('000 US$) 2010	2011	2012	2013	2014	2015	Total
I. Investment Costs									
A. Rehabilitation of WDP									
Rehabilitation of pump station	amnt		-	147,9	98,7	-	-	-	246,6
Equipment for pumping station	amnt		-	113,9	76,1	-	-	-	190,0
2 Reservoirs, capacity 1000m3	amnt		-	276,2	184,4	-	-	-	460,7
Rehabilitation of chlorination unit	amnt		-	31,6	21,1	-	-	-	52,8
Equipment for chlorination unit	amnt		-	42,0	28,1	-	-	-	70,1
Technological services/communications	amnt		-	66,3	44,3	-	-	-	110,6
Absorbing filters	amnt		-	3,6	2,4	-	-	-	6,0
External power supply	amnt		-	64,3	42,9	-	-	-	107,2
Power Supply networks	amnt		-	10,0	6,7	-	-	-	16,7
Digging	amnt		-	6,1	4,1	-	-	-	10,2
Repair of gateway	amnt		-	12,2	8,2	-	-	-	20,4
Latrine	amnt		-	5,4	3,6	-	-	-	9,0
Access road	amnt		-	0,7	0,5	-	-	-	1,1
Landscaping	amnt		-	14,5	9,7	-	-	-	24,2
SCADA	amnt		-	29,3	19,5	-	-	-	48,8
Security lighting	amnt		-	9,9	6,6	-	-	-	16,5
Other equipment (auxillary) /a	amnt		-	205,6	137,3	-	-	-	342,8
Subtotal			-	1 039,6	694,1	-	-	-	1 733,7
B. Detailed design	amnt		45,7	68,9	-	-	-	-	114,7
C. Construction of distribution mains									
Pipeline d-400 L-0.15km	m	153,152	-	14,8	9,9	-	-	-	24,7
Pipeline d-400mm L-0.4km	m	122,443	-	31,6	21,1	-	-	-	52,6
Pipeline d-400mm L-0.6km	m	155,227	-	60,0	40,1	-	-	-	100,1
Pipeline d-160mm L-0.66km	m	55,575	-	23,6	15,8	-	-	-	39,4
Pipeline d-125mm L-0.35km	m	53,635	-	12,1	8,1	-	-	-	20,2
Pipeline d-110mm L-3.58km	m	52,933	-	122,1	81,5	-	-	-	203,6
Subtotal			-	264,2	176,4	-	-	-	440,6
D. Rehabilitation of distribution mains									
Pipeline d-400mm L-1.7km	m	170,751	-	187,1	124,9	-	-	-	311,9
Pipeline d-315mm L-1.06km	m	142,303	-	97,2	64,9	-	-	-	162,1

		Unit	Unit Cost	Totals Including Contingencies ('000 US$) 2010	2011	2012	2013	2014	2015	Total
	Pipeline d-225mm L-0.36km	m	76,54	-	17,8	11,9	-	-	-	29,6
	Pipeline d-180mm L-0.21km	m	69,345	-	9,4	6,3	-	-	-	15,6
	Pipeline d-160mm L-1.62km	m	66,827	-	69,8	46,6	-	-	-	116,3
	Pipeline d-140mm L-1.1km	m	65,247	-	46,2	30,9	-	-	-	77,1
	Pipeline d-125mm L-1.37km	m	64,143	-	56,6	37,8	-	-	-	94,4
	Pipeline d-110mm L-17.17km	m	63,193	-	699,2	466,8	-	-	-	1 166,0
	Pipeline d-63mm L-0.64km	m	49,206	-	20,3	13,5	-	-	-	33,8
	Subtotal			-	1 203,5	803,5	-	-	-	2 007,0
	E. Maintenance equipment	amnt		-	47,0	20,2	-	-	-	67,2
	F. Toilet for school	unit	42.757	-	27,6	18,4	-	-	-	45,9
Total				45,7	2 650,8	1 712,6	-	-	-	4 409,2

APPENDIX 3: DRAWING OF THE PROPOSED KARMANA WATER DISTRIBUTION UNIT



APPENDIX 4: LAYOUT OF KARMANA WATER DISTRIBUTION NETWORK

APPENDIX 5: LAND ACQUISITION AND RESETTLEMENT - DUE DILIGENCE REPORT

LAND ACQUISITION AND RESETTLEMENT - DUE DILIGENCE REPORT

Tranche 1, Karmana WSD Subproject

A. Introduction

1. Under Water Supply and Sanitation Services Improvement Program: Uzbekistan Karmana DS subproject has been developed for construction of water distribution network and drinking water reservoir, pump station and chlorination unit, as well as construction of new Trunk Main and rehabilitation of water distribution networks to provide quality drinking water to 24,000 residents of Karmana, 94% of whom are already connected with water supply distribution network.

2. The Executing Agency (EA), Uzbekistan Communal Services Agency (UCSA) has carried out an Initial Poverty and Social Assessment (IPSA), in accordance with ADB's policy on Involuntary Resettlement for the first Tranche of MFF in order to assess the land acquisition and involuntary resettlement impacts. One Land Acquisition and Resettlement Framework (LARF) was also developed which will be applicable for the entire MFF, in accordance with Uzbekistan legislation and ADB's Involuntary Resettlement Policy. Following paragraphs address the LAR issues with respect of Karmana DS subproject in keeping with approved LARF.

B. Land Acquisition and Resettlement Implications

3 All the subproject works will be conducted within the territory of lands, in possession of district Khokimiyat. While conducting rehabilitation works for the water supply distribution network, temporary land acquisition for the period necessary for construction work will be required. For construction of the new water distribution unit, 0.75 ha of land will be given for permanent use to "Vodokanal" district administration. (See Table 1).

Table 1: Details of Land Availability

Component	Area / Length of land	Land acquisition need and Ownership status of land
Construction of new distribution unit	0.75 ha	Land will be alienated from, district *Khakimiyat* and will be given for permanent use of "Vodokanal"
Construction of new Trunk Main	10 km	Land will be alienated from district *Khakimiyat* and will be given for temporary use of "Vodokanal" along the existing main road
Reconstruction of Water Distribution network	18,5 km	

4 The proposed activities involve additional acquisition of land but have no impact in terms of resettlement. Initial social assessment has revealed that all the land required belongs to Govt, and is either vacant, or occupied by the roads. Potential adverse impacts, if any, will be limited to minor temporary disturbances during the construction phase of water supply networks

and water distribution unit. The EA will address such issues through appropriate conditionality in the civil works contract. The civil works contracts will require the contractors to obtain approval of respective district authorities before they temporarily occupy any land for alientation, and permanent acquisition, and possibly in agreement with other related authorities (such as, territorial sub-division of Communication Agency, energy supply, etc). .

C. Conclusion

5 The Due Diligence Report confirms that Karmana DS subproject under the tranche 1 of the MFF Water Supply and Sanitation Services Improvement Program: Uzbekistan, has no negative social impacts associated with LAR and that the project will benefit nearly 24,000 residents of Karmana city by providing adequate safe drinking water supply.

APPENDIX 6: SOCIAL ANALYSIS

1 Summary

No risk of negative social impact by the water sub-project in Karmana UTS (urban type settlement) has been identified. People's need for an increased and improved supply of potable water was found to be critical and urgent. More than 67% of households need to fetch water from sources outside the home for household purposes, and in 61% of Karmana households this is the predominantly the responsibility of women and children. The majority of households must currently fetch water from elsewhere at least once a day. The high level of demand for the proposed sub-project is also illustrated by beneficiaries' stated willingness and capacity to pay for connection fees and user charges, and to contribute to the cost of service provision if necessary. The proposed sub-project will therefore directly address this need for improved water supply.

It is clear that households, local enterprises and institutions have the necessary capacity to use and maintain the proposed improved water service. Water metering is also seen by beneficiaries as an equitable system and a way of rationalising the use of piped water, and no objections to this have been raised. In order to increase awareness of the sub-project however, it would be beneficial to conduct information campaigns in the local neighbourhoods, schools and hospitals to explain the work that will be carried out and the expected results from the sub-project. The beneficiary communities possess sufficient technical knowledge and skills which will contribute to the sustainability of sub-project benefits, and there is significant evidence of current participation and co-operation in local self-help activities related to local water supply.

There are significant levels of social capital in local neighbourhoods as indicated by the degree of social cohesion and support mechanisms within the community. Parents bring containers of water in their cars to their children's schools in order to alleviate the shortage of clean water in schools. Communities strive towards settling internal disputes concerning water distribution and towards building consensus. An analysis of current expenditure, time and effort in purchasing water from water vendors and from fetching water from distant sources, indicates that the cost and quality of improved water supply will compare favourably with current costs.

2 Introduction

Karmana UTS (urban type settlement) is the administrative centre of Karmana District in Navoi Province. The town is divided into nine makhallas (communities) occupying an area of 35.2 km^2. It contains all the district-level administrative institutions such as the Khokimiyat (mayor's office) and its sector teams, the sanitary and epidemiologic surveillance service, the social welfare office, the Court, the Public Prosecutor's office, the cadastre service, the district-level department of internal affairs and a weather station. The city has 147 enterprises both public and private including a bathhouse, three bakeries, four barber shops, 102 services sector facilities, 45 State budget-funded organizations and enterprises, a post office and four banks. There are several retail sales outlets in including one open market and over 90 stores and convenience shops and 27 cafes / restaurants.

3 Demographic Information

According to data from the City Hall, the total population of Karmana UTS was 24,773 as of 01 January 2009, made up of 5,010 households. The population density is 654 persons / sq km. According to the makhalla chairmen however, the total number of families is 5,864 and the average household size is 4.9 persons. These discrepancies in the data are possibly due to the

fact that makhalla chairmen do not count households but rather families to whom they grant and deliver low-income family welfare payments.

The ethnic composition of the population of Karmana is quite homogenous and Uzbeks make up 94.5% of the population. Tajiks make up 0.9% of all households. Representatives of Slav nationalities (including Russians, Ukrainians, Byelorussians and others) represent 1.7% of all households, and other ethnicities account for 2.7%. The majority of these ethnic groups live in Kuhna Kurgon makhalla, and slightly fewer in Alisher Navoi makhalla. In the remaining makhallas the Uzbeks are the majority:

Ethnic Composition of the Population of Karmana UTS

	Number of Families	%	Uzbek	%	Tajik	%	Turkmen	%	Kyrgyz	%	Kazakh	%	Slavonic	%	Other ethnic groups	%
Karmana city	5864	100	5541	94,5	53	0,9	3	0,0	2	0,0	7	0,1	102	1,7	156	2,7
Dehkon	646	100	616	95,4	3	0,5	0	0,0	0	0,0	0	0,0	11	1,8	15	2,4
Kuhna Kurgon	840	100	731	87,0	3	0,3	4	0,4	0	0,0	0	0,0	0	0,0	103	12,2
M.S. Bahrom	557	100	534	96,0	0	0,0	0	0,0	2	0,4	3	0,6	3	0,6	14	2,6
Usmon Yusupov	899	100	866	96,3	13	1,5	0	0,0	0	0,0	0	0,0	7	0,7	13	1,5
Huja Hisrav	550	100	541	98,3	0	0,0	0	0,0	0	0,0	0	0,0	5	0,9	4	0,8
Alisher Navoi	656	100	571	87,1	0	0,0	0	0,0	0	0,0	2	0,4	65	9,9	18	2,7
Farhod	574	100	537	93,6	25	4,4	0	0,0	0	0,0	2	0,3	4	0,7	6	1,0
Beshkent	634	100	604	95,3	3	0,5	0	0,0	0	0,0	0	0,0	15	2,4	12	1,9
Gulobod	508	100	508	100	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0

Source: Data from chairpersons of makhalla committees, June 2009

In addition the following demographic data was obtained from the 2009 household survey:

Demographic information of household survey samples	**Karmana**
Average family size, number of people	5.22
Average family size in poor households, no. of people	5.76
Average family size, in non-poor households, no. of people	5.01
% children under 7	11.5
% children under 16	26.1
% Employable age population (16-54 for women, 16-59 for men)	64.1
% population of pensionable age	9.8

4 Health infrastructure

There is a district hospital with 322 beds; an oncology hospital with 70 beds; an ophthalmology hospital with 40 beds and a skin and venereal diseases dispensary with 110 beds. In addition there are several dental clinics and pharmacies. All four hospitals have piped water connections, but are not connected to the sewerage system. In addition there are two polyclinics in the town which also have piped water connections, but with no connection to the sewerage system.

Karmana	**Piped water connection**	**Sewerage connection**
2 polyclinics	both connected	None connected
4 hospitals	All connected	None connected

5 Educational infrastructure

The educational facilities include four general education schools with an enrollment of 4,700 students; 10 kindergartens with a total of 1,020 preschoolers, and 2 vocational colleges with a total of 4,187 students enrolled. There is a boarding school for children with disabilities, where 282 children study; one arts centre where 450 people study and one music school where 90 people study. For older children, there are 3 sports schools attended by 1,312 people. None of the educational facilities are connected to the sewerage system.

Summary table of educational infrastructure	Karmana
Number of kindergartens/nurseries in the town	10
Number of schools in the town	4
Number of boarding schools in the town (for disabled, sportsmen etc.), art centres, music schools etc.	6
Number of colleges in the town	3

6 Employment levels

Official data regarding employment is not available however some data regarding district level employment was obtained during recent site visits. As of 1 January 2008, in Karmana District the total working-age population was 61,800 of which 37,000 were women, representing 60% of the total district population. This includes men aged 16-60 years and women aged 16-55 years. According to district level statistics offices the employment rate is very high and represents 82% of the total population of working age. The employment rate of women is 80% and does not differ significantly from that of men. Job seekers represent 1.5% of the total population of working age. The official unemployment rate is very low at 1.8% of the total population of working age for both genders. Thus, according to statistics, the inactive population represents only 3.4% of the population. It should be noted however, that the reliability of official data regarding employment is doubtful. The results from the 2009 household survey indicate that the current unemployment level in Karmana is 7.2%.

Employment of population in employable age (16-54/59)	**Karmana**
% Students of schools, colleges, university	15.9
% in permanent hired employment	41.4
% Owners of private business	10.9
% Self-employed	3.5
% Unemployed	7.2
% Disabled	5.3
Other categories	15.8
% Having additional employment (as % of household members of employable age)	5.6

2009 Household Survey

7 Incomes and Living Standards

In 2008 the average annual monthly salary in Karmana UTS was estimated to be 355,000 sums according to the Statistics Department of Karmana District.

Uzbekistan does not officially set a poverty line, and so official data concerning household living standards at provincial, or district level are not available. However, data from local self-

governing bodies revealed that for the first five months of 2009, 270 families received low-income family allowances i.e. 5.1% of families. This included 151 families who received financial assistance i.e. 2.8% of families; and 138 families who received childcare allowances for children younger than eighteen years of age i.e. 2.6% of families, and 86 families received allowances for welfare mothers with children younger than two years of age i.e. 1.6% of families.

In Karmana, a total of 3,621 people are registered as disabled and receive disability pensions.

Summary of poverty and income levels taken from household survey in 2009	Karmana
% households living in poverty, using the cost of consumption of 2100 Kcal per person a day as a poverty line	27.8
% population living in poverty	30.7
Poverty line, UZS per person per month (for June 2009)	1,600
Average household income, UZS per month (for June 2009)	415,160
Average incomes, UZS per person a month(for June 2009)	85,084
Average incomes in poor households, UZS per person per month	64,296
Average household expenditures, UZS per month (for June 2009)	444,000
Average expenditures, UZS per person per month(for June 2009)	79,559
Average expenditures in poor households, UZS per person per month	62,374
% Expenditure on food, as % of household expenditure	42.1
% Expenditure on food, as % of poor households' expenditure	41.8

8 Water supply

The following table indicates the comparative cost of water from piped household connections, standpipes and purchased water:

Summary table of water costs	Karmana
Average cost of water per litre from pipeline in house/yard, in UZS	2.8
Average cost of water per litre from street standpipe in UZS	1.6
Average cost of water purchased from water vendors	3.45
Average household expenditure for water purchased from water vendors, per household (for June 2009) in UZS	9,550
Average amount of water delivered by water vendors, per household (for June 2009), in litres	2,765
Average household expenditure for all piped (in-home connection and standpipes) water per household (for June 2009),in UZS	2,748
Average household expenditure for piped water from in-take in the house/yard per household (for June 2009), in UZS	2,888
Average household expenditure for piped water from standpipe per household (for June 2009), in UZS	2,071

Findings from the household survey indicate that the main source of water for 51% of households in Karmana is from the piped water connection situated either inside the house or in the yard. 4.6% of households rely mainly on purchased water.

Main source of water for drinking and household needs	Karmana
% of households whose **main source of water** is from water pipeline in the house/yard	51.2
% of households whose **main source of water** is from water pipeline in the street / neighbours	36
% of households whose main source of water is purchased from a water vendor	4.6
% of households whose main source of water is fetched water from a reservoir	5
% of households whose main source of water is from wells ("kachok")	1.4
% of households whose main source is surface water (river, canal)	0.1

The current water service and usage pattern in Karmana indicates that approximately 62% of households in Karmana have piped water connections which function only in part and are not wholly satisfactory. Only 25.5% of Karmana households received 21-24 hours of water service during the day prior to the survey. The vast majority of households i.e. 96% do not have water meters. The majority of households interviewed stated that they would prefer to pay for their water consumption based on meter readings 51.5% of households. The following table illustrates the main features of the current water services delivered to households:

Current piped water service	Karmana
% of households whose water supply pipeline in house/yard is functioning or partly functioning	62.2
% of households whose water supply system in house/yard is not functioning at all or never works	18.1
% of households with no centralized water supply pipeline in house/yard at all	19.7
Average number of days of water delivery in previous week when water system worked at least for a short period of time	6.6
Average number of hours of water delivery during the previous day	17.3
% of households with operating piped water system which did not received water during the day prior to survey (i.e. 0 hours of water / day)	7.1
% of households with operating piped water system which received water for 3 hours or less during the day prior to survey	4.7
% of households with operating pipeline who received water 21-24 hours during the day prior to survey	25.5
% of households complaining of poor quality of the piped water: Water has bad odour	5.3
Water has bad taste	6.4
Water not transparent	5
% of households not satisfied with quality of water from standpipe (as % of those who mainly get water from street standpipes)	22.8
% of households without installed water meter (as % of those who have piped water in-take in the house/yard)	95.9
% of households who would prefer to pay for water using water meter (as % of all households)	51.5
% of households who would prefer to pay for water using per capita norms (as % of all households)	31.4

From survey results, the average daily household consumption of water in Karmana from all sources is 66 litres. Average daily per capita water consumption is 12.6 litres. Survey findings indicate that there is currently a shortage of water for household needs is estimated at 53 litres.

Household water consumption	Karmana
Average water consumption from all sources, in litres per household per day	66
Average water consumption, in litres per person per day	12.6
Average water consumption, in litres per person per day, in poor families	12.2
Differences between actual water consumption and demand i.e. WATER SHORTAGE, in litres per household per day	53
Water consumption from pipelines, in litres per household per month	2,166

More than half of the households interviewed need to collect water from sources outside the home for household purposes and in 61% of Karmana households this is predominantly the responsibility of women and children. The majority of households must fetch water from elsewhere at least once a day.

Household water collection and storage	Karmana
% of households which must fetch water from elsewhere (i.e. go outside house yard to get water)	52.6
% of households which must go outside house yard to fetch water at least once a day (as % of **all** households)	35.4
% of households which must go outside house yard to fetch water at least	67.2

once a day (as % of households who have to collect water)	
Average time spent to fetch water (in person-days per month)	3.8 days/month
% of households storing water	92.6
% of households where women and children have to go to collect water more often than men	61

9 Household expenditure on water

Survey data show that the average monthly household expenditure for water in June 2009 was 10,451 sums. This included the cost of fetching potable water, and maintenance repairs of water pipes. Further details of household expenditure on water are given below.

Household expenditure on water	Karmana
Average household expenditure for water purchased from water vendors, per household (for June 2009) in UZS	9,550
Average amount of water delivered by water vendors, per household (for June 2009), in litres	2,765
Average household expenditure for all piped (in-home connection and standpipes) water per household (for June 2009),in UZS	2,748
Average household expenditure for piped water from in-take in the house/yard per household (for June 2009), in UZS	2,888
Average household expenditure for piped water from standpipe per household (for June 2009), in UZS	2,071
Average cost of water per litre from pipeline in house/yard, in UZS	2.8
Average cost of water per litre from street standpipe	1.6
% of households having potable water costs in June 2009 (WITHOUT ADVANCE PAYMENTS)	25.5
% of households having potable water costs in June 2009 (WITH ADVANCE PAYMENTS)	90
Average monthly household expenditure for water, in UZS (including advance payments and current payments, expenditures for fetching potable water, maintenance repairs of pipes etc.) WITHOUT CONSTRUCTION / BUYING OF TANKS / RESERVOIRS	9,025
Average monthly household expenditure for water (for June 2009), in UZS (including cost of fetching potable water, maintenance repairs of pipes etc.) - BUT WITHOUT ADVANCE PAYMENTS	10,451
% of household expenditure on water, as % of average weighted family expenditures	0.67%
% of household expenditure on water, as % of average weighted family expenditures, including expenditures for bottled water and expenditures for construction/purchase of reservoirs for storing potable water (baskets, canteens, khauz, water tank, water tun, etc.)	2.2

10 Affordability and willingness to pay

Survey results indicate that the majority of households are able to absorb increased in water tariffs and are willing to do so if the water supply is improved and the quantity of water available to them is increased.

Willingness to pay for improved water supply	Karmana
Average tariff that households are willing to pay for improved water supply, in UZS per person per month	936
% of households which are willing to pay for connecting their house/yard to water pipeline (if water pipeline is laid in the street), as % of those households which do not yet have a connection	86.7
Average tariff that households are willing to pay for connecting their house/yard to water supply pipe, in UZS	49,600

Findings from the household survey indicate that average household expenditure on piped water as a percentage of average weighted family expenditure is low at 0.67%. When expenditure on bottled water etc is included, the average household expenditure on water is currently 2.2% of average household income.

Relationship between expenditure on water and total household expenditure	Karmana
% of household expenditure on water, as % of average weighted family expenditures	0.67%
% of household expenditure on water, as % of average weighted family expenditures, including expenditures for bottled water and expenditures for construction/purchase of reservoirs for storing potable water (baskets, canteens, khauz, water tank, water tun, etc.)	2.2

APPENDIX 7: INSTITUTIONAL STRENGTHENING AND CAPACITY DEVELOPMENT

A. Introduction

1. Water supply and sanitation (WSS) service utilities should provide high-quality, reliable, and affordable services that also generate revenue sufficient for sustainable delivery. The achievement of these targets hinges on capacities of individuals, organizations and societies to transform to reach their development objectives. While financial resources, including external development assistance, are vital, they are not enough to promote sustainable human development. Without supportive laws, policies, strategies and procedures, well-functioning organizations, and educated and skilled people, utilities lack the foundation to plan, implement and review their local development strategies.

2. Capacity development is the process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time. To support this process effectively requires identifying what key capacities already exist and what additional capacities are needed to reach these objectives. This is the purpose of a capacity assessment. It is the analysis of desired capacities against existing which generates an understanding of capacity assets and needs from which a development program can be devised.

3. The process of WSS sector reform started in Uzbekistan in the late 1990's. The first steps were the decentralization of the water sector and transformation of water utilities into municipal enterprises. These actions were taken without the appropriate tariff and institutional reforms being in place. The old concept of water as a purely a social service was abolished, and the municipal water industry was expected to be a key player in the transition process to a market economy. At the same time, the government phased out direct subsidies to water utilities, which became self-financed companies. This "shock-therapy" reform appears to have largely failed, and more reforms are now urgently needed.

4. While the level of connection to water supply and sanitation remains high in the country, the actual quality of service provided is continuing to deteriorate, as is the condition of infrastructure in general. Failures in the distribution network are increasing in many places, while continuity of service is decreasing and the quality of drinking water remains low.

5.The deterioration of water quality that goes with a deteriorating infrastructure results in levels of water borne diseases remaining at significantly higher levels. In the country more than one-third of the population uses drinking water that does not meet hygiene standards. The deterioration of water services and associated impacts on public health and the environment are likely to accelerate in the future given that the rate of deterioration of the infrastructure is expected to worsen. This means that the situation could change significantly in a very short time; this should be borne in mind when analysing the figures provided in this report.

6. Reports and analysis by International Financing Institutions (IFI) on WSS point out that, the public utilities sector does not always meet requirements of modern infrastructure due to limited funds and institutional capacity. In particular, a government priority is "Strengthening institutional capacity of public utility companies in water supply and sanitation sector". The abilities of engineering and technical, financial and managerial personnel could be enhanced by intensive training programs and the provision of adequate information technology. Expected outcomes are far reaching and include best available technology solutions, more effective and stable operation, reduced energy consumption, significant improvement of commercial and technical practices of public utility companies.

7. Overarching goals are to improve level of services for existing consumers, expand services in line with requirements of municipal and other government objectives and meet consumer demand. Weak and inadequacy of institutional capacity of water supply and sanitation companies significantly impedes the development of the water supply and sanitation sector and works against ensuring their viability and sustainability. These shortcomings apply not only to provincial, District, and district water supply and sanitation companies, but also with Uzbek Communal Service Agency (UCSA), Interregional Trunk Main (IRTM) operators and relevant national and local authorities.

8. The main goal of this activity is initial assessment of current institutional structure and capacities of the Production Enterprises "Suvokova",Ltd of Karmana District (thereafter Karmana District Vodokanal) included into project area, and prepare programs of institutional and capacity development based on the ADB findings.

9. Main objectives of the initial assessment were to: i) identify role, responsibility, obligations, property rights, and legal obligations of all stakeholders; ii) review production objectives, schedules, monitoring and control systems as well as instruction requirements; iii) review current institutional capacity of vodokanal; iv) determine training needs for personnel and/or staff reorganization; v) ascertain needs for equipment and other supplies that influence productivity and develop a procurement action plan; vi) identify potential managers who can benefit from being included having a personnel development plan and ascertain needs for a training program for such staff; vii) identify potential trainers able to train their colleagues within an organization; viii) analyze current incentives schemes (if available) in vodokanal; ix) determine major drawbacks in performance of vodokanal, especially, in planning and management; x) ascertain water supply and sanitation tariff calculation and approval procedures;

B. Assessment of the Existing Institutional Capacity

10. **General Information.** Karmana District is located in northern part of Navoi Oblast**.** With a population of 101170 people, of which 78,980 are supplied with potable water; rate of drinking water availability is 78.1 %, water consumption amounts to 55 liter/day per capita. The district centre is Karmana Town with a population of 23,036 people. Most buildings are one-storey structures; 21,576 people (94%) are connected to water supply system. Water consumption amounts to 46 l/day per capita.

11. **Legal Status:** Karmana District VodokanalKarmana District Vodokanal is a Limited Liability Company and 51 % of its property belongs to the Navoi Oblast Branch of the State Property Committee. Full legal title is the Production Enterprise "Suvokava" of Karmana District, Ltd. It was established in line with RCM No. 97, 26 March 2002 and Order of the Navoi Oblast Branch of State Property Committee No. 58 March 4, 2004. Based on the Minute of general meeting of the Karmana District Vodokanal of September 2005, the Charter of the Vodokanal was developed and registered by Khokimiyat of Karmana District in April 22, 2005, with register No: 4/76. The Company's legal address is: 7, Tashkent Street, Karman District, Navoi Oblast, Uzbekistan

12. As indicated in the Charter the Karmana Karmana District VodokanalKarmana District Vodokanalis an independent company so that government authorities and its agencies have no right to interfere in its activities. The Company is considered as an independent economic entity whose purpose is to maintain water supply pipelines and facilities and to supply potable water to consumers.

13. Population of Karmana District also consume potable water from the water supply system of the Navoi Mining and Smelting Plant at the rate of3.28 thousand m^3 per day and from Damkoja Interregional Trunk Mains at the rate of 0.82 thousand m^3 per day. Quality of potable water in Karmana District is same as in Navoi.

Figure 1. View of Karmana District

14. **Main role and obligation**: Main role of Karmana District Vodokanal is to acquire, prepare, supply, distribute, and supply potable water to consumers. Their main obligation Karmana District Vodokanalis to supply potable water to populations, businesses, and organizations and generate income by means of collecting service fees.

15. In 2008, Karmana District Karmana District Vodokanaltook water from external suppliers and pumped 1183.8 thousand m^3 of potable water and distributed 1094.4 thousand m^3 of water to all consumers, while losses and wastage totalled 89.4 thousand m^3 of water or 7.6 % of the total water.

16. Total balance sheet value of water pipeline networks and facilities amounts to 18361.0 thousand Uzbek sums. In 2008, receipts from water sold totalled 150475.8 thousand sums, expenses amounted to 138436.8 thousand sums (incomes and expenses data)

17. Karmana District Vodokanal report periodically to the following organizations about their production and economic operations:

- Hokimiyat of Karmana district (reports, information notes, information regarding various spheres of activity);
- Navoi Oblast Branch of State Property Committee (annual reports, minutes of stakeholders meeting, annual information about allocation dividends, etc.)
- District Tax Committees (balance sheets, financial and economic activity statements);
- District Sanitary and Epidemiology Stations (water quality test results, sanitary condition of installations and facilities);
- District State Committee for Nature Protection (on completion of nature protection measures at installations and facilities);

- District State Statistics Committee (reports about water conduit and piped water supply structure performance reports (statistical reporting forms TP-1 -Vodhoz, and Form 1 water supply);
- Local offices of the Ministry for Emergency Situations (reports on completion of protection, safety, and safekeeping measures at water supply installations in emergency situations);
- Local Branches of State Technical Boiler Inspection, Trade Union and Fire Safety Department (reports on completing labour protection and occupational safety measures as well as fire safety instructions at jurisdictional installations and facilities);
- Navoi Oblast Vodokanal (information notes and information regarding different activities);
- Provincial Department of Finance (estimates of calculation of production costs to declare potable water tariffs for potable water supply and wastewater management services).

18. Management structure of Karmana District Karmana District Vodokanalis shown in Figure 2 below.

Figure 2 Management Structure of Vodokanal Karmana District

19. According to staff list, Karmana District VodokanalKarmana District Vodokanal has 30 employees, but the actual number of staff is 28 employees. District Vodokanal managerial staff consists of 4 persons. Manager – Umarov M.S. (tel:(8-436) 532-16-68), Chief Engineer– Abdullaev I.A., Chief Accountant-Yuldasheva D.B.

20**.** In the Karmana District Vodokanal garage there are two tractors with trailers (manufactured in 1983 and 1984), they are wholly deteriorated, out of order and are to be written off. Karmana District Vodokanal use one computer and a printer. Managers of Vodokanal have to use their personal cars for official travel. Practically all office premises need to be completely renovated; all the available furniture also needs replacement.

21. Buildings and manufacturing facilities of Karmana District Vodokanal need reconstruction and capital repairs; normal working conditions are absent; no changing rooms, shower rooms, rest-rooms, canteens etc.

22. In the company, management staff are mainly skilled employees with long experience of working for this institution. Employee salaries are at level of the average rate fixed for Uzbekistan. There are no young specialists in the management team of the vodokanal so there is no continuity planning or career development.

23. Although Karmana District Vodokanal also has skilled and qualified specialists with long experience; they do not have teaching skills. the believe that it is best to arrange training at the UCSA's Training Courses Centre.

24. The average salary of Karmana District Vodokanal staff is at level of the average monthly wage fixed in the country, which amounts to 240-300 thousand sums a month. Vodokanal employees are not paid bonuses or rewards. Some employees who collect ferrous metal scrap are paid one additional salary, if they bring the planned amount. No reimbursements for transportation or meals are provided.

25. As of today, managers, key specialist and operators of Karmana District Vodokanal require intensive training courses to master advanced skills and methods of operation and maintenance water supply mains and facilities.

26. Major drawbacks in Karmana District Vodokanal planning and management are as follows:

- Despite the independant, commercial status of company, managers and other employees are persistently distracted to take part in various public activities (wheat and cotton harvesting etc);
- Lack of uniform standards of planning, reporting, monitoring and control;
- Decision-making about tariffs is tied to choice or local socioeconomic indicators inconsistent with actual expenses of the Vodokanal. Consequently Vodokanal is on the verge of financial collapse;
- Lack of performance indicators and incentives scheme to boost effectiveness and improve performance.
- Lack of adequate computer and IT skills and experience.
- Lack of a minimal set of vehicles and mechanisms for maintenance, repair and servicing water supply pipelines and facilities;
- Employees responsible for production planning have not received career development training in a long time.

27. The procedure for tariff setting and approval for water supply and wastewater management service at the Karmana District Vodokanal is similar to that of other provincial and District vodokanals. So that Karmana District Vodokanal submits calculation of tariffs to Navoi Oblast Department of Finance. Subsequently, the Department of Finance upon verification and adjustments presents them as statement of increases in tariffs to the Ministry of Finance of Uzbekistan for consideration. Newly introduced tariffs are processed as a register approved by MOF letter and registered with Navoi Oblast Department of Finance.

To declare service tariffs for a planned period, Karmana District Vodokanal submits the same list of calculation to Provincial Department of Finance. Current tariffs of Karman District Vodokanal on water supply and sanitation services were approved on 16 March 2009 (Register No: TM-04-2009) and came into force on 1 April 2009; the following tariffs were fixed:

- water supply for population	1 m^3	- 66,0 sums;
- water supply for budget-funded organizations	1 m^3	- 396,0 sums(without VAT);
- water supply for other organizations	1 m^3	- 396,0 sums(without VAT)

28. The tariff setting procedures are inadequate and negatively affecting sector investment. Local authorities are responsible for the provision of water supply services, but the control of tariff setting resides with central government - MOF. This institutional set-up may pose further obstacles for adequate and transparent tariff setting, given the potentially divergent (political) interests of municipalities and central government. Rules and procedures for tariff setting remain poorly developed. As a consequence tariff setting is perceived as unpredictable and as lacking transparency, and prone to politically motivated decisions rather than sound economic sector management; this is a major impediment to sector investment.

29. Current tariffs do not reflect the real cost of the services provided and fail to cover not only future investment, but in many cases operational costs. This delay in reforms becomes costly for the sector and for society when accounts receivable and payable to the sector reached the level that may destroy the financial balance of the vodokanal. Another problem is that water supply system of Karmana was built in 1960. The operation time of water infrastructure is 30 years. As proper maintenance and operation was not possible during the last 10 to15 years, a substantial portion of the facilities and network is in poor condition. The failure in the system is already ten times higher than in developed countries, and this gap is progressively widening. Without timely reform actions, local governments may soon need enormous investment funds to replace existing facilities, and most of that demand will occur at once.

30. As a reaction to the stringent economic situation, lack of funds and low ability of consumers to pay the vodokanal reduced their operational costs by *reducing necessary* maintenance, e.g., reduced level of operation and service and insufficient treatment of discharges. The result of such a practice is rapid deterioration of the network and equipment and increased leakage and waste of water resources.

36. Under the current institutional setting and as a local government operator, the vodokanal has little incentive for efficient operation. An arbitrary set of bonuses and penalties provides weak motivation for efficient work. This makes the regulation process artificial or overloaded by the popular agenda of the owner, especially when the tariff and investment decision process is linked to the election cycle or macroeconomic performance of the government.

C. Conclusions:

38. Water supply system of Karmana town is worn out and requires almost full rehabilitation and renewal. Providing high quality potable water, improvement life and health of population remains main objective of the local government, but the sector is facing with many problems: worn-out infrastructure, outdated development and planning of the field, standards not fitting to requirements of the time, limited financial resources and weak institutional structure and capacities.

39. Solutions to the long-term problems and demands of the sector include: i) strategic planning, managing financial resources and determining priority of spending; ii) selection, training and allocation of managerial staff; iii) monitoring activities of rural district vodokanals; iv) expanding involvement of private sector and introduction of public private partnership in this sector; v) introduction of fair and transparent tariff policy; vi) development technical equipment and information technology and many others continue lack proper attention.

40. During the assessment PPTA identified that managers and key specialists of vodokanal have little possibility of regular instruction or training, and exchange of valuable experience. The vodokanal has outdated employee job descriptions, equipment and facility operational and maintenance guidelines, schedule and log books of regular inspections, technical service and repairs of material parts are lacking.

41. In the Vodokanal record keeping and technical documentation are done carelessly. There is no established system of filing, storing archive documentation, or proper usage of Information Technology. There is no reliable database; proper registration of water consumers and sewerage system users is missing. Although, the vodokanal present a lot of data and information to different authorities, very little of them is reliable or represents the real situation. The practice of presenting “good news” instead of accurate and precise data is widespread.

42. The vodokanal's activity is not focussed on the satisfaction of service consumers needs.. Public awareness and customer care services do not exist. There is no established order of correct estimation production, consumption, leakage and wasteful losses of water. Weakness (lack) of institutional capacity in the vodokanal is main obstacle for WSS development and and sustainability of the company.

43. Tariff setting and approval procedure are not adequate and in reality ignore actual expenditures of the vodokanal. The company continue to be loss-making because it routinely overspends and prevailing tariff rules do not allow actual cost recovery, which would include costs capital investments. Furthermore, tariff structures do not encourage the company in terms of cost reduction or resource conservation. There is little incentive for company to become efficient, and/or reduce costs because it will be penalized for under spending (cost savings) as tariff level are based on cost assumptions rather than actual cost.

44. Poor commercial performance leaves the company with severe cash shortages. Many consumers are not registered, and are not billed, many who are registered and billed do not pay on time, which leads to defaults on rapidly accumulating taxes and electricity. As above vodokanal receives ~ 75 % potable water from the water supply system of the Navoi Mining and Smelting Plant and 25 % water from Damkoja Interregional Trunk Mains, but cost of water from the Navoi Mining and Smelting Plant is nearly twice the price of water from Interregional trunk mains. This , leaves it little funds to operate and maintain the assets or to pay salaries. This situation does not allow the Vodokanal to pay rewards or bounces or to pay wages on regularly manner.

45. Reliable information that is essential for improving the company's performance is unavailable due to lack of equipment (district and consumer meters, laboratory equipment, etc) or lack of staff trained to carry out analysis and measurements. Consumer satisfaction survey has not been done, consumer complaints are rarely registered, and complaint response times are not measured. The few existing performance targets derived from "technical norms" that were largely defined in the Soviet era, hence stringent, difficult to measure, and unrealistic

46. Karmana District Vodokanal needs equipping with tools for repair and servicing of their facilities, communication, enhancemed Information Technology . During assessment the quantity of equipment required needed for enhancement of vodokanal's performance was determined

D. Recommendations:

47. Suggested actions for institutional and capacity building reform at central and regional government levels:

i) **Establish central coordination for water supply system**: Government could establish or appoint responsible agency to carry out WSS sector reforms. The Agency should also be given sufficient budget to coordinate and supervise sector reform tasks, namely performance monitoring, investment planning and a series of actions to achieve financial viability for water supply and sanitation service providers, involving private sector and private public partnership in the sector. Because many of problems the local vodokanals have are common, it would be sensible to have a central agency to develop standard forms of contracts, manuals, guidance and other operational documentation. The Agency should be given responsibility to coordinate activities of local vodokanals, collect information, conduct reliability and quality control, provide intensive training and technical assistance, and share good practice and lessons learned.

ii) **Establish a performance monitoring system:** The agency should focus first on launching a performance monitoring system by selecting and defining key performance indicators (benchmarking system) on WSS sector, collecting baseline data and monitoring the

progress/impact of reform. Technical assistance, training, and incentives may be given to the water supply and sanitation service providers to provide accurate and reliable information.

iii) **Establish central funding:** Government could establish WSS sector reform to pool central and regional government's budgets and International Financial Institutions loans and grants for technical assistance and investment financing. The Fund would be allocated in a competitive manner. Fund would initially provide financing for implementing interregional computerized information gathering system (e.g. performance monitoring systems, commercial information systems, network information systems, etc) and medium-term capital investment planning. Because of scarcity of funding, the Government may consider selecting pilot regions or cluster of regions to boosting reforms on WSS sector.

iv) **Strengthening WSS sector regulatory and supervisory institutions.** The strengthening regulatory and supervisory capacity at all level of service providers and government institutions is crucial for WSS sector. UCSA can be strengthened to provide more proactive and effective support to reform efforts on regional and local levels of WSS system. Regional vodokanals may improve their capacity to monitor and facilitate municipal WSS service provider performance, especially coverage population with water supply, access of population to sanitation, rate of unaccounted-for-water, leakage, quality of services and consumer satisfaction. Regional vodokanals could support a public awareness campaign and increase consumer awareness about the benefits of timely tariff payments and resource conservation. Regional Financial Departments and Regional Branches of the Anti-monopoly State Committee could be strengthened and also be authorized to review and approve tariffs for municipal natural monopoly companies such as WSS service providers.

v) **Strengthen legal and regulatory framework.** Despite some developments in the legal basis of the regulatory framework for key elements of WSS sector services. However, their implementation has been patchy, because the detailed regulations and procedure are either not written, or when they are written, not well understood by service providers and even the regulators, or are simply not well designed. The Government should review these regulations and rules with the assistance of international and regional experts to make them more transparent, simple and understandable.

vi) **Promote exchange of information, experience, and tools.** The Agency, with assistance of regional vodokanals, may share local and international good practice lessons, including specific methods and tools. Some topics and tools may include loss-reducing programs, energy optimization, and monitoring and control water consumption, commercial performance improvements (bill collection, incentive programs), computerized information systems (commercial, accounting, network information models, etc), and financial projection/simulation models.

48. For purpose Institutional strengthening and capacity building for the Karmana District Vodokanal it is recommended that an intensive exercise and training program for managerial and operational personnel be implemented. Recommended training course specifications for managerial and key personnel of Bukhara District Vodokanal and its cost estimates are given in Table 2, 3 and 4 below:

Table 2. Recommended training courses for managerial and key personnel of Karmana District Vodokanal

Group/ Course	Specification of courses	Managerial and key personnel
1	**Business & Investments Planning**	
1a	Business Planning	Manager and Economist
1b	Tariff Setting	Economist and Chief Accountant
1c	Assets Management	Economist and Chief Accountant
1d	Financial Management	Economist and Chief Accountant
1e	ADB Loan and grant applications, polices and procedure	Manager and Economist
2	**Management**	
2a	People Management/Decision Making, Leadership and Motivation	Manager

Group/ Course	Specification of courses	Managerial and key personnel
2b	Risk Management	Manager
2c	Performance targets, monitoring and control. Management Information systems	Manager and Economist
2d	Presentation and Report writing	Chief Engineer
3	**Commercial**	
3a	Billing and Collection, water balance-Commercial losses	Manager and Economist
3b	Accounting to International Standards	Water quality control specialist
3c	Customer relations	Manager
4	**Operations**	
4a	Energy Optimization, Monitoring and control of energy consumption	Chief Engineer
4b	Water supply management (demand, leakage, metering)	Chief Engineer
4c	Monitoring and control quality of water	Water quality control specialist
5	**Human Resources Management and Development**	
5	Human Resources. Staff training, Recruitment process	Human resources specialist

Table 3. Recommended training courses for Operational personnel of Vodokanal Karmana District

Group/ Course	Specification of courses	Operational personnel
3	**Potable Water Treatment Operations**	
	Energy Optimization, Monitoring and control of energy consumption	Chief Engineer
	Arrangement emergency works on water supply system	Chief Engineer
	Water pumps, gates, valves, and metering control operations	Chief Engineer
	Arrangement water reservoirs, mains and equip. O&M works	Chief Engineer
	Package of O&M documentations (logs, guidance, manuals)	Chief Engineer
	Basic water quality testing operations	Chief Engineer
	Labor Protection and safety technique on WWTP	Chief Engineer
	Safety handling with chlorine and other chemicals	Chief Engineer
4	**Vehicles and motor equipment fleet operations**	
	O&M Vehicles and Motor Fleet	Chief Engineer
	Labor Protection and safety technique on WWTP	Chief Engineer
	Safety handling with chlorine and other chemicals	Chief Engineer

Table 4: Cost estimates for Implementing Training Program for Managerial and Operational Personnel of Karmana District Vodokanal

No	Training Courses Topics	Number of attendants	Cost per Unit (US$)	Total Cost (US$)
1	Business & Investments Planning	4	215	860.0
2	Management	3	215	645.0
3	Commercial	3	215	645.0
4	Common operations	3	215	645.0
5	Human resources development	2	215	430.0
6	Potable Water Treatment Operations	4	220	880.0
7	Vehicles and motor equipment fleet operations	2	220	440.0
	Total		**USD**	**4 545.0**

49. For strengthening institutional capacity and upgrading technical performance the Karmana District Vodokanal requires additional vehicles and equipment. Recommended types and number of vehicles and equipments required for Karmana District Vodokanal and cost estimates are given in Table 5 and 6 below:

Table 5. A List of Vehicles and Equipments Required for Karmana District Vodokanal

No.	Name	Tentative Specification Parameters	Quantity
A. Vehicles:			
1	Light care	Engine volume 1,200-1,500 cm^3	1
2	Minibus for Employees	With number of seats 10-12	1
3	Lorry	With payload approximately 4 – 5 ton	1
4	Vehicle for repair networks	On a medium truck chassis	1
5	Vacuum cesspool truck	Tank capacity 3.0 m^3	1
6	Water Trucks	With volume of water tank 6,0 – 8,0m3	1
7	Auto crane	Lifting capacity up to 8 tons	1
B. Mechanisms:			
8	Wheeled Excavator	With bucket 0,25 m3	1
9	Mobile Water Pump	Similar to "Andizhanets" pump	2
10	Welding Device (mobile)	Similar to ASD (asynchronized synchronous motor) device	2
11	Trailer with Tractor	Similar to T28x4	1
C. Computers and Office Equipment:			
12	Personal Computer	Desktop with Monitor 17"	3
13	Office Printer	Analog of LaserJet 1100 or 1200	2
14	Copier	Analog of Canon 6317	1
15	Fax Machine	Analog of Panasonic Plan Paper Fax	1
16	Telephone Set	Digital type	2
17	Desk Set	For Managerial personnel	2
18	Desks	For office personnel	4
19	Chairs	For office personnel	12
20	Book Stacks	For storing and keeping files of Documents	5

Table 6 Cost estimates of Required Vehicles and Equipment for Strengthening Capacity of Karmana vodokanal

No	Training Courses Topics	Required Number	Cost per Unit (US$)	Cost of spare parts for 3 year (+ 10%)	Total Cost (US$)
Vehicles and Equipments					
1	Light care	1	9 500.0	95.0	9595.00
2	Minibus for Employees	1	16 500.0	165.0	16665.00
3	Lorry	1	25 000.0	250.0	25250.00
4	Vehicle for repair networks	1	120 000.0	1200.0	121200.00
5	Vacuum cesspool truck	1	90 000.0	900.0	90900.00
6	Water Trucks	1	60 000.0	600.0	60600.00
7	Auto crane	1	90 000.0	900.0	90900.00
8	Wheeled Excavator	1	45 000.0	450.0	45450.00
9	Mobile Water Pump	1	2 800.0	280.0	3080.00
10	Welding Device (mobile)	1	8 000.0	800.0	8080.00
11	Trailer with Tractor	1	30 000.0	300.0	3030.00
Computer and office equipments					
12	Personal Computer	3	500.0		1500.00
13	Office Printer	2	260.0		520.00
14	Copier	1	260.0		260.00
15	Fax Machine	1	350.0		350.00
16	Telephone Set	2	50.0		100.00
17	Manger desk set	2	1 200.0		2400.00
18	Desks	4	120.0		480.00
19	Chairs	12	60.0		720.00
20	Book Stacks	5	120.0		600.00

No	Training Courses Topics	Required Number	Cost per Unit (US$)	Cost of spare parts for 3 year (+ 10%)	Total Cost (US$)
21	Contengences				1000.00
	TOTAL				**481 680.00**

37. For reconstruction and capital repairs to office and ancillary buildings of the vodokanal and installation of basic working conditions for its managerial and operational personnel it is needed to allocate some finances means and include in the project these works. Initial cost estimation for renovation and repair buildings and premises of the vodokanal is **30 000.0 USD**.

Table 7. Summary of Costs For the Capacity Building Program for Karmana District Vodokanal

Type of Capacity Building Measures	US$
Training of Managerial and Operational Personnel	4 545.0
Procurement vehicles, computer and office equipments	481 680.00
Renovation and repair works on office building	30 000.00
TOTAL	**516 225.00**

Annexes and Photos

Annex 1

LIST

Managers and Key Specialists of Karmana City Vodokanal interviewed by the Consultant

1. Manager of Karmana Vodokanal – Umarov Muzafffar Sharopovich
2. Chief Accountant of Karmana Vodokanal – Yuldasheva Dilnovoz Burievna;
2. Chief Economist of Karmana Vodokanal – Juliyev Akmal Jurakulovich;

Photo 1. Entrance gate to the Karmana District Vodokanal territory

Photo 2. Office and ancillary buildings of the Karmana District Vodokanal

Photo 3. Office building of the Karmana District Vodokanal

Photo 3. Entrance to office building of the Karmana District Vodokanal

APPENDIX 8: ECONOMIC & FINANCIAL ANALYSIS

Introduction

1. This financial and economic analysis was undertaken for Karmana sample subproject of Tranche 1 investment. The financial analysis consists of two parts: (i) determination of appropriate water tariffs for the subproject, and (ii) preparation and assessment of financial projections for the subproject entity. The projections consist of annual financial statements (income statement, sources and applications of funds statement, balance sheet), key performance indicators, and operating and financial data for the 2010–2020 period.

2. **Financial Objectives.** The proposed tariff rates for the subproject were designed to (i) fully recover operation and maintenance (O&M) costs and (ii) recover all subproject debt service, and (iii) generate a financial internal rate of return (FIRR) greater than the weighted average cost of capital (WACC), wherever feasible.

3. **Operating Revenues.** Operating revenues include water sales payment for waste water. Future water sales were calculated on the basis of water demand and projected water tariff levels.

4. **Operating Expenses.** Annual O&M costs were projected separately for each subproject over the entire forecast period by major expense item (salary, electricity, chemicals, maintenance, social charges, selling and administration expenses). Depreciation allowance was calculated on an average asset life of 20 years using the straight-line method. Income tax was assumed to be 10% plus 8% infrastructure development tax.

B. Financial Performance of Karmana Vodokanal

5. Karmana Vodokanal is located in Navoi province and serves about 24 thousand people. Karmana Vodokanal purchases 80% of its volume from Navoi Mining Plant at Sum 75 (net of VAT) and 20% of the volume from Damkhodja IRTM at Sum 36 (net of VAT) and sells the water at weighted average tariff Sum 160. Cost of purchased water makes up about 44% of O&M costs. 50% of O&M costs comprise labor costs. Electricity costs are very low as sometimes pumps either do not function or electricity is supplied 3-4 hours a day, and water is supplied by gravity through pipes.

6. Vodokanal's net sales increased steadily from 2006 to 2008 and Vodokanal generated net income in 2006 and 2007. In 2008 Gross Profit Margin ratio decreased significantly due to increase of cost of purchased water and Vodokanal's income amounted to almost zero. Current ratio is higher than 1, however quick ratios ranged from 0.04 to 0.12.

Table 1: Karmana Vodokanal - Financial Highlights

Sum' 000

Description	2006	2007	2008	2009 II-QTR
Net Sales	111 607	127 760	135 049	80 345
Operating Expenses	(95 695)	(115 465)	(131 185)	(76 519)
Other Operating Revenue	-	-	-	-
Operating Income (Loss)	15 913	12 295	3 864	3 825
Non-operating items	(13 355)	(12 046)	(3 863)	(3 825)

Net Income	2 558	249	1	0
Cash and Cash Equivalent	1 622	995	1 083	3 994
Current Assets	23 108	57 626	63 423	70 739
Current Liabilities	13 677	16 447	27 770	46 951
Total Equity	12 955	14 624	18 191	18 191
Total Assets	27 461	65 168	73 691	80 505
Current ratio	1.69	3.50	2.28	1.51
Quick ratio	0.12	0.06	0.04	0.09
ROA	9.31%	0.38%	0.00%	0.00%
ROE	19.74%	1.70%	0.01%	0.00%
Gross profit margin	31.8%	24.7%	19.4%	19.5%
Operating expense ratio	85.7%	90.4%	97.1%	95.2%
Accounts Receivable Turnover in Days (customers)		29.10	40.28	39.80
Accounts Payable Turnover in Days (suppliers)		27.37	46.64	77.65

C. Benefit-cost analysis

7. Benefit-cost analysis for the subproject was undertaken to determine subproject economic and financial viability. The main viability parameters used are the BCR, EIRR and ENPV for economic analysis, and FIRR and FNPV for financial analysis. The proposed subproject is economically viable if the resulting BCR is greater than 1.0, EIRR exceeds the economic opportunity cost of capital EOCC at 12%, and ENPV is positive. Similarly, the subproject is financially viable if FIRR is greater than the weighted average cost of capital WACC at 3.3%, and FNPV is positive. In the economic analysis, the quantifiable benefits related to incremental and non-incremental water that result into resource cost savings were compared with capital and O&M costs that have been converted from financial costs using shadow pricing and after elimination of transfer payments. The resulting cash flows were discounted at the EOCC. In the financial analysis, net revenues were compared with capital and O&M costs and the resulting net cash flows were discounted at the WACC. The subprojects were subjected to sensitivity analysis to assess the effects of adverse circumstances on viability. The sensitivity scenarios for the economic and financial analyses include: a 20% increase in capital cost, a 20% increase in O&M cost, a 20% decrease in benefit (revenues)

.

8. The results of the analysis show that the subproject is economically viable with BCR at 1.03. EIRR is calculated at 12.6% and an ENPV of Sum 177 million for the base case. The subproject is also found financially viable with FIRR at 4.7% and an FNPV of SUM 1 357 million. Economic and financial sensitivity scenarios showed that the subproject is the most sensitive to reduction of benefits (revenue). Under other scenarios the subproject remained relatively robust. The combined results are given in Table 2.

Table 2: Summary Economic and Financial Analysis Results

Particulars	Change	EIRR	ENPV	EIRR SV	FIRR	FNPV	FIRR SV
Base Case		12.6%	177		4.7%	1 357	
Investment Cost	+20%	10.0%	(715)	5%	3.7%	370	27%
O&M Cost	+20%	11.9%	(38)	16%	3.9%	558	35%
Benefit (Revenues)	-20%	8.7%	(965)	3%	2.4%	(808)	12%
Implementation	1 yr delay	10.7%	(455)	3%	4.0%	684	6%

SV = Switching Value

D. Average Incremental Cost and Cost Recovery

9. In assessing the appropriate water charge to attain the required level of cost recovery, both average economic and financial incremental costs were calculated. AIC is an approximation of long term marginal costs and AIEC is the appropriate target for tariff setting. Subproject AIEC and AIFC are at Sum 593 and Sum 735 respectively.

10. Karmana Vodokanal is projected to generate net income starting from 2018 and positive net cash flow starting from 2015. Consequently, Return on Net Fixed Assets will be positive in 2018 only and will range from 2.9% to 14.1% from 2018 to 2020. DSR will be greater than 1.2 starting from 2015.

E. Tariff affordability

11. The viability of subproject operation ultimately depends on household capacity to pay for their monthly water dues. As the project aims to extend water service to the poor within the community served by the vodokanals the proposed tariff was tested against the average income of the low-income household. The affordability analysis shows that the proposed tariffs will result to a percentage of monthly bill to household income at 0.3 to 3.4 during the projection period for families belonging to the low-income group.

F. Financial Management Assessment of Karmana Vodokanal

12. Karmana Vodokanal's current financial management system is adequate to (i) record required financial transactions and balances, (ii) provide regular and reliable financial statements and monitoring reports during project implementation. Institutional Strengthening and Capacity Development components under this project will devise standard reporting system for vodokanals.

13. The following findings and observations were prepared based on interviews and consultations with Karmana Vodokanal during the Water Supply And Sanitation Services Improvement Program (WSSSIP) preparation.

14. Karmana Vodokanal is 51% State owned and 49% owned by 6 serving staff members.

15. **Staffing.** Vodokanal is run by an establishment of 30 staff while the finance staff consists of one Chief Accountant who manages all financial recording and reporting. Within the organization there is a Chief Controller, with 11 staff, who are responsible for meter reading, bill delivery, and debt collection. The Chief Controller oversees their work.

16. **Accounting Policies and Procedures.** Vodokanal does not have any established accounting policy and all accounting transactions and reporting are guided by National Accounting Standards and local legislation.

17. **Budgeting System.** Vodokanal prepares its budgets on quarterly basis. Budgets are produced at summary level for the entity. Actual expenditures reports are produced quarterly and compare budgeted and actual results. These reports are submitted to provincial governments.

18. **Payments**. Payment control is exercised by the requirement for two signatories per cheque. The signatories are the Director and the Chief Accountant.

19. **Cash and Bank.** A manual cash book is maintained and recording is up to date. A daily check is made between the bank statement and bank deposit slips but as the bills are produced manually the system is open to abuse.

20. **Safeguard over Assets**. Vodokanal maintains asset records, but these records are considered inadequate for control purposes. The assets are not insured.

21. **Internal Audit.** Vodokanal does not have an established internal audit unit.

22. **External Audit**. Financial reports are audited by an external auditors on annual basis.

23. **Reporting and Monitoring.** Vodokanal prepares its financial reports under Uzbekistan National Accounting Standards. Financial statements are prepared monthly, quarterly and annually. Financial recording is done using a manual system. Spreadsheets, using MS Excel, are used to produce the final accounts.

24. **Information Systems.** Vodokanal does not have any computerized MIS. Vodokanal uses a spreadsheet computer program to prepare its reports.

Projected Financial Statements, FIRR and Sensitivity Analysis for Subproject
(Sum million, current prices)

Table 3: Key Performance Indicators

	Projected										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Operating Data											
Water Sold	1.42	1.42	1.42	2.93	3.73	4.03	4.06	4.09	4.12	4.16	4.19
Population Served (Thousand)	24.59	24.79	25.00	25.20	25.40	27.27	27.49	27.71	27.94	28.16	28.38
Actual Water Production (1000 m3/d)	3.56	3.56	3.56	4.89	5.33	5.75	5.80	5.84	5.89	5.94	5.99
Non Revenue Water (%)	60%	60%	60%	40%	30%	30%	30%	30%	30%	30%	30%
Water Consumption (lpcd)	96	96	96	146	146	146	146	146	146	146	146
Average Tariffs (Sum/m3 - current prices)											
Expressed on Basis of Water Consumed:											
Accrual Basis	173.01	210.35	255.76	264.18	322.30	393.20	479.71	585.24	714.00	871.08	1 062.71
Cash Basis	69.43	87.25	109.53	164.77	253.80	317.97	388.03	473.51	577.83	705.13	860.46
Cost Recovery & Profitability											
Operating Ratio (%)	212%	183%	321%	244%	179%	141%	120%	102%	87%	74%	64%
Working Ratio (%)	211%	182%	157%	118%	97%	81%	71%	62%	54%	48%	42%
Return on Equity	472.6%	-27.2%	-35.4%	-54.0%	-121.2%	1413.9%	75.0%	20.1%	-16.8%	-91.0%	490.1%
Collection Performance											
Average Collection Performance (%)	86%	89%	93%	93%	93%	95%	95%	95%	95%	95%	95%
Accounts Receivable (Days Worth of	53	55	55	55	55	55	55	55	60	60	60
Cost Efficiency & Effectiveness (Sum/m3 - current prices)											
Cash O&M	0.13	0.14	0.15	0.17	0.20	0.21	0.23	0.24	0.26	0.28	0.30
Depreciation Expense	0.00	0.00	0.16	0.19	0.17	0.16	0.16	0.16	0.16	0.15	0.15
Liquidity & Cash Flow											
Cash (Days Worth of Cash O&M)	(118)	(209)	(347)	(342)	(344)	(297)	(202)	(34)	49	223	505
Cash (Days Worth of Cash Obligation	(118)	(209)	(347)	(342)	(344)	(297)	(202)	(34)	35	163	376
Current Ratio	(0.2)	(0.6)	(1.4)	(1.3)	(1.4)	(1.1)	(0.2)	0.7	1.2	2.2	4.0
Debt - Asset Ratio	0.86	0.81	0.84	0.89	0.95	1.01	1.05	1.06	1.05	1.01	0.91

Table 4: Projected Financial Statements

	Projected										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Income Statements											
Operating Revenue	77.3	97.8	123.5	263.6	409.3	551.5	678.3	834.3	1 026.0	1 261.7	1 551.5
Operating Expenses	163.1	178.2	194.1	309.9	396.1	444.9	479.3	517.0	558.4	604.2	654.8
Depreciation	0.9	0.9	202.5	332.2	334.8	334.8	334.8	334.8	334.8	334.8	334.8
Operating Income	(86.7)	(81.4)	(273.2)	(378.5)	(321.7)	(228.2)	(135.8)	(17.5)	132.8	322.8	561.9
Operating Subsidies	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Non-Operating Expenses	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest & Other Financial Expenses	0.0	0.0	0.0	0.0	64.4	64.4	64.4	64.4	63.0	85.5	81.7
Income Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Income	(86.7)	(81.4)	(273.2)	(378.5)	(386.1)	(292.6)	(200.2)	(81.9)	69.8	237.2	480.2
Cash Flow Statements											
Sources											
Internal Cash	(85.8)	(80.5)	(70.6)	(46.3)	13.1	106.6	199.0	317.3	467.6	657.6	896.8
Debt	54.8	3 174.4	2 082.9	53.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity Contributions	13.6	789.5	510.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	(17.4)	3 883.5	2 522.3	6.8	13.1	106.6	199.0	317.3	467.6	657.6	896.8
Applications											
Capital Investments	68.4	3 964.0	2 593.0	53.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Working Capital Increase (Decrease)	(44.5)	(31.1)	12.0	59.8	31.2	31.6	37.5	36.3	57.1	54.3	55.3
Interest	0.0	0.0	0.0	0.0	64.4	64.4	64.4	64.4	63.0	85.5	81.7
Debt Repayment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	223.5	223.5	223.5
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	23.9	3 932.9	2 604.9	112.9	95.6	96.0	101.8	100.7	343.7	363.4	360.6
Cash Changes	(41.2)	(49.3)	(82.6)	(106.1)	(82.5)	10.6	97.2	216.6	124.0	294.2	536.2
Ending Cash Balance	(52.6)	(101.9)	(184.5)	(290.6)	(373.1)	(362.5)	(265.3)	(48.7)	75.3	369.5	905.7
Balance Sheets											
Assets											
Current Assets	(13.5)	(56.3)	(132.4)	(153.6)	(192.1)	(148.2)	(22.3)	226.2	402.1	744.6	1 338.6
Net Fixed Assets	8.8	76.3	3 837.8	6 098.5	5 816.8	5 482.0	5 147.1	4 812.3	4 477.4	4 142.6	3 807.8
Work in Progress	68.4	3 964.0	2 593.0	53.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Assets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	63.7	3 984.0	6 298.4	5 998.0	5 624.7	5 333.7	5 124.8	5 038.5	4 879.5	4 887.2	5 146.3
Liabilities and Equity											
Current Liabilities	63.9	101.5	96.1	121.1	133.9	135.5	126.8	346.0	340.8	334.8	337.3
Long Term Debt	54.8	3 229.2	5 312.1	5 365.2	5 365.2	5 365.2	5 365.2	5 141.6	4 918.1	4 694.5	4 471.0
Equity	(54.9)	653.3	890.2	511.7	125.6	(167.0)	(367.2)	(449.1)	(379.4)	(142.1)	338.1
Total	63.7	3 984.0	6 298.4	5 998.0	5 624.7	5 333.7	5 124.8	5 038.5	4 879.5	4 887.2	5 146.3
Financial Ratios											
Cost Recovery Ratio	0.2	0.2	0.2	0.5	0.8	1.0	1.2	1.4	1.1	1.3	1.5
Debt Service Ratio	NA	NA	NA	NA	0.2	1.7	3.1	4.9	1.6	2.1	2.9
Debt - Asset Ratio	0.9	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.1	1.0	0.9

Table 5: FIRR and Sensitivity Analysis

Year	Revenue	Costs					Base Case	Capital	O & M	Revenue	1 Year Delay
		Capital	Capital Replacement	O & M	Residual Value	Total	Net	20%	20%	-20%	in Completion
2010	0.00	-0.06	0.00	0.00		-0.06	0.06	0.07	0.06	0.06	0.06
2011	0.00	3304.57	0.00	0.00		3304.57	-3304.57	-3965.48	-3304.57	-3304.57	-3304.57
2012	0.00	1996.88	0.00	0.00		1996.88	-1996.88	-2396.25	-1996.88	-1996.88	-1996.88
2013	68.23	37.88	0.00	83.77		121.65	-53.42	-61.00	-70.17	-67.07	-121.65
2014	103.22	0.00	0.00	123.72		123.72	-20.49	-20.49	-45.24	-41.14	-55.48
2015	150.34	0.00	0.00	136.90		136.90	13.43	13.43	-13.95	-16.63	-33.68
2016	178.42	0.00	0.00	140.53		140.53	37.90	37.90	9.79	2.21	9.81
2017	211.67	0.00	0.00	144.42		144.42	67.25	67.25	38.37	24.92	34.01
2018	251.00	0.00	0.00	148.62		148.62	102.38	102.38	72.65	52.18	63.05
2019	297.51	0.00	0.00	153.20		153.20	144.31	144.31	113.67	84.81	97.79
2020	352.51	0.00	0.00	158.19		158.19	194.33	194.33	162.69	123.82	139.33
2021	434.81	0.00	0.00	165.71		165.71	269.11	269.11	235.97	182.15	186.81
2022	535.29	0.00	0.00	212.37		212.37	322.93	322.93	280.45	215.87	222.45
2023	657.79	0.00	0.00	245.03		245.03	412.76	412.76	363.75	281.20	290.26
2024	806.95	0.00	0.00	277.40		277.40	529.55	529.55	474.07	368.16	380.39
2025	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	491.05
2026	988.34	0.00	266.96	315.90		582.86	405.48	405.48	342.30	207.81	405.48
2027	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2028	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2029	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2030	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2031	988.34	0.00	266.96	315.90		582.86	405.48	405.48	342.30	207.81	405.48
2032	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2033	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2034	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2035	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2036	988.34	0.00	266.96	315.90		582.86	405.48	405.48	342.30	207.81	405.48
2037	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2038	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2039	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2040	988.34	0.00	0.00	315.90		315.90	672.44	672.44	609.26	474.77	672.44
2041	988.34	0.00	266.96	315.90		582.86	405.48	405.48	342.30	207.81	405.48
2042	988.34	0.00	0.00	315.90	166.85	482.75	505.59	505.59	442.41	307.92	505.59
						FIRR	**4.7%**	**3.7%**	**3.9%**	**2.4%**	**4.0%**
WACC	**3.3%**					**NPV**	**1 357**	**370**	**558**	**(808)**	**684**
				Switching Value		**FIRR**		27%	35%	12%	6%
						FNPV		27%	34%	13%	6%

Summary Economic Analysis for Subproject

Table 6: Conversion of Financial Costs to Economic Costs

(SUM million - constant prices)

Particulars	Financial Costs	Conversion factor	Economic Costs
A. Capital Costs[/a]			
Traded componenets (SERF)	566	1.00	566
Non-traded compoments:			
Domestic M&E (SWRF)	5 076	1.00	5 076
Unskilled labour (SWRF)	170	0.80	136
Skilled labour (SERF)	19	1.00	19
Land acquisition (SERF)	0	1.00	0
Taxes and duties	735	0.00	0
Subtotal (A)	6 566		5 797
B. Operation and Maintenance Costs[/b]	130	0.95	124

/a Capital costs excluding IDC & replacements
/b O&M cost in 2014, year of full operation

Table 7: Economic Benefits Assumptions

Particulars	Values
Savings on collection cost	
Average collection time, hrs/mo.	20
Wage rate, SUM/hr	1 851
Collection cost, SUM/mo.	36 271
Collection cost, SUM/yr	435 256
% Actual benefit, SUM/yr	217 628
SWRF at 0.8	43 526
Benefit from collection savings, SUM/yr	174 102
Savings on storage cost	
Storage unit cost, SUM/yr	0
Unit financing cost, SUM/yr	0
Unit O&M cost, SUM/yr	0
Benefit from storage savings, SUM/yr	0
Savings on treatment cost	
Treatment cost of storage cost, SUM/yr	0
Total benefits from savings	174 102
Annual current water consumption, m3	181
Price of non-incremental water, SUM/m3	**964**
Price of incremental water and NTL, SUM/m3	**208**

Table 8: EIRR and Sensitivity Analysis

Year	Benefit	Economic Cost			Net Benefit (Cost)				
		Investmt	O&M	Total	Base Case	Investmt 20%	O&M 20%	Benefit -20%	1-yr Delay in Benefit
	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill
2008	0	59	0	59	(59)	(71)	(59)	(59)	(59)
2009	0	3 441	0	3 441	(3 441)	(4 129)	(3 441)	(3 441)	(3 441)
2010	517	2 251	0	2 251	(1 734)	(2 184)	(1 734)	(1 837)	(2 251)
2011	753	46	84	130	624	614	607	473	387
2012	934	0	124	124	810	810	786	624	630
2013	946	0	137	137	809	809	781	620	797
2014	947	0	141	141	806	806	778	617	805
2015	948	0	144	144	804	804	775	614	803
2016	950	0	149	149	801	801	771	611	800
2017	951	0	153	153	798	798	767	608	796
2018	952	0	158	158	794	794	762	604	793
2019	955	0	166	166	789	789	756	598	787
2020	958	0	212	212	745	745	703	554	743
2021	961	0	245	245	715	715	666	523	713
2022	963	0	277	277	686	686	630	493	683
2023	966	0	316	316	650	650	587	457	647
2024	966	98	316	414	553	533	489	359	553
2025	966	0	316	316	650	650	587	457	650
2026	966	0	316	316	650	650	587	457	650
2027	966	0	316	316	650	650	587	457	650
2028	966	0	316	316	650	650	587	457	650
2029	966	77	316	392	574	558	511	381	574
2030	966	0	316	316	650	650	587	457	650
2031	966	0	316	316	650	650	587	457	650
2032	966	0	316	316	650	650	587	457	650
2033	966	0	316	316	650	650	587	457	650
2034	966	60	316	376	590	578	527	397	590
2035	966	0	316	316	650	650	587	457	650
2036	966	0	316	316	650	650	587	457	650
2037	966	0	316	316	650	650	587	457	650
2038	966	0	316	316	650	650	587	457	650
2039	966	47	316	363	603	594	540	410	603
2040	966	181	316	497	469	433	406	276	469
		Discount Rate @ 12%		**EIRR**	12.6%	10.0%	11.9%	8.7%	10.7%
				ENPV	177	-715	-38	-965	-455
		Sensitivity Indicator		**EIRR**		22.2	6.1	34.0	30.1
				ENPV		25.2	6.1	32.3	32.3
		Switching Value		**EIRR**		5%	16%	3%	3%
				ENPV		4%	16%	3%	3%

APPENDIX 9: ENVIRONMENTAL ASSESSMENT

Map 1: Uzbekistan showing subproject location

Map2: Overview of the Karmana water distribution area

INTRODUCTION

Purpose of the Report and the Project Background

1. This report presents the findings of an initial environmental examination (IEE) of the proposed sub-project; i.e., the rehabilitation and upgrading of the water distribution system in Karmana City under TA 7240-UZB Water Supply and Sanitation Services. This is one of four proposed core subprojects that are representative of a multi-subproject Sector Project that is Tranche 1 of a Multi-tranche Financial Facility (MFF) Investment Program. The other three proposed sub-projects of Tranche 1 are Termez City Wastewater Treatment Facilities, Galaasiya City Water Supply System, and Damkhoja Water Supply System. The IEE was conducted during the subproject preparation period to identify the impacts of the proposed subproject on the environment and to recommend measures to mitigate adverse impacts arising from its implementation.

2. The proposed MMF Investment Program will improve access to safe, reliable, and sustainable water supply and sanitation (WSS) by about 3 million residents in several provincial capitals and district towns in about eight oblasts (provinces) in Uzbekistan. Through institutional strengthening and capacity development components in each subproject, the Investment Program will provide targeted assistance to Uzbekistan Communal Services Agency (UCSA), State Committee for De-monopolization and Supporting Competition and Entrepreneurship, local governments, and town level vodokanals (water supply companies), focusing on financial, managerial, and technical performance.

3. This subproject is designed to rehabilitate and improve the bulk supply import point from the Interregional Trunk Main (IRTM) and to replace the transmission main and distribution network. It is designed to cater for the total population of 23,086 in Karmana, of which 21,576 are currently connected to the water distribution network, by increasing the supply quantity and pressure and connecting all residents. Further, levels of service will be enhanced with reduced non revenue water (NRW) losses. On completion of the proposed improvement works, water supplies will become available to all existing customers and those who are presently not connected. The water quality will comply with Uzbekistan water quality standards.

4. In Uzbekistan, water sector developments are governed by the national list of priority investment projects (proposals) prepared for implementation with the involvement of international financial institutions and donor countries in accordance with Presidential Decree No 969 dated 02-10-2008. The proposed sub-project is one of the projects in the investment plan updated for 2009. The project will contribute to the Government's long-term program of providing Uzbekistan’s population with drinking water, which was approved by resolution of the Cabinet Ministry. Furthermore, this is also a priority project of the Government focusing on the elimination of existing water supply problems and improving the sanitation and epidemiological situation for 2009–2010 by Presidential Resolution No. 890 dated 10-06-2008 to provide rural population and cities with drinking water.

Extent of the IEE Study

5. The IEE study for the subproject was carried out by the Project Preparatory Technical Assistance (PPTA) Consultant, in accordance with the Environment Policy (2002) and

Environmental Assessment Guidelines (2003) of the Asian Development Bank (ADB) and relevant environmental policies and guidelines of the Government of Uzbekistan (GoU). Environmental Specialists of the PPTA consultants visited the subproject site and also carried out public consultations prior to preparation of this report. Moreover, information provided by consultants carrying out related feasibility studies[3] was used in this IEE. The IEE involved the following activities:

- gathering of baseline information available on the physical, chemical, biological, and socio-economic environment of the subproject area and subcomponent sites and understanding the technical, social, and institutional aspects of the subprojects;
- public consultation and field visits;
- screening of potential issues, concerns, and impacts relative to location, design, construction, and operation to distinguish those that are likely to be significant for a particular subcomponent and warranting further study;
- recommending measures to mitigate adverse issues, concerns, and impacts, particularly to the project design team;
- preparing an
- indicating impact areas, recommended mitigation measures, method of monitoring the impacts and responsible persons ; and
- proposing the institutional set-up for implementation of the EMP.

6. Findings of site reconnaissance, results of water quality tests and analyses, technical descriptions based on the engineering designs contained in the Draft Appraisal Reports, and outcomes of discussions with officers of the relevant agencies and the people are integrated in this IEE Report.

DESCRIPTION OF THE PROJECT

Type of Project

7. As noted, this is one subproject of a Multi-tranche Financial Facility Investment Program of which the first tranche is a Sector Project. This IEE is for one of four proposed core subprojects of the first tranche (Project 1) of the MFF.

8. The subproject will rehabilitate and extend the existing water supply network for Karmana to provide a reliable supply of potable water. It has three major inter-related components; namely, (i) water supply development, (ii) capacity development and institutional strengthening, and (iii), investment program management.

Environmental Category of Project

9. Based on a Rapid Environmental Assessment (REA) carried out by the PPTA Consultants, this sub-project is classified as a Category “B” project in accordance with the Environment Policy and Environmental Assessment Guidelines of the ADB. The adverse impacts that may arise from the implementation of all the components will generally be

[3] Appraisal Report Water Supply Appraisal Report Sub Project 3 Galaasiya City, June 2009, PPTA consultant. Prefeasibility study report - prepared by local design institute “O’zbekkomunalloyihaqurilish”.

minor; and mitigation measures can be provided and instituted without difficulty. The Environmental Policy of the ADB requires that Category "B" projects are subjected to an IEE.

10. The Uzbekistan law on Nature Protection was enabled in 1992 outlines the legal and institutional requirements for the conservation of the environment and the rational use of natural resources. The law empowers the State Committee for Nature Protection (Goskompriroda) as the agency responsible for implementing the law.

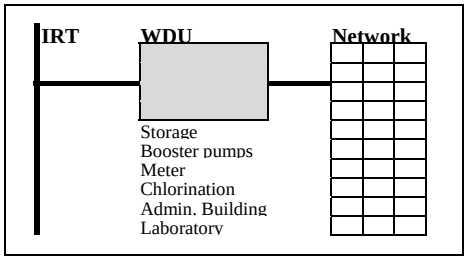
11. Preparation of the review reports and approval of projects on environmental grounds is regulated by the Decree of the Cabinet of Ministers No 491 dated 31.12.2001 - Approval of the Regulation of the State Environmental Expertise. This regulation stipulates four categories of projects. According to this regulation, the proposed subproject is a Category III project because the water supply facilities are limited to one province. Category III projects require the preparation of an Initial Environmental Assessment (IEA), which is similar to ADB's IEE. The Provincial Directorate for State Ecological Expertise (Gosecoexpertisa) under the provincial level of National Nature Protection Committee (Oblkompriroda) approves Category III projects. However, after considering the IEA report, the Oblkompriroda may request an Environmental Consequences Assessment (ECA) to be carried out before the project commences operation. There is no central National Protection Committee involvement.

12. The IEA and, if required, the ECA, will be prepared by the PPTA consultant in Uzbekistan Official Language for Government approval.

Need for Project

13. The Karmana City vodokanal is not able to cover the demand of the population's water consumption and water delivered doesn't comply with national standards for drinking water. The Karmana Water Distribution Unit (WDU-see schematic below) has the following problems:

- Due to low pressure at the import point, the feeder main connected to the distribution network can only provide limited (gravity) flow to the storage reservoir at the distribution unit
- The 250 m^3 storage reservoir leaks and is not in use
- The booster pump is not active
- No chlorination of the water is provided; consequently, the system relies on the chlorination at the Navoi Distribution Centre, which is located close to the Karmana water intake from the IRTM
- The Karmana import point has an old mechanical water meter, with questionable reliability
- The vodokanal is importing water from the Navoi Mining Plant at \$0.06/m^3 and selling at \$0.04/m^3
- The IRTM supply is scheduled for 2 hours every 2 days



14. Problems related to transmission and distribution network are:

- A total of 70% (103.5km) of the distribution network consist of 43 years old unlined steel pipe. The deteriorated network has significant water losses, reportedly in excess of 60%..
- The combination of high water loss in the network, significant deterioration of the cast iron and steel pipelines, limited supply schedules, and low operating pressures means that essentially none of the customers receive an adequate water supply, and some receive none and have to buy it from vendors.

15. The following benefits are expected from the improvement works for the consumers and vodokanal in Karmana

- water pressure will be increased so all residents will benefit from piped water into their residences
- water quality supplied will comply with Uzbekistan water quality standards
- most urban residents of Karmana will be connected
- all current connected customers who now do not pay water bills because they do not receive adequate water supplies will benefit from adequate water supply and are expected to pay their water bills leading to increased revenues
- O&M cost of materials for mains and service repairs will be reduced and water losses in the distribution network will be reduced after the distribution rehabilitation work is completed leading to increased revenues.

14. Considering the poor condition of the existing water supply system in Karmana and the expected benefits that will accrue when the system is improved, the subproject designed to efficiently deliver an adequate supply of affordable, potable water for the population of Karmana is required.

Project Location

15. Karmana City is situated in Navoi Oblast and is located a short distance north of Navoi City and just downstream of the Navoi Distribution Unit. The proposed project relates to the urban area of Karmana.

16. Only the proposed new Water Distribution Unit next to the IRTM and the new main to connect the water supply into the existing network at the old WDU will be in an area remote from the existing facilities. All other activities will be within the existing network and the existing alignments of already existing distribution net. The alignment for the new pipeline is within land identified for an industrial zone and land is either bare or with scanty grassy vegetation.

Magnitude of Operation

17. The total population of the urban area is 23,086 of whom 21,576 [94%] are connected to the water distribution network and they would all benefit from the subproject. In addition to the activities in this sub-project the Vodokanal is planning additional minor network upgrading to be able to serve more of the urban population. The vodokanal has also identified and intends to initiate network improvements for the rural area surrounding the city.

Descriptions of the Project

18. Water supplies to Karmana urban areas are provided from 2 water sources: (i) import from the Inter Regional Trunk Main [IRTM] accounting for 820 m3/d; (ii) the bulk water supply from the Navoi Mining Plant that provides 3,280m^3/d. The Distribution Unit for Karmana is located 2.8 km from the Damkhoja IRTM. A steel pipeline connects the IRTM supply to the distribution unit and it is connected directly to the main feeder of the distribution network. The distribution unit is comprised of a 250 m^3 reinforced concrete storage reservoir and booster pump station. There is no chlorination system. The bulk import from the Navoi Mining Plant source is taken directly to the storage reservoir at the distribution centre.

19. A series of 400 and 300 mm transmission mains transfers the water from the distribution unit to Karmana distribution network, which has a total network length of 148 km. Most of the 103.5 km network is unlined steel pipe with diameters ranging from 50 mm to 400 mm. The distribution network also contains 4.2 km of asbestos cement pipe, 24.1 km cast iron pipe, and 16.2 km of polyethylene pipe. The polyethylene sections were installed between 1998 and 2008; the majority of the remaining pipelines in the network were installed from 1961 to 1966.

20. The proposed rehabilitation and improvement will include the following components

- new Karmana Distribution Unit adjacent to import point from the IRTM
- administration building
- 3000 m^3 RC storage reservoir
- 250 mm water meter at import point
- booster pumping building with variable speed pump, stand-by unit, and electrical room
- laboratory facilities
- calcium hypochlorite solution storage, mix, and feed facilities
- rehabilitation of distribution mains
- construction of a new 400 mm transmission main from the new booster pump at the IRTM to the existing storage reservoir, with connections into the existing Karmana distribution network
- new 350, 300, 200, 150 mm pipes
- renewal and reinforcement of 76, 100, 150, 200, 250 and 300 mm sections of the existing Karmana distribution network

DESCRIPTION OF THE ENVIRONMENT

Physical Resources

21. Navoi is a 109,400 km^2 oblast in the southeast of Uzbekistan. Its northern and northeastern parts border with Kazakhstan, the eastern—with Samarkand and Djizzak Oblasts, the western–with Karakalpakstan Republic, and the southern—with Bukhara Oblast.

22. Navoi Oblast is comprised of 8 administrative divisions: Kanimekh, Kyzyltepa, Karmana, Navbakhor, Nurata, Tamdy, Uchkuduk, and Khatyrchi Districts. There are 7 cities/towns, 7 townships, 5 district centres, and 621 villages. As of 2004, the population was 804,200 people, of these 315,628 live in the urban areas and 488,572 in the rural areas. The Karmana Water Distribution Unit is in Kanimekh District. District details are tabled below.

Table 1: Detail of Districts within Navoi

District	Area ('000 ha)	Number of townships	Number of Villages	Population
Kanimekh	1,588	1	45	28,553
Kyzyltepa	270	1	133	101,112
Navbakhor	156	1	72	81,500
Nurata	653	1	56	43,023
Khatyrchi	69	1	167	131,878

Climate

23. The climate of Navoi Oblast is continental semi-desert. Average annual temperature is 14^{o}C. The coldest month is January with minimum average temperature of -3.7^{o}C, and the hottest month is July with maximum temperature of 47.2^{o}C. Northeastern and northern winds prevail; annual average wind speed is 3.1–5.3 m/s. Relative humidity is 58–64% in winter and 16–25% in summer. Annual precipitation ranges from 141 to 238 mm.

Topography and Soils

24. Regarding geomorphology, Navoi Oblast is located in the alluvial plain of the Zarafshan River delta. The soil in Navoi Oblast is represented by melkozem (clay loam, and clay sand) up to 10 m thick, under which there are pebble, and conglomerate deposits and sandstones. The soils are saline and corrosive to concrete and steel. In the sub-mountainous area the soil is mainly clay, with loamy and hard loamy strips. Soil freezes down to 0.6 m.

25. The oblast is in a seismic zone classified as 7 to 8 points on the Richter Scale and structural designs will incorporate this.

Water Resources

26. Navoi Oblast's general hydrography comprises Zarafshan River, irrigation canals, water storage pools (reservoirs), mountainous water flows and springs.

27. **Kanimekh District**. This subproject is in Kanimekh District, which is located in the Navoi oasis of the Zarafshan River delta. The key waterway of the district is Kanimekh Canal fed from the Zarafshan River and ending up with a collecting pond. Most underground waters in the Kanimekh District have a high total dissolved solids concentration (up to 5 g/L), and the water is unsuitable for drinking or household water supply. There are several small fresh water streams, but their capacities are not sufficient to act as adequate drinking water sources.

28. **Kyzyltepa District.** Kyzyltepa District is located in alluvial plain of the Zarafshan River delta, which flows through the northern part of the district. Canals were built and operated for irrigation of agricultural lands in Navoi, Bukhara and Samarkand Oblasts: Amu-Bukhara, Shafirkansky Branch, Kharkhursky Branch, and Shakhrud flows through the Kyzyltepa District. Canal waters are controlled by the Kuyumazar and Tudakul reservoirs. Kuyumazar Reservoir was commissioned in 1957, receives water from two sources Zarafshan and Amu-Darya Rivers; design capacity is 300 million m^3 , with an active storage volume of 240 million m3; surface area is 16 km^2. Tudakul Reservoir receives wastewaters from Zarafshan River, Kuyumazar Reservoir and irrigation canals; design capacity is 1,150 million m^3; with an active storage volume of 900 million m^3; surface area is 200 km^2.

29. The Kyzyltepa District has little fresh underground water, as underground water has a high concentration of total dissolved solids (TDS) and is thus unsuitable for drinking or household water supply.

30. **Navbakhor District.** Navbakhor District comprises plain, sub-mountainous and mountainous complexes. The plain area is in the southern part of the district in Zarafshan River delta and high priority settlements covered by the project are located in the plain part of Navbakhor District; northeastern and eastern parts of the district are elevated and become spurs of the Karatau Range (up to 1000 m above sea level).

31. The key watercourses of the district are the Zarafshan River running along the southern border of the district, Kanimekh and Pravoberezhny (Right-Bank) Canals are fed from Zarafshan River. There is a number of tributaries running from spurs of Karatau Range: Sormich, Gurullyauksay, Karangulsay, Changly, and springs.

32. The underground water of the plain in Navbakhor District has a high concentration of dissolved solids (up to 5 g/L) and very hard and is thus unsuitable for drinking or household water supply. There are separate fresh water bands in the sub-mountainous areas, but their capacity is low and not sufficient to act as a drinking water source.

33. **Nurata Disctrict.** Nurata District lies in the Zarafshan River basin and comprises plain, sub-mountainous and mountainous complexes: Nuratau Range (2,169 m above sea level), Aktau Range (2003 m above sea level), and Karatau Range (up to 1000 m above sea level).

34. The key waterways of the Nurata district are the Kattasay, Chuyasay, Nurata and Pashat Springs. Arnasay Cavity (Aidarkul Lake) is a natural low point in the northern part of the Nurata District 230 m above sea level and is a natural reservoir for the surplus water from irrigation. The Char-Darya Reservoir located on the Syr-Darya River. The water in the Lake has extremely high concentration of dissolved solids due to scarce precipitation, high air temperature, high evaporation and absence of surface discharge.

35. The underground waters in this district are plenty and with low salinity so they are suitable for drinking needs and household use.

36. **Khatyrchi District.** Khatyrchi District comprises plains and sub-mountainous complexes. The majority is located in the alluvial plain of the Zarafshan River delta, while to the north the land becomes elevated and become the foothills of the Aktau Range.

37. The key watercourses are the Zarafshan River running along the southern border of the district, and irrigation canals Toss and Shavat are fed from the Zarafshan River. There are a number of tributaries running from spurs of Aktau Range: Koksaraysay, Lyangar, Maydon and others; plus springs, but these are too small to act as drinking water sources.

38. TDS of the underground waters of the sub-mountainous part in Navbakhor District is up to 1.5 g/L and increases to the south, as does the hardness. These waters are marginally suitable for drinking and household water supply.

Ecological Resources

39. Navoi Oblast soils comprise sierozem, sierozem-brown soils, brown soils, dessert soils, dessert-sand soils, and sands. Irrigated areas located in the Zarafshan River delta are cultivated grasslands. Salinity/TDS levels of the irrigated areas vary greatly, due to high summer temperatures and dry air and high evaporation.

40. Vegetation growth in most of Navoi Oblast is very scarce, but in general saxaul, calligonum, wormwood, and saltwort grow. There are shrubs and semi-shrubs in the Zarafshan River valley and groups of trees along the canals and there is light forest in sub-mountainous and mountainous areas.

41. The fauna in this district is typical for arid lands and include rodents, reptiles, insects, arachnids, and many kinds of birds in the floodplains of the rivers and lakes. There are no sensitive wild fauna or flora in the vicinity of the proposed construction sites. Thus, the proposed water supply works construction will not have any significant impact on flora and fauna of the Navoi Oblast as they take place within already existing occupied areas; e.g., in industrial area and along existing roads.

Economic Development

42. Navoi Oblast industries are located in the towns and district centers and are specialized in mining of non-ferrous metals; gravel, sand, and building stone; production of building materials (lime, bricks, slabs); repair of farm equipment and machinery; processing of raw cotton; currying; and processing / production of foodstuff.

43. The total population of the urban area is 23,086 of which 21,576 [94%] are connected to the water distribution network.

44. Farming plays a dominating role in the rural areas, using mostly irrigated arable lands and pastures. Pastures are used for livestock-raising (caracul, goats, oxen, horses, and

camels). Crops grown in the area include cotton, boghara (dry) vegetable, horticulture, and wine. The lands to be used for the construction are mostly pastures.

Social and Cultural Resources

45. The majority of the Navoi Oblast population lives in rural areas and the districts are scarcely populated. The most densely populated area is the small valley along Zarafshan River, in which the following cities/towns are located: Navoi, Karmana, Yangirabad, Beshrabad, Kanimekh, Kyzyltepa. Average family size in Navoi Oblast is 6 persons, half of them children under 16 years. The ethnic composition in Navoi Oblast is 80.4% Uzbeks, 13.2% Kazakhs, 6.2% Karakalpaks, and 0.2% others. The general employment level in Navoi oblast is 52.7% of the population of the employable age (number include both employment of men and women). Education level of the population is generally secondary school level, with some people specializing in vocational fields or continuing to university level.

Potential Environmental Impacts and Their Mitigation

Potential Impacts

46. Screening of potential issues, concerns and/or impacts relative to location, design, construction, and operation of this subproject was carried out following ADB's Environmental Guidelines.

Impacts due to Location

Water Supply Facilities

47. The sites for water supply-related structures have negligible or minimal adverse environmental impact, which can be mitigated or resolved through design and during construction, and operation stages without difficulty. Except for the transmission main and distribution network, site selection was driven by the existing facilities and therefore, it is in accordance with local government land use planning. Distribution facilities are located within the existing dedicated area. Routes identified for the transmission pipes mainly follow existing roads. The exception is the location of the new facilities next to the IRTM, and the new transmission main to connect to the existing Karmana distribution network, but this area is located in an industrial area with no sensitive environmental areas in vicinity. The distribution network replacement will be mostly in the existing route of the distribution net.

48. All subproject components are located well clear of any forests or other sensitive areas; consequently, potential impacts on environmentally sensitive areas as well as cultural, historical, and religious sites have been avoided. Similarly, there will be no impact on cultural use of lands by minorities nor will there be impairment of aesthetics.

49. The subproject facilities will be designed and constructed to have no impact on the natural drainage pattern. The structures in flood prone areas will be protected from floods by constructing at a higher elevation and providing adequate drainage around the structure. The site selection was driven by the existing facilities and it is in accordance with local government land use planning,

50. Access roads and power supply is already available to all the sites for project construction purposes and no significant impacts related to basic infrastructure is foreseen.

51. Permanent loss of land is only for construction of pump houses, treatment facilities, storage reservoir, etc., but is marginal, since constructions will mainly take place within Government lands. Some temporary disruption of the land use can be expected by construction of pipe-lines; however, the likely route does will not interfere with any productive land use practiced at present.

Impacts Related to Design

52. The project design is basically the rehabilitation and upgrading of an existing water supply system. The PPTA consultant, assisted by IKS[4], has developed a preliminary design that is based on the existing facilities, which is considered the most cost-efficient option of meeting the objectives of this sub-project.

53. Transmission and distribution piping are designed along existing roads and will be of high-density polyethylene (HDPE) and polyvinylchloride (PVC) recommended for potable water and complying with international standards. Non-metallic pipes are characterized by long lasting durability and resistance to corrosion. Steel pipes will be used only crossing of rivers and canals. Asbestos cement pipes will not be used for any purpose.

54. The proposed new chlorination facilities will utilize calcium hypochlorite solution rather than gas, thereby eliminating the potential of serious hazards created by the failure of the gaseous chlorine system.

55. The risk of fire will be minimized by proper selection of fire-resistant or -retardant materials and an adequately designed power supply system that includes grounding of all sub-systems, appropriate insulation, and circuit breakers.

56. All structures in contact with the ground will be designed incorporating anti-corrosion measures for mitigation of negative impact on ground water and all structures will be designed to withstand seismic activity up to 8 on the Richter scale.

57. In summary, adverse impacts due to the subproject design are not expected. Temporary impacts due to construction and potential impacts during operation will be mitigated in accordance with the EMP (Appendix 2).

Impacts during Construction

Increased Traffic and Use of Machinery

58. Traffic of heavy trucks employed for the transportation of construction materials will increase temporarily during construction of the sub-project. Other temporary environmental concerns relate to the use of excavators, cranes, compressors, and other machineries during the construction works will include: (i) noise and dust from construction sites, and (ii) safety for workers and inhabitants. Measures will be taken in accordance with the EMP to limit dust

[4] ISLOHOTKONSALTSERVIS-IKS Group of Companies—local consulting company which specializes in provision of consulting services in Uzbekistan and other developing countries.

and noise levels and enforce strict observance of safety rules at main road crossings, along main roads, along the makhalla streets and near sub-project construction sites. Temporary traffic lights at road crossings where sensible and temporary traffic diversions will be installed and implemented by the contractors, under the supervision of the PIU. Traffic police control will be intensified in makhallas during the rehabilitation/construction period and adequate warning will be provided to enhance measures of prudence among school children. The contractor and the PIU will inform the public via media announcement about temporary road closings and traffic diversions.

Solid and Liquid Waste Management

59. At the sub-project sites, various types of solid waste, including wood, waste concrete, steel waste, discarded old equipment, oil filters, plastic and cartons from equipment packaging will be produced. Measures, based on the EMP, will include the provision of refuse collection containers and used oil collection containers, with further removal to specially allocated disposal and reclamation sites designated by the Hokimiyat. After completion of rehabilitation and construction works, all jobsites will be cleaned and landscaped. Maintenance of machinery will be done exclusively within the premises of gasoline stations specifically equipped for the storage of used oils and other liquid contaminants. No on-site maintenance of equipment will be permitted. If groups of workers are to remain at the work sites for extended periods of time, it will be necessary to construct adequate temporary sanitary facilities including provision for the disposal of wastewater to sites approved by the Hokimiyat.

60. Regulations on environmental protection, safety, and hygiene shall be fully complied with in all phases of constructing the sub-project. Moreover, involved workers (especially, but not limited to, the on-site Work Supervisors) should be made aware of, and trained/guided in, standard environmental protection requirements and the IEE recommendations. Contractors will be contractually required to include environmental monitoring as part of their management of the project.

Biological Environment

61. Run-off, if any, from construction sites into nearby water bodies will be controlled in accordance with the EMP so as to eliminate any detrimental effect downstream to aquatic flora and fauna. Impact on local flora and fauna will be minimal although some fruit trees growing along the transmission main route may have to be removed. Such action will be in conformance with the land acquisition and resettlement framework (LARF).

Socio-Economic Environment

62. Only minimal impacts on land use are expected, since sites are typically located on lands not used for any other purpose or in built-up areas. However, the contractor will produce a plan showing the impacts of pipe-laying affecting some utilities and/or trees established within the road allowances.

63. Regulations on environmental protection, safety, hygiene shall be fully complied with in all phases of constructing the sub-project. Moreover, involved workers (especially but not limited to the on-site Work Supervisors) should be made aware of, and trained/guided, in standard environmental protection requirements and the IEE recommendations. Contractors

will be contractually required to include environmental monitoring as part of their management of the project.

64. In summary, adverse impacts due to the construction of the subproject will be temporary and will be mitigated in accordance with the EMP.

Impacts during Operation

65. The operation of the Karmana water supply system will not produce any significant negative environmental impacts. Pumping equipment is sufficiently far from human habitation as not to cause any impacts due to noise and vibration.

66. However, the operation of the proposed subcomponents is expected to result in significant benefits. Currently, some customers in Karmana urban area do not receive adequate piped water but are provided with water from vendors. On completion of the proposed improvement works water supplies will become available to all existing and newly connected customers and they are expected to pay their water bills, resulting in significant increase in revenue from those customers who currently refuse to pay for billed water because of the unsatisfactory service.

67. The following socio-economic benefits resulting from access to potable water will far outweigh any minimal adverse environmental impacts:

- access to adequate amount of good quality water for 100% of the population in the service area at a reasonable cost (for drinking and sanitation), as the Karmana vodokanal will be able to supply water in compliance with Uzbekistan water quality standards.
- better health due to improved hygiene resulting in marked improvement in community health indicators (e.g., reduced frequency of diarrhea and other water-borne diseases);
- reduced lost work days for adults (e.g., increased income), and lost school days for children (improved educational benefits) due to reduced incidences of diseases; and
- with the improvements in the Karmana transmission and distribution infrastructure and the increased delivery from the IRTM, the current uneconomical bulk supply import from the Navoi Mining Plant could be discontinued.

Environmental Management Plan

68. Table 1 of the EMP in Appendix 2 summarizes anticipated environmental impacts, mitigation measures, required environmental monitoring, activities to ensure implementation of mitigation measures, and identifies the entities responsible for carrying out those activities. The estimated costs for implementation of this EMP that are not already included in the subproject construction contract are also indicated.

69. It is important to reiterate that in addition to the recommended mitigation measures, regulations on environmental protection, safety, hygiene shall be fully complied with in all phases of the construction. Workers (primarily the on-site Work Supervisors) should be made

aware of, and trained/guided in standard environmental protection requirements and the IEE recommendations.

70. In the bidding and construction contract documents, bidders and contractors will be made responsible for ensuring that:

- work activities are well organized and safely carried out;
- transportation companies involved in construction use only properly registered, safe vehicles; that all drivers must have current driving licenses; and that trucks are not overloaded;
- essential personal protective equipment is supplied to, and used by, all relevant staff;
- workers are properly trained and obey all relevant regulations on work safety and risk prevention;
- no transportation or heavy equipment movement, or mechanical digging is used at night in residential areas; and
- no concrete mixers will be used anywhere near architecturally significant and religious sites or near schools during school times.

71. The Contractors must adhere to the relevant Regulations regarding GOU Standards, in particular the norms issued by the State Nature Protection Committee for the subproject after submission of the IEA report. These stipulations will include:

- maximum allowed amount of air pollution
- maximum allowed amount of water pollution
- maximum allowed amount of wastes
- list of environmental actions which will be required to be followed by the subproject to meet existing regulations on impact on the environment.

INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN

Institutional Arrangements

72. The Uzbekistan Communal Services Agency (UCSA) will be the Executing Agency (EA) of the sub-project. A Central Program Preparation and Management Unit (PPMU) has been established at the UCSA to manage and monitor all implementation activities of the sub-project. The PPMU will include representatives from the agencies involved in the National Steering Committee (NSC). The participating provincial government will be the Implementing Agency (IA).

73. The sub-project will recruit consultants to assist both the EA and IA with the implementation for the duration of the sub-project. These consultants will be attached to the PPMU and PIU. Relevant provincial agencies will provide assistance to the PIU.

74. The supervision and monitoring of sub-project-related resettlement and environmental activities, particularly prior to, and during, construction, is one of the many specified functions of the PPMU. In line with this, it is proposed that an Environmental Monitoring

Unit (EMU) be set up within the PPMU to be responsible for environmental management and monitoring. The major responsibilities of the EMU are to ensure that:

- the mitigation measures and monitoring activities are carried out as set out in the IEE Report; and
- reporting is performed in compliance with ADB and Government of Uzbekistan requirements.

75. The EMU should be headed by a qualified staff among those assigned full time (including project Consultants) to the PPMU. At least one technical support staff and if possible one administrative staff shall be assigned to the EMU. Relevant agencies (such as the State Committee for Nature Protection of the Republic of Uzbekistan (Goskomprirodi), State Committee for Geology and Mineral resources of the Republic of Uzbekistan (Goskomgeologiya), Center of Hydrometeorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (Uzgidromet), Sanitary and Epidemiological Service (SES) of the Ministry of Health, and if possible and acceptable, NGOs will designate their respective representatives to assist the EMU.

76. If appropriate, the PIU will engage a local consultant (an Environmental Specialist) to provide assistance in environmental management and monitoring. Alternatively, if the subproject is not too large to warrant engagement of a consultant, the PIU will nominate Sanitation Engineer or Environmental Engineer to serve as the "focal person", with whom the EMU head will be closely coordinating, particularly for reporting the monitoring results by the focal person.

77. Project Implementation Assistance (PIA) consultants provided during implementation include Environmental Specialists (expatriate and local) who will impart expert advice and guidance and conduct capacity building on environmental management and monitoring, particularly to the members of the EMU and Construction Supervisors.

78. To ensure that ADB environmental requirements and all applicable Government of Uzbekistan environmental laws, regulations, and standards are met prior to start of construction and during construction and operation, an Environmental Management and Monitoring Plan has been prepared (Appendix 2) and this will be implemented by the EMU together with Construction Supervisors.

79. The EMP and functions of the EMU will apply mainly during the pre-construction and construction periods. Environmental monitoring during operation of water supply schemes will be largely the responsibility of the O&M staff attached to the local municipality (under oblast vodokanals) governed by Oblast Governors with the technical support of the UCSA. However the following agencies also have a role in regular monitoring of water quality:

- State Committee for Geology and Mineral Resources of the Republic of Uzbekistan (Goskomgeologiya), which is responsible for monitoring the quality of ground water sources;
- Centre of Hydro-meteorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (Uzgidromet), which is responsible for monitoring the

state of the rivers, lakes, water reservoirs, pollution of atmospheric air, and land;

- Ministry of Agriculture and Water Management, which monitors quality of collector-drainage waters (by 2 to 4 indicators of mineralization);
- Sanitary and Epidemiological Services (SES) of the Ministry of Health, which monitors water quality of water sources and water in pipelines from centralized drinking water intakes;
- Wastewater quality monitored both by the vodokanal and the national Environment Protection Committee.

80. Arrangements will be made to receive complaints and comments from the public (members of the makhallas) either directly through the EMU or other relevant representatives if any unexpected impacts occur. The relevant communities will be made aware of this process, their right to complain and necessity to protect the environment. EMU will arrange for this awareness creation, which should include public announcements and signposting at the construction sites, at the very stage of construction. Contractors will be required to register incoming complaints and how complains have been mitigated and report this to the PIU.

Environmental Monitoring Plan

81. Table 1 of the EMP in Appendix 2 summarizes anticipated environmental impacts, mitigation measures, required environmental monitoring, activities to ensure implementation of mitigation measures, and identifies the entities responsible for carrying out those activities. The estimated costs for implementation of this EMP that are not already included in the subproject construction contract are also indicated.

Reporting of Environmental Monitoring Results

82. Environmental monitoring results will be documented to ensure that signs of adverse impacts are detected at the earliest possible time. Monitoring results prior to construction and during construction will have to be reported monthly by the designated “focal person” of PIU to the EMU. A year-end report (or an end-of-monitoring phase report, e.g., end of pre-construction phase or end of construction phase), whichever is applicable, will be prepared jointly by the “focal persons” of each PIU and the EMU for submission to PMU head, who will in turn submit it to the provincial Environment Protection Committee for endorsement and to the ADB for non-objection.

83. The format for the monthly and annual environmental monitoring report will be developed during project implementation by the consultant appointed for the Project Implementation. The format may have to be refined during implementation to incorporate all monitoring findings and lessons learned. Semi-annual environment compliance reports on implementation of the EMP will be prepared by the PIU and submitted to the ADB for non-objection through PMU.

Budget for Environmental Monitoring

84. The cost of environmental monitoring will be that required for the remuneration of staff involved in EMP activities and their traveling expenses as well as any direct cost for

monitoring activities. If any NGO members are involved, they will be from the area and therefore, no cost for their involvement but voluntary participation is considered.

85. The nature of the projects and the project locations do not necessitate any specific measurements, such as noise level or quality of water in waste receiving water bodies, during the construction phase. However, if any unexpected impact arises, it is recommended that EMU take necessary action in coordination with the PIU. For such needs, it is recommended that the EMU will employ the existing laboratory facilities of PIU/EMU member agencies.

86. It is estimated that the required investment for Environmental management would be $260,000 for upgrading laboratory facilities (for analysis of water quality) and $55,000 for training the OMP staff on proper operation of upgraded facilities, particularly with respect to environmental sanitation. Other costs of implementing the EMP will be covered elsewhere in the sub-project budget.

PUBLIC CONSULTATIONS AND INFORMATION DISCLOSURE

Consultation and Participation Process

87. The PPTA Consultants carried out the following activities:

(i) Following a newspaper advertisement in the oblast, a formal public consultation was held on 2 July 2009 and discussions took place with representatives of government agencies and relevant community members and leaders including makhallas (neighborhood communities) of the project area (Appendix 3 refers).
(ii) Reconnaissance surveys of subproject communities/settlements and sites of all subcomponents in the oblast were carried out in July 2009. The survey was done by a composite group of members of the PPTA Consultants.
(iii) The on-site discussions with relevant officials and members of communities provided the PPTA team with information on the physical and environmental resources and opportunities and constraints relevant to the proposed subproject. Also, in terms of participatory-based consultations with stakeholder groups, there was considerable information sharing with a range of public sector officials and informal consultations with a range of local community members including poorer and vulnerable groups.
(iv) Stakeholders were also consulted about their existing capacities, and were asked for their ideas on how to implement and manage mitigation and enhancement measures, as well as perform environmental monitoring.

88. There were 22 participants at the public consultation, which was held in the Navoi District's hokimiyat administrative building on 2 July 2009. The participants represented neighboring makhallas, local hokimiyat, department of architecture, and vodokanal. The following summarizes comments received.

(i) The different makhallas receive water from different sources, i.e., from the IRT or Navoi Mining Company. The makhallas receiving water from the mining company noted that the quality of that water is poor with high turbidity

and that there is very low water pressure, forcing them to buy water elsewhere or fetch from other areas.

(ii) There was a general willingness to pay an increased tariff, if an appropriate service and quality of water could be guaranteed although no specific tariff increase was discussed.

(iii) People living in upper floors of houses noted that the water pressure is inadequate for them to receive piped water.

(iv) Some people have installed storage tanks so that water brought from outside can be stored for later use; however, it was noted that the storage tends to reduce quality of water causing especially children to catch diseases and parasites.

Information Disclosed

89. The submission of Environmental Protection Commitment Report to NPC will ensure the disclosure of environmental concerns to the relevant authority. The following is the information disclosed to date by the PPTA team.

(i) Objectives of the subproject as well as ADB environmental policies and procedures were disclosed to the relevant provincial and district representatives during the initial consultation by PPTA Consultants.

(ii) The environmental categories of the subproject per ADB and Government policies were disclosed to the Nature Protection Committee.

90. Environmental issues pertaining to subproject locations and designs, proposed mitigation measures, and forms of possible institutional set up for environmental monitoring will be disclosed to the relevant provincial authorities after completion of the IEE Reports.

FINDINGS AND RECOMMENDATIONS

91. This IEE shows that the implementation of the rehabilitation and upgrading of the water supply system for Karmana City sub-project is unlikely to cause significant adverse impacts on the environment during construction and operation in the short-, medium- and long term and that any minor impacts that are associated with design, construction and operation of the proposed subprojects can be mitigated without difficulty through proper engineering design and incorporation or application of recommended mitigation measures and procedures at all stages in accordance with the EMP. It is recommended to

- finalize the EMP during detail design,
- submit finalized EMP to ADB for non-objection,
- include non-objected EMP in bidding documents, and
- include the finalized EMP in the contract documents

93. Importantly, the proposed sub-project is intended to improve the quality of life of the residents of Karmana City through connection to a continuous, safe, water supply system at an affordable cost, both for drinking and sanitation; reduced loss of water through leakages resulting in reduced non-revenue water and increased system efficiency. The socio-economic benefits will include better health and environmental sanitation resulting in marked

improvement in community health indicators (e.g., reduced frequency of water related diseases); reduced lost work days for adults (increased income), and lost school days for children (improved educational benefits) due to reduced incidences of diseases; saving of money spent for buying water; and Induced socio-economic growth, (promotion of economic growth in various sectors).

94. Threats for human health are expected to be minimal during the construction and operational phases.

95. It is recommended to implement and revise, when appropriate, the proposed EMP.

CONCLUSIONS

96. Based on the indication of the Rapid Environmental Assessment in Appendix 1 and the findings of the IEE, the classification of the subproject as Category "B" is confirmed, and no further special study or detailed EIA will be needed to comply with the environmental policies of the ADB. The Government of Uzbekistan requirements do not demand an EIA study as this subproject is a Class III because it is limited to one province. The IEE with the recommended institutional arrangements and monitoring program given in the Environmental Management and Monitoring Plans would become the completed Environmental Assessment or the EIA.

APPENDIX 1

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST
WATER SUPPLY

Instructions:

This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.

This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.

This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.

Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: **PPTA No: 7240–UZB: Water Supply and Sanitation**
Upgrading of Karmana Water Supply and Distribution System

Sector Division: **CWRD/CWUS**

Dates Conducted: 02-Jul-09 (WipulaElkaduwa, Madina Khalmirzaeva, Environmental Specialists)
29-Jul-09 (Morten Jensen, Madina Khalmirzaeva, Environmental Specialists)

SCREENING QUESTIONS	Yes	No	REMARKS
A. PROJECT SITING IS THE PROJECT AREA…	☐	☐	
DENSELY POPULATED?	■	☐	Rehabilitation of Karmana WDU will take place outside densely populated area, but network improvements will take place inside the city. The impacts will be temporary and can be mitigated by EMP requirements
HEAVY WITH DEVELOPMENT ACTIVITIES?	☐	■	
ADJACENT TO OR WITHIN ANY ENVIRONMENTALLY SENSITIVE AREAS?			
• CULTURAL HERITAGE SITE	☐	■	
• PROTECTED AREA	☐	■	
• WETLAND	☐	■	
• MANGROVE	☐	■	
• ESTUARINE	☐	■	
• BUFFER ZONE OF PROTECTED AREA	☐	■	

SCREENING QUESTIONS	Yes	No	REMARKS
• SPECIAL AREA FOR PROTECTING BIODIVERSITY	☐	■	
• BAY	☐	■	
B. POTENTIAL ENVIRONMENTAL IMPACTS Will the Project cause…			
pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?	☐	■	
impairment of historical/cultural monuments/areas and loss/damage to these sites?	☐	■	
▪ hazard of land subsidence caused by excessive ground water pumping?	☐	■	
▪ social conflicts arising from displacement of communities ?	☐	■	
▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	☐	■	
▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	☐	■	
▪ delivery of unsafe water to distribution system?	☐	■	
▪ inadequate protection of intake works or wells, leading to pollution of water supply?	☐	■	
▪ over pumping of ground water, leading to salinization and ground subsidence?	☐	■	
▪ excessive algal growth in storage reservoir?	☐	■	
▪ increase in production of sewage beyond capabilities of community facilities?	☐	■	
▪ inadequate disposal of sludge from water treatment plants?	☐	■	
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?	☐	■	
▪ impairments associated with transmission lines and access roads?	☐	■	
▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	☐	■	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?	■	☐	Facilities will be designed to mitigate adverse impact. Workers will receive regular training on how to handle hazardous materials, including chlorine, and general health and safety training. Workers will be provided with necessary Personal Protective Equipment
▪ dislocation or involuntary resettlement of people	☐	■	
▪ social conflicts between construction workers from other areas and community workers?	☐	■	
- noise and dust from construction activities?	■	☐	Temporarily during construction work, but will easily be mitigated through EMP requirements
- increased road traffic due to interference of construction activities?	■	☐	Temporarily during construction work, but will easily be mitigated through EMP requirements
▪ continuing soil erosion/silt runoff from construction operations?	☐	■	
▪ delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	☐	■	
▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	☐	■	Project design include only plastic pipes
▪ accidental leakage of chlorine gas?	☐	■	Facilities will include standard chlorine safety equipment for hypochlorite solution feed. Workers will receive regular training on how to handle hazardous materials, including chlorine, and general health and safety training. Workers will be provided with necessary Personal Protective Equipment.
▪ excessive abstraction of water affecting downstream water users?	☐	■	
▪ competing uses of water?	☐	■	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ increased sewage flow due to increased water supply	■	☐	The increase in the volume of water will have the potential of creating increased sewage flow in Karmana. The local vodokanal will have to survey to make sure that its existing sewerage system has enough capacity to deal with the increased sewage flow, and if it does not, plan for upgrading. As part of the upgrading activities in the local distribution nets, in other sub-projects, installation of water meters is a feature, which will at least partly b counteract the increased sewage flow by reducing water usage.
▪ **increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant**	■	☐	The increase in the volume of water will have the potential of creating increased sullage and sludge in Karmana. The local vodokanal will have to survey to make sure that its existing sewerage system has enough capacity to deal with the increased volume of sullage, and if it does not, plan for upgrading. As part of the upgrading activities in the local distribution nets, in other sub-projects, installation of water meters is a feature, which will at least partly counteract the increased sullage production by reducing water usage. Sludge volumes should not increase as they are a function of population, not unit water use.

APPENDIX 2
ENVIRONMENTAL MANAGEMENT PLAN FOR UPGRADING OF KARMANA CITY WATER SUPPLY SYSTEM SUBPROJECT

Table A2.1: Environmental Management

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
Pre-construction Project Stage				
Accidents during operations	Risk of accidents after completion causing damage to facilities and workers due to inadequate designs	• Building design with a second category of fire resistance where all elements are made of fireproof or not-easy-to- burn materials; • Design structures to withstand seismic forces in accordance with Uzbek Construction Norms and Regulations (CNR) 2.01.03-96 "Civil Works within seismic areas"; • Ensure unhindered access to the facilities and availability of roads to them in case of emergencies;	PPTA consultants • provide conceptual design incorporating mitigation measures; Design-build contractors, if any, • provide detail design incorporating mitigation measures; PIU • reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Required structures will be items included in costing of the construction budget
Leaks from sewer system and water distribution network.	Contamination of water in distribution network from sewage leaks.	• All buried facilities designed on earth fill with a reliable water sealing installments in accordance with CNR. • Pipes used in the distribution network should be corrosion-proof and have a long service life; • Water distribution network cannot have direct contact to the sewerage system, i.e. the two systems cannot be in the same trench system.	PPTA consultants • provide conceptual design incorporating mitigation measures; Design-build contractors, if any, • provide detail design incorporating mitigation measures; PIU reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Required structures will be items included in costing of the construction budget
Pipe-laying for new extensions	No expected resettlement, but if it becomes relevant, the land acquisition and resettlement framework (LARF) will be reviewed and amended as necessary to ensure	• Resettlement is addressed in the land acquisition and resettlement framework (LARF) • Review LARF (if any) to ensure environmental aspects of resettlement are considered and addressed.	• Monitoring of implementation of LARF by PIU, EMU and PPTA Consultants; • Review of PPMU progress Reports By PIU and LARF Committee	No expected re-settlement cost involved in this phase of extension of Water Distribution System.

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
	no adverse environmental impact from resettlement.			
Location of Hazardous Materials (Haz-Mat) storage and of noisy equipment and operations.	Health hazard and nuisance to people living in proximity to facilities and to workers on the site.	• Design layout of facilities, which includes ample buffer distance (per CNR) to households living in close proximity to facilities and to worker facilities. • Include acoustical assessments to determine if noise mitigation at source (noise barriers) is required to prevent nuisance to nearby households or the workers on the facility. • If predicted noise level at neighboring households is expected to exceed ADB/IFC guidelines include acoustic barriers in design.	PPTA consultants • provide conceptual design incorporating mitigation measures; Design-build contractors, if any, • provide detail design incorporating mitigation measures; PIU • reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Required structures will be items included in costing of the construction budget
Asbestos Cement (AC) pipe	Health hazard due to inhaling fibres	• If AC pipes are to be left in ground, mark with appropriate plastic tape • If AC pipe is to be removed and disposed, such removal and disposal should be in accordance with - Applicable regulations of GOU (SES and Hokimiyat) - Pollution Prevention & Abatement Handbook (WB: 1998), also referenced in ADB's OM/FI (2006), paragraph 25	PPTA consultants • provide conceptual design incorporating mitigation measures; Design-build contractors, if any, • provide detail design incorporating mitigation measures and implement accordingly; PIU • reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Cost should be covered by contract sum, as it will be part of the contract requirements to avoid environmental impact
Construction Project Stage				
Contractor or workers not following contractual environmental requirements	No or insufficient environmental controls implemented	• Ensure specific contractual requirement, e.g. withholding of payment or penalty clauses, to ensure contractors' implementation of environmental mitigation measures. • Contracts to require contractor to have designated staff to oversee environmental issues and mitigation. • Contracts to include the requirement for the contractor to provide environmental induction training to all staff.	PIU • ensure monitoring of environmental requirements – by delegation to Environmental Specialist who is the Environment Focal Point of the PIU	Cost should be covered by contract sum, as it will be part of the contract requirements to avoid environmental impact.

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
Machines, equipment, and vehicles used for construction and transport	Emissions from construction equipment exhaust; Dust from vehicles, land clearing, grading, excavation, etc; Noise and vibration from transport vehicles	• Excavated or stockpiled soil and sand shall be watered before loading, if there is a risk of dust generation, e.g. if it is fine materials or under windy conditions. • Soil, sand and other construction materials on transport vehicles shall be covered. • Speeds of such vehicles shall be limited, particularly on unpaved areas. • All heavy equipment and machinery shall be fitted in full compliance with the national (SNPC) and local regulations with regards to emissions and noise. • Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions. • Smoke-belching vehicles and equipment shall not be allowed and shall be removed from the project sites. • Develop Traffic Management Plan to mitigate impact on local traffic conditions during construction. • Confine heavy construction related traffic to the least sensitive access roads to the construction sites to avoid accidents and nuisance to dwellers along the road and other road users ; • Require the owners of the transport vehicles to only use properly registered and well-maintained vehicles with mufflers to mitigate noise and emissions; • All vehicles shall be well-maintained and fitted in full compliance with the national (SNPC) and local regulations. • As a rule, the operation of heavy equipment shall be conducted in the time span 7am-7pm only unless otherwise agreed with local residents. • During nighttime (10pm to 7am) noise impact on sensitive areas, such as residential areas or hospitals shall not be more than 3dB above background noise levels, as measured at the nearest sensitive receiver (Leq15minutes) two weeks prior to the commencement of works. • Construction equipment, which generates excessive noise, such as compressors, jackhammers shall be enclosed to prevent noise nuisance. • Near sensitive locations, e.g. hospitals, schools, mosques, and schools, discuss and agree with the PIU – Environment Focal	Contractor's Site Supervisor • ensures compliance with EMP • visually inspects safety equipment use, observes vehicle noise levels, etc., • check trucks entering site to assess emissions and licensing;etc PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	$5,000 for contractor's additional activities; Cost of supervision included in contract cost estimate Cost of supervision included in contract cost estimate

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
		Point and the principals of the facilities the agreed time for operating noisy machinery. • Minimize transportation during high traffic periods (e.g., when students are entering or leaving school) to minimize potential traffic accidents		
Site preparation	Erosion from site clearing, grading and excavation resulting in sedimentation of water bodies;	• Preserve existing ground cover wherever possible, and provide approved ground cover where necessary; • Use appropriate stabilizing techniques to prevent cave-ins or landslides in excavated areas. • Constructing buildings and facilities following the land protection activities stipulated in CNR 3.01.01-97 and CNR 3.05.03-97. • If construction needs to take place during periods with expected rain, additional plan how to mitigate erosion and sedimentation must be agreed with PIU–Environment Focal Point prior to the work commences.	Contractor's Site Supervisor • ensures compliance with EMP PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	$10,000 for contractors additional activities; Cost of supervision included in contract cost estimate
Revegetation and landscaping	Erosion and sedimentation to water bodies, due to excessive clearing of vegetation or extended periods without vegetation.	• Prior to any clearing of vegetation, make a species inventory of the area to be cleared. Use vegetation inventory to identify appropriate local plant species to be used for revegetation. • Avoid tree removal unless justified on engineering, safety, and environmental grounds. • Store topsoil separately from other soil and re-use for revegetation upon completion of works. • Monitor revegetation regularly, especially during initial growth to ensure stable growth and lasting groundcover	Contractor's Site Supervisor • ensures compliance with EMP PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	
Excavation for pipe-laying; Road use for transport of material and equipment	Damages to utilities by excavation; Temporary access cut-off to properties; Current access roads in poor condition may become worse due to construction vehicles.	• Require contractors to carry out a utility survey before construction and take action during construction to minimize impact on utilities and attend to any damage; • Provide temporary access during construction, if required; • Contractor and PIU to ensure that coordination meetings are held and agreement has been obtained from Hokimiyat; prior to any construction beginning on the site (For an example agreement, see Appendix 5 in Termez IEE) • Obtain permission for road use from relevant authorities and agreement to repair damages immediately after construction	Contractor's Site Supervisor • coordinates with PIU and relevant authorities and agencies. • receives and records public complaints and resolves them PIU-Environment Focal Point • monitors contractor's complaint resolution procedures and compliance with all provisions of the EMP	$10,000 for contractors additional activities not covered by contract cost; Cost of supervision included in contract cost estimate of the contract budget

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
Wastewater generated at construction site	Site rainwater runoff can wash away residues, garbage, leaves, grease, etc., thereby potentially polluting nearby surface water	• Store all liquid/solid waste properly above ground to avoid spills/ leaks; • Store Haz-Mat, e.g. fuels, chemicals, and hazardous waste, in bunded areas to avoid leaks escaping to the ground or nearby surface waters. Provide ample natural ventilation • Develop spill response procedures and provide spill response kits at all Haz-Mat storage areas and work sites.	Contractor's Site Supervisor • periodic visual observation of run-off from construction sites PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	$10,000 for proper disposal of waste and wastewater; Cost of supervision included in cost estimate of the contract budget
Solid Waste generated by construction activities	Construction materials (wood, steel bar, cement, etc.), paper, packing, domestic/human waste from work sites causing environmental pollution and adverse aesthetic impact	• Prior to start of construction, develop an inventory of waste fractions expected to be generated during construction for approval of disposal routes and sites by Hokimiyat and SES • Provide refuse collection containers and used oil collection containers at all construction sites and labor camps. • Sell paper, resin, iron, and steel and other recyclable waste fractions to other enterprises for recycling. • Dispose inorganic solid waste (concrete, bricks, etc.) properly after approval by Hokimiyat and SES. • After completion of civil works, collect all garbage and waste construction materials from the sites, and dispose in specially designated places agreed by the SES	Contractor's Site Supervisor • monitors waste stream to ensure maximum recycling. • Ensures proper disposal PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	
Nuisance from Construction - complaints	Nuisance and impacts from the construction activities to neighboring activities and households.	• Include in contract clauses to reflect this, including the contractor's responsibility to mitigate nuisances, noise, vibration, and dust impacts and other nuisances to neighbors. • Ensure that contractor incorporates good construction management practices • Ensure that contractor liaises with local community on approach to mitigation. • Clarify by signboards on construction sites and/or stickers on equipment outlining how affected parties can lodge complaints. • Ensure that contractor records complaints, response and resolution monitoring and includes complaints registration in regular progress reports.	Contractor's Site Supervisor • ensures good construction management PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	No additional cost, for contract. Monitoring cost already in project budget
Use of labor for construction	Improper handling of waste from construction workers	• Provide temporary water supplies (trucked in) and portable/temporary toilets on-site during construction.	Contractor's Site Supervisor • ensures adequate sanitary conditions PIU-Environment Focal Point	

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
			• monitors contractor's compliance with all provisions of the EMP	
Use of labor from outside areas	Inadequate living facilities for non-local workers	• Labor camps, if any • Provide adequate sanitary facilities, potable water supply, waste collection, etc. • Test potable water supplies per Uzbek regulation • Ensure that locations of all labor camps are approved by PIU - Environment Focal Point; • Maximize use of local labor to minimize the need for temporary camps, and also to ensure socioeconomic benefit for the local population.	Contractor's Site Supervisor • ensures good construction management PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	Cost is included in the labor cost of the construction budget
Use of labor from outside areas	Non-local construction crews may generate increased demand for camp followers, illegal drugs, gambling, etc.	• Maximize use of local laborers who will live at home during construction.	Contractor's Site Supervisor • ensures use of local labor PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	No cost involved
Workers' Safety	Inadequate safety during work	• Contractor shall be required to use appropriate stabilizing techniques during excavations, especially during excavations for trenches, which will be down to 6 m depth, to avoid cave-ins. • Educate and train workers on regulations on work safety and risk prevention and to obey them • Workers exposed to noise impact greater than 85 Db(A) shall wear hearing protection. • Contractor shall make available all Personal Protection Equipment needed for workers, e.g. safety shoes, hard hats, safety glasses, and hearing protection • Asbestos cement pipe provisions detailed under pre-construction project stage	Contractor's Site Supervisor • ensures safe trenching methods • ensures workers' safety • ensure compliance with asbestos cement handling requirements PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	Cost of supervision included in cost estimate of the contract budget
• Operation & Maintenance Project Stage				
Toxic material released to environment	Damage to the environment and to people handling Haz-Mat, e.g. chlorine.	• Store all Haz-Mat in bunded areas, with ample ventilation. • Develop spill response procedures and provide spill response kits at all Haz-Mat storage areas. • Include routine training in proper handling of chlorine and other Haz-Mat in the O&M staff training, which covers the full	Vodokanal plant manager • ensures safe Haz-Mat handling and storage • develops spill response procedure and provides spill	Operational cost and training cost included in annual recurrent budget of PIA; After rehabilitation for

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
		range of technical and management skills required to safely operate the WDU; • Regularly inspect all chlorine dosing equipment, storage facilities and safety equipment. • Monitor all chlorine storage and dosing equipment and storage facilities for chlorine leaks.	response kits • ensures that O&M staff receives training in chlorination safety procedures from PIA PIU-Environment Focal Point • monitors plant manager's compliance with all provisions of the EMP	initial training of O&M staff $10,000 included in project cost
Accidents	Risks to workers and facilities due to hazards related to fire and other disasters	• Establish comprehensive safety regulations; • Train and equip all O& M staff to follow the regulations on occupational safety and risk prevention; • Install proper alarm systems; • Ground all electrical equipment and provide circuit breakers • Provide back-up water supplies for fire fighting. • Provide fire extinguishers at strategic locations around the site and monitor them for functionality	Vodokanal plant manager • ensures that O&M staff receives training in occupational safety from PIA PIU-Environment Focal Point • monitors plant manager's compliance with all provisions of the EMP	Cost involved in the annual budget of the implementing agency (Vodokanal) After rehabilitation for initial training of O&M staff $10,000 included in project cost
Contingency planning	Emergency measures as to what options are available and what measures are to be followed if the water quality of the WDU deteriorates, e.g. due to malfunction of chlorination equipment or pumps.	• PIA team will be available on short notice to identify a suitable solution to rectify the problem; When problem is identified and a solution is agreed upon, PIA will help find qualified specialists, who can deal with the problem.	• O&M staff and PIA (technical specialists) jointly with relevant local authorities dealing with Health/ Science and Technology	PIA Contingency expenses: If reserve O&M funds are insufficient, PIA staff will work with the local authorities to meet supplemental funding.

EMP = environmental management plan, EMU = Environmental Monitoring Unit, HRD = Human Resources Development, LARF = land acquisition and resettlement framework, O&M = operation and maintenance, PIU = project implementation unit, PIA = Project Implementing Agency (pCERWASS), PPTA = project preparatory technical assistance, SES = Sanitary and Epidemiological Services, WDU = water distribution unit,

Table A2.2: Environmental Monitoring Plan

Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency	Responsibilities	Cost
Construction Phase						
Control of	Dust, noise,	All construction	Visual observation and	Regularly during	Work supervisors of the PIU and	Work supervisors are

impacts of construction on people and environment	transport, waste disposal, land clearing, utilities and traffic impacts	sites	complaints by public	construction for compliance with the EMP requirements	EMU	under project budgets for construction
Operation & Maintenance Phase						
Adequate treatment of water prior to distribution.	Parameters shall be in accordance with Uzbekistan Standards for Water Supply O'z DSt 950:200	Monitoring locations shall be in accordance with Uzbekistan Standards for Water Supply O'z DSt 950:200	Laboratory analysis of samples at WDU laboratory facilities and SES laboratory, as per specifications in Uzbekistan Standards for Water Supply O'z DSt 950:200	Frequences for testing and analysis shal be Uzbekistan Standards for Water Supply O'z DSt 950:200.	Vodokanal is responsible for the daily monitoring of the water quality. SES is responsible for checking the self-control and records of the vodokanal, and will also sample and analyze as per Uzbekistan Standards for Water Supply O'z DSt 950:200	There will be adequate laboratory facilities at WDU after project completion for analysis of water quality - SES is already equipped with laboratory facilities for the tests to be done.

EMP = environmental management plan, EMU = Environmental Monitoring Unit, PIU = project implementation unit, SES = Sanitary and Epidemiological Services, WDU = water distribution unit.

CONSULTATION MEETINGS HELD IN THE OBLAST

Public consultation held on 2 July 2009


Vatan sajdagoh kabi muqaddasdir!

DO'STLIK bayrog'i

Xalq deputatlari Navoiy viloyati va Navoiy shahar Kengashlari gazetasi


ТАШКИЛОТЛАР ДИККАТИГА!

ВНИМАНИЮ ЗАИНТЕРИСОВАННЫХ ОРГАНИЗАЦИЙ!

List of Participants

Навоий вилояти Кармана шахри сув таъминоти тизмини кайта таъмирлаш ишларига багишланган семинар катнашчиларнинг

РУЙХАТИ

№	Катнашувчининг фамилияси ва исми-шарифи	Иш жойи ва лавозими	Имзоси
1	2	3	4
1	[illegible] Б.	"[illegible]" м.ф.й	
2	[illegible] Р.	"Гулобод" м.ф.й	
3	Бозоров Фарход	"Дехқон" м.ф.й	
4	Рахматова Р.	М.С бахром м	
5	Зиёева	Гулобод	
6	Бобонов	М.С Бахром	
7	Исмоилов Ф	Туман ҳок. [illegible]	
8	Тухтаева Д	"[illegible]" [illegible] директор	
9	Файзиев И	Фаровон м.ф.й	
10	Бекова Р	Кўзи-Бўстон котиб	
11	Рахмонова Д	У. Юсупов маслаҳат.	
12	Юлдашева Д	Кармана шаҳар сув	
13	Хасанова [illegible]	Кармана [illegible] сув	
14	Умаров Музаф	Кармана шаҳар дирек.	
15	[illegible]	У. Юсупов	
16	Ханиев	У. Юсупов	
17	Норкулова М	Фаровон м.ф.й [illegible]	
18	Халилова	Дехқон м.ф.й	
19	Нурбекова	У. Юсупов м.ф.й	
20	Наимова	М.С бахром м.ф.й	
21	Турматов	[illegible]	
22	Отакулов Камол	Архитектура	
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			

Republic of Uzbekistan

Uzbek Agency "UZKOMMUNHIZMAT"

ADB TA 7240: Water Supply and Sanitation Services Improvement Program (WSSSIP)

Water Supply Appraisal Report

Sub Project 3

Galaasiya Water Intake Facility Development

August 2009

Acronyms

AC	Asbestos Cement (pipe)
ACS	Automatic Control System
ADB	Asian Development Bank
AR	Appraisal Report
BCR	Benefit-Cost Ratio
CIA	Cumulative Impact Assessment
CMU	Contracts Monitoring Unit
DMF	Design and Monitoring Framework
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
ECA	Environmental Consequences Assessment
EIRR	Economic Internal Rate Of Return
EMDF	Ethnic Minority Development Framework
EMP	Environmental Management and Monitoring Plan
EMU	Environmental Monitoring Unit
ENPV	Economic Net Present Value
EOCC	Economic Opportunity Cost of Capital
FIRR	Financial Internal Rate of Return
FNPV	Financial Net Present Value
FMAQ	Financial Management Assessment Questionnaire
FMICRA	Financial Management Internal Control and Risk Assessment
GOU	Government of Uzbekistan
GPS	Global Positioning System
Haz-Mat	Hazardous Material
HDPE	High-Density Polyethylene
HH's	Households
IA's	Implementation Agencies
IEA	Initial Environmental Assessment
IEE	Initial Environmental Examination
IFI	International Financing Institutions
IKS	ISLOHOTKONSALTSERVIS (responsible for the completion of the NFS)
IPDP	Indigenous Peoples' Development Plan
IRTM	Inter Regional Trunk Main
KPI	Key Performance Indicators
LAR	Land Acquisition and Resettlement
LARF	Land Acquisition and Resettlement Framework
LARP	Land Acquisition and Resettlement Plan
MIS	Management Information System
MOE	Ministry of Economy
MOF	Ministry of Finance
MOU	Memorandum of Understanding
MFF	Multi-Tranche Financing Facility
NFS	National Feasibility Studies
NPSH	Net Pressure Suction Head
NRW	Non Revenue Water
OM	Operations Manual
O&M	Operation and Maintenance (costs of)
PIU	Program Implementation Unit
PFR	Periodic Financing Request
PPP	Public Private Partnership
PPTA	Project Preparation Technical Assistance
PPMU	Project Preparation Management Unit
PVC	Polyvinylchloride
REA	Rapid Environmental Assessment
RRP	Report and Recommendation to the President
SCNP	State Committee for Nature Protection
SERF	Shadow Exchange Rate Factor
SES	Sanitary and Epidemiological Services
SESU	PPMU's Social and Environment Subunit
SIEE	Summary Initial Environmental Examination
SNIP	Uzbekistan Regulatory Standards
SNPC	State Nature Protection Committee
SOE	Statement of Expenditure
SPRSS	Summary Poverty Reduction and Social Strategy
STP	Simplified Technical Proposal
SWRF	Shadow Wage Rate Factor (unskilled labour)
TA	Technical Assistance
TDS	Total Dissolved Solids
UCSA	Uzbekistan Communal Services Agency
UTS	Urban Type Settlement
WACC	Weighted Average Cost of Capital
WDU	Water Distribution Unit
WHO	World Health Organisation
WSS	Water Supply and Sanitation
WYGI	White Young Green International (PPTA lead company)

Table of Contents

1. BACKGROUND 5

1.1 Introduction 5

1.2 Project Location 5

1.3 Scope of Work 6

1.4 Appraisal Report - Technical 7

1.5 Design and Preparation of Documents for Approval of Government of Uzbekistan 7

2. EXISTING WATER SUPPLY & DISTRIBUTION SYSTEM 8

2.1 Existing Network Operation 8

2.2 Existing Operational Problems 8

2.2.1. Galaasiya Distribution Centre 9

2.2.2. Transmission and Distribution Network 9

2.3 Current Water Quality 10

3. APPRAISAL REPORT CRITERIA 11

3.1 Peak Flow Factors 11

3.2 Pipeline Hydraulics 11

3.2.1. Sizing 11

3.2.2. Hydraulic Calculation 12

3.2.3. Proposed System Layout 12

4. WATER DEMANDS 12

5. PROPOSED IMPROVEMENT WORKS 13

5.1 Option 1 Part 1 - Intake from IRTM 13

5.2 Option 1 Part 2 - Extension of Transmission Main 14

5.3 Option 1 Part 3 - Rehabilitation of Distribution Network 14

5.4 Option 2 – Rehabilitation of Boreholes 15

5.5 Option Recommendations 15

5.6 Preliminary Cost Estimates 15

5.7 Improvement Benefits 15

5.7.1. Levels of Service 15

5.7.2. Operating Costs and Income 16

5.8 Pipeline Materials 16

5.9 Civil and Mechanical Works 16

5.9.1. Storage Reservoir 16

5.9.2. Booster Pump 17
5.9.3. Chlorination 17
5.9.4. Plant and Equipment for O&M 18
6. DUE Diligence 18
6.1 Land Acquisition and Resettlement 18
6.2 Social Analysis 19
6.3 Institutional Strengthening and Capacity Development 19
6.4 Economic and Financial Analysis 20
6.5 Initial Environmental Examination 20
6.6 Earthquake Zone 20

1. BACKGROUND

1.1 Introduction

The proposed Multi-tranche Financing Facility program (Investment Program) is planned to be undertaken in four Tranches over the period 2009 to 2018. The water supply and sewerage systems in most of the towns and cities across the 12 provinces of Uzbekistan are in various stages of disrepair and require rehabilitation, upgrading and expansion. The total financing needs identified for the sector are estimated at $3.2 billion. ADB's proposed Investment Program will finance up to $375 million (including $75 million Government Funding). As envisaged at project preparation, each tranche will focus on three different provinces. The Executing Agency for the Investment Program is the Uzbekistan Community Services Authority (UCSA), which is responsible for implementing externally financed projects in the sector.

Operation of the Inter-regional transmission mains (IRTM's) is the responsibility of UCSA. Delivery and operation and maintenance (O&M) of water supply and sewerage (WSS) services are the responsibility of province (oblast) and district (rayon) vodokanals. All vodokanals are potentially eligible to apply for inclusion under the Investment Program, but will be evaluated against the eligibility criteria established with the Government. Commitment by the vodokanals to institutional and financial reforms is an important aspect of eligibility, with a view to full sustainability after the water and sewerage facilities have been upgraded.

Under Tranche 1 of the Investment Program 13 subprojects have been identified as being eligible including:

- Damkhodja IRTM water intake facility,
- 11 District Centre/city water supply and distribution systems, and
- Termez City sewage collection system and wastewater treatment plant.

Of these, four subprojects confirmed as meeting the eligibility criteria have been appraised in sufficient detail to confirm physical works, cost estimates, O&M costs, environmental and social safeguards, and economic and financial sustainability. They will be used as samples for the succeeding subprojects in Tranches 1-4. The four sample projects are the Damkhodja ITRM Water Intake Facility, the water supply and distribution systems in Karmana (Navoi Province) and Galaasiya (Bukhara Province), and the Termez (Surkhandarya Province) sewerage system.

This appraisal report is for the **Galaasiya** water supply sub-project.

1.2 Project Location

Galaasiya City is situated in Bukhara Province in a short distance north of Bukhara City (Figure 1). The proposed project relates to the urban area of Galaasiya, preliminary network improvements have been identified for the rural area surrounding the city. However UCSA has decided that the rural areas may be included in a subsequent phase of the Investment Program, or addressed through locally financed schemes.

Figure 1: Galaasiya subproject location

1.3 Scope of Work

The scope of work in preparing this appraisal reports included:

- Undertake detailed site visits to Galaasiya vodokanal to verify data. Identify data requirements and determine, from discussions with vodokanal management, how the current water supply and distribution infrastructure operates and the problems encountered operating the system;
- Evaluate the Galaasiya proposal against the agreed eligibility criteria for participation in the Investment Program;
- Review all UCSA reports and recommendations for the water sector in Uzbekistan and in particular for Galaasiya vodokanal;
- Prepare identification of the improvements required to bring the water supply, transmission and distribution infrastructure in Galaasiya vodokanal to Uzbekistan water service standards;
- Develop options for delivering the identified improvements to the Galaasiya vodokanal infrastructures;
- Analysis and selection of the preferred option to delivery the improvements to the Galaasiya urban water distribution network, based on value engineering and least cost principles, while meeting design and service standards;
- Development of pre-design cost estimates;
- Provision of criteria, general specifications, to be used for the later detailed design and tendering and construction;

- Preparation of an initial environmental examination (IEE), including an environmental management plan (EMP), to mitigate identified impacts. Related costs have been included as a line item in the subprojects costs estimates;
- Initial screening for resettlement requirements and preparation of a resettlement plan if required. Related costs have been included as specific line item in the subproject costs estimates;
- Preparation of economic and financial analysis;
- Incorporation of social and gender action plans including a program to improve hygiene in local schools, health clinics and hospitals;
- Projected revenue requirements, budget, and cost recovery plan including analysis of current and projected water tariff requirements, financing of gaps in revenue versus costs.

1.4 Appraisal Report - Technical

The main objectives of the appraisal report are:

- Identification of the operational problems currently impacting on the provision of adequate water supplies to customers of the Galaasiya urban water supply, transmission and distribution system.
- Identification of water demand projections including adequate provision for fire fighting according to Uzbekistan standards.
- Development of the water supply and distribution improvement options.
- Provide recommendations for the investment requirements to improve water supplies in Galaasiya urban area.
- Development of pre-design level cost estimates.
- Development of criteria for use in the detailed designs of the Galaasiya city infrastructure improvements.
- Ensuring that water quality provided to the city complies with Uzbekistan standards.

1.5 Design and Preparation of Documents for Approval of Government of Uzbekistan

After Government and ADB approval of the Investment Program, the following work will be carried out by UCSA and their consultants:

- Field surveys using GPS, satellite images, latest maps and supplementary field surveys.
- Topographical maps and profile drawings for all proposed pipelines including all reference points, with details inset for hydrants, valves, meters, service connections, and other equipment.
- Confirmation of water demand production, water quality, pumping and network operating pressures
- Use of hydraulic network model to confirm pre-feasibility pipeline diameters and flows.
- Production of final design report, specifications, and cost estimates.

- Production of tender documents and support to UCSA with the procurement process.

2. EXISTING WATER SUPPLY & DISTRIBUTION SYSTEM

2.1 Existing Network Operation

The total population of the urban and semi urban areas is 18,370 of which 15,430 are covered by the urban water distribution network. In the semi urban area the population of 2,944 are covered by the urban water distribution system. There are an estimated 3,674 domestic, 29 institutional and 85 commercial/light industrial connections.

Water supplies to Galaasiya urban areas are currently provided from one water source:

Import from the 1400mm diameter Inter Regional Trunk Main (IRTM), this connection provides 775m^3/day to the city water supply distribution network.

The Distribution Centre for Galaasiya contains an inlet water meter, 500m^3 storage reservoir, booster pump and a drip feed chlorination unit. The inlet water pressure at the IRTM import point is 0.2bar (2.03mh).

Near to the IRTM distribution centre the vodokanal has three boreholes; these are currently not in operation. Historically, the poor-quality water from these boreholes was blended in the 500m^3 service reservoir with the water from the IRTM.

A 400mm transmission main transfers the water from the IRTM import to the Galaasiya distribution network; it has a total network length of 27.26km. The majority of the network is of unlined steel pipes with diameters ranging from 100mm to 400mm; 20.53km was laid in 1964, 4.85 km in 1980 and the remaining 1.87km in 1984. Of the total network length 12.96km is laid in unlined 100mm diameter steel pipes, [48%]. A total of 3km of small diameter distribution mains have been replaced in the last 10 years.

Water supplies to customers are on a scheduled timed basis of four to five hours per day, supplied direct by gravity from the IRTM, the maximum pressure of 0.4 bar is insufficient to supply all customers, 20% do not receive water supplies from the network and have to rely on tanker supplies at a cost of 100 soum per 10 litres.

No chlorination is undertaken in the water supply and distribution network. The results of bacteriological & chemical water samples were not available for review.

The existing water distribution network is indicated in Appendix 3.

2.2 Existing Operational Problems

The city is currently experiencing many water supply and distribution problems, the key ones are indicated below:

2.2.1. Galaasiya Distribution Centre

(a) The water pressure at the IRTM import point is only 0.4 bar (4.1mh) and this pressure is insufficient to supply water to the inlet of the service reservoir. The supply from the IRTM is limited to four hours operation per day, producing a maximum of 775m^3/day.

(b) The 500m^3 storage reservoir is in very poor condition, the walls and floor joints are leaking and the roof has partly collapsed; the reservoir is not in operation.

(c) The booster pump at the IRTM import point is currently disconnected from the operating system, the vodokanal have unpaid energy accounts and the electricity supply to the pump has been disconnected.

(d) The city is supplied by gravity direct from the IRTM using a 400mm steel transmission main, the 0.4 bar pressure is insufficient to supply 20% (2650) of existing customers in the urban area.

(e) The vodokanal income is insufficient to pay the import tariffs to the Damkhodja IRTM – O&M Administration, an agreement has been reached for a restricted gravity supply for approximately two 2 hour periods per day, this quantity and low pressure cannot provide adequate supplies to customers in Galaasiya.

(f) The chlorination dosing unit which was designed to drip feed into the storage reservoir is not operational.

(g) The Galaasiya import point has an old mechanical water meter; the intake supply totals are based on this existing meter; it is unlikely that the data is accurate.

(g) The Vodokanal has three boreholes located near the existing service reservoir; the hardness level is significantly higher than current Uzbek standards. The boreholes are not in operation due to the water quality and lack of pumping equipment. When in operation the water from the boreholes was blended with the imported IRTM water in the service reservoir.

(h) One of the three transformers requires replacement and a security fence is required around the transformer installations.

2.2.2. Transmission and Distribution Network

(a) A total of 20.53km (75.3%) of the distribution network is laid in unlined steel pipelines which are approximately 40 years old. These mains have a high level of deterioration and are the cause of many real network water losses with NRW quoted at >60%. Insufficient accurate data are available to be able produce an International Water Association (IWA) water balance to confirm the network losses; however it is likely that the real water losses will exceed 50%. (Vodokanals tend to use normative values for estimating water losses and in the absence of accurate meters, these normative values are used for reporting water supply and calculating losses)

The normal Key Performance Indicators (KPI's), indicated below, required to support a mains renewal and reinforcement programme are not available, the vodokanal's assessment of mains rehabilitation requirements is based on the age of pipes.

- NRW (m3/km/day)
- Pipe Repairs (Number/km/year)

- NRW (litres/connection/day)
- Bacteriological Failures (number/km/year)
- Chemical Failures (Number/km/year)
- Customer Complaints (Number/km/year)

Two mains and service repairs are being undertaken on a daily basis.

(b) The combination of limited supply schedules and low operating pressures reduces the number of customers who can receive adequate water supplies. Other customers have to rely on tanker supplies, for which they have to pay and in turn they refuse to pay the Vodokanal billed charges for a non existent service. Consequently the Vodokanal has insufficient income to pay its outstanding utility invoices.

(c) The combination of real water losses in the network, high deterioration of the cast iron and steel pipelines, limited supply schedules/hours of operation and low operating pressures means that all connected customers receive a poor service, much below Uzbekistan standards. In the majority of cases no water available above the ground floor in multi-story buildings, nor is there sufficient pressure to meet fire protection standards.

2.3 Current Water Quality

The current key water quality indicators for the sources supplying Galaasiya are indicated in Table 1 below:

Table 1 – Galaasiya Water Quality Information

Component	Galaasiya Water Quality Analysis			
	Unit	WHO	Uzbek Standard 950:2000	Karmana WDU
PH	Units	6.5-8.5	6-9	7.6
TDS	mg/l	1000	1000 (1500)	525
Calcium Ca	mg/l	200		N/c
Sodium Na	mg/l	200		N/c
Chloride Cl	mg/l	250	250	16.4
Sulphate SO4	mg/l	400		N/c
Nitrate NO3	mg/l	50	45	4.3
Hardness Ca+Mg	Mg*ecv/l	500	7/10	6.4
Turbidity	NTU		1.5/2.0	0.12
Ammonium NH4	mg/l	0.5		N/a
Polyphosphate Phosphorus	mg/l		3.5	N/c
Fluoride F	mg/l	1.5	0.7	N/c
Nitrite NO2	mg/l	3	3	N/a
Iron Fe	mg/l	0.3	0.3	0.06
Manganese Mn	mg/l	0.5	0.1	N/a
Copper Cu	mg/l	1	1	N/a
Lead Pb	mg/l	0.01	0.03	N/c
Chromium Cr	mg/l	0.05	0.05	N/c
Cadmium Cd	mg/l	0.003	0.001	N/c

Component	Galaasiya Water Quality Analysis			
	Unit	WHO	Uzbek Standard 950:2000	Karmana WDU
Zinc Za	mg/l	3	3	N/c
Nickel Ni	mg/l	0.07	0.1	N/c
Arsenic As	mg/l	0.01	0.05	N/c
Alpha	Bq/l	0.1	0.1	N/c
Beta	Bq/l	1	1	N/c
Aluminium Al	mg/l		0.2(0.5*)	N/c
Beryllium Be	mg/l		0.002	N/c
Boron B	mg/l		0.5	N/c
Cadmium Cd	mg/l		0.001	N/c
Molybdenum Mo	mg/l		0.25	N/c
Mercury Hg	mg/l		0.0005	N/c
Selenium Se	mg/l		0.01	N/c
Strontium Sr	mg/l		7	N/c
Benzol C_6H_6	mkg/l		10	N/c
Benzpyrene	mkg/l		0.01	N/c
Polyakrilamid	mkg/l		2	N/c
Total Coliforms	MPN/100ml	Not Allowed	<100	N/c
E Coli	MPN/100ml	Not allowed	<3	<3
Free Chlorine	mg/l		0.2 – 0.3	0.11

N/c –Not conducted (Analysis)
N/a – Not available

3. APPRAISAL REPORT CRITERIA

The general design criteria used in this appraisal report to determine the operating pressure, main and pipe diameter and related operational fittings (valves, meters, air valves, non return valves and fire hydrants) of the proposed transmission and distribution mains are summarized below. While the Uzbekistan standards for minimum pressure, fire flows and hours of supply have been followed, these will be further checked and expanded in the detailed design stage.

3.1 Peak Flow Factors

Uzbekistan standards have been used to calculate the multiplying factor for the peak day, this varies from 1.3 to over 2 times the daily average demand.. The peak hourly rate, which could occur twice per day, should be twice the peak day flow rate. This takes into account the 10 l/sec additional flow required to be provided for fire fighting purposes, for a 2 hour eventuality as per the SNIP (Uzbekistan regulatory standards).

3.2 Pipeline Hydraulics

3.2.1. Sizing

Pipelines will be sized to meet the maximum specified flow rate to achieve the defined levels of service. Inlet mains to storage will not be required to meet the full peak flow rates.

3.2.2. Hydraulic Calculation

Hydraulic calculations will be conducted using the Hazen Williams Equation for the calculation of friction loss; the roughness factor applied for HDPE is 100[1].

In the later detailed design stage it is recommended the hydraulic calculations be conducted using Water Cad software

3.2.3. Proposed System Layout

The final designed water supply and distribution layout will generally depend on the following factors:

- Quantities of water to be pumped, based on peak hour and fire flows
- Operating Pressure
- Reliability of supply
- Good access for maintenance
- Location of sluice valves, air valves and washouts.
- Adverse ground conditions and difficult terrain.
- Pipe materials and corrosion protection systems in aggressive or contaminated grounds for ductile iron or steel pipes.
- Crossing of railways and water courses
- Depth of frost penetration
- Private ground and Rights of Way
- Traffic loading
- Location of other utilities equipment
- Ease of operation

After all the above have been taken into consideration, site investigations undertaken and agreement reached with other utility operators, the most appropriate pipeline route can be selected. However, generally the replacement, and new water mains and distribution pipe, will follow existing road, street and other utility rights of way.

4. WATER DEMANDS

From the data available for analysis the water demands for the period 2009 to 2025 is indicated in Table 2 below:

Table 2 Galaasiya Water Demand Projections – 2009 to 2025.

Water Demand Factors	2009	2015	2025
Total Population of Galaasiya Urban Area	12,300	12,810	13,730
Total Population of rural area supplied	2,940	3,250	3,700
Total Population Connected	100%	100%	100%

[1] This is a conservative figure – HDPE can be rated at up 140, but doing do makes little difference to pipe diameters

Water Demand Factors	2009	2015	2025
Number of Urban Water Connections	13,035	13,623	14,655
Domestic Water Consumption – l/c/day	80	150(R115)	150(R115)
Daily Domestic Water Demand –m^3/day	**1,043**	**2,015**	**2,166**
Commercial and Industrial Consumption – m^3/day	82	101	541
Daily Water Demand – m^3/day	**1,125**	**2,116**	**2,707**
Expected Daily Water Availability – m^3/day [Damkhodja &1 B/H]	**1,392**	**2,115**	**2,707**
Distribution Losses and VK Own Use – %	18%	30%	30%
Water Available for Resale – Domestic and Industrial	1,141	1,481	1,895

5. PROPOSED IMPROVEMENT WORKS

Due to the extensive deterioration of the existing system only the most urgent and major components can be replaced under this subproject/Investment Programme. Continued improvement of the systems will need to be carried out even after this intervention by the provincial PIU's and/or vodokanals. Their technical capacities will have been strengthened under the Investment Programme. The tariff reforms will lead to increasing revenues enabling the vodokanals to conduct their own leakage detection and repair, meter maintenance and expansion to connect new consumers as the population increases. If further evaluations reveal that more work is required now to attain targets of improved service/leakage reduction, UCSA could consider such follow-on works under later tranches of the Investment Programme.

Indicated below are the two options for improvement in water supplies to Galaasiya City, option 1 is in three parts, as indicated in Sections 5.1, 5.2 and 5.3 below:

5.1 Option 1 Part 1 - Intake from IRTM

It is proposed that the following rehabilitation and improvement work be undertaken at the bulk supply import point; this work should be undertaken in Phase 1 of the improvement proposals:

(a) Installation of 200mm electromagnetic meter (EM) water meter at import point from the IRTM.

(b) Construction of chlorination building with storage, mixing, and dosing equipment for hypochlorite solution feed system.

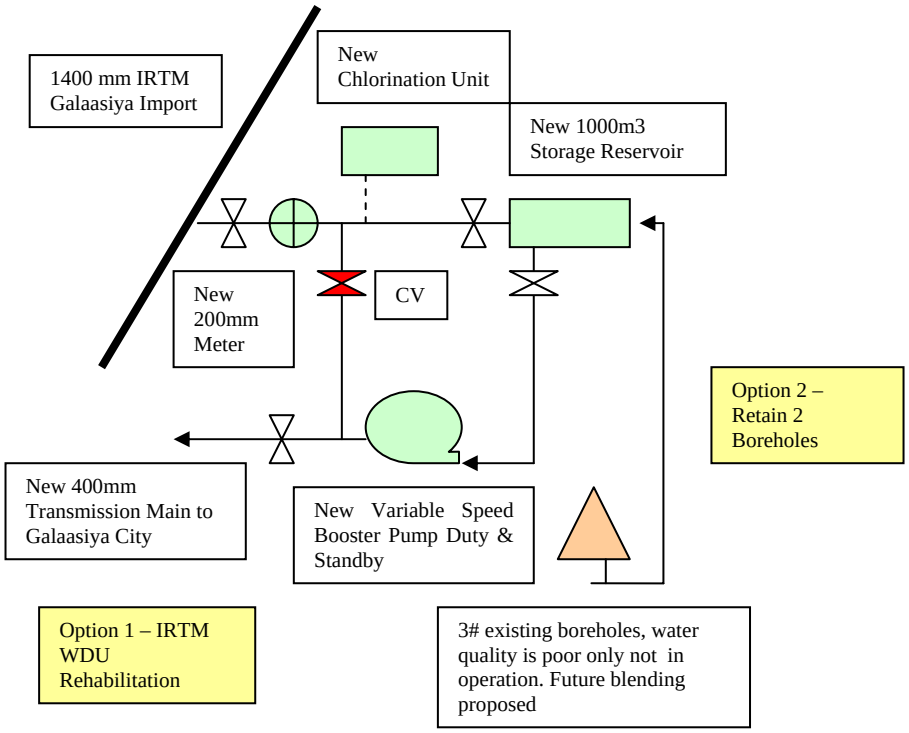
(c) Construction of two 1,000m^3 RC storage reservoirs.

(d) Construction of Booster Pumping Building and Electrical Room.

(e) Installation of Variable Speed booster pump and standby unit.

(f) The chemical water quality from the boreholes should be fully analyzed to correctly determine whether they can be involved in the future water supply plans for Galaasiya VK.

The layout for the above improvement works at the IRTM is indicated in Sketch 1 below.



Sketch 1 – Proposed Improvement Works at Galaasiya IRTM Connection

5.2 Option 1 Part 2 - Extension of Transmission Main

It is proposed that the following rehabilitation and improvement work be undertaken in the transmission system:

(a) Construction of a new 200mm transmission main in the existing water distribution network to reinforce the network in the outer areas of the city and connect into the existing Galaasiya distribution network.

The transmission main lengths, materials and diameters are indicated in **Appendix 2.**

5.3 Option 1 Part 3 - Rehabilitation of Distribution Network

It is proposed that the following rehabilitation and improvement work be undertaken in the water distribution system: (The proposals are based on information from the vodokanals, site inspections, and UCSA inputs).

(a) New construction of 5.3 km of 200 and 100 mm sections in the existing Galaasiya distribution network and connection into the existing distribution mains. (Note: final quantities to be based on detailed evaluation of the existing system during detailed surveys and analysis under the detailed design).

(b) Rehabilitation of 28.9 km of 100 - 300 mm diameter sections of the existing distribution network, including replacement of 3,086 house connections to the new water distribution network system. Installation of valves and water meters to each service connection. (Note:

while there currently about 3,674 connections to the Galaasiya water supply area, 588 of these are in the in the immediate surrounding rural areas, improvement of which are not included in the subproject as decided by UCSA).

The distribution network main lengths, materials and diameters are indicated in **Appendix 2**

5.4 Option 2 – Rehabilitation of Boreholes

It is proposed that the following rehabilitation and improvement work be undertaken at the existing boreholes:

(a) Cleaning two of the existing three boreholes.

(b) Install new submersible pumps, rising mains, cables, dipping tubes and electrical panels and equipment.

(c) Construct new 150mm pumping main direct to the service reservoir at the IRTM import point.

5.5 Option Recommendations

It is recommended that both options are included in the improvement works for Galaasiya City.

Due to the high hardness of the water from the boreholes it would have to be blended with Damkhodja supplies in the service reservoir prior to pumping to distribution. Calculations indicate that a flow of 35m^3/hour (0.84Ml/day) from one borehole would provide an acceptable quality of blended water. The second borehole would be on standby and rotated on a regular basis, the third borehole would be abandoned.

5.6 Preliminary Cost Estimates

The preliminary cost estimates for Galaasiya activities works is US$ 4,2 m. The detailed breakdown of the costs based on preliminary data is indicated in **Appendix 2**.

The actual cost for Galaasiya subproject activities will be identified during the detail design.

5.7 Improvement Benefits

The following benefits are expected from the improvement works:

5.7.1. Levels of Service

About 30% of customers in the Galaasiya urban area do not pay their water bills, because they do not receive adequate water supplies. On completion of the proposed improvement works water supplies will become available to all existing customers with increased l/c/d from 46 to 150 from 2010 to 2018. It is further intended, with additional pipeline replacements and distribution system expansion, to increase flows to a minimum of 150 l/c/d by 2025, in accordance with Uzbekistan requirements. System operating pressures will be a minimum of 10 m of head.

Water quality supplied will comply with Uzbekistan water quality standards.

5.7.2. Operating Costs and Income

(a) Initially, billed income will increase when the new system becomes operative as consumers will have access to water 24 hrs/day with higher pressure compared with the current 4/5 hours per day at low pressure. Furthermore supply will continue to improve/ in stages from 2012 to 2018, due to reduction in real network water losses as the rehabilitation is completed and leakage detection and repair programs are introduced in the vodokanal, along with increased output from the Damkhodja IRTM, the new feeder main system, reservoir storage and booster pumps. Billed income should increase from the 3,900 customers who currently refuse to pay for billed water; the additional income is estimated at Soum10.2M per year.

(b) The real water losses in the distribution network are expected to reduce by a minimum of 15% when the proposed distribution rehabilitation work is completed.

(c) Cost of materials and leakage repairs will be reduced as the numbers of defects reduces after the completion of the work.

(d) There will be an increase in electricity costs for operation of the new booster pump, compared with the existing pump (when it is working); however the new variable speed will have high efficiency and will have a low operating head. The new pumps and motors will have a combined efficiency of > 80%. There will also be additional electricity costs for the operation of one rehabilitated borehole.

(e) The estimated O&M costs of the rehabilitated system, including effective chlorination systems and energy increases, will be determined in conjunction with the vodokanal after the design stage site visit and if any change to the sub-project scope has been agreed with UCSA.

(f) Based on current water tariff of 54 soum/m^3, the projected revenue for the Galaasiya water supply system in 2018 will be 54 x 3,642 (from table 2)= 196,668 soums/day ($106).

5.8 Pipeline Materials

The transmission and distribution mains up to and including 400mm diameter will HDPE Class PN 25.

The pipelines between the IRTM import point to the outlet from the booster will be Flanged Ductile Iron with cement mortar lining to EN BS 545.

5.9 Civil and Mechanical Works

5.9.1. Storage Reservoir

The reservoir will be constructed from reinforced concrete, with a capacity of 2,000 (2x1,000) m^3, it must contain inlet main with ball valve, DN400mm outlet main, DN400mm valved washout main and DN400mm overflow pipe. The discharge from the overflow and washout must be taken to a suitable point.

Two access points to the reservoir will be provided in the roof slab, with access ladders internally and externally at the access points. DN 100mm vents and roof drainage system will be installed.

A 200mm EM water meter will be installed between the import point and the inlet to the storage reservoir.

A reservoir water level indication gauge will be installed in the pumping station building.

5.9.2. Booster Pump

The distribution network system has no water storage, therefore for efficient operational management, particularly at times of low demands; variable speed pumps will be used.

Velocity in the variable speed pump suction manifold will be designed to be around 1.0 m/s to improve the NPSH available at the pumps. The pump discharge velocity should be less than 1.5l/s. The standby pump capacity will be 100% of the operational requirement.

The pump efficiency should be > 83%, it should be a single stage centrifugal pump with horizontal split casing driving through a flexible coupling. The electric motor will be continuously rated at least 15% above the power adsorbed by the pump at the duty pump, the motor efficiency shall not be less than 96%. The combined efficiency will be >80%.

5.9.3. Chlorination

(a) UCSA has indicated that they plan to install gas chlorinators under the Investment Program. However, considering the weak technical capacity and lack of O&M funds, gas chlorination may prove too complicated and potentially dangerous, especially for the smaller, less skilled vodokanals. The capacity of vodokanals to operate and maintain gas chlorinators, even after capacity building and training should be reviewed carefully by UCSA at the detailed design stage. The chlorination building will have 2 separate rooms, one for the gas cylinders and the second for the chlorine feed equipment. Both doors into the building must open outwards

(b) The following chlorination equipment must be installed:

- Chlorine cylinders filled with 65kg liquid Cl_2, suitable for drinking water.
- Isolating valves for each cylinder, gas manifold from cylinders to the chlorinators.
- Automatic cylinder change-over switch actuated by a pressure gauge.
- Emergency shut-off valve.
- Pressure reducing valve with pressure gauges and strainer.
- Safety vent valve with outgoing pipe ending above the building roof.
- Vacuum regulating valve and vacuum safety valve.
- Control panel for controlling components installed in the chlorine storage room, including alarm light and audible alarm of chlorine leakage.

(c) Chlorinators should be of the modular, V-notch, vacuum operated type housed in free standing cubicles. The chlorinators will be operated in conjunction with motive water pumps and each chlorinator shall be complete with its injector unit, manifold gas inlet, vent and drain lines. The chlorinators shall also be complete with a flow meter having a 20:1range, differential pressure regulator and vacuum/pressure relief devices.

(d) The following health and safety equipment should be provided:

- Gas leakage and monitoring equipment
- Controlled air ventilation of chlorine building.

- Safety equipment and leak detection equipment.
- Chlorine leak detection equipment
- Water sample test equipment.

5.9.4. Plant and Equipment for O&M

PPTA consultants in conjunction with PPMU and vodokanal will determine and agree the following:

- A list of equipment required for the vodokanal to be able to maintain the rehabilitated works;
- Vehicles and excavators
- O&M maintenance equipment,
- Emergency pipe stocks based on usage and diameter.
- Pipe stocks for network extensions and diversions.
- Fittings for replacing and installing /new service connections,
- Joints and VJ repair clamps for mains and service repairs.
- Safety equipment.
- Computers and office equipment.
- Domestic water meters replacements
- Spare parts for electrical/mechanical equipment will be added to the supply contracts for 3 or 5 years usage.
- Hach equipment for on site water quality testing.
- Leakage detection equipment

6. DUE DILIGENCE

6.1 Land Acquisition and Resettlement

A short Land Acquisition and Resettlement Plan (LARP) was prepared to mitigate impact of the resettlement during the Galaasiya subproject for rehabilitating and improving water distribution system network for Galaasiya.

The LARP has been prepared based on census and socio-economic survey that was carried out considering outcome of the preliminary engineering and technical design as per requirement for replacement of water distribution network.

The complete report is presented in the **Appendix 5**.

6.2 Social Analysis

No risk of negative social impact by the water sub-project in Galaasiya City has been identified. People's need for an increased and improved supply of potable water was found to be critical and urgent. More than half of households need to fetch water from sources outside the home for household purposes, and in 57.8% of Galaasiya households this is the predominantly the responsibility of women and children. The majority of households must currently fetch water from elsewhere at least once a day. The high level of demand for the proposed sub-project is also illustrated by beneficiaries' stated willingness and capacity to pay for connection fees and user charges, and to contribute to the cost of service provision if necessary. The proposed sub-project will therefore directly address this need for improved water supply.

It is clear that households, local enterprises and institutions have the necessary capacity to use and maintain the proposed improved water service. Water metering is also seen by beneficiaries as an equitable system and a way of rationalising the use of piped water, and no objections to this have been raised. In order to increase awareness of the sub-project however, it would be beneficial to conduct information campaigns in the local neighbourhoods, schools and hospitals to explain the work that will be carried out and the expected results from the sub-project. The beneficiary communities possess sufficient technical knowledge and skills which will contribute to the sustainability of sub-project benefits, and there is significant evidence of current participation and co-operation in local self-help activities related to local water supply.

There are significant levels of social capital in local neighbourhoods as indicated by the degree of social cohesion and support mechanisms within the community. Parents bring containers of water in their cars to their children's schools in order to alleviate the shortage of clean water in schools. Communities strive towards settling internal disputes concerning water distribution and towards building consensus. An analysis of current expenditure, time and effort in purchasing water from water vendors and from fetching water from distant sources, indicates that the cost and quality of improved water supply will compare favourably with current costs.

The complete report is presented in **Appendix 6**.

6.3 Institutional Strengthening and Capacity Development

An initial assessment of current institutional structure and capacities of the Galaasiya vodokanal was conducted as part of the Investment Program. Main objectives of the initial assessment were to: (i) identify role, responsibility, obligations, property rights, and legal obligations of all stakeholders; (ii) review production objectives, schedules, monitoring and control systems as well as technical training requirements; (iii) review current institutional capacity of the vodokanal; (iv) determine training needs for personnel and/or staff reorganization; (v) ascertain needs for equipment and other supplies to improve productivity and develop a procurement action plan; (vi) identify potential managers who would benefit from having a personnel development plan and ascertain training needs program for such staff; (vii) identify potential trainers able to train their colleagues within an organization; (viii) analyze current incentives schemes (if available) in the vodokanal; (ix) determine major drawbacks in performance of vodokanal, particularly in planning and management; (x) ascertain water supply and sanitation tariff calculation and approval procedures.

The complete report is presented in the **Appendix 7**.

6.4 Economic and Financial Analysis

Benefit-cost analysis for the subproject was undertaken to determine subproject economic and financial viability. The main viability parameters used are the BCR, EIRR and ENPV for economic analysis and FIRR and FNPV for financial analysis. The proposed subproject is economically viable if the resulting BCR is greater than 1.0, EIRR exceeds the economic opportunity cost of capital EOCC at 12%, and ENPV is positive. Similarly, the subproject is financially viable if FIRR is greater than the weighted average cost of capital WACC at 3.3%, and FNPV is positive.

The complete report is presented in **Appendix 8**.

6.5 Initial Environmental Examination

An Initial Environmental Examination (IEE) study for the Galaasiya subproject was carried out following the Environment Policy (2002), and Environmental Assessment Guidelines (2003), of the ADB and relevant environmental policies and guidelines of the Government of Uzbekistan (GoU).

The IEE involved: (i) gathering baseline information available on the physical, chemical, biological, and socio-economic environment of the sub-project area and subcomponent sites and understanding the technical, social, and institutional aspects of the sub-projects; (ii) public consultation and field visits; (iii) screening of potential issues, concerns, and impacts relative to location, design, construction, and operation to distinguish those that are likely to be significant for a particular subcomponent and warranting further study; (iv) recommending measures to mitigate adverse issues, concerns, and impacts, particularly to the project design team; (v) preparing an Environmental Management Plan (EMP) indicating impact areas, recommended mitigation measures, method of monitoring the impacts and responsible persons; and (vi) proposing the institutional set up for implementation of the EMP.

Based on the indication of the Rapid Environmental Assessment and the findings of the IEE, the classification of the Galaasiya subproject as Category “B” was confirmed, and no further special study or detailed EIA will be needed to be carried out to comply with the environmental policies of the ADB.

The complete IEE report is presented in the **Appendix 9**.

6.6 Earthquake Zone

The Galaasiya subproject area is located in a designated (Richter Scale) Earthquake Zone 7. Project design will incorporate strengthening of structures based on the relevant international or Uzbekistan standards, whichever are the more conservative.

APPENDIX 1 - DESIGN CRITERIA FOR PROJECTED CONSUMPTION THROUGH TO 2025

Normative water consupmtion rate for Galaasiya / Нормативное водопотребление Галаасия **Table 3/ Таблица 3**

Consumers (2025)/ Наименование потребителей (2025)	Unit/Един. измер	Quantity/Кол-во	Average water consumption 1 person. Litres/day/ Удельн. питьевое водопотребл	Number of working hours/ Кол-во час. работы	Average daily supply, m3/day/Сред.сут расход для населения, $м^3$/сут	Industry development (20%), m3/day/Развитие промышленности (20%),	Average daily supply, m3/day/Общий сред.сут расход, $м^3$/сут	Daily inequality coefficient/ Коэф. сут нерав. Ксут.мах	Hours inequality coefficient/ Коэф. час. нерав. Кч.мах	Comsumption/ Расходы			
										max.daily m3/day/макс.сут $м^3$/сут	average hour m3/hour / сред.час $м^3$/час	max.hours m3/hour/макс.час $м^3$/час	calculation per second l/sec/расч.сек. л/с
City/городское	people/чел.	17222	150	24	2583	517	3100	1,20	1,44	3720	155	223	62,00
Rural/сельское	people/чел.	3697	115	24	425	85	510	1,20	1,44	612	26	37	10,20
Total/ Общее	**people/чел.**	**20919**			**3008**	**602**	**3610**	**1,20**	**1,44**	**4332**	**181**	**260**	**72,20**

Footnote:/ Примечание:

2. Hours inequality coefficient Кч. мах =1,2x1.18=1,42 Kdaily.=1,2 2. Коэффициент часовой неравномерности Кч. мах =1,2x1.18=1.42 Ксут.=1,2

Qdaily.aver.=N x qaver.x K/1000 / Qсут.ср.=N x qуд.x K/1000

Qdaily.max=Qdaily.aver.x Kdaily.мах. / Qсут.мак=Qсут.ср.x Ксут.мак.

qhour.aver.=Qdaily.max / 24.qчас.ср.=Qсут.мак/24

qhour.max=qour.aver.x Khour.мах. / qчас.мак=qчас.ср.x Кчас.мак.

qsec=qhour.max/3,6 / qсек=qчас.мак/3,6

Calculation of Storage Reservoir Volume / Райцентр Галаасия . Расчет емкости резервуаров Table 4/ Таблица 4

Item/ Наименование	Daily Demandm3/day /Суточный расход Qсут, $м^3$/сут	Max Hour m3/hr/ Максим часовой расход q, $м^3$/час	Average Hour m3/hr/ Средний часовой расход, $м^3$/час	CoefficientHourly /Коэф-т час. неравн. Кч	Кн	Volume m3/Регулирующий объем, $м^3$	Emergency Volume m3/Аварийный объем воды, м3	Неприкосновенный пожарный запас, м3	Reservoir Volume m3/Объем резервуара, м3
Galaasiya / Галаасия	4332	260	181	1,44	1,00	578	1011	454	2043

$Wрег=Qсут[1-Кн+(Кч-1)(Кн/Кч)^{Кч/(Кч-1)}]$

Wemergeny =Qaverage hour * 0.7 * T+ Qпром авар*T / Wавар.=Qср.ч*0.7*T + Qпром авар*T

Wрег = Volume (regulating /active)/ Wрег= Емкость (регулируемая/ активная)

Кн = Coefficient of nonregular flow (of daily flow) Кн= коеффициент нерегулярного стока (от суточного стока)

Qсут = Daily Flow/ Qсут= суточный объём стока

Кч = Coefficient of nonregular flow (of hourly flow) Кч коеффициент нерегулярного стока (от час. стока)

T = Emergency time - 8 hours/T - время ликвидации аварии = 8 часов

Adopt 2 reservoirs each volume 1000 m3 total 2000 m3/ Принимаем 2 резервуара емкостью по 1000м3 каждый,общей емкостью 2000м3.

1. According to ШНК 2.04.02.-97 п.2.12 if fire 2 externals - 10 l/sec= total 2o l/sec; 2. Length of fire extinguishing according to ШНК 2.04.02.-97 п.2.24 - 3 hours.
/1.Расчёт расхода согласно ШНК 2.04.02.-97 п.2.12 при пожаре 2 наружних - по 10 л/сек = итого 20л/сек 2.Продолжительность тушения пожара согласно ШНК 2.04.02.-97 п.2.24 принимается -3часа

Note: Pipe flow characteristics will be determined accurately during detailed design phase.

APPENDIX 2 – PRELIMINARY COST ESTIMATES

	Unit	Unit Cost	Totals Including Contingencies ('000						
			2010	2011	2012	2013	2014	2015	Total
I. Investment Costs									
A. Rehabilitation of WDP									
Rehabilitation of pump station	amnt		-	-	103,9	61,3	-	-	165,2
Equipment for pumping station	amnt		-	-	124,7	73,5	-	-	198,2
Heating facility	amnt		-	-	28,7	16,9	-	-	45,6
2 Reservoirs, capacity 1000m3	amnt		-	-	205,2	121,0	-	-	326,2
Rehabilitation of chlorination unit	amnt		-	-	34,7	20,5	-	-	55,2
Equipment for chlorination unit	amnt		-	-	44,2	26,1	-	-	70,3
Technological services/communications	amnt		-	-	66,1	39,0	-	-	105,1
Absorbing filters	amnt		-	-	3,9	2,3	-	-	6,2
Digging	amnt		-	-	6,7	4,0	-	-	10,7
External power supply	amnt		-	-	97,3	57,4	-	-	154,7
Power supply network	amnt		-	-	11,0	6,5	-	-	17,5
Repair of gateway	amnt		-	-	13,4	7,9	-	-	21,4
Latrine	amnt		-	-	5,9	3,5	-	-	9,4
Repairs of adminsitrative offive	amnt		-	-	67,7	39,9	-	-	107,6
Landscaping	amnt		-	-	11,9	7,0	-	-	19,0
SCADA	amnt		-	-	37,2	21,9	-	-	59,1
Security lighting	amnt		-	-	10,8	6,4	-	-	17,2
Other equipment (auxillary) /a	amnt		-	-	226,9	133,8	-	-	360,7
Subtotal			-	-	1 100,5	648,9	-	-	1 749,3
B. Detailed design	amnt		42,9	64,7	-	-	-	-	107,6
C. Construction of distribution mains									
Pipeline d-280 L-0.05km	m	108,734	-	-	3,7	2,2	-	-	5,9
Pipeline d-110mm L-1.05km	m	54,902	-	-	39,1	23,0	-	-	62,1
Subtotal			-	-	42,7	25,2	-	-	68,0
D. Rehabilitation of distribution mains									
Pipeline d-400mm L-0,15km	m	158,851	-	-	16,1	9,5	-	-	25,7
Pipeline d-280mm L-1.2km	m	60,984	-	-	49,6	29,2	-	-	78,8
Pipeline d-280mm L-1.675km	m	134,312	-	-	152,4	89,9	-	-	242,3
Pipeline d-225mm L-1.8km	m	79,388	-	-	96,8	57,1	-	-	153,9
Pipeline d-160mm L-1.175km	m	69,313	-	-	55,2	32,5	-	-	87,7

	Unit	Unit Cost	Totals Including Contingencies ('000						
			2010	2011	2012	2013	2014	2015	Total
Pipeline d-125mm L-2km	m	66,53	-	-	90,2	53,2	-	-	143,3
Pipeline d-110mm L-21km	m	65,545	-	-	932,7	550,0	-	-	1 482,7
Subtotal			-	-	1 393,1	821,4	-	-	2 214,5
E. Maintenance equipment	amnt		-	35,8	15,4	-	-	-	51,1
F. Toilet for school	unit	44.692	-	-	30,3	17,9	-	-	48,1
Total			42,9	100,4	2 581,9	1 513,4	-	-	4 238,6

APPENDIX 3: DRAWING OF THE PROPOSED GALAASIYA WATER DISTRIBUTION UNIT

APPENDIX 4: LAYOUT OF GALAASIYA WATER DISTRIBUTION NETWORK

APPENDIX 5: LAND ACQUISITION AND RESETTLEMENT - DUE DILIGENCE REPORT

Tranche 1, Galaasiya WSD Subproject

A. Introduction

1. The Uzbekistan Water Supply and Sanitation (WSS) Services Improvement Investment Program has been initiated with a view to improving living standard in urban areas with the help of upgrading water supply and sanitation services which, till now, is less than satisfactory. Access to safe water and sanitation facilities have direct impact on poverty reduction and welfare improvement strategy. Apart from investment in physical infrastructure the program also proposes for long term capacity building and institutional strengthening of the executing agency and staff training.

2. This short Land Acquisition and Resettlement Plan (LARP) was prepared to mitigate impact of the resettlement during the Galaasiya subproject to rehabilitate and improve the water distribution system network for Galaasiya—a small city covering 3.5 sq.km. and the administrative centre of Bukhara district.

3. The LARP has been prepared based on census and socio-economic survey that was carried out considering outcome of the preliminary engineering and technical design as per requirement for replacement of water distribution network.

4. The objectives of the proposed LARP are as follows: (i) identify the project impact on the community in terms of loss of assets, livelihood and income; (ii) outline measures to mitigate the adverse impact; and (iii) provide an estimate for budgetary allocation for compensation of loss of assets and resettlement benefits. And if required, for loss of income & livelihood, according to principles and guidelines provided in the entitlement matrix prepared for UZB: WSS Services Improvement Investment Program. The primary purpose of this short LARP is to identify steps to restore the living standards of the affected persons (APs) to the pre-project situation within a short period of time without any disruptions in their own economic and social environment

B. Subject details

5. The subproject is intended for rehabilitation and upgrade of water supply system of Galaasiya city, which will enable to provide safe potable water to the 100 percent of the population. The scope of work includes the following:

(i) rehabilitation of water distribution unit, including chlorinator, clean water reservoir, pump, panel and fittings;
(ii) rehabilitation of 28.54 km of water supply distribution network; and
(iii) construction of a new network pipelines.

6. The assessment of the above works from the land and other property acquisition as well as resettlement standpoint show the following:

(i) rehabilitation of water distribution unit will take place at the site allocated to the district vodokanal in accordance with the established procedure, therefore no property belonging to any legal entity or individual will be affected and no additional land acquisition will be required;

(ii) rehabilitation of distribution network will be along the existing pipeline on the land of Khokimiyate city, therefore there is no requirement for additional land, rather than just temporal acquisition of municipal land:

(iii) construction of a new water conduit will be carried out along the existing pipeline on the land of Khokimiyate city, therefore there is no requirement for additional land, rather than just temporal acquisition of municipal land. The construction works however, will have limited impact on property of several households, located in immediate proximity from the site. Besides, the network pipelines might probably affect a farm land plot under cotton and wheat. The vodokanal specialists however are ready to consider bypassing this farm landplot.

Figure 1: Layout of Galaasiya Water Supply System

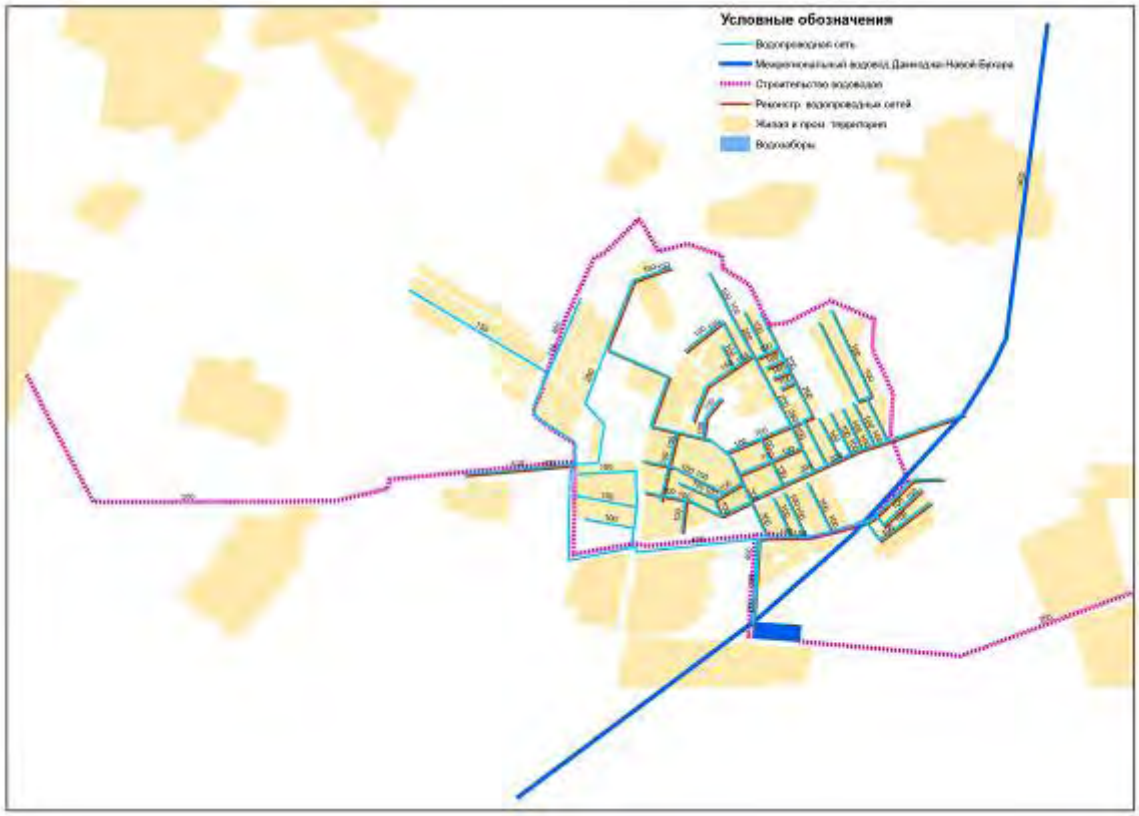


Figure 2: Layout of Galaasiya Water Supply System and the Affected Households


Bricks plant
ПОЛЕ ФЕРМЕРСКОГО ХОЗЯЙСТВА
Private farm
ТРАССА БУХАРА - ГИЖДУВАН
BUKHARA-GIJDUVAN ROAD
РОВД
Police

C. DESCRIPTION OF LAR IMPACTS

Project Area

7. The subproject will entail improvement of water supply distribution network along the existing supply and distribution line and will also replace sections of network pipe lines. There will be no change in land use pattern as the improved trunk main lines will be passing through either existing alignment or within right-of-way of Khokimiyate city jurisdiction. However the works will affect some unauthorized structures of households located along the pipeline (including structures, fruit and other trees). The abovementioned unauthorized structures are located beyond the land given for specific use by the district administration in accordance with the established procedure and are on land belonging to Khokimiyate city within the right-of-way.

8. The census of the affected persons was conducted on 7–14 June 2009. The day the census was completed, that is, June 14, 2009 is considered as **census cut-off-date**. No person, building, any structures or cause, any kind of land use change, after the census cut-off-date, will be considered eligible for resettlement assistance or compensation.

The LAR Implications

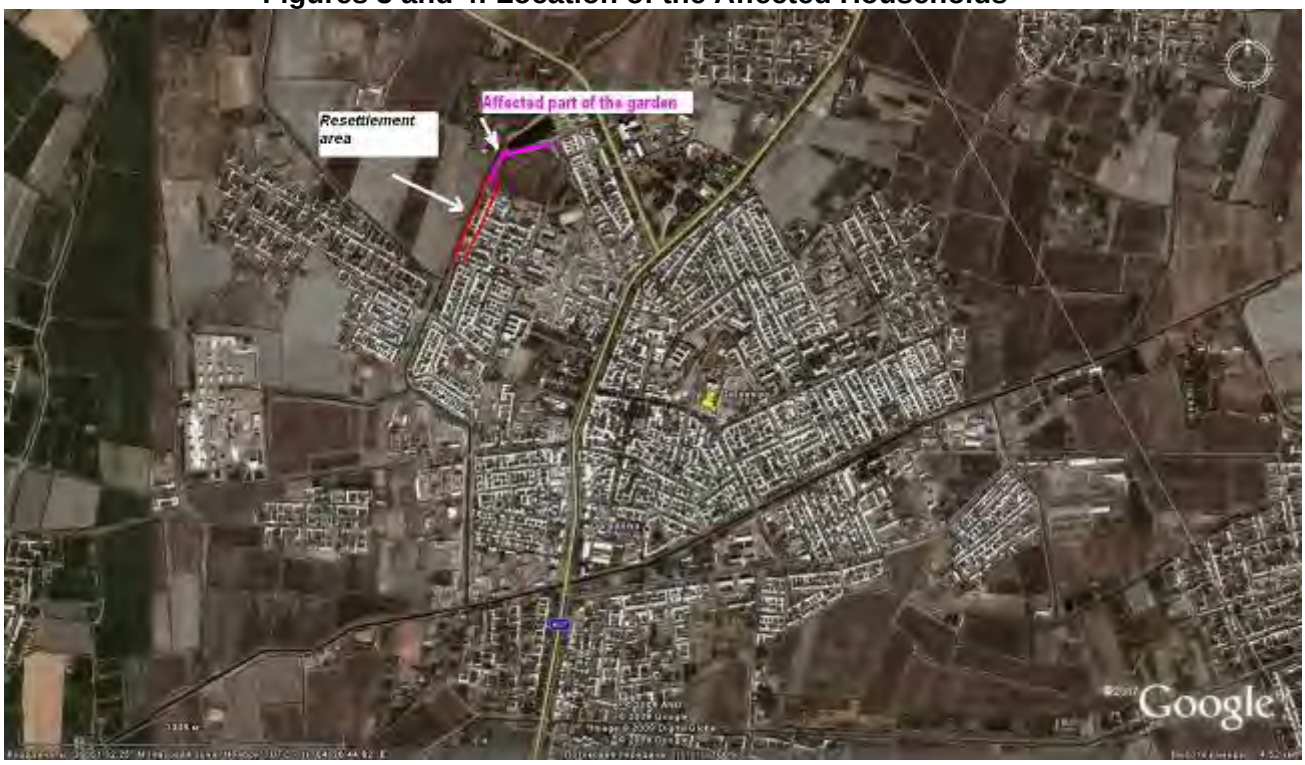
9. The census revealed that along about 200m. by the road side drain, through which proposed water distribution pipelines will be installed, 12 households have extended their structures into the government land in an unauthorized manner. As a result of the construction, 11 households will incur losses of residential and outhouse structures and trees, and one household will incur loss of fruit trees. All the affected property is not registered with the city administration/Khokimiyate.[2] Although land use carried out by these households are illegal so far as Land Code of Uzbekistan is concerned, provision for resettlement assistance and compensation for these 12 affected families (AFs), who are likely to face loss of their productive assets and parts of residential structures, has been made in the SLRP in accordance with the Civil Code of the Republic of Uzbekistan, the ADB's Involuntary Resettlement Policy and Land Acquisition and Resettlement Framework (LARF).

10. All the affected structures and trees owned by the 11 households are located within a 10 meter wide right-of-way, intended for the subproject and under the jurisdiction of the city Khokimiyate. The civil works will also affect an orchard, owned by one farmer without proper registration with the State Cadastre Authorities. This plot of land with total area of 4.2 hectares[3] at the outskirts of the city has been used as a landfill for a long time. In 2006, a farmer living in a registered farm nearby the landfill has cleared the land at his own expense and planted an orchard which at the time of the survey had nearly 1,600 apple trees and 2,000 apricot trees. For the purpose of entitlement according to ADB's involuntary resettlement policy, the affected households are defined as encroachers eligible for compensation for their loss of extended structures and trees planted within household premises.

[2] In accordance with the Land Code of the Republic of Uzbekistan land plots for construction of housing and dekhkan farming are allocated to individuals under usufruct terms (lifelong, inheritable possession), and should be duly registered with the Land Cadastre authorities

[3] The owner believes that the area is 7 hectares, however measurement using Google Earth prove that the plot dimensions are 160x260 meters, hence the area is 4.2 hectares.

Figures 3 and 4: Location of the Affected Households



11. The number of affected households and persons as collected from census is given in Table 1 below. The total number of affected persons (AP) is 68. The average family size of the affected households is 5.7 persons.

Table 1. Status of Census & Socio-economic Survey

Sl.	Details	No.
1	Total Affected Household	12
2	Household not found	Nil
3	Total household surveyed	12
4	Household responded	12
5	**Total Affected Person**	**68**

Source: Census & socioeconomic survey, June, 2009

12. The information on type and extent of loss as well as use of the lost properties was collected during the census. It shows that 11 out of 12 AFs will lose portions of the residential structures, which are used for various household purposes, such as, cowshed, kitchen, store, bathroom, toilets and extended part of a living room presently under construction. Some of these AFs have planted poplars and fruit trees like, cherry, apple and apricot for their domestic consumption. One family will lose a part of orchard grown on government land. In all, property loss over 4200 sq m area, corresponding to 0.42 ha, will take place, while a total of 372 trees including 23 fruit trees and 349 poplars will be lost. The extent of loss is shown in Table 2 below. None of the loss will affect the families severely so far as their residence or livelihood is concerned. The loss of income from fruit trees is minimal as they do not yet produce substantial yield to support livelihood of the AFs.

Table 2. Affected Assets

Sl.	Type of loss	No. of AFs	Area (Sq m)	No. of trees
1	Structures only (extended parts of residential house)	5	1200	-
2	Structures with trees	6	1400	362
3	Only Trees/orchard	1	1600	10
	Total	**12**	**4200**	372

Source: Census & socioeconomic survey, June, 2009

13. The Resettlement Framework (RF) prepared for the program classifies several groups of population as socially "vulnerable" and has provided special assistance for them. The vulnerable groups are: (a) those who are below the poverty line (BPL); (b) those who belong to indigenous people/ethnic minorities; (c) female-headed households (FHH); (d) single elderly; and (e) disabled persons. There are four female-headed households and one household with a disabled woman among the affected families who will be provided additional assistance as per resettlement framework.

Socio-economic Profile of Affected Households

14. A detailed socio-economic survey was carried out during the census operation in June, 2009 over the subproject area and interviews were taken with the head of the affected households (AFs) and other members at their residences. The table 3 provides a brief socio-economic profile of the affected persons. It shows that proportion of female population is higher than the male, with a sex ratio of 1107 females per 1000 males. Percentage of women workers is also remarkable, that is, 47% of total affected population. Both these indicators show a gender sensitive population group among the affected households.

Table 3: Summary Profile of the Affected Families

Characteristics	Units
Total Affected Households	12
Total Affected Persons	68
Average Family Size of Affected Households	5.7 persons
Sex ratio (females per 1000 males)	1107
Total No. of Ethnic minority household	Nil
Total No. of Female Headed Households	4
Total No. of Title Holders	Nil
Total No. of Encroachers	12
Total no. of Workers	35 (51% of total population)
Percentage of women to total employed	47%
Main Occupation of the Affected Persons	In State / Pvt. Organization /Enterprise / Institute (70% of the employed)

Source: Census & socioeconomic survey, June, 2009.

15. Based on the data of the surveyed households, social stratification of the affected households can be ascertained. All the affected households asserted themselves belonging to Muslim community. The majority of the AFs, 8 in number, are of joint family type while 4 are nuclear families. The predominant family size is "large" with more than 5 persons, accounting for 45% of the total. The average family size is 5.7, as stated earlier. There is only one small family, with members up to 3. There are four female-headed families, one family with disabled and two low income households, all belonging to "vulnerable group". (Table 4)

Table 4: Social Stratification details of AFs

Criteria	Classification	No. of AFs
Family Type	Joint	8
	Nuclear	4
Vulnerability	Female-headed HH	4
	HH with disabled persons	1
	Low income HH	2
Family Size	Up to 3	1
	4-5	5
	More than 5	6

Source: Census & socioeconomic survey, June, 2009

16. The distribution of population by age groups shows that majority of the population accounting for 51% belong to the age group of 26–59 years, while another 24% are within 18–25 years of age group. Minor children (under 18 years of age) account for 24% of the household members, including the very young children of pre-school age of under 7 (12%). There is only one person of retirement age–a 55 year old lady (Table 5).

Table 5. Distribution of Affected persons by Age Group

Sl.	Age-group	Male	Female	Total	% to total population
1	Less than 7 yrs	5	3	8	11.8
2	7 – 17 yrs	5	4	9	13.2
3	18 – 25 yrs	7	8	15	22.1
4	26 – (54) 59 yrs	16	18	24	50
5	Above (54) 59 yrs	1	1	2	2.9
	Total*		**34**	**68**	**100**

Source: Census & socioeconomic survey, June, 2009.

17. Educational achievement of the affected population is remarkable. The total number of persons attaining professional education is 52%, Of them, almost half has university-level degree. 18% of the members of surveyed households have completed their secondary education at grades 10–11, while nearly 30% of the population are still students of various level education institutions or have not reached school age (Table 6).

Table 6. Distribution of population by Educational Status

Sl.	Educational level	Male	Female	Total	% of the APs
1	General secondary (7-9 grade)	0	1	1	1.5
2	Complete secondary (10-11 grade)	4	8	12	17.6
3	Secondary vocational (coll / lyceum	6	12	18	26.5
4	Student (coll./ lyceum / univ.)	11	6	17	25.0
5	University / PG	13	7	20	29.4
	Total	34	34	68	100

Source: Census & socioeconomic survey, June, 2009.

18. There are 35 employed in the surveyed 12 households, including 19 men and 16 women. The employment level is 63% of the total persons of working age. Employment (work participation) level among the women is considerably lower than that among men–46% and 83% respectively. Three women of working age perceive themselves as unemployed. And seven people (including 6 women) are neither employed nor seeking jobs.

19. The employment structure among the affected families is shown in Table 7. Among 12 affected households the share of their members engaged in agriculture is very small–12% and 5 of 6 persons engaged in farming are members of the family of that farmer who has planted the orchard which will be slightly affected by the subproject. The household members are largely work for hire (21 persons), 8 people are engaged in temporal one-time jobs and only one person is self employed in his farm. Women account for the majority (10 of 12) of those employed in government sector which is prevailing occupational pursuit among the affected families.

Table 7: Economic Activity and Employment

Employment Data	Men	Women	Total	Men	Women	Total
	people			In % of working age personsa		
Economically Active	**19**	**16**	**35**	**82.6**	**57.1**	**68.6**
Including unemployed	0	3	3	0	10.7	5.9
Employed, including	**19**	**13**	**32**	**82.6**	**46.4**	**62.7**
Public budget funded sector	2	8	10	8.7	28.6	19.6
Enterprises of non-agricultural private and government sector	6	2	8	26.1	7.1	15.7
Temporal, one time jobs	8	0	8	34.8	0	15.7
Household homestead (plot attached to a household)	0	1	1	0	3.6	2
Household farm	3	2	5	13.0	7.1	9.8

Source: Census & socioeconomic survey, June, 2009.

17. Based on the census data on affected household income as of May 2009, the average monthly per capita income was Som71,000. Given the high share of full time employees of non agricultural government and private sector, one may assume that the level of income of the surveyed families is sufficiently sustainable and very slightly exposed to seasonal or other

fluctuations. Average per capita income of bulk of the affected household vary from Som33,000–150,000 (Table 8).

20. None of the surveyed households receives low income allowance. However, one family among those affected generated no income in May 2009. This family consists of the five members including three children. The head of the family has no permanent work and his wife is unemployed. There was also a family with average per capita income in May below the minimum wages, which at the survey time was Som28,000. This family also consists of five members, including two children. In this family, two adults are unemployed and only one household member has irregular earnings at temporal jobs. There are justified reasons to consider those families as low income and they are eligible for additional allowance within the resettlement plan.

Table 8. Monthly Income Pattern of APs, as of May 2009

Average montly per capita income (UZS)	Number of Households	Humber of Members	Share in the Total APs, %
No Income	1	5	7.5
24 000	1	5	7.5
33 300 – 66 700	2	9	13
75 000 – 90 000	5	30	44
110 000 & above	3	19	28
Total	**12**	**68**	**100**

Source: Census & Socio-economic Survey, June, 2009
Note: **$1 = Som1,500 (approximately)**

21. Evaluation of well being of the APs has been brought out by their self assessment of economic condition, which is reflected in the table below (Table 9). 10 of 12 households have assessed their income sufficient for the family needs. Two families have assessed their income as adequate only for food, i.e. referred themselves low income. One of the two households has average per capita income below the minimum wage level and is eligible for additional aid under the resettlement plan.

Table 9. Self Assessment of Poverty / Economic Wellbeing

Self Assessment	AHs	APs
Adequate for all reasonable household needs	4	27
Adequate only for essential needs Food / Clothes /Municipal payments	6	33
Adequate only for Food	2	8
Total	**12**	**68**

Source: Census & Socio-economic Survey, June, 2009

Indigenous People

22. Galaasiya subproject does not affect any indigenous peoples groups.

Objectives, policy framework, and entitlements

23. Although land use carried out by these households are illegal so far as Land Code of Uzbekistan is concerned, provision for resettlement assistance and compensation for these twelve affected families (AFs), who are likely to face loss of parts of residential structures, and their productive assets has been made in the short LARP as per LARF.

24. The RP is based on the general findings of the census, socio-economic survey, observation during field visits, and participatory consultation meetings with various groups including the

affected persons in the subproject area. The census was carried out on 7–14 June 2009. Compensation and resettlement assistance for various types of loss have been determined following the provision made in the LARF. In brief, the people affected by the subproject will be entitled to the following types of compensation and assistance: (i) compensation for loss of portions of structure at replacement cost; (ii) compensation for loss of fruit and timber trees; (iii) and assistance to vulnerable households for livelihood assistance for a period of 3 months. Since, none of the APs will be losing their major livelihood, income loss is not envisaged. The loss of yield from the fruit trees is not significant since these do not have much productive value to provide the families subsistence income.

25. The census cut-off date of 14 June 2009 has been considered as the cut-off-date for APs' eligibility for entitlement. The entitlement matrix has been prepared in accordance with the LARF of the program, for the affected people. People moving in the project area after the cut-off date will not be entitled to any assistance.

26. UCSA, the EA will use the LARP as a planning tool, verify and update the inventory prior to implementation of the project, and provide ID cards to the entitled affected persons for compensation and resettlement purposes. The principles applicable in defining the entitlements and compensation packages for the affected households shall remain unchanged. A detailed Entitlement Matrix for the subproject is provided in Table 10.

Table 10. Entitlement Matrix

Sl. No.	Type of Loss	Unit of Entitlement	Details of Compensation and Rehabilitation Assistance
A. Loss of Structures			
1	Loss of residential structures (portions)	Affected persons (irrespective of title /lease holding)	Cash compensation at replacement rate for affected portions of the structures. Cost for electrical / water connections to be included. Salvageable materials will be allowed to be taken away. For partial impact of adjoining structures full cash compensation at replacement rate to restore remaining part of structures.
B. Loss of Trees			
2	Loss of trees; fruit trees / timber (poplar)	Owners of trees (including non-leaseholders)	Income from fruit trees for 1 year plus net profit for 1 year multiplied by no. of yrs needed to grow a tree of same productive value, Plus market value of young trees and planting costs. Cash compensation for poplars at market price.
C. Loss of Livelihood			
3	Livelihood	Vulnerable APs (i.e. poor family, female headed households, disable persons)	Allowances equal to 3 months' average monthly income for vulnerable group - female headed households, low uncome HH and HH with disabled. Priority for employment in project related activities, if suitable
D. Other losses			
4	Irrigation drainage	Affected persons	Rehabilitation/replacement of affected structures/utilities to pre-project level
5	Any unanticipated adverse impact due to project intervention	Any unanticipated consequence of the subproject will be documented and mitigated according to the resettlement framework prepared.	

COMPENSATION AND ENTITLEMENT

Compensation for the Affected Properties

27. The short LARP provides the compensation details according to LARF prepared for the MFF program. As described in the entitlement matrix (Table 10), the compensation for all type loss in terms of assets / livelihood, temporary loss and other unanticipated loss will be given due consideration for preparing compensation adequate for rebuilding life of the APs at pre-project level. As per census the APs will lose portions of their residential structures extended into the Govt. land and some of their fruit trees and poplars.

28. Compensation for parts of the residential structures will be based on replacement cost at market value. Part of a structure of one AP was under construction at the time of census, valuation of which will also be included.

29. Compensation for fruit trees that will be affected by construction will be calculated based on their potential productivity. In the event of loss of trees, the net profit from their current yield (yield multiplied by the market value of a unit cost minus production cost) multiplied by number of years that would have been required to grow these trees until productive stage plus annual income from sale of fruit will be compensated. Besides, market value of young plants and planting costs will be compensated.

30. The LARF envisaged compensation for loss of income of hired labor as a result of subproject. Among the affected persons, only one land user engaged hired labor–the owner of the orchard. The census has no data on use of hired agricultural labor on regular or seasonal basis on that plot of land, as well as on how many people will lose jobs and livelihood as a result of the subproject operations. Therefore, the proposed Resettlement Plan (RP) does not include cost of hired labor compensations for lost income, However, this will be taken into account while preparing an updated LARP after finalization of the subproject document.

31. The greatest portions of the structures that will be affected are cowshed, toilets, bath, store, etc. and those areas not part of living quarters. Only in one household that construction of a residential house has been started. However, on census date, that structure was used as a store. Consequently, the APs will not be relocated from their present place of residence. The electrical/water connection or any other assets that are likely to be affected/demolished will be compensated at replacement cost.

Gender Issues

32. Four of the affected households are female-headed household. During the implementation, it will be ensured that compensation is paid directly to the de facto head of the household.

PUBLIC PARTICIPATION and CONSULTATION

33. During initial social assessment, census and socio-economic survey as well as focus group discussions were held with the beneficiaries, the makhalla community members, as well as with the secondary stakeholders of the project, namely, the government officials of the province. The design engineering team together with vodokanal and makhalla officials met the persons/households likely to be affected and had a discussion with them regarding project scope, the benefits to be accrued and verified the documents showing ownership/possession right over land use/structures, etc that are within proposed alignment drawing. Certain facts about land ownership status of the project area and the people likely to be affected were derived from these

discussions and through the survey. None of the project area, that is, the water distribution network along 71.8km is within individual ownership. Eleven non-titled households are living within 10 m of the right-of-way designated for the subproject. These households have extended their structures into the government land by the side of drain and have planted trees within the land parcel in an unauthorized manner. Besides, one family is growing orchard containing fruit trees on one government plot of land which has not been authorized for any land use by the provincial Khokimiyat, as per Land Code of Republic of Uzbekistan.

34. Once this short LARP is approved, the affected people will be informed about the formal procedures of compensation payment and all other relevant details.

ORGANIZATIONAL SET-UP

35. In accordance with the legislation of Uzbekistan province commission on land acquisition and district evaluation boards are responsible for conducting of a resettlement. Such commissions include representatives of the following authorities:

7. Province/district department of the State Committee on Land Resources, Geodesy, Cartography and State cadastre (SCLRGCSC)
8. Province/district Hydromeliorative Expedition
9. Province/Department/District Unit of Goskompriroda
10. Province/district dividions of SES
11. Province/district fire units
12. Beneficiary organizations and contractors (UCSA, EA, the Social and Environment Sub-Unit (SESU), Design Institute. Project Consultants).

36. The commission includes all the affected legal entities and individuals or their holders of power. In addition to government organizations and agencies non-government organizations such as WUAs, ADFs and makhallas may be involved in resettlement procedures to ensure safeguards of rights and legitimate interests of the affected land users.

37. UCSA has overall responsibility for all aspects of the program. The Program Preparation and Management Unit (PPMU) within UCSA is responsible for the day to day management of the program including LAR and cross-agency coordination and for compensation disbursement.

38. The Social and Environment Sub-Unit (SESU) and Project Implementation Unit (PIU)/ vodokanal under the PPMU will directly participate in all LAR related planning, implementation, inter-agency coordination and monitoring. However, they will carry out this responsibility with technical assistance from the project consultants (PC) of the program and with the active participation of the district/municipal executive powers and as advised by SCLRGCSC from time to time.

39. **Design Institute** is in charge in elaborating the design and construction documents for the project. It will collaborate with the PC, SESU and PIU to: (i) assemble all documents required for compensation; (ii) carry out topographic surveys of the expropriated land and replacement lands; (iii) elaborate layouts indicating the location of the worksites and the permanent infrastructures and the perimeter of the required surfaces differentiating the land use patterns in the areas being occupied to serve as a base for the selection of compensation land; (iv) establish layouts of the lands proposed as option for compensation; (v) conduct the land marking and pegging of the land assigned for temporary use and permanent occupation and of the compensation lands. The design institute, in collaboration with resettlement team of the PSC and PIU, will review the LARPs and provide the necessary information for an updated estimate of the effective compensation plan and related cost for each subproject.

40. **Project Consultant–Resettlement Team** are engaged to design and assist in the implementation of subprojects under the program. The PSC will have sufficient in house expertise on resettlement consisting of international and national resettlement specialists. With the assistance from the Design Institute and PIU, they will analyze the cadastral maps, carry out DMS, conduct first level compensation negotiation with the APs and prepare subproject LARPs. The PC will submit these LARPs to the respective vodakanal/PIU and to SLAU division for approval. After its approval, PSC will submit LARPs to the respective Province and Rayon LAR Commission.

41. Local government agencies involved in LARP review and implementation are Province (Oblast) and District (Rayon) Executive Authorities who form Province Commissions on Land Acquisition and District Evaluation Commissions. These commissions will form a provincial land acquisition and resettlement committee (PLARC) which include the institutions as described below.

42. Province Commission on Land Acquisition, established under the Province Khokimiyate decision undertakes the following: (i) outlines location of constructions and structures, envisaged by the project; (ii) selects land plot for construction site, (iii) prepares and approves an Act for the right to use the land plot (title) and (iv) approved the Act for the right to use the land plot, specifying areas of the acquired farm land, accepted norms and total agricultural production losses. In addition to permanent members the Commission includes representatives of UCSA, as well as affected legal entities and individuals.

43. The Evaluation Commission established under the district khokim decision estimates losses of land owners and land users in accordance to the standard procedure, as well as losses in agricultural output as a result of the farm land acquisition based on data provided by the design institute. The commission prepares an Act for the right to use the plot of land specifying the acquired farm land area, accepted norms and total value of losses and agricultural output losses.

44. The regional representatives of the SCLRGCSC is the key executive authority responsible for the following: (i) identify land losses, incurred by land owners and land users as well as agricultural output losses; (ii) determine the degree and area of land recultivation, including removal and temporal storage of productive soil layer; (iii) determine the need for protective sanitary and water protection zones around the constructions being built and regime of their use; (iv) prepare proposals on allocation of land plots of equal value instead of the acquired; (v) estimate possibility and approximate cost of development of new land instead of the acquired; (vi) approve the Benchmark Setting up Act and the attached plan; (vii) amend the government acts on land use and land ownership as well as other cadastre documents.

45. Department of SCNP: (i) environmental impact assessment of construction projects and implemented methods, (ii) approves location of the sites affecting the land condition; (iii) develops measures for land protection for designed sites and launched facilities adversely affecting the land; (iv) approves the Act on Land Plot Acquisition.

46. Government SES and Fire Inspection and Water Supervision authorities approve the Act of the Land Plot Acquisition.

47. At town/regional/ rayon level a grievance redress committee (GRC) will be established with the involvement of PIU/SESU/PC, leaders of affected makhallas and Hakimiyat (the local executive body).

GRIEVANCE AND REDRESS MECHANISM

48. A grievance redress mechanism will be developed for addressing the grievances/decisions not agreeable to the APs, particularly actions in reacted with compensation or payment disbursement. The APs will be fully informed of their entitlement according to the short LARP and the procedures for addressing their complaints/ grievances during public consultation, census survey, verification of measurement survey at the time of implementation. The procedure of grievance redress will be incorporated in the disclosure pamphlet to be distributed prior to implementation.

49. In order to prevent grievances rather than to redress these through a process to avoid lengthy redress process, participatory consultation with the affected households will be undertaken during LAR planning and implementation stages. If the grievances fail to be resolved, all attempts will be made to resolve those informally at the local makhalla level. If this attempt fails, APs will have the option of taking their complaints to the formal mechanism of addressing grievances described in Table 3.

Table 11: Grievance Redress Process

Assets Compensation Issues
1. First, complaints resolution will be attempted at town/district (Rayon) level of grievance and redress committee with the involvement of the PC, leaders of the affected Mahallas and Khakimiyate (the local executive body)
2. In absence of a settlement, APs may lodge a complaint to District/Oblast Khokimiyate as part of provincial land acquisition and resettlement committee (PLARC) and get a reply within 15 days.
3. If the District/Oblast Khokimiyate. decision is unacceptable to the APs, they he/she may approach the appropriate court of law for its resolution.

Training in LARP Implementation

50. All PIU staff, project consultants (PCs), SESU officials, leaders of Makhallas, Khakimiyate, representatives of SCLGRCSC, and District evaluation committee who will be involved in LAR activities will undergo an orientation and training in ADB's involuntary resettlement policy and implementation of RP. The training will be provided by the international specialist under the Program consultant's contract and will cover the following topics:

(i) principles and procedures of land acquisition based on Uzbekistan's law and regulation;
(ii) principles and guidelines of ADB's involuntary Resettlement Policy
(iii) public consultation and participation;
(iv) entitlements and compensation & assistance disbursement mechanisms;
(v) grievance resolution; and
(vi) monitoring of resettlement operations.

COST ESTIMATES AND BUDJECTS

51. The total estimated budget for compensation of structures, trees including special assistance to the entitled AP, preparation of identity card, cost of resettlement operation and management for the Project through Implementing Agency and engaging Independent External

Monitor is **UZS 183,664,300** (equivalent to **USD 122,443** @ UZS1500 = USD1). A break up of cost estimate is given in the Table 12 below.

Table 12. Estimated LAR Cost and Budget

Sl. No.	Item	Unit	Quantity	Rate	Total Cost (UZS)	Totals
A. Compensation						
1	Structures	sq.m.				
a	Part of existing building		724.95	208,890.34	152,160,219.40	152,160,000.00
b	Building extension (u/c)		120.00	833.33	99,999.60	100.000.00
	Subtotal of structure				**152,260,000.00**	
2	Trees	No.				
a	Poplar		349	12,000.00	4,188,000.00	
b	Fruit trees		23	35,348.00	813,000.00	
	Subtotal of trees				**5,001,000.00**	**5,001,000.00**
	Subtotal of A				**157,261,000.00**	**157,261,000.00**
B. Resettlement Assistance						
3	Vulnerability					
a	Female-headed households	4		@Som33,645/monthly		403,740.00
b	Households with physically challenged person	1		Allowance for 3 months Som100,935		100,935.00
c	Low-income households	2				201,870.00
	Subtotal of B					**706,545.00**
C. Support for RP Implementation						
4	Training LARP L/S implementation					1,000,000.00
5	Engaging Makhalla L/S					6,000,000.00
6	External Monitoring L/S					2,000,000.00
	Subtotal of C					**9,000,000.00**
	Total of A+B+C					**166,967,545.00**
	Add: Contingency @10%					16,696,754.50
	Total Cost of Resettlement					**183,664,299.50**
					say	**183,664,300.00**

NB: For construction of U/c Structure higher charges is due to RCC work and the stairs.

IMPLEMENTATION SCHEDULE

52. UCSA as the Executing Agency (EA) will direct the PSC resettlement team with assistance from SELAU and the design institute to verify documents of the APs and carry out the detailed measurement survey of the affected assets. If any change in design alignment is foreseen, the team will notify the EA. The Galaasiya makhalla will be engaged as implementing agency and assist the SELAU & PSC's resettlement team particularly during payment disbursement and in resolving compensation issues.

53. Valuation of compensation and assistance will be done after detailed measurement of lost assets is done. Grievance, if any, will be addressed at this stage so that any delay in payment of compensation and assistance does not occur and contractor's award is issued as per schedule.

54. After initiation of LARP the UCSA will take step to engage external monitor to review and evaluate the LARP implementation. Table 13 shows the tentative implementation schedule of LARP.

Table 13: Tentative Implementation Schedule

Sl.	LARP Implementation Activities	Year 1			
		Q1	Q2	Q3	Q4
		Scheduled completion			
1	LARP update	M1			
2	Preparation of action plan specifying resettlement tasks for Social and Environment Sub-Unit (SESU), Consultants and NGOs, if any	M1			

Sl.	LARP Implementation Activities	Year 1			
		Q1	Q2	Q3	Q4
		Scheduled completion			
3	Training for LARP implementation with relevant stakeholders	M1			
4	Consultations and premilinary surveys to identify the APs with the aim to prevent/minimize resettlement/assets acquisition	M1			
5	Finalization of subproject technical plans considering minimized requirements in assets acquisition	M2			
6	Collection of cadastre maps and land parcel maps in the subproject area. Verification of land records and cadastre maps in the affected areas	M2			
7	Application to Province Khokimiyate on selection of land plot for temporal or permanent acquisition for the construction under the project accompanied by all necessary permits	M3			
8	Submission of the project design and estimates necessary for computing compensation to district department of PCLRGCPC and district Evaluation Commission	M3			
9	Inform the stakeholders on construction plans (border guards, rail road, utilities and other). Getting approval for construction plans. Public consultations	M3			
10	Approval of the selected land plots and getting Land Plot Selection Act		M4		
11	Preparation and conducting the census of affected persons. Gathering of documents, proving ownership title. Computation of compensations. Approval of compensation amounts with government authorities and the affected persons		M4-M5		
12	Informing land users on forthcoming land acquisition, provision of maps, written documents and full information of work plans, time schedule and duration of acquisition procedures, information on compensation, grievance redress process. Processing of claims and consideration of proposals		M4-M5		
13	Getting Act on Land Acquisition Approval from the Oblast Commission		M5		
14	Preparation of Final Resettlement Plan		M5-M6		
15	Submission of LARP to SESU, Oblast Commission on LAR and the ADB for approval		M6		
16	Publication of the Resettlement plan, dissemination of the plan and information flyers in the Uzbek language among the affected communities; posting of the English version at the ADB website.			M7	
17	Informing the affected persons on moving /demolition of structures			M7	
18	Payment of compensation by the UCSA/PIU			M8-M9	
19	Review of the Resettlement Plan implementation				M10
20	Approval of contract award by ADB				M10
21	Getting Benchmark Setting up Act in the district Khokimiyate and Act on Right to Use the Land Plot and the Oblast Khokimiyate				M10-M11
22	Issue of notification on start of construction work if the implementation of the resettlement plan was recognized as satisfactory,				M11
23	Demolition/shifting of the affected structures/assets. Amending the land cadastre documents				M12
24	CYCLIC/CONTINUOUS TASKS				M12
25	Internal control. Quarterly reporting on LAR issues to the ADB		M6		M12
26	External monitoring annual report to the ADB/Independent assessment of the Resettlement Plan				M12

Monitoring and Evaluation

55. All LAR tasks under the program will be subject to both internal and external monitoring. Internal monitoring will be conducted by UCSA's SESU. External monitoring will be assigned to the supervision consultants or to an External Monitoring Agency (EMA) to be engaged by the EA with specific terms of reference (TOR) and approved by ADB four months after commencement of LARP implementation.

Internal Monitoring

56. Internal monitoring will be carried out regularly by UCSA-SESU. The progress of LARP implementation to be carried out by PSC's resettlement team and Mahalla will be communicated to ADB through the monthly Program Implementation Reports. Indicators for the internal monitoring will be those related to the processes and immediate outputs and results. This information will be collected directly from the field and reported monthly to the PMU. The monthly reports will be consolidated and included in the standard quarterly supervision reports to ADB. Internal monitoring will specifically focus on the status of:

(i) information campaign and consultation with APs;
(ii) revise implementation schedule in case of design change
(iii) revise AP database in case of design change
(iv) compensation and assistance payments for structures and trees / other assets;
(v) payments for loss of income for the vulnerable HH;
(vi) grievance redress, if any; and
(vii) preparing monthly progress report.

57. The above information will be collected by the UCSA-SLAU which will monitor the day-to-day resettlement activities of the Program through the following instruments:

(i) review of census information for all APs;
(ii) consultation and informal interviews with APs;
(iii) in-depth case studies;
(iv) key informant interviews; and
(v) community meetings.

External Monitoring

58. External monitoring agency will review and monitor LAR activities as per implementation schedule prepared by SLAU and results will be communicated to UCSA and ADB. The Galaasiya subprojects with LARP implementation time frame under three months will entail only one report. External Monitoring will cover:

(i) review and verification of internal monitoring reports prepared by SLAU;
(ii) review of the socio-economic baseline census information of APs;
(iii) identification and selection of impact indicators;
(iv) impact assessment through formal and informal surveys and interviews with the affected persons;
(v) consultation with APs, officials, community leaders of the makhalla for preparing review report; and
(vi) assess the resettlement efficiency, effectiveness, impact and sustainability, drawing lessons for future resettlement policy formulation and planning.

59. External monitoring will also assess the status of vulnerable groups such as female-headed households or families below the poverty line. The following will be considered as the basis for indicators in monitoring and evaluation of the program:

(i) socio-economic conditions of the APs in the pre-resettlement period;
(ii) feed back and opinion of the APs on entitlements, compensation options, alternative developments options etc.;
(iii) changes in housing and income levels and hygiene status;

(iv) valuation of property;
(v) grievance procedures;
(vi) disbursement of compensation and assistance; and
(vii) level of satisfaction of APs in the post resettlement period.

60. A final external evaluation of LARP implementation will be carried out about a year after completion of its implementation. The compelling reason for this study is to find out if the objectives of the LARP have been attained or not. The benchmark data of socioeconomic survey of severely affected APs conducted during the preparation of the LARP will be used to compare the pre and post program conditions. The evaluation will recommend appropriate supplemental assistance for the APs should the outcome of the study shows that the objectives of the LARP have not been achieved.

APPENDIX 6: SOCIAL ASSESSMENT

Summary

No risk of negative social impact by the water sub-project in Galaasiya City has been identified. People's need for an increased and improved supply of potable water was found to be critical and urgent. More than half of households need to fetch water from sources outside the home for household purposes, and in 57.8% of Galaasiya households this is the predominantly the responsibility of women and children. The majority of households must currently fetch water from elsewhere at least once a day. The high level of demand for the proposed sub-project is also illustrated by beneficiaries' stated willingness and capacity to pay for connection fees and user charges, and to contribute to the cost of service provision if necessary. The proposed sub-project will therefore directly address this need for improved water supply.

It is clear that households, local enterprises and institutions have the necessary capacity to use and maintain the proposed improved water service. Water metering is also seen by beneficiaries as an equitable system and a way of rationalising the use of piped water, and no objections to this have been raised. In order to increase awareness of the sub-project however, it would be beneficial to conduct information campaigns in the local neighbourhoods, schools and hospitals to explain the work that will be carried out and the expected results from the sub-project. The beneficiary communities possess sufficient technical knowledge and skills which will contribute to the sustainability of sub-project benefits, and there is significant evidence of current participation and co-operation in local self-help activities related to local water supply.

There are significant levels of social capital in local neighbourhoods as indicated by the degree of social cohesion and support mechanisms within the community. Parents bring containers of water in their cars to their children's schools in order to alleviate the shortage of clean water in schools. Communities strive towards settling internal disputes concerning water distribution and towards building consensus. An analysis of current expenditure, time and effort in purchasing water from water vendors and from fetching water from distant sources, indicates that the cost and quality of improved water supply will compare favourably with current costs.

1 Introduction

Galaasiya City is the administrative centre of Bukhara District in Bukhara Province. It was assigned the status of a city in 1982. It is located 10 km to the north of the provincial administrative centre of Bukhara City. The Bukhara-Gijduvan highway cuts across the city. The closest railway station is Bukhara - 2. The city is divided into five makhallas and occupies an area of 3.5 sq. km. Prior to 2009, Galaasiya was the only urban settlement in this district[4]. The city contains all the district-level administrative institutions such as the Khokimiyat and its sector teams including the sanitary and epidemiologic surveillance service, the social welfare office, the Court, the Public Prosecutor's office, the cadastre service, and the fire department under the district-level department of internal affairs. The city has 27 enterprises both public and private, including a bread-baking complex, two

[4] In 2009, six more rural settlements in Bukhara District received the status of an urban settlement in line with Resolution No.68 of the Cabinet of Ministers as of 13 March 2009.

bakeries, three clothing companies, a meat-processing plant, a furniture shop, a post office and banking institutions. There are several retail outlets in Galaasiya including two open markets and over twenty stores and convenience shops, and 20 cafes / restaurants.

2 Demographic Information

According to data from the City Hall, the total population of Galaasiya City was 15,330 as of 01 January 2009, made up of 2,746 households. The population density is 261 persons / sq km. According to the makhalla chairmen the total number of households is 2,925. These discrepancies in data are again possibly due to the fact that makhalla chairmen do not count households, but rather families to whom they grant and deliver low-income family welfare payments. The average household size is 5.7 persons.

The ethnic composition of the population is quite homogenous and Uzbeks make up 78.5% of the population. Tajiks comprise 11% of all households. Representatives of Slav nationalities (including Russians, Ukrainians, Byelorussians and others) amount to 4.2% of all households, and other ethnicities account for 2.6%. The majority of these ethnic groups live primarily in Mustakillik makhalla, and some in Galaasiya makhalla. In the remaining makhallas the Uzbeks are the majority.

In addition the following demographic data was obtained from the 2009 household survey:

Demographic information of household survey samples	Galaasiya
Average family size, number of people	4.86
Average family size in poor households, no. of people	5.61
Average family size, in non-poor households, no. of people	4.63
% children under 7	11.1
% children under 16	23.9
% Employable age population (16-54 for women, 16-59 for men)	63.8
% population of pensionable age	12.4

3 Health infrastructure

There is a district hospital in Galaasiya City with 225 beds; a maternity hospital with 38 beds; a family polyclinic for adult and pediatric care; a tuberculosis dispensary; three private dental clinics and five pharmacies. The district hospital and the maternity hospital are located in one building and have connections to piped water and the sewerage system. However, due to the unreliable and intermittent functioning of the piped water supply, the hospital uses an alternative source which is water from an independent borehole in the grounds of the health facility. The polyclinics for adults and children are not connected to the sewerage system but are connected to the city's piped water supply.

Galaasiya	Piped water connection	Sewerage connection
1 polyclinic	connected	Not connected
2 hospitals, including maternity hospital	Both connected	Both connected

4 Educational infrastructure

The educational facilities in Galaasiya City include four general education schools, five kindergartens, and three vocational colleges – for teacher training, construction, and agriculture – with an enrollment of 1639, 892, and 862 students respectively. In addition, there are three boarding schools for children with disabilities with an enrollment of 146, 126 and 173 children, and one sports boarding school with an enrollment of 132 pupils. The cultural facilities in the city include two music schools, a Cultural Centre, and a cinema. None of the educational facilities is connected to the sewerage system. None of the five kindergartens have piped water. One of the schools and one of the colleges also do not have connections to piped water supply.

Summary table of educational infrastructure	Galaasiya
Number of kindergartens/nurseries in the City	5
Number of schools in the City	4
Number of boarding schools in the City (for disabled, sportsmen etc.), art centres, music schools etc.	5
Number of colleges in the City	3

5 Employment levels

The total population of working age men and women in Galaasiya District is 8,100 (of which 4,100 are women) representing 53% of the total district population. According to district level statistics offices the employment rate is very high and represents 82% of the total population of working age. The employment rate of women does not differ significantly from that of men. The number of job seekers is significant at 14% of the total population of working age. The official unemployment rate is very low at 0.3% of the total population of working age for both genders. Thus, according to statistics, the inactive population represents only 3.7% of the population. The results from the household survey indicate the current unemployment level in the Galaasiya sample is 7%.

Employment of population in employable age (16-54/59)	Galaasiya
% Students of schools, colleges, university	12.7
% in permanent hired employment	37.3
% Owners of private business	10.5
% Self-employed	11.7
% Unemployed	7
% Disabled	4
Other categories	16.8
% Having additional employment (as % of household members of employable age)	8.9

Household Survey 2009

6 Incomes and Living Standards

Uzbekistan does not officially set a poverty line, and so official data concerning household living standards at provincial, or district level are not available. However, data from makhallas revealed that for the first five months of 2009, 347 families (12% of all families) received low-income family allowances i.e.12% of families. This included 58 families who received financial assistance i.e. 2% of families; and 148 families (5.1%)

who received childcare allowances for children younger than eighteen years of age, and 141 families (5%) received allowances for welfare mothers with children younger than two years of age.

Summary of poverty and income levels taken from household survey in 2009	Galaasiya
% households living in poverty, using the cost of consumption of 2100 Kcal per person a day as a poverty line	23.4
% population living in poverty	27
Poverty line, UZS per person per months (for June 2009)	1,380
Average household income, UZS per month (for June 2009)	432,530
Average incomes, UZS per person a month(for June 2009)	90,161
Average incomes in poor households, UZS per person per month	62,453
Average household expenditures, UZS per month (for June 2009)	438,050
Average expenditures, UZS per person per month(for June 2009)	89,025
Average expenditures in poor households, UZS per person per month	55,451
% Expenditure on food, as % of household expenditure	44.4
% Expenditure on food, as % of poor households' expenditure	51.4

7 Water supply

The following table indicates the comparative cost of water from piped household connections, standpipes and purchased water:

Summary table of water costs	Galaasiya
Average cost of water per litre from pipeline in house/yard, in UZS	3.2
Average cost of water per litre from street standpipe in UZS	2.4
Average cost of water purchased from water vendors	5.6
Average household expenditure for water purchased from water vendors, per household (for June 2009) in UZS	5,672
Average amount of water delivered by water vendors, per household (for June 2009), in litres	1,012
Average household expenditure for all piped (in-home connection and standpipes) water per household (for June 2009),in UZS	3,311
Average household expenditure for piped water from in-take in the house/yard per household (for June 2009), in UZS	3,685
Average household expenditure for piped water from standpipe per household (for June 2009), in UZS	2,838

Findings from the household survey indicate that the main source of water for 40% of households in Galaasiya is from the piped water connection situated either inside the house or in the yard. 1.3% of households rely mainly on purchased water.

Main source of water for drinking and household needs	Galaasiya
% of households whose **main source of water** is from water pipeline in the house/yard	40
% of households whose **main source of water** is from water pipeline in the street / neighbours	40.1
% of households whose main source of water is purchased from a water vendor	1.3
% of households whose main source of water is fetched water from a reservoir	5.6
% of households whose main source of water is from wells ("kachok")	12.4
% of households whose main source is surface water (river, canal)	0

The current water service and usage pattern in Galaasiya indicates that approximately 42.6% of households in Karmana have piped water connections which function only in part and are not wholly satisfactory. Only 18.1% of Karmana households received 21-24 hours of water service during the day prior to the survey. The vast majority of households

i.e. 86.6% do not have water meters. The majority of households interviewed stated that they would prefer to pay for their water consumption based on meter readings i.e. 67% of households. The following table illustrates the main features of the current water services delivered to households:

Current piped water service	Galaasiya
% of households whose water supply pipeline in house/yard is functioning or partly functioning	42.6
% of households whose water supply system in house/yard is not functioning at all or never works	14.9
% of households with no centralized water supply pipeline in house/yard at all	42.6
Average number of days of water delivery in previous week when water system worked at least for a short period of time	6.2
Average number of hours of water delivery during the previous day	15
% of households with operating piped water system which did not received water during the day prior to survey (i.e. 0 hours of water / day)	0.6
% of households with operating piped water system which received water for 3 hours or less during the day prior to survey	11
% of households with operating pipeline who received water 21-24 hours during the day prior to survey	18.1
% of households complaining of poor quality of the piped water: Water has bad odour	7.7
Water has bad taste	9.7
Water not transparent	2.4
% of households not satisfied with quality of water from standpipe (as % of those who mainly get water from street standpipes)	24.3
% of households without installed water meter (as % of those who have piped water in-take in the house/yard)	86.6
% of households who would prefer to pay for water using water meter (as % of all households)	67
% of households who would prefer to pay for water using per capita norms (as % of all households)	15.9

From survey results, the average daily household consumption of water in Galaasiya from all sources is 72 litres. Average daily per capita water consumption is 14.9 litres. Survey findings indicate that there is currently a shortage of water for household needs is estimated at 75 litres.

Household water consumption	Galaasiya
Average water consumption from all sources, in litres per household per day	72
Average water consumption, in litres per person per day	14.9
Average water consumption, in litres per person per day, in poor families	12.3
Differences between actual water consumption and demand i.e. WATER SHORTAGE, in litres per household per day	75
Water consumption from pipelines, in litres per household per month	1,781

More than half of the households interviewed need to collect water from sources outside the home for household purposes and in 57.8% of Galaasiya households this is predominantly the responsibility of women and children. The majority of households must fetch water from elsewhere at least once a day.

Household water collection and storage	Galaasiya
% of households which must fetch water from elsewhere (i.e. go outside house yard to get water)	52.1
% of households which must go outside house yard to fetch water at least once a day (as % of **all** households)	31.9
% of households which must go outside house yard to fetch water at least once a day (as % of households who have to collect water)	61.1
Average time spent to fetch water (in person-days per month)	2.2 days/month

% of households storing water	92
% of households where women and children have to go to collect water more often than men	57.8

8 Household expenditure on water

Survey data show that the average monthly household expenditure for water in June 2009 was 5,814 sums. This included the cost of fetching potable water, and maintenance repairs of water pipes. Further details of household expenditure on water are given below.

Household expenditure on water	Galaasiya
Average household expenditure for water purchased from water vendors, per household (for June 2009) in UZS	5,672
Average amount of water delivered by water vendors, per household (for June 2009), in litres	1,012
Average household expenditure for all piped (in-home connection and standpipes) water per household (for June 2009),in UZS	3,311
Average household expenditure for piped water from in-take in the house/yard per household (for June 2009), in UZS	3,685
Average household expenditure for piped water from standpipe per household (for June 2009), in UZS	2,838
Average cost of water per litre from pipeline in house/yard, in UZS	3.2
Average cost of water per litre from street standpipe	2.4
% of households having potable water costs in June 2009 (WITHOUT ADVANCE PAYMENTS)	43.7
% of households having potable water costs in June 2009 (WITH ADVANCE PAYMENTS)	90.9
Average monthly household expenditure for water, in UZS (including advance payments and current payments, expenditures for fetching potable water, maintenance repairs of pipes etc.) WITHOUT CONSTRUCTION / BUYING OF TANKS / RESERVOIRS	7,286
Average monthly household expenditure for water (for June 2009), in UZS (including cost of fetching potable water, maintenance repairs of pipes etc.) - BUT WITHOUT ADVANCE PAYMENTS	5,814

9 Affordability and willingness to pay

Survey results indicate that the majority of households are able to absorb increased in water tariffs and are willing to do so if the water supply is improved and the quantity of water available to them is increased.

Willingness to pay for improved water supply	Galaasya
Average tariff that households are willing to pay for improved water supply, in UZS per person per month	1068
% of households which are willing to pay for connecting their house/yard to water pipeline (if water pipeline is laid in the street), as % of those households which do not yet have a connection	87.8
Average tariff that households are willing to pay for connecting their house/yard to water supply pipe, in UZS	69,300

Findings from the household survey indicate that average household expenditure on piped water as a percentage of average weighted family expenditure is low at 0.63%. When expenditure on bottled water etc is included, the average household expenditure on water is currently 1.49% of average household income.

Relationship between expenditure on water and total household expenditure	Galaasiya
% of household expenditure on water, as % of average weighted family	0.63%

expenditures	
% of household expenditure on water, as % of average weighted family expenditures, including expenditures for bottled water and expenditures for construction/purchase of reservoirs for storing potable water (baskets, canteens, khauz, water tank, water tun, etc.)	1.49

APPENDIX 7: INSTITUTIONAL STRENGTHENING AND CAPACITY DEVELOPMENT

Bukhara District (Galaasiya town) Subproject 3

A. Introduction

1. Water supply and sanitation service utilities should provide high-quality, reliable, and affordable services that also generate revenue sufficient for sustainable delivery. The achievement of these targets hinges on capacities of individuals, organizations and societies to transform, to reach their development objectives. While financial resources, including external development assistance, are vital, they are not enough to promote sustainable human development. Without supportive laws, policies, strategies and procedures, well-functioning organizations, and educated and skilled people, utilities lack the foundation to plan, implement and review their local development strategies.

2. Capacity development is the process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time. To support this process effectively requires identifying what key capacities already exist and what additional capacities are needed to reach these objectives. This is the purpose of a capacity assessment. It is the analysis of desired capacities against existing which generates an understanding of capacity assets and needs, from which a development program can be devised.

3. The process WSS sector reform started in Uzbekistan in the late 1990's. The first steps were the decentralization of the water sector and transformation of water utilities into municipal enterprises. These actions were taken without the appropriate tariff and institutional reforms being in place. The old concept of water as a purely a social service was abolished, and the municipal water industry was expected to be a key player in the transition process to a market economy. At the same time, the government phased out direct subsidies to water utilities, which became self-financed companies. This "shock-therapy" reform appears to have largely failed, and more reforms are now urgently needed.

4. While the level of connection to water supply and sanitation remains high in the country, the actual quality of service provided is continuing to deteriorate, as is the condition of infrastructure in general. Failures in the distribution network are increasing in many places, while continuity of service is decreasing and the quality of drinking water remains low.

5.The deterioration of water quality that goes with a deteriorating infrastructure results in levels of water borne diseases remaining at significantly higher levels. In the country more than one-third of the population uses drinking water that does not meet hygiene standards. The deterioration of water services and associated impacts on public health and the environment are likely to accelerate in the future given that the ate of deterioration of the infrastructure is expected to worsen. This means that the situation could change significantly in a very short time; this should be borne in mind when analyzing the figures provided in this report.

6. Several reports and analysis by International Financing Institutions (IFI) on WSS point out that, the public utilities sector does not always meet requirements of modern infrastructure due to limited funds and institutional capacity. In particular, a government priority is "Strengthening institutional capacity of public utility companies in water supply and sanitation sector. The abilities of engineering and technical, financial and managerial personnel could be enhanced by intensive training programs and the provision of adequate information technology. Expected outcomes are far reaching and include best available technology, more effective and stable operation, reduce energy consumption, significant improvement of commercial and technical practices of public utility companies.

7. Overarching goals are to improve level of services for existing consumers, expand services in line with requirements of municipal and other government objectives and meet consumer demand. Weak and inadequacy of institutional capacity WSS companies significantly impedes the development of the water supply and sanitation sector and works against ensuring their viability and sustainability. These shortcomings apply not only to provincial, city, and district water supply and sanitation companies, but also with UCSA, IRTM operators and relevant national and local authorities.

8. The main goal of this activity is initial review and assessment of current institutional structure and capacities of the Production Enterprises "Suvokova" (vodokanal)[5] of Bukhara District of Bukhara Oblast which is responsible for water supply services in rural settlements as well as Galaasiya town; both areas are included into Institutional Strengthening and Capacity Development Program based on the ADB findings.

9. Main objectives of the initial assessment were to: i) identify role, responsibility, obligation, property rights, and legal obligations of all stakeholders; ii) review production objectives, schedules, monitoring and control systems as well as instruction requirements; iii) review it existing institutional capacity; iv) determine training needs for personnel and/or staff reorganization; v) ascertain needs for equipment and other supplies that influence productivity and develop a procurement action plan; vi) identify potential managers who can benefit from having a personnel development plan and ascertain needs for a training program for such staff; vii) identify potential trainers able to train their colleagues within an organization; viii) analyze current incentives schemes (if available) in entity; ix) determine major drawbacks in performance of vodokanal, especially, in planning and management; x) ascertain water supply and sanitation tariff calculation and approval procedures;

B. Existing Institutional Capacity Assets

10. **General Information.** Bukhara District is located in southern part of Bukhara Oblast, with a population of 119.940 people, 87.210 supplied with potable water, rate of potable water availability is 72.71 %, water consumption amounts to 94 litre/day per capita. The District centre, Galaasiya has a population of 13,520 people. Most buildings of the town are single storey. The whole population of the town is connected to a safe water supply system. Water consumption Amounts to 41.6 l/day per capita. The town has no central wastewater collection and disposal facilities- pit latrines are used.

11. Vodokanal of Bukhara District is a state-owned enterprise and its property belongs to the Bukhara district local government authority – the Hokimiyat of Bukhara District. Full legal title of organization is the Production Enterprise "Suvokova" of Bukhara District. Date of establishment and date of approval of its Charter are not specified in the Charter. Before 2004 the district vodokanal, as well as other Bukhara Oblast rural district vodokanals were part of Production Enterprise "Suvokova" of the Bukhara Oblast. In 2005 following decentralization of all communal utilities (including district vodokanals), the vodokanal was moved from the Provincial vodokanal to the direct jurisdictions of local district administrations. The Charter of Bukhara district vodokanal was issued and approved by local government authorities in 2005.

12. Although in the Charter the vodokanal's legal address is indicated: 54, Buyuk Ipak Yuly Street, Galaasiya Town, Bukhara District, Bukhara Oblast, Uzbekistan, the vodokanal does not have its own building or premises.

[5] The Uzbek term of Suvokava is derived from a Russian term Vodokanal which means of the combined water and wastewater utility widely used in the Former Soviet Union countries

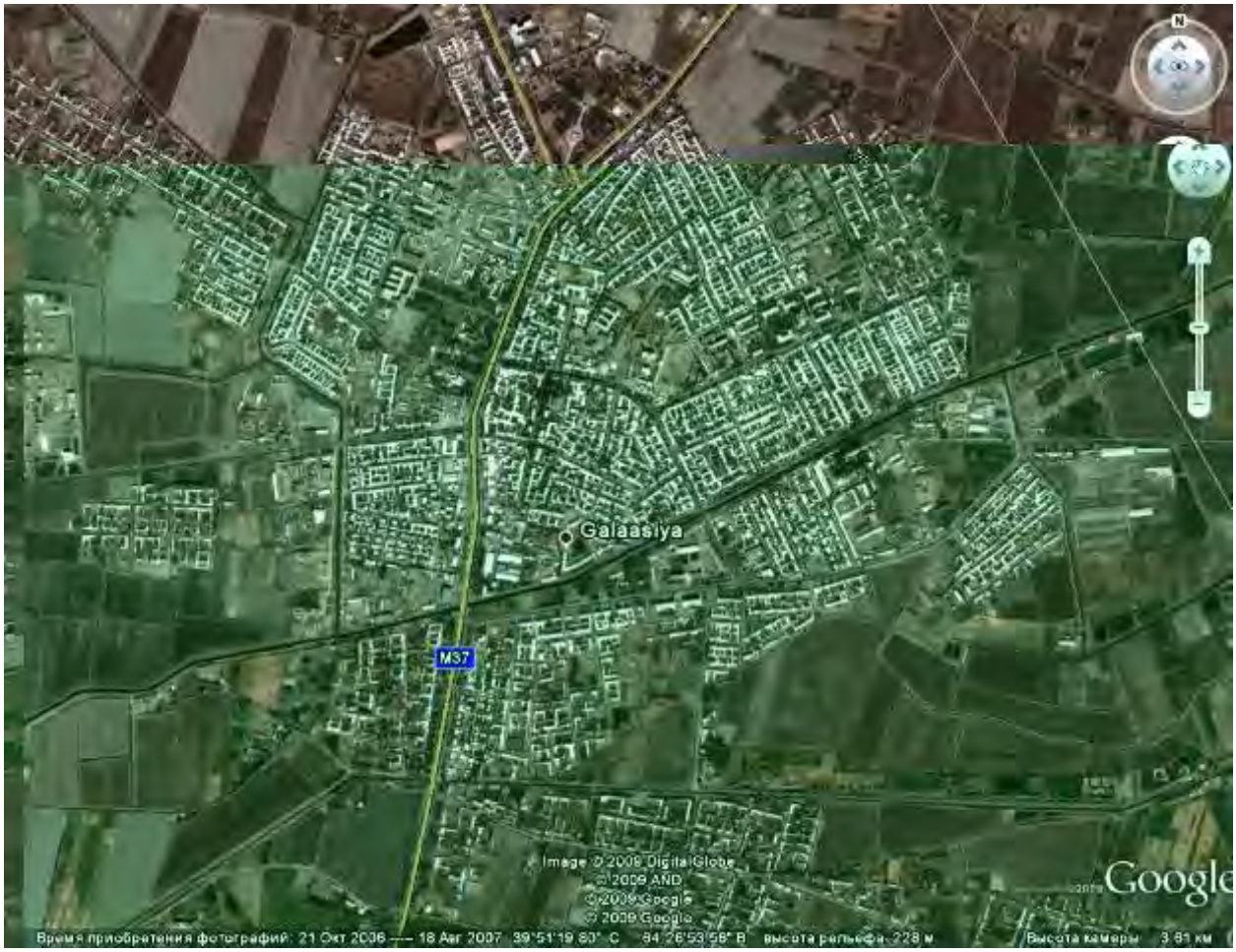


Figure 1 View of Bukhara District centre - Galaasiya Town

13. **Main role and objective:** Main role of Bukhara District Vodokanal is to acquire, prepare, supply, distribute, and supply potable water to consumers of Bukhara district and Galaasiya town. Their main obligation is to supply potable water to populations, businesses, and organizations and generate income by means of collecting service charges from consumers.

14. The Vodokanal is under direct supervision of the Hokimiyat Bukhara district (local government authority) and act on basis of its charter and district administration resolutions and orders.

15. Prior to 2004, Bukhara District Vodokanal was part of Production Enterprise “Suvokova” of the Bukhara Oblast. They were moved from this enterprise to the control of their corresponding district administrations. Decentralization of administrative responsibility for water supply and sanitation to the municipalities, in the framework of broader institutional reforms, has been the major step towards sector reform. The ownership of water utilities has been given to the local authorities. These reforms of the sector management significantly reduced the responsibilities of central and regional governments, but failed to define clearly and accurately the exact mandates and legal powers of the various actors, or to endow them with the necessary capacities and resources to perform their new duties. This is the consequence of an incomplete decentralization process, which delegated all responsibilities for water supply and sanitation to the municipal level, but left crucial functions in the hands of other levels of government.

16. Although the vodokanal is officially autonomous and self-supporting, in practice this is rarely the case, investment decisions and setting of tariff levels are still taken by central government. Despite decentralization ownership rights are not always located at the municipal level, or are not

clearly defined. The ownership of water infrastructure assets is another issue of contention. The lack of clear allocation of property rights and of decision making responsibilities is among the key obstacles.

16. In 2004 the breakup of the regional Vodokanals and the formation of district Vodokanals lead to a significant over-fragmentation of the WSS sector in the Oblast, creating many independent water supply utilities. While it can be argued that decentralization is a positive development, bringing decision-making closer to local conditions, it also has created difficulties and obstacles. This generates problems at several levels: a) the monitoring of these utilities has become an impossible task, and has resulted in the disruption of information flow from the sector. As a consequence central and regional authorities do not always have a clear picture of the sector's situation; b) hokimiyat, especially in medium and small towns, do not have sufficient institutional and management capacity or the financial resources to manage and support the WSS sector; c) over-fragmentation prevents the realization of economies of scale and contributes to increasing the cost of water supply and sanitation services, which is particularly felt in smaller vodokanals.

17. Uncoordinated institutional and economic reform resulting from decentralization of utilities services seems to be the root of many problems and difficulties;

- Decentralization of water supply and sanitation in the Bukhara Oblast lead to a lack of a unified authority which would be responsible for development of water supply and sanitation services in towns and residential areas in the Oblast. As of today, they are governed without any centralized coordination.
- there are neither reporting standards established for district vodokanals (except for tax reporting) nor obligations to report performance indicators to authorities responsible for supervision of their activities and development.
- A system of data collection and financial and performance achievement analysis is nonexistent even at the level of district and provincial authorities.
- The current institutional structure and status of district vodokanals provides no incentives for them to improve their performance and efficiency.
- Thevodokanal's managerial and operational staff are often diverted from work due to events of district significance such as harvesting wheat and cotton or preparation for district level celebrations, unsystematic incentives and penal sanctions discourage effective performance.
- Decision-making about tariffs is coupled to the election of authorities or macro-economic/socioeconomic indicators inconsistent with actual expenses of vodokanals. Consequently, most district vodokanals in Bukhara Oblast are on the verge of collapse.

18. The above negative consequence of the "reforms" has lead to Bukhara District Vodokanal being on verge of bankruptcy; it does not own building or fixed assets (except for pipelines and water intake facilities) everything else has been sold at auction to settle huge taxes. The Vodokanal has payable large tax liability, unpaid electricity bills and salaries, etc. Managers and key specialists, except of operational personnel, have not been paid their salaries for several months, if not years.

19. Due to a complicated financial situation and frequent diversions, managers and key specialists do not have the opportunity for regular career development training and exchange of positive experience with colleagues from other regions. There is a high rate of turnover of managers and key specialists (up to several times a year). The vodokanal has not developed job descriptions, manuals for operation and maintenance of equipment and facilities are nonexistent, schedules and registries of regular inspections, maintenance and repair are unavailable. If documentation is available, it is kept unsystematically and without care.

20. In the vodokanal operational and technical documentation are non-existent. Document filing and archiving systems exist, but while computer use is rare. There is no reliable database or

adequate record keeping of water consumers and sewage system users. Vodokanal activities do not focus on the customer. They; do not keep records of produced water, consumption, leaks orwastage.

21. In 2008, Bukhara District Vodokanal acquired 103.99 thousand m^3 of potable water from external suppliers, abstracted from its own intake 311.98 thousand m^3 of water and distributed 415.97 thousand m^3 of water to consumers, while losses and wastage totalled 46.3 thousand m^3 of water or 11.1 %. Total balance sheet value of water pipeline networks and facilities amounts to 66406.0 thousand Uzbek sums. In 2008, receipts from sold water totalled 30005.5 thousand sums, expenses amounted to 46166.9 thousand sums.

22. The Vodokanal reports periodically to the following organizations about their operational financial and economic activities:

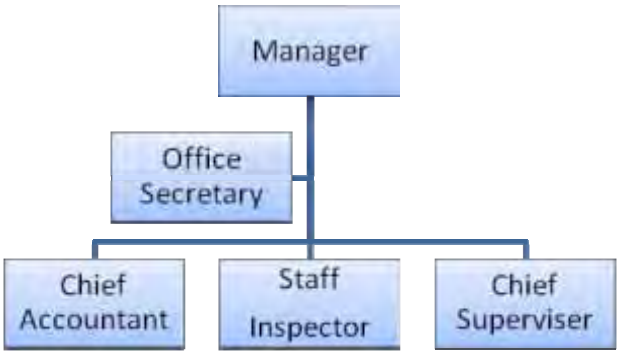
- District hokimiyat (reports, information notes, information regarding various spheres of activity);
- District Tax Committees (balance sheets, financial and economic activity statements);
- District Sanitary and Epidemiology Stations (water quality test results, sanitary condition of installations and facilities)
- District divisions of State Committee for Nature Protection (on completion of nature protection measures at jurisdictional installations and facilities);
- District State Statistics Committee (reports about water conduit and piped water supply structure performance reports (statistical reporting forms TP-1 -Vodhoz, and Form 1 Piped Water Supply));
- Local offices of the Ministry for Emergency Situations (reports on completion of protection, safety, and safekeeping measures at water supply installations in emergency situations);
- Local Branches of State Technical Boiler Inspection, Trade Union and Fire Safety Department (reports on completing labour protection and occupational safety measures as well as fire safety instructions at jurisdictional installations and facilities);
- When necessary to Bukhara Oblast vodokanal (information notes and information regarding different activities);
- Provincial Department of Finance (estimates of calculation of production costs to declare potable water tariffs for potable water supply and wastewater management services).

23. Information about the performance of the sector is important to improve the accountability and management of utilities and for attracting investment into the sector. The rapid decentralization led to a disruption in information gathering. Not only local authorities (and potential investors), but also water utilities themselves often lack a clear picture of various aspects of utility's operation. Decentralization has also weakened the strategic planning capacity within UCSA, who are in charge of developing the framework for decentralized water services.

24. In order to address this problem and to provide decision-makers with information about utility performance it would be sensible to return all rural district vodokanals of Bukhara Oblast to the jurisdiction of Oblast vodokanal. Performance indicators compiled by an individual utility can be useful in establishing its performance targets and monitoring trends. They are most useful for comparing utility performance at regional and national levels, and, when integrated, can be used for evaluating water sector performance. The challenge is to establish the data collection function on a sustainable basis in the long term. The provincial vodokanal have traditionally played a role in sector data collection and processing, but had to disrupt these activities in the process of the decentralization. It would be preferable to strengthen the provincial vodokanal and to give it responsibility to could carry out this work under the direct supervision of the UCSA or other agency.

25. Management structure of Vodokanal Bukhara District is similar to other district vodokanals and is shown in Figure 2 below.

Figure 2 . Management Structure of Bukhara District Vodokanal



26. According to staff list, the Bukhara District vodokanal of has an establishment of 22 employees, but the actual number is 21 employees. Vodokanal's managerial staff consists of 5 persons. Manager – Akromov Utkir Sobirovich (tel: 54-251-54), Chief Accountant- Turaeva R.K.

27**.** The Vodokanal does not have any vehicles or equipment nor any computers ;the Manager of Vodokanal has to use his own car for official travel. The vodokanal rents a room in District khokimiyat's building since they do not own any office buildings or premises . All the available furniture needs replacement.

28. At the company, management staff are mainly unskilled employees who lack the relevant working experience. Salaries are at the average level fixed in the country.
There are no young specialists in the management team of the vodokanal so there is no continuity planning or career development.

29. Since the vodokanal lacks skilled and qualified specialists with long experience in WSS sector all its managerial and operational personnel require intensive training courses to master the skills and methods of water supply system management. They believe that it would be best to organize training courses at the Training Complex of a former Bukhara Oblast Territorial Communal Utilities Association. The director of the Training Center is Sharipova Sharofat (tel: 3-76-05 office, 274-35-90 mobile and 224-35-81 home)

30. The average salary of the vodokanal staff is at level of the average monthly wage fixed in the country, which amounts to 240-300 thousand sums a month. Vodokanal employees due to financial difficulties of organization are not paid bonuses or rewards. No reimbursements for transportation or meals are provided.

31. Major drawbacks in the vodokanal planning and management are as follows:

- Extremely difficult financial and economic situations within organization and uncertainty about its future;
- Persistent diversion of managers and other employees to take part in various public events throughout the district (wheat and cotton harvesting and others);
- Lack of a centralized authority responsible for standardization of planning, reporting, monitoring and control;

- Decision-making about tariffs is tied to choice of macroeconomic socioeconomic indicators inconsistent with actual expenses of the vodokanal. Consequently Bukhara District vodokanal is on the verge of collapse;

- Low salaries and lack of incentives impede increased effectiveness and performance.

- Lack of adequate computer and IT skills and experience.

- Lack of a minimum set of vehicles and mechanisms for maintenance, repair and servicing water supply pipelines and facilities;

- Employees responsible for production planning have not received career development training in a long time.

32. The procedure for tariff setting and approval for water supply and wastewater management service at the Bukhara District Vodokanal is similar to that of other provincial and city vodokanals. Bukhara District Vodokanal submits calculations for tariffs to Bukhara Oblast Department of Finance. Subsequently, the Department of Finance after verification and review presents them as statement of increases in tariffs to the Ministry of Finance of Uzbekistan for consideration. Newly introduced tariffs are processed by MOF and registered with Bukhara Oblast Department of Finance.

To declare service tariffs for a planned period, Bukhara District Vodokanal submits the same list of calculation to Provincial Department of Finance. Current tariffs of Bukhara District Vodokanal on water supply services were approved on 16 March 2009 and came into force on 1 April 2009; the following tariffs were fixed:

- water supply for population	1 m^3	- 95,0 sums;
- water supply for budget-funded organizations	1 m^3	- 259,0 sums(without VAT);
- water supply for other organizations	1 m^3	- 335,0 sums(without VAT)

33. It should be particularly to notice than actual tariff setting procedures are still inadequate, affecting sector investment negatively. Local authorities are responsible for the provision of water supply services, but the control of tariff setting resides with central government authority - MOF. This institutional set-up may pose further obstacles for adequate and transparent tariff setting, given the potentially divergent (political) interests of municipalities and central government. Rules and procedures for tariff setting remain poorly developed. As a consequence tariff setting is perceived as unpredictable and as lacking transparency, and prone to politically motivated decisions rather than sound economic sector management; this is a major impediment to sector investment.

34. Current tariffs do not reflect the real cost of the services provided and fail to cover not only future investment, but in many cases operational costs. This delay in reforms becomes costly for the sector and for society when accounts receivable and payable to the sector reached the level that may destroy the financial balance of the vodokanal. Another problem is that water supply system of Galaasiya was built in 1960. The operation time of water infrastructure is 30 years. As proper maintenance and operation was not possible during the last 10 to15 years, a substantial portion of the facilities and network is in poor condition. The failure in the system is already ten times higher than in developed countries, and this gap is progressively widening. Without timely reform actions, local governments may soon need enormous investment funds to replace existing facilities, and most of that demand will occur at once.

35. As a reaction to the stringent economic situation, lack of funds and low ability of consumers to pay the vodokanal reduced their operational costs by *reducing -necessary* maintenance, e.g., reduced level of operation and service and insufficient treatment of discharges. The result of such a practice is rapid deterioration of the network and equipment and increased leakage and waste of water resources.

36. Under the current institutional setting and as a local government operator, the vodokanal has little incentive for efficient operation. An arbitrary set of bonuses and penalties provides weak motivation for efficient work. This makes the regulation process artificial or overloaded by the popular agenda of the owner, especially when the tariff and investment decision process is linked to the election cycle or macroeconomic performance of the government. Vodokanal is often treated as a part of the political apparatus of the Hokimiyat instead of as efficient service providers. The owner experiences control functions only through appointment/attrition of vodokanal's manager and key personnel.

C. Conclusions:

37. Water supply system of Galaasiya town is worn out and requires almost full rehabilitation and renewal. Providing high quality potable water, improvement life and health of population remains main objective of the local government, but the sector is facing with many problems : worn-out infrastructure, outdated development and planning of the field, standards not fitting to requirements of the time, limited financial resources and weak institutional structure and capacities.

38. Solutions to the long-term problems and demands of the sector include: i) strategic planning, managing financial resources and determining priority of spending; ii) selection, training and allocation of managerial staff; iii) monitoring activities of rural district vodokanals; iv) expanding involvement of private sector and introduction of public private partnership in this sector; v) introduction of fair and transparent tariff policy; vi) development technical equipment and information technology and many others continue lack proper attention.

39. During assessment it has been identified that managers and key specialists of vodokanal of Galaasia town almost hasn't possibility of going through regular instructions or trainings, and exchange of valuable experience. In the vodokanal there is outdated employee job descriptions, equipment and facility operational and maintenance guidelines, schedule and log books of regular inspections, technical service and repairs of material parts are lacking.

40. In the Vodokanal record keeping and technical documentation are done carelessly. Comparably established system of filing, storing archive documentation, as well as proper usage of Information Technology cannot be observed. There is no reliable database; proper registration of water consumers and sewerage system users is missing. Although, the vodokanal present a lot of data and information to different authorities, very small part of them is reliable and represent real situation. Practice of presenting "good news" instead of accurate and precise data is widespread.

41. Activity of the vodokanal is almost not oriented to satisfaction of needs of consumers of services. Public awareness and customer care services not established. There is no established order of correct estimation production, consumption, leakage and wasteful losses of water. Weakness and insufficiency of institutional capacity in the vodokanal is main obstacle for WSS development and providing viability and sustainability of the company.

42. Tariff setting and approval procedure are not adequate and in reality ignore actual expenditures of the vodokanal. The company continue to be loss-making because it routinely overspend tariff levels and prevailing tariff rules do not allow actual cost recovery, which would

include capital investments cost. Furthermore, tariff structures do not encourage the company cost reduction or resource conservation. There are little incentive for company to become efficient, and/or reduce costs because it will be penalized for under spending (cost savings) as tariff level are based on cost assumption rather than actual cost.

43. Poor commercial performance leaves the company with severe cash shortages. Many consumers are not registered, and thus are not billed, many how are registered and billed do not pay on time, which leads to defaults on rapidly accumulating taxes and electricity billing. As usual this in turn the company's banks account being blocked, leaving it little funds to operate and maintain the assets or pay employee salaries. Criticality of situation does not allow the Vodokanal to pay rewards or bounces to personnel, but also to pay them wages on regularly manner.

44. Reliable information that is essential for improving the company's performance is unavailable due to of equipments (district and consumer meters, laboratory equipment, etc) or lack of staff trained to carry out analyses and measurements. Consumer satisfaction survey is haven't been done, consumer complaints are rarely registered, and complaint response times are not measured. The few existing performance targets derived from "technical norms" that were largely defined in the Soviet era, hence stringent, difficult to measure, and unrealistic.

D: Recommendations

45. The Bukhara provincial vodokanal have traditionally played a key role in regional WSS sector data collection, processing and analyses, but had to disrupt these activities in the process of the total decentralization. *First of all, for strengthening institutional capacities of Bukhara district vodokanal and other rural districts vodokanals of Bukhara Oblast it will be reasonable and most useful to return all of them under jurisdiction of Bukhara Oblast vodokanal, and given it responsibility to establish the data collection, processing analyses function on a sustainable basis under the supervision of the UCSA or other agency*.

46. Suggested actions for institutional and capacity building reform on central and regional government levels:

i) **Establish central coordination for water supply system**: Government may establish or appoint responsible agency to carry out WSS sector reforms. The Agency should also be given sufficient budget to coordinate and supervise sector reform tasks, namely performance monitoring, investment planning and a series of actions to achieve financial viability or water supply and sanitation service providers, involving private sector and private public partnership in the sector. Because many of problems in local vodokanals are common, it would be make sense to have a central agency to develop standard forms of contracts, manuals, guidance and other operational documentations. The Agency should be given responsibility coordinate activities of local vodokanals, collect information, conduct reliability and quality control, provide intensive training and technical assistance, and share good practice and lessons learned.

ii) **Establish a performance monitoring system:** The agency first focus on launching a performance monitoring system by selecting and defined key performance indicators (benchmarking system) on WSS sector, collecting baseline data and monitoring the progress/impact of reform. Technical assistance, training, and incentives may be given to the water supply and sanitation service providers to provide accurate and reliable information.

iii) **Establish central funding:** Government may establish WSS sector reform to pool central and regional government's budgets and International Financial Institutions loans and grants for technical assistance and investment financing. The Fund may be allocated in a competitive manner. Fund may initially provide financing for implementation interregional computerized information gathering system (e.g. performance monitoring systems, commercial information systems, network information systems, etc) and medium-term capital investment planning.

Because of scarcity of funding, the Government may consider selecting pilot regions or cluster of regions to boosting reforms on WSS sector.

iv) **Strengthening WSS sector regulatory and supervisory institutions.** It is crucial for WSS sector the strengthening regulatory and supervisory capacity at all level of service providers and government institutions. UCSA can be strengthened to provide more proactive and effective support to reform efforts on regional and local levels of WSS system. Regional vodokanals may improve their capacity to monitor and facilitate municipal WSS service provider performance, especially coverage population with water supply, access population to sanitation, rate of unaccounted-for-water, leakage, quality of services and consumer satisfaction. Regional vodokanals could support a public awareness campaign and increase consumer awareness about the benefits of timely tariff payments and resource conservation. Regional Financial Departments and Regional Branches of the Anti-monopoly State Committee could be strengthened and also be authorized for reviewing and approving tariffs for municipal natural monopoly companies as WSS service providers.

v) **Strengthen legal and regulatory framework.** Despite of development basic the legal and regulatory framework for key elements of WSS sector services, which define the general directions or reform and outline the principles. However, their implementation to straggle, because the detailed regulations and procedure are either not written, or when they are written, not well understood by service providers and even the regulators, or are simply not well designed. The Government may review these regulations and rules with the assistance of international and regional experts so as to make them more transparent, simple and understandable.

vi) **Promote exchange of information, experience, and tools.** The Agency, with assistance regional vodokanals, may share local and international good practice lessons, including specific methods and tools. Some topics and tools may include loss-reducing programs, energy optimization, and monitoring and control water consumption, commercial performance improvements (bill collection, incentive programs), computerized information systems (commercial, accounting, network information models, etc), and financial projection/simulation models.

47. Vodokanal of Bukhara District need technical equipping with repair tools and water supply facilities servicing, communication, Information Technologies means enhancement. During assessment was determined quantity of required equipment needed for strengthening of vodokanal's technical and operational capacities.

48. For purpose Institutional strengthening and capacity building for the Vodokanal of Bukhara District is recommended intensive exercise and training program for managerial and operational personnel. Recommended training course specifications for managerial and key personnel of Bukhara District Vodokanal and its cost estmates are given in Table 2, 3 and 4 below:

Table 2. Recommended training courses for managerial and key personnel of Bukhara District Vodokanal

Group/ Course	Specification of courses	Managerial and key personnel
1	**Business & Investments Planning**	
1a	Business Planning	Manager and Economist
1b	Tariff Setting	Economist and Chief Accountant
1c	Assets Management	Economist and Chief Accountant
1d	Financial Management	Economist and Chief Accountant

1e	ADB Loan and grant applications, polices and procedure	Manager and Economist
2	**Management**	
2a	People Management/Decision Making, Leadership and Motivation	Manager
2b	Risk Management	Manager
2c	Performance targets, monitoring and control. Management Information systems	Manager and Economist
2d	Presentation and Report writing	Chief Engineer
3	**Commercial**	
3a	Billing and Collection, water balance-Commercial losses	Manager and Economist
3b	Accounting to International Standards	Water quality control specialist
3c	Customer relations	Manager
4	**Operations**	
4a	Energy Optimization, Monitoring and control of energy consumption	Chief Engineer
4b	Water supply management (demand, leakage, metering)	Chief Engineer
4c	Monitoring and control quality of water	Water quality control specialist
5	**Human Resources Management and Development**	
5	Human Resources. Staff training, Recruitment process	Human resources specialist

Table 3. Recommended training courses for Operational personnel of Vodokanal Bukhara District

Group/ Course	Specification of courses	Operational personnel
3	**Potable Water Treatment Operations**	
	Energy Optimization, Monitoring and control of energy consumption	Chief Engineer
	Arrangement emergency works on water supply system	Chief Engineer
	Water pumps, gates, valves, and metering control operations	Chief Engineer
	Arrangement water reservoirs, mains and equip. O&M works	Chief Engineer
	Package of O&M documentations (logs, guidance, manuals)	Chief Engineer
	Basic water quality testing operations	Chief Engineer
	Labor Protection and safety technique on WWTP	Chief Engineer
	Safety handling with chlorine and other chemicals	Chief Engineer
4	**Vehicles and motor equipment fleet operations**	
	O&M Vehicles and Motor Fleet	Chief Engineer
	Labor Protection and safety technique on WWTP	Chief Engineer
	Safety handling with chlorine and other chemicals	Chief Engineer

Table 4: Cost estimates for Implementing Training Program for Managerial and Operational Personnel of Vodokanal of Bukhara District

No	Training Courses Topics	Number of attendants	Cost per Unit (US$)	Total Cost (US$)
1	Business & Investments Planning	4	215	860.0
2	Management	3	215	645.0
3	Commercial	3	215	645.0
4	Common operations	3	215	645.0
5	Human resources development	2	215	430.0

6	Potable Water Treatment Operations	4	220	880.0
7	Vehicles and motor equipment fleet operations	2	220	440.0
	Total		**USD**	**4 545.0**

49. For purposes strengthening institutional capacity and upgrading technical performance of Bukhara District Vodokanal requires additional vehicles and equipments. Recommended types and number of vehicles and equipments required for Bukhara District Vodokanal and also its cost estimates are given in Table 5 and 6 below:

Table 5. A List of Vehicles and Equipments Required for Bukhara District Vodokanal

No.	Name	Tentative Specification Parameters	Quantity
A. Vehicles:			
1	Light care	Engine volume 1,200-1,500 cm^3	1
2	Minibus for Employees	With number of seats 10-12	1
3	Lorry	With payload approximately 4 – 5 ton	1
4	Vehicle for repair networks	On a medium truck chassis	1
5	Vacuum cesspool truck	Tank capacity 3.0 m^3	1
6	Water Trucks	With volume of water tank 6,0 – 8,0m3	1
7	Auto crane	Lifting capacity up to 8 tons	1
B. Mechanisms:			
8	Wheeled Excavator	With bucket 0,25 m3	1
9	Mobile Water Pump	Similar to “Andizhanets” pump	2
10	Welding Device (mobile)	Similar to ASD (asynchronized synchronous motor) device	2
11	Trailer with Tractor	Similar to T28x4	1
C. Computers and Office Equipment:			
12	Personal Computer	Desktop with Monitor 17”	3
13	Office Printer	Analog of LaserJet 1100 or 1200	2
14	Copier	Analog of Canon 6317	1
15	Fax Machine	Analog of Panasonic Plan Paper Fax	1
16	Telephone Set	Digital type	2
17	Desk Set	For Managerial personnel	2
18	Desks	For office personnel	4
19	Chairs	For office personnel	12
20	Book Stacks	For storing and keeping files of Documents	5

Table 6: Cost estimates of Required Vehicles and Equipment for Strengthening Capacity of Bukhara district Vodokanal.

No	Training Courses Topics	Number of attendants	Cost per Unit (US$)	Total Cost (US$)
1	Business & Investments Planning	4	215	860.0
2	Management	3	215	645.0
3	Commercial	3	215	645.0
4	Common operations	3	215	645.0
5	Human resources development	2	215	430.0
6	Potable Water Treatment Operations	4	220	880.0
7	Vehicles and motor equipment fleet operations	2	220	440.0
	Total		**USD**	**4 545.0**

50. For establishing normal working conditions for the vodokanal managerial and operational personnel it would be reasonable to include in the Loan Agreement АБР with Government a condition obliging central and regional the authorities to delivery to the given organization on a gratuitous basis of the separate building or to rent on favorable conditions 3-4 premises in empty buildings in territory of Galaasia town.

Table7 :Summary of Costs For the Capacity Building Program for Vodokanal of Bukhara district

Type of Capacity Building Measures	US$
Training of Managerial and Operational Personnel	4 545.00
Procurement vehicles, computer and office equipments	481 680.00
TOTAL	486 225.00

Annexes

Annex 1

LIST
Managers and Key Specialists of Bukhara District Vodocanal interviewed by the Consultant

1. Head of Bukhara Vodokanal – Akromov Utkir Sobirovich;
2. Chief Accountant of Bukhara Vodokanal – Turayeva Rizvon Kilichevna.

APPENDIX 8: ECONOMIC AND FINANCIAL ANALYSIS

Introduction

1. This financial and economic analysis was undertaken for Galaasiya sample subproject of Tranche 1 investment. The financial analysis consists of two parts: (i) determination of appropriate water tariffs for the subproject, and (ii) preparation and assessment of financial projections for the subproject entity. The projections consist of annual financial statements (income statement, sources and applications of funds statement, balance sheet), key performance indicators, and operating and financial data for the 2010–2020 period.

2. **Financial Objectives.** The proposed tariff rates for the subproject were designed to (i) fully recover operation and maintenance (O&M) costs and (ii) recover all subproject debt service, and (iii) generate a financial internal rate of return (FIRR) greater than the weighted average cost of capital (WACC), wherever feasible.

3. **Operating Revenues.** Operating revenues include water sales payment for waste water. Future water sales were calculated on the basis of water demand and projected water tariff levels.

4. **Operating Expenses.** Annual O&M costs were projected separately for each subproject over the entire forecast period by major expense item (salary, electricity, chemicals, maintenance, social charges, selling and administration expenses). Depreciation allowance was calculated on an average asset life of 20 years using the straight-line method. Income tax was assumed to be 10% plus 8% infrastructure development tax.

B. Financial Performance of Galaasiya Vodokanal

5. Galaasiya Vodokanal is located in Bukhara province and serves about 13 thousand people. Galaasiya Vodokanal purchases its water from Damkhoja IRTM at Sum 43.2 (Sum 36 plus VAT) and sells at Sum 95 (net of VAT), thus cost of purchased water makes up about 50% of O&M costs. Other 50% of O&M costs comprise labor costs. Consequently Vodokanal suffers losses from its main operations. Electricity costs are very low as sometimes pumps either do not function or electricity is supplied 3-4 hours a day, and water is supplied by gravity through pipes.

6. Vodokanal maintains very low liquidity ratio (less than 1) and very high Accounts Receivable and Accounts Payable Turnover period due to low collection rate.

Table 1: Galaasiya Vodokanal - Financial Highlights

Sum' 000

Description	2006	2007	2008	2009 II-QTR
Net Sales	20 348	25 203	27 588	23 164
Operating Expenses	(19 379)	(30 759)	(30 005)	(14 895)
Other Operating Revenue	-	-	2 417	306
Operating Income (Loss)	969	(5 556)	1	8 576
Non-operating items	(47)	(1 110)	-	(1 872)
Net Income	922	(6 666)	1	6 704
Cash and Cash Equivalent	117	474	293	326
Current Assets	18 783	20 268	45 768	47 963

Current Liabilities	41 717	49 867	54 986	45 356
Total Equity	5 936	(1 227)	16 371	33 977
Total Assets	53 433	54 421	77 138	79 333
Current ratio	0.45	0.41	0.83	1.06
Quick ratio	0.00	0.01	0.01	0.01
ROA	1.73%	-12.25%	0.00%	8.45%
ROE	15.53%	543.19%	0.01%	19.73%
Gross profit margin	21.4%	-1.7%	8.0%	50.4%
Operating expense ratio	95.2%	122.0%	108.8%	64.3%
Accounts Receivable Turnover in Days (customers)		144.23	212.87	180.87
Accounts Payable Turnover in Days (suppliers)		265.17	289.65	315.31

C. Benefit-cost analysis

7. Benefit-cost analysis for the subproject was undertaken to determine subproject economic and financial viability. The main viability parameters used are the BCR, EIRR and ENPV for economic analysis, and FIRR and FNPV for financial analysis. The proposed subproject is economically viable if the resulting BCR is greater than 1.0, EIRR exceeds the economic opportunity cost of capital EOCC at 12%, and ENPV is positive. Similarly, the subproject is financially viable if FIRR is greater than the weighted average cost of capital WACC at 3.3%, and FNPV is positive. In the economic analysis, the quantifiable benefits related to incremental and non-incremental water that result into resource cost savings were compared with capital and O&M costs that have been converted from financial costs using shadow pricing and after elimination of transfer payments. The resulting cash flows were discounted at the EOCC. In the financial analysis, net revenues were compared with capital and O&M costs and the resulting net cash flows were discounted at the WACC. The subprojects were subjected to sensitivity analysis to assess the effects of adverse circumstances on viability. The sensitivity scenarios for the economic and financial analyses include: a 20% increase in capital cost, a 20% increase in O&M cost, a 20% decrease in benefit (revenues)

.

8. The results of the analysis show that the subproject is economically viable with BCR at 1.3. EIRR is calculated at 17.9% and an ENPV of Sum 1 380 million for the base case. The subproject is also found financially viable with FIRR at 6.3% and an FNPV of Sum 2 788 million. Economic and financial sensitivity scenarios showed that the subproject remained robust. The combined results are given in Table 2.

Table 2: Summary Economic and Financial Analysis Results

Particulars	Change	EIRR	ENPV	EIRR SV	FIRR	FNPV	FIRR SV
Base Case		17.9%	1 380		6.3%	2 788	
Investment Cost	+20%	14.2%	606	31%	5.2%	1 939	54%
O&M Cost	+20%	17.3%	1 194	175%	5.6%	2 064	85%
Benefit (Revenues)	-20%	12.6%	143	22%	4.0%	561	26%
Implementation	1 yr delay	14.5%	696	19%	5.5%	2 082	12%

SV = Switching Value

D. Average Incremental Cost and Cost Recovery

9. In assessing the appropriate water charge to attain the required level of cost recovery, both average economic and financial incremental costs were calculated. AIC is an approximation of long term marginal costs and AIEC is the appropriate target for tariff setting. Subproject AIEC and AIFC are at Sum 998 and Sum 900 respectively. With AIEC higher than AIFC, setting the tariff at AIEC would result in sufficient cost recovery level.

10. Galaasiya Vodokanal is projected to generate net income and positive net cash flow starting from 2019. Consequently, Return on Net Fixed Assets will be positive in 2019 only and will range from 1.47% to 6.8% from 2019 to 2020. DSR will be greater than 1.2 starting from 2017.

E. Tariff affordability

11. The viability of subproject operation ultimately depends on household capacity to pay for their monthly water dues. As the project aims to extend water service to the poor within the community served by the vodokanals the proposed tariff was tested against the average income of the low-income household. The affordability analysis shows that the proposed tariffs will result to the percentage of monthly bill in household income at 0.3 to 4 during the projection period for families belonging to the low-income group.

F. Financial Management Assessment of Galaasiya Vodokanal

12. Galaasiya Vodokanal's current financial management system is adequate to (i) record required financial transactions and balances, (ii) provide regular and reliable financial statements and monitoring reports during project implementation. Institutional Strengthening and Capacity Development components under this project will devise standard reporting system for Vodokanals.

13. The following findings and observations were prepared based on interviews and consultations with Galaasiya Vodokanal during the Water Supply And Sanitation Services Improvement Program (WSSSIP) preparation.

14. Galaasiya Vodokanal is a state owned entity with its own charter (ustav) that reports to the provincial government.

15. **Funds Flow.** Funds flow arrangement (ADB loan funds) for the WSSSIP will follow the same set-up as in the UWSP, the KNWSSSP and the SWSSP. A new project account will be opened by the Vodokanal/PIU in a commercial bank acceptable to ADB. Government counterpart funds will be disbursed through this account. The counterpart funds flow will follow the existing government set-up.

16. **Staffing.** Vodokanal has a total staff of 17 people. Finance department is staffed with a Chief Accountant only. The Chief Accountant is not professionally qualified.

17. **Accounting Policies and Procedures.** Vodokanal's accounting transactions and reporting are guided by National Accounting Standards and local legislation.

18. **Budgeting System.** Vodokanal prepares its budgets on quarterly basis. Budgets are produced at summary level for the entity. Actual expenditures reports are produced quarterly and compare budgeted and actual results. These reports are submitted to provincial governments.

19. **Payments**. Payment control is exercised by the requirement for two signatories per cheque. The signatories are the Director and the Chief Accountant. The FMA revealed that at present Vodonal's bank account is blocked by the bank due to tax liabilities. Vodokanal's revenue is automatically transferred to tax authorities to cover the tax liabilities. Vodokanal is allowed to use only 5% of its revenue.

20. **Cash and Bank.** A manual cash book is maintained and recording is up to date. A daily check is made between the bank statement and bank deposit slips but as the bills are produced manually the system is open to abuse. Currently Vodokanal is implementing card-based payment system for population which will provide less cash transactions.

21. **Safeguard over Assets**. Vodokanal maintains asset records, but these records are considered inadequate for control purposes. The assets are not insured.

22. **Internal Audit.** Vodokanal does not have an established internal audit unit.

23. **External Audit**. Financial reports are not audited by external auditors.

24. **Reporting and Monitoring.** Vodokanal prepares its financial reports under Uzbekistan National Accounting Standards. Financial statements are prepared monthly, quarterly and annually. Financial recording is done using a manual system. Spreadsheets, using MS Excel, are used to produce the final accounts.

25. **Information Systems.** Vodokanal does not have any computerized MIS. Vodokanal uses a spreadsheet computer program to prepare its reports.

Projected Financial Statements, FIRR and Sensitivity Analysis for Subproject
(Sum million, current prices)

Table 3: Key Performance Indicators

	Projected										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Operating Data											
Water Sold	0.56	0.56	0.56	1.64	1.93	1.94	1.99	2.04	2.09	2.14	2.19
Population Served (Thousand)	13.13	13.23	13.33	13.42	13.52	13.62	13.72	13.83	13.93	14.03	14.14
Actual Water Production (1000 m3/d)	1.39	1.39	1.39	2.73	2.75	2.77	2.84	2.91	2.98	3.06	3.13
Non Revenue Water (%)	60%	60%	60%	40%	30%	30%	30%	30%	30%	30%	30%
Water Consumption (lpcd)	77	77	77	148	148	148	148	148	148	148	148
Average Tariffs (Sum/m3 - current prices)											
Expressed on Basis of Water Consumed:											
Accrual Basis	135.77	169.56	211.75	251.73	314.66	393.32	508.33	655.50	843.58	1 083.65	1 389.77
Cash Basis	47.25	65.44	89.68	172.20	251.04	329.31	427.15	552.58	713.13	918.38	1 180.45
Cost Recovery & Profitability											
Operating Ratio (%)	251%	198%	188%	284%	290%	228%	178%	140%	111%	88%	71%
Working Ratio (%)	233%	186%	149%	126%	123%	101%	83%	69%	57%	47%	40%
Return on Equity	-106.5%	-124.0%	-8.1%	-27.9%	-56.6%	-111.0%	4090.3%	82.9%	26.3%	-2.0%	-54.2%
Collection Performance											
Average Collection Performance (%)	68%	76%	84%	87%	87%	91%	92%	92%	93%	93%	93%
Accounts Receivable (Days Worth of	150	150	140	120	100	80	70	65	60	60	60
Cost Efficiency & Effectiveness (Sum/m3 - current prices)											
Cash O&M	0.09	0.10	0.11	0.17	0.24	0.26	0.27	0.29	0.31	0.33	0.36
Depreciation Expense	0.01	0.01	0.03	0.21	0.32	0.32	0.31	0.30	0.30	0.29	0.28
Liquidity & Cash Flow											
Cash (Days Worth of Cash O&M)	14	(226)	(185)	(241)	(395)	(472)	(469)	(364)	(380)	(271)	10
Cash (Days Worth of Cash Obligation	14	(226)	(185)	(241)	(395)	(472)	(469)	(364)	(233)	(172)	6
Current Ratio	0.4	(0.4)	(0.1)	(0.1)	(1.1)	(1.8)	(2.1)	(0.4)	(0.4)	(0.0)	1.1
Debt - Asset Ratio	0.48	0.76	0.80	0.83	0.89	0.95	1.02	1.07	1.10	1.11	1.05

Table 4: Projected Financial Statements

	Projected										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Income Statements											
Operating Revenue	18.8	26.2	36.1	131.1	192.5	254.3	338.6	449.5	595.2	786.0	1 035.7
Operating Expenses	43.8	48.6	53.8	164.9	237.0	257.9	281.8	308.5	338.4	372.2	410.6
Depreciation	3.3	3.3	14.1	207.2	321.9	321.9	321.9	321.9	321.9	321.9	321.9
Operating Income	(28.4)	(25.8)	(31.7)	(241.0)	(366.5)	(325.6)	(265.1)	(180.9)	(65.2)	91.8	303.2
Operating Subsidies	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Non-Operating Expenses	(0.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest & Other Financial Expenses	0.0	0.0	0.0	0.0	61.3	61.3	61.3	61.3	60.0	81.4	77.8
Income Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Income	(28.0)	(25.8)	(31.7)	(241.0)	(427.8)	(386.9)	(326.5)	(242.2)	(125.2)	10.4	225.3
Cash Flow Statements											
Sources											
Internal Cash	(24.7)	(22.4)	(17.6)	(33.8)	(44.5)	(3.7)	56.8	141.1	256.8	413.8	625.1
Debt	51.4	120.8	3 093.1	1 844.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity Contributions	12.8	29.9	769.0	450.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	39.4	128.2	3 844.5	2 261.6	(44.5)	(3.7)	56.8	141.1	256.8	413.8	625.1
Applications											
Capital Investments	64.1	150.7	3 862.1	2 295.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Working Capital Increase (Decrease)	(26.0)	9.3	(20.5)	47.7	41.7	12.3	23.7	25.1	28.8	43.6	47.1
Interest	0.0	0.0	0.0	0.0	61.3	61.3	61.3	61.3	60.0	81.4	77.8
Debt Repayment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	212.9	212.9	212.9
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	38.1	160.0	3 841.6	2 343.1	103.0	73.6	85.1	86.4	301.8	338.0	337.8
Cash Changes	1.3	(31.8)	2.9	(81.5)	(147.5)	(77.3)	(28.3)	54.6	(45.0)	75.8	287.3
Ending Cash Balance	1.6	(30.2)	(27.3)	(108.8)	(256.4)	(333.7)	(361.9)	(307.3)	(352.3)	(276.5)	10.7
Balance Sheets											
Assets											
Current Assets	14.9	(12.4)	(5.9)	(11.7)	(105.6)	(170.1)	(182.8)	(106.2)	(126.1)	(11.2)	325.5
Net Fixed Assets	28.0	88.9	225.5	3 880.4	5 853.9	5 531.9	5 210.0	4 888.1	4 566.1	4 244.2	3 922.3
Work in Progress	64.1	150.7	3 862.1	2 295.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Assets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	107.1	227.1	4 081.7	6 164.2	5 748.3	5 361.8	5 027.2	4 781.9	4 440.0	4 233.0	4 247.7
Liabilities and Equity											
Current Liabilities	37.0	32.1	56.3	84.3	96.2	96.7	88.5	298.3	294.6	290.1	292.4
Long Term Debt	51.4	172.1	3 265.2	5 109.9	5 109.9	5 109.9	5 109.9	4 897.0	4 684.0	4 471.1	4 258.2
Equity	18.7	22.9	760.2	970.0	542.2	155.3	(171.2)	(413.4)	(538.6)	(528.2)	(302.9)
Total	107.1	227.1	4 081.7	6 164.2	5 748.3	5 361.8	5 027.2	4 781.9	4 440.0	4 233.0	4 247.7
Financial Ratios											
Cost Recovery Ratio	0.6	0.1	0.1	0.2	0.4	0.8	0.9	1.1	0.9	1.1	1.4
Debt Service Ratio	NA	NA	NA	NA	(0.7)	(0.1)	0.9	2.3	0.9	1.4	2.2
Debt - Asset Ratio	0.5	0.8	0.8	0.8	0.9	1.0	1.0	1.1	1.1	1.1	1.1

Table 5: FIRR and Sensitivity Analysis

Year	Revenue	Costs					Base Case	Capital	O & M	Revenue	1 Year Delay
		Capital	Capital Replacement	O & M	Residual Value	Total	Net	20%	20%	-20%	in Completion
2010	0.00	-0.06	0.00	0.00		-0.06	0.06	0.07	0.06	0.06	0.06
2011	0.00	125.61	0.00	0.00		125.61	-125.61	-150.73	-125.61	-125.61	-125.61
2012	0.00	2974.26	0.00	0.00		2974.26	-2974.26	-3569.11	-2974.26	-2974.26	-2974.26
2013	61.15	1636.78	0.00	65.97		1702.75	-1641.60	-1968.95	-1654.79	-1653.83	-1702.75
2014	72.10	0.00	0.00	104.11		104.11	-32.01	-32.01	-52.83	-46.43	-42.95
2015	90.47	0.00	0.00	106.46		106.46	-15.98	-15.98	-37.28	-34.08	-34.36
2016	117.63	0.00	0.00	110.79		110.79	6.83	6.83	-15.33	-16.69	-20.32
2017	152.23	0.00	0.00	115.52		115.52	36.71	36.71	13.60	6.26	2.10
2018	196.19	0.00	0.00	120.72		120.72	75.47	75.47	51.33	36.23	31.51
2019	251.90	0.00	0.00	126.49		126.49	125.42	125.42	100.12	75.04	69.71
2020	322.33	0.00	0.00	132.91		132.91	189.42	189.42	162.83	124.95	118.99
2021	411.14	0.00	0.00	140.10		140.10	271.04	271.04	243.02	188.81	182.23
2022	522.91	0.00	0.00	148.21		148.21	374.70	374.70	345.06	270.12	262.93
2023	663.32	0.00	0.00	210.69		210.69	452.63	452.63	410.49	319.97	312.23
2024	839.36	0.00	0.00	256.45		256.45	582.91	582.91	531.62	415.04	406.86
2025	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	537.67
2026	1059.73	0.00	236.83	301.70		538.53	521.20	521.20	460.87	309.26	521.20
2027	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2028	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2029	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2030	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2031	1059.73	0.00	236.83	301.70		538.53	521.20	521.20	460.87	309.26	521.20
2032	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2033	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2034	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2035	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2036	1059.73	0.00	236.83	301.70		538.53	521.20	521.20	460.87	309.26	521.20
2037	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2038	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2039	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2040	1059.73	0.00	0.00	301.70		301.70	758.03	758.03	697.69	546.09	758.03
2041	1059.73	0.00	236.83	301.70		538.53	521.20	521.20	460.87	309.26	521.20
2042	1059.73	0.00	0.00	301.70	148.02	449.71	610.02	610.02	549.68	398.07	610.02
						FIRR	**6.3%**	**5.2%**	**5.6%**	**4.0%**	**5.5%**
WACC	**3.3%**					**NPV**	**2 788**	**1 939**	**2 064**	**561**	**2 082**
					Switching Value	**FIRR**		54%	85%	26%	12%
						FNPV		66%	77%	25%	13%

Summary Economic Analysis for Subproject

Table 6: Conversion of Financial Costs to Economic Costs

(SUM million - constant prices)

Particulars	Financial Costs	Conversion factor	Economic Costs
A. Capital Costs[/a]			
Traded componenets (SERF)	583	1.00	583
Non-traded compoments:			
Domestic M&E (SWRF)	4 859	1.00	4 859
Unskilled labour (SWRF)	164	0.80	131
Skilled labour (SERF)	18	1.00	18
Land acquisition (SERF)	0	1.00	0
Taxes and duties	689	0.00	0
Subtotal (A)	6 312		5 591
B. Operation and Maintenance Costs[/b]	110	0.95	104

/a Capital costs excluding IDC & replacements
/b O&M cost in 2014, year of full operation

Table 7: Economic Benefits Assumptions

Particulars	Values
Savings on collection cost	
Average collection time, hrs/mo.	30
Wage rate, SUM/hr	1 826
Collection cost, SUM/mo.	54 773
Collection cost, SUM/yr	657 274
% Actual benefit, SUM/yr	525 819
SWRF at 0.8	105 164
Benefit from collection savings, SUM/yr	420 655
Savings on storage cost	
Storage unit cost, SUM/yr	0
Unit financing cost, SUM/yr	0
Unit O&M cost, SUM/yr	0
Benefit from storage savings, SUM/yr	0
Savings on treatment cost	
Treatment cost of storage cost, SUM/yr	0
Total benefits from savings	420 655
Annual current water consumption, m3	136
Price of non-incremental water, SUM/m3	**3 093**
Price of incremental water and NTL, SUM/m3	**237**

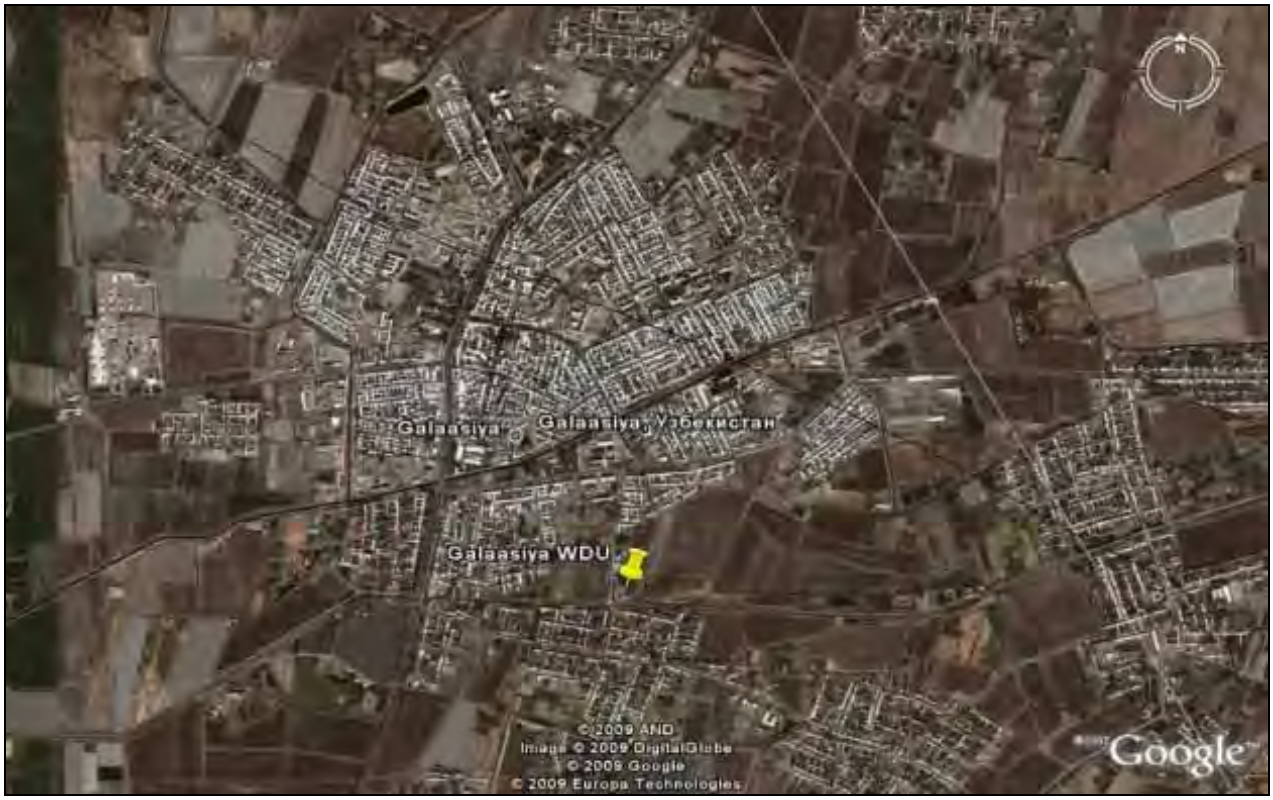
Table 8: EIRR and Sensitivity Analysis

Year	Benefit	Economic Cost			Net Benefit (Cost)				
		Investmt	O&M	Total	Base Case	Investmt 20%	O&M 20%	Benefit -20%	1-yr Delay in Benefit
	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill	SUM mill
2010	0	56	0	56	(56)	(68)	(56)	(56)	(56)
2011	0	132	0	132	(132)	(159)	(132)	(132)	(132)
2012	636	3 388	0	3 388	(2 753)	(3 430)	(2 753)	(2 880)	(3 388)
2013	742	2 014	66	2 080	(1 338)	(1 740)	(1 351)	(1 486)	(1 444)
2014	1 048	0	104	104	944	944	923	734	638
2015	1 047	0	106	106	940	940	919	731	941
2016	1 044	0	111	111	933	933	911	724	936
2017	1 041	0	116	116	926	926	902	717	928
2018	1 038	0	121	121	917	917	893	710	920
2019	1 035	0	126	126	909	909	883	702	912
2020	1 032	0	133	133	899	899	873	693	902
2021	1 029	0	140	140	889	889	861	683	892
2022	1 026	0	148	148	878	878	848	673	881
2023	1 023	0	211	211	812	812	770	608	815
2024	1 020	0	256	256	763	763	712	559	766
2025	1 016	0	302	302	715	715	654	511	718
2026	1 016	87	302	388	628	611	568	425	628
2027	1 016	0	302	302	715	715	654	511	715
2028	1 016	0	302	302	715	715	654	511	715
2029	1 016	0	302	302	715	715	654	511	715
2030	1 016	0	302	302	715	715	654	511	715
2031	1 016	68	302	370	647	633	587	444	647
2032	1 016	0	302	302	715	715	654	511	715
2033	1 016	0	302	302	715	715	654	511	715
2034	1 016	0	302	302	715	715	654	511	715
2035	1 016	0	302	302	715	715	654	511	715
2036	1 016	53	302	355	662	651	601	458	662
2037	1 016	0	302	302	715	715	654	511	715
2038	1 016	0	302	302	715	715	654	511	715
2039	1 016	0	302	302	715	715	654	511	715
2040	1 016	0	302	302	715	715	654	511	715
2041	1 016	42	302	343	673	665	613	470	673
2042	1 016	175	302	476	540	505	480	337	540
		Discount Rate @ 12%		**EIRR**	17.9%	14.2%	17.3%	12.6%	14.5%
				ENPV	1 380	606	1 194	143	696
		Sensitivity Indicator		**EIRR**		3.2	0.6	4.5	5.2
				ENPV		2.8	0.7	4.5	4.5
		Switching Value		**EIRR**		31%	175%	22%	19%
				ENPV		36%	148%	22%	22%

APPENDIX 9: ENVIRONMENTAL ASSESSMENT

Map 1: Uzbekistan showing subproject location

Map 2: Overview of the Galaasiya water distribution area



INTRODUCTION

Purpose of the Report and the Project Background

61. This report presents the findings of an initial environmental examination (IEE) of the proposed subproject; i.e., improvements to the water supply and distribution system for Galaasiya City in Bukhara Oblast under TA 7240-UZB Water Supply and Sanitation Services. This is one of four proposed core subprojects that are representative of a multi-subproject Sector Project that is Tranche 1 of a Multi-tranche Financial Facility (MFF) Investment Program. The other three proposed core subprojects of Tranche 1 are Damkhoja Water Supply System, Karmana City Water Supply System, and Termez City Wastewater Treatment Facilities. The IEE was conducted during the subproject preparation period to identify the impacts of the proposed subproject on the environment and to recommend measures to mitigate adverse impacts arising from its implementation.

62. The proposed MMF Investment Program will improve access to safe, reliable, and sustainable water supply and sanitation (WSS) by about 3 million residents in several provincial capitals and district towns in about eight oblasts (provinces) in Uzbekistan. Through institutional strengthening and capacity development components in each subproject, the Investment Program will provide targeted assistance to Uzbekistan Communal Services Agency (UCSA), State Committee for De-monopolization and Supporting Competition and Entrepreneurship, local governments, and town level vodokanals (water supply and sanitation agency), focusing on financial, managerial, and technical performance.

63. This subproject is designed to rehabilitate and improve the bulk supply import point from the Interregional Trunk Main (IRTM) and to replace the transmission main and distribution network. It is designed to cater for the total population of 13,520 in Galaasiya, of which 13,000 are currently connected to the water distribution network, by increasing the supply quantity and pressure and connecting all residents. Further, levels of service will be enhanced with reduced non revenue water (NRW) losses. On completion of the proposed improvement works, water supplies will become available to all existing customers and those who are presently not connected. The water quality will comply with Uzbekistan water quality standards.

64. In Uzbekistan, water sector developments are governed by the national list of priority investment projects (proposals) prepared for implementation with the involvement of international financial institutions and donor countries in accordance with Presidential Decree No 969 dated 02-10-2008. The proposed subproject is one of the projects in the investment plan updated for 2009. The project will contribute to the Government's long-term program of providing Uzbekistan’s population with drinking water, which was approved by resolution of the Cabinet Ministry. Furthermore, this is also a priority project of the Government focusing on the elimination of existing water supply problems and improving the sanitation and epidemiological situation for 2009–2010 by Presidential Resolution No. 890 dated 10-06-2008 to provide rural population and cities with drinking water.

Extent of the IEE Study

65. The IEE study for the subproject was carried out by the Project Preparatory Technical Assistance (PPTA) Consultant, in accordance with the Environment Policy (2002) and Environmental Assessment Guidelines (2003) of the Asian Development Bank (ADB) and relevant environmental policies and guidelines of the Government of Uzbekistan (GoU).

Environmental Specialists of the PPTA consultants visited the subproject site and also carried out public consultations prior to preparation of this report. Moreover, information provided by consultants carrying out related feasibility studies[6] was used in this IEE. The IEE involved the following activities:

- gathering of baseline information available on the physical, chemical, biological, and socio-economic environment of the subproject area and subcomponent sites and understanding the technical, social, and institutional aspects of the subprojects;
- public consultation and field visits;
- screening of potential issues, concerns, and impacts relative to location, design, construction, and operation to distinguish those that are likely to be significant for a particular subcomponent and warranting further study;
- recommending measures to mitigate adverse issues, concerns, and impacts, particularly to the project design team;
- preparing an Environmental Management Plan (EMP) indicating impact areas, recommended mitigation measures, method of monitoring the impacts and responsible persons ; and
- proposing the institutional set-up for implementation of the EMP.

66. Findings of site reconnaissance, results of water quality tests and analyses, technical descriptions based on the engineering designs contained in the Draft Appraisal Reports, and outcomes of discussions with officers of the relevant agencies and the people are integrated in this IEE Report.

DESCRIPTION OF THE PROJECT

Type of Project

67. As noted, this is one subproject of a Multi-tranche Financial Facility Investment Program of which the first tranche is a Sector Project. This IEE is for one of four proposed core subprojects of the first tranche (Project 1) of the MFF.

68. The subproject will rehabilitate and extend the existing water supply network for Galaasiya to provide a reliable supply of potable water. It has three major inter-related components; namely, (i) water supply development, (ii) capacity development and institutional strengthening, and (iii), investment program management.11.

Environmental Category of Subproject

69. Based on a Rapid Environmental Assessment (REA) in Appendix 1 carried out by the PPTA Consultant, this subproject is classified as a Category “B” project in accordance with the Environment Policy (2002) and Environmental Assessment Guidelines of the ADB. Adverse impacts that may arise from the implementation of all the components will generally be minor and measures to mitigate them will be provided and instituted without difficulty. The Environmental Policy of the ADB requires that Category “B” projects are subjected to an IEE.

[6] Appraisal Report Water Supply Appraisal Report Sub Project 3 Galaasiya City, June 2009, PPTA consultant

70. The Uzbekistan law on nature protection enabled in 1992 outlines the legal and institutional requirements for the conservation of the environment and the rational use of natural resources. The law empowers the State Committee for Nature Protection (*Goskompriroda)* as the agency responsible for implementing that law.

71. Preparation of the review reports and approval of projects on environmental grounds is regulated by the Decree of the Cabinet of Ministers No 491 dated 31.12.2001 - Approval of the Regulation of the State Environmental Expertise. This regulation stipulates four categories of projects. According to this regulation, the proposed subproject is a Category III project because the water supply facilities are limited to one province. Category III projects require the preparation of an Initial Environmental Assessment (IEA), which is similar to ADB's IEE. The Provincial Directorate for State Ecological Expertise *(Gosecoexpertisa)* under the provincial level of National Protection Committee *(Oblkompriroda)* approves Category III projects. However, after considering the IEA report, the *Oblkompriroda* may request an Environmental Consequences Assessment (ECA) to be carried out before the project commences operation. There is no central National Protection Committee involvement.

72. The IEA and, if required, the ECA, will be prepared by the PPTA consultant in the Uzbekistan Official Language for Government approval.

Need for the Project

73. Water supplies to the Galaasiya urban area are provided from two sources: (i) abstraction from the IRTM via the Galaasiya Water Distribution Unit (WDU) to provide most of the city supply and (ii) three local boreholes located near the abstraction point. The water quality from these boreholes is poor and consequently, none are in operation at present. In the past, well water was blended with the IRTM water. Old transmission and distribution mains, a dilapidated reservoir, inoperative disinfection system, and a disconnected booster pump due to unpaid electricity bills have all contributed to the city receiving insufficient supplies at inadequate pressure (some 20% of connected customers do not have running water due to low pressure).

74. When the distribution system is rehabilitated and extended and the quantity from the IRTM is increased and adequate pressure is provided, a number of benefits will accrue:

- water pressure will be increased so all residents will benefit from piped water into their residences
- water quality supplied will comply with Uzbekistan water quality standards
- most urban residents of Galaasiya will be connected
- all current connected customers who now do not pay water bills because they do not receive adequate water supplies will benefit from adequate water supply and are expected to pay their water bills leading to increased revenues
- O&M cost of materials for mains and service repairs will be reduced and water losses in the distribution network will be reduced after the distribution rehabilitation work is completed leading to increased revenues

75. Considering the poor condition of the existing water supply system in Galaasiya and the expected benefits that will accrue when the system is improved, the subproject designed to efficiently deliver an adequate supply of affordable, potable water for the population of Galaasiya is required.

Project Location

76. Galaasiya City is situated in Bukhara Oblast and a short distance north of Bukhara City. The proposed project relates to the urban area of Galaasiya. However, preliminary network improvements have also been identified for the rural area surrounding the city.

Magnitude of Operation

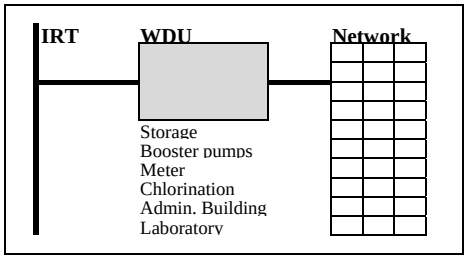
77. The total population of Galaasiya is 13,520, some 13,000 of whom are connected to the water distribution network.

Description of the Project

78. The physical components of this water supply infrastructure development and rehabilitation work that are subject to environmental assessment are listed below.

79. The Water Distribution Unit (WDU - see schematic below) for Galaasiya contains a water meter, a 500 m^3 reinforced concrete storage reservoir, a booster pump, and a sodium hypochlorite solution drip-feed dosing unit.

- Almost half (48%) of the 27.3 km transmission main from the IRTM to Galaasiya distribution network and 75% (20.53 km) of the distribution network are 45-year old unlined steel pipe that has badly deteriorated, causing many real network water losses resulting in NRW quoted at more than 60%.[7]
- the reservoir is in very poor condition, leaking badly and with a partially collapsed roof, consequently not in use;
- the booster pump is disconnected from the operating system due to unpaid electricity bills and the city is supplied directly from the IRTM, for two hours per day and at inadequate 0.4 bar pressure such that 20% of the connected customers do not have running water and instead, have to rely on tanker supplies; consequently, they do not pay their bills, reducing vodocanal revenue and its ability to pay its electric charges – a sad catch-22 situation
- the sodium hypochlorite solution dosing unit designed to drip-feed into the storage reservoir is currently not operational; consequently, disinfection for the system depends on the previous chlorination point at Navoi WDU more than 90 km from Galaasiya.
- the Galaasiya import point has an old water meter, which is believed to be grossly inaccurate.



[7] Appraisal Report Water Supply Appraisal Report Sub Project 3 Galaasiya City, June 2009

80. The proposed subproject will include the following improvements

(i) Construction of about 1 km transmission main
(ii) Rehabilitation of about 29 km distribution mains
(iii) Rehabilitation of WDU
- Domestic water meters
- Calcium hypochlorite solution storage, mixing, and feed equipment
- Two 1,000 m3 reinforced concrete storage reservoirs
- Booster pump station
- One of the 3 transformers requires replacement and a security fence is required around the transformer installations.

Section 4 DESCRIPTION OF THE ENVIRONMENT

Physical Resources

81. Bukhara Oblast-is located in the south-west of Uzbekistan, bordering Turkmenistan, Navoi and Kashkadarya Oblasts, and the autonomous region of Karakalpakstan. The total area is 40,300 km2 and the Kyzyl-Kum desert comprises the majority of its territory (64%). The centre of the oblast is Bukhara City.

Climate

82. The climate of Bukhara Oblast is severe continental. Average annual temperature is $+14^0$C. The coldest month is January with minimum temperature -18^0C, the hottest month is July with maximum temperature $+44^0$C. Annual precipitation in Bukhara is 142 mm, and in Karakul 188 mm.

Topography and Soils

83. Most of Bukhara Oblast comprises the thinly populated desert Kyzyl-Kum. The geomorphologic structure consists of pit-run fines (loam, clay sand) from 3 m to 8 m, below which there is a sandy-pebble layer from 20 m to 40 m.

84. The area is in a seismic zone with severity of 8 on the Richter Scale. Structural designs will take this into account.

Water Resources

85. The main watercourse of Bukhara Oblast is the Zarafshan River. Amubukharskiy, Amukarakulskiy, and other canals traverse the oblast.

86. Bukhara Oblast is located on the bank of Zarafshan River, which is fed by glaciers at the intersection of Turkestan and Zarafshan mountain ridges in Tajikistan. The total length of the river from source is 781 km, 18.5 km runs through Bukhara Oblast and ends at the Hamkur hydro-electric scheme. Water flow in the river is about 150-300 million m^3 per annum.

87. Zarafshan River is significantly exposed to cross-border influence. Near its source in the Republic of Tajikistan ore-dressing and processing enterprises are located on the river, causing

pollution including toxic metals (antimony and mercury). In Uzbekistan effluents from industry in Samarkand, Kattakurgon, Navoi, and rural economic enterprises flow into the river. This influence can be observed as total dissolved solids (TDS) concentration in the river increases from 305 mg/L at its source to 1,364 mg/L in downstream areas. The TDS of the river has not changed significantly over the years. The oxygen regime of the river in 2007 was at satisfactory levels with dissolved oxygen (DO) of 9.1 mg/L. Entering Uzbekistan, the Zarafshan River water has chemical oxygen demand (COD) of 3.32 mg/L, increasing to 24.23 mg/L below Navoi City.

88. The most polluted water is downstream of Navoi. Of particular concern are the concentrations of Cr+6 and Cu, which are right on the limits of their maximum permitted concentration (MAC) of 1.4 mg/L and 3.5 mg/L respectively., Other pollutants of concern are phenols, TDH, nitrite, and ammonia nitrogen. Nevertheless, the Zarafshan River in Bukhara Oblast is classified as moderately polluted, with an Index of Water Pollution[8] ranging from 1.0 to 2.5.

89. Surface and groundwater qualities towards the end of the Zarafshan River are characterized by high levels of TDS (0.6-2.0 g/L) and hardness, and containing phenols and organic matter. With the increase of water usage for irrigation and a consequential increase of run-off, dissolved solids are increasing.

Ecological Resources

90. The territory of Bukhara Oblast is 4.2 million ha, of which 0.2 million ha are covered by forest. The desert area is 2.7 million ha; protected forests comprise only 1,404 ha. There are two state reserves in Bukhara Oblast and a protected area. State ornithological reserve Lake "Dengizqul", with an area of 50,000 ha, was designated for the preservation and reproduction of migratory birds and water birds. Some of these birds are in the Red Book (Red List [9]) of Uzbekistan: pelican, white cormorant, and spoon-bill. This lake was included in the list of water reservoir based on the Ramsar Convention (preservation of wetlands), which Uzbekistan signed in 2001. The other reserve, the ecological centre "Jeyran", is located 35 km from Bukhara. Existing plants and animals here are protected by the State; many are very rare and are included in the International Red Book and the Red Book of Uzbekistan. Jeyran has two areas with typical desert plants and a system of lakes. One area contains mainly wild, hoofed mammals. The second one has the status of a scientific production zone and a protected territory of 18,300 ha, for 41 hooved animals, including 21 of the global population of 3,000 Przewalski horses and five onagers (member of the horse family). The 10,141 ha Kyzyl-Kum protected area was establish in 1971 and is comprised of 5,144 ha forest, 6,964 ha sandy area, and 3,177 ha flood-lands of the Amudarya River. The main protected species in the area, the Bukhara deer, is included in the Red Book of Uzbekistan.

91. The likelihood of any of the proposed developments affecting any of the listed species is essentially nil.

[8] Uzbekistan operates with a 6 category Index of Water Pollution (IWP). Depending on value of IWP, water is categorized from pure water to very dirty, with 6 being the most polluted category.

[9] The Red Book of Uzbekistan is equivalent to IUCN's definition of a Red List, which is a tool used for categorization of endangered flora and fauna species, by dividing the species into 5 categories related to their extinction threat.

Economic Development

92. About 62% of Bukhara Oblast is covered by the thinly populated Kyzyl-Kum desert where stock-raising is practised. The only town in the desert is Gazli with a population of 8,900.

93. The main industries are concentrated in Bukhara City include the Republic's largest textile enterprise, cotton-cleaning, silk-making, sewing factory, canning factory, wine production, mechanical maintenance. Agriculture and farming is practiced in the irrigated zone of the oblast. Gross agriculture production accounted for $556 million at 2007 prices of which $235 million derived from cattle breeding.

94. Kagan is the largest rail centre with attendant maintenance workshops and a number of food processing enterprises. In other small towns and rural settlements, there are textile companies (branches of Bukhara textile enterprise) that generally employ female labour.

Infrastructure

95. As of 1 January 2008, 79.9% of the urban population and 55.4% percent in rural areas of Galaasiya were connected to the water supply system; gas supply was available to 96.6% and 94.5% respectively.

96. To implement Cabinet of Ministers Decree № 405 of 17 September 2003, "Additional measures of providing population of rural area with drinking water and natural gas", additional 142.2 km water pipeline and 66 km gas pipeline were planned in 2007 and in that year, 176.2 km water pipeline (123.9 %) and 67.7 km of gas pipeline (102.5%) were laid. 50 villages are provided with water and two with natural gas.

Social and Cultural Resources

97. This Oblast consists of 11 administrative districts, 11 towns, and three rural settlements. Population in 2008 was 1,567,722, 487,533 in urban areas and the rest, some 70%, in rural areas. Large towns of Bukhara Oblast include Bukhara, Kogon, Gijduvan, Karakul, Vobkent, Shofirkon, and Romitan.

98. Bukhara Oblast is one of the main tourist centres of Uzbekistan. The oblast has a number of unique memorial complexes that are protected by UNESCO. During the last 20 years, much restoration has been completed.

Potential Environmental Impacts and Mitigation

Impacts due to Location

Water Supply Facilities

99. The sites for water supply related structures have negligible or minimal adverse environmental impact, which can be mitigated or resolved through design and during construction, and operation stages without difficulty. Except for the transmission main and distribution network, site selection was driven by the existing facilities and therefore, it is in accordance with local government land use planning. Distribution facilities are located within the existing dedicated area. Routes identified for the transmission pipes mainly follow existing roads.

Where encroachment is unavoidable, the resolution of resulting resettlement issues, if any, is detailed in the resettlement plan.

100. All subproject components are located well clear of any forests or other sensitive areas; consequently, potential impacts on environmentally sensitive areas as well as cultural, historical, and religious sites have been avoided. Similarly, there will be no impact on cultural use of lands by minorities nor wiil there be impairment of aesthetics.

101. Access roads to all the sites are available for project construction purposes and power supply is already connected into the facilities which are to be replaced. As such, no significant impacts will be encountered related to basic infrastructure required for project facilities.

Impacts Related to Design

102. The project design is basically the rehabilitation and upgrading of an existing water supply system. The PPTA consultant, assisted by IKS,[10] has developed a preliminary design that is based on the existing facilities, which is considered the most cost-efficient option of meeting the objectives of this subproject.

103. Transmission and distribution piping are designed along existing roads and will be of high density polyethylene (HDPE) and polyvinylchloride (PVC) recommended for potable water and complying with international standards. Non-metallic pipes are characterized by long lasting durability and resistance to corrosion. Steel pipes will be used only crossing of rivers and canals. Asbestos cement pipes will not be used for any purpose.

104. The proposed new chlorination facilities will utilize calcium hypochlorite solution rather than gas, thereby eliminating the potential of serious hazards created by the failure of a gaseous chlorine system.

105. The risk of fire will be minimized by proper selection of fire-resistant or -retardant materials and an adequately designed power supply system that includes grounding of all sub-systems, appropriate insulation, and circuit breakers.

106. All structures in contact with the ground will be designed incorporating anti-corrosion measures for mitigation of negative impact on ground water and all structures will be designed to withstand seismic activity up to 8 on the Richter scale.

107. In summary, adverse impacts due to the subproject design are not expected. Temporary impacts due to construction and potential impacts during operation will be mitigated in accordance with the EMP (Appendix 2).

Impacts during Construction

Land use

108. The water supply facilities work will be limited to the existing sites and additional distribution pipes will be laid along existing roads.

[10] ISLOHOTKONSALTSERVIS–IKS Group of Companies–local consulting company which specializes in provision of consulting services in Uzbekistan and other developing countries

Increased Traffic and Use of Machinery

109. Traffic of heavy trucks employed for the transportation of construction materials will increase temporarily during construction of the subproject. Other temporary environmental concerns relate to the use of excavators, cranes, compressors, and other machineries during the construction works will include: (i) noise and dust from construction sites, and (ii) safety for workers and inhabitants. Measures will be taken in accordance with the EMP to limit dust and noise levels and enforce strict observance of safety rules at main road crossings, along main roads, along the makhalla streets and near subproject construction sites. Temporary traffic lights at road crossings where sensible and temporary traffic diversions will be installed and implemented by the contractors, under the supervision of the PIU. Traffic police control will be intensified in makhallas during the rehabilitation/construction period and adequate warning will be provided to enhance measures of prudence among school children. The contractor and the PIU will inform the public via media announcement about temporary road closings and traffic diversions.

Solid and Liquid Waste Management

110. At the subproject sites, various types of solid waste, including wood, waste concrete, steel waste, discarded old equipment, oil filters, plastic and cartons from equipment packaging will be produced. Measures, based on the EMP, will include the provision of refuse collection containers and used oil collection containers, with further removal to specially allocated disposal and reclamation sites designated by the Hokimiyat. After completion of rehabilitation and construction works, all jobsites will be cleaned and landscaped. Maintenance of machinery will be done exclusively within the premises of gasoline stations specifically equipped for the storage of used oils and other liquid contaminants. No on-site maintenance of equipment will be permitted. If groups of workers are to remain at the work sites for extended periods of time, it will be necessary to construct adequate temporary sanitary facilities including provision for the disposal of wastewater to sites approved by the Hokimiyat.

111. Regulations on environmental protection, safety, and hygiene shall be fully complied with in all phases of constructing the subproject. Moreover, involved workers (especially, but not limited to, the on-site Work Supervisors) should be made aware of, and trained/guided in, standard environmental protection requirements and the IEE recommendations. Contractors will be contractually required to include environmental monitoring as part of their management of the project.

Biological Environment

112. Run-off, if any, from construction sites into nearby water bodies will be controlled in accordance with the EMP so as to eliminate any detrimental effect downstream to aquatic flora and fauna. Impact on local flora and fauna will be minimal although some fruit trees growing along the transmission main route may have to be removed. Such action will be in conformance with the land acquisition and resettlement framework (LARF).

Socio-Economic Environment

113. Only minimal impacts on land use are expected, since sites are typically located on lands not used for any other purpose or in built-up areas. However, the contractor will produce a plan

showing the impacts of pipe-laying affecting some utilities and/or trees established within the road allowances.

114. Regulations on environmental protection, safety, hygiene shall be fully complied with in all phases of constructing the subproject. Moreover, involved workers (especially but not limited to the on-site Work Supervisors) should be made aware of, and trained/guided, in standard environmental protection requirements and the IEE recommendations. Contractors will be contractually required to include environmental monitoring as part of their management of the project.

115. In summary, adverse impacts due to the construction of the subproject will be temporary and will be mitigated in accordance with the EMP.

Impacts during Operation

116. The operation of the Galaasiya water supply system will not produce any significant negative environmental impacts. Pumping equipment is sufficiently far from human habitation as not to cause any impacts due to noise and vibration.

117. The operation of the proposed subcomponents are expected to result in significant benefits. Currently around 30% customers in Galaasiya urban area do not receive adequate piped water but are provided with water from bowsers. On completion of the proposed improvement works water supplies will become available to all existing and newly connected customers and they are expected to pay their water bills, resulting in significant increase in revenue from the approximately 3,900 customers who currently refuse to pay for billed water because of the unsatisfactory service.

118. The following socio-economic benefits resulting from access to potable water will far outweigh any minimal adverse environmental impacts:

(i) access to adequate amount of good quality water for 100% of the population in the service area at a reasonable cost (for drinking and sanitation);
(ii) better health due to improved hygiene resulting in marked improvement in community health indicators (e.g., reduced frequency of diarrheal and other water-borne diseases);
(iii) reduced lost work days for adults (e.g., increased income), and lost school days for children (improved educational benefits) due to reduced incidences of diseases

Environmental Management Plan

119. Table 1 of the EMP in Appendix 2 summarizes anticipated environmental impacts, mitigation measures, required environmental monitoring, activities to ensure implementation of mitigation measures and identifies the entities responsible for carrying out those activities. The estimated costs for implementation of this EMP that are not already included in the subproject construction contract are also indicated.

120. It is important to reiterate that in addition to the recommended mitigation measures, regulations on environmental protection, safety, hygiene shall be fully complied with in all phases of the construction. Workers (primarily the on-site Work Supervisors) should be made aware of, and trained/guided in standard environmental protection requirements and the IEE recommendations.

121. In the bidding and construction contract documents, bidders and contractors will be made responsible for ensuring that:

- work activities are well organized and safely carried out;
- transportation companies involved in construction use only properly registered, safe vehicles; that all drivers must have current driving licenses; and that trucks are not overloaded;
- essential personal protective equipment is supplied to, and used by, all relevant staff;
- workers are properly trained and obey all relevant regulations on work safety and risk prevention;
- no transportation or heavy equipment movement, or mechanical digging is used at night in residential areas; and
- no concrete mixers will be used anywhere near architecturally significant and religious sites or near schools during school times.

122. The Contractors must adhere to the relevant Regulations regarding GOU Standards, in particular the norms issued by the State Nature Protection Committee for the subproject after submission of the IEA report. These stipulations will include:

- maximum allowed amount of air pollution
- maximum allowed amount of water pollution
- maximum allowed amount of wastes
- list of environmental actions which will be required to be followed by the subproject to meet existing regulations on impact on the environment.

INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN

Institutional Arrangements

123. The Uzbekistan Communal Services Agency (UCSA) will be the Executing Agency (EA) of the subproject. A Central Project Preparatory Management Unit (PPMU) has been established at the UCSA to manage and monitor all implementation activities of the subproject. The PPMU will include representatives from the agencies involved in the National Steering Committee (NSC). The participating provincial government will be the Implementing Agency (IA).

124. The subproject will recruit consultants to assist both the EA and IA with the implementation for the duration of the subproject. These consultants will be attached to the PPMU and PIU. Relevant provincial agencies will provide assistance to the PIU.

125. The supervision and monitoring of subproject-related environmental activities, particularly prior to, and during, construction, is one of the many specified functions of the PPMU. In line with this, it is proposed that an Environmental Monitoring Unit (EMU) be set up within the PPMU to be responsible for environmental management and monitoring. The major responsibilities of the EMU are to ensure that:

- the mitigation measures and monitoring activities are carried out as set out in the IEE Report; and
- reporting is performed in compliance with ADB and Government of Uzbekistan requirements.

126. The EMU should be headed by a qualified staff among those assigned full time (including project Consultants) to the PPMU. At least one technical support staff and if possible one administrative staff shall be assigned to the EMU. Relevant agencies (such as the State Committee for Nature Protection of the Republic of Uzbekistan (Goskomprirodi), State Committee for Geology and Mineral resources of the Republic of Uzbekistan (Goskomgeologiya), Center of Hydrometeorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (Uzgidromet), Sanitary and Epidemiological Service (SES) of the Ministry of Health, and if possible and acceptable, NGOs will designate their respective representatives to assist the EMU.

127. If appropriate, the PIU will engage a local consultant (an Environmental Specialist) to provide assistance in environmental management and monitoring. Alternatively, if the subproject is not too large to warrant engagement of a consultant, the PIU will nominate Sanitation Engineer or Environmental Engineer to serve as the "focal person", with whom the EMU head will be closely coordinating, particularly for reporting the monitoring results by the focal person.

128. Project Implementation Assistance (PIA) consultants provided during implementation include Environmental Specialists (expatriate and local) who will impart expert advice and guidance and conduct capacity building on environmental management and monitoring, particularly to the members of the EMU and Construction Supervisors.

129. To ensure that ADB environmental requirements and all applicable Government of Uzbekistan environmental laws, regulations, and standards are met prior to start of construction and during construction and operation, an Environmental Management Plan has been prepared (Appendix 2) and this will be implemented by the EMU together with Construction Supervisors.

130. The EMP and functions of the EMU will apply mainly during the pre-construction and construction periods. Environmental monitoring during operation of water supply schemes will be largely the responsibility of the O&M staff attached to the local municipality (under oblast vodokanals) governed by Oblast Governors with the technical support of the UCSA. However the following agencies also have a role in regular monitoring of water quality:

(i) State Committee for Geology and Mineral Resources of the Republic of Uzbekistan (Goskomgeologiya), which is responsible for monitoring the quality of ground water sources;
(ii) Centre of Hydro-meteorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (Uzgidromet), which is responsible for monitoring the state of the rivers, lakes, water reservoirs, pollution of atmospheric air, and land;
(iii) Ministry of Agriculture and Water Management, which monitors quality of collector-drainage waters (by 2 to 4 indicators of mineralization);
(iv) Sanitary and Epidemiological Services (SES) of the Ministry of Health, which monitors water quality of water sources and water in pipelines from centralized drinking water intakes; and
(v) Wastewater quality monitored both by the vodocanal and the national Environment Protection Committee.

131. Arrangements will be made to receive complaints and comments from the public (members of the makhallas) either directly through the EMU or other relevant representatives if any unexpected impacts occur. The relevant communities will be made aware of this process, their right to complain, and the necessity to protect the environment. EMU will arrange for this awareness creation, which should include public announcements and signposting at the construction sites, at the very stage of construction. Contractors will be required to register incoming complaints and how complains have been mitigated and report this to the PIU.

Environmental Monitoring Plan

132. Table 1 of the EMP in Appendix 2 summarizes anticipated environmental impacts, mitigation measures, required environmental monitoring, activities to ensure implementation of mitigation measures, and identifies the entities responsible for carrying out those activities. The estimated costs for implementation of this EMP that are not already included in the subproject construction contract are also indicated.

Reporting of Environmental Monitoring Results

133. Environmental monitoring results will be documented to ensure that signs of adverse impacts are detected at the earliest possible time. Monitoring results prior to construction and during construction will have to be reported monthly by the designated "focal person" of PIU to the EMU. A year-end report (or an end-of-monitoring phase report; e.g., end of pre-construction phase or end of construction phase, whichever is applicable), will be prepared jointly by the "focal persons" of each PIU and the EMU for submission to PPMU head, who will in turn submit it to the provincial Environment Protection Committee for endorsement and to the ADB for non-objection.

134. The format for the monthly and annual environmental monitoring report will be developed during project implementation by the consultant appointed for the Project Implementation. The format may have to be refined during implementation to incorporate all monitoring findings and lessons learned. Semi-annual environment compliance reports on implementation of the EMP will be prepared by the PIU and submitted to the ADB for non-objection through PPMU.

Budget for Environmental Monitoring

135. The cost of environmental monitoring will be that required for the remuneration of staff involved in EMP activities and their traveling expenses as well as any direct cost for monitoring activities. If any NGO members are involved, they will be from the area and therefore, no cost for their involvement but voluntary participation is considered.

136. The nature of the projects and the project locations do not necessitate any specific measurements, such as noise level or quality of water in waste receiving water bodies, during the construction phase. However, if any unexpected impact arises, it is recommended that EMU take necessary action in coordination with the PIU. For such needs, it is recommended that the EMU will employ the existing laboratory facilities of PIU/EMU member agencies.

137. It is estimated that the required investment for Environmental management would be $260,000 for upgrading laboratory facilities (for analysis of water quality) and $55,000 for training the OMP staff on proper operation of upgraded facilities, particularly with respect to

environmental sanitation. Other costs of implementing the EMP will be covered elsewhere in the subproject budget

PUBLIC CONSULTATIONS AND INFORMATION DISCLOSURE

Consultation and Participation Process

138. The PPTA Consultants carried out the following activities:

(i) Following a newspaper advertisement in the oblast, a formal public consultation was held on 4 July 2009 and discussions took place with representatives of government agencies and relevant community members and leaders including makhallas (neighborhood communities) of the project area (Appendix 3 refers).
(ii) Reconnaissance surveys of subproject communities/settlements and sites of all subcomponents in the oblast were carried out in July 2009. The survey was done by a composite group of members of the PPTA Consultants.
(iii) The on-site discussions with relevant officials and members of communities provided the PPTA team with information on the physical and environmental resources and opportunities and constraints relevant to the proposed subproject. Also, in terms of participatory-based consultations with stakeholder groups, there was considerable information sharing with a range of public sector officials and informal consultations with a range of local community members including poorer and vulnerable groups.
(iv) Stakeholders were also consulted about their existing capacities, and were asked for their ideas on how to implement and manage mitigation and enhancement measures and perform environmental monitoring.

139. There were 62 participants in the public consultation. The following summarizes comments received.

- immediate implementation of this project as the water shortage was very severe.
- complaints of no water supply in some areas
- no water supply on higher floors due to inadequate pressure
- only about 2000 households connected and 500 more houses need connection
- all participants noted that if the project is to be a success, the entire distribution system should be replaced
- before water was made available from Damkhoja, Galaasiya water supply was from eight boreholes and there had been many incidences of water-related diseases among children.
- although water quality has improved with Damkhoja water supply, participants expressed doubt that Damkhoja water will be adequate to supply all of Galaasiya.
- as the water supply is inadequate, a lot of people have to buy water for drinking and cooking purposes
- drilled wells are used despite the poor quality of water
- some participants observed that there are no drinking water facilities for the hospital
- some participants were of the opinion that the lack of sewerage facilities in Galaasiya will be a major issue in future.

- the need for proper repair to the roads after completion of pipe-laying, was highlighted.
- pipe distribution network should also facilitate connections in the makhallas
- willingness to pay was expressed

Information Disclosed

140. The submission of Environmental Protection Commitment Report to NPC will ensure the disclosure of environmental concerns to the relevant authority. The following is the information disclosed to date by the PPTA team.

(i) Objectives of the subproject as well as ADB environmental policies and procedures were disclosed to the relevant provincial and district representatives during the initial consultation by PPTA Consultants.

(ii) The environmental categories of the subproject per ADB and Government policies were disclosed to the Nature Protection Committee.

141. Environmental issues pertaining to subproject locations and designs, proposed mitigation measures, and forms of possible institutional set up for environmental monitoring will be disclosed to the relevant provincial authorities after completion of the IEE Reports.

FINDINGS AND RECOMMENDATIONS

142. This IEE shows that the implementation of the rehabilitation and upgrading of the water supply system for Galaasiya City subproject is unlikely to cause significant adverse impacts on the environment during construction and operation in the short-, medium- and long term and that any minor impacts that are associated with design, construction, and operation of the proposed subprojects can be mitigated without difficulty through proper engineering design and incorporation or application of recommended mitigation measures and procedures at all stages in accordance with the EMP. It is recommended to

- finalize the EMP during detail design,
- submit finalized EMP to ADB for non-objection,
- include non-objected EMP in bidding documents, and
- include the finalized EMP in the contract documents

.83. Importantly, the proposed subproject is intended to improve the quality of life of the residents of Galaasiya City through connection to a continuous, safe, potable water supply system at an affordable cost, both for drinking and sanitation; reduced loss of water through leakages resulting in reduced non-revenue water and increased system efficiency. The socio-economic benefits will include better health and environmental sanitation resulting in marked improvement in community health indicators (e.g., reduced frequency of water related diseases); reduced lost work days for adults (increased income), and lost school days for children (improved educational benefits) due to reduced incidences of diseases; saving of money spent for buying water; and Induced socio-economic growth, (promotion of economic growth in various sectors).

.84. Threats for human health are expected to be minimal during the construction and operational phases.

.85. It is recommended to implement and revise, when appropriate, the proposed EMP

CONCLUSIONS

.86. Based on the indication of the Rapid Environmental Assessment in Appendix 1 and the findings of the IEE, the classification of the subproject as Category “B” is confirmed, and no further special study or detailed EIA will be needed to comply with the environmental policies of the ADB. The Government of Uzbekistan requirements do not demand an EIA study as this subproject is a Class III because it is limited to one province. The IEE with the recommended institutional arrangements and monitoring program given in the Environmental Management and Monitoring Plans would become the completed Environmental Assessment or the EIA.

Appendix 1

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST
WATER SUPPLY

Instructions:

- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: **PPTA No: 7240–UZB: Water Supply and Sanitation**
Upgrading of Galaasiya Water Supply and Distribution System

Sector Division: **CWRD/CWUS**

Dates Conducted: 31-Jun-09 (WipulaElkaduwa, Madina Khalmirzaeva, Environmental Specialists)
31-Jul-09 (Morten Jensen, Madina Khalmirzaeva, Environmental Specialists)

SCREENING QUESTIONS	Yes	No	REMARKS
A. PROJECT SITING IS THE PROJECT AREA…	☐	☐	
▪ DENSELY POPULATED?	■	☐	Rehabilitation of Galaasiya WDU will take place outside densely populated area, but network improvements will take place inside the city. The impacts will be temporary and can be mitigated by EMP requirements
▪ HEAVY WITH DEVELOPMENT ACTIVITIES?	☐	■	
▪ ADJACENT TO OR WITHIN ANY ENVIRONMENTALLY SENSITIVE AREAS?			
• CULTURAL HERITAGE SITE	☐	■	
• PROTECTED AREA	☐	■	
• WETLAND	☐	■	
• MANGROVE	☐	■	

Appendix 1

SCREENING QUESTIONS	Yes	No	REMARKS
• ESTUARINE	☐	☐	
• BUFFER ZONE OF PROTECTED AREA	☐	☐	
• SPECIAL AREA FOR PROTECTING BIODIVERSITY	☐	☐	
• BAY	☐	☐	
B. POTENTIAL ENVIRONMENTAL IMPACTS Will the Project cause…			
▪ **pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?**	☐	☐	
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?	☐	☐	
▪ hazard of land subsidence caused by excessive ground water pumping?	☐	☐	
▪ social conflicts arising from displacement of communities ?	☐	☐	
▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	☐	☐	
▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	☐	☐	
▪ delivery of unsafe water to distribution system?	☐	☐	
▪ inadequate protection of intake works or wells, leading to pollution of water supply?	☐	☐	
▪ over pumping of ground water, leading to salinization and ground subsidence?	☐	☐	
▪ excessive algal growth in storage reservoir?	☐	☐	
▪ increase in production of sewage beyond capabilities of community facilities?	☐	☐	
▪ inadequate disposal of sludge from water treatment plants?	☐	☐	
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?	☐	☐	
▪ impairments associated with transmission lines and access roads?	☐	☐	

Appendix 1

SCREENING QUESTIONS	Yes	No	REMARKS
▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	☐	■	
▪ health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?	■	☐	Facilities will be designed to mitigate adverse impact. Workers will receive regular training on how to handle hazardous materials, including chlorine, and general health and safety training. Workers will be provided with necessary Personal Protective Equipment
▪ dislocation or involuntary resettlement of people	☐	■	
▪ social conflicts between construction workers from other areas and community workers?	☐	■	
▪ noise and dust from construction activities?	■	☐	Temporarily during construction work, but will easily be mitigated through EMP requirements
▪ increased road traffic due to interference of construction activities?	■	☐	Temporarily during construction work, but will easily be mitigated through EMP requirements
▪ continuing soil erosion/silt runoff from construction operations?	☐	■	
▪ delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	☐	■	
▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	☐	■	Project design include only plastic pipes
▪ accidental leakage of chlorine gas?	☐	■	Facilities will include standard chlorine safety equipment for hypochlorite solution feed. Workers will receive regular training on how to handle hazardous materials, including chlorine, and general health and safety training. Workers will be provided with necessary Personal Protective Equipment.
▪ excessive abstraction of water affecting downstream water users?	☐	■	
▪ competing uses of water?	☐	■	
▪ increased sewage flow due to increased water supply	■	☐	The increase in the volume of water will have the potential of creating increased sewage flow in Galaasiya. The local vodokanal will have to survey to make sure that its existing sewerage system has enough capacity to deal with the increased sewage flow, and if it does not, plan for upgrading. As part of the upgrading activities in the local distribution nets, in other sub-projects, installation of water meters is a feature, which will at least partly b counteract the increased sewage flow by reducing water usage.

Appendix 1

SCREENING QUESTIONS	Yes	No	REMARKS
▪ **increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant**	☐	■	The increase in the volume of water will have the potential of creating increased sullage and sludge in Galaasiya. The local vodokanal will have to survey to make sure that its existing sewerage system has enough capacity to deal with the increased volume of sullage, and if it does not, plan for upgrading. As part of the upgrading activities in the local distribution nets, in other sub-projects, installation of water meters is a feature, which will at least partly counteract the increased sullage production by reducing water usage. Sludge volumes should not increase as they are a function of population, not unit water use.

ENVIRONMENTAL MANAGEMENT PLAN FOR GALAASIYA CITY WATER SUPPLY SYSTEM

Table A2.1: Environmental Management

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
Pre-construction Project Stage				
Accidents during operations	Risk of accidents after completion causing damage to facilities and workers due to inadequate designs	• Building design with a second category of fire resistance where all elements are made of fireproof or not-easy-to- burn materials; • Design structures to withstand seismic forces in accordance with Uzbek Construction Norms and Regulations (CNR) 2.01.03-96 "Civil Works within seismic areas"; • Ensure unhindered access to the facilities and availability of roads to them in case of emergencies	PPTA consultants • provide conceptual design incorporating mitigation measures; Design-build contractors, if any, • provide detail design incorporating mitigation measures; PIU • reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Required structures will be items included in costing of the construction budget
Leaks from sewer system and water distribution network.	Contamination of water in distribution network from sewage leaks.	• All buried facilities designed on earth fill with a reliable water sealing installments in accordance with CNR. • Pipes used in the distribution network should be corrosion-proof and have a long service life; • Water distribution network cannot have direct contact to the sewerage system, i.e. the two systems cannot be in the same trench system.	PPTA consultants • provide conceptual design incorporating mitigation measures; Design-build contractors, if any, • provide detail design incorporating mitigation measures; PIU • reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Required structures will be items included in costing of the construction budget
Pipe-laying for new extensions	No expected resettlement, but if it becomes relevant, the land acquisition and resettlement framework (LARF) will be reviewed and amended as necessary to ensure no adverse environmental impact from resettlement.	• Resettlement is addressed in the land acquisition and resettlement framework (LARF) • Review LARF (if any) to ensure environmental aspects of resettlement are considered and addressed.	• Monitoring of implementation of LARF by PIU, EMU and PPTA Consultants; • Review of PPMU progress Reports By PIU and LARF Committee	No expected re-settlement cost involved in this phase of extension of Water Distribution System.
Location of Hazardous Materials (Haz-Mat) storage and	Health hazard and nuisance to people living in proximity to facilities and to workers on the	• Design layout of facilities, which includes ample buffer distance (per CNR) to households living in close proximity to facilities and to worker facilities. • Include acoustical assessments to determine if noise	PPTA consultants • provide conceptual design incorporating mitigation measures; Design-build contractors, if any,	Cost of consultants covered in the project budgets Required structures will be items included in costing of the

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
of noisy equipment and operations.	site.	mitigation at source (noise barriers) is required to prevent nuisance to nearby households or the workers on the facility. • If predicted noise level at neighboring households is expected to exceed ADB/IFC guidelines include acoustic barriers in design.	• provide detail design incorporating mitigation measures; PIU • reviews conceptual and detail designs for compliance with mitigation measures	construction budget
Asbestos Cement (AC) pipe	Health hazard due to inhaling fibres	• If AC pipes are to be left in ground, mark with appropriate plastic tape • If AC pipe is to be removed and disposed, such removal and disposal should be in accordance with - Applicable regulations of GOU (SES and Hokimiyat) - Pollution Prevention & Abatement Handbook (WB: 1998), also referenced in ADB's OM/FI (2006), paragraph 25	PPTA consultants • provide conceptual design incorporating mitigation measures; Design-build contractors, if any, • provide detail design incorporating mitigation measures and implement accordingly; PIU reviews conceptual and detail designs for compliance with mitigation measures	Cost of consultants covered in the project budgets Cost should be covered by contract sum, as it will be part of the contract requirements to avoid environmental impact
Construction Project Stage				
Contractor or workers not following contractual environmental requirements	No or insufficient environmental controls implemented	• Ensure specific contractual requirement, e.g. withholding of payment or penalty clauses, to ensure contractors' implementation of environmental mitigation measures. • Contracts to require contractor to have designated staff to oversee environmental issues and mitigation. • Contracts to include the requirement for the contractor to provide environmental induction training to all staff.	PIU • ensure monitoring of environmental requirements – by delegation to Environmental Specialist who is the Environment Focal Point of the PIU	Cost should be covered by contract sum, as it will be part of the contract requirements to avoid environmental impact.
Machines, equipment, and vehicles used for construction and transport	Emissions from construction equipment exhaust; Dust from vehicles, land clearing, grading, excavation, etc; Noise and vibration from transport vehicles	• Excavated or stockpiled soil and sand shall be watered before loading, if there is a risk of dust generation, e.g. if it is fine materials or under windy conditions. • Soil, sand and other construction materials on transport vehicles shall be covered. • Speeds of such vehicles shall be limited, particularly on unpaved areas. • All heavy equipment and machinery shall be fitted in full compliance with the national (SNPC) and local regulations with regards to emissions and noise. • Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions.	Contractor's Site Supervisor • ensures compliance with EMP • visually inspects safety equipment use, observes vehicle noise levels, etc., • check trucks entering site to assess emissions and licensing; • etc PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	$5,000 for contractor's additional activities; Cost of supervision included in contract cost estimate Cost of supervision included in contract cost estimate

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
		• Smoke-belching vehicles and equipment shall not be allowed and shall be removed from the project sites. • Develop Traffic Management Plan to mitigate impact on local traffic conditions during construction. • Confine heavy construction related traffic to the least sensitive access roads to the construction sites to avoid accidents and nuisance to dwellers along the road and other road users ; • Require the owners of the transport vehicles to only use properly registered and well-maintained vehicles with mufflers to mitigate noise and emissions; • All vehicles shall be well-maintained and fitted in full compliance with the national (SNPC) and local regulations. • As a rule, the operation of heavy equipment shall be conducted in the time span 7am-7pm only unless otherwise agreed with local residents. • During nighttime (10pm to 7am) noise impact on sensitive areas, such as residential areas or hospitals shall not be more than 3dB above background noise levels, as measured at the nearest sensitive receiver (Leq15minutes) two weeks prior to the commencement of works. • Construction equipment, which generates excessive noise, such as compressors, jackhammers shall be enclosed to prevent noise nuisance. • Near sensitive locations, e.g. hospitals, schools, mosques, and schools, discuss and agree with the PIU – Environment Focal Point and the principals of the facilities the agreed time for operating noisy machinery. • Minimize transportation during high traffic periods (e.g., when students are entering or leaving school) to minimize potential traffic accidents		
Site preparation	Erosion from site clearing, grading and excavation resulting in sedimentation of water bodies;	• Preserve existing ground cover wherever possible, and provide approved ground cover where necessary; • Use appropriate stabilizing techniques to prevent cave-ins or landslides in excavated areas. • Constructing buildings and facilities following the land protection activities stipulated in CNR 3.01.01-	Contractor's Site Supervisor • ensures compliance with EMP PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	$10,000 for contractors additional activities; Cost of supervision included in contract cost estimate

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
		97 and CNR 3.05.03-97. • If construction needs to take place during periods with expected rain, additional plan how to mitigate erosion and sedimentation must be agreed with PIU – Environment Focal Point prior to the work commences.		
Revegetation and landscaping	Erosion and sedimentation to water bodies, due to excessive clearing of vegetation or extended periods without vegetation.	• Prior to any clearing of vegetation, make a species inventory of the area to be cleared. Use vegetation inventory to identify appropriate local plant species to be used for revegetation. • Avoid tree removal unless justified on engineering, safety, and environmental grounds. • Store topsoil separately from other soil and re-use for revegetation upon completion of works. • Monitor revegetation regularly, especially during initial growth to ensure stable growth and lasting groundcover;	Contractor's Site Supervisor • ensures compliance with EMP PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	
Excavation for pipe-laying; Road use for transport of material and equipment	Damages to utilities by excavation; Temporary access cut-off to properties; Current access roads in poor condition may become worse due to construction vehicles.	• Require contractors to carry out a utility survey before construction and take action during construction to minimize impact on utilities and attend to any damage; • Provide temporary access during construction, if required; • Contractor and PIU to ensure that coordination meetings are held and agreement has been obtained from Hokimiyat; prior to any construction beginning on the site ((For an example agreement, see Appendix 5 in Termez IEE)) • Obtain permission for road use from relevant authorities and agreement to repair damages immediately after construction;	Contractor's Site Supervisor • coordinates with PIU and relevant authorities and agencies. • receives and records public complaints and resolves them PIU-Environment Focal Point • monitors contractor's complaint resolution procedures and compliance with all provisions of the EMP	$10,000 for contractors additional activities not covered by contract cost;; Cost of supervision included in contract cost estimate of the contract budget
Wastewater generated at construction site	Site rainwater runoff can wash away residues, garbage, leaves, grease, etc., thereby potentially polluting nearby surface water	• Store all liquid/solid waste properly above ground to avoid spills/ leaks; • Store Haz-Mat, e.g. fuels, chemicals, and hazardous waste, in bunded areas to avoid leaks escaping to the ground or nearby surface waters. Provide ample natural ventilation • Develop spill response procedures and provide spill response kits at all Haz-Mat storage areas and work sites.	Contractor's Site Supervisor • periodic visual observation of run-off from construction sites PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	$10,000 for proper disposal of waste and wastewater; Cost of supervision included in cost estimate of the contract budget
Solid Waste	Construction materials	• Prior to start of construction, develop an inventory of	Contractor's Site Supervisor	

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
generated by construction activities	(wood, steel bar, cement, etc.), paper, packing, domestic/human waste from work sites causing environmental pollution and adverse aesthetic impact	waste fractions expected to be generated during construction for approval of disposal routes and sites by Hokimiyat and SES • Provide refuse collection containers and used oil collection containers at all construction sites and labor camps. • Sell paper, resin, iron, and steel and other recyclable waste fractions to other enterprises for recycling. • Dispose inorganic solid waste (concrete, bricks, etc.) properly after approval by Hokimiyat and SES. • After completion of civil works, collect all garbage and waste construction materials from the sites, and dispose in specially designated places agreed by the SE	• monitors waste stream to ensure maximum recycling. • Ensures proper disposal PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	
Nuisance from Construction - complaints	Nuisance and impacts from the construction activities to neighboring activities and households.	• Include in contract clauses to reflect this, including the contractor's responsibility to mitigate nuisances, noise, vibration, and dust impacts and other nuisances to neighbors. • Ensure that contractor incorporates good construction management practices • Ensure that contractor liaises with local community on approach to mitigation. • Clarify by signboards on construction sites and/or stickers on equipment outlining how affected parties can lodge complaints. • Ensure that contractor records complaints, response and resolution monitoring and includes complaints registration in regular progress reports.	Contractor's Site Supervisor • ensures good construction management PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	No additional cost, for contract. Monitoring cost already in project budget
Use of labor for construction	Improper handling of waste from construction workers	• Provide temporary water supplies (trucked in) and portable/temporary toilets on-site during construction.	Contractor's Site Supervisor • ensures adequate sanitary conditions PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	
Use of labor from outside areas	Inadequate living facilities for non-local workers	• Labor camps, if any • Provide adequate sanitary facilities, potable water supply, waste collection, etc. • Test potable water supplies per Uzbek regulation • Ensure that locations of all labor camps are approved by PIU - Environment Focal Point; • Maximize use of local labor to minimize the need for	Contractor's Site Supervisor • ensures good construction management PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	Cost is included in the labor cost of the construction budget

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
		temporary camps, and also to ensure socioeconomic benefit for the local population.		
Use of labor from outside areas	Non-local construction crews may generate increased demand for camp followers, illegal drugs, gambling, etc.	• Maximize use of local laborers who will live at home during construction.	Contractor's Site Supervisor • ensures use of local labor PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	No cost involved
Workers' Safety	Inadequate safety during work	• Contractor shall be required to use appropriate stabilizing techniques during excavations, especially during excavations for trenches, which will be down to 6 m depth, to avoid cave-ins. • Educate and train workers on regulations on work safety and risk prevention and to obey them • Workers exposed to noise impact greater than 85 Db(A) shall wear hearing protection. • Contractor shall make available all Personal Protection Equipment needed for workers, e.g. safety shoes, hard hats, safety glasses, and hearing protection,	Contractor's Site Supervisor • ensures safe trenching methods • ensures workers' safety PIU-Environment Focal Point • monitors contractor's compliance with all provisions of the EMP	Cost of supervision included in cost estimate of the contract budget
Operation & Maintenance Project Stage				
Toxic material released to environment	Damage to the environment and to people handling Haz-Mat, e.g. chlorine.	• Store all Haz-Mat in bunded areas, with ample ventilation. • Develop spill response procedures and provide spill response kits at all Haz-Mat storage areas. • Include routine training in proper handling of chlorine and other Haz-Mat in the O&M staff training, which covers the full range of technical and management skills required to safely operate the WDU; • Regularly inspect all chlorine dosing equipment, storage facilities and safety equipment. • Monitor all chlorine storage and dosing equipment and storage facilities for chlorine leaks.	Vodokanal plant manager • ensures safe Haz-Mat handling and storage • develops spill response procedure and provides spill response kits • ensures that O&M staff receives training in chlorination safety procedures from PIA PIU-Environment Focal Point • monitors plant manager's compliance with all provisions of the EMP	Operational cost and training cost included in annual recurrent budget of PIA; After rehabilitation for initial training of O&M staff $10,000 included in project cost
Accidents	Risks to workers and facilities due to hazards related to fire and other disasters	• Establish comprehensive safety regulations; • Train and equip all O& M staff to follow the regulations on occupational safety and risk prevention; • Install proper alarm systems; • Ground all electrical equipment and provide circuit breakers	Vodokanal plant manager • ensures that O&M staff receives training in occupational safety from PIA PIU-Environment Focal Point • monitors plant manager's compliance with all provisions of	Cost involved in the annual budget of the implementing agency (Vodokanal) After rehabilitation for initial training of O&M staff $10,000 included in project cost

Project Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Cost Estimation ($)
		• Provide back-up water supplies for fire fighting. • Provide fire extinguishers at strategic locations around the site and monitor them for functionality	the EMP	
Contingency planning	Emergency measures as to what options are available and what measures are to be followed if the water quality of the WDU deteriorates, e.g. due to malfunction of chlorination equipment or pumps.	• PIA team will be available on short notice to identify a suitable solution to rectify the problem; When problem is identified and a solution is agreed upon, PIA will help find qualified specialists, who can deal with the problem.	• O&M staff and PIA (technical specialists) jointly with relevant local authorities dealing with Health/ Science and Technology	PIA Contingency expenses: If reserve O&M funds are insufficient, PIA staff will work with the local authorities to meet supplemental funding.

EMP = environmental management plan, EMU = Environmental Monitoring Unit, HRD = Human Resources Development, LARF = land acquisition and resettlement framework, O&M = operation and maintenance, PIU = project implementation unit, PIA = Project Implementing Agency (pCERWASS), PPTA = project preparatory technical assistance, SES = Sanitary and Epidemiological Services, SNPC = State Nature Protection Committee, WDU = water distribution unit,

Table A2.2: Environmental Monitoring

Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency	Responsibilities	Cost
Construction Phase						
Control of impacts of construction on people and environment	Dust, noise, transport, waste disposal, land clearing, utilities and traffic impacts	All construction sites	Visual observation and complaints by public	Regularly during construction for compliance with the EMP requirements	Work supervisors of the PIU and EMU	Work supervisors are under project budgets for construction
Operation & Maintenance Phase						
Adequate treatment of water prior to distribution.	Parameters shall be in accordance with Uzbekistan Standards for Water Supply O'z DSt 950:200	Monitoring locations shall be in accordance with Uzbekistan Standards for Water Supply O'z DSt 950:200	Laboratory analysis of samples at WDU laboratory facilities and SES laboratory, as per specifications in Uzbekistan Standards for Water Supply O'z DSt 950:200	Frequences for testing and analysis shall be Uzbekistan Standards for Water Supply O'z DSt 950:200.	Vodokanal is responsible for the daily monitoring of the water quality. SES is responsible for checking the self-control and records of the vodokanal, and will also sample and analyze as per Uzbekistan Standards for Water Supply O'z DSt 950:200	There will be adequate laboratory facilities at WDU after project completion for analysis of water quality - SES is already equipped with laboratory facilities for the tests to be done.

EMP = environmental management plan, EMU = Environmental Monitoring Unit, PIU = project implementation unit, SES = Sanitary and Epidemiological Services, WDU = water distribution unit.

Appendix 3

PUBLIC CONSULTATION RECORDS

Галаосиё шаҳри ташкилотлари раҳбарлари диққатига!

«TA7240-UZB-Ўзбекистон ...

Appendix 3

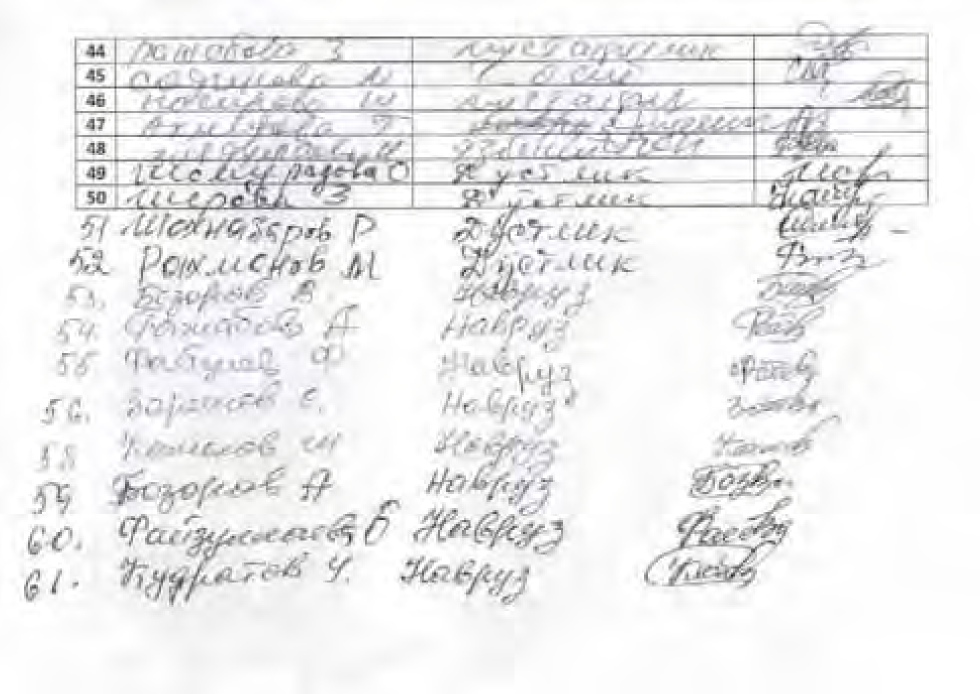
List of Participants

Бухоро вилояти Галасия шахри сув таъминоти тизмини кайта таъмирлаш ишларига багишланган семинар катнашчиларнинг

РУЙХАТИ

№	Катнашувчининг фамилияси ва исми-шарифи	Иш жойи ва лавозими	Имзоси
1			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			

Appendix 3



44	[illegible] З	[illegible]	[signature]
45	Содикова М	[illegible]	[signature]
46	[illegible] Ш	[illegible]	[signature]
47	[illegible] Т	[illegible]	[signature]
48	[illegible] М	[illegible]	[signature]
49	Шомирзаева О	Дўстлик	[signature]
50	Шерова З	Дўстлик	[signature]
51	Мамназаров Р	Дўстлик	[signature]
52	Рахмонов М	Дўстлик	[signature]
53	Бозоров В	Наврўз	[signature]
54	Ражабов А	Наврўз	[signature]
55	[illegible] Ф	Наврўз	[signature]
56	Зоиров С.	Наврўз	[signature]
58	Камолов Ш	Наврўз	[signature]
59	Бозоров А	Наврўз	[signature]
60	Файзуллаев Б	Наврўз	[signature]
61	Қудратов Ч.	Наврўз	[signature]