Environmental Management Plan for Stefan-Voda Apa Canal
Moldova Water Supply and Sanitation Project (P074469)

1. Introduction

This document summarizes the environmental management plan (EMP) to ensure that the rehabilitation and operation of the water supply system in Stefan-Voda will meet the requirements of the World Bank environmental assessment policy as described in OP/BP/GP 4.01, as well as laws of the Republic of Moldova and regulations on environmental expertise and impact assessment, and will follow the best environmental practices. The investment program is to be financed by IDA under the proposed Moldova Water Supply and Sanitation Project. The Project has no significant environmental impact and does not pose a risk to human health and thus for the purposes of OP 4.01 has been categorized by the Bank as Category "B".

The EMP will cover the following operations: (a) management of water resources including the abstraction of groundwater from underground water sources, and control drinking water quality; and (b) water distribution operations and prevention of water wastage from the Stefan-Voda Apa Canal operations and by consumers. Ministry for Environment and Territorial Development will be responsible for the EMP implementation and monitoring. Ministry for Environment and Territorial Development controls the standards drinking water and wastewater effluent quality. Ministry of Health and its State Sanitary Inspection controls the potable water safety standard and quality of the effluent.

The summary of the Project environmental issues, mitigation program, and associated costs is summarized in Annex A. The budget for implementing the EMP in all project sites in Moldova is $200,000, and specifically for Stefan-Voda $30,000. This includes salary of the environmental specialist, the cost of monitoring, technical assistance associated with water resource management, and technical assistance with the development of legal and institutional framework.

2. Baseline Conditions

Apa Canal Stefan-Voda supplies a population of about 12,000 persons, including about 10,000 urban and 1,600 rural population. The utility is not only dealing with water and wastewater but has such other communal services as solid wastes, street cleaning and maintenance of green areas.

40% of population are living in private houses in a well defined area of the town, and the remaining 60% are living in 3-5 storey buildings. Appr. 40% of persons are connected to water supply system. 97% of all consumers have meters. Service hours are one hour in the morning and 1.5 hour in the evening. Most people in private houses have their own shallow wells and are not connected to centralized water system.

Water is provided from artesian wells at app. 235 m depth. The water level is 195 m below the ground level. There are 11 wells in the town and 7 outside at Slobodzia village. The latter are not in operation and at present not known. Slobodzia is located 7.5 km from the town, and a 300-mm pipe is installed from Slobodzia to Stefan-Voda.

The water from the wells is pumped into a reservoir (2 x 1000 m³). From here the water is pumped into the distribution system. Water from Slobodzia is also pumped to this reservoir when it is operating. The capacity of artesian wells was originally 10 m³ per hour but now it is only 6 m³ per hour; 15000 m³ per month. Only 4500 m³ per month is consumed (all is metered). That is 37.5 l/person per day. There is no meter on the wells pumping to the reservoirs, meaning that abstracted water is not metered. Wastewater is only collected from the 3 storey buildings, and not from private houses that have septic tanks. These are emptied by vacuum tankers on the initiative of the houses owners.

The total pipe length is 26 km. The age is between 25-50 years and the losses are assessed at 78%. Number of breakdowns in the distribution system was 14 in 2001, this is a high figure given an intermittent water supply. The Sanitary-Epidemiological Center tests the drinking water: bacteriological – test interval
is one month; chemical – test interval is three months. The overall efficiency of pumping water from the wells and into the distribution system is about 27%, ideally it should be 60-70%.

The stress placed on the pipe work by the intermittent supply is quite severe and is likely to be a significant factor in the increased pipeline burst frequency. An interrupted water supply may bring out the health hazards because of infiltration of sewage into water pipelines under surge, or damage to pipelines due to water hammers and also to water meters. Additional problems include the lack of accurate production. Some of the existing pumps operate out of their optimum duty point, which results in high energy consumption.

High losses and lack of equipment at almost all facilities of the Stefan-Voda Apa Canal result in low water quantity and unsatisfactory supply throughout a day. Booster stations cannot provide the appropriate pressure to the distribution system.

Water losses from transmission mains, secondary and tertiary distribution network are accounted at 60%. The transmission mains were not properly repaired for at least 10 years that results in many of pipe-breaks. There is no leakage control equipment in Stefan-Voda, and high permeability of the city surface does not allow timely control of this. All of these result in both: leakage of drinking water into groundwater, and in suction of the contaminated groundwater into the distribution network during the water supply interruptions.

3.1 Project Description

Investment components to address the main issues and problem areas identified are focused on accelerated network rehabilitation and improvement of customer metering. The main elements are as follows: installation of new production meters, immediate “Find and Fix” leak detection and repair to remove the backlog of bursts that exist within the network, immediate service connection repair program, expertise for a leak detection training program, permanent on-going active leakage control, network zoning, replacement of non-domestic meters to increase accuracy and therefore revenue, block metering of all apartment blocks, metering of domestic houses to achieve 100% coverage, prioritized mains replacement – the implementation of mains replacement in specific areas having high losses, installation of multi level electricity meters to reduce the production costs. The components of the project also include the purchase of needed vehicles and repair tools.

In addition, a pump replacement where economically justifiable, based on the results of energy efficiency study, will be implemented over the following two years of the medium term investments.

As the city wells have no chlorination unit, it should be installed to assure water quality that meets the health requirements.

High priority investment (first year). It involves production metering, metering of non-domestic consumers and apartment blocks, leak detection and emergency repair of the network, energy efficiency study, purchase of vehicle and repair tools, purchase of vehicle and repair tools, and network zoning.

Medium term (year two and three). Mains replacement program. Energy efficiency program: including pumps replacement, water treatment and wastewater treatment plants operation improvement.

3.2 Policy, Legal and Administrative Framework

The following laws, standards and norms are directly applied for the environmental sustainability of this project:

Construction Norms and Regulations (CHntII 2.04.01-04-85);  
The Rules on Surface Water Protection approved by the State Environmental Protection Committee Nr.03-13/57-442 of March 1, 1991  
The Water Code of Moldova Nr.1532-XII of June 22, 1993  
Law on the Nature Protection Nr.1515 of June 16, 1993  
Law on Drinking Water Nr.272 of February 10, 1999

Environmental issues likely to be associated with the project include:

- Quality of water resources;
- Morbidity with water-borne diseases;
- Development and supervision of leak detection programs;
- Disposal of water treatment sludge;
- Underground water pollution by the construction run-offs;
- Disturbance during construction;
- Protection of air quality from the construction dust;
- Disposal of demolition debris;
- Protection of cultural resources.

4. Identification of Impacts and Potential Mitigation Measures

**Impacts on quality of water resources**

The project should affect improvements in the physiological and microbiological quality of water supplied to Stefan-Voda consumers. At the same time it will not affect the quality of small rivers, which are however not used for water supply.

**Morbidity with water-borne diseases**

The project will result in reduction in morbidity associated with improper water treatment and distribution. The life expectancy will increase.

**Development and supervision of leak detection programs**

General groundwater movement and flows will not be affected by the proposed project. Since the water reservoirs will be sealed, no groundwater can enter them, and no fresh water will affect the condition of groundwater near water reservoirs. Implementation of the leak detection program will stabilize the water table in the city and will reduce the groundwater discharges into wastewater system. That will also improve the efficiency of the treatment process at Stefan-Voda wastewater treatment plant.

**Disposal of water treatment sludge air control for chlorination process**

The project will result in enforcement of the proper disposal of the water treatment sludge and prevention of sludge run-offs into watercourses and into groundwater. The existing Moldova construction standard (CHuPP 2.04.02-85) requires special measures for handling collection and burial of the water treatment sludge, and air control for chlorination process. These measures will be implemented by contractor and supervised by Environmental Specialist in the Project Implementation Unit.

**Underground water pollution by the construction run-offs**

Civil works will be conducted during very short in time. Additionally, Moldova Construction Code requires proper measures for protection of groundwater from construction run-offs. Environmental Specialist in the Project Implementation Unit as part of his/her contract supervisory duties will undertake monitoring and supervise the protection measures during the construction phase.

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1 The detailed measures and actions are presented within the Annexes A-E
Disturbance during construction

These impacts will occur during the rehabilitation works on transmission pipelines and distribution network, but will be only short-term and affect different people at different times. It can cause the following: restriction on access to buildings, noise due trench excavation, possible effect of vibration on old buildings, closure of roads and section of roads, causing increased traffic, dust from construction activities, and movement of construction traffic. For residents of the streets where these works are being conducted, these impacts will be felt but only for a short period. Impacts will also be moderate for people using or passing through the affected areas.

The conditions of the contract will include requirements for the work to be performed as per international specifications. The contract will be properly prepared and supervised that will result in minimization of the disturbance. Monitoring of the impact during the construction phase will be undertaken by Environmental Specialist in the Project Implementation Unit as part of his/her contract supervisory duties and by the Municipal Department for Environment. Dedicated and fully trained personnel will be appointed to carry out this monitoring.

Protection of air quality from the construction dust

The contractor will employ dust suppression measures during the construction process and transportation, and vehicle emissions. The contractor will use traffic routing to avoid build up areas and bottlenecks. Also it will be required for contractor to provide routine control and maintenance for all equipment used for construction and transportation. It will be obliged to run the equipment only when required.

Disposal of demolition debris

As the Project will mainly rehabilitate the water production and distribution systems in Stefan-Voda, the generation of the demolition debris during the implementation will be limited. Moldova Construction Code requires proper measures for the removal of demolition debris. Environmental Specialist in the Project Implementation Unit as part of his/her contract supervisory duties will supervise the implementation of these measures during the construction phase.

Protection of cultural resources

Currently, no important historical objects are known within Stefan-Voda and its vicinities, therefore there is low possibility that historical zones could be potentially affected by the Project. There will be continuous liaison between the Project and the Ministry of Culture and also with concerned NGOs in the city in case that cultural properties are found during the construction works.

5. Public Consultation Plan

There is a general concern that the Project should be managed in an environmentally acceptable way and the need for inter-agency coordination, training, public awareness, high quality construction, monitoring, and good management is widely seen. The Project team and Project PIU will continue the cooperation with all stakeholders, concerned public interest groups and NGOs. The social survey that was conducted during the Project preparation confirmed this view. In relation to that, it is planned to organize several public meetings with residents and industries that will be affected during the Project implementation.

Details of the project have been and will be presented at several seminars and published in local newspaper, and will be available in public library of the town of Stefan-Voda and the capital Chisinau.
ENVIRONMENTAL MANAGEMENT PLAN FOR STEFAN-VODA

The adverse impacts of the project are limited and are primarily related to the impacts associated with the construction including noise, dust and increased traffic loads on local roads. No resettlement is required. No known archaeological or cultural cites within the project area. An outline mitigation plan for the construction, operation and decommissioning phase impacts is provided in Annex A below.

<table>
<thead>
<tr>
<th>Component and Activity</th>
<th>Impact or Concern</th>
<th>Mitigation Opportunities</th>
<th>Responsible Authority for Implementing Mitigation</th>
<th>Monitoring Requirements</th>
<th>Responsible Agency for Monitoring and Enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Environmental</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehabilitation of Water Treatment Plants</td>
<td>Potential Construction Related Environmental Impacts or Concerns Include Improvement of the water quality</td>
<td>none required</td>
<td>Contractor</td>
<td>not applicable</td>
<td>not applicable</td>
</tr>
<tr>
<td>Replacement of transmission mains</td>
<td>Reduction of water leaks and water losses, improvement of the efficiency of operations Underground water pollution by the construction run-offs</td>
<td>none required</td>
<td>Contractor</td>
<td>not applicable</td>
<td>not applicable</td>
</tr>
<tr>
<td>Dust generation</td>
<td>follow best management practices to prevent accidental or intended release of toxic waters, general prevention of water leaks, control of excavation levels employment of dust suppression measures, use traffic routing measures, bund construction areas</td>
<td>Contractor</td>
<td>Periodical underground water quality tests</td>
<td>State Sanitary Inspection, Regional environmental agency</td>
<td></td>
</tr>
<tr>
<td>Construction Waste Disposal</td>
<td>Potential contamination of soils and watercourses as a result of improper disposal of demolition debris</td>
<td>minimize waste generation during construction; reuse construction waste where practical; use appropriate</td>
<td>Contractor</td>
<td>Periodical tests for air pollution, immediate actions in case of complains from nearby residents</td>
<td>State Sanitary Inspection</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Annex A
<table>
<thead>
<tr>
<th>Socio-Economic</th>
<th>Water mains and water treatment plants rehabilitation activities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>methods for storage of waste materials; and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>dispose waste on proper site</td>
<td></td>
</tr>
<tr>
<td>Potential Construction Related Socio-Economic Impacts or Concerns Include</td>
<td>limit construction work to normal daylight working hours, employ noise bunds or other noise suppression devices</td>
<td>Contractor</td>
</tr>
<tr>
<td>Noise, vibration and dust disturbances to residents and commercial enterprises</td>
<td>Contractor</td>
<td>construction supervision, State Sanitary Inspection</td>
</tr>
<tr>
<td>Temporary problems related to water quality due to replacement and construction works</td>
<td>Contractor</td>
<td>not applicable</td>
</tr>
<tr>
<td>Temporary interruptions of water supply due to repair works</td>
<td>Contractor</td>
<td>not applicable</td>
</tr>
<tr>
<td>Damage to cultural/heritage structures - not likely in Dushanbe</td>
<td>Contractor</td>
<td>ensure project is evaluated for potential to damage archeological or cultural relics, ensure necessary permits in place municipal department of culture</td>
</tr>
<tr>
<td>Reduced access to residences and or businesses during the period of construction Reduced pedestrian access</td>
<td>Contractor</td>
<td>periodic inspection of construction sites to ensure alternative safe access is provided municipal development board, state road police inspection</td>
</tr>
<tr>
<td>Operation</td>
<td>Potential Operation</td>
<td>Related Environmental Impacts or Concerns</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Rehabilitation of Water Treatment Plant</td>
<td>Air pollution from chlorination facilities</td>
<td>proper following of the construction norms, control of operation, and chlorine emissions prevention</td>
</tr>
<tr>
<td>Development and supervision of leak detection programs</td>
<td>Positive effect on water losses reduction, improvement of the efficiency and reduction of energy consumption</td>
<td></td>
</tr>
<tr>
<td>Socio-Economic</td>
<td>Improved quality of water, uninterrupted utility service, increased coverage</td>
<td>none required</td>
</tr>
</tbody>
</table>
B. INSTITUTIONAL STRENGTHENING

B.1 Equipment Purchases Estimate*

<table>
<thead>
<tr>
<th>#</th>
<th>Type of Equipment</th>
<th>Number of Units</th>
<th>Unit Cost, $</th>
<th>Total Cost, $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Consumers meters</td>
<td>340</td>
<td>29.4</td>
<td>10,000</td>
</tr>
<tr>
<td>2</td>
<td>Leak detection equipment</td>
<td>2</td>
<td>10,000</td>
<td>20,000</td>
</tr>
<tr>
<td>3</td>
<td>Computer equipment and software</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Computers - 10</td>
<td></td>
<td>1,000</td>
<td>20,000</td>
</tr>
<tr>
<td></td>
<td>Other equipment - 8</td>
<td></td>
<td>1.250</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Construction equipment</td>
<td></td>
<td></td>
<td>150,000</td>
</tr>
<tr>
<td></td>
<td>Excavators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Asphalt cutters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vibratory plates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Chlorination equipment</td>
<td>4 sets</td>
<td>2.500</td>
<td>10,000</td>
</tr>
<tr>
<td>6</td>
<td>Network repair materials</td>
<td></td>
<td></td>
<td>120,000</td>
</tr>
<tr>
<td></td>
<td>Polyethilene pipes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>metal pipes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fittings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Materials for production metering</td>
<td>Meters – 50</td>
<td>40</td>
<td>20,000</td>
</tr>
<tr>
<td>8</td>
<td>Materials for wells rehabilitation</td>
<td></td>
<td></td>
<td>80,000</td>
</tr>
<tr>
<td></td>
<td>Polyethylene pipes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Filters cleaning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pumps and electrical equipment</td>
<td></td>
<td></td>
<td>60,000</td>
</tr>
<tr>
<td></td>
<td>3 x 75 m³/h – 20 m</td>
<td></td>
<td>3.500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 x 75 m³/h – 30 m</td>
<td></td>
<td>8.800</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 x 75 m³/h – 50 m</td>
<td></td>
<td>11.550</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Equipment for canalization works</td>
<td></td>
<td></td>
<td>160,000</td>
</tr>
<tr>
<td></td>
<td>Grand Total</td>
<td></td>
<td>660,000</td>
<td></td>
</tr>
</tbody>
</table>

* the number of units and costs will be specified on the implementation stage

B.3 Consultant Services

Consultant services (local and international) will be necessary for the following programs: institutional strengthening, financial capacity building, environmental impact assessment and safeguard review for the Stefan-Voda Apa Canal. Consultants will also be involved in the preparation of the operational plan, business plan and health assessment as well. A separate consultant study will provide a Legal review and social assessment and community participation plan for the whole Project and for the Stefan-Voda Apa Canal in particular.

B.4 Special Studies

Geological and hydrology studies may be required on reserve sources for drinking water. The cost special studies are up to $10,000.
INSTITUTIONAL ARRANGEMENTS

The schedule of potable water quality testing is coordinated with the Regional Center of Preventive Medicine Stefan-Voda. There are four water sampling sites, and the water samples are taken and tested regularly once a month. Within the utility there is no laboratory equipment and experts for testing the potable and waste water quality. The tests results are provided to the utility and Mayor's office and are displayed on the Announcement board at the Stefan-Voda water utility.

There is no special established system for informing the population in case of accidents, however in this case the people will be informed by TV and radio.

Waste water is collected and discharged into the biologic ponds; the total amounts of collected water are low, and there are no discharges of untreated waste water into the natural water sources.

CONSULTATION WITH LOCAL NGOs AND PROJECT-AFFECTED GROUPS

The Project should be managed in an environmentally acceptable way and the need for inter-agency coordination, training, public awareness, high quality construction, monitoring, and good management is widely seen. The Project team and Project PIU will continue the cooperation with all stakeholders, concerned public interest groups and NGOs. It is planned to organize several public meetings with residents and industries that will be affected during the Project implementation.
Details of the project have been and will be presented at several seminars and published in local newspaper, and will be available in public library of the cities of Orhei and the capital Chisinau.

**Local NGOs in Cahul to be involved into the project discussion:**

1. Territorial organization of MEM-Stefan-Voda. MEM – Ecological Movement of Moldova–Tatiana Marin, Stefan-Voda, Str. 31 August #8, tel.: +373 242 23361;

2. Center for Sustainable Development „Rural-21” – Vitalie Rusanovschi, Stefan-Voda, Str.Libertatii # 1, tel/fax: +373 242 23223;


**Government officials that will lead the public consultation process:**

Stefan-Voda Apa Canal
MD 4201, Stefan-Voda, Str.Industriala, #2
Head – Nicolae Danila, tel/fax: + 373 242 24328

Head of the Regional Ecological Agency. Member of Regional Council - Nicolae Nastas, tel: + 373 242 22757

Mayor of Stefan-Voda – Gheorghe Anghel, tel: + 373 242 23053

Deputy Mayor of Stefan-Voda – Vasile Godiac, tel.: + 373 242 22153.
Annex F

Minutes of Meeting on EMP discussion
with the community representatives in Stefan-Voda

November 13, 2002
Stefan-Voda
Apa canal Stefan-Voda

The meeting was attended by the representatives of local community, local authorities, environmental NGO and Stefan-Voda Apa Canal. Information on the project was published in the local daily newspaper; copies of EMP translated in local language (Romanian) were distributed to the meeting participants at the beginning of event.

List of attendees:
1. Godiac V.
2. Nacai B.
3. Sirbu M.
4. Boian V.
5. Dunischin M.
6. Andreev I.
7. Tomov M.
8. Caraman S.
9. Rusanovschi V.
10. Barcari A.
11. Nastasi N.
12. Podilei I.
13. Bulbuc I.
14. Gaju V.
15. Popa V.
16. Rusu N.
17. Marin T.
18. Dodorov S.
19. Teslun G.
20. Vlas I.
21. Radu P.
22. Ursachi E.
23. Cruban Z.
24. Danila A.
25. Fulga I.
26. Cotoman N.
27. Fulga A.
28. Cocu E.
29. Verebcean N.

Scopes of the meeting:
1. Information preparation and dissemination regarding the improvements in water supply and sanitation system, awareness rising and creation of public support for improved system;
2. Discussions on EMP for Stefan-Voda town;
3. Public participation and community involvement into the project implementation.
Issues discussed:

1. Basic information on the WSSP in Stefan-Voda was outlined by the Director of Stefan-Voda water and waste water utility, Mr. N. Danila.
2. Discussion was held on EMP. The main problems discussed included:
   - environmental and social risks associated with the civil works and untreated wastewater discharges;
   - the role of citizens, municipal authorities, community, NGOs, Ministry of Ecology and other institutions in successful implementation of the project and further sustainable operation of water supply and sanitation system in the town, avoiding environmental hazards and accidents;
   - plan of information dissemination concerning the advantages of upgraded water system operation, including publications in local rayonal newspaper;
   - project implementation requirements;
   - public participation as an integral part of planning process;
   - public awareness and information of population on environmental impacts;
   - measures to be taken by the utility and contractor to reduce the impacts during the construction stage (noise, air pollution, damage to roads, etc.);
   - tariffs for after wastewater for population and work with consumers;
   - environmental monitoring and test procedures.

The participants were very active in discussion and supportive for the project. They also recognise the potential environmental impacts of project implementation, especially on the stage of construction and discussed the mitigation measures.
Moldova: Pilot Water Supply and Sanitation Project

Environmental Assessment

Rehabilitation of the Water System of the town of Stefan-Voda

A. BACKGROUND

1. Project Objective. The overall goal of the project is to enhance the welfare of population living in Stefan-Voda by improving the access to water supply and sanitation services. The strategy is to assist in creating a framework that would enable the implementation, sustainable management and regulation of essential water supply and sanitation infrastructure.

2. Environmental Category. The investment is to be financed by IDA under the proposed Moldova Pilot Water Supply and Sanitation Project. The proposed project is classified as Category B because its potential adverse impacts on human population or environmentally important areas, including wetlands, forests, grasslands and other natural habitats are not significant and are site-specific. Few of them are irreversible, and in most cases mitigatory measures do not require a specific study and can be designed quickly. In accordance with World Bank Operational Policy 4.01 (January 1999) the Project is rated as Category B and requires the preparation of Environmental Assessment that includes an EMP.

3. Investment Components. Investment components to address the main issues and problem areas identified are focused on accelerated network rehabilitation and improvement of customer metering. The main elements are as follows: installation of new production meters, immediate “Find and Fix” leak detection and repair to remove the backlog of bursts that exist within the network, immediate service connection repair program, expertise for a leak detection training program, permanent on-going active leakage control, network zoning, replacement of non-domestic meters to increase accuracy and therefore revenue, block metering of all apartment blocks, metering of domestic houses to achieve 100% coverage, prioritized mains replacement – the implementation of mains replacement in specific areas having high losses, installation of multi level electricity meters to reduce the production costs. The components of the project also include the purchase of needed vehicles and repair tools.

In addition, a pump replacement where economically justifiable, based on the results of energy efficiency study, will be implemented over the following two years of the medium term investments.

As the city wells have no chlorination unit, it should be installed to assure water quality that meets the health requirements.

High priority investment (first year). It involves production metering, metering of non-domestic consumers and apartment blocks, leak detection and emergency repair of the network, energy efficiency study, purchase of vehicle and repair tools, purchase of vehicle and repair tools, and network zoning.

Medium term (year two and three). Water mains replacement program. Energy efficiency program including pumps replacement, water treatment and wastewater treatment plants operation improvement.
B. ENVIRONMENTAL MANAGEMENT AND MITIGATION PLAN

The adverse impacts of the project are limited and are primarily related to the impacts associated with the construction including noise, dust and increased traffic loads on local roads. No resettlement is required. No known archaeological or cultural cites within the project area.

An outline mitigation plan for the construction, operation and decommissioning phase impacts is provided in Table 1 below.
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<th>Mitigation Opportunities</th>
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</thead>
<tbody>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td>Contractor</td>
<td>not applicable</td>
<td>not applicable</td>
</tr>
<tr>
<td>Rehabilitation of Water Treatment Plants</td>
<td>Potential Construction Related Environmental Impacts or Concerns Include Improvement of the water quality</td>
<td>none required</td>
<td>Contractor</td>
<td>not applicable</td>
<td>not applicable</td>
</tr>
<tr>
<td>Rehabilitation of Water Treatment Plants</td>
<td>Reduction of water leaks and water losses, improvement of the efficiency of operations Underground water pollution by the construction run-offs</td>
<td>none required</td>
<td>Contractor</td>
<td>not applicable</td>
<td>not applicable</td>
</tr>
<tr>
<td>Rehabilitation of Water Treatment Plants</td>
<td>Dust generation</td>
<td>follow best management practices to prevent accidental or intended release of toxic waters, general prevention of water leaks, control of excavation levels employment of dust suppression measures, use traffic routing measures, bund construction areas</td>
<td>Contractor</td>
<td>Periodical underground water quality tests</td>
<td>State Sanitary Inspection, Regional environmental agency</td>
</tr>
<tr>
<td>Rehabilitation of Water Treatment Plants</td>
<td>dusty generation</td>
<td>none required</td>
<td>Contractor</td>
<td>Periodical tests for air pollution, immediate actions in case of complains from nearby residents</td>
<td>State Sanitary Inspection</td>
</tr>
<tr>
<td>Construction Waste Disposal</td>
<td>Potential contamination of soils and watercourses as a result of improper disposal of demolition debris</td>
<td>minimize waste generation during construction; reuse construction waste where practical; use appropriate methods for storage of waste materials; and dispose waste on proper site</td>
<td>Contractor</td>
<td>Construction supervision</td>
<td>Municipal department for solid waste collection disposal, State Sanitary Inspection, Regional environmental agency</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>------------</td>
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<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td>Socio-Economic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water mains and water treatment plants rehabilitation activities</td>
<td>Potential Construction Related Socio-Economic Impacts or Concerns Include Noise, vibration and dust disturbances to residents and commercial enterprises</td>
<td>limit construction work to normal daylight working hours, employ noise bunds or other noise suppression devices</td>
<td>Contractor</td>
<td>periodic inspection of construction activities to ensure equipment noise and dust abatement systems are in place; work is curried out during normal construction hours not applicable</td>
<td>Municipal environment protection office</td>
</tr>
<tr>
<td></td>
<td>Temporary problems related to water quality due to replacement and construction works</td>
<td>minimize time for the replacement operations, conduct actual replacement works during the night time minimize time for the replacement operations,</td>
<td>Contractor</td>
<td>not applicable</td>
<td>construction supervision, State Sanitary Inspection</td>
</tr>
<tr>
<td></td>
<td>Temporary interruptions of water supply due to construction activities</td>
<td></td>
<td>Contractor</td>
<td>not applicable</td>
<td>not applicable</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Repair Work</th>
<th>Potential Operation</th>
<th>Environmental Impacts or Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply</td>
<td></td>
<td>Recreation of Water Treatment</td>
</tr>
<tr>
<td>Interruptions can be only at during the night time</td>
<td>Reduced access to residences and/or businesses during the period of construction</td>
<td>Reduced access to archeological or cultural relics and permits as per State regulations is required. Contractor ensures that the project is evaluated for potential damage to archeological or cultural relics.</td>
</tr>
<tr>
<td>Damage to Dushanbe cultural relics and structures - not likely in time only at during the night</td>
<td>Contractor must ensure that permits are in place for archeological or cultural relics.</td>
<td>Contractor must ensure that permits are in place for archeological or cultural relics.</td>
</tr>
<tr>
<td>Development and supervision of leak detection programs</td>
<td>methods for storage of waste materials; and dispose waste on proper site</td>
<td>tests for groundwater pollution near the disposal site</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Air pollution from chlorination facilities</td>
<td>proper following of the construction norms, control of operation, and chlorine emissions prevention</td>
<td>Stefan-Voda Apa Canal</td>
</tr>
<tr>
<td>Positive effect on water losses reduction, improvement of the efficiency and reduction of energy consumption</td>
<td>none required</td>
<td>not applicable</td>
</tr>
<tr>
<td>Socio-Economic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential Operation Related Socio-Economic Impacts or Concerns Include Improved quality of water, uninterrupted service, increased coverage</td>
<td>none required</td>
<td>not applicable</td>
</tr>
<tr>
<td>Operation of Improved Water Utility</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Positive effect on water losses reduction, improvement of the efficiency and reduction of energy consumption.
1. **Environmental Capacity Building and Training Program.** A detailed training program would be funded through the project with the assistance of local or international consultants. The training will focus on the following:

- Construction quality assurance procedures, protocols and inspections;
- Water supply and sanitation environmental management;
- Environmental monitoring and test procedures;
- Environmental audit;
- Handling of special/hazardous wastes; and
- Basic public health education, public awareness and community relations.

In addition, there is also a requirement for technical capacity building within Stefan-Voda utility in respect with the following:

- Contract management and enforcement of contract conditions;
- Financial management including full cost accounting and cost recovery;
- Preventive maintenance procedures and arrangements;
- Strategic planning of water and wastewater service provision.

It is envisaged that the training would be provided through a variety of mechanisms, including: on-site training during construction and operation; workshops and seminars on key issues conducted by experienced professionals; short-term overseas placement with environmental regulatory authorities responsible for water and wastewater monitoring.

2. **Project Monitoring.** The details of project monitoring are shown in the Table 1 above. The Ministry of Environment and Territorial Development bears overall responsibility for monitoring the EMP and would conduct specific environmental reviews once a year. Responsibility for monitoring will be shared by the PIU, Regional Ecological Agency subordinated to the Ministry of Environment, Ministry of Health (Sanitary Epidemiological Stations), the Office of the Mayor, the User Association, and the Works Managers/Contractors.

3. **Reporting.** The PIU with the help of local/international consultants would be responsible for annual reports outlining the progress of EMP implementation. The reports would include project findings (lessons learned), environmental issues, if any, status of mitigation measures taken and next steps. The reports would be submitted to the Ministry and the World Bank as part of the progress report.

4. **Project Supervision.** Staff of the WB local office would supervise the environmental issues including mitigation measures. Progress on mitigation measures would be included in regular Bank supervision reports, including Project Status Report updates and midterm reviews.
5. **Public Consultation Plan.** The project should be managed in an environmentally acceptable way and the need for inter-agency coordination, training, public awareness, high-quality construction, monitoring and good management system is evident. The task team and PIU would continue the cooperation with all stakeholders, public interest groups and NGOs. It is planned to organize several public meetings with residents and industries. Details of the project have been and would be presented at several seminars and published in local newspapers, and would be available.

Consultations with the Stefan-Voda occurred during the preparation of the PWSS and into 2002 (See Annex 1 – Minutes of Consultation). Discussions were also held with the Mayor of Stefan-Voda. During these sessions participation of the villagers in the implementation process were discussed including the provision of financial and in-kind contributions. Consultation will continue as part of the representational process in place.

6. **EMP Cost Estimate and Schedule.** It is estimated that EMP implementation would cost for Stefan-Voda $30,000 for staff, consultants and training activities. EMP implementation would be integrated into the overall schedule. The budget and implementation schedule for EMP would be discussed and agreed upon with the borrower.
Annex 1

Minutes of Meeting on EMP discussion
with the community representatives in Stefan-Voda

November 13, 2002

Stefan-Voda
Apa canal Stefan-Voda

The meeting was attended by the representatives of local community, local authorities, environmental NGO and Stefan-Voda Apa Canal. Information on the project was published in the local daily newspaper; copies of EMP translated in local language (Romanian) were distributed to the meeting participants at the beginning of event.

List of attendees:

1. Godiac V.
2. Nacai B.
3. Sirbu M.
4. Boian V.
5. Dunischin M.
6. Andreev I.
7. Tomov M.
8. Caraman S.
9. Rusanovschi V.
10. Barcari A.
11. Nastasi N.
12. Podilei I.
13. Bulbuc I.
14. Gaju V.
15. Popa V.
16. Rusu N.
17. Marin T.
18. Dodorov S.
19. Teslun G.
20. Vlas I.
21. Radu P.
22. Ursachi E.
23. Cruban Z.
24. Danila A.
25. Fulga I.
26. Cotoman N.
27. Fulga A.
28. Cocu E.
29. Verebcean N.
Scopes of the meeting:

1. Information preparation and dissemination regarding the improvements in water supply and sanitation system, awareness rising and creation of public support for improved system;
2. Discussions on EMP for Stefan-Voda town;
3. Public participation and community involvement into the project implementation.

Issues discussed:

1. Basic information on the WSSP in Stefan-Voda was outlined by the Director of Stefan-Voda water and waste water utility, Mr. N. Danila.
2. Discussion was held on EMP. The main problems discussed included:
   - environmental and social risks associated with the civil works and untreated waste water discharges;
   - the role of citizens, municipal authorities, community, NGOs, Ministry of Ecology and other institutions in successful implementation of the project and further sustainable operation of water supply and sanitation system in the town, avoiding environmental hazards and accidents;
   - plan of information dissemination concerning the advantages of upgraded water system operation, including publications in local rayonal newspaper;
   - project implementation requirements;
   - public participation as an integral part of planning process;
   - public awareness and information of population on environmental impacts;
   - measures to be taken by the utility and contractor to reduce the impacts during the construction stage (noise, air pollution, damage to roads, etc.);
   - tariffs for after and wastewater for population and work with consumers;
   - environmental monitoring and test procedures.

The participants were very active in discussion and supportive for the project. They also recognize the potential environmental impacts of project implementation, especially on the stage of construction and discussed the mitigation measures.