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Subproject VII

IMPROVEMENT OF SYUNIK REGION WATER SUPPLY SYSTEMS

L2860-ICB-1-07/1

IMPROVEMENT OF WATER SUPPLY SYSTEMS IN GORIS TOWN AND BRNAKOT VILLAGE

ENVIRONMENTAL MANAGEMENT PLAN

Yerevan,
February, 2014
Asian Development Bank Funded

Water Supply and Sanitation Sector Project - Additional Financing

Subproject VII

Improvement of Syunik Region Water Supply Systems

L2860-ICB-1-07/1

Improvement of Water Supply Systems in Goris Town and Brnakot Village

Book VII.1.3

Environmental Management Plan

HGSN Ltd, Director

V. Hovasapyan

Environmental expert

K. Sahakyan

Yerevan,
February, 2014
Subproject VII

IMPROVEMENT OF SYUNIK REGION WATER SUPPLY SYSTEMS

L2860-ICB-1-07/1

IMPROVEMENT OF WATER SUPPLY SYSTEMS IN GORIS TOWN AND BRNAKOT VILLAGE

COVER OF THE DETAILED DESIGN

Book VII.1.1 - General provisions and explanatory part
Book VII.1.2 - Technical specifications
Book VII.1.3 - Environmental management plan
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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AP</td>
<td>Affected Person</td>
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<tr>
<td>AWSC ADB PMU</td>
<td>Armenian Water and Sewage Company/ Project Management Unit of Asian Development Bank</td>
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<tr>
<td>BVJ</td>
<td>Buried Valve Junctions</td>
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<tr>
<td>DD</td>
<td>Detailed Design</td>
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<tr>
<td>DRR</td>
<td>Daily Regulating Reservoir</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>EMP</td>
<td>Environmental Management Plan</td>
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<td>IEE</td>
<td>Initial Environmental Examination</td>
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<td>JV</td>
<td>Joint Venture</td>
</tr>
<tr>
<td>MPE</td>
<td>Maximum Permissible Emissions</td>
</tr>
<tr>
<td>PIU</td>
<td>Project Implementation Unit</td>
</tr>
<tr>
<td>RA</td>
<td>Republic of Armenia</td>
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<tr>
<td>RA MoNP</td>
<td>RA Ministry of Nature Protection</td>
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<tr>
<td>SSEMP</td>
<td>Site Specific EMP</td>
</tr>
<tr>
<td>TSC</td>
<td>Technical Supervision Company</td>
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<tr>
<td>WSS</td>
<td>Water Supply and Sanitation</td>
</tr>
<tr>
<td>WSSSP</td>
<td>Water Supply &amp; Sanitation Sector Project</td>
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<tr>
<td>W&amp;W Systems</td>
<td>Water and Wastewater Systems</td>
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</table>
1. BACKGROUND OF THE PROJECT

Project implementation for the improvement of WSS systems will improve public health and environment for about 400,000 people (households and other consumers), living in 18 towns and up to 92 villages through providing safe, reliable and sustainable water supply. The outcome of the Project is improved access to safe, reliable, and sustainable WSS services managed on commercial principles and environmentally sound practices.

The Project will also support poverty reduction by (i) reducing the incidence of waterborne diseases and costs of medical care; (ii) improving the time poverty of women due to labor intensive housework such as water collection, which may allow them to participate more in social and economic activities; (iii) providing safer and more reliable water supply; and (iv) improving the quality of life of the households in all the project towns and villages by improving their access to safe and sustainable drinking water.

Similar to the original W&W first project, the additional financing project also will fund two project components which include: (i) municipal infrastructure rehabilitation and improvement; and (ii) management improvement and development which include gender features.

2. ENVIRONMENTAL AND SOCIAL SAFEGUARD DOCUMENTS

In accordance with the ADB Environmental policy (2002) the Subproject is ranked to B category which does not need extended EIA, excluding also Environmental expertise, according to the RA law on “Environmental Impact Assessment” (issued on November 20, 1995) and the RA Government decree “Threshold of environmental impact activities subject to expertise” (N-193, 30 March 1999).

As a B Category Project ADB Policy required development of Initial Environmental Examination/ IEE reports for each Subproject and site specific Environmental Management Plan/EMP (separately report for each lot of the subproject).

3. INTRODUCTION

This report is developed for the Subproject on the Improvement of WSS Systems in Goris town and Brnakot village of Syunik region, the design of which has been performed by the JV agreement of HGSN and JINJ LLCs. The Water supply systems rehabilitation involves activities on reconstruction of DRRs, reconstruction of the water supply distribution network and construction of new ones, as well as construction of valve junctions, entry lines of apartment buildings and water metering chambers of private houses.

As a result of the construction work implementation, as well as further operation and maintenance of the water supply systems there might be undesirable negative impacts on the environment.
It is expected that the impacts during construction work implementation will be the least and temporary, probably involving vegetation cut, soil erosion, air pollution, as well as soil and water resource pollution by lubricants, chlorine compounds, households and construction waste.

At the operation stage the environmental impact, the main reason of which might be improper execution of operation requirements, will decrease.

The significant among positive impacts of the environment is the reservation of water resources and its stable use.

The social and economic effects as a result of water supply system improvement are expected to be mostly positive, such as excluding potable and wastewater mixture, minimization of water pollution risk, prevention and exclusion of infection disease agents penetration into potable water, as well as water supply extension, providing steady water supply and rational water use.

Below the description of possible impacts and facilitating measures required during different stages of water supply systems rehabilitation project is provided.

**Design stage**

The design works on water systems have been performed by the JV of HGSN and JINJ LLCs, which was selected as a consultant of the engineering design within the framework of ADB “Water Supply and Sanitation Sector Project - Additional Financing”. The design documents include articles on climatic conditions, relief, natural soil types, hydrology and biodiversity of the very package, as well as requirements on obtaining the RA MoNP and other ministries’ agreements. They also include environmental and social articles, as well as EMP of this package and EMP of specific site. The project consultant is in charge to follow the appropriate statements of the RA environmental and social legislation, as well as ADB instructions and strategy requirements which are mentioned in the contract.

**Construction stage**

The list of measures required to mitigate the environmental impact during construction stage is provided in the EMP matrix (Appendix1).

**Operation stage**

During the operational stage it should be performed in accordance with operational rules and standards of the water supply to decrease the environmental impact.

During the construction stage the operation should be performed in accordance with the Operational rules and standards.
4. SCOPE OF WORKS

4.1 Description of existing water supply systems

Goris town is supplied by AWS CJSC. The town has complex and dissected relief. The water supply of Goris town is carried out from “Mukhuturyan” and “Akner” springs by gravity.

“Akner” springs are situated on the absolute elevation of 2150.0m, from which Goris town gets 100 l/sec water volume. The total length of the water main is 14km, and was built in 1970.

“Mukhuturyan” springs are situated on the absolute elevation of 2550.0m, the capacity of springs is about 300 l/sec, from which Goris town gets 100 l/sec water volume, total length of the water main is about 60km.

Currently Goris town gets 200.0 l/sec water volume in total from “Akner” and “Mukhuturyan” springs. These two water mains feed four groups of DRRs, overall volum of which is 4000m³.

1. DRRs with the capacity of 2x500m³ on the elevation of 1465m (above see level),

2. Two DRRs with the capacities of 1000m³ and 500m³ are situated on the elevation of 1505.0m,

3. DRR with the capacity of 1000m³ situated on the elevation of 1575.0m, which from the point of view of operation currently on the one hand is a storage, and on the other hand is a pressure braking chamber and feeds DRRs for Argavand neighborhood of the town.

4. DRRs with the capacity of 2x250m³ situated on the elevation of 1555.0m, which are fed from the DRR with the capacity of 1000m³ situated on the elevation of 1575.0m, completely satisfy the water demand of Argavand neighborhood.

There is need to repair DRRs, to develop the territory, and to reconstruct the distribution valve junctions.

The distribution network of Goris town was constructed in 1950s. Sections of the distribution network constructed from cast iron pipes occupy mainly the lower section-the centre of the town. In the peripheries the internal network is mainly constructed from polyethylene pipes, which have been constructed in recent years and have been finance by ADB. Although the works covered the design and construction of 22km waterline in the distribution network of Goris town, however the distribution network still may not be considered as satisfactory.

The overall chlorination of the water supply system of Goris town is carried out from “Mukhuturyan” chlorination station operating in the vicinity of Mukhuturyan water main,
where chlorination equipment working on vacuum principle have been installed by AWSC in recent years.

**Brnakot village** is not served by AWS CJSC. The village is situated on the absolute elevations of 1660-1730m. The water supply of the village is mainly carried out from “Sartsatun” catchment, the discharge of which is 22 l/sec. But as there is a lack water in summer months the village uses also “Khaldar” and “Ghachagh Dzor” catchments, which are connected to the water main feeding the village. The length of the water main is about 20km.

The water supply of Brnakot village is carried out from the DRRs of 250m³ and 80m³ capacities. The water is transmitted to the various streets of the village through 14 waterlines.

The distribution network of the village constructed from steel pipes and is completly in deteriorated condition. In 2007 *partial* reconstruction of the distribution network was carried out by the Agricultural PIU, as a result of which 6-7km long polyethylene waterlines were installed.

*Description of proposed rehabilitation works*

The following measures were proposed by the detailed design for the improvement of water supply system:

- **Goris town**
  - Reconstruction of DRRs with the capacity of 2x500m³; constructing their regulating junctions (I zone), fencing the area (L=177,5m).
  - Reconstruction of DRRs with the capacities of 1x500m³ and 1x1000m³ (II zone).
  - Reconstruction of DRRs with the capacity of 2x250m³ (IV zone).
  - Construction and reconstruction of distribution network waterlines from polyethylene pipes of about 5km total length and of de50-de225 diameter.
  - Reconstruction of the entry lines of 159 private house connections, construction of water metering chambers.
  - Reconstruction of the entry lines of a total of 4 apartment buildings, constructing the water metering chambers.
  - Construction of 9 pressure regulating and 2 water supply chambers in various sections of the town for the regulation of high pressure inside the water supply distribution network and the system.
  - Construction and reconstruction of 46 buried valve junctions (BVJ) in the distribution network.

- **Brnakot village**
  - Reconstruction of DRR of 250m³ capacity, installation of corresponding valve junctions and fencing the area (L=136 m).
  - Construction of chlorination station.
- Construction and reconstruction of distribution network waterlines from polyethylene pipes of de50-de110 diameter, about 10km total length.
- Reconstruction of entry lines of 524 private house connections, constructing water metering chambers.
- Construction and reconstruction of 4 buried valve junctions (BVJ) in the distribution network.

Works implemented in the scope of this package are summed up in table 1.

**Brief description of the works**

*Table 1: Brief description of the main works*

<table>
<thead>
<tr>
<th>Works</th>
<th>M/U</th>
<th>t.Goris</th>
<th>V. Brnakot</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair of DRRs*</td>
<td>m³</td>
<td>3,000</td>
<td>250</td>
<td>3,250</td>
</tr>
<tr>
<td>Fencing the sanitary zone of the DRRs</td>
<td>lm</td>
<td>177.5</td>
<td>136</td>
<td>313.5</td>
</tr>
<tr>
<td>Construction of chlorination station**</td>
<td>pieces</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Reconstruction of the water supply internal network of de50-de200 diameter pipes, testing, washing and disinfection</td>
<td>lm</td>
<td>4,714</td>
<td>9,933</td>
<td>14,647</td>
</tr>
<tr>
<td>Construction of entry lines of private houses, constructing water metering chambers</td>
<td>pieces</td>
<td>159</td>
<td>524</td>
<td>683</td>
</tr>
<tr>
<td>Construction of the entry lines of apartment buildings and public units</td>
<td>pieces</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Construction of buried valve junctions</td>
<td>set</td>
<td>46</td>
<td>4</td>
<td>50</td>
</tr>
<tr>
<td>Construction of water supply chambers</td>
<td>pieces</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Construction of pressure regulating chambers</td>
<td>pieces</td>
<td>9</td>
<td>-</td>
<td>9</td>
</tr>
</tbody>
</table>

*DRRs in Goris are located in three zones (EMP, Appendix 7), in the administrative border of the town (near to sparsely populated areas). All DRRs have buffer zones and are fenced. The nearest house is about 200m distance from the DRR fence (Zone I and Zone II). The third DDR, (Zone IV) is about 0,5km distance from the nearest house. The possible impacts of earthwork, waste management/disposal and noise are addressed in the EMP matrix (see Appendix 1).**

**The chlorination station is located in the area of DRR (inside of the fence). The distance from the DRR and the nearest house is about 250meter. No additional impact is anticipated, except for those mentioned in the EMP matrix.*
Under this DD it is planned to rehabilitate the cover of asphalt covered streets in good condition after laying of water lines to its previous quality condition (see General Provisions Book VII-1.1).

In all trenches where the backfill on the sand protective layer is planned to be done with sand, it is planned to lay net polyethylene tape at 30.0cm height from the upper level of pipe, throughout the length of the trench.

5. BASELINE ENVIRONMENTAL CONDITIONS

5.1 Geographic location and climate of Goris town and Brnakot village

Goris town is situated in the south-east of the republic, the distance from the centre of the region Kapan is 62 km, and from capital Yerevan is about 240km. The town is situated on the absolute elevation of 1250-1550m, in the Valley of Vararak River, (tributary of Vorotan River). Valley of the reaver surrounded the area Goris is rather wide, deep trough-shaped concavity, filled with river, river-gully and water-icefield sediments. The slopes are abrupt, in some places they are even vertical, fissured with deep ravines of Shorin, Tangun, Ghatrini, Chopchun, Drngani. The high rocks, pyramid-shaped tops, deep canyons and ravines provide the unique view of the town relief.

The town has a temperate mountainous climate with mild, snow covered winters, warm summers. The annual effulgence is more than 2100 hours; the number of long days is 59. The average temperature in January is -1.3 °C, in July 19 °C. The annual precipitations reach up to 700mm.

Brnakot community is situated in the region of Sisian in Syunik Marz. The distance of the community from the centre of the region is 111 km, and from capital Yerevan - 222km. The administrative area of the community is 5153ha. The village is situated on the absolute elevation of 1660-1730m above sea.

The relief of the village may be separated into mountainous, stony, plain, pasture-meadow sections. Two small rivers flow through the centre of the village, they are Brnakot and Haram rivers. In the village there are several soil types: dark, brown, mountainous-meadowfoam, black soils.

The area is characterized by temperate, moderate terrestrial climate, warm summer and cold winter. The annual average temperature is 6.6 °C, in January it is -12°C (minimum -37°C), the average temperature in July is 17°C, the maximum - 34°C. The annual average precipitations make 360mm.

5.2 Biodiversity

Flora: The region of Syunik, due to its geographical location, dissected relief, various positions of slopes and interaction of floristic provinces, is famous for its rich landscape and biological diversity. Various high zonings have stimulated the enriching of the biodiversity and ecosystems.
In this region the landscape of average mountainous type with its mountainous and lawn-steppe vegetation is formed on the forest, umber and lime-free soils, or dark brown crushed stone soils.

In the observed area the flora is mainly rich in herbs, dense forests are missing. The tree types are mainly expressed by xerophil sparse forest vegetation type, involving juniper, mixed foliate types and types of plume and peach trees. In some places bushy, rocky vegetation is expressed. "Goris" sanctuary is situated about 2km away from the town.

The considerable part of Brnakot village is in the steppe zone. There are two types of steppes: couch grass and feather grass-fescue. Meadows occupy wide areas, which are the main forage base for the cattle breeding in the village. The upper zone is rich in alpian meadows. Subalpian meadows are also kept as pastures. There is vegetation growing here (clover, alfa-alfa, bromus, feather grass, etc).

Fauna: In the described area the characteristic animals are wolfs, foxes, rabbits, badgers. Wild goats, pigs, lynxes and martens are also met. Among rodents field mice are very common, which cause a lot of damage to the agriculture. The family of birds involves partridges, magpies, crows, nightingales, pigeons etc. Rivers and lakes are rich with fish. The region is rich also with predatory birds, such as vultures, eagles, etc.

However, the work foreseen by the subproject is carried out in the area of the town, where there are no special protected natural landscapes. The historic-cultural monuments nearby of the project area are located far from the dwelling areas of the Goris town (see Appendix 7), therefore any adverse impact on them is not expected during project implementation and as a result of project implementation.

6. ENVIRONMENTAL AND SOCIAL IMPACTS

As a result of the implementation of works aimed at the improvement of WSS systems the expected positive environmental and population health effects are as follows:

- water resource protection and sustainable use,
- excluding mixing of drinking, irrigation and sewerage water,
- preventing, excluding penetration of infectious disease viruses into drinking water,
- reduction of drinking water pollution hazard,
- providing high drinking water quality,
- improvement of health condition of population,
- water loss reduction,
- increasing duration of water supply to population,
- introduction of water metering system,
- increasing water consumption efficiency.

IEE revealed that the implementation of works aimed at WSS systems improvement will have probable temporary harmful effects on the selected for this purpose area – landscapes, river ecosystems, environment and human health.
The negative effects on the environment, aquatic ecosystems and people might be mainly caused by construction works implementation, and expected to do little damage and be shortterm. They can be prevented or mitigated as a result of best construction practice.

Based on the initial assessment, the following adverse impacts can be expected:

- air pollution
- noise
- traffic and pedestrian roads congestion
- soil erosion and soil eroding processes
- environment and water resources pollution by construction and household waste
- soil and water resources pollution by fuels and lubricants,
- soil and water resources pollution by chlorine.

Subproject implementation will have positive social effects directly improving the population life quality in Goris town and Brnakot village, providing sustainable and reliable water supply and water resource rational use for about 25 thousand people.

7. ENVIRONMENTAL IMPACT MITIGATION MEASURES

Adverse impacts on the environment and human health while implementing construction works for the improvement of Goris town’s and Brnakot village’s water supply system are possible during the construction of: (i) trenches for water lines, (ii) pits for regulating and metering nodes and (iii) construction of chlorination station.

To prevent soil erosion and drilling processes, the following is to be implemented: in inclined sites of the water line route implement measures for retaining the inclinations, minimize the time during which trench and pit excavations for regulation and metering nodes are open.

At works near river and tributary bed areas, the inclinations should be retained to prevent soil erosion and sediment transport.

- remove the excess soil mass and building material from the construction sites after completion of construction activity;
- recover the asphalt* - concrete pavement, providing its previous good condition and quality;
- provide graveling with compaction on the streets with damaged and half-destroyed asphalt-concrete pavement, as well as on earth roads

*Note: The asphalt will be bought from specialized asphalt plant which is responsible for taking environmental impact mitigation measures. All asphalt plants function in accordance with RA Environmental legislation.

To prevent the topsoil layer damage, or landscape degradation, the topsoil should be stored on the assigned site, thereafter used for the areas restoration. The construction
site should be cleaned from the household and construction waste providing the previous state of landscape.

To exclude *land and water resources pollution with fuels and lubricants*, the latter must be stored on a sealed surface, away from water resources, plan use of special tanks for their collection, which will then be removed to special sites envisaged for re-treatment.

To prevent *environment pollution with construction and household waste*, remove construction waste to corresponding landfill of the community, having in advance a contract agreement with the community heads or landfill operators.

To exclude *land and water resources pollution with chlorine*, organize works for washing the water supply distribution network with chlorine, according to calculations. Provide appropriate technical means; implement chlorine discharge to surface water body or land area after washing the pipes, according to the regime planned under the design.

**Water quality change** - Environmental monitoring plan must include also control over water quality and residual chlorine level.

To reduce *dust during the construction works*, the construction site and roads are to be regularly watered.

To prevent *noise*, night work in residential areas is to be limited, and usage of machines/equipment with extra noise is to be avoided; installation of silencers if needed.

To reduce *disturbance to population because of overloaded roads* safe area for trucks is to be provided; waste on the construction site must not be accumulated and burnt, construction should be implemented in stages, adequate notice of construction activities must be given to the population the traffic flow should be regulated if required. As well as effective road signs, temporary safety bridges as alternative walk way and tape fencing safety purposes are to be provided. Diversions or barricades are to be organized. Adequate street lighting in suitable places when passers-by or entry by public is likely is to be provided.

To prevent *hazards for workers and the population* during the construction, the following must be implemented: install fencing around construction site; control access of unauthorized persons to site; place warning signs in dangerous places; carry out regular examination of equipment by highly qualified staff, as well as make regular safety audits; provide first aid and safety training to construction staff.

Provide community participation in subproject design, which will minimize disruption to community social activities.

**Drinking water quality change**: Environmental monitoring plan must include also control over water quality and residual chlorine level.

To provide drinking water quality in Goris town and Brnakot village, AWSC will implement planned sampling of water from the water sources feeding the communities, checking all the parameters required by the Ministry of Health. Water quality monitoring
is carried out also by State Hygienic and Epidemiological Surveillance Inspectorate, according to "Drinking Water. Requirements to the Centralized Water Supply System's Water Quality"; Quality Control № 2-III-A'2-1 sanitary rules and norms" (registered on 28.12.2002), document, which establishes the requirements to the drinking water quality, as well as the rules for quality control of water produced and supplied to residential area through water supply systems.

Since disinfecting is done by chlorine, also residual chlorine level monitoring must be done.

For mitigation or prevention of the above mentioned adverse impacts, mitigating measures are planned and environmental management plan EMP (Appendix 1), as well as site specific environmental management plan EMP (Appendix 2) were developed, which shall be followed by the contractor, controlling and supervising units.

The EMP is an environmental assessment document and is included in the detailed design.

8. INSTITUTIONAL FRAMEWORK OF ENVIRONMENTAL MANAGEMENT

The organizational obligations for the proposed mitigating measures are distributed among the following agencies:

➢ **Executive agencies, which are responsible for implementation of the measure.**

1. For this special task the executive agency (HGSN Ltd and JINJ Ltd. joint venture) must provide in the design stage obtaining of all the required agreements and permits from corresponding state and local authorities, before tendering the construction works;
   - Conclusion of environmental expert examination (if needed),
   - Agreement of the State Agency for Protection of Historical and Cultural Monuments, if impact is envisaged by the design.

2. The executive agencies in the construction stage (construction contractors) will be responsible for physical implementation of mitigating measures planned under the EMP, as well as for obtaining of all permits and agreements required during the construction implementation. Those are:
   - Agreements from the local self-governing authorities for the sites allotted for transportation of wastes and construction garbage,
   - Agreement of the State Agency of Protection of Historical and Cultural Monuments, if unexpectedly historical and cultural or archaeological monuments are discovered during the construction implementation.

3. Before commencement of the construction, the following permits and certificates must be obtained from ADB/PMU, if needed:
   - Cadastre certificate on the land allotment;
   - Water use permit, if needed.
Controlling agencies, which are responsible for controlling the executive units to provide implementation of the EMP measures by the latter

1. AWS CJSC/ADB PMU environmental specialists will be responsible for in time, due and reliable implementation of the works and measures in the order under the EMP and SSEMP. The mentioned specialists will regularly visit the construction sites to provide due implementation of the measures aimed at mitigation of work impact. During the visits the possible gaps will be identified and the infringements in implementation of mitigating measures will be discovered, in accordance with the field visits checklist (Appendix 3).

The AWS CJSC/ADB PMU has the right also to require and check whether all permits are available and valid, all the measures and monitoring part under the EMP are implemented during the construction, in accordance with ADB guidelines and the RA environmental and social legislation.

2. HGSN LLC and JINJ LLC joint venture will also implement control of implementation of mitigating measures during the construction. The environmental specialist shall make visits to control the EMP and SSEMP implementation and assess the situation according to the Ambient Monitoring Form (Appendix 6).

State monitoring agencies, which are responsible for observing the extent and efficiency of EMP implementation and making corrections in the project, if needed. The state monitoring agencies are as follows:
- State Environmental Inspectorate of the Ministry of Nature Protection, RA
- State Hygiene and Anti-Epidemic Inspectorate of the Ministry of Health, RA
- The State Agency for Protection of Historical and Cultural Monuments, RA
- The RA local self-governance bodies,
- The RA Ministry of Transport and Communication.

The amounts envisaged for implementation of environmental measures included in the EMP and SSEMP are included in the detailed design.

Implementation of mitigating measures for environmental impacts will be controlled regularly through visits to the construction sites. With the help of the specially developed check list the gaps and drawbacks will be discovered.

In case of not implementing or infringing the implementation of the mitigating measures, after warning, the next payment will be terminated until the infringement is completely eliminated.

9. ENVIRONMENTAL CONSULTATIONS

During the meetings organized within the framework of public awareness campaigns, the environmental and social impacts of the planned works were represented to the
beneficiary and affected communities of Goris town and Brnakot village included in the sub-project.

To provide the presence of beneficiaries, preliminary agreements were gained with the community head (Mayor), company staff, Environmental Information Center functioning in Syunik region, environmental NGOs and other stakeholders.

The meeting in Brnakot village was held in the village hall on 08.11.2013. The meeting was attended by the employees of the AWSC, village council members, and employees of the village hall, medical ambulatories, the school and kindergarten (25 people in total, Figure 1).

The meeting in Goris was held in the Orhus Centre on 09.11.2013, which was attended by the representatives of the town hall and regional government, head of Goris district of AWS CJSC, representatives of higher educational institutions, as well as public organizations (11 people in total, Figure 2).

During all meetings the women's presence and active participation was provided. There were participants from the more vulnerable groups, women and elderly people, for whom the improvement of the water supply systems is of vital importance.

During the meetings the works planned under the detailed design in each community were represented, after which the environmental specialist represented the possible adverse environmental impacts described in the environmental management plan.

The latter is the description of the negative impacts on the environment, population health and safety of construction workers, which are possible during the subproject implementation in design, construction and operation stages. The list of the measures mitigating or preventing these possible negative impacts was also represented.

The community's residents were mainly concerned with the following problems arising during the construction works:

- infringement of traffic and pedestrians normal regime because of presence of open trenches for a long time, as well as improper rehabilitation of roads after the construction;
- hazardous situation for children and elders because of absence of warning signs and not limiting the construction site with tapes;
- pollution of the settlement with construction and household waste during the construction, as well as construction garbage not removed after the construction;
- termination of water supply for a long time (sometimes 1-2 days) during the construction;
- presence of dust during dry weather;
- Improper washing and disinfecting of new pipes, resulting in unclean water in flats for a long time.
After representing the EMP, the environmental specialist asked the residents of both communities to get acquainted with the environmental management plan in detail and during the construction follow implementation of the measures included in the plan.

The environmental management plan was copied and disseminated among the participants of the meeting, as well as in village halls.

**Contact data of residential areas are:**

**Goris town**
Mayor: Nelson Voskanyan  
Tel. (+374 284) 2-25-52;  
E-mail: info@goriscity.am

**Brnakot village**
Head of village: Atom Arakelyan  
Tel. (+374 284) 6 14 14;  
E-mail: brnakot100@mail.ru

**Environmental consultation**

Figure 1. Environmental consultation in Brnakot village

Figure 2. Environmental consultation in Goris town

10. GRIEVANCE MECHANISM FOR AFFECTED PUBLIC

A grievance mechanism for external stakeholders and affected public is a process focused mainly on receiving, evaluating, and addressing project-related grievances from affected communities at the level of the WSSSP. The grievance mechanism differ from other forms of dispute resolution (e.g. courts, administrative systems, etc.) in that is offers the advantage of a locally based, simplified, and mutually beneficial way to settle issues within the framework of the relationship between the WSSSP and the community.
Properly designed and implemented grievance management processes can benefit both the WSSSP and communities by increasing the likelihood of resolving minor disputes quickly, inexpensively, and fairly with solutions that reasonably satisfy both sides without taking the grievances to other (formal) dispute resolution body. Grievance mechanisms can help to identify and resolve issues before they are elevated to formal dispute resolution methods, including the courts. For a grievance mechanism to function effectively, it is important to define the grievance processing structure and to assign responsibilities for the mechanism’s implementation and make them clear for the stakeholders.

Contact details for questions, complaints and recommendations from the external stakeholders of the WSSSP are as follows:

* **HotLine:** 1 -71   **AWSC Customers Support Calling Center,**  
  Investment Program Coordination Department  
  Mrs. Lilit Hovhannisyan-Environmental and Social Impact Specialist  
  **Address** 8a Vardanants blind alley, Yerevan 0010, Armenia  
  Phone / Fax (+374 10) 542877  
  E mail: lhovhannisyan@armwater.am

AWS CJSC will register all the complaints. The Complaints Log form is provided in Appendix 4.

The focus of the grievance mechanism on the needs of affected communities is substantiated by the fact that they are directly, and in some cases significantly, affected during the project implementation but often lack viable options or capacity for raising their concerns through formal structures such as the courts. This is especially true for disadvantaged groups within communities. The WSSSP should periodically review the adequacy of the grievance process, with the participation of communities, and agree on modifications. The contact details will be provided in construction information posters and information leaflets distributed in the project affected communities during the public consultations. Questions and comments expressed during the public meetings will be recorded and addressed during the design and implementation of the WSSSP.

A grievance mechanism will be available to allow an AP appealing any disagreeable decision, practice or activity arising from disturbance during the construction works. APs during public consultation will be fully informed of their rights and of the procedures for addressing complaints whether verbally or in writing during consultation, survey, and time of compensation. This can be obtained through by ensuring full participation and consultation with the APs, and by establishing extensive communication and coordination among the affected communities, the PMU and town or community heads. The below grievance mechanism does not limit the citizen’s right to submit the case to the court of law just in the first stage of grievance process.
11. ENVIRONMENTAL MANAGEMENT PLAN

The EMP and the SSEMP will be based on the results of IEE prepared by subproject and will include appropriate mitigation measures.

EMP consists of two components:

1. Mitigation measures and institutional responsibilities for implementation;
2. Environmental monitoring.

In case if an unanticipated environmental impact arises during the construction, the Table provided in Appendix 5. Unanticipated Impact / Significant Incident / Accident Notice will be filled up and attached to the changed orders.

The Contractor should strictly follow the environmental mitigation measures prescribed in the EMP and SSEMP. The costs foreseen for the implementations of all the measures prescribed in the EMP and SSEMP are included the total value of the Contract.

Notice on the failure to implement measures prescribed by the Technical Supervision Company (TSC) or the Client would be sent to the Contractor in written. After the Notice to Correct, the next recorded violation would trigger charging of liquidated damages in the amount of 0.1% of the total value of the contract. The liquidated damages do not relieve the Contractor from remedying the violation. The recorded violation should be remedied in two working days period. Liquidated damages would be retained from the next Performance Certificate and after the completion of the construction activities the liquidated damages for the recorded violation will be retained from the Retention Money. In case of three liquidated damages the Contract could be terminated unilaterally.

Above described remedies of EMP violation will be included in the contracts for provision of works concluded by AWSC under the WSSS project.
## APPENDIX 1. ENVIRONMENTAL MANAGEMENT MATRIX

<table>
<thead>
<tr>
<th>Works and possible impacts</th>
<th>Proposed mitigating measures</th>
<th>Monitoring</th>
<th>Responsible bodies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td></td>
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</tbody>
</table>
| 1. Air pollution, noise, traffic congestion | - Install fencing around construction site  
- regularly water the construction site and roads,  
- limit night work in residential areas,  
- Avoid usage of machines/equipment with extra noise; installation of silencers if needed,  
- Provide safe area for trucks,  
- Do not accumulate and burn waste on the construction site,  
- Carry out construction in stages, give adequate notice of construction activities to the population,  
- Provide effective road signs, diversions or barricades,  
- Provide adequate street lighting,  
- Proper signage and lighting in suitable places when passers-by or entry by public is likely,  
- Provide community participation in subproject design, which will minimize disruption to community social activities. | Daily site inspection | Constructor, Consultant, PMU |
| Dust and noise during the construction works | - Inclined sites of the waterline measures for retaining the inclinations shall be carried out,  
- Minimize the time during which trench and pit excavations for regulation and metering nodes are open  
- Rehabilitate disturbed surfaces as soon as possible after completion of construction activity, according to the design  
- Store oil, fuels and lubricants on a sealed surface, away from water resources,  
- Remove construction waste to corresponding landfill of the | Daily inspection of construction contract and maintenance | Constructor, Consultant, PMU |
| Disturbance to population because of overloaded roads | | | |

2. Environmental pollution  

| Soil erosion and sediment transport | - Inclined sites of the waterline measures for retaining the inclinations shall be carried out,  
- Minimize the time during which trench and pit excavations for regulation and metering nodes are open  
- Rehabilitate disturbed surfaces as soon as possible after completion of construction activity, according to the design  
- Store oil, fuels and lubricants on a sealed surface, away from water resources,  
- Remove construction waste to corresponding landfill of the | Daily inspection of construction contract and maintenance | Constructor, Consultant, PMU |
<p>| Environment pollution with construction waste | | | |
| Land and water | | | |</p>
<table>
<thead>
<tr>
<th>Works and possible impacts</th>
<th>Proposed mitigating measures</th>
<th>Monitoring</th>
<th>Responsible bodies</th>
</tr>
</thead>
</table>
| resources pollution with fuels and lubricants | - community, having in advance a contract agreement with the community heads or landfill operators,  
- Organize works for washing the water supply distribution network with chlorine, according to technical calculations. Provide appropriate technical means.  
- Implementation of chlorine discharge to surface water body or land area after washing the pipes, according to the regime planned under the design, MPE. | Daily inspection throughout construction stage. Monthly inspection of accident reports and complaints register | Constructor, Consultant, PMU, Population |
| Land and water resources pollution with chlorine |                                                                                                                                                                                                                                                                                                                                                           |                                                                            |                                      |

**Health and Safety**

- Hazards for Workers and the population

- Install fencing around construction site
- Control access of unauthorized persons to site
- Place warning signs in dangerous places
- Carry out regular examination of equipment by highly qualified staff, as well as make regular safety audits,
- Provide first aid and safety training to construction staff

- Constructor, Consultant, PMU, Population
## APPENDIX 2. SITE SPECIFIC ENVIRONMENTAL MANAGEMENT PLAN

### Water supply systems improvement of Goris town and Brnakot village - I package

<table>
<thead>
<tr>
<th>No</th>
<th>Construction Activities</th>
<th>Hazards to Consider</th>
<th>Likelihood of risk/Value</th>
<th>Construction of risk/Value</th>
<th>Risk/Value</th>
<th>Environmental Management Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reconstruction of DDRs, pipeline, water network, construction of chlorination station, water supply and pressure regulating chambers <strong>inside</strong> of residential areas</td>
<td>Dust</td>
<td>Certain/5</td>
<td>Major/3</td>
<td>15</td>
<td>- Regularly water the construction site and roads.</td>
</tr>
</tbody>
</table>
|    |                         | Noise                | Likely/3                 | Major/3                   | 9         | - Limit night work in residential areas.  
|    |                         |                      |                          |                           |           | - Avoid usage of machines/equipment with extra noise, installation of silencers if needed. |
|    |                         | Disturbance to population because of overloaded roads | Certain/5 | Major/3 | 15 | - Provide safe area for trucks.  
|    |                         |                      |                          |                           |           | - Carry out construction in stages, give adequate notice of construction activities to the population.  
|    |                         |                      |                          |                           |           | - Provide effective road signs, temporary safety bridges as alternative walk way, and tape fencing for safety purposes.  
|    |                         |                      |                          |                           |           | - Provide adequate street lighting  
|    |                         |                      |                          |                           |           | - Proper signage and lighting in suitable places when passers-by or entry by public is likely.  
|    | Soil erosion and sediment transport | Likely/3 | Major/3 | 9 | - In inclined sites of the water line route implement measures for retaining the inclinations to prevent soil erosion and sediment transport.  
|    |                         |                      |                          |                           |           | - Minimize the time during which trench and pit excavations for regulation and metering nodes are open.  
|    |                         |                      |                          |                           |           | - Rehabilitate disturbed surfaces as soon as possible. |
possible after completion of construction activity, according to the design.

<table>
<thead>
<tr>
<th>Construction and household waste</th>
<th>Certine/5</th>
<th>Major/3</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Do not accumulate and burn household waste on the construction site.</td>
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<tr>
<td></td>
<td>- Do not mix household waste with construction waste and place them into dustbins.</td>
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<tr>
<td></td>
<td>- Remove construction waste to corresponding landfill of the community, having in advance a contract agreement with the community heads or landfill operators.</td>
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<tr>
<td></td>
<td>- Exclude filling of the construction and household waste into the rivers and their tributaries.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pollution with fuels and lubricants</th>
<th>Likely/3</th>
<th>Major/3</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Store oil, fuels and lubricants on a sealed surface, away from soil and water resources.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Regularly check the condition of machines and mechanisms.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Chlorine water from washing of pipelines</th>
<th>Certine/5</th>
<th>Catastrophic/5</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Implement disinfecting of water supply pipelines with chlorine according to technical calculations.</td>
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<tr>
<td></td>
<td>- Provide appropriate technical means.</td>
<td></td>
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<tr>
<td></td>
<td>- After washing of pipes discharge of chlorine to surface water body or land area according to the established order and background concentration of the water body.</td>
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</tbody>
</table>
## APPENDIX 3. FIELD VISITS CHECKLIST

### General Information

<table>
<thead>
<tr>
<th>General Information</th>
<th>Corrective Action Request</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date / Month / Year</td>
<td>D/M/Y</td>
<td>Υ/Σ</td>
<td>Π/Ψ</td>
</tr>
<tr>
<td>Subproject</td>
<td></td>
<td>Υ/Σ</td>
<td>Π/Ψ</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td>Υ/Σ</td>
<td>Π/Ψ</td>
</tr>
<tr>
<td>Contraction contractor</td>
<td></td>
<td>Υ/Σ</td>
<td>Π/Ψ</td>
</tr>
<tr>
<td>Marz</td>
<td></td>
<td>Υ/Σ</td>
<td>Π/Ψ</td>
</tr>
</tbody>
</table>

### Design

<table>
<thead>
<tr>
<th>Required permissions</th>
<th>Yes</th>
<th>Υ/Σ</th>
<th>Π/Ψ</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity assessment / EEC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Written consent on land acquisition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment of impact on cultural heritage</td>
<td></td>
<td></td>
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</tbody>
</table>

### Construction

<table>
<thead>
<tr>
<th>Required permissions</th>
<th>Yes</th>
<th>Υ/Σ</th>
<th>Π/Ψ</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written consent on disposal of construction waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Written consent in case of sudden discovery of cultural heritage</td>
<td></td>
<td></td>
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</tbody>
</table>

### Public Awareness

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>Υ/Σ</th>
<th>Π/Ψ</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of population regarding construction works according to the project design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community’s participation in construction works according to the project design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Safety

<table>
<thead>
<tr>
<th>Safety of workers</th>
<th>Yes</th>
<th>Υ/Σ</th>
<th>Π/Ψ</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of safety uniforms (earflaps, mask)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Subproject VII, Package VII.1**

**Environmental Management Plan**

20
<table>
<thead>
<tr>
<th>Safety of population</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Թիմականական ապահովության կարգավիրակություն / management of safety</td>
<td>Այո</td>
<td>Ոչ</td>
<td>N/A</td>
</tr>
<tr>
<td>Մեքենաների համար առկայություն գրական / availability of safe place at the construction site for vehicles</td>
<td>Այո</td>
<td>Ոչ</td>
<td>N/A</td>
</tr>
<tr>
<td>Պատյաների պահեստների առկայություն գրական / availability of storage for oils and lubricants at the appropriate part of the construction site</td>
<td>Այո</td>
<td>Ոչ</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temporary air pollution/dust</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Օդի ժամանակավոր աղտություն / temporary air pollution</td>
<td>Այո</td>
<td>Ոչ</td>
<td>N/A</td>
</tr>
<tr>
<td>Հողի էրոզիա / soil erosion</td>
<td>Այո</td>
<td>Ոչ</td>
<td>N/A</td>
</tr>
<tr>
<td>Փոսորակների ժամանակին հետլիցք / timely backfill of pits</td>
<td>Այո</td>
<td>Ոչ</td>
<td>N/A</td>
</tr>
<tr>
<td>Activity</td>
<td>Yes/No</td>
<td>Σ/Ν</td>
<td>N/A</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Repair of damaged surface after completion of construction works</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water pollution</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Water pollution caused by fuel and lubricants</td>
<td></td>
<td></td>
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<tr>
<td>Leakage of chlorine after wash up of the pipes according to the scheduled regime</td>
<td></td>
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<tr>
<td>Noise close to settlements</td>
<td></td>
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<tr>
<td>Implementation of the works during working hours, otherwise in projected manner</td>
<td></td>
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<tr>
<td>Construction west disposal</td>
<td></td>
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<tr>
<td>Transportation and disposal of construction and consumer waste in appropriate community landfill</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Drinking water pollution</td>
<td></td>
<td></td>
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<tr>
<td>Correspondence of balance quantity of residual chlorine to the quality of potable water</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
## APPENDIX 3. COMPLAINTS LOG

<table>
<thead>
<tr>
<th>Log number</th>
<th>Date / Location</th>
<th>Complainant/ Date of Contact</th>
<th>Details of Complaint</th>
<th>Investigation / Mitigation Action</th>
<th>Resolution Status*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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*Open or Closed (If closed include date)

Filed by PMU Environmental Specialist: ____________________________

Date: ____________________________
## APPENDIX 4. UNANTICIPATED IMPACT / SIGNIFICANT INCIDENT / ACCIDENT NOTICE

<table>
<thead>
<tr>
<th>Date/ Location Of Incident</th>
<th>Description of incident/Impact including Magnitude and Control Action taken at the time</th>
<th>Evaluation of Consequences</th>
<th>Corrective Action Required including Deadline, and Lessons Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

Jointly signed by:

Site Supervision Engineer: ___________________________________________ Date: ______________________

Contractor: ________________________________________________________ Date: ______________________

**Appendices:**
(e.g. photographs, laboratory reports, etc.)
## APPENDIX 5. EMISSIONS / AMBIENT MONITORING FORM

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Date / Location</th>
<th>Measured By</th>
<th>Monitoring Method / Equipment used</th>
<th>Result</th>
<th>Performance Standard</th>
<th>% Exceedence</th>
<th>Reason for exceedence and Corrective Action Request if works related</th>
<th>Resolution Status of previous CAR</th>
</tr>
</thead>
<tbody>
<tr>
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