ASIAN DEVELOPMENT BANK FUNDED
WATER SUPPLY AND SANITATION SECTOR PROJECT - ADDITIONAL FINANCING

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SUBPROJECT III  IMPROVEMENT OF ARMAVIR REGION SETTLEMENTS WATER SUPPLY SYSTEMS

L2860-ICB-1-01/2  IMPROVEMENT OF WATER SUPPLY SYSTEMS IN AMBERD, AYGESHAT, DASHT, DOGHS, LERNAMERDZ, AGHAVNATUN VILLAGES

ENVIRONMENTAL MANAGEMENT PLAN
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LIST OF ABBREVIATIONS

RA – Republic of Armenia
RA MoNP – RA Ministry of Nature Protection
RA MoH - RA Ministry of Healthcare
RA MoT&C – RA Ministry of Transport and Communication
RA MoC – RA Ministry of Culture
JV – Joint Venture
LSGB - Local Self-Governmental Bodies
EIA – Environmental Impact Assessment
AWSC ADB PMU – Armenian Water and Sewage Company/ Project Management Unit of Asian Development Bank
EMP - Environmental Management Plan
IEE- Initial Environmental Examination
DD - Detail Design
1. BACKGROUND OF THE PROJECT

WSSP Project 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 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 households in all the project towns and villages by improving their access to safe and sustainable drinking water.

Similar to the original WSSP, the Additional Financing Project 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 (November, 2002) the Subproject is ranked to B category which does not need extended EIA, excluding aslo 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 expertiz ” (N-193, 30 March 1999).

As a B Category Project ADB Policy required development of Initial Environmental Examination/ IEE reports for each Subproject (1 report) and site specific Environmental Management Plan/EMP (separately report for each lot of the subproject).

3. INTRODUCTION

The very report is developed for the Subproject on the Improvement of W&W Systems in Amberd, Aygeshat, Dasht, Doghs, Lernamerdz, Aghavnatun villages of the RA Armavir region, the design of which has been performed by the JV of HGSN and JINJ LLCs. The Water supply systems rehabilitation involves activities on reconstruction and repair of water distribution systems, as well as construction of new water pipelines, regulating and water measuring junc.
As a result of construction work implementation, as well as further operation and maintenance of the water supply systems there might be negative impacts on the environment.

It is expected that the impacts during construction work implementation will be minimal and temporary, probably involving vegetation cut, soil erosion, air, soil and water resource pollution by lubricants and chlorine compositions, as well as household and construction waste.

At the Operation Stage the environmental impact, mainly expected because of improper execution of operation requirements, will decrease.

The activities aimed at improvement will be considered environmentally friendly in case of water resource conservation, as well as their rational and sustainable use.

The social and economic effect as a result of water supply system improvement are expected to be long-term, mostly positive, excluding potable and waste waters mix, minimization of water pollution risk, prevention and exclusion of infection disinfection disease agents penetration into potable water, as well as water supply extension, providing sustainable water supply and effective water use.

The EMP Part 5 introduces description of possible impacts and its facilitating measures required at different stages of Water Supply Systems Rehabilitation Project.

- **Designing stage**

  The design works on water systems have been performed by the JV of HGSN and JINJ, which has been selected as a Consultant who provides services on civil works and public awareness campaign within the framework of “Water Supply and Sanitation Sector Project – Additional Financing”. The EMP includes articles on climatic conditions, relief, natural soil types, hydrology and biodiversity of the very package, requirements on obtaining the RA MoNP and other Ministries’ agreements, as well as fulfillment of executive parties’ contractual commitments during all stages of implementation. The Design documentation includes adequate environmental and social articles and separate Matrix of the very EMP Subproject. The Project Consultant covenants to follow the appropriate statements of the RA Environmental and social legislation, as well as ADB instructions and strategy requirements.

- **Construction stage**

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

- **Operation Stage**

  The Contractor should strictly follow the requirements on environmental impact mitigation measures, which are involved in the EMP.

  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

The total length of water supply distribution pipelines in Amberd, Aygeshat, Dasht, Doghs, Lernamerdz and Aghavnatun rural communities is 54 km. The community water supply is performed from Bazmaghbyur and Ghazaravan ground water springs of Ashtarak region.

To provide water supply through the conduits coming from the ground water intake structures the mentioned beneath works were performed for the Subproject communities.

- For Amberd community – 4 connections with 150, 125, 100 and 75 mm steel pipelines,
- For Aygeshat community – 5 connections, the main of which are considered 150 mm and 63 mm polyethylene feeding pipeline,
- For Dasht community – 8 connections, where the main ones are performed with 100 mm, 75 mm and 50 mm diameters steel pipes,
- For Doghs community – 2 connections, with 150 mm and 125 mm diameters steel pipes,
- For Aghavnatun community – 2 connections with 200 mm and 50 mm diameters steel conduits,
- Water supply of Lernamerdz community is performed at one point through 200 mm diameter steel pipe.

The water is directly supplied to the distribution system through water conduit.

The water supply in the residential areas are performed through the pipelines which are in poor condition. The inner network is entirely laid with steel pipes which are corroded. The most of the settlements distribution pipelines are deteriorated due to which the leakages are significant. Non-counted water of the abovementioned communities makes about 88%. The system consumed water recording is not performed completely.

In 2010 within the framework of “Improvement of W&W systems of the RA settlements” Project funded by ADB there were performed some works, partially, reconstruction of reservoirs and coming out of them conduits, distribution system pipelines and valve junc.

In 2010-2011 by the mutual efforts of “AWSC” LLC and communities in Aygeshat and Aghavnatun villages there were reconstructed polyethylene pipelines and distribution systems, including also installation of private houses water metering junctions in Aghavnatun community.

4.2. Description of proposed rehabilitation works

The very Subproject aims at rehabilitation of water supply system of Amberd, Aygeshat, Dasht, Doghs, Lernamerdz and Aghavnatun rural communities of the RA Armavir region, providing the inhabitants with safe potable water and improving water distribution and accounting systems.
The population number in Amberd, Aygeshat, Dasht, Doghs, Lernamerdz and Aghavnatun villages, according to 01.01.2012, makes 10652 in total. The clients total number in the rural communities is 1851.

Taking into account the population prospective growth by 2040, which assumes 0.43% annual growth, the rural communities dwellers number is supposed to be 11809 men.

For the settlements, considering also the leakages, the mean daily water demand rate is assumed to be 200 l/day per man.

The average hourly discharge of maximal daily water demand of the rural communities makes \( Q_{av.,h} = 117.4 \text{ l/sec} \).

Based on the technical and economical calculations done in the Preliminary Design, as well as submitted justifications, in the Detailed Design there have been developed activities on the water supply rehabilitation.

By the very Detailed Design the works designed for the improvement of water supply system in Amberd, Aygeshat, Dasht, Doghs, Lernamerdz and Aghavnatun rural communities are as follows:

- Construction of de50-de200 diameter 36900 lm long polyethylene pipelines
- Construction of valve junc. – 48 sets
- Construction of private house connections - 18210 lm
- Installation of private houses water metering junc. - 1647 sets
- Reconstruction of external system with de50-de200 mm diameter 133 lm long polyethylene pipes, its washing and disinfection

The aggregative indexes of the designed works in the Subproject rural communities are introduced in Table 1.
## Table 1

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction of de50-de200 diameter polyethylene pipeline of water supply internal system</td>
<td>lm</td>
<td>6100</td>
<td>5400</td>
<td>6300</td>
<td>4500</td>
<td>3100</td>
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<td>11300</td>
<td>111500</td>
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<td>Testing, washing, disinfection of the abovementioned system</td>
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<td>6.1</td>
<td>5.4</td>
<td>6.3</td>
<td>4.5</td>
<td>3.1</td>
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<td>3.7</td>
<td>20.9</td>
<td>11.3</td>
<td>111.5</td>
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<tr>
<td>Construction of valve junc.</td>
<td>set</td>
<td>12</td>
<td>9</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>24</td>
<td>13</td>
<td>7</td>
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<td>20</td>
<td>9</td>
<td>14</td>
<td>35</td>
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<tr>
<td>Construction of private houses connections</td>
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<td>3065</td>
<td>2060</td>
<td>2740</td>
<td>1265</td>
<td>5010</td>
<td>3900</td>
<td>2130</td>
<td>3205</td>
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<td>13550</td>
<td>5650</td>
<td>61585</td>
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<tr>
<td>Installation of private houses water metering junc.</td>
<td>set</td>
<td>184</td>
<td>305</td>
<td>184</td>
<td>231</td>
<td>100</td>
<td>465</td>
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<td>1300</td>
<td>476</td>
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<tr>
<td>Reconstruction of de50-de200 diameter polyethylene pipeline of water supply external system, washing, disinfection</td>
<td>lm</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>133</td>
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<td>-</td>
<td>133</td>
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<tr>
<td>Replacement of connections of apartment buildings and public buildings</td>
<td>unit</td>
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<td>-</td>
<td>16</td>
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<td>11</td>
<td>27</td>
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</tbody>
</table>
According to the agreement between the Contractor, Consultant and rural communities, the mentioned beneath works should be implemented by the construction completion, in spite of the pipeline diameter and its function.

1. To restore the asphalt concrete pavement of roads which were previously in favorable condition, providing the same cover quality,

2. To perform backfilling of the trenches in the destroyed and half-destroyed streets, paved with asphalt concrete, then 10-15 cm graveling with compaction.

5. BASELINE ENVIRONMENTAL CONDITIONS

5.1 Geographic location and climate of Amberd, Aygeshat, Dasht, Doghs, Lernamerdz and Aghavnatun villages of the RA Armavir region

The studied area of the RA Armavir region is situated within the premountain flat land, at average elevation, where the relief is slightly hilly, somewhere channeled by small ravines. The Subproject settlements are 25-30 km far north-east from Armavir town, and 20-22 km far north-west from Erevan.

The area is characterized by hot summer, with 21.5°C average monthly temperature in July and cold windless winter with January 3.8°C average monthly temperature. The air absolute maximal temperature is +41°C, and absolute minimal -31°C. The average annual atmospheric rainfalls make 280-340mm. The snow average cover reaches 42 cm. The ground freezing depth is 0.50-0.70 m, subject to the absolute elevation. The air average many-year relative humidity makes 59%. The wind average annual velocity is 1.8 m/sec.

Considering the geo-morphological aspect the area represents accumulative relief, slightly gradient plain. It is situated in the east part of Ararat valley premountain zone, within the terrace of Araks River left bank (accumulative terraces, flood plain).

Among exogenic phenomena there are surface erosion, water flooding, caused by the rainfalls, change and deepening of the gullies formed due to the rainfall permanent and temporary flows, and some technogenic phenomena, etc.

The inhabited part of the studied area is situated at 800-1000m elevation marks.

5.2 Biodiversity

The predominant type of the area soils is brown, represented by gravel and stoney, somewhere carbonate cemented and hydromorphic saline soils, formed on the lake-alluvial deposits.

In the west, south and east the area bounds on the Ararat valley the geological structure of which represents the Armenian Upland Upper Pliocene alluvial and proluvial lake-river, flood deposits. The latter are introduced by clay layer groups which in some places pass into gravel, sand and clay-sand sublayers with 5-10 cm, and somewhere more thicknesses.

The sediments section in its turn is covered by the Quaternary period alluvial-diluvial sediments, or volcanic complexes of andesite-basalts, dacites.
The area feeding big water pulse is the Araks River with its Metsamor and Vedi tributaries. From the hydrogeological aspect the area is rich in ground waters occurring at different depth, starting from 0-5m, 100 and deeper levels. The ground water availability depends on lake-river formations and cracked andesite-basalts.

There are no negative physical and geological phenomena within the area. The region is situated in 9 magnitude potential seismicity zone.

**Flora.** The area vegetation is introduced by semi-desert and desert plant species, like sagebrush ephemers and halophiles, typical of Erevan floristic region vegetation types, developed on the sand-clay bedrocks. That is meadow, steppe and semi-desert types.

Within this landscape zone there are registered about 130 plant species, out of which the dominant ones are lanceleaf water plantain (Alisma lanceolatum), common arrowhead (Sagittaria sagittifolia L.), threeleaf arrowhead (Sagittaria trifolia L.), bean trefoil (Cousinia tenella), salt-wort (Salsola tamamschjanae), spinach (Spinacia tetrandra), milk-vetch (Astragalus paradoxus), fenugreek (Trigonella capitata), wheat (Triticum araracum), tamarisk (Tamarix), tamarisk (Tanarix octandra), etc.

Out of wild useful plant species there are thorn apple (Datura stramonium), squirting-cucumber (Ecballium elaterium) and Syrian rue (Reganum harmala).

The area endangered species are sweet sedge (Acorus calamus L.), bindweed (Convolvulus commutatus Boiss), lettuce (Lactuca Takhtadzani Sosn), milk-vetch (Astragalus paradoxus), etc.

**Fauna.** In the studied area there 113 commonly occurred vertebrate species, the dominant of which are widely spread in Armenia. Crocidura (white-toothed shrews), Vulpes vulpes L. (fox), Cricetus auratus Nat. (golden hamster), Mucrotus arvalis Pall. (field mouse), Perdix perdix L. (partridge), Grus grus L. (crane), Armenian Gull (Larus armeniacus But.), etc.

The area widely spread vertebrates are marsh frog, grass snake, levantine, magpie, fox, wolf, ermine, out of invertebrate: ants, crickets, moths, blue butterflies, cabbage white butterflies, etc.

Among the species recorded in the Red Book there are Long-eared hedgehog (Erinaceus auritas Gmelin), Mehely’s Horseshoe Bat (Rhinolophus Mehelyi), Marbled polecat (Vormela peregusna peregusna Guld), Glossy Ibis (Plagadis falcinellus Linneaus).

### 6. ENVIRONMENTAL AND SOCIAL IMPACTS

Due to the implementation of works aimed at the improvement of water supply systems of Amberd, Aygeshat, Dasht, Doghs, Lernamerdz and Aghavnatun villages, 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 reveals that the implementation of works aimed at water supply systems improvement in Amberd, Aygeshat, Dasht, Doghs, Lernamerdz and Aghavnatun villages of the RA Armavir region will have no harmful effects on the selected for this purpose area - either landscape, or flora and fauna.

The negative effects might be mainly caused by construction works implementation, with little damage and carrying temporal character. To prevent negative impacts, or facilitate them there have been developed facilitating measures which are involved into the EMP.

EMP is the prime part of bidding document and based on the IEE the expected negative impacts are as follows:

- air pollution
- noise
- traffic and pedestrian roads damage and loading
- soil erosion and soil eroding processes
- environment 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 providing sustainable and reliable water supply and water resource rational use for about 11788 men.

7. ENVIRONMENTAL IMPACT MITIGATION MEASURES

The probable harmful impacts on the environment and people’s health, caused by the works aimed at the water supply internal system improvement of Amberd, Aygeshat, Dasht, Doghs, Lernamerdz and Aghavnatun rural communities, depend on construction works of water pipeline trenches and pits for control and water measuring junc.

To prevent soil erosion and eroding processes the preventive measures should be performed on slopes protection on the inclined areas designed for the pipe laying, providing minimal short time of keeping open the trenches and pits made for the pipelines and control and water measuring junctions.
The slopes protection measures should be performed to prevent soil eroding processes on the areas close to the riverbeds.

After construction work completion the sites should be recovered by performing the mentioned beneath activities:

- remove the excess soil mass and building material from the construction sites,
- 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 dirt roads.

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

To prevent the **soil and water resources pollution** by fuels and lubricants, the latter should be stored on the area isolated from soil and water resources, in special tanks. Special containers should be prepared for the utilized lubricants, which thereafter will be disposed in landfills or places for reprocessing.

To prevent the **environment pollution by construction waste and excess soil mass** they should be disposed on special sites according to the agreements signed beforehand between community head and disposal site superintendent.

To avoid **water and soil resources pollution** by chlorine, the works on chlorine washing and disinfection should be arranged considering special calculations. Chlorine handling needs treating the appropriate way, following the established technological procedures. After washing the pipes, the chlorine outflow to the surface water unit, or land area, should be controlled according to the designed mode and calculation.

**Water quality change.** While performing the environment monitoring the supervision on water quality and residual chlorine should be arranged.

To minimize **dust emission** caused by construction works the site should be regularly watered.

To **prevent noise** impact the schedule should be developed on limiting the night works on the residential areas, avoiding noisy vehicles and equipment use, installing mufflers, if necessary.

To minimize the **population disturbance** caused by roads damage and loading, the special parking lots for trucks should be allotted, and the construction works should be performed by stages, arranging population awareness campaign, including placing special traffic signs, providing bypasses, or barricades.

To provide population and builders’ safety and **prevent risks** during the construction, the unauthorized persons’ entrance to the construction site should be controlled, warning signs should be placed in the accident-prone sectors, regular inspection of equipment by qualified specialists should be performed, including safety audits, first aid and safety courses organization for builders.
The affected parties and local population should be appropriately informed through public consultations on the coming activities, their schedules and all measures involved in the EMP, since information lack can bring forth discontent causing complains. Providing the communities' participation in the Subproject will minimize the disturbance caused by construction works to the social life of community.

**Potable water quality change.** The EMP should involve monitoring of water quality and residual chlorine level.

To provide potable water quality in Amberd, Aygeshat, Dasht, Doghs, Lernamerdz and Aghavnatun rural communities, the AWSC should perform routine sampling from the springs feeding the communities, testing the water for all criteria required by the MoH. Water quality monitoring is also performed by the State Hygiene Anti-Epidemic Inspectorate according to the document “Potable water. Requirements on water quality of centralized water supply systems. Sanitation rules and norms of quality inspection № 2-III-A2-1” (recorded on 28.12.2002), which specifies the potable water quality requirements, including the rules of quality inspection of water produced and supplied through water distribution systems to the residential areas.

Since water disinfection is performed by chlorine, the monitoring of residual chlorine level is also of great importance.

### 8. INSTITUTIONAL FRAMEWORK OF ENVIRONMENTAL MANAGEMENT

To perform the proposed facilitating measures, the commitments on their arrangement have been allocated between the agencies, as follows:

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

1. To perform this special task the implementing unit (JV of HGSN and JINJ) in the Designing stage should provide the procurement of all required agreements and permissions from the corresponding public administrative and local self-governing bodies before civil works distribution according to the tender terms.
   - environmental expertise (if necessary),
   - consent of Protection Agency of Historical and Cultural Heritage, in case of expected impact on the latter.

2. The implementing units in the construction stage (Contractors) will covenant to physically implement the specified in the MEP facilitating measures, as well as procure all permissions and consents relating to the civil works implementation, which are as follows:
   - local municipal bodies’ written consents on the specified sites for household and construction waste disposal,
   - consent of Historical and Cultural Heritage Protection Agency, in case of historical, cultural or ancient monuments accidental occurrence during civil works implementation.

3. Before civil works startup, if necessary, the mentioned beneath permissions and certificates should be procured by ADB/PMU:
   - certificate on land use right registration,
- water use permission, if necessary.

- **Controlling agencies, which are responsible for controlling the executive units to provide implementation of the EMP measures by the latter**

1. The environment and safety specialists of “AWSC” CJSC/ADB PIU will be responsible to supervision over the implementation of mitigation measures specified in EMP. The mentioned experts will regularly perform sites visits to supervise the proper implementation of works and corresponding activities on mitigating the impacts. During the checkups the probable omissions will be revealed by the check list, as well as violations of mitigation measures implementation by Contractors.

“AWSC” CJSC/ADB PIU is also entitled to demand and check up the availability and validity (expiration date) of all permissions, complete implementation of impact facilitating measures and monitoring according to the EMP in terms of ADB environmental instructions and the RA nature protection and social legislation.

2. The JV of HGSN and JINJ are also to carry out the supervision over the implementation of mitigating measures during civil works implementation.

- **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 agencies, which are to carry out monitoring, are as follows:

- State Environmental Inspectorate of the RA MoNP,
- State Hygiene and Anti-Epidemic Inspectorate of the RA MoH,
- Historical and Cultural Heritage Protection Agency of the RA MoC, if necessary,
- The RA local self-governance bodies,
- The RA MoT&C.

The amounts envisaged for implementation of environmental measures included in the EMP 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 MANAGEMENT PLAN**

The EMP 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.

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

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 W&W project.

The environmental management matrix is presented in Appendix A.
### 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><strong>Construction</strong></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 community participation in subproject design, which will minimize disruption to community social activities | Daily site inspection | Constructor, Consultant, PIU |
2. Environmental pollution

- Soil erosion and sediment transport
- Environment pollution with construction waste
- Land and water resources pollution with fuels and lubricants
- Land and water resources pollution with chlorine

- 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 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 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.

Works and possible impacts

<table>
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<tr>
<th>Proposed mitigating measures</th>
<th>Monitoring</th>
<th>Responsible bodies</th>
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<tbody>
<tr>
<td>Health and Safety</td>
<td>Daily inspection of construction contract and maintenance</td>
<td>Constructor, Consultant, PIU</td>
</tr>
<tr>
<td>- Hazards for Workers and the population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Install fencing around construction site</td>
<td></td>
<td>Constructor, Consultant, PIU, Population</td>
</tr>
<tr>
<td>- Control access of unauthorized persons to site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Place warning signs in dangerous places</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Carry out regular examination of equipment by highly qualified staff, as well as make regular safety audits,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Provide first aid and safety training to construction staff</td>
<td></td>
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</tbody>
</table>

Daily inspection throughout construction stage. Monthly inspection of accident reports and complaints register
### Field visits checklist

<table>
<thead>
<tr>
<th>General information</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Միկաևի/ամսաթիվ D/M/Y</td>
<td></td>
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<tr>
<td>Չիգրական/ / Subproject</td>
<td></td>
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<tr>
<td>Տեղակայում/ Location</td>
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<tr>
<td>Շինարարական/ / Constriction contractor</td>
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<tr>
<td>Մարզ / Marz</td>
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<table>
<thead>
<tr>
<th>Design</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Միացման/ որակներ Required permissions</td>
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</tr>
<tr>
<td>Մասնագիտական տվյալներ, լուրեր, EEC</td>
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<tr>
<td>Հեռախոսներով գրավում համաձայնություն / written consent on land acquisition</td>
<td></td>
</tr>
<tr>
<td>Պատմամշակութային փորձաքննություն / assessment of impact on cultural heritage</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Միացման/ որակներ Required permissions</td>
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<tr>
<td>Շին</td>
<td>մարտական գրավում համաձայնություն / written consent on disposal of construction waste</td>
</tr>
<tr>
<td>Մասնագիտական հատուկի գրավում համաձայնություն / written consent in case of sudden discovery of cultural heritage</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Public awareness</th>
<th></th>
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<tbody>
<tr>
<td>Համայնքի/ մասնակցություն/ որակներ Required permissions</td>
<td></td>
</tr>
<tr>
<td>Համայնքի/ մասնակցություն/ աշխատանքների համաձայնություն / awareness of population regarding construction works according to the project design</td>
<td></td>
</tr>
<tr>
<td>Համայնքի/ մասնակցություն/ աշխատանքների համաձայնություն / community's participation in construction works according to the project design</td>
<td></td>
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<tr>
<td>Մասնագիտություն</td>
<td>Safety</td>
</tr>
<tr>
<td>----------------</td>
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</tr>
<tr>
<td>Անվտանգություն Safety of workers</td>
<td>Անվտանգության հանդերձանքը բանվորի առկայության մեջ /availability of safety uniforms (earflaps,mask)</td>
</tr>
<tr>
<td>Safety of population</td>
<td>Այո Yes</td>
</tr>
<tr>
<td>Բանվորների անվտանգության Safety of population</td>
<td>Բանվորների անվտանգություն Safety of workers</td>
</tr>
<tr>
<td>Աշխատանքի իրականացման management measures during construction</td>
<td>Մարդիկության տեղափոխության վրա ծածկի</td>
</tr>
<tr>
<td>Operation on area/construction site</td>
<td>Operation on area/construction site</td>
</tr>
</tbody>
</table>
| **Հող էռոզիա**  
**Soil erosion** | Անդամ Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
|---|---|---|---|
| Համետ դատարանների հետ էքսկայից համարակալման վերաբերած երկրաչափական տարածքեր / soil erosion prevention measures at the slope places according to the project design | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
| Փառքային թաքնվեցի հետևիորդ / timely coverage of holes by soil | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
| Հատեղադիմակարգվող հատուկ միջնրականական ֆիզիկական ուժերի / repair of damaged surface after completion of construction works | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |

| **Ջրի աղտոտում**  
**Water pollution** | Անդամ Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
|---|---|---|---|
| Ջրի աղտոտումներ` սակավարկման` և ջրածուցման` water pollution caused by fuel and lubricants | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
| Ջրի աղտոտումներ` սակավարկման` և ջրածուցման` water pollution caused by fuel and lubricants  / Leakage of chlorine after wash up of the pipes according to the scheduled regime. | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |

| **Փոսորակների ժամանակի հետիցք**  
** timely coverage of holes by soil** | Անդամ Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
|---|---|---|---|
| Փոսորակների ժամանակի հետիցք / timely coverage of holes by soil | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
| Փոսորակների ժամանակի հետիցք / timely coverage of holes by soil | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |

| **Աշխատանքների ավարտից հետո` վնասված մակերեսների վերանորոգում` repair of damaged surface after completion of construction works** | Անդամ Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
|---|---|---|---|
| Աշխատանքների ավարտից հետո վնասված մակերեսների վերանորոգում / repair of damaged surface after completion of construction works | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |

| **Խողովակների` լվացման` հետո` քլորի` արտահոսք` համապատասխան ռեժիմի` Leakage of chlorine after wash up of the pipes according to the scheduled regime. | Անդամ Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
|---|---|---|---|
| Խողովակների` լվացման` հետո` քլորի` արտահոսք` համապատասխան ռեժիմի` Leakage of chlorine after wash up of the pipes according to the scheduled regime. | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |

| **Աղմուկ` բնակավայրերի` տարածքի` Noise close to settlements** | Անդամ Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
|---|---|---|---|
| Աղմուկ` բնակավայրերի` տարածքի` Noise close to settlements | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
| Աղմուկ` բնակավայրերի` տարածքի` Noise close to settlements | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |

| **Շինարակային` և կենցաղային` աղբի` տեղափոխում` և տեղադրում` և համայնքի` համապատասխան աղբավայր` Transportation and disposal of construction and consumer waste in appropriate community landfill** | Անդամ Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
|---|---|---|---|
| Շինարակային` և կենցաղային` աղբի` տեղափոխում` և տեղադրում` և համայնքի` համապատասխան աղբավայր` Transportation and disposal of construction and consumer waste in appropriate community landfill | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |

| **Օպերացիա` Տարածքի` Operation** | Անդամ Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
|---|---|---|---|
| Օպերացիա` Տարածքի` Operation | Այո Ոչ Կ Հավանական  
**Yes**  
**No**  
**N/A** |
<table>
<thead>
<tr>
<th>Խմելու գիտերադիասույց / Drinking water pollution</th>
<th>Մնացորդային քլորի քանակի համապատասխանում խմելու որակի ջրի նորմերին / Correspondence of balance quantity of residual chlorine to the quality of potable water</th>
<th>Ող</th>
<th>Հա</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Այո</td>
<td>Ոչ</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>