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INITIAL SOCIAL AND ENVIRONMENTAL IMPACT ASSESSMENT

MODERNIZATION OF BAGRATASHEN, BAVRA AND GOGAVAN

BORDER CROSSING POINTS OF THE REPUBLIC OF ARMENIA

Yerevan

December 2011

MAP OF THE REPUBLIC OF ARMENIA AND PROJECT SITES' LOCATION

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Non-Technical Summary

1. Description of the Project

1.1. Description of the physical characteristics of the whole project and the land-use requirements during the construction and operational phases

On November 2010, the NSC requested the UNDP support, to develop design outlines and bills of quantities for the implementation of "Modernization of Bagratashen, Bavra and Gogavan BCPs of the Republic of Armenia" (MBBG) project.

The MBBG Project goals are:

- To facilitate free movement of persons and goods across borders while at the same time maintaining secure borders of the Republic of Armenia by provision of all necessary conditions for effective performance of border, customs, phyto-sanitary, veterinary and health controls;
- To enhance inter-agency cooperation efficiency including technical capacity for information exchange between executive authorities on border management related issues and on border control operational procedures;
- To strengthen the international cooperation between the South Caucasus countries, EU Member States and other international stakeholders for securing the legal movement of people and goods;
- To optimize border management costs in State Budget of the Republic of Armenia;
- To ensure the modern equipment and EU adopted best IBM standards are employed by the border management agencies.

The scope of reconstruction works includes reconstruction of existing infrastructure, construction of new buildings and facilities required for border control, customs control and other kinds of border crossing controls as well as performance of all necessary measures for increasing of throughput capacity of BCP and extension of existing BCP area.

Reconstruction solutions will ensure the possibility of future increase of the BCP's throughput capacity by improved border control technologies.

All three BCPs are planned as 24h and 7 days multidirectional road crossing point for international cargo and passengers' traffic equipped for mixed auto transportation and pedestrians flow.

In addition to the territory covered by the existing BCPs, some 229658.9 m^2 of land is planned to be added, including for:

- Gogavan - 75039.2 m^2,
- Bavra - 75169.7 m^2,

- Bagratashen - 79450.0 m^2:

There are 60 plots in total, where 29 are community or state owned and 31 are privately owned. Those community and state owned plots is manly arable land, with some pastures and unused areas. 4 of the aforementioned plots have houses (4) and 2 of them have public service buildings.

1.2. Description of the main characteristics of the production processes

The existing border crossing points perform the necessary border management functions. However, the existing management system does not meet the requirements of modern international standards, and there is also an increase in cross border movements is forecasted, therefore there is a need to expand and modernize the BCPs.

Several functional zones are planned to be arranged within each BCP area:

- Regulation zone for inward and outward cargo, pedestrian and passenger flows
- Control zone for inward and outward passengers, pedestrians and cargo
- Cargo specialized inspection zone
- Vehicles in-depth control zone
- Service zone

Operation of the modernized BCPs does not require any significant use of natural resources. During the operational phase, water resources will be used for household purposes. Natural gas will be used for heating during the cold season. Electrical energy will be used to operate the equipment and provide lighting. No other natural resources or row materials will be used.

1.3. Estimation of expected residues and emissions

Environmental impact of the existing BCPs is caused by light and heavy vehicle traffic, which, however, is not a direct impact of operation of those BCPs.

Implementation of the proposed project can be divided into 2 phases: construction and operation.

During the construction phase the impact will be caused by earthwork and operation of construction equipment. During this phase, emissions of particulate matter and vehicle and equipment exhaust will take place (carbon, sulphur and nitrogen oxides, tar). Noise levels will significantly increase caused by equipment operation. Construction will generate waste, as well as point pollution of soil caused by leakage of fuel and lubricants.

No significant emissions are expected during the operational phase. Some emissions will come out as a result of heating. Sewerage water will be treated in bio-treatment plants to the specified standard and will be released into natural water sources or ground. There will be some solid household rubbish, and in some cases industrial or food rejects may be generated.

2. Outline of Main Alternatives Studied by the Developer and Indication of Main Reasons for This Choice, Taking into Account the Environmental Effects.

There were limited alternatives for locating the BCPs other then they are suggested to be located by the design-outline documentation developed by the international consulting company in consultation with the national authorities.

3. Description of the Aspects of the Environment Likely to be Significantly Affected by the Proposed Project

The impact of BCP expansion will be caused by addition of new land plots. BCPs will be expanded at the expense of lands taken as dominating public interest, as well as some community owned land plots. Two public facilities will be shut down and dismantled. This will cause some decrease in current or future income of a part of local population. However, this may be compensated with the creation of additional jobs.

Increase in vehicle traffic will cause inconvenience for the population of the nearby settlements.

A new bridge will be constructed as part of modernization of Bagratashen BCP, and some water contamination in the Debed River is possible during this construction. River banks adjacent to the construction site will be modified as well.

Both Bagratashen and Gogavan BCPs are located at a significant distance from any specially protected areas, and their reconstruction will not cause any impact on the endemic communities of flora and fauna.

Bavra BCP is located within the protection (buffer) zone of the Arpi Lich National Park, areas adjacent to the BCP are included in the economic zone, and protected areas are located 8-14 km away (see annex 4)

Given their functional purpose, the BCPs do not generate any significant air and water contamination.

4. Description of the Likely Significant Effects of the Proposed Project on the Environment Resulting From

- the existence of the project
- the use of natural resources

As it was mentioned above, no significant use of natural resources will take place during the operation of the BCPs, therefore it will not affect the balance of local natural resources.

Initial assessment of the environmental impact of the proposed project was conducted based on functional characteristics of the project and comparative analysis with other identical projects.

5. Schedule of Environmental Approvals Required, Approvals Obtained to Date and Their Validities

In accordance with the RA Law on Environmental Impact Assessment, any activity or project included in the lists specified by the Law, shall undergo environmental impact assessment prior to their introduction or implementation, and only based on positive results of such an assessment may these activities start or the project implemented. The following projects shall be subject to assessment based on a number of criteria:

- Projects that have cross-border impact,
- Estimated total area of construction at each BCP exceeds 1.500 m^2,
- Construction of a new bridge is being planned at Bagratashen BCP.

Upon completion of reconstruction all BCPs will need to have water supply and sewerage permissions that are issued by the RA Ministry of Nature Protection.

6. Description of Measures Envisaged to Prevent, Reduce and where Possible, Offset Any Significant Adverse Effects on the Environment.

Measures to reduce dust, as well as emissions caused by operating vehicles and equipment will be envisaged during the construction phase. Water will be sprayed at construction sites and land areas during the earthwork. Granular construction materials will be stored in sheltered facilities. Trucks carrying construction materials and soil will be equipped with covers. Noise generating equipment will be operated at daytime hours. Equipment and vehicle engines will undergo regular maintenance and repair.

There will be no accumulation of construction waste since it will be regularly removed to dumpsites specified by local municipalities.

During the operational phase, principal risks will arise from threats related to detection and locally arranged storage of hazardous substances and food. During discussions aimed at elaborating solutions for this issue, options for decontamination of those substances and food were offered, which will be taken into account during the design phase.

Introduction

The Republic of Armenia is located in the South Caucasus with the population of 3,267,3 people,[1]. The state language is Armenian. The capital city is Yerevan (1,121,000 residents, 2011).

On 23 August 1990 the Supreme Council of the Armenian Soviet Socialist Republic declared the beginning of the process of establishment of independent statehood, and on September 23 1991, based on the results of the referendum held in Armenia on September 21, the Supreme Council of the Republic adopted the "Declaration on State Independence of Armenia".

On December 26 1991, the last session of the Supreme Council of the USSR, thereafter the Soviet Union formally ceased to exist. On March 22 1992 the Republic of Armenia joined the United Nations.

United Nations Development Programme supports the government of Armenia in introducing the EU best practices and Integrated Border Management (IBM) standards by streamlining the IBM related legislation and reforming the relevant institutional framework.
For this purpose, the National Security Council (NSC), RA has been assigned by the Decree of the President as responsible authority for coordination and monitoring of the activities implemented in the relevant area.
With the UNDP support, the National Security Council elaborated the "Strategy of Border Security and Integrated State Border Management of the Republic of Armenia" (Strategy), which was adopted on 3 November 2010 by the Decree of the President of Armenia.
With further support of UNDP in the area of legislative and institutional frameworks, on 21 April 2011, the Government of Armenia adopted the Decree # 482 on the approval of 2011-2015 IBM Action Plan. According to this Action Plan, one of the priorities for the Armenian authorities is the modernization of all border crossing points (BCP) of the Republic of Armenia.

Legislative and Institutional Framework

- *Main International Legal Acts*

1. Convention on Environmental Impact Assessment in a Trans-boundary Context (Espoo, 1991, ratification date - 14.05.1996)
2. Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Trans-boundary Context (Kyiv, 2003 ratification date - 25.10.2010)
3. Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention, 1998, ratification date – 14.05.2001)
4. Convention on Biological Diversity (adopted in 1992, ratification date – 31.03.1993)

[1] The demographic Handbook of Armenia, 2011

5. Convention Concerning the Protection of the World Cultural and Natural Heritage (adopted in 1972, ratification date -1993)
6. International Plant Protection Convention (adopted in 1952, ratification date – 31.03.1993)
7. Convention to Combat Desertification (adopted in 1994, ratification date – 23.06.1997)

- *Main National Legal Acts*

8. Constitution of the Republic of Armenia (05.07.1995, with amendments as of 27.11.2005)
9. Law on Environmental Impact Assessment (20.11.1995)
10. Law on Environmental Control (11.04.2005)
11. Land Code (02.05.2001)
12. Water Code (04.06.2002)
13. Forest Code (24.10.2005)
14. Law on Plant World (23.11.1999)
15. Law on Animal World (03.04.2000)
16. Law on Specially Protected Areas of Nature (27.11.2006)
17. Law on Alienation of Property for the Needs of Society and State (27.11.2006)
18. Civil Code (05.05.1998)
19. Law on Real Monuments of History and Culture and the Protection and the Use of Historical Environment (11.11.1998)
20. Law on Wastes (24.11.2004)
21. Government Decree on Limits of Activities Subject to Environmental Impact Assessment (N 193, 30.03.1999)
22. Government Decree on Authorized State Body Responsible Environmental Impact Assessment (N 345, 30.10.1996)
23. Government Decree on National Action Program on Environment Protection (N801, 14.12.1998)
24. Government Decree on National Action Program of the Republic of Armenia in the area of Environment Hygiene (N 1204-Ն, 01.08.2002)
25. Government Decree on Approval of the Charter and the Structure of the Ministry of Nature Protection of the Republic of Armenia (N 1149-Ն, 25.07.2002)
26. Government Decree on Approval of the Charter and the Structure of the State Inspection on Nature Protection of the Nature Protection Ministry Staff of the Republic of Armenia (N 1149-Ն, 25.07.2002)
27. Government Decree on Approval of the Water Resources Management Agency of the Nature Protection Ministry Staff of the Republic of Armenia (N 649-Ն, 14.04.2004)

Institutional Framework

The current Armenian institutional structure in the field of construction and border management activity is based on multi-agency model.

Ministry of Nature Protection

The Ministry of Nature Protection elaborates and implements the policies of the Republic of Armenia in the areas of environmental protection and sustainable use of natural resources and is represented by the Minister and the Staff of the Ministry. Within the system of the Ministry there are also State Non-Commercial Organizations and Institutions.

- Agency of Water Resources Management

- Agency of Bioresources Management

- State Environmental Inspectorate with its 11 regional offices oversees the implementation of legislative and regulatory standards on natural resources protection, use and renewal.

Organizations of Ministry

- State Environmental Expertise SNCO

- Information Analytical Center

- Environmental Impact Monitoring Center monitors water and air quality in different areas of Armenia through its network of observation points.

Ministry of Healthcare

The Ministry of Healthcare elaborates and implements the policy of the Republic of Armenia in the healthcare sector. The structure of the Ministry includes main staff and two subordinate bodies: National Healthcare Agency and State Anti-Epidemiological Surveillance Inspectorate (SAESI). The Ministry performs its role in the food safety system principally through the SAESI, which is responsible for the inspection of sanitary norms and anti-epidemiological measures as well as hygienic conditions of products manufacturing, transportation, storage, marketing and service rendering (catering). This inspectorate has subdivisions in all Marzes as well as in border points.

Ministry of Emergency Situations

Ministry of Emergency Situations is responsible for development and implementation of RoA policy in the area of civil defense and protection of the population in emergency situations. The following separate divisions and state agencies, such as State Hydrometeorology and Monitoring Service of Armenia, National Technical Safety Center, Armenian Rescue Service, National Reserves Agency and National Seismic Protection Service Agency, are also included in the structure of the Ministry.

Ministry of Economy

The Ministry of Economy is responsible for the elaboration and implementation of the economic and industrial development policies of the Republic of Armenia.

Ministry of Transportation and Communication

The Ministry of Transportation and Communication is responsible for maintaining the road infrastructures and communication networks. The Ministry will implement the North-South corridor project for road rehabilitation and after the construction this strategic road with total length of 556 km will provide facilitated traffic from Armenia's southern border to the Georgian border, and further-on to the Black Sea ports. The road will pass through Bavra BCP and will allow transport of goods and passengers in accordance with the European standards; will provide great development opportunities to all settlements from the North to the South of Armenia.

Ministry of Territorial Administration

The Ministry of Territorial Administration is responsible for the development and ensuring the implementation of territorial policy of the Republic of Armenia. It ensures the implementation of programs of socio-economic development of the Republic of Armenia by the local government authorities of the Republic of Armenia, submission of recommendations pertaining to areas within the competence of the Ministry under the European Neighborhood Policy and ensuring the implementation of the respective activities. It also ensures the interrelations between central and local government authorities and proper management and secure use of state-owned water systems. The ministry is charge of the formal regulation of migration policy processes and is responsible for the introduction and further improvement of Community Service System in the Republic of Armenia.

The Agencies represented on the border crossing points of Armenia

Border Troops of the National Security Service of the Republic of Armenia

The Border Troops of the National Security Service of the Republic of Armenia are responsible for border checks at BCPs, as well as for land border surveillance between authorised BCPs, exception of the territories controlled by the Ministry of Defence and the Russian Border Troops.

State Revenue Committee of the Government of the Republic of Armenia

The SRC is in charge of carrying out customs functions at BCPs and at the inland customs houses. It is placed directly under the Government of the Republic of Armenia and is composed of two

blocks: Taxation and Customs. The Customs have a centralised three-level structure; Customs posts on the border line are subordinated to Customs houses at the regional level.

Passport Visa Department of the Police of the Government of Armenia

The Passport Visa Department of Police, RA has officers deployed at all border crossing points of Armenia, with Bagratashen being the busiest BCP for the land borders. The Police officers issue visas at the border while the border guards check the passports.

State Service for Food Safety of the Ministry of Agriculture of the Republic of Armenia

The State Service for Food Safety (formerly called Inspectorate of Food Safety and Veterinary Services of the Ministry of Agriculture, RA) had a centralized organization with three levels. Together with the State Inspectorate for Plant Quarantine & Farming, this organization was placed within the Ministry of Agriculture. Their role was to prevent the introduction of any diseases and harmful organisms on the territory of the Republic of Armenia.

There were 8 border inspection posts (BIPs); 7 were in operation, 1 with the Republic of Turkey not functioning for the moment. The State Inspectorate had 1 central laboratory in charge of analyzing samples taken at the borders. The managers wished to have 1 mini laboratory for each BIP.

The State Service for Food Safety provides permissions for imports once they get guarantees that food safety conditions were met.

State Hygiene and Anti-epidemic Inspectorate of the Ministry of Health

The Ministry of Healthcare elaborates and implements the policy of the Republic of Armenia in the healthcare sector. The structure of the Ministry includes main staff and two subordinate bodies: National Healthcare Agency and State Hygiene and Anti-Epidemic Inspectorate. The Inspectorate is a separate sub-division within the Ministry of Health and it has 7 quarantine and sanitary posts at the borders. In complement to the border posts, (regional) sanitary centres can be used in case of pandemic situations.

Project Background Information

On November 2010, the NSC requested the UNDP support, to develop design outlines and bills of quantities for the implementation of "Modernization of Bagratashen, Bavra and Gogavan BCPs of the Republic of Armenia" (MBBG) project.

On January 2011 the UNDP identified independent international expert who developed the Terms of Reference (TOR) for production of the above-mentioned design engineering documentation, which was approved by the Protocol Decision of the Government of Armenia # 29.6/[62150]-11(6) on 17 February 2011. Based on the above mentioned TOR and following open

international competitive selection process, the UNDP Country Office in Armenia contracted international engineering company, which, within the framework of South Caucasus Integrated Border Management (SCIBM) Programme, developed Tender Dossiers and Master Plans (design-outlines, including bills of quantities) based on the FIDIC New Yellow Book 1999 Contract conditions for the reconstruction of the above mention border crossing points. Tender Dossiers consist of three parts:

1. Construction Tender Dossier (Design-Build contract)
2. Equipment and Supplies Tender Dossier
3. Technical supervision and consultancy Tender Dossier

These Tender Dossiers have been formally provided by UNDP to the Staff of the National Security Council and Prime Minister's office.
Prime Minister of Armenia sent a letter to UNDP requesting to express its position concerning the UNDP's involvement in the implementation of the Modernization of Bagratashen, Bavra and Gogavan BCPs (MBBG) project as the implementing and co-financing agency, including using the UNDP name in the upcoming Loan Agreement to be signed between the GoAM and the European Investment Bank, who had preliminarily expressed interest in funding part of the project. UNDP responded positively to the letter. At the same time, UNDP developed draft project document on Modernization of Bagratashen, Bavra and Gogavan BCPs and shared with the Prime Minister's office.

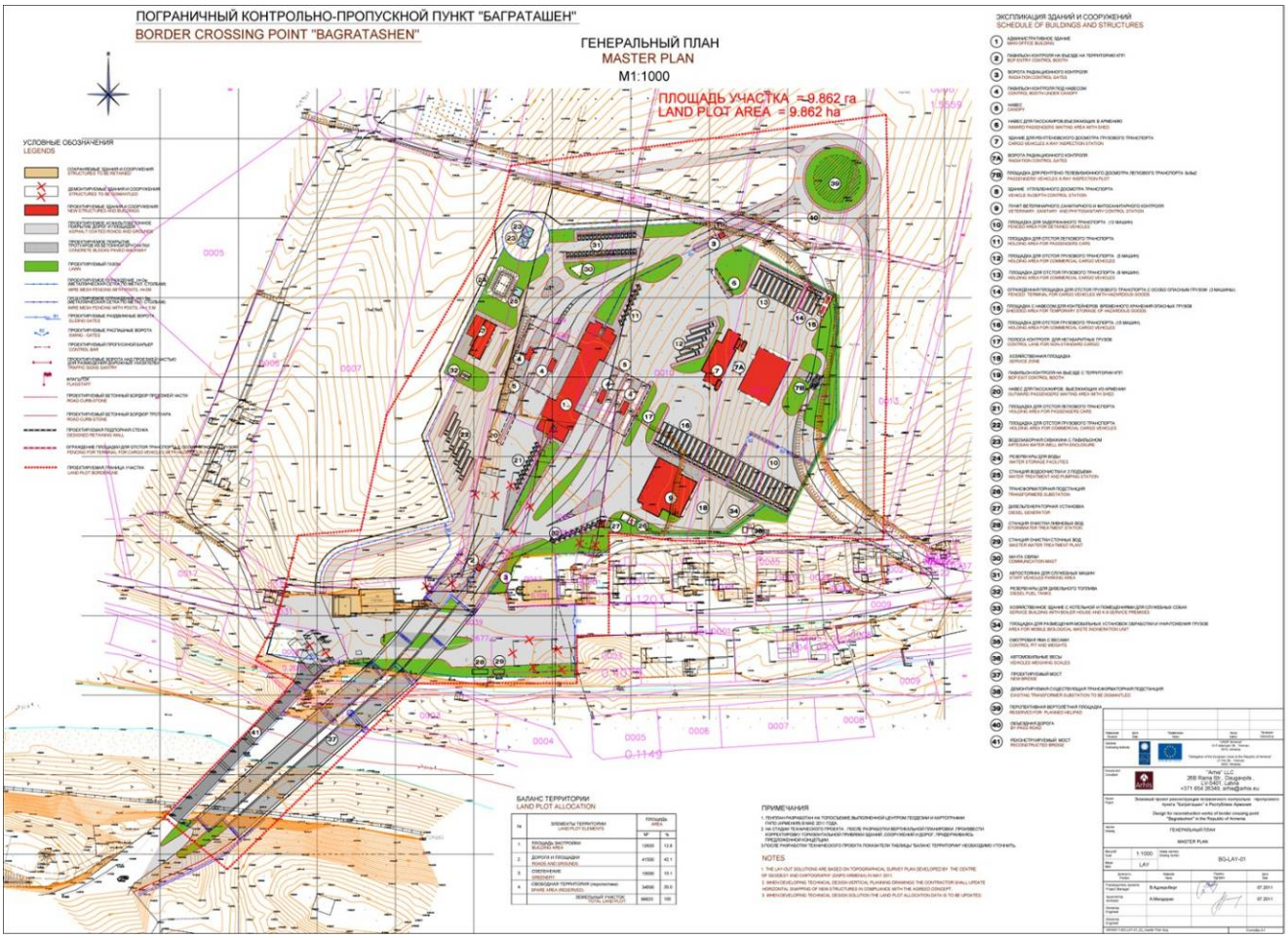
The MBBG Project goals are:

- To facilitate free movement of persons and goods across borders while at the same time maintaining secure borders of the Republic of Armenia by provision of all necessary conditions for effective performance of border, customs, phyto-sanitary, veterinary and health controls;
- To enhance inter-agency cooperation efficiency including technical capacity for information exchange between executive authorities on border management related issues and on border control operational procedures;
- To strengthen the international cooperation between the South Caucasus countries, EU Member States and other international stakeholders for securing the legal movement of people and goods;
- To optimize border management costs in State Budget of the Republic of Armenia;
- To ensure the modern equipment and EU adopted best IBM standards are employed by the border management agencies.

Project Area

The Project will be executed in the north of the Republic of Armenia. The country in the north borders with Georgia, and in the east and south with Azerbaijan, in the south with Iran, in the

west with Turkey. The total length of Armenia's borders is 1,422 km, including 190km with Georgia, 910 km with Azerbaijan (including Nakhichevan), 42 km with Iran and 280 km with Turkey. In a straight line the distance from Armenia to the Black Sea is 145 km, to the Caspian Sea it is 175 km, to the Mediterranean Sea it is 750 km, and to the Persian Gulf it is 1000 km.



The relations between Armenia and Georgia are traditionally friendly and contribute significantly to the maintenance of stability in the region. Georgia is important as a state having a high-level relationship with Armenia in the region, and the development and advancement of mutually beneficial cooperation in various spheres is derived from the long-term strategic interests of Armenia and Georgia. This promotes the safe and reliable use of transit routes which are of vital importance for Armenia, as well as the resumption of operation of the Kars - Gyumri - Tbilisi – Sukhumi railroad which is of great importance to the entire region.

The Government of Armenia already initiated the process of expropriation of the land and real properties belonging to the communities, individuals and legal entities for compensating them the cost of expropriated property. For that reason, the State Revenue Committee of the Government of Armenia requested the State Cadastral Committee of the Government of Armenia

to provide the list of the landlords in all 3 BCPs, the area of each property unit, land type and parcel code and prepared the draft GoAM Decree[2].

BCP "Bagratashen" Reconstruction Project Area[3]

"Bagratashen" BCP is located on highway M6 Yerevan - Tbilisi at a distance of around 200 km from Yerevan, 1km from Bagratashen community. The border crossing point is located in Tavush province (marz) of the Republic of Armenia. The BCP is situated on the bank of the river Debed, which is the border line between Georgia and Armenia. The port of entry in Georgia is border crossing point „Sadakhlo".

Tavush marz is rich with mineral resources, including bentonite clue, marble lime, basalt, sand-stones, felsitic tuff, diabase porphyrytes, color conglomerates, gypsum lime, non-anthracite coal, mineral waters, etc.

From the environment point of view there is a problem with the waste management, irregularities with garbage removal to the undesignated areas. There are four official waste-collection sites located in Ijevan, Berd, Noyemberyan and Voskepar communities. Proper solid-waste management issue remains unresolved in the marz and negatively affects both ecological situation and the recreational attractiveness of the region at large. The issue requires the implementation of activities in several areas like: (i) development of master plans for waste management of large settlements, (ii) design of inter-community waste collection sites and (iii) allocation of resources for their effective deployment and exploitation. At the same time, there is a need for reinforced control over the sanitary situation of community areas.

The forests in Tavush mars occupy 40,3% of the total land area; they have the land-protection, water-protection and climate-regulating role and are explicit with their biodiversity. The main environmental problems of the marz are connected with the overutilization of forest ecosystems and as a result the capacity of forests' self-cultivation is smashed. Certain activities are deployed in the marz in regard to the development of forests' management plans. For that reason, the activities are underway for the forests' inventory, mapping and correcting the boundaries. Each year the municipal authorities implement around 50 ha forestation projects (around 30 million AMD worth), which however can't fully serve to the rehabilitation of cut forests.

The issue of forests' maintenance in the marz is strongly interlinked to the issue of biodiversity and maintenance of water resources. Illegal forest cuts brought to the soil erosion problems and land-slides. Such land sliding zones exist in 25 communities of the marz and some works had been carried out during 2010-2011 aimed at the maintenance of settlements and engineering infrastructures.

[2] Annex 1
[3] http://tavush.gov.am/about-communities/710/

To increase the recreational value and attraction of the marz, it should be consider that the marz communities are completely deprived of the water-sewage system and the water collector of Dilijan has not been reconstructed since 1988 earthquake and the city sewage is conveyed directly into the river Aghstev. The problems existing in water resource management area are the following:

- Illegally used 43 water-springss
- Lack of water-meters and other required equipment in the water-stations;
- Huge water waste at the source and pipelines;
- Lack of water preliminary and biological cleaning stations, particularly in Dilijan, Ijevan, Berd, Noyemberyan and Ayrum cities

Taking into consiedration that the main source of pollution for marz water reservoirs are the sewage waters caused by the solid waste and agricultural waste, there is a need for studying the possibility of efficient water treatment modern technologies

Bagratashen BCP covers 23sq. km area with the population of 3023 people (data of 2005)

The BCP is located northeast from Noyemberyan city at the distance of 15 km from mars center. Bagratashen's reported population was 3024 people in 2010. Latitude of Bagratashen is 41,2458 (4114'44.880"N); longitude is 44,8211 (4449'15.960"E). Altitude of Bagratashen is 479 m. above the sea level. The climate is dry-intercontinental, with hot summers and warm winters. There is small amount of precipitation during the year (350mm). From agro-climatic point it is located in the zone of intensive irrigation.

Gender distribution of the community is 49% of males to 51% of females. The distribution of age population by groups is as follows:

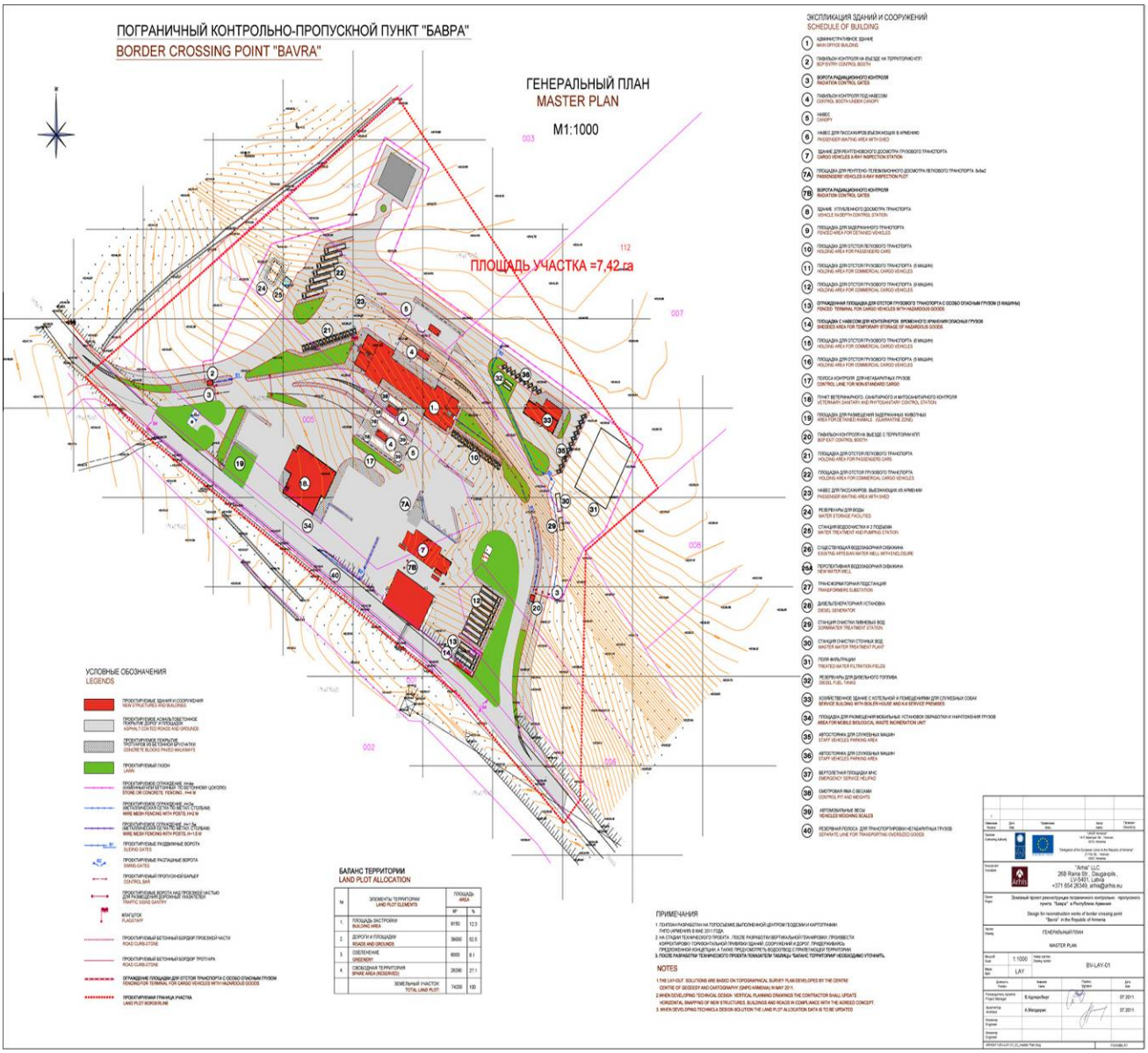
- Before-workable – 25%
- Workable – 53%
- After -workable 22%

There are 960 families in the community and it has its school, kinder-garden, polyclinic, post office. The professional direction of the community development is the horticulture. The proportion of the agricultural land is distributed as follows: arable - 458ha, orchards – 733ha, vineyards – 65 ha. The state land is mainly used as arable -59ha, orchards -37 ha and pastures - 131 ha. The inhabitants are busy with Vine-making, gardening, gardening and livestock. No industry and manufacturing. The main issues for communities are the road construction, development of potable and irrigation network, school-construction.

Bagratashen BCP photos

BCP "Bavra" Reconstruction Project Area[4]

"Bavra" BCP is located in Shirak marz, Ashotsk region, on highway M1, Yerevan - Tbilisi at the distance of around 150 km from Yerevan. The community area is 16,5 sq. km with the population of 538 people (data of 2005). The community is located at the elevation of 2150 meter above the sea level. The climate is mountainous, with long and cold winters and extensive snow cover. There are strong winds, frequent fogs and snowstorms. Summers are warm and relatively humid. Yearly precipitation is about 600-700 mm. Natural landscape is steppe-mountainous with the black-soil. The port of entry in Georgia is border crossing point „Ninotsminda".



[4] http://shirak.gov.am/about-communities/600/

In 1958 Bavra was destroyed as a result of the earthquake and was rebuilt bit away from its earlier location. The ancestors of village inhabitants moved to this village from Ardahan, Turkey in 1860

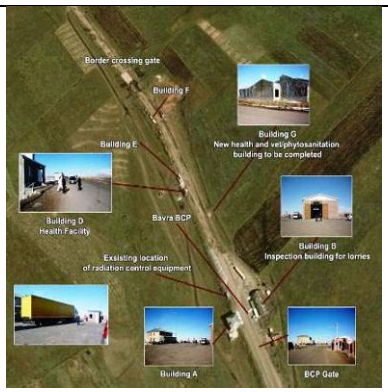
Gender distribution of the community is 49% of males to 51% of females. The distribution of age population by groups is as follows:

- Before-workable – 29%
- Workable – 51%
- After –workable - 20%

The professional direction of the community development is the livestock. The proportion of the agricultural land is distributed as follows: arable - 655ha, heys – 217ha. The state land is mainly used as arable (66ha), hey (73 ha) and pastures (382ha). The inhabitants are busy with livestock, corn and feed growing, gardening. The issues for communities are the road construction, development of potable and irrigation networks, school-construction, sale of the agricultural products, and gasification.

The Project area includes the vast vacant area on the right side of highway M-1 directly adjoining the border line between Armenia and Georgia (in distance of 1 km from the existing BCP). Total Project area is 7.4 ha.

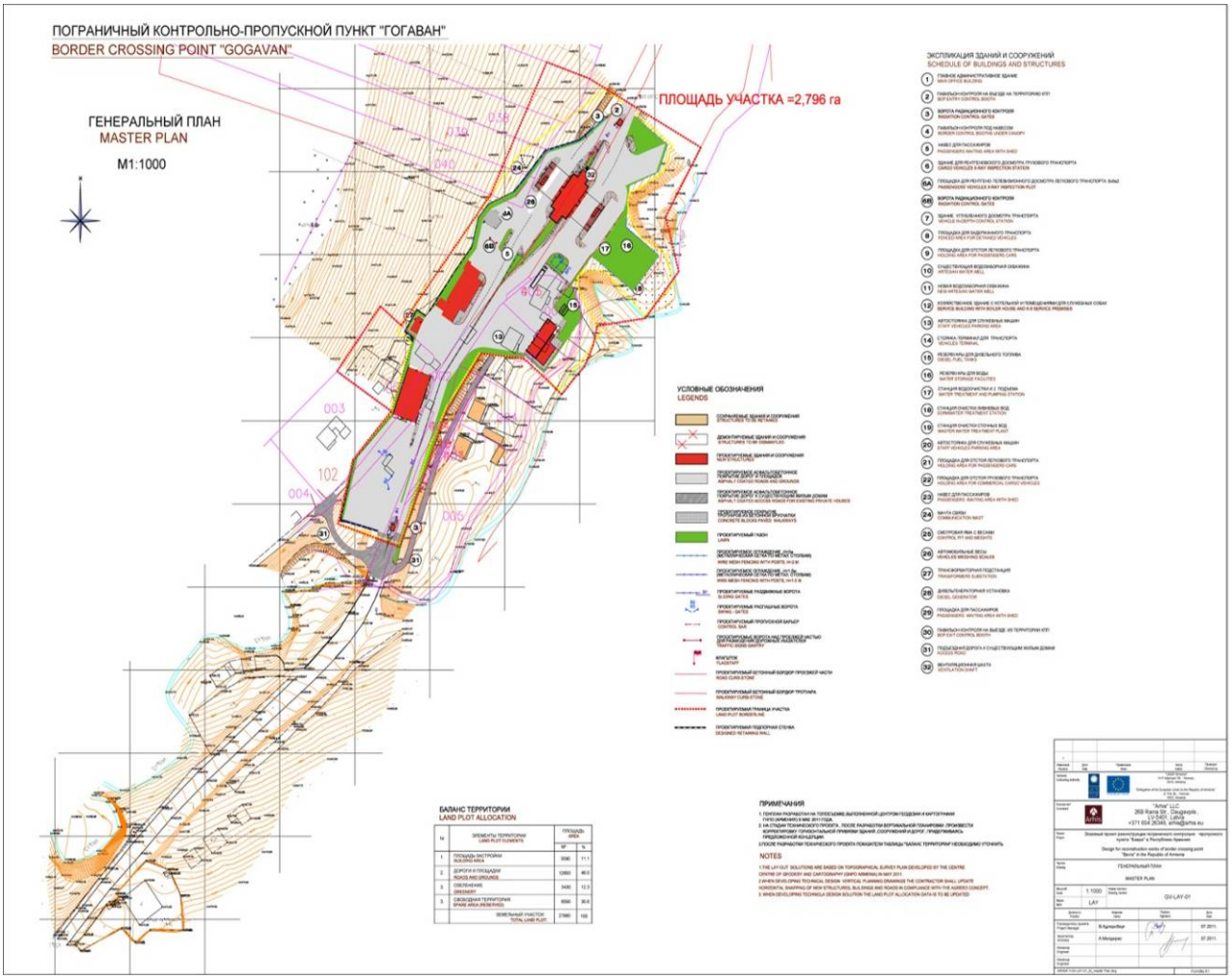
Bavra BCP photos



BCP "Gogavan " Reconstruction Project Area[5]

"Gogavan" BCP is located in Lori province (marz) of the Republic of Armenia at a distance of 170 km from Yerevan, next to Dzoramut community, Tashir region. The port of entry in Georgia is border crossing point „Guguti". Dzoramut latitude is 41.19°, Longitude is 44.29°; the elevation is 1590 meter above the sea level. The climate is temperate, with long and cold winters and cool summers.

[5] http://lori.gov.am/about-communities/529/



The area of agricultural land is 594.4ha, out of which arable -248,8ha, hey - 157,7ha and pastures -155,2ha. The village inhabitants are mainly busy with livestock and field crop cultivation. There are 93 families in the community and it has its school, polyclinic, post office. The village was founded in 1986 and was inhabited by the refugees from Azerbaijan and Javahketi, Georgia. The issues for communities are the intra-community and inter-community road construction, sale of the agricultural products, and gasification.

The Project area includes the area occupied by the existing BCP with extension on both sides of highway Yerevan-Stepanavan-Gogavan and section of access road from Stepanavan direction. Total Project area is 2.8 ha.

Gogavan BCP photos

Project Description

The scope of reconstruction works includes reconstruction of existing infrastructure, construction of new buildings and facilities required for border control, customs control and other kinds of border crossing controls as well as performance of all necessary measures for increasing of throughput capacity of BCP and extension of existing BCP area.

Upon completion of reconstruction measures the BCPs have to perform the following throughput capacity:

- 600 units of vehicles per day (Bavra and Bagratashen BCPs);
- 2000 persons per day (Bavra and Bagratashen BCPs);
- 200 units of vehicles per day (Gogavan BCP);
- 900 persons per day (Gogavan BCP).

Reconstruction solutions will ensure the possibility of future increase of the BCP's throughput capacity by improved border control technologies.

All three BCPs are planned as 24h and 7 days multidirectional road crossing point for international cargo and passengers' traffic equipped for mixed auto transportation and pedestrians flow.

Several functional zones are planned to be arranged within each BCP area:

Regulation zone for inward and outward cargo, pedestrian and passenger flows including

- Control booths at BCP's entry and exit points;
- Radiation detection gates for vehicles and pedestrians;
- Roads and grounds for passing through and maneuvering;
- Walkways and grounds;
- Parking lots;
- Waiting shed for inward and outward passengers.

Control zone for inward and outward passengers, pedestrians and cargo:

- Main office building;

- 8 control lanes: 4–in and 4-out (correspondingly, 2 lanes in each direction for lorries and passenger vehicles) and 2 control lanes (1-in and 1-out) for pedestrians for Bavra and Bagratashen
- 4 control lanes: 2–in and 2-out (correspondingly, 1 lane in each direction for lorries and1 lane for passenger vehicles for Gogavan
- Short-term parking area for passengers' cars;
- Short-term parking area for cargo vehicles;
- Control booths.

Cargo *specialized inspection zone:*

- Sanitary, phyto-sanitary and veterinary inspection station
- Area for phyto-sanitary and veterinary goods treatment (fumigation) and incineration units;

Vehicles in-depth control zone:

- Vehicles in-depth control station;
- Cargo vehicles X-ray inspection station;
- Roads and grounds for controlled vehicles maneuvering;
- Additional radiation detection gates for vehicles;
- Site for installation of passenger cars X-ray inspection units;
- Weighing zone.

Service zone:

- Staff cars parking;
- By-pass roads and service grounds;
- Service building with boiler house and K-9 premises;
- Well field;
- Raw water treatment (purification) station;

- Waste water treatment station;
- Storm water treatment station;
- Transformer substation with diesel power generator;
- Underground diesel fuel tanks.

Special zone (in Bagratashen BCP only):

- Areas and roads under the bridge overpass area;
- Bridgehead area of existing bridge;
- New bridge with exit ramps;
- Reconstructed bridge;
- Area reserved for helipad (outside "sterile" zone borders)

Special zone (in Bavra BCP only):

Equipped helipad

Analysis of Alternatives

There were limited alternatives for locating the BCPs other then they are suggested to be located by the design-outline documentation developed by the international consulting company in consultation with the national authorities.
The current Bagratashen BCP is located on the edge of state border of the Republic of Armenia neighboring with the existing Georgian BCP called Sadakhlo. The design of the upcoming BCP is suggested in a way so that the road infrastructures are matched to the existing roads on the Georgian side leading to the operational Georgian BCP. Further expansion of BCP facilities within the existing planning would limit the implementation of IBM systems as required by EU standards. The two-lane bridge connecting Armenia and Georgia underwent the thorough examination by the national institute of Seismological Expertise and the report recommends strengthening the bridge and to the extent possible limiting its load and preventing the possible queues on it. Also, the two lanes create the limitation of traffic of passengers and cargo at the bottleneck where the Border Troop's check-point is erected.
The only alternative for Bagratashen BCP could be the joint use of the facilities on the other side of the border (in Georgia) which has been constructed back in 2008 and has limited space to accommodate the Armenian border management services. It is planned that, where possible, join

use of facilities and equipment will be introduced and encouraged by the authorities of Armenia and Georgia.

Current Bavra BCP is located around 1600 meter away from the Georgian BCP called Ninotsminda. The international engineer consultants in consultation with the national authorities assessed the possibility of shifting the BCP for 1100 meters to the north of the Armenian-Georgian administrative border and locating it closer to the Georgian BCP, thus shortening the walking distance for the pedestrians and ensuring the border control regime in the sterile zone is followed.

The alternative could be leaving the current Bavra BCP as it is and start the reconstruction works at the place of existing BCP, but this could create hindrances for the movement of passengers and cargo, deteriorate the sterility of the border zone and increase the costs of the construction because of some demolition works.

Current Gogavan BCP is located very near to the Georgian BCP called Guguti. The geographical location of the BCP and the only two ways road leading to Georgia leaves no alternatives for constructing the BCP in any other location.

The alternative could be discontinuing the operation of Gogavan BCP and informing the general population and traders to organize the border crossing through other border crossing points; however this could be detrimental for those people who live next to the border, have mixed marriages and frequently cross the border. Also, given the location of Gogavan BCP not far from one of the biggest cities in Armenia – Vanadzor the existence of the BCP is vital for trade and transit organized via and from that City.

7. Baseline Conditions

7.1. General Environment

7.1.1. BCP “Bagratashen”

a. Meteorological conditions

Project area is situated in north eastern part of Armenia in subtropical zone. The climate is characterized by hot long-standing summers (average temperature in July is around 30°C) and mild, snow-free winters (average temperature in January is 0 to -5°C).

Precipitation:

- July-August - 50 – 100 mm,
- November-March - 100 – 150 mm,
- September-October - 50 – 100 mm.

Absolute air humidity - 7 – 8 mb.

Wind direction:

- In January - Northerly,
- In April - Northerly,
- In July - Northerly,
- In October - Northerly, Northeasterly.

b. Tectonic and seismic conditions

North-east of Tavush province is formed by plain terrain and hills, elevated at 500 m above the sea level. Terrain of the area comprises of hilly landforms, partly transformed by human economic activities. The elevations vary from 441 till 450 m above the sea level.

The area belongs to seismic zone 1 with expected maximal peak ground acceleration and seismic intensity levels of the Medvedev-Sponheuer-Karnik scale (MSK-64) equal to 8.

c. Geologic conditions

Geological structure: Upper Cretaceous Period, conglomerates, sandstone, marls, radiolarites, tufa-breccias, basalts, spilites, diabases.

Relief forming exogenous phenomena: low-intensity defluxion.

The detailed geologic conditions have to be investigated during the design phase of construction works.

d. Water resources

The BCP is situated on the right bank of the River Debed.

Based on the results of long-term measurements, the average annual flow of the Debed River is 35.5 m^3/sec.

Pollution levels of water resources on Armenia's territory are controlled by the "Environmental Impact Monitoring Center" State Non-Commercial Organization under the RA Ministry of Nature Protection (hereinafter referred to as Eco-monitoring). Areas adjacent to the Debed River are monitored by Observation Post No. 7. Several dozens of indicators are measured, significant part of which do not go beyond permissible sanitary levels, while some of them do exceed these norms /see the table below/.

Water body	IN of the observation post on the map	Location of the observation post	Number of samples	Names of indicators exceeding the norm	Number of detected cases	Excess of average concentrations (times)
Debed	7	Near the border	11	Nitrite ion	7	2,0
				BOD	4	1,2
				Aluminum	10	18,2
				Vanadium	10	4,0
				Chrome	5	2,0
				Iron	4	1,4
				Manganese	6	4,0
				Copper	11	17,0
				Zinc	6	2,5

The hydro-geological conditions of the project area have to be investigated during the design phase of construction works.

e. Atmospheric air

No air monitoring is conducted in this area, and there are no observation posts located nearby managed either by Eco-monitoring or any other entity. There are no industrial enterprises or large agriculture farms in the area, thus it can be suggested that the air pollution level is not high. Some impact on the air is caused by traffic.

f. Soils

Soils in the area are characterized as river valley terraced and pebbled. Soil erosion level is near 1%.
Given the poor level of agricultural land development in the area, soil contamination level may also be considered medium. Traffic intensity and its respective environmental impact is not high either.

g. Biodiversity

The project area has been gradually transformed due to agricultural, commercial and state border management activities suffering anthropogenic impacts of different kinds. The adjusting area has been used for agricultural purposes for many years.

The project location is not in an area of special concern, such as areas designated as having national or international importance (e.g. world heritages, wetlands, biosphere reserve, wildlife refuge, or protected areas). The project will not lead to the extinction of endangered and endemic species or the degradation of critical ecosystems, and habitats.

Vegetation in the area is mainly represented by xerophilous species, such as Festuca versicolor Tausch, F. ovina L., F. valesiaca Gaudin, Phleum pratense L., Hordeum violaceum Boiss. et Huet, Carex humilis Leys, Trifolium ambiguum L.
Fauna is represented by species common for Armenia. Among other widely common mammals, there are hares (*Lepus europaeus*), foxes (*Vulpes vulpes*). A few species of rodents are very common, such as Muridae species, and specifically voles (Microtinae).

Invertebrates: earthworms, crayfish, ants, bees, cricket, forest bugs, grasshoper, blue butterfly, cabbage white butterfly, field flies (Musca corvina F.).

The existing ecosystems and the potential threats shall be evaluated in detail during the design phase of construction works in accordance with Biodiversity Strategy and Action plan for RA.

h. Protected areas

There are no specially protected natural sites (SPNS) in the program impact area. The closest SPNS is the Ijevan State Reserve located at 34-35 km distance.

7.1.2. BCP "Bavra"

a. Meteorological conditions

The climate is dry and is characterized by frosts at below 41°C in winter and warm summer with temperature +24°C.

Precipitation:

- July-August - 50 – 100 mm,
- November-March - 150 – 200 mm,
- September-October - 600 – 700 mm.

Absolute air humidity - 3 – 4 mb.

Wind direction:

- In January – Northerly ,
- In April - Northerly,
- In July – Northerly, Northeasterly
- In October – Northerly, Northeasterly

b. Tectonic and seismic conditions

The BCP area is situated on Shirak Plateau in the north-west of Armenia. Terrain of the area comprises of hilly landforms. The elevations vary from 2130 till 2140 m above sea level.

The area belongs to seismic zone 2 with expected maximal peak ground acceleration and seismic intensity levels of the Medvedev-Sponheuer-Karnik scale (MSK-64) equal to 8-9.

c. Geologic conditions

Geological structure: Upper Pliocene-Pleistocene, limnetic, riverine, shower and slope-side sediments. Relief forming phenomena: low intensity eluvial-soil forming phenomena and infiltration on lavas. Detailed geological conditions have to be investigated during the design phase of construction works.

d. Water resources

Bavra area is located in between the catchment basin of the River Akhuryan and Madatava Lake located on the territory of the Republic of Georgia in the North.

The River Akhuryan is monitored by Eco-monitoring, although the observation post is located at a significant distance and measurement results cannot characterize the quality of the area's water resources.

The hydro geological conditions of the project have been investigated during the preparation of the Tender Dossiers for design and construction works and the report has been included into the Dossiers.[6]

e. Atmospheric air

No air monitoring is conducted in this area, and there are no observation posts located nearby managed either by Eco-monitoring or any other entity. There are no industrial enterprises or large agriculture farms in the area, thus it can be suggested that the air pollution level is not high. Some impact on the air is caused by traffic.

f. Soils

Soils in the area are mainly characterized as limeless pebbled black earth. Soil erosion level in some plots is up to 45%.

[6] See annex 2

g. Biodiversity

The project area has been gradually transformed due to agricultural, commercial and state border management activities suffering anthropogenic impacts of different kinds. The adjusting area has been used for agricultural purposes for many years.

The project location is not in an area of special concern, such as areas designated as having national or international importance (e.g. world heritages, wetlands, biosphere reserve, wildlife refuge, or protected areas). The project will not lead to the extinction of endangered and endemic species, nor the degradation of critical ecosystems, and habitats.

Flora of the area is mainly represented by mountain steppe species: *Festuca ovina*, *F. Valesiaca, Bromus variegatus*, *Phleum phleoides*, *Koeleris cristata, etc*.

For mountainous steppes and valley landscapes the following Mollusk are common: *Vertigo substriata, euxina somchetica*, bugs: Caucasian olophrum, Armenian pterostrichus , orthopterans: saddle-shape and steppe grasshoppers.

Among other widely common mammals, there are hares (*Lepus europaeus*), foxes (*Vulpes vulpes*), wolves (*Canis lupus*), several species of rodents are widely common. Among those, the Muridae species are especially common.

The existing ecosystems and the potential threats shall be evaluated during the design phase of construction works in accordance with Biodiversity Strategy and Action plan for RA.

h. Protected areas

"Arpi Lich" National Park was established as per RA Government Decree No. 405-N of 16 April, 2009.

The National Park was established to ensure the protection, natural development, reproduction and sustainable use of eastern slopes of Eghnakhagh Range and south-western slopes of Javakhk Range and meadow-steppe, sub-alpine meadow and humid area eco-systems located in between those ranges, including the catchment basins of Arpi and Ardenis lakes and upstream tributaries of the Akhuryan River, landscape and biological diversity, natural monuments and their components.

Based on the protection and exploitation regimes, functional purposes and environmental, scientific, recreational, economic, historical-cultural and aesthetic significance, the area of the park is divided into the following territorial-functional zones:

1) Reservation,
2) Recreational,
3) Economic:

The following activities are prohibited within the Park's Economic zone:

1) Any activity that affects the water regime,
2) Negative impact on natural habitats of flora and fauna,

3) lumbering (except for sanitary and care purposes),

4) introduction and acclimatization of new plant and animal species, as well as genetically modified organisms (species),

5) use of pesticides and mineral fertilizers,

6) use of technologies that generate exhaust and wastewater in volumes exceeding the norms established by the RA legislation,

7) production, use and storage of radioactive substances and waste, as well as other hazardous or toxic substances,

8) mining with explosives,

9) deployment of ore processing facilities,

10) movement and parking of motor and track-type vehicles and vessels outside of public roads and waterways or in areas not designated for that purpose.

The following activities are allowed within the Park's economic zone:

1) environmentally safe agriculture,

2) reproduction of rare and valuable endemic wild plants and animals,

3) organization of services related to recreation and tourism,

4) rent-out of land for industrial activities not prohibited by the Park's regime,

5) use of organic fertilizers and other means of natural origin against plant and animal pests and diseases,

6) use of mining, water, plant and animal resources, including commercial fishing, in the manner specified by the RA legislation.

7) scientific exploration, registration, inventory and monitoring of eco-systems, biodiversity, landscapes and natural heritage (including monitoring of agricultural and industrial activities and tourist and visitor services),

8) conduct of educational events and internships,

9) organization of educational tourism,

10) sanitary and care lumbering,

11) movement of transport.

Protection zone (buffer zone) of the Park

Protection zone of the Park encompasses Arpi and Ardenis lakes, as well as areas enclosed within the watersheds of the upstream catchment basins of the Akhuryan River.

Regime of the Protection Zone of the Park

Any economic activity that may potentially harm the sustainability of the area's eco-systems and preservation of flora, fauna, as well as sites of scientific and historical-cultural significance is prohibited within the Park's protection zone.
Use of land plots located within the Park's protection zone by its owners is regulated by the RA legislation.

RA Government Decree No. 1151-N of 21 July 2011 approved the specification of the borders of Arpi Lich National Park, the Park's map and its territory, as well as changed the purpose of the land areas.
In accordance with the aforementioned Decree, the Park's territory encompasses the land areas of the following villages in Shirak Marz: Mets Sepasar, Ghazanchi, Sizavet, Krasar, Alvar, Aghvorik, Ardenis, Berdashen. Dzorakert, Tsaghkut, Garnarich, Shaghik, Zarishat and Amasia.
The Decree approved the description of the Park's borders, the Park's map and zoning scheme in accordance with Annexes 1, 2 and 3, as well as the Park's territory, it being 21179.3 hectares.
As seen from the Decree, Bavra and the surrounding lands are located beyond the National Park's territory. The village of Bavra is located within the buffer zone. The BCP's distance from the preservation zones is 8, 9.5 and 14 km accordingly.

7.1.3. BCP "Gogavan"

a. Meteorological conditions

The climate is moderate with warm summers (average temperature in July is 20°) and mild winters (average temperature in January –8°) with stable snow cover.

Precipitation:

- July-August - 100 – 150 mm,
- November-March - 100 – 150 mm,
- September-October - 300 – 400 mm.

Annual average rainfall -683mm.

Absolute air humidity - 6 – 7 mb.

Wind direction:

- In January - Southeasterly,
- In April - Northerly ,

- In July - Northerly,
- In October - Northerly.

b. Tectonic and seismic conditions

The area belongs to seismic zone 2 with expected maximal peak ground acceleration and seismic intensity levels of the Medvedev-Sponheuer-Karnik scale (MSK-64) equal to 8-9. Terrain of the area comprises of mountain landforms. The average elevation is 1,509 m above sea level.

c. Geologic conditions[7]

Geological structure: Middle Eocene, andesine, tuffa-breccias, tufa-sandstone, tufa-aleurolites, volcanic sedimentary flysch, marls, limestone.

Relief forming exogenous phenomena - weak linear erosion.

The geologic conditions have been investigated during the preparation of Tender Dossier for design-built works and the report has been included into the Dossiers.

d. Water resources[8]

The BCP is located in close proximity of local straight of unnamed small river that falls within the Tashir catchment basin. Based on long-term measurements, the average annual flow of the Tashir river is 1.52 m^3/sec.

Area adjacent to the Tashir River is monitored by Observation Post No. 11 of Eco-monitoring. Several dozens of indicators are measured, significant part of which do not go beyond permissible sanitary levels, while some of them do exceed these norms /see the table below/.

Water source	IN of the observation post on the map	Location of the observation post	Number of samples	Names of indicators exceeding the norm	Number of detected cases	Excess of average concentrations (times)
Tashir	11	0,5 km up Mikhaylovka village	9	Aluminum	9	12,6
				Vanadium	8	5,0
				Manganese	8	13,0
				Iron	5	1,7
				Copper	6	2,0

[7] See annex 3
[8] See annex 3

The hydro-geological conditions of the project site have been investigated during the preparation of the Tender Dossier for design-construction works.

e. Atmospheric air

No air monitoring is conducted in this area, and there are no observation posts located nearby managed either by Eco-monitoring or any other entity. There are no industrial enterprises or large agriculture farms in the area, thus it can be suggested that the air pollution level is not high. Some impact on the air is caused by traffic.

f. Soils

Soils in the Gogavan BCP area are characterized as limeless non-carbonate black earth. In some areas, meadow black-earth pebbled types are found. Soil erosion level is 1 - 10%.
Lithologic structure of soil-forming rock comprises clays and loamy sandstone detritus.

g. Biodiversity

The project area has been gradually transformed due to agricultural, commercial and state border management activities suffering anthropogenic impacts of different kinds. The adjusting area has been used for agricultural purposes for many years.

The project location is not in an area of special concern, such as areas designated as having national or international importance (e.g. world heritages, wetlands, biosphere reserve, wildlife refuge, or protected areas). The project will not lead to the extinction of endangered and endemic species, nor the degradation of critical ecosystems, and habitats.

Flora of the area is mainly represented by xerophilous species, incl. Paliurus spina-christi Mill., Spiraea crenata L., Amugdalus fenzliana (Fritsch) Lipsky, Pistacia nutica Fisch. et Mey. Celtis glabrata Stev. Ex Planch., Cerasus incana (Pall.) Spach, Pyrus salicifolia Pall.

Fauna is represented by species common for Armenia. Among other mammals, badgers and foxes are common. Several species of rodents are widely common. Among those, the Muridae species are especially common.

Invertebrates: rainworms, ants, bees, grasshoppers, locusts, wood bugs, white cabbage butterfly, field flies.

The existing ecosystems and the potential threats shall be evaluated during the design phase of construction works in accordance with Biodiversity Strategy and Action plan for RA.

h. Protected areas

There are no SPNSs in the program impact area. The nearest SPNS is the Gyulagarak Pine State Reserve which is located 25 km away.

7.2. Infrastructure

7.2.1. BCP Bagratashen

The site doesn't have raw water supply and purification and distribution system. Wastewater treatment facilities are not available at BCP. Domestic sewage is generally collected and conveyed by the existing sewer but is discharged directly into the Debed River.

Appropriate MSW management system in the area does not exist.

Infrastructure is mainly limited to road network including state highways and local level roads, telephone, internet and power supply.

7.2.2. BCP Bavra

The proposed site for BCP construction has only a road network including state highway and local roads, and power supply air transmission main.

7.2.3. BCP Gogavan

The BCP infrastructure is limited only to the road network, including state highway and local roads, and power supply air transmission main. The site isn't provided with engineering utilities like water supply, sewerage, heat supply.

7.3. Socio-Economic Conditions

7.3.1. BCP Bagratashen

The closest settlement from Bagaratshen – Ptghavan is located in distance of 2 km from the BCP. Socio-economic information about the settlements in the adjoining area is obtained from the National Statistical Near one of the villages – Teghout there is a large copper-molybdenum deposit. Stocks of copper-molybdenum ore at the deposit are 450 million tons. The deposit is currently in development field.

The economy in of the area is mainly driven by public and private sector employments. Tourism is very limited in the study area. Local business is present mainly in the form of small-varied activities like catering, food-processing, vehicle maintenance, etc.

The high percentage of land-use in the project area designated as agricultural. The agriculture presents a major economic driver. The rate of unemployment in Tavus marz is around 8.5% of economically active population (2010, RA State Statistical Service official website).

7.3.2. BCP Bavra

The closest settlement Bavra is located in distance of 7 km from the proposed BCP site. Socio-economic information about the settlements in the adjoining area is obtained from the National Statistical Service of the Republic of Armenia. Bavra's reported population was 577 in 2010. Local inhabitants are mainly members of the active population (20-50 years old).

The economy in of the area is mainly driven by agriculture.

The rate of unemployment in Shirak mars is around 10.11 % of economically active population (2010, RA State Statistical Service official website).

7.3.3. BCP Gogavan

The closest settlement Dzoramut is located in distance of 2 km from the existing BCP site. Socio-economic information about the settlements in the adjoining area is obtained from RA State Statistical Service official website.

The economy in of the area is mainly driven by agriculture.

The rate of unemployment in Lori marz is 10.83% of economically active population (2010, RA State Statistical Service official website).

7.4. Historical and Cultural Sites

No historical and cultural sites are available close to border crossing points. There is a cemetery on the Georgian side of Bagaratashen BCP, which will not be affected during the construction of the bridge.

8. Preliminary Impact Identification and Analysis

On-site and off-site impacts can be induced during the construction of the BCP facility, and later during their operation. On-site impacts result from construction activities carried out within the

construction site. The impacts of off-site work result from activities carried out outside the construction site, such as traffic, yet are directly related to the project.

8.1 Impact During Construction Phase

8.1.1 Soil and erosion

The total volume of soil and rock that would be excavated and supplied for backfilling and relocating during BCPs reconstruction is significant, thus may lead to certain erosion problems and impacts on soils. The special attention shall be paid during design of vertical planning solutions and development of work performance program for all types of earthworks. Special attention should be paid to the handling of fuel and oil (hydraulic, transmission, engine, etc.) to power and maintain the different equipment on site.

8.1.2 Water resources

Major impacts on water resources may take place during the construction phase of the facilities of the BCPs. Bagratashen BCP is located close to river Debed, Gogavan BCPs is located close to the unnamed stream. Special measures shall be implemented in order to protect the existing water resources from all possible pollutions.

8.1.3 Air quality

Dust is the main impact on air quality caused primarily by the excavation works. Increased traffic will also increase dust, CO, SOx, NOx and heavy metals emissions both on-site and off- site. However, since the construction phase is of limited time, this impact should not be considered of high significance. Odor emissions may also arise during this phase by increased machinery.

8.1.4 Noise

Construction equipment will constitute the main source of noise. Due to the limited time of the construction period and the sparsely populated area for a largest part of the BCP noise during construction activities will be low.

8.1.5 Biodiversity

The proposed construction sites are not situated on the area of significant ecological concern. The construction of the facilities therefore will not lead to the destruction of critical ecosystems or the extinction of endangered or rare species. The potential negative impacts affecting biodiversity during project construction are preliminary evaluated as the following:

- Habitat loss or destruction caused by excavation, compaction and soil relocation works;
- Mortality of individual organisms caused by destruction of vegetation, destruction of normal feeding chain;

- Loss of individual organisms through emigration caused by disturbance or loss of habitat
- Habitat fragmentation, habitat removal caused by introduction of barriers like roads, grounds etc;
- Disturbance caused by construction noise, traffic, or intensive presence of people;
- Altered species composition caused by changes in abiotic conditions, and habitats;
- Vegetation loss caused by soil contamination by disposed oils and hazardous materials.

8.2. Impact During Operation Phase

8.2.1 Soil

Soil pollution from on-site construction works and during transporting of some materials may occur by the intentional or accidental leakage of used chemicals, fuel, or oil products (from equipment and vehicles). The special measures should be undertaken to avoid such cases and workmanship performance should be adopted for the disposal of such hazardous products.

The main concern during operation of the facility is related to soil pollutions during regular maintenance of BCPs including accidental leakage in water and sewerage and heating site pipelines, irregularities in operation disinfection facilities and accidental or intentional discharge of hazardous materials (including fuels) stored on BCPs sites or transporting through BCP.

8.2.2 Water resources

During operation, the main activities that could possibly affect the natural resources are raw water extraction and waste water management processes.

The network for collecting and conveying storm water and wastewater to appropriate points of treatment and discharge should be developed and properly maintained in order to avoid the accidental discharge to the local rivers/ streams or into the ground.

The proposed BCP infrastructure management system should include the separation of rainwater from roofs /shelters and rainwater from roads and service grounds and ensure the proper treatment of both flows.

8.2.3 Air quality

The potential sources of pollution during regular operation of the BCPs are:

- dust and gaseous from increased traffic crossing the state border and maneuvering within BCP area during control and clearance procedures;

- odors from solid waste delivery trucks;
- odors from waste water treatment facilities;
- Emissions of boiler house;
- Emissions of biological waste incineration unit used during clearance of veterinary and phyto-sanitary cargo

8.2.4 Noise

Vehicles, and specifically big trucks, will be the noise sources during the operational phase.

8.2.5 Biodiversity

With proper management of BCP facilities, negative impacts on biodiversity during operation of the BCP should be minimal. On the contrary, the project could lead to positive environmental impacts on the biodiversity level if landscaping plans including proposed greenery and planting works are implemented properly.

Inclusion of native/ endemic species in the proposed landscape plan could be adopted to alleviate visual impacts and compensate loss of habitat and communities.

The installation of wastewater and rainwater treatment facility will prevent the direct impact on the biodiversity of the surrounding area caused by the unregulated discharge of waste water into soil or water.

The proper solid waste management shall prevent the creation of new habitats for pests which could pose serious impacts on the local biodiversity.

8.3. Impact on Social Well-Being

8.3.1 Construction phase

Main impact is linked to the new land plots added for the expansion of the BCP territories. Some of those plots are privately owned and will have to be procured back from the owners. There are 60 plots in total, where 29 are community and state owned plots and 31 are privately owned. 4 of those privately owned plots are inhabited homesteads, 4 are used for service purposes, and the rest is arable land. 4 plots have residential houses, and their inhabitants will have to be moved. Appropriate compensation is planned to be paid against the plots and the buildings. The amount of compensation, payment terms and owner satisfaction information will be presented in the main Environmental Impact Assessment report.

The main impact on the people crossing the state border will be caused by extended control time and poor throughput capacity of BCP, as well as temporarily limited BCP operating time during a day while performing the construction works.

The impacts on nearby local communities during BCP construction are related to disturbances including noise and dust generation, inconvenience and obstructions to access their dwelling places and private properties. The detailed analysis of the possible negative impacts and their mitigation options is to be performed during the initial phase of construction works (design and built works).

The provision of proper fencing during this phase will alleviate public discomfort. However, given the fact that construction works will last for a limited period, the impacts from potential dust and noise generation as well as access difficulties will probably not be significant in case of carefully developed Program of Work Performance.

General public as well as construction staff safety risks can arise from various constructions activities such as deep excavations, operation, and movement of heavy equipment and vehicles, storage of hazardous materials, and disturbance of traffic. The mentioned activities are planned only for limited time of 2 years, they are proposed to be supervised and controlled in accordance with national regulations and consequently the associated risks are minimal. Proper supervision, high workmanship performance, and provision of adequate safety measures will suppress the likelihood of such impacts on public and occupational safety.

The opportunity of local workers employment - certain job opportunities for skilled and unskilled labor for performance of miscellaneous construction works can have positive impact on local economy.

8.3.2 Operation phase

The implementation of BCPs reconstruction project is supposed to have significant positive impact on social situation in the project region. The major impacts can be summarized as follows:

- improvement of transport infrastructure on both local and state level – reconstruction of separate section of state highways and new access roads to local communities;
- equipped helipad for rescue services can serve not only BCP needs but local communities.

8.4. Impact in a Trans-Boundary Context

Since the geographical location of future structures is the Armenian-Georgian border, some impact on Georgia's water resources and air may be caused as a result of construction and

operation.
In compliance with “Convention on Environmental Impact Assessment in a Trans-boundary Context” the Republic of Armenia as a "Concerned Party", shall take all appropriate and effective measures to prevent, reduce and control significant adverse trans-boundary environmental impact from proposed activities.
The Republic of Armenia with full respect to the provisions of this Convention, shall ensure that Republic of Georgia as an “Affected Party” is notified of a proposed activity.

9. Environmental and Social Management Plan

9.1 Mitigation Measures

In the Project Environmental Impact Assessment context, mitigation should refer to the set of measures aimed at elimination, reduction, or remediation of potential undesirable effects resulting from the reconstruction of the three BCPs. Mitigation should be typically considered for all the developmental stages of the project, namely the design, construction and operation.

9.1.1 Mitigation measures for the operational and maintenance phases

Issue / Potential Impact	Action
Avoidance of cultural and historical sites	• Selection of the roads that bypasses most of the villages • Selection of location of access roads to avoid any specific site • Local experts will accompany designer to check whether cultural sites will be affected by the final corridor and to advise if over-spanning is possible or if a bypass is needed.
Minimisation of resettlement needs	• Selection of the construction sites and access roads with minimum resettlement actions/ relocation of households required
Soil / Erosion	• Minimization of removing topsoil at sites. • Bringing back the topsoil to its original place after having finished the construction works. • Replanting of grass/shrubs. • Careful selection of locations for access roads. • Erosion prevention measures at access roads. • Rehabilitation of new access roads not needed anymore.

Issue / Potential Impact	Action
Noise exposure of workers and of local population during construction activities	• Optimisation of transportation management to avoid needless truck drives; avoidance of truck movements in residential areas at least during night-time. • Reduction of speed of trucks crossing residential areas. • Regular maintenance and service of building machinery and other during construction works. • Shut down or throttling down of noisy machinery to a minimum. • Utilization of ear protection devices by the workers if they are exposed to high noise levels (included in the construction site HSE Management Plan).
Air pollution (dust, exhausts etc.) during construction activities	• Limitations of size, weight or axle loads of vehicles using particularly difficult roads. • Reduction of speed and limited movement of vehicles. • Optimised transportation management to avoid needless truck trips. • Routine service and regular maintenance of vehicles and machines to reduce engine emissions. • Burning of rubbish on site must be strictly forbidden.
Pollution of groundwater during construction	• Good and regular maintenance of all vehicles and machines used on site is mandatory. Maintenance activities of the vehicles shall be performed in regular service stations. • Maintenance and re-fuelling of the construction equipment shall be done only on sealed and enclosed areas (careful handling and careful maintenance, especially of the fuel tanks). • On site storage of fuel, engine oil and lubricants in locked tanks and on sealed and shadow roofed areas. • All wastes generated through the use of fuel, engine oil and lubricants like drums and containers shall be collected and disposed of properly. • Staff training to increase awareness of waste minimisation and appropriate waste disposal.
Pollution of surface water especially during rainy seasons	• All liquid materials and lubricants shall be stored in closed containers or barrels. • Construction material as bags of cement etc. shall be stored in containers in order to avoid rinsing out. • Temporary sewage treatment facilities shall be provided for the construction site and the labour camp.

9.1.2. Mitigation measures during the operation phase

Environmental protection measures to be implemented during the operational phase will be developed as part of working designs of the buildings and technological sites. They should include mitigation measures aimed at minimizing the impact of traffic, parking, operation, goods storage, examination and, as appropriate, decontamination and neutralization.

Below are some general activities planned for the implementation phase of the project:

Issue / Potential Impact	Action
Soil contamination prevention	• Install garbage containers onto special pallets in a way to prevent waste scattering in the BCP area • Waste removal to be performed by closed trucks
Minimizing water contamination	• Stormwater and sewerage to be accumulated and treated in local bio-treatment plants. • In summer season, treated water to be used for irrigation
Reduction of emissions into the atmosphere	• Routine service and regular maintenance of vehicles and machines to reduce engine emissions. • Modern gas boilers to be installed for heating

9.2 Environment Management Plan

Environmental management and monitoring is essential for ensuring that identified impacts are maintained within the allowable levels, unanticipated impacts are mitigated at an early stage, and the expected project benefits are realized.

The aim of an Environment Management Plan is to assist in the systematic and prompt recognition of problems and the effective actions to correct them, and ultimately good environmental performance is achieved.

Awareness of environmental priorities and policies, proper management of the facilities knowledge of regulatory requirements and keeping up-to-date operational information are basic to good environmental performance.

The Environment Management plan should set and describe the monitoring schemes to be applied and which can ensure the monitoring of compliance with national and international

regulations (monitoring parameters and schedule, requirements for records keeping and reporting, contingency plan, capacity-building program).

10. Public Involvement

Public involvement shall be ensured at the early stages of the project. The public information activities including public hearings for the public opinion, the opinions of affected community leaders, the opinions of affected communities and relevant state bodies should be performed in compliance with the Aarhus Convention and the Law of Republic of Armenia on Environmental Impact Assessment.

In the initial phase of the Project, the main bulk of activities is tobe conducted with the owners of land plots to be bought back. Questionnaires will be made to document the owners' opinion about the proposed project.

Upon completion of the initial EIA report, it will be made public through the press and the Internet, as well as public hearings will be organized. Results of public hearings, as well as other written comments and recommendations will be finalized and, upon common consent, taken into account during the main design and project phase and the development of EIA report.

Annex1

Decree of the Government of the Republic of Armenia # 1777, 08.12.2011

LIST OF THE PROPERTY LOCATED IN GOGAVAN (DZORAMUT), LORI MARZ, BAVRA, SHIRAK MARZ, AND BAGRATASHEN, TAVUSH MARZ BELONGING TO THE VILLAGE COMMUNITIES< PRIVATE AND LEGAL PERSONS AS PRIVATE OWNERSHIP AND TO BE EXPROPRIATED IN CONSIDERATION OF THE EXCLUSIVE PUBLIC PRIORITY INTEREST

Dzoramut Community , Village Gogavan				
NN h/h	Owner	Land type	Parcel code	Parcel area (sq.m)
1.	Chnavaryan Tengiz	Arable, grade III	06-067-203-034	13510
2.	Pnjoyan Gevorg	Arable, grade III	06-067-203-035	6180
3.	Aghayan Yughaber	Arable, grade III	06-067-203-036	6150
4.	Pogosyan Sedrak	Arable, grade III	06-067-203-037	9950
5.	Chnavaryan Tengiz	Arable, grade III	06-067-203-038	6334
6.	Chapanyan Qishmish	Arable, grade III	06-067-203-039	6250
7.	Arakelyan Katya	Arable, grade III	06-067-203-040	6630
8.	Sargsyan Lyova	Homestead	06-067-102-001	2070
9.	Levonyan Anjela	Homestead	06-067-102-003	204.5
10.	Qosyan Irina	Homestead	06-067-101-002	1288.5
11.	Poghosyan Grigor	Homestead	06-067-101-001	1508
Total				60075
12.	Dzoramut Community	Other lands of the settlements	06-067-402-001	837.2
13.	Dzoramut Community	Other lands of the settlements	06 - 067-405-001	44.8

14.	Dzoramut Community	Arable, grade IV	06-067-218-001	461.2
15.	Dzoramut Community	Other lands of the settlements	06-067-103-001	1860
16.	Dzoramut Community	Arable, grade IV	06-067-218-010	445
17.	Dzoramut Community	Arable, grade IV	06-067-218-011	21
18.	Dzoramut Community	Other lands of the settlements	06-067-101-003	130.2
19.	Dzoramut Community	Other lands of the settlements	06-067-101-005	102.5
20.	Dzoramut Community	Other lands of the settlements	06-067-101-006	92.9
21.	Dzoramut Community	Other lands of the settlements	06-067-101-007	82
22.	Dzoramut Community	Arable, grade IV	06-067-218-012	17.1
23.	Dzoramut Community	Other lands of the settlements	06-067-404-005	26.4
24.	Dzoramut Community	Other lands of the settlements	06-067-101-008	93.9
25.	Dzoramut Community	Arable, grade IV	06-067-202-005	5984
26.	Dzoramut Community	Arable, grade IV	06-067-218-031	4766
Total				Dzoramut Community
Total for Gogavan BCP				75039.2

Bavra Community				
NN h/h	Owner	Land type	Parcel code	Parcel area (sq.m)
1.	Gharsleyan Samvel	Arable	112-003	10241.70
2.	Gabrielyan Hovhannes	Arable	112-005	18008.30
3.	Gabrielyan Hovhannes	Arable	112-006	4360.90
4.	Gharsleyan Martin	Arable	112-007	10548.80

Total				43159,7
5.	Bavra community	Pasture	112-004	25835.80
6.	Bavra community	Pasture	119-001	1498.70
7.	Bavra community	Unused	122-001	67.00
8.	Bavra community	Other	359-001	115.00
9.	Bavra community	Other	310-001	106.00
Total				27 622,5
10.	Republic of Armenia	Inter-state road	319-001	4387,50
Total				4387,50
Total for Bavra BCP				75169,7

Bagratashen Community				
NN h/h	Owner	Land type	Parcel code	Parcel area (sq.m)
1.	Sahakyan Norayr	Irrigated arable	236-007	2674.00
2.	Nasibyan Lyova	Irrigated arable	236-008	12393.00
3.	Abovyan Hovik	Irrigated arable	236-010	15839.00
4.	Egurchyan Daniel	Irrigated arable	236-011	7120.00
5.	Minasyan Anakhas	Irrigated arable	236-012	6925.00
6.	Khachatryan Pargev	Irrigated arable	236-013	5058.00
7.	Muradkhanyan Khachik	Public	251-003	523.00
8.	Sargsyan Vahan	Irrigated arable	236-014	12.00
9.	Karoyan Karapet	Irrigated arable	237-005	1862.00
10.	Hasratyan Hamlet	Irrigated arable	237-006	3443.00
11.	Yesayan Razmik	Irrigated arable	237-007	4774.00
12.	Tamazyan Karlen	Irrigated arable	237-008	1804.00
13.	Muradkhanyan Khachik	Public	251-003	183.00
14.	Sargsyan Norik	Irrigated arable	250-003	286.00
15.	Abovyan Hovik	Public building, house	236-027	1095.00
16.	“Seyran Ananyan&Co” LLC	Public building, house	236-050	240
Total				64231
17.	Community ownereship	Other lands	792-001	81.00
18.	Community ownereship	Pasture	250-001	507.00
19.	Community ownereship	Pasture	232-005	157.00
20.	Community ownereship	Other lands	799-001	180.00
21.	Community ownereship	Public	251-003, 236-029	13231.00
22.	Community ownereship	Other lands	791-001	910.00

23.	Community ownereship	Other lands	236-034	124.00
24.	Community ownereship	Other lands	236-034	29.00
Total				15219
Total for Bagratashen BCP				79450

Head of Staff of the GoAM

D. Sargsyan

Annex 2

REPUBLIC OF ARMENIA

”EPRAT-TIGRIS” LLC

PASSPORT

of Well N 1 drilled on the territory of Bavra BCP for the conduct of a hydro-geological survey and water supply

Customer:
SCIBM Project Manager in Armenia G. Malintsyan

Contractor:
Director of Eprat-Tigris LLC E. Sargsyan

Yerevan
2011

1.	Well location	Republic of Armenia, Shirak Marz, Bavra village, territory of Bavra BCP
2.	Purpose of drilling	Conduct of hydro-geological survey on the territory of Bavra BCP for water supply
3.	Absolute wellhead mark	2142.8m
4.	Well depth	110.0m
5.	Timeline of works	Start 08.04.2011г. End 08.06.2011г.
6.	Drilling technique	Drilling was performed with a 1БА-15В drilling rig with a rotary method without core recovery

Well Design

1) Drilling:

0.0 – 77.0m = 77.0m – with a 244.5 mm drill bit

77.0 – 110.0m = 33.0m – with a 151 mm drill bit

2) Casing:

0.0 – 77.0m = 77.0m –168 mm steel pipes, with a perforated filter in between 61.0 – 76.0 m. Annular space in the filter part is filled with basaltic grit.

In between 0.0 – 10.0 m, cementation of annular space was performed in order to avoid contamination of ground waters with surface waters.

General Information on the Work Site

The survey site is located in the North-Western part of Armenia and covers the area of the upstream left bank of the Akhuryan River.

This area borders Georgia in the North.

The work site is an administrative part of Bavra Community of Ashotsk sub-district of Shirak Marz.

Geographical coordinates of the well:

- 41^0 08' 18.35" Northern Latitude,
- 43^0 47' 42.67" Eastern Longitude.

Bavra village is linked to the capital city of Yerevan (175 km) with a fairly good asphalted road, as well as with the neighboring districts of Georgia.

Industry in Ashotsk sub-district is underdeveloped. Some construction industry is in place based on local materials (basalt, andesite-basalt and tufa processing).

Agriculture-wise the district is characterized with some cattle breeding and grain industry.

The work site is a typical mountainous area with high altitudes and hard terrain (absolute height marks between 1900 - 3200 m), featuring river valleys, inter-mountain hollows and sub-mountain plains.

From geo-morphological standpoint, the district is featured by the following areas:

1. Ghukasyan (Ashotsk) Range
2. Jvakheti Range (Wet Mountains)
3. Upper Akhuryan hollow.

The site has continental climate and is characterized with cold winters and short cool summers. Average annual temperature is +2,4˚C. Winters are cold (down to -42,0°C) and lasts 5-5,5

months. Soil freezing depth id 1.04 m. First signs of freezing in high altitude areas are observed in the first decade of October, while late signs are observed in mid-May.

Average annual precipitation is 850-900 mm.

Annual relative air humidity is 77%, wind speed is 2,2 m/sec.

District's main river, Akuryan, flows out of Lake Arpa (2020,0 m). The length of the river is 151,0 km. The river feeds from mixed sources: melted snow, rain and spring water. The Akhuryan River has numerous tributaries, including Ghukasyan, Ghazanchi, Dali, Illi, etc.

Surveys within Akhuryan's catchment basin were conducted in different sites and with different level of detail, depending on the objectives.

A mineral water spring (Ghukasyan) and two still water springs (Zuygakhbyur and Upper-Akhuryan).

Geological Structure of the District

The geological structure of the surveyed district stands out with Upper Cretaceous strata featured by limestone, as well as volcanogenic and volcanic-detrital formations of Neocene-Quaternary period.

In the Upper Cretaceous strata, santon-campan-maastricht layers stand out. Those are represented by carbonate rock (limestone, sandy limnestone and marl) and have a depth of down to 200,0 meters.

The Neocene structural layer incorporates volcanogenic and volcanic-sediment rock of Middle and Upper Pliocene. They are represented with andesites, andesite-dacites, andesite-basalts, doleritic basalts widely distributed in the area. Total depth of the layer is 350 m.

Volcanic formations and alluvial-proalluvial-dealluvial sediments relate to the Quternary Period.

Pliocene-Quaternary Period is characterized by severe volcanic activity. Lavas with basalt, andesite-basalt and andesite-dacite structure flowed from numerous volcanic cones and covered the ancient lowlands and plains.

Alluvial-proalluvial-dealluvial sediments are represented by boulders, pebbles, crushed stone, anisomerous sand, loamy soil and clay.

Hydro-Geological Features of the District and Outcome of the Work Performed

Climatic and geo-morphological features of the area, as well as its geological structure play a key role in the formation of its general hydro-geological features.

Most favorable conditions for formation and feeding of underground waters are present in medium and high mountain zones. Snow plays a key role in feeding of underground waters.

Pliocene-Quaternary volcanic rock is highly fissured and covered with porous fragmental formations. These formations create favorable conditions for significant accumulation of underground waters.

The surveyed district specifically features:

1. The water bearing horizon of upper-quaternary and modern alluvial-proalluvial-dealluvial sediments represented by boulders, pebbles, crushed stone, anisomerous sand, loamy soil and clay. This water bearing horizon is weak and has a narrow distribution. The depth of sediment in various sites is 8.0-30.0 m.
2. The water bearing horizon of pliocene-quaternary lava rock. Here, underground waters are linked to highly fissured slagged andesites and andesite-basalts.

Here the rock is water abundant, and the bearing horizon stands out for its strong discharge head. The depth of the static water level from the surface is 15.0 - 53.0 m. By its chemical structure, the water is hydrocarbonate-calcic, with overall mineralization up to 0.4 g/l.

Below is the top-to-bottom geologic profile of Well № 1 drilled on the territory of Bavra BCP:

0.0 – 76.0 m	Boulder-pebble sediment, fragments of basalt rock with clay filling (0-61 m) and sandy-loam filling (61 m and deeper) (with a weak water bearing layer between 61.0-76.0 m)
76.0 – 80.0 m	Solid small-grained basalts, free of water

80.0 – 98.0 m	Weakly fissured basalts, free of water
98.0 – 108.0 m	Highly fissured, partly slagged basalts, water bearing
108.0 – 110.0 m	Solid small-grained basalts, free of water

Test Extraction Results

Following the drilling activity, the well bore was rinsed clean, and a test extraction was performed with a ЭЦВ-5-6,5-80 bottomhole electric pump.

1. Initial extraction data:

- static water level from the mouth (H st.) - 43,2 m
- water bearing horizon intervals - 61,0 - 76,0 m,

98,0 - 108,0m (pressure horizon)

- total depth of the water bearing horizon - 25,0m
- depth of installation of 73 mm stainless steel pipes with a pump - 55,2 m

2. Extraction results (basic hydro-geological parameters):

- water flow (Q) with a constant decrease level - 2,4 l/sec or 207,36 m^3 in 24 hrs.
- decrease of water level (S) - 4,0 m
- dynamic water level (Hdyn.) – 47,2m
- discharge intensity (q) - 0,6 l/sec.m
- water permeability degree (Км) - 295,0m^2/day
- filtration degree (K) - 11,8m/24 hrs
- water level recovery time – 40 min

Qualitative Characteristics of Underground Waters

Qualitative composition of the water is determined based on samples taken at the end of extraction.

Chemical test was performed at Analitic CJSC laboratory of the RA Ministry of Energy and Natural Resources, while bacteriological test was performed at the laboratory of Experimental Center SNCO of Shirak Marz regional sanitary-epidemiological inspectorate of RA Ministry of Health.

The water is transparent, odorless, with no sediment.

By its chemical composition, the water is hydrocarbonate, calcium-magnesium, with overall mineralization of up to 0,15 g/l. Overall hardness 1,5 mg.eq./l, temperature 7,0˚C, pH – 6,4.

For drinking purposes, water quality control is required.

Description of Equipment Installed and Electrical Supply

The well is equipped with a ЭЦВ-5-6.5-80 electric pump (N 43921, product of Belarus) that was installed in the well be means of a 73 mm stainless steel lift pipe (18 in total, product of USA). These lift pipes are coupled with muffs. Sections are 3 m long each. The depth of pump's immersion from the mouth of the well is 55.2 m.

The mouth of the well is 1.3 m below ground surface and is enclosed in a 1.05X1.3 size pit. The pit is covered with a metal cap made of 6.5 mm thick sheet steel. An anchor metal plate is installed on the mouth. In the pit, a 73 mm slide valve (product of Spain) is installed on the offlet pipeline. The offlet pipeline is heat insulated.

A 5x5x1.8m protected sanitary control zone is installed around the well. It consists of a wire netting fence and a door. A pump control and protection station is installed within the zone (N916, product of Belarus) that provides power supply to the immersion pump through a VPP-10

type cable. Power supply during extraction was provided by a vehicle mounted three-phase diesel generator.

The fence holds a 0.5X0.75 m metal shield with warning notes in English and Armenian.

It is recommended to build a daily run-off pond next to the well.

Attachments

1. Results of chemical test
2. Results of bacteriological test
3. Work site photos:

- Photo 1. Well drilling process
- Photo 2. Water extraction process
- Photo 3. General view of the complete site

4. 1:1000 site map of Bavra BCP

Annex 3

Unofficial translation from Armenian

"HORATANTSK" LLC
(Limited Liability Company)

Implementation of geological surveys in the territory of "Gogavan" SBCP of Lori region

Client: United Nations Development Programme (UNDP)

Company Director /K.Babloyan/
Geological Engineer /V.Titizyan/

Lori Marz, village Dzoramut

I N T R O D U C T I O N

According to the assignment of the United Nations Development Programme (UNDP) it is necessary to implement engineering-geological surveys of the territory, specified to be built up in the territory of "Gogavan" SBCP up to 15,0 linear meters deep.
The geologists of "Horatantsk" LLC carried out geological-geophysical researches in April 2011. During the researches the below-mentioned works were carried out:
Column-mechanical boring – 75 linear meters.
Vertical electrical sounding – in 7 points.
Determination of physical-mechanical properties of 10 samples taken.
Drawing up of reports.
The field engineering-geological and geophysical works were carried out by the geologist V.Titizyan and geophysicist A.Danielyan.
The laboratory researches were carried out by "Father and Son Titizyans" LLC.

PHYSICAL-GEOGRAPHICAL DESCRIPTION OF THE TERRITORY

The surveyed territory is located in the north region of the Republic of Armenia, in Lori region, Tashir territory, Gogavan community.
From the orographical point of view the researched territory is a foothills locality. The north slope of Bazum chain of mountains. The absolute datum of the locality of survey works is 1438-1480 m.
The climate of the region is mainly characterized as one having cold winters and soft summers. The yearly average air temperature varies in 6-7 degrees Celsius; the yearly average rainfall is 500-600 mm. The snow cover is preserved for 3,5-4,5 months, the capacity reaches 0,4-0,5 m, the maximum capacity of the cooling zone – 0,5-0,6m.

Geological structure

The geological structure of the region is presented by cliffs of volcanic deposits complex, capacity – 150-250m, which are covered with alluvial, diluvial and eluvial deposits. The rocky volcanic deposit cliffs are presented by sinter-sandy stones, sinter-breccia and porphyrites of Eocene epoch, which are widespread in the researched territory, they are basements of friable rocky structure of contemporary age. The contemporary age natural soils are presented by crushed-stone and crushed-stone-sandy, sand-clay and large-fragmentary natural soils, the average power of which varies 5,0-11,0 m.

Tectonic

From the tectonic point of view the researched territory is located in the synclinal zone of Sevan-Shirak orotectonic area. The structure of Somkheti Mountain is presented by quaternary lava, which covers the old structures like armours. There are no specific tectonic disturbances here, except for such ones in the length of which volcanic explosions happened.
The seismicity of the researched territory described with the 2nd seismicity zone according to "Tectonic regionalization of the Republic of Armenia" and "Standards of earthquake resistant construction" manuals.

Hydrogeology

The hydro-geological conditions of the region are closely connected with relief, climate and peculiarities of geological structure. The locality is in the average width mild climatic zone. The recharge of groundwater mainly occurs at the expense of precipitations and partially at the expense of condensed waters.
In the regulation of groundwater regime snow melt waters play a significant part. The low temperature regime of the sublime zone contributes to the slow melting of snow.
Parallel to this, cliffs of sublime zone, which are considered to be recharge spheres of groundwater, are notable for filtration conditions. They are heavily cracked in large areas, are covered with crushed-stones, slag and sands. The vegetations here are presented by clay-sand composition grazing variety and are notable for filtration peculiarities.
The wholeness of the above-mentioned favourable conditions gives opportunity for formation of alluvial groundwater resources.
In the geological structure of the region participate volcanic deposit cliffs and quaternary friable-fragment deposits. The following types of gutter horizons are spread among the mentioned cliffs:
Gutter horizon of contemporary quaternary alluvial, diluvial and eluvial deposits, which is presented by rubbles, pebbles, crushed-stones, shingles and sands.
Gutter horizon of crack zone of sinter-sandy stones of Eocene epoch.

ENGINEERING-GEOLOGICAL CONDITIONS

With the intension of ascertaining the engineering-geological peculiarities in the territory of "Gogavan" SBCP during the surveys some topographic, survey-boring, geophysical and laboratory researches were carried out, in the result of which five engineering-geological elements were separated:
Layer No 1: Sand-clay natural soil with content of up to 15% fragment material (dl Q_4). With 0,4-1,2m power.
Layer No 2: Crushed-stone and crushed-stone-sandy natural soil of diluvial origin with % filler (dl Q_4). With 2,2-11,0m power.
Layer No 3: Sand-clay natural soil of alluvial origin with % fragment material, cobble and clay (al Q_4). With 1,5-2,0m power.

Layer No 4^a: Dark brown, heavily aerated, cracked sinter-sand stones of Eocene epoch (el Q_3). With 5,0-8,0m power.
Layer No 4: Whitish volcanic deposit sinter sand stone with dense, firm, strong structure (Q_{2-3}). With 150-250m power.

PHYSICAL-MECHANICAL PROPERTIES OF THE NATURAL SOILS

On the basis of fund materials and laboratory examinations of the samples from field geological surveys, geological-yield, geological-physical, carried out boring works with the layer-taking order, from top to bottom are varied the below-mentioned natural soils:
Layer No 1: ground-vegetable cover of clay-sand structure with the content of up to 15% fragment material. The constructional processing order as per SHN& IV-2-82 collections 1 and 3 $9^1/8^1$-II order.
Layer No 2: Crushed-stone and crushed-stone-sand natural soil of diluvial origin of contemporary age with sand-clay filling material up to 30%. They have the following physical-mechanical properties:

Specific weight – 2,69g/cm^3
Volume weight – 1,91 g/cm^3
Natural moisture – 26,4%
Volume weight of the skeleton – 1,51 g/cm^3
Porosity factor – 0,78
Angle of internal friction - 26^0
Cohesiveness – 0,21 kg/cm^2
Modulus of deformation – 85kg/cm^2
Permitted tension – 2,0kg/cm^2
Granulometric composition:
Cobble-stone – 10,%
Shingle – 24,8%
Sand – 48,5%
Dust – 3,2%
Clay – 13,3%

Constructional processing order 13/14 – IV order
Seismic order of the soil – II

Layer No 3: Sand-clay natural soil of alluvial origin of contemporary age with content of up to 10% of pebble. They have the following physical-mechanical properties' criterion:

Specific weight – 2,71g/cm^3
Volume weight – 1,88 g/cm^3

Natural moisture – 35,2%
Volume weight of the skeleton – 1,39 g/cm^3
Porosity – 48,7%
Porosity factor – 0,95
Angle of internal friction - 19^0
Cohesiveness – 0,18 kg/cm^2
Modulus of deformation – 52kg/cm^2
Permitted tension – 1,5 kg/cm^2
Granulometric composition:
Shingle – 8,2%
Sand – 67,5%
Dust – 8,9%
Clay – 15,4%

Constructional processing order 33^g/ 33^g – III order
Seismic order of the soil – II

Layer No 4^a: Dark brown, heavily aerated, cracked sinter-sand stones of Eocene epoch.

Specific weight – 2,6g/cm^3
Volume weight – 2,13 g/cm^3
Natural moisture – 5%
Volume weight of the skeleton – 2,03 g/cm^3
Porosity – 22 %
Porosity factor – 0,28
Angle of internal friction - 55^0
Modulus of deformation – 1,1 X 10^{4}kg/cm^2
Permitted tension – 5,0 kg/cm^2

Constructional processing order 28^a/ 29^a – V order
Seismic order of the soil – I

Layer No 4: Whitish volcanic deposit sinter sand stones of Eocene epoch with dense, firm, strong structure.

Specific weight – 2,62g/cm^3
Volume weight – 2,24 g/cm^3
Natural moisture – 5%
Volume weight of the skeleton – 2,13 g/cm^3
Porosity – 19%
Porosity factor – 0,23

Angle of internal friction - 75^0
Modulus of deformation – 1,5 X 10^5kg/cm^2
Permitted tension – 8,0 kg/cm^2

Constructional processing order 28^b/ 29^b – VI order
Seismic order of the soil – I

GEOLOGICAL-LITHOLOGICAL DESCRIPTIONS OF BORE WELL SURVEYS

Bore well No 1 absolute datum – 1451,5m

0,0-1,2m Ground-vegetable cover of clay-sand structure, Layer No 1.
1,2-5,0m Crushed-stone and crushed-stone-sandy natural soil of diluvial origin with up to 30 % sand-clay filler, Layer No 2.
5,0-8,0m Sand-clays of alluvial origin with content of up to 10% of gravel, Layer No 3,
8,0-10,0m Dark brown, heavily aerated, cracked sinter-sand stones, Layer No 4^a.
10,0-15,0m Whitish volcanic deposit sinter sand stones with dense, firm, strong structure, Layer No 4.

Groundwater level – 6,0m.
The following samples are taken: No 1 (h=2,2-2,4m), sample No 2 (h=5,8-6,0m) and sample No 3 (h=6,4-6,6m).

Bore well No 2 absolute datum – 1455,5m

0,0-2,2m Crushed-stone and crushed-stone-sandy natural soil of diluvial origin with up to 30 % sand-clay filler, Layer No 2.
2,2-12,0m Dark brown, heavily aerated, cracked sinter-sand stones of Eocene epoch, Layer No 4^a.
12,0-15,0m Whitish volcanic deposit sinter sand stones of Eocene epoch with dense, firm, strong structure, Layer No 4.
Groundwater level – 5,9m.
The following samples are taken: No 4 (h=10,0-10,2m) and sample No 5 (h=13,0-13,1m).

Bore well No 3 absolute datum – 1459,5m

0,0-0,4m Ground-vegetable cover of clay-sand structure with content of up to 10% of gravel, Layer No 1.
0,4-10,6m Crushed-stone and crushed-stone-sandy natural soil of diluvial origin with up to 30 % sand-clay filler, Layer No 2.

10,6-14,0m Dark brown, heavily aerated, cracked sinter-sand stones of Eocene epoch, Layer No 4^a.
14,0-15,0m Whitish volcanic deposit sinter sand stones of Eocene epoch with dense, firm, strong structure, Layer No 4.

Groundwater level – 9,5m.
The following samples are taken: No 6 (h=2,5-5,8m) and sample No 7 (h=8,8-8,9m).

Bore well No 4 absolute datum – 1459,6m

0,0-0,9m Ground-vegetable cover of clay-sand structure, Layer No 1.
0,9-6,0m Crushed-stone and crushed-stone-sandy natural soil of diluvial origin with up to 30 % sand-clay filler, Layer No 2.
6,0-12,0m Dark brown, heavily aerated, cracked sinter-sand stones of Eocene epoch, Layer No 4^a.
12,0-15,0m Whitish volcanic deposit sinter sand stones of Eocene epoch with dense, firm, strong structure, Layer No 4.

Groundwater level – 8,4m.
The following samples are taken: No 8 (h=5,0-5,2m) and sample No 9 (h=13,0-13,2m).

Bore well No 5 absolute datum – 1459,6m
0,0-0,8m Ground-vegetable cover of clay-sand structure, Layer No 1.
0,8-2,8m Crushed-stone and crushed-stone-sandy natural soil of diluvial origin with up to 30 % sand-clay filler, Layer No 2.
2,8-11,0m Dark brown, heavily aerated, cracked sinter-sand stones of Eocene epoch, Layer No 4^a.
11,0-15,0m Whitish volcanic deposit sinter sand stones of Eocene epoch with dense, firm, strong structure, Layer No 4.
Groundwater level – 8,4m.
The following samples are taken: No 10 (h=14,0-14,5m)

GEOLOGICAL-PHYSICAL WORKS

Simultaneously with geological surveys in Gogavan territory of the state border crosspoint of the Republic of Armenia and Georgia some geological-physical works were implemented by the resistance method.
The works were carried out by means of Vertical Electrical Sounding (VES). By means of the geological-physical works we decided to determine the geological-lithological section of the

constructed territory, as well as within our capabilities to determine the depth of groundwater spreading.
The essence of this method is in AMNB with measurement of electric resistance (pk) of the natural soil with the help of symmetric installation.
In the result of field measurements the obtained graphs reflect the dependence of the electrical resistance (pk) of the natural soil from the depth of research (h).
The qualitative processing of the obtained curves allowed to determine the capacity of land layers(h_i) with corresponding resistance.
The obtained graphs were drawn up on billsgarythmial scale blanks. On the grounds of electrical conductivity in the researched areas mainly stand out:

Sand-clay deposits with content of rubble and gravel, the specific electric resistance depends on the percentage of gravels, it varies within the limits of 17-40 ohm m.
Crushed-stone and crushed-stone-sand natural soils, the specific electric resistance of which depends on the content of sand-clay and clay-sand, which varies within the limits of 40-70 ohm m.
Sinter sand-stones of root installation, the specific electric resistance of which depends on the level of aeration, as well as on water saturation, varies within the limits of 70-250 Ohm. M.

7 electric soundings were carried out in the territory, the data of which were used during the draw up of 4 geological-physical sections.
Below are the results of carried out 7 electric soundings interpretation in a form of tables.

CONCLUSIONS AND SUGGESTIONS

On the basis of the above-mentioned we can do the following conclusions:
The volcanic deposit cliffs of root origin of Eocene epoch with 150-250m capacity as per fund materials play a significant and unique role in the geological structure of the researched territory, which are covered with friable fragment, fixed sand-clay deposit formations of contemporary age alluvial and diluvial origin.
The crushed-stone and crushed-stone-sand natural soils (Layer No 2) and rocky sinter sand-stones (Layer No 4^a) will be as basements of buildings, provided to be built in the territory of "Gogavan" SBCP, the physical-mechanical properties of which are quite favorable from the constructional point of view.
The contemporary physical-geological phenomenon in the researched territory, in particular landslide ruins phenomena, no locational exertion or displacements thereof are seen, they are comparably expressed mainly by different forms of aeration. The groundwater level varies from 4,4m to 8,4m, their depth is in 1445,5-1457,4 absolute datum. From the tectonic point of view the researched territory is located in the 2nd zone of seismicity.

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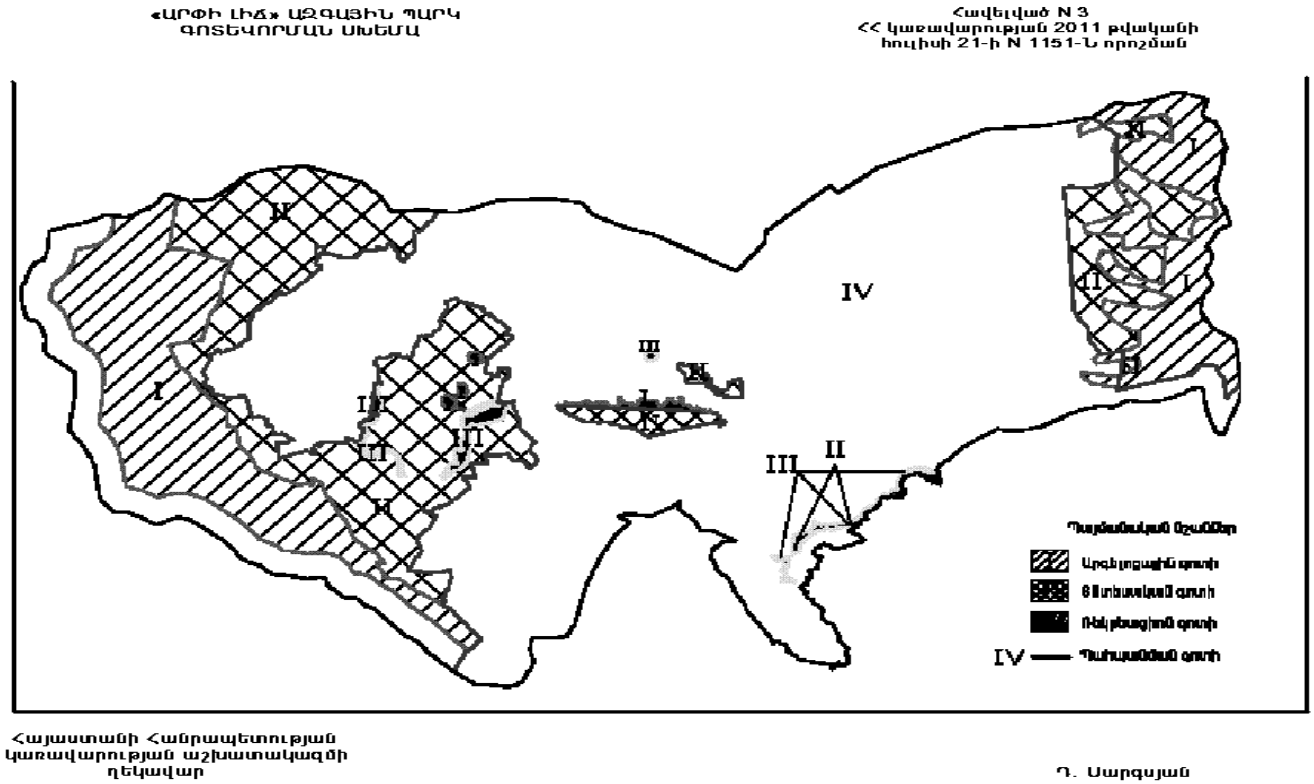
Engineer-geophysicist A.Danielyan

Annex 4

National Park “ARPHI LICH” Zoning Scheme



It may be noticed from the Scheme, that Bavra BCP is outside of the zone and is included in the buffer zone, outside of the National Park.