Environmental Impact Assessment (EIA)

Armenia:
North-South Road Corridor Investment Program
Tranches 2: Ashtarak-Talin road

March 2011

ABBREVIATIONS

ADB	Asian Development Bank
AARM	ADB Armenian Resident Mission
CO_2	carbon dioxide
EA	executing agency
EARF	environmental assessment and review framework
EE	environmental expertise
EIA	environmental impact assessment
EMP	environmental management and monitoring plan
IUCN	International Union for Conservation of Nature
LARP	Land Acquisition and Resettlement Plan
MFF	multi-tranche financing facility
MNP	Ministry of Nature Protection
MOC	Ministry of Culture
MOH	Ministry of Health
MOTC	Ministry of Transport and Communication
MPC	maximum permissible concentration
NGO	nongovernment organization
NO_2	nitrogen dioxide
NO	nitrogen oxide
NSS	National Statistical Service
PAHs	polycyclic aromatic hydrocarbons
PMU	Project Management Unit
PPTA	Project Preparatory Technical Assistance
RA	Republic of Armenia
RAMSAR	Ramsar Convention on Wetlands
REA	Rapid Environmental Assessment (checklist)
SEI	State Environmental Inspectorate
SNCO	State Non-commercial Organization
SO_2	sulfur dioxide
SPS	Safeguard Policy Statement (2009)
TOR	terms of reference
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization

WEIGHTS AND MEASURES

dBA	decibel (A-weighted)
km	kilometer(s)
km^2	square kilometer(s)
m	meter(s)
mg/m^3	milligram(s) per cubic meter
$\mu g/m^3$	microgram(s) per cubic meter

GLOSSARY

berd	castle (e.g., Zakari)
marz	province
marzpet	provincial governor
tuff	volcanic rock

NOTE

In this report, "$" refers to US dollars

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ANNEXES

PREAMBLE

The updates to Tranche 2 Project Environmental Impact Assessment (EIA) Document and to the Environmental Management Plan (EMP) of the North-South Road Corridor Investment Program (NSRCP) to be financed under the Multi-Tranche Financing Facility (MFF) of Asian Development Bank (ADB) are written here in conforme with the prescribed Environmental Assessment and Review Framework (EARF). Aside from the new description of Tranche 2 Project, all the chapters and sections of the document were lifted from and are reiterations of the NSRCIP, EIA Document of August 2010.

It should be understood that the previously approved EIA Document for Tranches 2 and 3 remains valid and serves as the basis for updating the separate EIA and EMP Documents for each of the Tranches 2 and 3. The updates to the EIA and EMP incorporates the new assessment based on the new road alignment from 29+600 km to end at 71+500 km and the recommendations generated during the public consultations undertaken for Tranches 2 and 3 (NSRCIP, Tranches 2 and 3 EIA Document, August 2010).

The Tranche 2 Project starts at km 29+600 in Ashtarak and end at km 71+500. The Project will upgrade the 2-lane road to a 4-lane divided highway with a total distance of about 41+900 km. Two bypasses will be constructed in Agarak starting at km 29+934 to km 32+600, and in Ujan from km 36+600 to km 40+300. The Project will also have a new road alignment (8.95 kilometres) at Khatnagbyur starting from km 59+950 to km 68+900 that will be located on the left side of the existing highway to join the existing alignment in Talin. The highway crosses 10 gorges, only four of which contain permanent water courses; the others are seasonal.

The report on Environmental Impact Assessment, and proposed mitigating and enhancement measures on the bio-physical environment and on archaeology, historical, natural, and cultural monuments recommends additional mitigation measures brought about by the new detail design of the alignment. The new road alignment was deemed necessary to avoid and minimize the potential impacts to the physical environment, flora and fauna, the archeological/historical and cultural resources occurring along the immediate vicinities of the pre-existing road.

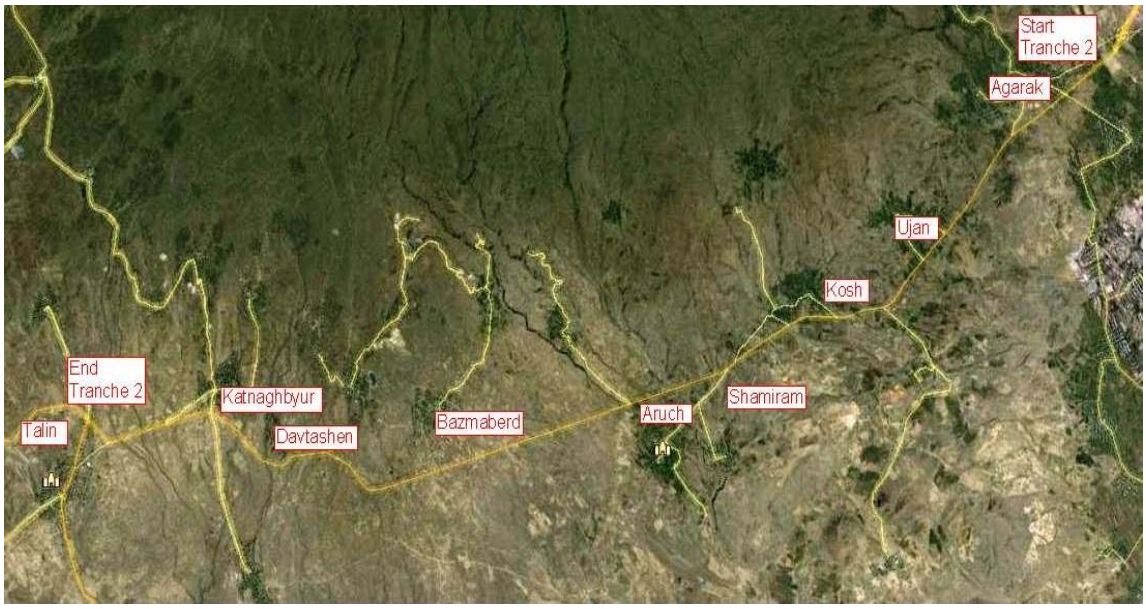
It has been assessed that most of the potential impacts will be during the Construction Stage; these will be temporary in nature and can be managed effectively with the updated mitigation measures. The EMP and monitoring program will be implemented by the contractor during the construction period. Moreover, appropriate environmental clauses will be included in the General Specifications of the civil works contracts to ensure the implementation of the EMP. The EMP, including Environmental Monitoring Plan will be incorporated into the bid documents and contract for civil works.

A. INTRODUCTION

In compliance to the Requirements of the SPS of 2009, the Ministry of Transport and Communication (MOTC) has agreed with the ADB on an Environmental Assessment Review Framework (EARF). In particular, Safeguard Requirements 1 and 4 apply to Tranche 2 Project of the North-South Road Corridor Investment Program.
Tranche 2 of the NSRCP will span some 41+420 km conversion of a 2-lane road to a 4-lane divided highway from Ashtarak to Talin as shown in Map-1, including the rehabilitation of the existing carriageway and construction of a second carriageway.

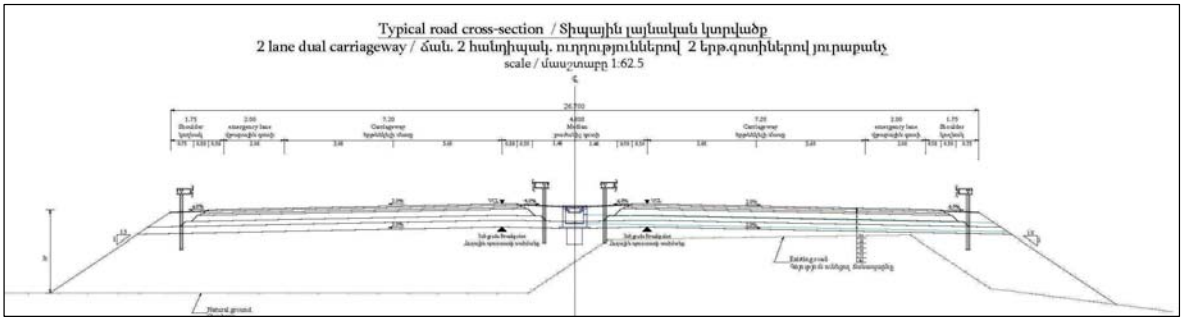
Tranche 2 Project of the North-South Road Corridor Investment Program will be financed by the ADB through the Multi-Tranche Financing Facility (MFF). The ADB has recently replaced its Environment Policy (2003) with its Safeguard Policy Statement or SPS (2009). The SPS of 2009 sets out the requirements for environment protection and environmental impact assessments and for specific lending modalities. The Appendix 1 and 4, i.e., requirements for environmental protection and the Special Requirements for Different Finance Modalities respectively are requirements to be complied with by Tranche 2.

The updates to this Environmental Impact Assessment (EIA) report is consistent with the EARF and based on the proposed changes in road alignment and technical design viz-a-viz to the archaeological sites, historical and cultural monuments located along and adjacent to the vicinities of the Tranche 2 road alignment.



Description of the Tranche 2 Project

The existing road and the new road alignment will be designed and constructed to standards that result in improved road markings, signage, safety, drainage, culverts, shoulders and 9 grade separated interchanges. Some of the existing road-beds that were built over a 30-year period are structurally sub-standard and will therefore be reconstructed as part of the upgrading exercise to form the new 4-lane divided highway.and have deteriorated and will therefore be reconstructed by improving the sub-grade and asphalt surface and a second 2-lane road will be newly constructed, together forming a 4-lane divided highway. Typical cross-sections through the existing and new road beds are shown in Figure 1 below.



The roads will be designed in accordance with Construction Norm of Republic of Armenia IV11.05.02-99 and Bridge Design Building Code SNIP 2.05.03.84. The structural elements of the project will be designed with consideration to the high risk of seismic activity and flooding in the region. This will enhance the sustainability of the project.

The design includes landscaping on the median and along the shoulders. Benefits of landscaping include enhancing ecological value, facilitating infiltration of run-off, enhancing visual aesthetics of the locality. Where trees must be cut, replanting will be undertaken and in agreement of local village heads.

The road design will include the communities' access to the existing road and will also have access to the new highway in both directions. Underpasses for pedestrians, cattle, agricultural and personal vehicles, and wild animals will be provided as necessary. Special cases that were brought to the attention of the EIA team during public consultations were passed on to the PMU.

B. POLICY, LEGAL, INSTITUTIONAL AND ADMININISTRATIVE FRAMEWORK

1. Armenian Laws Governing Environmental Management and Assessment

The 10th Article of the Constitution of the Republic of Armenia (passed in 1995) outlines the State responsibility for environmental protection, reproduction and use of natural resources. Some 33 relevant national laws have been promulgated to protect the environment. There are two main laws administered by the Ministry of Nature Protection: Law on the Principles of Environmental Protection (1991) and Law on Environmental Impact Assessment (EIA) (1995).

(ii) The Law on the Principles of Environmental Protection outlines the environmental protection policy of the Republic of Armenia. Its purpose is to ensure state regulation of environmental protection and use within the

territory of the Republic. It provides a legal basis for the development of environmental legislation regulating the protection and use of forest, water, flora and fauna, and the atmosphere. This law also grants every citizen the right to obtain reliable information on environmental conditions.

(ii) The Law on Environmental Impact Assessment contains the standard steps of the EIA process for various projects and activities in Armenia. In Articles 2-5 it establishes the general legal, economic, and organizational principles for conducting the mandatory state EIA of various types of projects and "concepts" of sectoral development, which includes construction and infrastructure. The Law forbids any economic unit to operate or any concept, program, plan or master plan to be implemented without a positive conclusion of an EIA. In addition, an EIA may also be initiated for projects that exceed "threshold" value requirements set by Governmental Decree N: 193 issued on March 30, 1999. The "special status" of a particular territory may also trigger a review of environmental impact. The Ministry of Nature Protection can initiate a review of environmental impact when it considers it necessary to do so. The EIA Law specifies notification, documentation, public consultations, and appeal procedures and requirements (Articles 6-11).

Other pieces of pertinent environmental legislation have also been considered during the assessment, which include specially protected natural areas, air protection, cultural and historical monuments, flora, fauna, water use, seismic defense, waste, hygiene, and workers' protection.

(i) Law on Specially Protected Areas (1991) outlines the procedures for establishing protected areas and their management. The Law defines four categories of protected areas in RA: (i) State Reserves; (ii) State Reservations; (iii) National Parks; and (iv) Nature Monuments.

(iii) Law on the Protection and Use of Fixed Cultural and Historic Monuments and Historic Environment (1998) provides the legal and policy basis for the protection and use of such monuments in Armenia and regulates the relations among protection and use activities. Chapter 1 - Any building, construction or site, cultural value that is fixed by the State (State Registration), is a monument and is under protection and preservation of the Government of the Republic of Armenia.

Chapter 13 - The recorded list of the monuments has a power of law and is a basis for giving an official status to the monument.

Chapter 19 - Any type of the construction activity in the areas containing historical monuments or archaeological sites must be realized in agreement with the authorized body (Ministry of Culture).

Chapter 20 - Newly discovered sites are immediately getting a status of protection and are protected by law till they will be included in the State Lists.

Article 15 of the Law describes procedures for - amongst other things – the discovery and state registration of monuments, the assessment of protection zones around them and the creation of historic-cultural reserves. Article 22 requires the approval of the authorized body (Department of Historic and Cultural Monuments Preservation) before land can be allocated for construction, agricultural and other types of activities in areas containing monuments.

(iii) Law on Flora (1999) and Law on Fauna (2000) outline Armenia's policies for the conservation, protection, use, regeneration, and management of natural populations of plants and animals, and for regulating the impact of human activities on biodiversity. These laws aim for the sustainable protection and use of flora/fauna and the conservation of biodiversity. The laws provide for assessing and monitoring species, especially rare and threatened species.

(iv) Law on Atmospheric Air Protection (1994 and last amended in 2007) regulates the emission licenses and provides maximum allowed loads/concentrations for atmospheric air pollution, etc. There is secondary legislation that establishes sanitary norms for noise in workplaces, residential and public buildings, residential development areas, and construction sites.

(v) Land Code (2001) defines the main directives for use of the lands allocated for energy production, water economy (water supply, water discharge, pumping stations, reservoirs, etc.), and other purposes. The Code defines the lands under the specially protected areas as well as forested, watered, and reserved lands. It also establishes the measures aimed at protection of the lands as well as the rights of state bodies, local authorities, and citizens towards the land.

(vi) Code on Underground Resources (2002) contains the main directives for use and protection of mineral resources and underground water, including the sanitary protection zones for the underground water resources.

(vii) Water Code (2002) provides the legal basis for the protection of the country's water resources, the satisfaction of water needs of citizens and economic sectors through effective management of water resources and safeguarding the protection of water resources for future generations. The Water Code addresses the following key issues: (a)responsibilities of state/local authorities and public, (b) development of the national water policy and national water program, (c) water cadastre and monitoring system, (d) public access to the relevant information, (e) water use and water system use permitting systems, (f) trans-boundary water resources use, (g) water quality standards, (h) hydraulic structures operation safety issues, (i) protection of water resources, and (j) state supervision. Adoption of the Water Code in 2002 generated the need for development of a number of Governmental regulations and procedures, including: (a) permitting procedures, (b) environmental flows, (c) drainage water use, (d) water alternative accounting, (e) access to information on trans-boundary water, (f) water use for fishery purposes, (g) reservation of underground water sources, (h) registration of documents in state water cadastre, and (i) public awareness and publicity of the documents developed by WRMA and other normative documents which provide guidelines directly linked with water and environmental issues.

(viii) Law on Water Users' Associations (WUA) and Federations of the WUAs (2002) The WUAs and federations of WUAs are established to effectively operate and maintain the irrigation infrastructure and provide for reliable irrigation water supply to members of the WUA, collect water payments and present and protect the rights of member water users. Within the objectives of the Association and Federation (Article 4) the following important issues from an environmental perspective could be mentioned: (a) operation and maintenance of irrigation systems; (b) implementation of construction works and restoration of watercourses and irrigation systems; (c) water supply management and pollution prevention; (d) implementation of activities necessary to improve the quality of land; and (f) providing ecological safety

through preventing land erosion, salinization, over-watering, and promoting the protection of irrigation system.

(ix) Law on Wastes (2004) provides the legal and economic basis for collection, transportation, disposal, treatment, and re-use as well as prevention of negative impacts of waste on natural resources, human life, and health. The law defines the roles and responsibilities of the state authorized bodies in the waste sector.

(x) Law on Environmental Oversight (2005) regulates the issues of organization and enforcement of oversight over the implementation of environmental legislation of Armenia and defines the legal and economic bases underlying the specifics of oversight over the implementation of environmental legislation, the relevant procedures, conditions and relations as well as environmental oversight in Armenia. The existing legal framework governing the use of natural resources and environmental protection includes a large variety of legal documents. Government resolutions are the main legal implementing instruments for environmental laws. The environmental field is also regulated by presidential orders, Prime-Minister's resolutions, and ministerial decrees.

(xi) Forest Code (2005) regulates the conservation, protection, and management of forests.

2. Armenia's Participation in International Environmental Conventions and Protocols

The Republic of Armenia has signed and ratified International Conventions, starting in1993 with the Ramsar Convention on wetland protection. Of particular significance to this project is that recently, Armenia has decided to adopt the IUCN Red Book in its entirety in favor of its Red Book that was based on the former Soviet Union definitions. This EIA report is based on the IUCN Red Book, which is expected to be formally adopted later in 2010. Table 1 lists the global and regional multilateral international environmental agreements signed and/or ratified by Armenia.

Table 1: Environmental Conventions and Protocols signed and/or ratified by Armenia

Title, place and date adopted	Signed	Ratified by National Assembly
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971) - aka Ramsar Convention		1993
UN Convention on Biological Diversity (Rio de Janeiro, 1992)	1992	31 Mar 93
- Cartagena Protocol on Bio-safety		15 Mar 04
UN Framework Convention on Climate Change (New York, 1992)	1992	29 Mar 93
- Kyoto Protocol (Kyoto, 1997)		27 Dec 02
Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)		1993
UNECE Convention on Long-range Trans-boundary Air Pollution (Geneva, 1979)		14 May 96
- Protocol on Heavy Metals	14 Dec 98	
- Protocol on Persistent Organic Pollutants	14 Dec 98	
- Protocol on Abate Acidification,	01 Dec 99	

Title, place and date adopted	Signed	Ratified by National Assembly
Eutrophication and Ground-level Ozone Formation		
UNECE Convention on Environmental Impact Assessment in a Trans-boundary Context		14 May 96
- Protocol on Strategic Environmental Assessment (Kiev, 03)	21 May 03	
UNECE Convention on Trans-boundary Effects of Industrial Accidents (Helsinki, 1992)		14 May 96
- Protocol on Civil Liability and Compensation for Damage caused by Trans-boundary	21 May 03	
UN Convention to Combat Desertification (Paris, 1994)	1994	
UN Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal (Basel, 1989)		26 Mar 99
Convention for the Protection of the Ozone Layer (Vienna, 1985)		28 Apr 99
- Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal, 1987		28 Apr 99
- London Amendments to the Montreal Protocol		22 Oct 03
- Copenhagen Amendments to the Montreal Protocol		22 Oct 03
UNECE Convention on Access to Information, Public Participation in Decision Making, and Access to Justice in Environmental Matters (Aarhus,1998) - aka Aarhus Convention	1998	14 May 01
Convention on the Prohibition of Military or Any Hostile Use of Environmental Modification Techniques (Geneva, 1976)		04 Dec 01
- The Protocol on Pollutant Release and Transfer Registers (Kiev, 2003)	21 May 03	
Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam, 1998)	1998	22 Oct 03
UNECE Convention for the Protection and Use of Trans-boundary Watercourses and International Lakes (Helsinki, 1992)	1998	22 Oct 03
- Protocol on Water and Health (London, 1999)	17 Jun 99	
Stockholm Convention on Persistent Organic Pollutants (Stockholm, 2001)	23 May 01	22 Oct 03
European Landscape Convention (Florence)	14 May 03	23 Mar 04
Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property		22 Jun 93
Convention Concerning the Protection of World Culture and Natural Heritage		22 Jun 93
European cultural convention		22 Jun 93
European Convention for the Protection of the Archaeological Heritage	18 Jun 05	
Convention for the Protection of the Architectural Heritage of Europe	19 May 06	
Convention for Protection of Non-material Cultural Heritage		20 Mar 06
Bern Convention - Council of Europe Convention on	2006	

Title, place and date adopted	Signed	Ratified by National Assembly
the Conservation of European Wildlife and Natural Habitats (Bern, 1979)		

3. National Institutional Framework

The roles of government agencies that could be involved in the Tranche 2 project from an environment perspective are described below.

Ministry of Transport and Communication

(i) The Executing Agency (EA) is the Ministry of Transport and Communication (MOTC). Ministry of Transport and Communication is a republican body of executive authority, which elaborates and implements the policies of the Republic of Armenia Government in the transport, communication, and information technologies sectors.

(ii) The MOTC will be monitored by the Project Governing Council, whose key functions include guiding the overall policy and strategic direction of the MFF program, reviewing and evaluating its performance, and coordinating with other external aid agencies.

North-South Road Corridor Investment Project Implementation Unit SNCO

(i) The MOTC set up a North-South Road Corridor Investment Project Implementation Unit SNCO to manage day-to-day coordination, implementation, monitoring and administration activities of the project.

(ii) Project Implementation Unit includes Department on Safeguards, Resettlement and Environment consisting of 3 persons.

Ministry of Nature Protection

The Ministry of Nature Protection (MNP) is responsible for the protection, sustainable use, and regeneration of natural resources as well as the improvement of the environment in the Republic of Armenia. In those areas, the MNP's authority includes overseeing national policy development, developing environmental standards and guidelines, and enforcement. The MNP implements those functions through its structural departments.

The key subordinate structures within the MNP that have administrative authority over the EIA and the project approval process are:

(i) The Environmental Expertise SNCO Nature Protection Expertise (EE) is responsible for reviewing and approving EIA reports and projects for implementation and adding conditions when necessary to protect the environment; and

(ii) The State Environmental Inspectorate (SEI) is responsible for inspecting projects to ensure compliance with conditions imposed by the NPE and with the project EMP.

The EIA process and the SEI's power to inspect are the principal tools used by the MNP to achieve compliance with environmental protection principles.

The Ministry of Culture

The Ministry of Culture has jurisdiction over archaeological, historical, and cultural sites. It is not, however, involved with the fate of modern monuments erected along the highway by private citizens in commemoration of accident victims. The relocation of those monuments will be coordinated by the respective provincial authority (*marzpets*).

Ministry of Energy and Natural Resources

The Ministry of Energy and Natural Resources (MoE) is a state body of executive authority, which elaborates and implements the policies of the Republic of Armenia Government in the energy and natural resources management sector. The MoE implements the functions related to natural resources management through the following structural departments:

- Geological Agency
- Mineral Resources Agency

Ministry of Health

State Hygienic and Anti-epidemiological Survey of the Ministry of Health of RA is responsible for the following actions implementation:

- Coordination of all issues related to health (including those on noise and vibration);
- Supervise implementation of sanitary norms, hygienic and anti-epidemiological measures implementation by organizations and citizens.

Ministry of Territorial Administration

Marzpetarans (regional administration bodies) are responsible for administration of roads under the regional jurisdiction.

State committee on water system as a structural body in the Ministry of Territorial Administration is authorized body of management of water structures.

State Committee of the Real Estate Cadastre

The State Committee of the Real Estate Cadastre adjunct to the RoA Government is a republican body of executive authority, which elaborates and implements the policies of the Republic of Armenia Government in the area of maintaining the unified national cadastre of immovable property.

D. ENVIRONMENTAL ASSESSMENT OF TRANCHE 2 PROJECT

It may be reiterated here that the Environmental Assessment of Tranche 2 Road Project was prepared by the Ministry of Transport and Communications (MOTC) of Armenia for Asian Development Bank (NSRCIP, Tranches 2 and 3 EIA Document, dated August 2010). The governing council has given its non-objection for posting the EIA on ADB's website by letter of 2 August 2010. The EIA Document remains to be valid and serves as the "mother document" of the EIA and EMP updates of this document.

In compliance to the requirements of the ADB's Safeguard Policy Statement (June 2009), prepare the final EIA report in accordance with ADB's manuals/guidelines and legislation of the Republic of Armenia, assist the PMU in actions for getting approvals for the EIA and EMP (conclusion from Environmental Expertise SNCO under the RA Ministry of Nature Protection, agreement on route with the RA Ministry of Culture, etc.).

The updates to the EIA Document has been undertaken to satisfy both the ADB and RA requirements with regard to environmental protection and management. The report is structured consistent with ADB's *Safeguard Policy Statement* (2009).

1. Highlights of the NSRCIP, Tranches 2 and EIA Update Document

The updates to the Environmental Impact Assessment and Environmental Management Plan (EIA and EMP) were prepared by the environmental team of EGIS-BCEOM composed of 2 national specialists (Environmental Specialist and Archeologist) with 1 international Environment Specialist. The team conducted the revalidation and reassessment of the different impacts of Tranche 2 may have on the environment and on the archeological, historical and cultural resources located along and/or immediately adjacent along the Project's road alignment. These activities were undertaken during the months of October, November and December 2010 and in February 2011 to consider the changes and new decisions made for Tranche 2 Project.

Updates to the EIA document went through the process of field evaluation and reassessment of the impacts of Tranche 2 Project and within the context of EIA procedures for the Project the following desk and field activities were performed:

(i) Review of the EIA Document (Aug. 2010), detail design, progress reports and relevant project documents
(ii) Identification of environmental values along the Tranche 2 road alignment
(iii) Assessment of the potential impacts, issues and constraints of road construction works on the environment and on the Physical Cultural Resources (PCR)
(iv) Update of the Environmental Management Plan (EMP) and Monitoring Plan

Field surveys and site inspections included driving the route of the existing road and walk through the sites/areas of environmental, archaeological, historical, and cultural interest, including those likely to be impacted.

Baseline data and other information from published and unpublished sources including climate, topography, geology and soils, natural resources, flora and fauna, and socio-economic data have been reviewed and verified during the field investigations. Supplemental data on historical-archaeological monuments, and monuments of religious, aesthetic, cultural significance (cultural monuments) including flora and fauna were also gathered.

2. Screening

Every sub-project of this MFF program was screened to determine its environmental category based on the ADB's Rapid Environmental Assessment Checklist (REA). A completed REA is in Annex 1. Classification is based on the most environmentally sensitive component, which means that if one part of a sub-project has the potential for significant adverse environmental impacts, then the sub-project is to be classified as environmental category "A" regardless of the potential environmental impacts of other aspects of the sub-project. The sub-project has been classified as category "A" because (i) most of the additional lanes will be located in a new right-of-way and (ii), several significant archaeological sites as well as one specific environmentally sensitive area and several others will be adversely affected and will require special mitigation measures to minimize the impacts.

3. Description of the Environment (Baseline)

Ecology

- This EIA has determined that except for one important wetland, which requires special protection measures, the impact on the environment – sparse flora and fauna – is relatively benign and can be mitigated through routine design changes and construction measures that are summarized in the Environmental Management and Monitoring Plan (EMP).

- There are, however, areas in which endangered and critically endangered Red Book species have been found. Species in those areas will receive special attention to satisfy Armenia's Law on Flora (1999) and the requirements of the Red Book.

- Incremental CO_2 emissions are estimated at 140 t/year; i.e., significantly less than the SPS (2009) threshold of 100,000 t/year.

Archaeology

- Armenia being where and what it is - a veritable treasure house of antiquity – the EIA also determined that the impact on archaeological, historical, and cultural sites and monuments is widespread and requires special consideration. A desk study indicated 21 areas of interest. The field survey verified those areas and added many additional points of interest. The EIA team found 14 previously unknown archaeological/historical sites, one of which yielded a fragment of a terra cotta clay figurine that was identified to belong to the middle Bronze-age (ca. 500 BC). To safeguard the most important eight of the sites, this report and the EMP contains several types of responses ranging from realignment to chance-find procedures.

a. Geographical Location and Relief

The Ashtarak – Talin highway is located in Aragatsotn and pass along the dry steppe and steppe landscape zones. It runs through flat and rolling terrain. Within 20 km from Ashtarak the elevation increases from 900 m to 1400 m above sea level (asl) as the alignment enters the Aragatsotn Plateau.

The highway passes Shahverd, Amberd, Karkachun, Karmraqar and other seasonal small rivers and brooks as well. Over time, watercourses have produced several gorges and lowlands in Aragatsotn *marz,* which the highway crosses.

The area between the floodplains of the Shahverd and Amberd rivers and a part of Shirak plateau are covered by layered sediments from lakes, rivers, floods, and other sediments of the Upper Pliocene and Pleistocene eras.

Geology and Seismology

Much of the highway is located adjacent to the edges of the volcanic Aragats mountain range that is composed of upper Paleogenic andesite-basalt, andesite-dacite, and tuff[8]. The terrain is characterized by many slag cone hills and polygene volcanoes. The lower layers of volcanic flows in some isolated areas typically contain liparite-perlite-obsidian and sometimes pumice. The lava flows occurred mainly in southerly and south-western directions. They are generally covered by a thick layer of erosion products including rock fragments and clayey soils.

The highway is located in a seismic area (8-9 on the Richter scale and maximum horizontal acceleration of 0.4 g, presenting a high degree of seismic risk along existing fault lines. There was a serious earthquake in 1988 in the north of the country, measuring 6.9 on the Richter scale, which led to a large loss of life and property value. Detail design of bridges, culverts, underpasses, and embankments will include seismic considerations.

b. Climate, Air Quality, and Noise

Baseline conditions, against which any change is measured for the components of the environment likely affected by the sub-project, were established through available data and data obtained by on-site measurements. This includes the collection and analysis of background noise, and air and water quality. These data were collected by *bona fide* technical and scientific institutes and are therefore readily traceable.

Climate

A dry continental climate is typical for the highway section in Aragatsotn *marz*. In July, the average air temperature varies between 20 and 24^{0}C. The maximum summer temperature reaches up to 40^0 C. The number of days with temperatures of over 10^0 C is 180-200. The average air temperature in January varies between -4 and -6^0 C. The minimum temperature is as low as -34^0 C. The duration of stable snow cover is 1-3 months on average. The number of non-frosty days varies between 200 and 240. The annual precipitation is 300-400mm, in some sites 400-500 mm. The annual evaporation is 900-1100 mm and the average relative humidity varies from 40% in summer to 75% in winter, both indicative of the semi-arid to arid conditions. Wind directions are mainly northerly and south-easterly.

The maximum summer temperature reaches 34^0 C. The number of days with temperatures of over 10^0 C is 150-180. The average air temperature in January varies between -8 and -12^0 C. The minimum temperature is as low as –40^{0}C. The duration of stable snow cover is 2-3 months on average. The number of non-frosty days varies between 140 and 160 and in a few places, 220 days. The annual precipitation is 400-500 mm. The annual evaporation is 800 to 900 mm, and the average relative humidity varies from 44% in summer to 80% in winter. Wind directions are mainly northerly and north-easterly but are said to be persistently in one direction, which can cause inordinate snow build-up in winter. To reduce such build-up, it has been suggested to install movable wind deflectors that were reportedly successful.

Air Quality

The air quality in Armenia is monitored by "Environmental Effect Monitoring Center" SNCO (a.k.a. Armecomonitoring) under the MNP. It operates the air quality measurement automatic station in Amberd, on Mount Aragats, as part of the *European Monitoring and* Evaluation Programme. Armecomonitoring air quality monitoring specialists were engaged to provide the air quality baseline data for this EIA study.

Yerevan is the closest cities to the project where air quality is routinely monitored. The closest station in Yerevan from the beginning of project site is approximately 19.5 km and Amberd station from the highway is approximately 11 km.

Specialists from Armecomonitoring were engaged to obtain and analyze air quality samples at all communities with potential receptors located no more than 250 m from the highway. Sampling was done under the supervision of Armecomonitoring's Deputy Director S. Minasyan.

Sulphur dioxide (SO_2) and nitrogen dioxide (NO_2) concentrations were measured in receptors representative of the 6 communities close to the highway (Agarak, Ujan, Kosh, Davtashen, Katnaxbyur, and Talin). Measurements were taken from 9 June 2010 to 16 June 2010. Armecomonitoring were unable to provide dust and aromatics data as they have no suitable equipment. Also, there is no such equipment in Armenia.

Table 2 summarizes the measurements. The table compares the maximum permissible concentration (MPC) of air pollutants based on the Armenian standard *Maximum Permissible Concentration (MPC) for Ambient Air in Human Settlements*. The table indicates that the daily average concentrations are consistently and significantly below the MPC. Because these measurements indicate very good air quality, compared to the Armenian standard, it is suggested that no further baseline data are necessary. It is also presumed that the one location for which no measurements were obtained because of equipment failure be waived as it can be assumed that the air quality there is comparable to the air quality in the other 5 locations. Map IV-1 shows the locations of the monitoring positions.

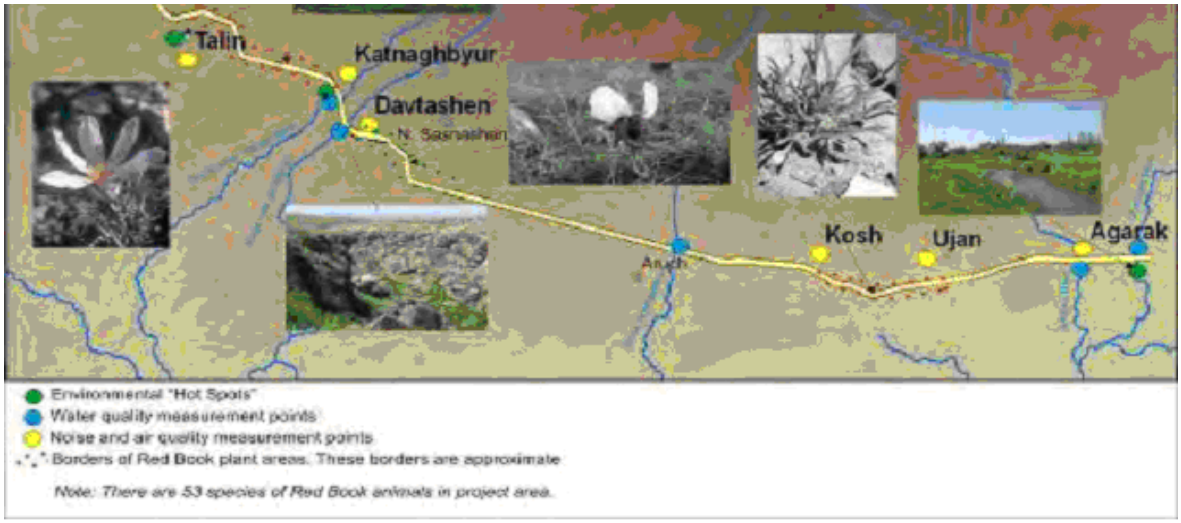
Table 2: Measured Air Quality Parameters

Community	Measured Parameters at road (mg/m_3)	
	SO_2	NO_2
Agarak	0.0104	0.0122
Ujan	0.0080	0.0098
Kosh	0.0096	0.0073
Davtashen	0.0072	0.0048
Katnaghbyur	0.0040	0.0056
Talin	0.0048	0.0035

MPC (mg/m_3)[b]	Parameters measured at receptor (mg/m_3)	
	SO_2	NO_2
Single event	0.50	0.085
Daily average	0.05	0.040

[a] The NO_2 measurement at Lusakert was unavailable because the meter malfunctioned. [b] Source: *Maximum Permissible Concentration (MPC) for Ambient Air in Human Settlements*, Republic of Armenia government decision N160-N, 02.02.2006.

Map 2: Monitoring Locations & Environmental Areas of Interest



Greenhouse Gas Emissions

The project (Tranches 2) will add significantly less CO_2 per year than the SPS (2009) threshold of 100,000t/year. Based on actual and projected traffic counts and the assumptions in Table 3, the estimated increase in CO_2 emissions due to increased traffic is less than 140t/year.

Table 3: Data and Factors for CO_2 Emission Calculation

		Ashtarak ~ Talin
Average annual traffic count[a]	PCU	6,402
Projected 2032 traffic count [a]	PCU	18,820
Percent gas powered	%	40%
Distance	km	40
Gas efficiency	L/100km	10
Diesel efficiency	L/100km	7
CO_2 emission gas	kg/L	2.32
	kg/L	2.67

[a] TA7208-ARM Preparing the North-South Road Corridor Development Project, Final Report, Vol. III, PADECO Co., Ltd.

Noise

Representative receptors of the 6 communities that are within 250 m of the existing or planned highway are affected by noise from traffic and potentially, from construction activities. Noise measurements were taken at all 6 locations between 4 and 10 June 2010. Two sets of measurements were taken. The first sets were at the existing highway during traffic and the second, 20 m towards the nearest receptor. Map 2 shows the locations of the survey positions – same as for air quality monitoring. Measurements are in Annex 7 and a summary of the measurements is given in Table 4 below.

Table 4: Summary of Measured Noise Levels & Maximum Permissible Noise Levels

Community	Average Daytime Noise Level at road		Average Daytime Noise Level 20 m from source	
	dB LAeq15min	dB LAmax15min	dB LAeq15min	dB LAmax15min
Agarak	68	**83**	65	**79**
Ujan	70	**81**	67	**79**
Kosh	70	**85**	66	**81**

Davtashen	67	**80**	65	**78**
Katnaghbyur	68	**81**	66	**78**
Talin	71	**94**	67	**84**

Receptor	**Time (hours)**	**Maximum Permissible Noise Levels[a]**	
		dB L_{Aeq}15min	**dB L_{Amax}15min**
Near residential dwellings	06.00 ~ 22.00	55	**70**
Institutional buildings	22.00 ~ 06.00	45	**60**

Source: Ministry of Health, Republic of Armenia, Order N138, 6 March, 2002, Order on adoption of N2-III- 11.3 sanitary norms "Noise in workplaces, apartment and public buildings, territories of urban construction"

Comparing the results with the maximum permissible noise levels established by the Ministry of Health, it is obvious that average ambient noise levels taken 20 m from the highway are significantly above the limits at all 6 locations.

Time and resources were not available to model the expected noise levels at all receptor locations; however, the experts from the Sanitation and Hygiene Department who were engaged to conduct this noise monitoring advised that in their opinion, noise levels at the receptors would be above the limits for all of the 6 . In their opinion, the expected increase in traffic may not increase the noise levels; however, the expected increase in the speed limit will undoubtedly raise the average speed and with it, the noise levels. All receptors would be affected; however, it is unclear by how much.

c. Hydrology and Water Quality

Hydrology

a. Rivers

The watercourses in the project area are Shahverd and Amberd, and are the main rivers crossed by the highway. There are also some brooks which are mostly dry during summer months including Agarakadzor brook and brooks near Davtashen and "Zakari *berd*" archeological site. Table 5 shows some physical characteristics of the three rivers.

Table 5: Some Indicators of Water Courses Crossing the Ashtarak-Gyumri Highway

Name of river	Flows into	Source m	Outlet elev. m	Length km	Grade % (avg.)	Area km^2
Shahverd	Qasakh R.	3300	990	28	8.2	162
Amberd	Qasakh R.	3700	955	36	7.6	141

Source: L. A. Chilingaryan, B. P. Mnatsakanyan, K. A. Aghababyan, H. V. Tockmajyan "Hydrology of Rivers and Lakes in Armenia", Yerevan, 2002

There is no available information on the hydrology of Shahverd and Amberd rivers and the various brooks in the project area.

c. Lakes and Reservoirs

There are no lakes near the highway; the closest, L. Ashnak, is 5.5 km from the highway. The alignment is in areas with dry continental climate where cultivation without irrigation is practically impossible. Consequently, there are several water reservoirs in nearby communities: N. Sasnashen, Davtashen, and V. Bazmaberd, which are 1.3 to 5.6 km from the highway and thus, will not be impacted by the project. The reservoir North of Talin is about 140 m from the highway and thus, could be impacted by the project.

d. Wetlands

Shahverd wetland - According to the report, the wetland in the floodplain of Shahverd River is a system of small marshes and is classified as follows:

Ramsar wetland classification **Tp** (Permanent freshwater marsh/pool) Type **M** (Permanent stream)

This wetland performs various functions, it: (i) mitigates microclimate, including that of adjacent areas (private orchards); (ii) has a beneficial effect on the river flow by attenuating floods, thereby providing greater water security and flow regulation; and (iii), consists of floodplain marshes that provide a wide range of habitats for many wetland-dependent species.

This wetland is of local ecological, social, and economic importance since it is located in a dry steppe region, which makes it rare and thus, valuable. The wetland also has special aesthetic value, especially during the summer, providing a green spot of life on the background of dried steppe vegetation. The wetland is not, however, a Ramsar site nor a protected area.

e. Groundwater

In Aragatson *marz*, groundwater along the alignment is at depths of 120 to 150 m (Source: EMP for Rehabilitation of Talin Main Canal, MCA-Armenia Program to facilitate Poverty Reduction Through Economic Growth).

Water Quality

Water quality in Armenia is also monitored by Armecomonitoring, with monitoring stations on the Shahverd River (Station N 50, 0.5 km upstream from Parpi community, approximately 4.3 km from the highway).

Armecomonitoring provided monitoring data from February 2007 to November 2009 for the two nearest rivers. The data in Annex 9 show that several maximum permitted concentrations (MPCs) were exceeded during that period. The Shahverd River station registered exceedences for BOD5, COD, DDD, heptachlor, Cu, Fe, Zn, TSS. Table 6 shows the maximum exceedences. A dash indicates that there was no exceedence of the parameter during the period.

Table 6: MPC Exceedences in Shahverd & Karkachun Rivers

Parameter	MPC[11]	Unit	Shahverd River 0.5 km upstream from Parpi community	
BOD_5	3	mg/L	15/10/08	5.7
COD	30	mg/L	14/08/09	34
DO	>6	mg/L	-	-
DDD	0.01	µg/l	15/05/09	0.025
DDE	0.01	µg/l	-	-
DDT	0.01	µg/l	-	-
Heptachlor	0.01	µg/l	13/03/08	0.024
Ca	180	mg/L	-	-
Cu	0.001	mg/L	13/03/08	0.003
Fe	0.5	mg/L	11/04/07	0.505
Mg	40	mg/L	-	-

Na	120	mg/L	-	-
SO_4^{-2}	100	mg/L	-	-
Zn	0.01	mg/L	11/04/07	0.018
NH_4^{+1}	0.5	mg/L	-	-
NH_4^{+1} (N)	0.39	mg/L	-	-
NO_3^{-1}	40	mg/L	-	-
NO_3^{-1} (N)	9	mg/L	-	-
NO_2^{-1}	0.080	mg/L	08/05/08	0.126
NO_2^{-1}(N)	0.024	mg/L	11/04/07	0.036
TSS	30	mg/L	15/10/08	80.1
pH	6.5-8.5	$-\log_{10}[H^+]$	15/02/07	8.59

MPC[11]: Armecomonitoring uses former Soviet MPCs (Ministry of Fish Industry of USSR, M. VNIERKH, (1990), "Integrated list of MPCs and nearly safe levels of influence of pollutants on water in fishing reservoirs", p.44). Some of these standards are significantly different from, for example, USEPA standards (the most striking is copper, for which USEPA and other standards cite 1.0 mg/L in drinking water while the MPC here is 0.001 mg/L; i.e., a factor of 1000. By contrast, distilled water can contain 10 mg/L Cu.). Reportedly, Armenia has also banned the use of listed insecticides and pesticides although concentrations appear to persist due to run-off from areas where such chemicals have been used previously. The EIA team learned from a representative of the Water Resources Management Agency, a group that is responsible for water quality standards in the Ministry of Nature Protection, that new standards have been drafted following the EU Water Framework Directive (2000/60/EC) and that these new standards are expected to be promulgated by government decree later this year. The EIA team was unable to obtain a copy of the draft standards.

Specialists from Armecomonitoring were engaged to obtain and analyze physical chemical and biological water quality samples of all 7 streams that are crossed by the existing and new highway and the samples were analyzed in Armecomonitoring's laboratory under the supervision of Deputy Director S. Minasyan and Head of Water Monitoring Program G. Shahnazaryan from 6 to 23 June 2010. Those streams are the Shahverd, Amberd rivers, Agarakadzor brook, and brooks near Davtashen, "Zaqari *berd*" archeological site.

Sampling showed that vanadium concentrations in all watercourses exceeded MPCs. Aluminum exceeded in all places except Agarakadzor and copper concentrations less than permissible limits only in Amberd and brook near Davtashen. Concentrations of total suspended solids are high in the brooks near "Zaqari *berd*" archaeological site. Boron concentration exceeded MPC in Shahverd, Agarakadzor. Table 7 shows all occurrences of MPC exceedence.

Table 7: MPC Exeedences in Sampled Watercourses

Name Of watercourse	Date Of sample	TSS	DO	$NO2^{-1}$	$NO2^{-1}$ (N)	$NH4^{+1}$	$NH4^{+1}$ (N)	BOD_5	B	Al	V	Cr^{+6}	Mn	Ni	Cu
MPC (mg/L) >>>		30	>6	0.08	0.024	0.5	0.39	3	0.018	0.04	0.001	0.001	0.01	0.01	0.001
Shahverd	06/09/10								0.080	0.084	0.006				
Amberd	06/09/10									0.097					
Agarakadzor	06/09/10								0.033		0.010				0.002
Davtashen	06/09/10									0.076	0.007				
Zakari *berd*	06/09/10	38.4								0.083	0.009				

These are representative measurements taken during the EIA period. It may be necessary to analyze additional samples over a longer period to understand the actual level of water pollution in the project area's rivers.

Most surface water in the region is considered aggressive and the choice of concrete mix during detail design of bridges and underpasses, as well as concrete roadways if that is the final choice of pavement surface, should take that into consideration.

d. Soils, Erosion, and Land Contamination

The highway passes through arid steppe and steppe soil zones. These zones are highly cultivated, with only small patches of natural landscape. Cultivation is achieved in brown and black soils.

Brown soils - These soils are generally found between the start, near Ashtarak. They have the following, typical properties: (i) average humus content of about 3%; (ii) contain rock debris; (iii) show a clearly developed, partially cemented eluvial-carbonate layer; (iv) slightly alkaline (pH 7.4 - 8.5); absorption properties (30 – 35 mg-eq/100 g soil); saturated with alkalies; and (v), unfavorable hydro-geologic properties.

There are no available data on land contamination in the project area. There is, however, a visible source of contamination caused by *tuff* mining near the Zaqari *berd* archaeological site. All mining waste has been dumped directly into the near-by gorges. The contractor will be restrained from imitating that practice in the EMP.

e. Biodiversity

1. Flora

While most of the landscape in the project area has been transformed for agricultural use, the EIA team investigated 20 locations where typical indigenous plant species abound. The following types of plants are found in the project area. Some of them were identified by scientists in the Botanical Institute of the National Academy of Science.

a. Iranian-turanian phryganas

Iranian-turanian phryganas consists of formations of Artemisia fragrans mostly. There are many steppe flora types here, but the essential part are phryganoid vegetation (Kochia prostrata, Teucrium polium, T.orientale, Xsranthemum squarrosum, Achillea, Adonis, Taracsacun, Thymus, Campanula, Vicia, Verbascum). There are also bushes (Paliurus) and tragacanth astragaluses (Astragalus kotschyanus, A.rariflorus).

b. Mountain steppes

Mountain steppes are presented in three formations: Stipa, Festuca, and Bromus steppes.

(i) The dominant grass is Stipa tirsa. Only a few natural areas survived on typical rich, humus black earths. In some places, Stipa lessingiana and S.pulcherrima accompany the dominant grass.

(ii) The dominant species of Festuca formations are Festuca (Festuca valesiaca ssp. Sulcata and F.ovina). These formations cover areas with low percent humus black earths. In some places, Stipa lessingiana, Bothriochloa ischaemum, Koeleria cristata, Agropyron cristatum, Poa, Bromus, Trifolium, Medicago, Plantago, Taracsacum, Achillea, Betonica, and Thimus accompany dominant species. Verbascum, Prangos, Euphorbia, Sanguisorba, and Efedra are often found in small areas.

(iii) The dominant Bromus formations are Bromus variegates that have survived in small areas. The coexisting types are F.ovina, Koeleria cristata, Poa bulbosa, and sometimes Stipa lessingiana, S. pulcherrima, Artemisia fragrans, Achllea, and Plantago. Also registered are Tragopogon, Taracsacum, Betonica, Vicia, Trifolium, Cirsium, Verbascum, Euphorbia, Papaver, from bushes- Rosa, Paliurus, rarely-Tamarix and Acantholimon.

c. Tragacanths

Tragacanths are widespread in many places. The most typical tragacanths are Astragalus microcephalus, A.aureus, A.lagurus, and A.erinaceus, which are accompanied by Acantholimon.

d. Steppe bushes

These formations are comparatively few. The dominants are Spiraea and Spiraea hypericifolia.The coexisting types are Asphodeline traurica, Asyneuma virgatum, Allium decipiens, A.rupestre, Asperula affinis, and also Rosa, Lonicera, Rahmnus, Paliurus, and Crataegus.

e. Steppe meadow

Steppe meadow is presented by four formations: Festuca ovina, Koeleria critstata, Phleum phleoides, and forb steppe meadows.

(i) Festuca ovina formation develops on thick steppe meadow black earths. Depending on the elevation, coexisting species are steppe and meadow plants.

(ii) Koeleria cristata formation occupies small areas, mainly on steep and dry slopes. Accompanying species are typically steppe meadow zone plants.

(iii) Phleum phleoides formation is very typical in Aragatsotn *marz*. It develops on typical brown steppe meadow soils.

(iv) Forb steppe meadow formations occupy slopes with different grades and locations. Dominant plants are usually Cephalaria gigantean, Scabiosa caucasica, S. bipinnata, Achillea setasea, Artemisia absinthium, Anteriscus nemorosa, and Galium verum. Medicago L. and Trifolium L. can also be found.

f. Hydrophilous vegetation

This vegetation is widely spread throughout Armenia, but it does not cover large areas. It is growing in floodplains of rivers, gorges, and lowlands. The dominant species are Phragmites australis, Typha latifolia, and Juncus inflexus.

g. Forest vegetation

In Aragatsotn *marz*, there are islands of arid low forests in the Ashtarak region. All of these areas were covered by forests; however, agriculture has displaced most forested areas.

In some sections, trees and bushes are growing along the highway. Among these trees have been registered Populus, Robinia, Acer, Salicx, Morus, Armeniaca, Crataegus, Pyrus salicifolia, Berberis, Fraxsinus excelsior, F.oxycarpa, Spiraea crenata, Berberis orientalis, Cotoneaster integerrima, Lonicera iberica, Ephedra procera, Jasminum fruticans, Ulmus, Prunus, Elaeagnus, Paliurus, and Rosa.

h. Red Book species

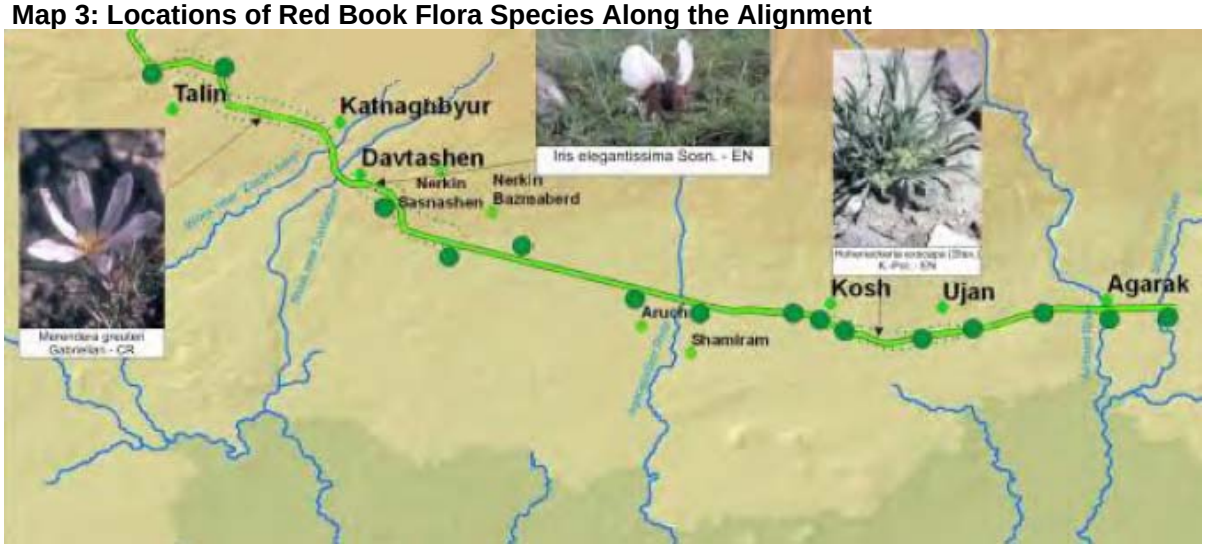
The following three species that are registered in the Armenian Red Book can be found in the project area:

(i) **Hohenackeria exscapa (Stev.) K.- Pol.** is also registered as EN and is, therefore, also facing a very high risk of extinction in the wild in the near future. Its habitats are near Kosh and Ujan.

(ii) **Merendera greuteri Gabrielian** is registered as CR; i.e., critically endangered. That means that this species is facing an extremely high risk of extinction in the wild in the immediate future. It is said to be endemic in Armenia but reportedly found only in Shirak floristic region. The territory of its living and spreading is less than 10 km2. Its habitats are near Talin and Katnakhbyur.

(iii) **Iris elegantissima Sosn.** Is also registered as EN and is, therefore, also facing a very high risk of extinction in the wild in the near future. It is said to be endemic in the Caucasus. The only known habitat is West of Ashtarak, near Davtashen, where a new population of the species was found by the EIA team archaeologist, Boris Gasparyan, during the archeological field investigations.

Map 3: Locations of Red Book Flora Species Along the Alignment



Special mitigation measures are in the EMP to minimize the negative impact on flora and to avoid any detrimental effect to Red Book plants, which are specifically protected by law.

2. Fauna

An investigation was undertaken by a zoologist to identify animal species living in the project area and particularly to identify protected species and the potential impact from the project on them. Animals, due to their mobility, have vast habitats; however, there are some species associated with more defined places and zones.

Amphibians and reptiles are represented by different species of toads, frogs, lizards, and snakes.

Among mammals, widely spread species are hare (Lepus europaeus), fox (Vulpes vulpes), wolf (Canis lupus) and a number of representatives of rodents; meadow mouse (Msubterraneus), and marten (Martes foina).

According to the zoologist's report, 7 insect, 2 fish, 6 reptile, 15 bird, and 7 mammal protected species are present in the project area and are thus potentially affected by the project. Special measures are included in the EMP to avoid negative impact on fauna representatives and especially on protected species.

f. Environmental Protected Areas and Natural Monuments

There is no preserve, national park, or other protected area near the highway. The EIA team has proposed solutions to the disturbance that may be caused by the pre-design highway alignment.

Environmental "Hot Spots" of the Project Area

Summarizing the investigations, the following five environmental "Hot Spots" are emphasized:

(i) **The wetland in the floodplain of the Shahverd River** is situated some 500 m north of the start point of the project. It is a system of interconnected small marshes which are creating an environmental "paradise" for a wide range of habitats and provide important habitat for many wetland-dependent species. It is significant also because it is situated in dry steppe zone. According to pre design, the new highway will pass through it, which is detrimental to the whole system.

(ii) **The gorge near "Zaqari *berd*" archeological site.** The highway is passing areas where there are many small and deep gorges created by rivers and floods. The gorge near Zaqari castel (*berd)* archeological site is the most distinctive among all gorges which the highway crosses. The gorge is in close proximity to the casle and as such, would enhance the touristic attraction once Zakari *berd* is developed for that purpose.

(iii) **Protected Red Book flora and fauna species.** There are several sites in the immediate vicinity of the alignment of the road where flora species listed in the Red Book exist. Armenia's Law on Flora (1999) outlines policies for the conservation, protection, use, regeneration, and management of natural populations of plants, aiming for (a) the sustainable protection and use of flora, (b) the conservation of biodiversity, and (c) assessing and monitoring rare and threatened species. A regimen is proposed such that the project will not lead to a reduction in the population of any recognized endangered or critically endangered species (per Red Book/Red List) or a loss in areas of the habitats concerned. In all areas likely to contain endangered or critically endangered species, a competent botanist will survey the territory to be impacted by construction activities, report on the location and number of species (EN and CR), and propose methods to achieve at least no net loss of biodiversity, including the replanting of those species in suitable locations, being mindful of appropriate soil conditions.

(iv) **Trees along the highway.** There are several sections where trees and bushes are growing along the highway. Taking into account that the highway is passing through dry steppe and steppe zones and that it is relatively difficult to grow trees in this environment, it is necessary to avoid as much as possible cutting trees and bushes. The actual number will be determined by an arborist's dendro design. It is proposed that where trees need to be cut, new trees are planted at a ratio of 10:1. The following sections have been identified:

(a) about 300 m in the beginning of the highway
(b) about 1 km between Agarak and Ujan communities
(c) Near Ujan village – 3.1 km long section of tree rows and single trees
(d) Near the Aruch village intersection - 500m length

(v) **Quarries and gravel pits.** Contractors obtain their aggregates from existing quarries that they either own themselves or by other contractors own. All quarries are permitted and monitored by MNP. In the even that new quarries need to be developed, they should be sited down-wind of settlements and at a distance of at least 1 km. In such cases, the

contractor must prepare a quarry management plan consistent with MNP requirements and those listed in the EMP.

g. Archaeology & Historical, Natural, and Cultural Monuments

The alignment does not pass through or near any cultural heritage or archaeological sites designated by UNESCO or the MOC except the Agarak archaeological preserve.

The archaeological field investigations were based on a desk study that indicated 21 sites of archaeological significance. After a careful survey, a total of 38 sites were identified comprised of archaeological/historical, natural, and cultural monuments. Three of these sites were previously unknown; they are identified in Table 9.

Of the 38 sites, 18 will be directly affected by the design alignment. Of these, 11 are archaeological sites and 7 Cultural (Memorial) objects. Their identifying names and representative period are in Table 8 and 9.The cultural monuments were erected by private parties to commemorate motor vehicle accident victims and do not fall under the jurisdiction of the MOC. This is a sensitive cultural issue accordingly, to avoid public criticism they should be carefully relocated under the direction of the relevant *marzped* and in coordination with the families or friends of the victims.

Twenty of the 38 sites /historical or natural sites will be indirectly affected by the Project. These include 10 archaeological sites, 1 architectural/historical monument and 9 Cultural (Memorial) objects.

Table 8: Directly Affected Archaeological/Historical Sites

No.	Site	Period
1	Nerkin Naver archaeological complex (tomb field and settlement)	III – I Millennia BC, 13th-14th centuries Ad
2	Agarak historical-cultural preserve	IV Millennium BC – High medieval
3	Medieval village remains near Kosh	11th-17th centuries AD
4	Medieval village remains near Shamiram	11th-17th centuries AD
5	Aruch Neolithic settlement	VIII Millennium BC
6	Aruch medieval Caravanserai	13th century
7	Nerkin Bazmaberd Necropolis Cemetery	III - mid-I Millennia BC.
8	Verin Sasnashen complex	Early Bronze Age (IV-III Millennia B.C.) and Early Medieval period (4th - 6th centuries A.D.)
9	Davtashen archaeological complex	III - I Millennia B.C.
10	Zakari Berd archaeological complex	Early Medieval period (3rd-5th centuries A.D.)
11	Talin tomb field	IV-I Millennia BC

1. Nerkin Naver archaeological complex (# 1 in GM and Map 1).
Aragatsotn marz, Parpi community,
Distance in correspondence to the "0 point" of the road: 0 – 0.60 km,
GPS coordinates: N 40°, 17', 40, 8''; E 44°, 18', 32, 0"
State List of Historical-Archaeological Monuments: # **2. 110. 2.**

This site consists of Middle Bronze Age kurgan (burial mound) tomb field, several inhabited caves and remains of the Medieval settlement. The site is located on the left side of the Ashtarak-Gyumri Highway on the peninsula, formed by gorge of the Shahverd River. The systematic excavations that started here since 2001 opened rich Middle Bronze Age tombs with specific painted pottery and exclusive jewelry belonging to "Trialeti culture" of the Middle Bronze Age (22-18 centuries B.C.). Some of larger "royal" tombs were used as secondary burials later in I Millennium B.C. In 1970-ies the part of site area was used under agricultural

activities, and external signs of many burials – particularly their mounds and "stone shields," were lost. Fully preserved burial mounds and wall structures of the medieval settlement are visible is the southern part of the site area. The northern part of the cemetery, where the burial signs had been ameliorated, is endangered by the suggested road design.

2. Agarak historical-cultural preserve (# 2 in GM and Map 2)
Aragatsotn marz, Agarak community
Distance in correspondence to the "0 point" of the road: 2.600 – 3.200 km
GPS coordinates: N 40°, 17', 47,0'' ; E 44°, 16', 28,7"
State List of Historical-Archaeological Monuments: **# 2. 4. 1.**

The site is located on the western (left) bank of the Amberd river, covering an area of about 200 hectares, a larger part of which (118 hectares) in 2001 has been declared a historical and cultural preserve by the government of Armenia (Map 2). The site is established on the horizontal flows of solidified tuf, bordered on the East with the river, while in the West turn into a hilly ridge. There are niches carved into the cliffs, as well as polygonal platforms leading to them, in addition to structures of other types. All of these structures, including unbroken series of round, horseshoe-shaped structures and channels linking them, as well as trapezoidal "altars," transform the natural landscape into a gigantic sacral monument. This ensemble of cultic structures is complemented by artificial constructions located around the plateaus and in the spaces between them. According the stratigraphic observations this cultic ensemble was created in the Early Bronze Age (29-27 centuries BC). Within the limits of the Armenian Highlands and the neighboring regions no other site of this type is known. It is unique in terms of its unusual composition and design, as well as its volume and area. In general, the site of Agarak is one of the outstanding historical monuments of Armenia, represented by open-air temples ("Ritual landscape"), as well as representing nearly all the phases of the material culture starting from the Early Bronze Age, through the Urartian and Classical periods, up to Late Medieval Ages.

The suggested design of the new highway is passing through the excavated part of the site and will destroy it completely.

3. Settlement of Kosh (# 14 in GM and Map 3)
Aragatsotn marz, Kosh community
Distance in correspondence to the "0 point" of the road: 14.280 – 14.650 km
GPS coordinates: N 40°, 17', 31,0'' ; E 44°, 08', 55,0"

The site was discovered recently, during the survey activities. It has the same location characteristics as the site of Agarak (Map 3). The existing Ashtarak-Gyumri road cut it through. The Northern (right) side of the site was left under the houses of nowadays village of Kosh and lost its scientific potential. The southern (left) side of the site was partly destroyed and covered with a large mound of constructional waste of the road construction in Soviet period. The survived constructions are clearly visible on the distance of nearly 30-35 meters from the left side of the highway. The chronology of the settlement is still unclear, but the character of the surface material and construction technique of the dwellings are mainly correlated to the sites of the I Millennium B.C.

4. Medieval village of Shamiram (# 15 in GM and Map 4)
Aragatsotn marz, Shamiram community
Distance in correspondence to the "0 point" of the road: 18.000 – 18.500 km
GPS coordinates: N 40°, 18', 02,5'' ; E 44°, 06', 09,8"

The newly-discovered archaeological site occupies large area on both sides of the existing road (Map 4) in the limits of Shamiram community. The better preserved part of the

settlement is located now on the right (northern) side of the Ashtarak-Gyumri road, which divides the site into two part almost equal in size.

At the northern part of the site, bases of dwelling constructions, church foundations are clearly visible. Based on the pottery collected from the both sides of the site, it must be dated in the chronological limits of 11-15th centuries. The left side of the site which will be affected by the suggested design is preserved mainly in its western part. House fundaments and traces of constructions are clearly visible. The rest of this portion of the site is completely destroyed by amelioration and agricultural activities.

5. Aruch Neolithic settlement and Medieval village (# 20 in GM and Map 5)
Aragatsotn marz, Aruch community
Distance in correspondence to the "0 point" of the road: 20.500 – 20.700 km
GPS coordinates: N 40°, 18', 13,1'' ; E 44°, 04', 42,1"

The newly-discovered medieval settlement of 10-13-th centuries spreading around the Aruch caravanserai, is one of the rare monuments of this type, seems to be an important trade point on the Silk Road. The excavations here had opened a Neolithic site of "Pre-pottery phase" (VIII Millennium B.C.), under the remains of medieval constructions. Sites of both periods are very important from the scientific point of view. First one can be a source for understanding the character of functioning of a medieval town involved in intensive inter-regional trade and the second - to throw light on the problems of spread of Neolithic civilizations in the areas of the m-t Aragats foothills and the Ararat valley.

Suggested design of the road will affect the site, covering most of its area with a *cloverleaf*, which is linking the main highway to the village of Agarak (in the Talin district).

6. Aruch Medieval Caravanserai (# 21 in GM and Map 5)
Aragatsotn marz, Aruch community
Distance in correspondence to the "0 point" of the road: 20.630 km
GPS coordinates: N 40°, 18', 14,6'' ; E 44°, 04', 37,9"
State List of Historical-Archaeological Monuments: **# 2. 22. 16.**

This construction is one of the outstanding monuments of civil architecture of the Medieval Armenia, was built in 13th century, on one of the active crossroads of the Great Silk Road. The three-nef building of the caravanserai is enforced by round towers, which are transforming it into a multifunctional fortified dwelling. Only a quarter of the building had been preserved to nowadays. In 2007 caravanserai was partly restored and prepared to become one of the important tourist objects of Armenia. This kind of buildings are rare enough not only in Armenia, but in the Near East as well. But the fortified caravanserai of Aruch is absolutely unique even among the known constructions of this type. In addition to that, the presence of synchronous settlement near the caravanserai makes it more significant both for the specialists and visitors.

Suggested design of the road is affecting the site, covering most of its protection area with a *cloverleaf*, and coming closer to the building from the North. Meanwhile, any construction activity is unacceptable in this area, particularly on southern (left) side of the road.

7. Nerkin Bazmaberd necropolis (tomb field) (# 23 in GM and Map 6)
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 25.280 – 25.700 km
GPS coordinates: N 40°, 19', 09,3'' ; E 44°, 01', 17,8"
State List of Historical-Archaeological Monuments: **# 2. 73. 1. 1. 1.**

The site occupies a large area on the South from the village of Nerkin Bazmaberd, attached to the right side of the existing Ashtarak-Gyumri road. It is represented by groups of kurgan

(burial mounds) and cromlech constructions (round stone "belts" around burials), preserved in and in between agricultural fields, mainly in rocky areas. It is very little known about the tomb field: small scale excavations that were carried out here reveal the tombs and the materials of III - mid-I Millennia BC.

New design of the highway is suggested on the left side of the existing road, which means the lesser impact on the site. The only part which will be influenced by construction activities is the western end of the tomb field, the area around *cloverleaf* to the Nerkin Bazmaberd community.

8. Verin Sasnashen archaeological complex (# 30 in GM and Map 7)
Aragatsotn marz, Verin Sasnashen community
Distance in correspondence to the "0 point" of the road: 29.000 – 31.400km
GPS coordinates: N 40°, 19', 51,8'' ; E 43°, 58', 35,3"
State List of Historical-Archaeological Monuments: # # **2.74. 4; 2.74. 2; 2.104. 1. 1; 2.104. 1. 2.**

The archaeological complex of Verin Sasnashen in fact - is continuation to the North of the Nerkin Bazmaberd necropolis. The site consists of number of tomb-fields and settlements spread on the both sides of the existing Ashtarak-Gyumri road. The small-scale excavations had been carried out here and several burials of III-I Millennia B.C. were discovered. In some areas of the site traces of walls and other dwelling constructions of the Early Bronze Age (IV-III Millennia B.C.) and Early Medieval period (4^{th} - 6^{th} centuries A.D.) are visible.

9. Zakari Berd archaeological complex (# 35 in GM and Map 9, 10)
Aragatsotn marz, Katnaghbiur community,
Distance in correspondence to the "0 point" of the road: 35.150 – 35.300 km,
GPS coordinates: N 40°, 22', 04, 0'' ; E 43°, 56', 37, 8"
State List of Historical-Archaeological Monuments: # **2.57.2.**

The first site of the complex is represented by a fortified settlement built on a peninsula formed by two small, but deep gorges on the distance of 1,5 km South-East from the village of Katnaghbyur. The excavations were conducted here from 1979, after the construction of the existing Ashtarak-Gyumri road, which cut the site into two parts. The initial investigation reveal a well designed settlement with different private and public constructions, workshops etc., surrounded by defense walls.

According the archaeological data, the site was functioning in Early Medieval period (3^{rd}-5^{th} centuries A.D.). It was the "Komopolis" type of settlements, surrounding the royal residence of Arshakuni kings in the capital of Vagharshapat.

10. Talin tomb field (# 38 in GM and Map 10)
Aragatsotn marz, Talin community
Distance in correspondence to the "0 point" of the road: 40.800 – 44.900 km
GPS coordinates: N 40°, 24', 03, 0'' ; E 43°, 53', 30, 7"
State List of Historical-Archaeological Monuments: # **2.3.3.**

The site is represented by a large tomb field (necropolis), occupying a large area from the N-NE and southern suburbs of Talin and then continuing East towards the acting Ashtarak-Gyumri road. The burials are concentrated by separate groups survived between the agricultural fields, cleaned by melioration activities. During the excavations, conducted here since 1985 because of urban needs of Talin, were able to open around 90 separate tombs that belong to the Early Bronze Age and Late Bronze - Early Iron Ages (IV – I Millennia BC), with outstanding remains of the specific material culture. But, the numbers of tombs are still unexcavated. They are mostly visible on the both sides of the existing Ashtarak-Gyumri road.

The 15 other sites will be protected by observing routine construction practices that are noted in the EMP, such as care to be taken not to deposit construction waste or utilizing the soil for sub-grade. 11 of the 20 sites that will be directly affected can be protected by relatively simple measures included in the construction contract. They are noted in the EMP.

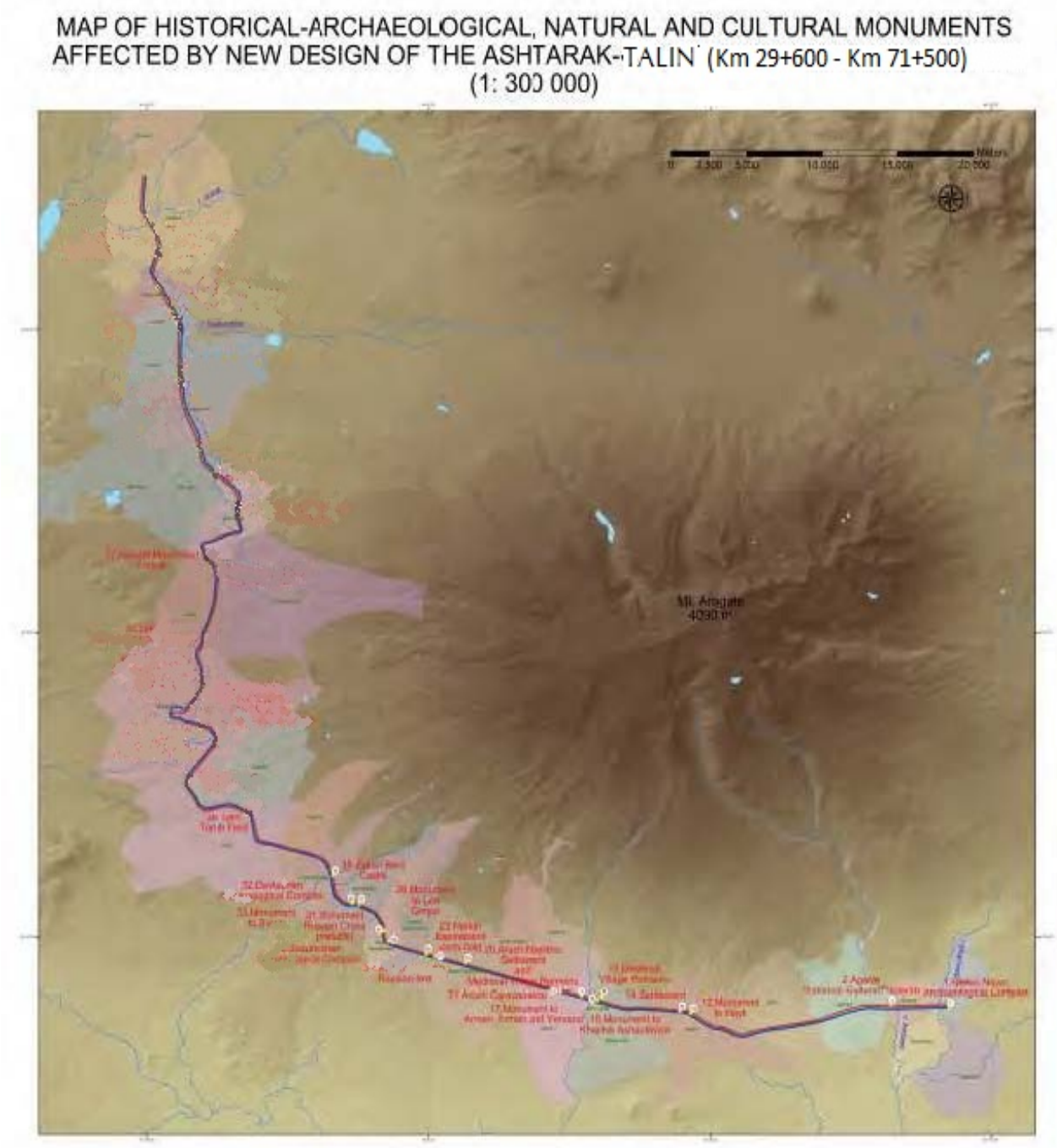
Table 9: List of Archeological, Historical and Cultural Monuments

Map Number	No	Type	Name	Community	Extent (km)	GPS Coordinates
Map 1 0+000 - 11+500 Aragatzotn *marz*	1	Archaeological monument	Nerkin Naver archaeological complex	Parpi	0 - 0.60	N 40°17'40.8" E 44°18'32.0"
	2	Archaeological monument	Agarak historical-cultural preserve	Agarak	2.65 -3.20	N 40°17'47.0" E 44°16'28.7"
	3	Archaeological monument	Tomb field	Aghtsk	6.10 -6.55	N 40°17'31.2" E 44°14'21.1"
	4	Cultural monument	To the victims of Maralik-Yerevan direction	Ujan	9.15	N 40°17'04.1" E 44°12'19.5"
	5	Cultural monument	Nikolyan Khachik	Ujan	10.15	N 40°16'57.1" E 44°11'38.4"
	6	Archaeological monument	Karhanki Baird archaeological complex	Kosh-Ujan	10.65 - 11.00	N 40°16'57.1" E 44°11'09.5"
	7	Archaeological monument	Tomb	Kosh	11.35	N 40°16'50.3" E 44°10' 46.4"
	8	Archaeological monument	The great khachkar of Kosh	Kosh	11.75	N 40°17'03.1" E 44°10'35.5"
Map 2 11+500 - 23+800 Aragatzotn *Marz*	**9**	Cultural monument	Ujantsi Rudik	Kosh	11.90	N 40°17'03.3" E 44°10'29.2"
	10	Cultural monument	Armenian Alphabet	Kosh	12.50	N 40°17'07.9" E 44°10'07.8"
	11	Archaeological monument	Archaeological complex tomb field & Medieval village	Kosh	12.40 - 12.90	N 40°17'12.1" E 44°09'57.5"
	12	Cultural monument	To the memory of Hayk	Kosh	13.83	N 40°17'31.0" E 44°09'18.4"
	13	Archaeological monument	Archaeological complex (tomb field and settlement)	Kosh	14.00 - 14.09	N 40°17'35.4" E 44°09'13.2"
	14	Archaeological monument	Medieval village remains	Kosh	14.280 - 14.65	N 40°17'31.0" E 44°08'55.0"
	15	Archaeological monument	Medieval village remains	Shamiram	18.00 - 18.50	N 40°18'02.5" E 44°06'09.8"
	16	Cultural monument	Khachik Ashotovich	Shamiram	18.32	N 40°17'52.9" E 44°06'11.0"
	17	Cultural Monument	Armen, Arman, Yervand	Shamiram	18.61	N 40°17'55.9" E 44°06'00.3"
	18	Archaeological monument	Aruch-2 tomb field	Shamiram - Dprevank	18.60 - 18.80	N 40°17'47.3" E 44°05'56.8"
	19	Archaeological monument	Aruch-3 tomb field	Aruch	18.90 - 19.05	N 40°18'03.3" E 44°05'44.1"
	20	Archaeological monument	Aruch Neolithic settlement and Medieval village	Aruch	20.50 - 20.70	N 40°18'13.1" E 44°04'42.1"
	21	Archaeological monument	Medieval Caravanserai	Aruch	20.63	N 40°18'14.6" E 44°04'37.9"
	22	Cultural monument	Serob	Nerkin Bazmabaird	24.25	N 40°18'53.2" E 44°02'14.2"
Map 3	**23**	Archaeological monument	Nerkin Bazmabaird tomb field	Nerkin Bazmabaird	25.28 - 25.70	N 40°19'09.3" E 44°01'17.8"

Map Number	No	Type	Name	Community	Extent (km)	GPS Coordinates
23+800 - 33+900 Aragatzotn *Marz*	**24**	Archaeological monument	Fortified settlement and tomb field	Nerkin Bazmabaird	25.30 - 25.85	N 40°19'01.0" E 44°01'16.2"
	25	Cultural monument	Hamlet	Nerkin Bazmabaird	26.30	N 40°19'14.1" E 44°00'51.0"
	26	Cultural monument	Tiko	Nerkin Bazmabaird	26.40	N 40°19'14.5" E 44°00'47.6"
	27	Cultural monument	Russian text	Nerkin Bazmabaird	27.20	N 40°19'22.2" E 44°00'14.3"
	28	Cultural monument	Leo Gmyur	Nerkin Bazmabaird	27.70	N 40°19'27.4" E 43°59'54.4"
	29	Archaeological monument	Sev Baird fortress settlement	Nerkin Sasunashen	28.60 - 29.10	N 40°19'30.2" E 43°59'04.0"
	30	Archaeological monument	Archeological complex (Settlements & tomb field)	Verin Sasunashen	29.00 - 31.40	N 40°19'51.8" E 43°58'35.3
	31	Cultural monument	Russian cross (methalic)	Verin Sasunashen	30.43	N 40°20'11.5" E 43°58'26.2"
	32	Archaeological monument	Archeological complex (Settlements & tomb field)	Davtashen	31.60 - 33.20	N 40°21'04.1" E 43°57'32.8"
	33	Cultural monument	To Suren from friends	Davtashen	32.99	N 40°21'06.2" E 43°57'18.9"
	34	Archaeological site	Katnaghbyur tomb field	Katnaghbyur	33.90 - 34.70	N 40°21'39.8" E 43°56'44.7"
Map 4 33+900 - 46+800 Aragatzotn *Marz*	**35**	Archaeological site	Zakari *baird*	Katnaghbyur	35.15 - 35.30	N 40°22'04.0" E 43°56'37.8"
	36	Cultural monument	Dedicated to All Armenian Dance around Mt. Aragats in 2005	Katnaghbyur	37.15	N 40°22'44.4" E 43°55'45.7"
	37	Cultural monument	Sargis-Armen and Manuk-Azat	Talin	37.86	N 40°22'51.8" E 43°55'16.7"
	38	Archaeological site	Talin tomb field	Talin	40.80 - 44.90	N 40°24'03.0" E 43°53'30.7"

If any item of cultural heritage or archaeological interest is uncovered during excavation activities, works must stop and the MOC notified. Construction activities cannot commence until the chance-find has been investigated by an archaeologist and written permission given by the MOC. Contractors will be obliged to familiarize themselves with the chance-find procedure of the MOC and will be contractually required to implement them strictly.

Map 4: Archaeological/historical Sites and Cultural Monuments



C. ENVIRONMENTAL IMPACTS, IMPACTS TO THE PCR & MITIGATION MEASURES

The environmental impacts and the impacts to the archeological/historical sites and cultural monuments was written based on the proposed changes of the road alignment and with the revised design of Tranche 2 Project and in consideration of the recommendations proposed in the original EIA document.

The Ashtarak to Talin portion of the North-South Road Corridor Investment Program begins from the outskirts of Ashtarak at 29+600 km to the outskirts of Talin at 71+500 km. The Project consists of upgrading a total of 41+900 kilometers of road to a 4-lane divided highway from Ashtarak to Talin, (shown in Map-1).

The construction and upgrading of the 41.900 kilometers of highway will span 2 bypasses, i.e., Agarak and Ujan and the new alignment at Katnaghbyur. The Agarak bypass starts from km 29+935 to km 32+600 with a total distance of 2.666 kilometers and the Ujan bypass from km 36+600 to km 40+300 having 3.70 kilometer in length. The Katnaghbyur alignment extends to 8.95 kilometers starting from km 59+950 to km 68+990.

The existing road and the new road alignment will be designed and constructed to standards that will result in improved road markings, signage, safety, drainage, culverts, overpasses, underpasses, and shoulders. Some of the existing road-bed that was built over a 30-year period is structurally sub-standard and in decline and will therefore be reconstructed.

Other activities associated with construction include:

(i) identification and protection or relocation of existing utilities including irrigation systems and communication lines;
(ii) selection of suitable locations for construction camps; facilities and offices; and storage of materials and machinery;
(iii) installation of gated security fences around the camps;
(iv) removal of existing waste material dumped along the route;
(v) storage and distribution of surplus topsoil;
(vi) utilization of existing borrow pits; and
(vii) reinstatement and landscaping of the shoulders and adjacent areas and medians following construction.

Preliminary design has been completed for this project and the detail design was completed in February 2011. The construction will be undertaken over a period of approximately 2-1/2 years.

The EIA Document for Tranche 2 (August 2010) was reviewed followed by a revalidation and reassessment of impacts based on the changes in road alignment and revised design have both direct and indirect impacts on the physical and biological resources of the environment and to the archeological/historical sites and cultural monuments. This is largely attributable to the location of Tranche 2 road alignment. These are described and discussed in detail in the succeeding sections.

The feature of this project, aside from resulting in an upgraded section of the North-South Road Corridor Investment Program, will also put emphasis on protecting important archaeological/historical sites.

During construction and operation, the communities adjacent to the alignment should not experience any adverse effects except, perhaps, a temporary increase in noise and vibration and exhaust beyond current levels that already exceed national standards.

Positive global impacts may be derived from further excavations of existing archaeological sites that will be preserved and especially, from the new sites discovered during this EIA that can provide new insights for archeologists and historians. The major transboundary impact is that the upgraded highway will benefit transportation of goods and people.

The Project is envisaged to bolster the economic growth of Armenia with its neighboring countries such as Georgia in the north and Iran in the southern border. Temporary employment will provide additional income. Some may improve their situation temporarily while working on the project. The tiny minority population in the region is unlikely to be affected differently from the whole population, if at all.

It is expected that the upgraded highway will play a positive role in enhancing economic growth of the region and the country.

The anticipated potential impacts of the Project on the physical and biological environment and to the archaeological, historical sites and cultural monuments were identified to be temporary and will occur during the construction period such impacts are manageable and shall be minimized if not eliminated through timely and proper implementation of the Environmental Management Plan (EMP).

The summary of potential impacts, issues and constraints and their corresponding mitigation and enhancement measures during the detail design, construction, operation and maintenance phases are presented in Table 10 below. The detailed mitigation measures are provided in the EMP. The recommendations provided in the Environmental Management Plan (EMP) are aimed to minimize the impact of the project for all affected sites and to the bio-physical environment along the road-band. The EMP represents the key mitigation and enhancement measures for the Project's impacts which are translated into concrete action plans.

Table 10: POTENTIAL IMPACTS AND MITIGATION/ENHANCEMENT MEASURES

PROJECT ACTIVITIES	***MAJOR POTENTIAL IMPACTS*** **ISSUES & CONSTRAINTS**	*FEASIBLE* **MITIGATION MEASURES**
Detail Design: Completion of alignment and bridge detail design	 Encroachment of archaeological historical & Cultural sites	Relocation of the proposed road alignment, in some specific cases when the relocation is impossible undertake archeological excavations prior to road construction
Construction: Identification of appropriate construction camps, field office, warehouse/equipment storeroom	**Physical:** Shahverd River: Blockage of spring and stream flow, changed water regimes	Ensure dust suppression by water sprinklers, Good traffic management & promotion of public awareness

PROJECT ACTIVITIES	***MAJOR POTENTIAL IMPACTS*** **ISSUES & CONSTRAINTS**	*FEASIBLE* **MITIGATION MEASURES**
Moving-in of equipment & materials Site clearing and installation of sediment and silt control Earthworks Surface clearing of service roads and excavation Destabilization of embankments and slopes Quarrying Inadequate siting of borrow pits and Disposal of borrow and surplus materials Inadequate supervision of construction works Hauling and transport of construction and quarry materials	Nuisance from noise, dust/air pollution and traffic movement Inadequate siting and disposal of garbage, surplus materials and construction debris Waste, garbage and construction debris disposal Surface run-offs from borrow pits during high rainfall events and storm flows Exceedence of allowable noise (decibel) limits Nuisance from excessive dust and gaseous emissions along road works and transport and hauling of construction materials Run-off from exposed soil, stock piles and excavated materials during rainfall events and storm flows	Ensure proper regular collection, disposal of solid waste and garbage The stabilization of denuded slopes (e.g., by planting); Careful planning to minimize soil exposure Provisions of silt fence to hold surface run-off and rainwater diversion Construction of adequate temporary and permanent drainage Enhance protective cover with naturally growing species of grass/shrubs, ornamentals and fruiting trees Identify appropriate dumpsite Adequate monitoring and supervision and management of the construction and work sites
	Biological: Disturbance to wetland Disturbance and displacement of Red Book migratory species of birds Unnecessary cutting/removal of trees and ground vegetation	Vegetation, flora and fauna protection plan Restrict construction works and workers' activities along the road alignment by fencing to control encroachment, degradation and disturbance of Red Book species Tree planting of appropriate species contractors to maintain trees until they are viable
	Archaeological/historical & Cultural: Impairment of Agarak historical and cultural site Infringement of archaeological historical and cultural sites along the alignment	Physical Cultural Resources Plan Relocation of historical or cultural monuments, Undertake archeological excavations prior to road construction Obtain necessary approvals for archaeological finds follow the chance-find procedures of MOC.

PROJECT ACTIVITIES	*MAJOR POTENTIAL IMPACTS* ISSUES & CONSTRAINTS	*FEASIBLE* MITIGATION MEASURES
		Strengthening and reinforcement of the foundation of historical-cultural sites and monuments alongside the road to protect these objects from the negative impact during the construction works and related activities
	Social: Poor and lack of public information to local communities and other stakeholders Social conflicts and inequities from non-local workers and restriction towards female workers Lack of information about the EMP and applicable environmental laws and regulations of the Project. Workers lack of understanding and care to protect the environment and archaeological/ historical sites and cultural monuments No safety measures for the prevention of injury, or death of workers, road users and other people from construction hazards/accident Spread of communicable disease and sickness	Public Consultation and Communications Plan Conduct orientation of all construction workers and personnel in relation to environmental and archeological issues and the implementation of the EMP Sufficient number of latrines need to be constructed to serve work sites/ work camps Mitigation measures to prevent negative impacts associated with public health include increasing site sanitation, provision of protective clothing and ensure proper garbage and waste disposal. Contractor to conduct orientation of workers on environmental management explaining impact prevention/mitigation, the EMP included in their contracts, and the environmental management monitoring to be implemented
Operation & Maintenance: Inadequate supervision and management of structures and facilities	Nuisance from dust/air pollution and traffic movement Inadequate management of structures and facilities Inadequate supervision of operation and maintenance works	Ensure good clean up supervision Conduct public information on traffic management Ensure soil covering is effectively and efficiently implemented

To ensure the proper implementation of the Environmental Management Plan all contractors' contract will contain clauses that define the environmental requirements to be met prior to the construction, during construction works and after construction. Compliance will be monitored through the supervision arrangements.

Careful planning and adequate engineering design as well as observance of proper construction practices are expected to address the impacts predicted to occur during the construction, operation and maintenance phases of the project.

To ensure that the responsibilities of the contractors in relation to the environment aspects are properly carried out, the Terms of Reference for such contracts should contain specific provisions pertaining to considerations and observance of pertinent environmental protection laws and regulations, for civil works, public safety and health of workers. Environmental provisions and conditionalities must be adequately stipulated in the contractors' tender documents and construction activities. Compliance to these conditions will be closely monitored by PMU in coordination with the MNP. Under the Environmental Monitoring Program, the PMU will monitor the monitoring plan of activities of the Contractors as specified under their contract.

The environmental impact mitigation measures stated in the EMP will be specified in the Technical Specifications to ensure that Contractors are made aware of the environmental issues and concerns in the Project area.

1. Impacts Due to Location

The project will be located partially within the right-of-way that was established during the1980's for the construction of the existing highway M-1. The existing highway is owned by the State and partially in a new right-of-way that will be established based on the final design, which will require land and asset acquisition. There may also be several private business and other buildings within new rights-of-way that would be removed and occupants resettled and/or compensated. Resettlement and compensation are detailed in the Land Acquisition and Resettlement Plan (LARP) for the Tranche 2 of the Project.

No part of the project passes through or near any designated ecologically sensitive areas, designated wildlife or other sanctuary, national park, botanical garden, nor area of international significance (e.g., IUCN, RAMSAR site). This updated EIA contain measures to minimize the impact on the archeological/historical sites, as well as the impact on other similar sites which were previously unknown. Where the project is likely to displace endangered or critically endangered Red Book species, a flora and fauna protection plan have been proposed. Based on this, the project will not adversely impact any ecologically sensitive areas.

Flora and Fauna

The Tranche 2 Project from Ashtarak to Talin pass through steppe and dry steppe landscape zones. Almost both sides of the highway are cultivated lands interspersed with big and small communities and only small areas of natural environment are along the road.

During investigations it was verified that there are endangered Flora and Fauna Red Book species recorded along the vicinities of the road alignment. Species in those areas should receive special attention to comply with Armenia's Law on Flora (1999), Law on Fauna (2000) and the requirements of the Red Book for Flora (Governmental decree 29.01.2010, N

72-N), Red Book for Fauna (Governmental decree 29.01.2010, N 71-N). A flora and fauna protection plan is given in the EMP.

Flora

Since the Supervision consultant's environmental team commenced its activities in October, when blossom of flowers was ended and vegetation cover was dried, the team members took the special literature, draft EIA's team conclusions and data available from field visits as a basis in order to make respective recommendations and conclusions. There are three Red Book species near the highway these are:

Hohenackeria exscapa (Stev.) K.-Pol. - EN – A taxon is endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.
Habitat: Ujan, Kosh.

Iris elegantissima Sosn. - EN – A taxon is endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future. It is endemic for Caucasus.
Habitat: West from Ashtarak, near Davtashen community.

Merendera greuteri Gabrielian - CR - A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future. It is Armenian endemic. It is found only in Shirak floristic region. The territory of its living and spreading is less than 10 sq. km.
Habitat: Between Katnaghbyur and Talin communities.

The Special mitigation measures included in the EMP to minimize the negative impact on flora and to avoid any detrimental effect to Red Book plants.

Trees along the Highway

There are several sections where trees and bushes are growing along the highway (about 300 m in the beginning of the highway from km 30+600 till km 30+900, about 1 km between Agarak and Ujan communities from km 34+280 till km 35+200, about 3.1 km in Ujan community from km 36+700 till km 39+800 and about 500 m near the Aruch intersection from km 49+400 till km 49+900). Among these trees registered Populus, Robinia, Acer, Salicx, Morus, Armeniaca, Crataegus, Pyrus salicifolia, Berberis, Fraxsinus excelsior, F.oxycarpa, Spiraea crenata, Berberis orientalis, Cotoneaster integerrima, Lonicera iberica, Ephedra procera, Jasminum fruticans, Ulmus, Prunus, Elaeagnus, Paliurus, Rosa. The EMP contains the replanting scheme and the recommendation to delimit and refrain from unnecessary cutting or removal of trees along the Project alignment.

Fauna

In this region among widely spread species we can find: mammals - hare (Lepus europaeus), fox (Vulpes vulpes), wolf (Canis lupus) and a number of representatives of rodents - meadow mouse (Msubterraneus), marten (Martes foina) and others. Amphibians and reptiles are represented by different species of toads, frogs, lizards and snakes. The project can negatively affect fauna during construction by:

- Disturbing/destroying nesting places, burrows and holes of animals;
- Killing animals during construction;
- Making difficulties for their hunting, migrating and reproduction;
- Creating shocking circumstances by noise, vibration, and air and water pollution.

The EMP details the flora and fauna plan to minimize/restrict the impacts of the Project on the plants and animals.

Shahverd Wetland

The small marshes formed by small streams of the Shahverd River stretched along both sides of the highway bridge (near the starting point of the Ashtarak – Talin road) fed by spring groundwater. It is a seasonal wetland where the occurrence of local and migratory species of birds has been documented in the area.

Field investigations have determined that the following nesting bird species in the wetland area may be directly impacted by the disturbance cause by the construction activities. It is recommended that the road and bridge works should be scheduled during the non-breeding and nesting period of the species listed below (from April to May):

2. *Carduelis cannabina* –Twite
3. *Luscinia svecica* - European Robin (included in the Bern Convention lists[1])
4. *Acrocephalus arundinaceus* – Cetti's Warbler
5. *Emberiza schoeniclus* - Reed bunting
6. *Carpodacus erythrinus* - Common rose finch
7. *Hirundo rustica*- Barn swallow
8. *Ixobrychus minutus* - Little bittern (included in the Bern Convention lists)
9. *Gallinula chloropus* - Common moorhen
10. *Falco tinnunculus* - Common kestrel
11. *Circus aeruginosus* - Western marsh harrier (included in the Bern Convention lists)

During annual migration, the following bird species cross these areas (October to November and January to February):

1. *Motacilla alba* - White wagtail
2. *Motacilla citreola* - Citrine wagtail (included in RA Red Book and IUCN Red List[2])
3. *Miliaria calandra* - Corn bunting
4. *Passer hispaniolensis* - Spanish sparrow (included in RA Red Book and IUCN Red List)
5. *Phalacrocorax pygmaeus* - Pygmy cormorant (included in RA Red Book and IUCN Red List)
6. *Tringa ochropus* - Green sandpiper
7. *Tringa stagnatilis* - Marsh sandpiper
8. *Egretta garzetta* - Little egret (included in the Bern Convention lists)
9. *Ardeola ralloides* - Squacco heron (included in the Bern Convention lists)
10. *Anas platyrhynchos* – Mallard
11. *Fulica atra*- Common coot
12. *Larus armenicus* - Armenian gull (Included in Armenian Red Book)
13. *Chlidonias niger* - Black tern
14. *Sterna albifrons* - Little tern (Included in Armenian Red Book and IUCN Red List, and Bern Convention lists)
15. *Turdus merula* - Eurasian blackbird
16. *Lanius collurio* - Red-backed shrike (included in the Bern Convention lists)

[1] Bern Convention - Council of Europe Convention on the Conservation of European Wildlife and Natural Habitats, originally drafted in] 1979, in Bern. Armenia joined this convention on 2006. This convention sets out to conserve wild flora and fauna and their natural habitats, promote co-operation between states, monitor and control endangered and vulnerable species and assist with the provision of assistance concerning legal and scientific issues. Four appendices set out particular species for protection. Appendix II sets strictly protected fauna species and Appendix III - protected fauna species.

[2] The new edition of Red Book of RA was created based on IUCN categories and parameters.

Protection measures are included in the EMP to avoid negative impact of fauna existing in the area.

Archaeological & Historical Sites and Cultural Monuments

Aragatsotn marz where Tranche 2 Project is situated is well known for their rich historical-cultural monuments, as well as tourism attractions such as the Church of Talin and Aruch caravanseri. The Project's road alignment is passing across or closely alongside archeological/historical sites and cultural monuments of different periods. Some of the sites are adjacent to the existing road while others are located in the general vicinity. The archeological and historical monuments situated along the highway such as "Zaqari *berd*" can become touristic attraction in the future like the Agarak archeological site.

During the field activities a total of 38 sites were counted and tallied. Of the 38 sites, 18 will be directly affected by the design alignment. Of these, 11 are archaeological sites and 7 Cultural (Memorial) objects. Their identifying names and representative period are presented in Table 3 and 4.

Three of archaeological and historical sites were previously unknown or not listed in the State List of the Historical and Cultural Immovable Monuments of the Republic of Armenia (adopted on the 11 of November 1989) that provide for the protection and preservation of archaeological sites, historical and cultural monuments of RA.

The cultural monuments were erected by private parties to commemorate motor vehicle accident victims and do not fall under the jurisdiction of the MOC. This is a sensitive cultural issue accordingly, to avoid public criticism they should be carefully relocated under the direction of the relevant *marzpet* and in coordination with the families or friends of the victims.

Twenty of the 38 sites /historical or natural sites will be indirectly affected by the Project. These include 10 archaeological sites, 1 architectural/historical monument and 9 Cultural (Memorial) objects.

The recommendations provided in the Environmental Management Plan are aimed to minimize the impact of the project for all affected sites along the road-band. These recommendations can include:

- relocation of the cultural and historical monuments along the road alignment,
- in some specific cases - excavations of the sites (settlements, tomb fields), or the part of their areas, for the preservation of their cultural-historical value,
- strengthening (reinforcement) of the ground foundations of historical-cultural sites and monuments alongside the road to protect these objects from vibrations during construction works.

Table 11: Archaeological, Historical- Cultural Sites/Monuments along Tranche 2

Map Number	No	Type	Name	Community/ Location	Type of Impacts	
					Direct	Indirect
Map 1 0+000 - 11+500 Aragatzotn *marz*	1	Archaeological monument	Nerkin Naver archaeological complex	Parpi	✓	
	2	Archaeological monument	Agarak historical-cultural preserve	Agarak	✓	
	3	Archaeological monument	Tomb field	Aghtsk		✓

Map Number	No	Type	Name	Community/ Location	Type of Impacts	
					Direct	Indirect
	4	Cultural monument	To the victims of Maralik-Yerevan direction	Ujan		✓
	5	Cultural monument	Nikolyan Khachik	Ujan		✓
	6	Archaeological monument	Karhanki Baird archaeological complex	Kosh-Ujan		✓
	7	Archaeological monument	Tomb	Kosh		✓
Map 2 11+500 - 23+800 Aragatzotn *Marz*	**8**	Archaeological monument	The great khachkar of Kosh	Kosh		✓
	9	Cultural monument	Ujantsi Rudik	Kosh		✓
	10	Cultural monument	Armenian Alphabet	Kosh		✓
	11	Archaeological monument	Archaeological complex tomb field & Medieval village	Kosh		✓
	12	Cultural monument	To the memory of Hayk	Kosh	✓	
	13	Archaeological monument	Archaeological complex (tomb field and settlement)	Kosh	✓	
	14	Archaeological monument	Medieval village remains	Kosh	✓	
	15	Archaeological monument	Medieval village remains	Shamiram	✓	
	16	Cultural Monument	Khachik Ashotovich	Shamiram	✓	
	17	Cultural Monument	Armen, Arman, Yervand	Shamiram	✓	
	18	Archaeological monument	Aruch-2 tomb field	Shamiram - Dprevank		✓
	19	Archaeological monument	Aruch-3 tomb field	Aruch		✓
	20	Archaeological monument	Aruch Neolithic settlement and Medieval village	Aruch	✓	
	21	Archaeological monument	Medieval Caravanserai	Aruch	✓	
Map 3 23+800 - 33+900 Aragatzotn *Marz*	**22**	Cultural monument	Serob	Nerkin Bazmabaird		✓
	23	Archaeological monument	Nerkin Bazmabaird tomb field	Nerkin Bazmabaird	✓	
	24	Archaeological monument	Fortified settlement and tomb field	Nerkin Bazmabaird	✓	
	25	Cultural monument	Hamlet	Nerkin Bazmabaird		✓
	26	Cultural monument	Tiko	Nerkin Bazmabaird		✓
	27	Cultural monument	Russian text	Nerkin Bazmabaird	✓	
	28	Cultural monument	Leo Gmyur	Nerkin Bazmabaird	✓	
	29	Archaeological monument	Sev Baird fortress settlement	Nerkin Sasunashen		✓
	30	Archaeological monument	Archeological complex (Settlements & tomb	Verin Sasnashen	✓	

Map Number	No	Type	Name	Community/ Location	Type of Impacts	
					Direct	Indirect
			field)			
	31	Cultural monument	Russian cross (methalic)	Verin Sasunashen		✓
	32	Archaeological monument	Archeological complex (Settlements & tomb field)	Davtashen	✓	
	33	Cultural monument	To Suren from friends	Davtashen	✓	
	34	Archaeological site	Katnaghbyur tomb field	Katnaghbyur		✓
Map 4	**35**	Archaeological site	Zakari *baird*	Katnaghbyur	✓	
33+900 - 46+800	**36**	Cultural monument	Dedicated to All Armenian Dance around Mt. Aragats in 2005	Katnaghbyur		✓
Aragatzotn *Marz*	**37**	Cultural monument	Sargis-Armen and Manuk-Azat	Talin		✓
	38	Archaeological site	Talin tomb field	Talin	✓	
				TOTAL	**18**	**20**

The following cultural monuments devoted to the victims of car accidents. Most of these objects are under the supervision of the communities and in case of the necessity to relocate such objects liaison and coordination with the community authorities will be required:

1. Memorial to Hayk (# 12 of GM)
Aragatsotn marz, Kosh community
Distance in correspondence to the “0 point” of the road: 13.830 km
GPS coordinates: N 40°, 17’, 31, 0’’; E 44°, 09’, 18, 4”

2. Memorial to Khachik Ashotovich (# 16 of GM)
Aragatsotn marz, Shamiram community
Distance in correspondence to the “0 point” of the road: 18.320 km
GPS coordinates: N 40°, 17’, 52, 9’’; E 44°, 06’, 11, 0”

3. Memorial to Armen, Arman, Yervand (# 17 of GM)
Aragatsotn marz, Shamiram community
Distance in correspondence to the “0 point” of the road: 18.610 km
GPS coordinates: N 40°, 17’, 55, 9’’; E 44°, 06’, 00, 3”

4. Memorial Monument with Russian text (# 27 of GM)
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the “0 point” of the road: 27.200 km
GPS coordinates: N 40°, 19’, 22, 2’’; E 44°, 00’, 14, 3”

5. Memorial to Leo Gmyur (# 28 of GM)
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the “0 point” of the road: 27.700 km

There are 7 archeological/historical sites that will be directly impacted by the project and correspondingly mitigation measures are proposed these are as follows:

1. Nerkin Naver Archaeological Complex (# 1 in GM and Map 1).

Aragatsotn marz, Parpi community,
Distance in correspondence to the "0 point" of the road: 0 – 0.60 km,
GPS coordinates: N 40°, 17', 40, 8''; E 44°, 18', 32, 0"
State List of Historical-Archaeological Monuments: # 2. 110. 2.

This site consists of Middle Bronze Age kurgan (burial mound) tomb field, several inhabited caves and remains of the medieval settlement. The site is located on the left side of the Ashtarak-Gyumri Highway on the peninsula, formed by gorge of the Shahverd River. The systematic excavations that started here since 2001 opened rich Middle Bronze Age tombs with specific painted pottery and exclusive jewelry belonging to "Trialeti culture" of the Middle Bronze Age (22-18 centuries B.C.). Some of larger "royal" tombs were used as secondary burials later in I Millennium B.C. In 1970-ies the part of site area was used under agricultural activities, and external signs of many burials – particularly their mounds and "stone shields," were lost.

Issues/Concerns - The road design will directly affect the northern part of the cemetery and cave site within the Nerkin Naver archaeological complex.

Mitigation Measures:

Comply with the procedures of MOC on Chance-finds such as discoveries of tombs and archaeological finds;

Contractor to engage the services of archaeologist(s) to lead and ensure the proper chance-find procedures and archaeological research are followed;

Construction works near the cave must be done carefully. As construction works takes place inside of the protection area of the site, the following are forbidden: to use the area of the site for parking of the heavy construction equipments; storing construction materials; use of local soil for construction purposes.

2. Agarak Historical-Cultural Preserve (# 2 in GM and Map 2)

Aragatsotn marz, Agarak community
Distance in correspondence to the "0 point" of the road: 2.600 – 3.200 km
GPS coordinates: N 40°, 17', 47, 0''; E 44°, 16', 28, 7"
State List of Historical-Archaeological Monuments: # 2. 4. 1.

The site is located on the western (left) bank of the Amberd river, covering an area of about 200 hectares, a larger part of which (118 hectares) in 2001 has been declared a historical and cultural preserve by the government of Armenia (Map 2). The site is established on the horizontal flows of solidified tuff, bordered on the East with the river while in the West turn into a hilly ridge. Taking into account the special characteristics of the local relief, the ancient inhabitants of this area transformed the landscape turning natural masses of tuff into a spacious system of stone structures. For many of kilometers along the Amberd river flow, on the tuff cliffs, rocky hills, and natural plateaus, as well as freestanding blocks of stone the traces of intensive stone working are visible. There are niches carved into the cliffs, as well as polygonal platforms leading to them, in addition to structures of other types. All of these structures, including unbroken series of round, horseshoe-shaped structures and channels linking them, as well as trapezoidal "altars," transform the natural landscape into a gigantic sacral monument. This ensemble of cultic structures is complemented by artificial constructions located around the plateaus and in the spaces between them. According the stratigraphic observations this cultic ensemble was created in the Early Bronze Age (29-27 centuries BC). Within the limits of the Armenian Highlands and the neighboring regions no other site of this type is known. It is unique in terms of its unusual composition and design, as well as its volume and area. In general, the site of Agarak is one of the outstanding historical monuments of Armenia, represented by open-air temples ("Ritual landscape"), as

well as representing nearly all the phases of the material culture starting from the Early Bronze Age, through the Urartian and Classical periods, up to Late Medieval Ages.

Issues/Concerns - The revision of the road alignment and design of the bypass road to Agarak community starting from the of Shahverd bridge and up to the Agarak bridge area will encroach the eastern border of the "Agarak" State archaeological reserve that extend along the Amberd riverbed.

The alignment the Agarak Bridge will directly encroach on the Agarak Historical-Cultural Preserve on western bank of the Amberd River. The road widening and construction of the Agarak bridge will result to the destruction of the riverside zone of archaeological site (up to 6000 m^2) which will include the "buffer line" between the edge/slope of the road and the site itself).

Mitigation Measures:

It is recommended to change the design of the road from the north as much as possible. The widening of the road must be planned to the North (right side of the existing road) and Eastward; and Exclude any construction activity in southern (from the existing road) part of the site.

Undertake excavations of the northern part of the site (which is not examined yet) before the beginning of the construction. Disposal of construction wastes in the area of the site will not be allowed.

3. Settlement of Kosh (# 14 in GM and Map 3)

Aragatsotn marz, Kosh community
Distance in correspondence to the "0 point" of the road: 14.280 – 14.650 km
GPS coordinates: N 40°, 17', 31, 0''; E 44°, 08', 55, 0"

The site was discovered recently, during the survey activities. It has the same location characteristics as the site of Agarak (Map 3). The existing Ashtarak-Gyumri road cut it through. The Northern (right) side of the site was left under the houses of nowadays village of Kosh and lost its scientific potential. The southern (left) side of the site was partly destroyed and covered with a large mound of constructional waste of the road construction in Soviet period. The survived constructions are clearly visible on the distance of nearly 30-35 meters from the left side of the highway. The chronology of the settlement is still unclear, but the character of the surface material and construction technique of the dwellings are mainly correlated to the sites of the I Millennium B.C.

Issues/Concerns - Widening of the road and construction activities will directly affect the settlement.

Mitigation Measures:

Widen the new road mainly in northern direction if deficient of space in the North from the existing road conduct the salvage excavations of the widened band.

The following are forbidden inside the protection area: to use the area of the site for parking of the heavy construction equipments; storing construction materials; use of local soil for construction purposes.

Manage construction works carefully;

4. Medieval Village of Shamiram (# 15 in GM and Map 4)

Aragatsotn marz, Shamiram community
Distance in correspondence to the "0 point" of the road: 18.000 – 18.500 km
GPS coordinates: N 40°, 18', 02, 5''; E 44°, 06', 09, 8"

The newly-discovered archaeological site occupies large area on both sides of the existing road (Map 4) in the limits of Shamiram community. The better preserved part of the settlement is located now on the right (northern) side of the acting Ashtarak-Gyumri road, which divides the site into two part almost equal in size.

At the northern part of the site, which is not affected by the suggested design of the new highway, bases of dwelling constructions, church foundations are clearly visible. Based on the pottery collected from the both sides of the site, it must be dated in the chronological limits of 11-15th centuries. The left side of the site which will be affected by the suggested design is preserved mainly in its western part. House fundaments and traces of constructions are clearly visible. The rest of this portion of the site is completely destroyed by amelioration and agricultural activities.

Issues/Concerns - The left side of the site which will be directly affected by the road design.

Mitigation Measures:

Undertake excavations at the existing portions of the left side of the settlement;

During excavation of the site the following are forbidden: to use the area of the site for parking of the heavy construction equipments; storing construction materials; disposal of construction wastes in the area and the use of local soil for construction purposes.

5. Nerkin Bazmaberd Necropolis (tomb field) (# 23 in GM and Map 6)

Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 25.280 – 25.700 km
GPS coordinates: N 40°, 19', 09, 3''; E 44°, 01', 17, 8"
State List of Historical-Archaeological Monuments: # 2. 73. 1. 1. 1.

The site occupies a large area on the South from the village of Nerkin Bazmaberd, attached to the right side of the existing Ashtarak-Gyumri road. It is represented by groups of kurgan (burial mounds) and cromlech constructions (round stone "belts" around burials), preserved in and in between agricultural fields, mainly in rocky areas. It is very little known about the tomb field: small scale excavations that were carried out here reveal the tombs and the materials of III - mid-I Millennia BC.

Issues/Concerns - New design of the highway is suggested on the left side of the existing road, which means the lesser impact on the site. The only part which will be influenced by construction activities is the western end of the tomb field, the area around *cloverleaf* to the Nerkin Bazmaberd community.

Mitigation Measures:

It is recommended to excavate this portion of the site. After fixation of the results, the area of the site can be used under the road construction. This is the only way to protect the scientific and cultural values of the affected portion;

During excavation of the site the following are forbidden: to use the area of the site for parking of the heavy construction equipments; storing construction materials; disposal of construction wastes in the area and the use of local soil for construction purposes.

6. Verin Sasnashen Archaeological Complex (# 30 in GM and Map 7)

Aragatsotn marz, Verin Sasnashen community
Distance in correspondence to the "0 point" of the road: 29.000 – 31.400km
GPS coordinates: N 40°, 19', 51, 8''; E 43°, 58', 35, 3"
State List of Historical-Archaeological Monuments: # # 2.74. 4; 2.74. 2; 2.104. 1. 1; 2.104. 1. 2.

The archaeological complex of Verin Sasnashen in fact - is continuation to the North of the Nerkin Bazmaberd necropolis. The site consists of number of tomb-fields and settlements spread on the both sides of the existing Ashtarak-Gyumri road. The small-scale excavations had been carried out here and several burials of III-I Millennia B.C. were discovered. In some areas of the site traces of walls and other dwelling constructions of the Early Bronze Age (IV-III Millennia B.C.) and Early Medieval period (4^{th} - 6^{th} centuries A.D.) are visible.
Issues/Concerns - The design of the new highway will directly impact the left portion of the complex

Mitigation Measures:

Undertake excavations to include some groups of tombs and wall constructions which are spreading directly on the left side of the existing road prior to construction works;
The following are forbidden: to use the area of the site for parking of the heavy construction equipments; storing construction materials; use of local soil for construction purposes.

7. Talin Tomb Field (# 38 in GM and Map 10**)**

Aragatsotn marz, Talin community
Distance in correspondence to the "0 point" of the road: 40.800 – 44.900 km
GPS coordinates: N 40°, 24', 03, 0''; E 43°, 53', 30, 7"
State List of Historical-Archaeological Monuments: # 2.3.3.

The site is represented by a large tomb field (necropolis), occupying a large area from the N-NE and southern suburbs of Talin and then continuing East towards the acting Ashtarak-Gyumri road. The burials are concentrated by separate groups survived between the agricultural fields, cleaned by melioration activities. During the excavations, conducted here since 1985 because of urban needs of Talin, were able to open around 90 separate tombs that belong to the Early Bronze Age and Late Bronze - Early Iron Ages (IV – I Millennia BC), with outstanding remains of the specific material culture. But, the numbers of tombs are still unexcavated. They are mostly visible on the both sides of the existing Ashtarak-Gyumri road.

Issues/Concerns - The suggested design of the highway is directly affecting the burials spread on the left and right sides of the highway, especially directly after the city of Talin (after the eastern cloverleaf entrance to the community).

Mitigation Measures:

The only way to save the cultural and historical significance of the site is to organize excavations of these tombs prior to construction works;

During excavation of the site the following are forbidden: to use the area of the site for parking of the heavy construction equipments; storing construction materials; disposal of construction wastes in the area and the use of local soil for construction purposes.

8. Zakari Berd archaeological complex (# 35 in GM and Map 9, 10)

Aragatsotn marz, Katnaghbiur community,
Distance in correspondence to the "0 point" of the road: 35.150 – 35.300 km,
GPS coordinates: N 40°, 22', 04, 0'' ; E 43°, 56', 37, 8"
State List of Historical-Archaeological Monuments: # **2.57.2.**

The first site of the complex is represented by a fortified settlement built on a peninsula formed by two small, but deep gorges on the distance of 1,5 km South-East from the village of Katnaghbyur. The excavations were conducted here from 1979, after the construction of the existing Ashtarak-Gyumri road, which cut the site into two parts. The initial investigation reveal a well designed settlement with different private and public constructions, workshops etc., surrounded by defense walls.

According the archaeological data, the site was functioning in Early Medieval period (3rd-5th centuries A.D.). It was the "Komopolis" type of settlements, surrounding the royal residence of Arshakuni kings in the capital of Vagharshapat.

Issues/Concerns – The construction of the road will destroy completely the left part of the site complex.

Mitigation Measures:

The recommended way to protect the site from destruction is to change design of the highway and to put it further to the South-West with a bridge passing over southern end of the gorge.

9. Aruch Neolithic settlement and Medieval village (# 20 in GM and Map 5)

Aragatsotn marz, Aruch community
Distance in correspondence to the "0 point" of the road: 20.500 – 20.700 km
GPS coordinates: N 40°, 18', 13,1'' ; E 44°, 04', 42,1"

The newly-discovered medieval settlement of 10-13-th centuries spreading around the Aruch caravanserai, is one of the rare monuments of this type, seems to be an important trade point on the Silk Road. The excavations here had opened a Neolithic site of "Pre-pottery phase" (VIII Millennium B.C.), under the remains of medieval constructions. Sites of both periods are very important from the scientific point of view. First one can be a source for understanding the character of functioning of a medieval town involved in intensive inter-regional trade and the second - to throw light on the problems of spread of Neolithic civilizations in the areas of the m-t Aragats foothills and the Ararat valley.

Issues/Concerns – Suggested design of the road will affect the site, covering most of its area with a *cloverleaf*, which is linking the main highway to the village of Agarak (in the Talin district).

Mitigation Measures:
Change the access to the Agarak community. The *cloverleaf* must be redesigned and moved to the East or West from the site.

10. Aruch Medieval Caravanserai (# 21 in GM and Map 5)

Aragatsotn marz, Aruch community
Distance in correspondence to the "0 point" of the road: 20.630 km
GPS coordinates: N 40°, 18', 14,6'' ; E 44°, 04', 37,9"
State List of Historical-Archaeological Monuments: # **2. 22. 16.**

This construction is one of the outstanding monuments of civil architecture of the Medieval Armenia, was built in 13th century, on one of the active crossroads of the Great Silk Road. The three-nef building of the caravanserai is enforced by round towers, which are transforming it into a multifunctional fortified dwelling. Only a quarter of the building had been preserved to nowadays. In 2007 caravanserai was partly restored and prepared to become one of the important tourist objects of Armenia. This kind of buildings are rare enough not only in Armenia, but in the Near East as well. But the fortified caravanserai of Aruch is absolutely unique even among the known constructions of this type. In addition to that, the presence of synchronous settlement near the caravanserai makes it more significant both for the specialists and visitors.

Issues/Concerns – Suggested design of the road will directly encroach on the site covering most of its protection area with a *cloverleaf.*

Mitigation Measures:

The *cloverleaf* must be redesigned and moved to the East or West from the site. The highway must not overpass the gorge which is the boundary of protection area of the caravanserai.

11. Davtashen archaeological complex (# 32 in GM and Map 8)

Aragatsotn marz, Davtashen community,
Distance in correspondence to the "0 point" of the road: 31.600 – 33.200 km,
GPS coordinates: N 40°, 21', 04, 1'' ; E 43°, 57', 32, 8"
State List of Historical-Archaeological Monuments: # **2.36.1.**

Davtashen archaeological complex is the continuation to the North of the Sasnashen complex. Series of tomb fields and remnants of settlements spread on both sides of the existing Ashtarak-Gyumri road. Small scale excavations conducted here were able to date the burials between the III - I Millennia B.C. On the left side of the existing Ashtarak-Gyumri highway traces of different wall constructions are clearly visible, showing the existence of a settlement continuing South-East along the left side of the road.

Issues/Concerns – Due to the suggested design of the new highway the left side of the complex will be directly affected by the construction activities.

Mitigation Measures:
It is strongly recommended to conduct excavations prior to construction activities. The excavation must include some groups of tombs on the left side of the existing Ashtarak-Gyumri road.

Cultural (Memorial) Objects of Direct Impact

The objects of this group are presented mainly by memorial monuments devoted to the victims of car accidents. Most of these objects are under the supervision of the communities and in case of necessity can be relocated in frames of co-ordination with the community authorities.

1. Memorial to Hayk (# 12 of GM)
Aragatsotn marz, Kosh community

Distance in correspondence to the "0 point" of the road: 13.830 km
GPS coordinates: N 40°, 17', 31, 0''; E 44°, 09', 18, 4"

2. Memorial to Khachik Ashotovich (# 16 of GM)
Aragatsotn marz, Shamiram community
Distance in correspondence to the "0 point" of the road: 18.320 km
GPS coordinates: N 40°, 17', 52, 9''; E 44°, 06', 11, 0"

3. Memorial to Armen, Arman, Yervand (# 17 of GM)
Aragatsotn marz, Shamiram community
Distance in correspondence to the "0 point" of the road: 18.610 km
GPS coordinates: N 40°, 17', 55, 9''; E 44°, 06', 00, 3"

4. Memorial Monument with Russian text (# 27 of GM)
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 27.200 km
GPS coordinates: N 40°, 19', 22, 2''; E 44°, 00', 14, 3"

5. Memorial to Leo Gmyur (# 28 of GM)
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 27.700 km
GPS coordinates: N 40°, 19', 27, 4''; E 43°, 59', 54, 4"

2. Impacts Related to Design

The alignment starts at the outskirts of Ashtarak and ends at Talin. To overcome any social impacts associated with severance of communities, every community is provided with at least one bi-directional access to the highway. Where required, underpasses will be provided to allow safe passage of persons, cattle, wild life, and agricultural and private vehicles.

3. Indirect Impact Receptors

There will be archeological sites and historical monuments including cultural (memorial) objects that will be indirectly impacted by the Project these include the following:

Aghtsk Necropolis, Karhanki Berd fortified settlement, Kurgan burial, The Great Khachkar of Kosh (Khachkar of Zakaryan princes), Necropolis of I Millennium B.C. and Medieval village, Necropolis and Settlement of I Millennium B.C., Aruch-2 Necropolis, Aruch-3 Necropolis, Fortified settlement and Necropolis, Sev Berd Archaeological Complex and Katnaghbyur Tomb Field.

The Cultural Memorial objects to be indirectly affected will include the following:
Memorial to the Victims of Maralik – Yerevan Direction, Memorial to Nikolyan Khachik, Memorial to Ujantsi Rudik, Monument "Armenian Alphabet", Memorial to Serob, Memorial to Hamlet, Memorial to Tiko, Stele to the All-Armenian Dance circling Mt. Aragats, and Two Memorials: Sargis and Armen, Manouk and Azat.

4. Impacts During Construction

Activities during the pre-construction, site preparation, and construction phases are outlined below and the potential impacts assessed and mitigation measures recommended. Detailed mitigation measures including the requirement to prepare detailed operating plans for specific aspects are included in the EMP. Regulations on environmental protection, safety of

the public, and safety and hygiene of workers should be fully complied with in all phases of constructing the project.

During construction, the following should be closely observed:

- Location and set-up of construction quarters near the project site (for migrant workers only). These shall be provided with power and water supply and sanitary toilet and washing facilities.
- Provision of stockyard for construction materials such as aggregates, cement, reinforcing bars, among others.
- Identification of appropriate areas where excavated materials will be temporarily stockpiled.
- Coordination with authorities in the identification of the disposal site for solid waste materials.
- Programming of land clearing and excavations during the dry season where practicable.
- Inevitable removal and cutting of trees must be undertaken with permit duly authorized.
- Construction of temporary erosion ponds and silt traps as necessary around the work areas.
- Strict observance of proper cut - and - fills procedures to avoid or minimize any wastage or removal of excavated materials from the work areas.
- Placing of material stockpiles and spoil dumps as far away as possible from the waterways and provision of proper and adequate containment.
- Reduction of storage time of construction spoils and materials in the work areas.
- Observance of proper operational procedures in the use of heavy equipment for transporting, hauling and moving earth spoils from one area to another so as to avoid spills on roads and into the rivers or nearby waterways.

PMU must require its contractors to implement a waste management program, which will include regular collection and disposal of wastes at a designated sites approved by the MNP. This program should include the following waste management practices:

- Provision of waste bins in various strategic points within the construction area for the workers to dispose their wastes. Wastes from these containers will be collected (dump truck of the contractor) regularly to be disposed at a designated dumpsite by the Local Authorities.
- Placing of recyclable materials at local material recovery facilities (MRF).
- Conduct of a thorough orientation of workers on proper waste disposal practices.
- Re-use of excess excavated materials as aggregate or fill.
- Regular hauling of construction debris to the designated dumping area to prevent their accumulation on-site.
- Conduct of equipment/vehicle cleanup and maintenance as far away as possible from work areas and waterways. Collection of spent and placement of used oil placed in sealed containers and their proper disposal or sale to other users.
- Post construction clean-up and disposal of construction debris shall be a contractor’s responsibility.

The following measures shall be observed by the Contractor to reduce the incidence of project related accidents:

- Designation of a safety engineer or its equivalent at the construction site at all times.
- Provision of rubber boots, safety gloves, dust masks, colored raincoat and other equipment for all workers as deemed necessary.
- Non admittance of technical staff, construction workers to work areas without the use of appropriate safety apparel.

Construction Camps - Locations for any construction camps will be selected by the contractor in consultation with the PMU's Environment and Archaeology Specialists to ensure minimal impact. For each camp, the contractor should develop a site-specific EMP that includes a site plan, a solid and liquid waste management plan, plan to exclude camp followers, and a plan for site restoration.

Utilities - There is potential for disruption to both above and below-ground utilities during construction. This might include above-ground gas mains, water mains, sewers, and electricity and communications lines as well as irrigation facilities. Surveys will be undertaken by the contractor prior to construction to identify operational and redundant utilities. Plans will be prepared to set out temporary or permanent relocation and/or protection measures prior to construction. Any disruption to services will be short-term and localized and will take into account the time of year and time of day. Affected persons should be notified prior to the works.

Safety - Construction site safety for workers and residents of the nearby communities is of concern to the ADB. The construction site layout will be planned and areas and machinery secured as required prior to and during construction to ensure safety. First aid facilities will be provided and safety and environmental emergency response plans prepared prior to the start of construction. Polycyclic aromatic hydrocarbons (PAHs) released during asphalting is potentially dangerous to the health of workers who will be affected over prolonged periods. All persons subjected to PAHs should wear appropriate personal safety equipment, receive instructions on its proper use, and be tested periodically.

Employment - There is potential for the project to generate employment opportunities for locals. It is recommended that recruitment be offered in the local community as it is likely to workers will also minimize social problems otherwise caused by non-local workers attracting camp followers.

Environmental Orientation - On-site workers should be made aware of, and trained in, standard environmental protection requirements and the EIA requirements. Contractors will be contractually required to include environmental orientation and monitoring as part of their management of the project. The orientation should include posters in work camps that illustrate the Red Book species likely to be found in various areas of the project.

Public Awareness - Potentially sensitive receptors will be notified by the Contractors of upcoming construction activities in their area that may result in increased dust, noise, temporary road closures and traffic diversions. This may include media announcements to the general public. Notifications should provide contact details on who to contact to obtain further information or make a complaint. To be really effective, public awareness campaigns should be enhanced by involving NGOs.

Vegetation Clearing - Prior to construction, decorative and orchard trees and other vegetation within the alignment will be cleared. Based on the botany report in Annex 4, none of the trees are protected species. Clearing of vegetation, earthmoving activities and other

construction activities have the potential to impact on other flora and fauna. To the extent practicable, trees that must be removed should be transplanted. Vegetation removal and site clearing should be undertaken during late autumn and/or winter which are seasons most favorable to minimize impact on flora and protected fauna species.

Top Soil - should be stored for site restoration and in medians. Surplus top soil should be distributed in the area based on recommendations by the local government.

Dust and Exhaust Gases - As ground cover is removed, exposed soils of the site will provide a dust source potentially causing nuisance to nearby receptors and a reduction in local air quality. The generation of dust should be mitigated primarily through maintaining vegetation cover as long as practicable and spraying the haul roads with water. Particulate matter and NO_2 will be generated by construction vehicle exhaust although the exposure to potential receptors is expected to be insignificant because of the limited level and duration. Nevertheless, exhaust attenuation such as scrubbers or diesel particulate filters will still be applied to vehicles.

Cultural Heritage - The alignment does not pass through or near any cultural heritage or archaeological sites designated by UNESCO or the MOC except as noted above, the Agarak archaeological preserve. However the archaeological investigation identified the remains of several settlements near the alignment. If any item of cultural heritage or archaeological interest is uncovered during excavation activities, works must stop and the MOC notified. Construction activities cannot commence until the chance-find has been investigated by an archaeologist and written permission given by the MOC. Contractors will be obliged to familiarize themselves with the chance-find procedure of the MOC and will be contractually required to implement them strictly.

Noise **-** During construction, noise will be generated from the operation of vehicles and machinery (including excavators, compactors, jackhammers, vehicle reversing alarms, etc) and other construction-related activities. The most sensitive receptors are occupants of residential properties and other buildings that are adjacent to the site boundary.

Construction noise levels at nearby receptors will vary throughout the construction period depending on the activities carried out, the distance to sensitive receptors, as well as atmospheric conditions. The Contractor will develop a Noise and Vibration Management Plan, when actual locations of construction camps are known. Without mitigation, increased noise levels would likely result in significant temporary noise impacts. Mitigation measures that will be applied to minimize noise include:

(i) siting of construction camps away from residential areas;
(ii) distancing noisier activities away from receptors where practicable;
(iii) scheduling of noisy activities towards the middle of the day and avoiding night time activities;
(iv) minimizing the need for heavy vehicles to pass through residential areas by specifying routes along public roads, site access points, and haul routes;
(v) installing and maintaining effective exhaust silencing systems on vehicles and equipment; and
(vi) installing temporary hoarding around noise sources where considered necessary where other mitigation measures are not sufficient or practicable.

Vibration **-** Construction equipment may generate vibration at the properties immediately adjacent to the alignment. Any vibration would result in nuisance effects, and will be localized and temporary and will unlikely result in structural damage to buildings or walls of the adjacent private properties. A property dilapidation survey will be undertaken prior to construction and again following construction to inspect any damage. Any damage as a result of construction of the project will either be repaired or the owners compensated.

Particular care must be exercised to prevent damage from vibration to archaeological/historical/cultural monuments such as the Aruch caravanseri, the Kosh cross-stone, and those modern monuments that will not need to be relocated.

Excess Spoil - If excess spoil is generated from the excavation and grading activities, the spoil will be classified and transported and disposed in accordance with MNP requirements.

Oil and Fuel Spills - There is potential for spill or leakage of fuels and oils from inappropriately stored material or when refueling. This would contaminate the soil and could infiltrate into the groundwater or eventually enter surface water if carried off site through run-off. Mitigation in the EMP sets out measures for avoiding on-site maintenance and re-fuelling where practicable, providing bounded areas for fuel storage and maintenance where on-site maintenance activities cannot be avoided, clean-up of any spill/leak, and reporting to the MNP in case of spills and leaks.

Vehicle Movements on Local Roads and Altered Access - The project will increase heavy vehicle movements on local roads throughout construction from transport of waste, spoil, and construction materials and machinery. There is potential for disruption to public road access, including diversions where the new highway crosses the existing road, and increased road traffic conflict. A Traffic and Transport Management Plan will be prepared by the contractor to set out safe entry and exit points, enforce strict safety on public roads in conjunction with local police forces, specify timing for deliveries, and, in conjunction with local governments, determine routes on local roads to manage traffic and minimize potential conflict.

Solid and Liquid Waste Generation - Solid waste that may be generated during construction includes redundant road surface, oil filters, material packaging, and solid waste discarded by construction workers. Liquid wastes that will be generated by the project include construction worker sewage and waste oils. The EMP specifies that waste must be collected, stored, transported, and disposed in accordance with MNP requirements.

Site Reinstatement - Following construction, and prior to handover of the site by the Contractor to the MOTC, the Contractor will reinstate the site which will include clearing the site of all construction-related material and waste and transporting same to sites approved by the PMU, the MNP, and respective marzpeds. Landscaping activities should include grass-seeding and planting native trees within the median and along the shoulder. All trees removed from rights-of-way will be replaced with native trees at a ratio of 10:1, most of which will be in the vicinity of the alignment consistent with sight distances. The contractor will engage competent companies to maintain the trees for at least three years to assure their survival.

5. Impacts Related to Operations

Air Quality - Ambient measurements indicate that the air quality at the closest communities is excellent. The slight deterioration in air quality that may be caused by increased traffic on the upgraded highway is expected to be insignificant.

Noise - Operational noise levels are predicted to increase beyond ambient levels that already exceed day and night standards in the 6 communities with receptors close to the new highway.

Socio-economics - Often with upgrading roads to highways, there is concern about negative socio-economic impacts from lost business of incidental through-traffic. Such is the case on this project where fruit vendors may not be permitted to erect stands at the side of the highway. Vendors who will lose their income will be compensated under the LARP.

The project will also bring socio-economic benefits to the local community by providing short-term local employment opportunities. The improved highway link will induce regional economic growth by enhancing accessibility between the North and the South.

6. Cumulative Environmental Effects

During construction, receptors adjacent to the route will be exposed to short-term construction-related nuisance effects, including noise, dust, and altered access resulting in cumulative effects. These impacts will largely be mitigated to insignificant levels. Construction of these sections will likely not occur simultaneously and consequently, there will be no adverse combined impacts during construction.

7. Alternatives to the Project

The ADB's *Safeguard Policy Statement* (2009) requires consideration of feasible alternatives to the project in terms of project location and design allowing measures to be proposed to avoid or prevent potential environmental impacts.

The Ashtarak-Talin portion of the highway is an integral part of the North-South road corridor that routes around Mt. Aragats. Furthermore, the project follows the route of the existing M1 road and will be constructed as a category 1 highway. Consequently, there are no practicable alternatives in terms of general alignment, design, and construction methodology and the no-go option is not considered viable as it would run counter to Government planning of comprehensive highway network, of which this project is a vital link.

The potential impacts of the project on the environment and primarily on historical and cultural sites will be reduced by proposed modest changes in the alignment. These changes will also result in relatively slight social impacts in addition to those resulting from the pre-design alignment, which will be addressed by the LARP.

Shahverd Wetland - The wetland situated on both sides of the existing highway some 500 m north from the starting point of the project. It is the only wetland in this semi-arid region. It supports several flora and fauna species. Protecting this wetland is consistent with Armenia's formal endorsement in 1993 of the Ramsar Convention on Wetlands.

The Agarak bypass is seen as an alternative to minimize the impact on the wetland flora and fauna occurring in the area and to the Agarak Historical-Cultural Site. The Agarak bypass is seen to avoid any direct impacts on the existing habitat and animals the area. Also, it will prevent the disruption of the water regimes from spring under the present bridge.

Agarak Historical-Cultural Site - The reason for the proposed change in the pre-design alignment is to minimize the possible destruction within the protection area of the site. The road widening and rehabilitation of the Agarak Bridge must be planned to the North (right side of the existing road) and to the East away from the banks of Amberd River.

E. CONSULTATION, INFORMATION DISCLOSURE AND GRIEVANCE REDRESS MECHANISM

Under Armenia's EIA legislation, the EIA will be subject to public hearings conducted by the MNP to gauge "…the public opinion, the opinions of affected community leaders, the opinions of affected communities, and relevant state bodies."

Specifically, prior to the implementation or start of construction and after the updates to the EIA and EMP documents have been duly accomplished and have been submitted to the Ministry of Nature Protection the project shall abide with the applicable provisions of *Article 6,* the procedure of notification about the implementation of the intended activity of the law of the Republic of Armenia on environmental impact assessment.

Public Consultations

The 1st Public Consultation consisted of four meetings over two days. On 26 May 2010, a meeting was held in one of MOTC's meeting rooms in Yerevan. That meeting was chaired jointly by the PMU Director and ADB staff consultant and was attended by 18 persons. On 27 May 2010 meeting was held in Kosh, the meeting was held in the new public school auditorium, attended by 20 persons, and chaired jointly by a representative of the PMU and ADB staff consultant. Each attendee received a project fact sheet in English and Armenian (Annex 10) and a notebook and ball pen printed with project title, ADB logo, and the Armenia coat of arms.

Copies of the actual attendance sheets and their translations in English are in Annex 10. Questions and comments are summarized in Table VII-2.

The 2nd Public Consultation took place on 1 and 2 July 2010 and again and provided a platform to discuss the findings of the EIA team and the project with key stakeholders. The project was assessed during these meetings by participating stakeholders with concerns and issues captured and where appropriate further actions taken to alleviate concerns raised at the event.

On 1 July 2010 meeting was held in Kosh, the meeting was held in the new public school auditorium, attended by 15 persons, and chaired jointly by the ADB staff consultant; and on 2 July 2010, a meeting was held in one of MOTC's meeting rooms in Yerevan. That meeting was chaired jointly by the PMU Public Relations Officer and ADB staff consultant and was attended by 5 persons in addition to the EIA team and several PMU staff.

Each attendee again received a project fact sheet in English and Armenian (Annex 11) and a notebook and ball pen printed with project title, ADB logo, and the Armenia coat of arms.

In total, the two public consultations were attended by 58 persons, including 3 from Government other than PMU, 2 from media organizations, and 9 from the 7 different NGOs listed below. Several of the persons attended both consultations.

(i) NGO Forum on ADB
(ii) Consumers' Association of Armenia
(iii) Eco Alliance
(iv) Ecological Academy
(v) Environmental Survival
(vi) Geo Botanic
(vii) Shogher Union

Information Disclosure

Information about the project was disclosed primarily during the two public consultation meeting but also during introductory and follow-up meetings with relevant government ministries. The participation of the affected public was achieved by soliciting questions and

concerns about the project from affected and interested parties during the public consultations.

The advertisements in the *Republic of Armenia* newspaper for the first and second public consultations were posted in the website of the MOTC. Copies of the advertisements as they appeared in the *Republic of Armenia* and the *Aragats World* newspapers are in Annex 10 and Annex 11 respectively. In addition, multiple television and radio announcements for both events were made in Gyumri by the SHANT and TSAYG broadcasting companies. Written (Email) and verbal invitations rounded out the publicizing of the event.

A draft final EIA in the Armenian language has been transmitted to the PMU for non objection by the council of Ministers and posted the non-objection on the MOTC website. The draft final EIA was then made publicly available on the ADB website (in English[22]) on or about 1 August 2010. This ensured the disclosure of environmental concerns and proposed mitigation measures to the relevant authorities and other interested parties.

Stakeholder Meetings

The stakeholders were involved during the information disclosure, and consultation with affected people. During these activities comments and concerns received from affected people and other stakeholders and will be addressed by the updated EMP.

The meetings were held with representatives of a number of stakeholder groups and will be ongoing with the same and other stakeholder groups during the preparation of future projects funded under the MFF. Stakeholder meetings held during the EIA report preparation in May and June 2010 are listed in Table 12.

Table 12: Stakeholder meetings

Date	Entity/Venue	Attendees
05 May 10	Artsakhroad Institute CJSC	Robert Soghoyan, Executive Director Artur Avetisyan, Project Coordinator ADB: Klaus Schonfeld, Arman Vermishyan, Dmitri Arakelyan (GIS expert - EIA team)
06 May 10	MOTC	Hrant Beglaryan, First Deputy Minister Feliks Pirumyan, Director, PMU Gagik Grigoryan, Head, Foreign Relations Karen Badalyan, Deputy Director, Autoroad GNCO ADB: Klaus Schonfeld, Arman Vermishyan
06 May 10	Shirak Regional Museum (Gyumri)	Hamazasp Khachatryan, Director ADB: Klaus Schonfeld, Boris Gasparyan, Arman Vermishyan
18 May 10	Artsakhroad Institute CJSC	Eduard Bezoyan, President Robert Soghoyan, Executive Director Artur Avetisyan, Project Coordinator ADB: Klaus Schonfeld, Arman Vermishyan
07 May 10	MNP	Dr. Simon Papyan, First Deputy Minister Margarita Korkhmazyan, Head, International Relations Andranik Gevorkyan, Head, Environmental State Expertise ADB: Klaus Schonfeld, Arman Vermishyan
07 May 10	MNP	Margarita Korkhmazyan, Head, International Relations ADB: Klaus Schonfeld, Arman Vermishyan
10 May 10	MOC	Ms. Arev Samuelyan, Deputy Minister Armenak Sargsyan, Head, Department of Cultural Heritage Artyom Grigoryan, Head, Dept. of Historic and Cultural

Date	Entity/Venue	Attendees
		Monuments Conservation ADB: Klaus Schonfeld, Arman Vermishyan, Boris Gasparyan
17 May 10	MOTC PMU	Feliks Pirumyan, Director, PMU Ms Arevik Sindoyan, Assistant to Director, PMU ADB: Klaus Schonfeld, Arman Vermishyan, Boris Gasparyan, Dmitri Arakelyan (GIS expert - EIA team)
18 May 10	Artsakhroad Institute CJSC	Eduard Bezoyan, President Robert Soghoyan, Executive Director Artur Avetisyan, Project Coordinator ADB: Klaus Schonfeld, Arman Vermishyan
26 May 10	MOTC	Feliks Pirumyan, Director, PMU Ms Arevik Sindoyan, Assistant to Director, PMU Klaus Schonfeld, ADB
03 Jun 10	ADB AARM	Feliks Pirumyan, Director, PMU Armine Simonyan, Head, PMU Safeguards Unit ADB: Areg Barseghyan (AARM), Arto Ahonen, Klaus Schonfeld
10 Jun 10	MOTC	Feliks Pirumyan, Director, PMU Ashot Karakhanyan, Head, PMU Technical Unit Armine Simonyan, Head, PMU Safeguards Unit ADB: Areg Barseghyan (AARM), Gohar Mousaelyan (AARM), Klaus Schonfeld Briefly, after the meeting: Hrant Beglaryan, First Deputy Minister ADB: Areg Barseghyan (AARM), Klaus Schonfeld
28 Jun 10	ADB AARM	Silva Adamyan, NGO Forum on ADB Dr. Knarik Hovhannisyan, NGO “Eco Alliance” ADB: Klaus Schonfeld, Arman Vermishyan
02 Jul 10	MOC	Ms. Arevik Samonyan, Deputy Minister Armenak Sargsyan, Head, Department of Cultural Heritage ADB: Klaus Schonfeld, Boris Gasparyan
06 Jul 10	MNP	Edgar Pirumyan, Department Head, Water Resources Management Agency Klaus Schonfeld, ADB
06 Jul 10	National Statistical Service	Lusine Kalantaryan, Labor Statistics Division Klaus Schonfeld, ADB
06 Jul 10	Ministry of Health	Ruzanna Yuzbashyan Klaus Schonfeld, ADB
06 Jul 10	Ministry of Education	Suzanna Mashuryan Klaus Schonfeld, ADB

Grievance Procedure and Redress Mechanism

At times and for different reasons, contractors do not adhere to sound construction procedures that include environment protection. When that occurs, affected people are encouraged to lodge their complaints. The following is intended to assist aggrieved persons in lodging their complaints and to describe the mechanism designed to redress their grievances in a timely and effective manner. This process is provided in addition to the existing channels of petitions in the form of letters and personal pleas long established by local governments. The entities potentially involved are: complainant, contractor, EA, PMU, NGOs, ADB, and the courts.

Contractor

The contractor is obliged to carry out the work in accordance with contractual requirements that include:

(i) a provisional sum for grievance redress;
(ii) a person on staff responsible for grievance procedure who
  a. is first contact,
  b. keeps a log,
  c. drafts mitigation measure to be implemented by contractor, and
  d. prepares periodic reports;
(iii) a designated telephone line;
(iv) posting the telephone number, email address, and contact name on Project Boards.

Executing Agency

The EA, the Ministry of Transport and Communication (MOTC) has agreed with ADB to:

(i) arbitrate disagreements between PMU, contractor, and aggrieved person; and
(ii) report periodically to ADB.

PMU

PMU staff to include an appropriate specialist who will:

(i) monitor grievance process;
(ii) coordinate and arbitrate grievances with contractor;
(iii) coordinate with NGO; and
(iv) report periodically to EA (MOTC).

NGOs

NGOs have participated in the public consultation events described in Section IV. They are committed to:

(i) provide public monitoring dimension;
(ii) assist with grievance redress negotiations;
(iii) assist with grievance arbitration; and
(iv) assist PMU to raise public awareness of the project.

Complainant

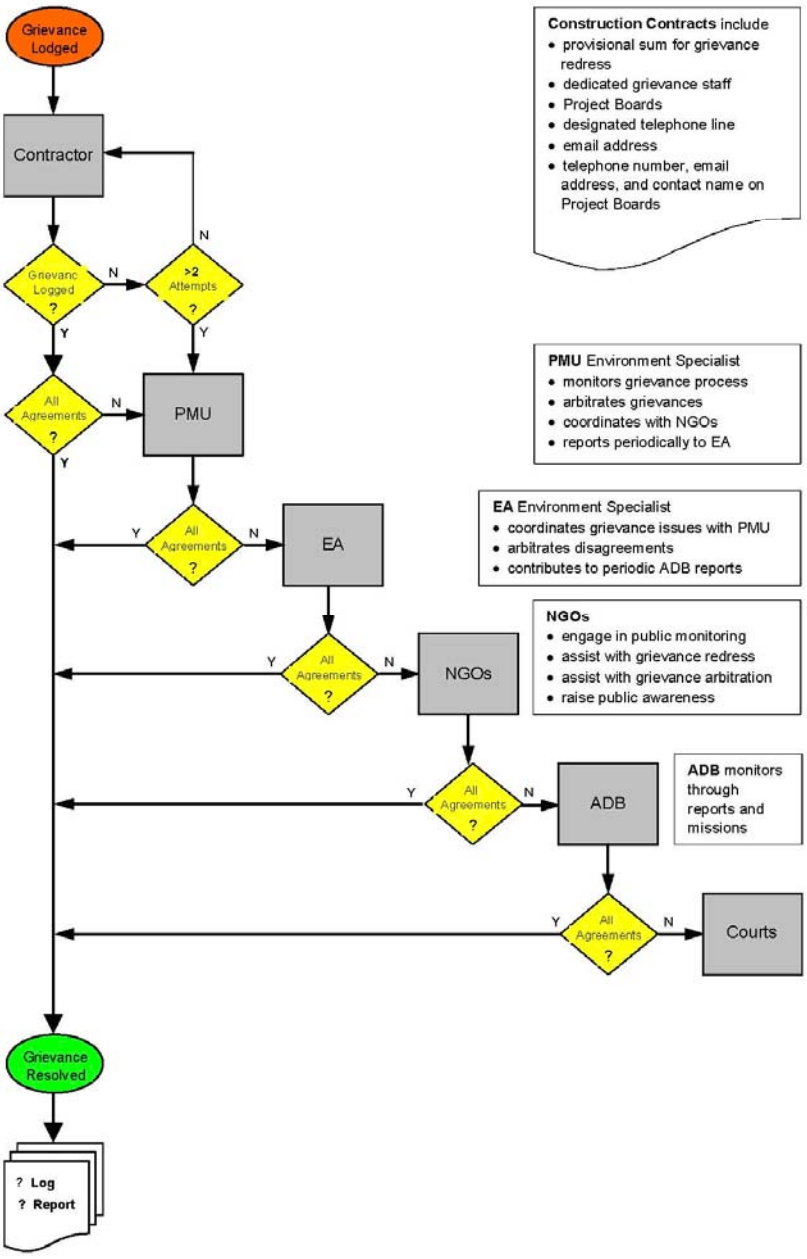
A potential complainant is urged to proceed in the following order; s/he should:

(i) contact contractor's designated grievance staff in person or via designated telephone number;
(ii) lodge complaint and provides information for complaint log;
(iii) agree with contractor on mitigation measure;
(iv) agree with contractor on time limit to implement mitigation measure;
(v) agree with contractor on verification method that mitigation measure has been implemented as agreed;
(vi) sign off that mitigation measure has been implemented as agreed;
(vii) seek redress from PMU if not satisfied with (iii), (iv), and (v);
(viii) seek redress from EA if not satisfied with (vii);

(ix) seek redress from ADB (AARM) if not satisfied with (ix);
(x) involve appropriate NGOs; and
(xi) seek redress from the courts if all else fails.

The steps described above are shown graphically in Figure II.

Figure II : Grievance Procedure and Redress Mechanism



F. Monitoring and Reporting

The key departments within the MNP that have administrative authority over the EIA and the project approval process are two Organizations:

(i) The Environmental Expertise SNCO (EE) is responsible for reviewing and approving EIA reports and projects for implementation and adding conditions when necessary to protect the environment; and
(ii) The State Environmental Inspectorate (SEI) is responsible for inspecting projects to ensure compliance with conditions imposed by the NPE and with the project EMP.

The EIA process and the SEI's power to inspect are the principal tools used by the MNP to achieve compliance with environmental protection principles.

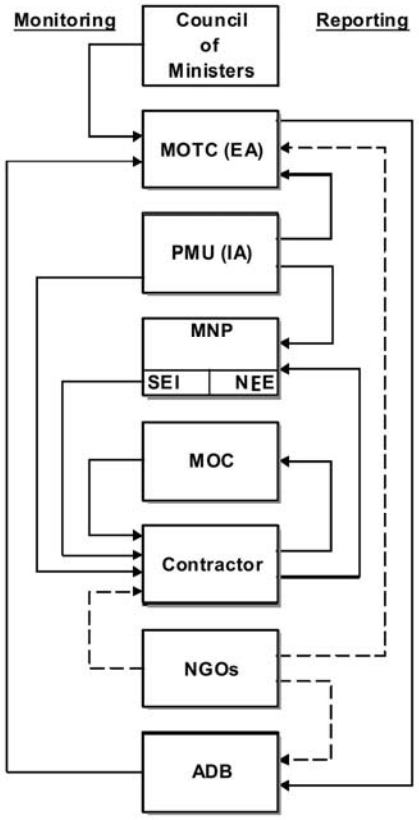
To satisfy relevant regulations and to gain project approval of the MNP, an EIA, in accordance with the Law on Environmental Impact Assessment (EIA) (1995), has been prepared in Armenian. The MNP EIA will have similar, if not identical, requirements as the ADB EIA.

The Ministry of Nature Protection can initiate a review of environmental impact when it considers it necessary to do so. The EIA Law specifies notification, documentation, public consultations, and appeal procedures and requirements (Articles 6-11).

The Ministry of Culture has jurisdiction over archaeological, historical, and cultural sites. It is not, however, involved with the fate of modern monuments erected along the highway by private citizens in commemoration of accident victims. The relocation of those monuments will be coordinated by the respective provincial authority (*marzpet*).

The steps described above are shown graphically in Figure III.

Figure III : Monitoring and Reporting Relationships



MOTC	Ministry of Transport & Communication
PMU	Project Management Unit
MNP	Ministry of Nature Protection
SEI	SNCO State Environmental Inspectorate
NEE	SNCO Nature Protection Expertise
MOC	Ministry of Culture
NGOs	Non-governmental Organizations
ADB	Asian Development Bank
SNCO	State Non-commercial Organizations

Reporting

The Contractor shall submit regular environmental reports to the Project Manager as a requirement of the EMP. A summary report shall be submitted as part of the Monthly Progress Report. Prior to submission, the Contractor's Project Manager shall endorse the Report. Reports shall comprehensively address all relevant aspects of environmental

regulations and requirements and, in particular, report on all environmental audits undertaken during the period covered by the report.

The following environmental reports shall be submitted:

- Initial Environmental Baseline Report. Required environmental baseline data is specified in **Section 101.16.9 Environmental Monitoring under the General Requirement of the Bidding Document.** The Initial Environmental Baseline Report and shall be submitted as specified under the said Section.
- Weekly Environmental Reports. Environmental reports shall be undertaken on weekly basis. Environmental Report summarizing the results shall be submitted on a monthly basis.
- Incorporation of Summaries in the Project Monthly Report. Summaries of the Weekly Environmental Reports will be included in the Project's Monthly Progress Report. Monthly reports shall be analytical and provide explanations for anomalies and problems encountered. (See Annex 6 - Report Forms)

Notification of environmental break-down and accidents:

The Resident Engineer will be notified immediately of any environmental break-down (fire, explosion, oil, emulsion and bitumen overflow) and accidents which occur whether on-Site or off-site in which the Contractor, his personnel or construction plant, or those of any subcontractors are directly or indirectly involved and which result in any injuries to any persons.

Such initial notification may be verbal and shall be followed by a written comprehensive report within 24 hours of the environmental break-down and accident.

Conclusions

It is concluded that:

(i) the key benefit of this project is a safer, more efficient highway that is expected to contribute to the economic growth of Armenia;
(ii) the proposed changes and alternatives to the detail design of the project would reduce the significant and eliminate irreversible adverse impacts on the environment and important archaeological sites when implemented;
(iii) nuisance impacts, including noise, dust, traffic and access changes, which are likely to be experienced by nearby receptors during construction will be minimized through mostly routine measures set out in the EMP;
(iv) Summarizing the study of the archaeological, historical and cultural resources along the new design of the Ashtarak-Talin alignment (Bazmaberd - Talin segment) at least 3 archaeological monuments are affected by the preliminary design these are:

(a) Nerkin Naver archaeological complex (# 1 in GM).
(b) Agarak historical-cultural preserve (# 2 in GM)
(c) Settlement of Kosh (# 14 in GM)
(d) Aruch Neolithic settlement and Medieval village (# 20 in GM)
(e) Medieval village of Shamiram (# 15 in GM)
(f) Davtashen Archaeological complex (# 30 (# 32 in GM)
(g) Zakari Berd Archaeological complex (# 31 (35)
(h) Talin tomb field (# 32 (38)

(v) The revision of the road alignment from the of Shahverd bridge and up to the Agarak bridge area, in its last point reaches the eastern border of the "Agarak" State archaeological reserve, that goes along the Amberd riverbed. The widening and enlargement of the existing bridge to the South (the left side of the existing road) and West will drive the destruction of the riverside zone of archaeological site (up to 6000 sq. m., including the necessary "buffer line" between the edge/slope of the road and the site itself), which is **absolutely unacceptable** taking into account scientific importance of the latter and the status of its protection as well. To avoid the destruction of the settlement, the widening and enlargement of the Agarak bridge must be planned to the North (right side of the existing road) and East.

(vi) by considering environmental and archaeological impacts, and including detail design changes as well as strict adherence to mitigation measures set out in the EMP, several environmental and archaeological sites that would otherwise be destroyed will be preserved.

ANNEXES

Annex 1
Rapid Environmental Assessment (REA) Checklist - Roads and Highways
Armenia: North-South Road Corridor Investment Program Tranches 2 & 3 – Environmental Impact Assessment Report

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

Country/Project Title: RSC-C00457 (ARM): North-South Road Corridor Investment Program Tranches 2 & 3: Ashtarak – Gyumri highway improvements

Sector Division: Roads and Highways

Conducted by / date: Arman Vermishyan, Boris Gasparyan, and Klaus Schonfeld, 6 May 2010

SCREENING QUESTIONS	Yes	No	REMARKS
A. PROJECT SITING Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
1. Cultural heritage site	X		Approximately 21 archaeological sites will be investigated and measures for the maximization of their preservation will be recommended. Numerous modern monuments that have been erected close to the edge of the existing road to commemorate vehicle accident victims are not under the jurisdiction of the MOC, but under the control of the relevant provincial head (*marz pet*), in this case, Shirak and Aragatzotn. There are no ecological cultural heritage sites
2. Protected area	X		The Agarak site (No. 6 on the map showing all sites) has the status of a historical-cultural preserve and is a special protected area. The recommendation to locate the highway on the opposite side as indicated in the preliminary design will be made in order to minimize the impact of the project on

Annex 1
Rapid Environmental Assessment (REA) Checklist - Roads and Highways
Armenia: North-South Road Corridor Investment Program Tranches 2 & 3 – Environmental Impact Assessment Report

SCREENING QUESTIONS	Yes	No	REMARKS
			this site. There are no ecologically protected areas.
3. Wetland	X		Two small wetlands are located adjacent to the road; however, it will not be affected if routine mitigation measures as set out in EMP are implemented during construction.
4. Mangrove		X	
5. Estuarine		X	
6. Buffer zone of protected area	X		All 21 cultural heritage sites have their own buffer zones of physical protection and zones of surrounding landscape protection as set out in the Law of preservation of immovable monuments. There are no ecological buffer zones.
7. Special area for protecting biodiversity		X	
B. POTENTIAL ENVIRONMENTAL IMPACTS Will the Project cause…			
1. Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?	X		The existing road encroaches on several archaeological sites without apparent regard for their importance. This project will include measures, satisfactory to the Ministry of Culture, to adequately explore the sites and close them. These measures will be described in the IEE/EIA, disclosed during public consultations, and specified in the EMP. There are no obvious areas where additional embankments required for the additional lanes will disfigure the landscape any more than the existing embankments. Potential impacts during construction will be routinely mitigated as set out in EMP.
2. Encroachment on precious ecology (e.g. Sensitive or protected areas)?	X		
3. Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	X		Routine mitigation during construction as set out in EMP.
4. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and	X		Routine mitigation during construction as set out in EMP.

Annex 1
Rapid Environmental Assessment (REA) Checklist - Roads and Highways
Armenia: North-South Road Corridor Investment Program Tranches 2 & 3 – Environmental Impact Assessment Report

SCREENING QUESTIONS	Yes	No	REMARKS
chemicals used in construction?			
5. Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	X		Routine mitigation during construction as set out in EMP.
6. Noise and vibration due to blasting and other civil works?	X		Routine mitigation during construction as set out in EMP.
7. Dislocation or involuntary resettlement of people			Refer to Land Acquisition and Resettlement Plan (LARP).
8. Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		X	Generation of dust, which is a normal occurrence during road construction, will be minimized through routine mitigation measures as set out in EMP
9. Hazardous driving conditions where construction interferes with pre-existing roads?	X		Routine mitigation during construction as set out in EMP.
10. Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?	X		Routine mitigation during construction as set out in EMP.
11. Creation of temporary breeding habitats for mosquito vectors of disease?		X	
12. Dislocation and compulsory resettlement of people living in right-of-way?			Refer to Land Acquisition and Resettlement Plan (LARP).
13. Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials and loss of life?		X	While improved roads are expected to result in increased traffic volumes, better alignment, surfacing, and signage, are expected to result in overall decrease of accidents.
14. Increased noise and air pollution resulting from traffic volume?		X	While improved roads are expected to result in increased traffic volumes, better alignment, surfacing, and signage, together with more efficient and better maintained vehicles are expected to result in overall decrease of noise and air pollution
15. Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		X	While improved roads are expected to result in increased traffic volumes, better alignment, surfacing, and signage, together with more diligent inspections and monitoring by the MOTC are expected to result in overall decrease of accidental spills.

ANNEX 2

Environmental Report in Support of EIA

ANNEX 2
Environmental Report in Support of EIA
For ADB-funded North-South Road Corridor Investment Program, Tranche 2 (Ashtarak – Talin)

[18.11.2010]
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RA Government, with funding from ADB, is implementing the North-South Road Corridor Investment Program aimed at improvement of the transportation links with its neighbor countries Iran and Georgia to international standards.

The Tranche 2 project consists of upgrading about 41.2 km 2-lane road from Ashtarak to Talin to a 4-lane divided highway.

According to ADB's *Safeguard Policy Statement* (2009), constructing a highway on new alignment usually classifies the project as environment category "A", which requires that an Environmental Impact Assessment (EIA) report is developed and posted on the ADB website for at least 120 days prior to Board Consideration. This project is considered as environment category "A". According to RA law on EIA this project should also be reviewed by State Environmental Expertise SNCO under the RA Ministry of Nature Protection and respective conclusion should be issued prior to commencement of civil works.

Egis-Bceom International consulting organization should develop final design for Tranche 2 and respectively update the EIA. EgisBceom International consulting organization's environmental team consisted of one international environmental consultant and two national experts (environmentalist and archaeologist), should review and update the EIA report in accordance with ADB's Safeguard Policy Statement (June 2009), prepare the final EIA report in accordance with ADB's manuals/guidelines and legislation of the Republic of Armenia, assist the PMU in actions for getting approvals for the EIA and EMP (conclusion from Environmental Expertise SNCO under the RA Ministry of Nature Protection, agreement on route with the RA Ministry of Culture, etc.).

Within the context of EIA procedure for the project, the main goals of investigations are:

(i) identification of environmental values of areas along the highway,

(ii) assessment of potential impacts of road construction on environment,
(iii) update Environmental Management Plan (EMP) to reflect final detail design.

This report is based on field investigations carried out in October and November, 2010 and desk review of available literature.

During the site visits all environmental, archaeological, historical and cultural sites located along the proposed alignment (including those likely to be impacted during the Project) were investigated. Summarizing the findings of site visits and literature review, the following environmental "Hot Spots" are emphasized (during development of the final detail design special attention is given to them and appropriate mitigation measures are included in EMP):

The wetland in the floodplain of the Shahverd River: The small marshes formed in the floodplain of the Shahverd River stretch along both sides of the highway bridge near the Agarak community (Aragatsotn marz), about 500 m north of the start point of the Ashtarak – Talin road: some of them are formed by small streams flowing into the Shahverd, others fed by groundwater. All of them are relatively small - from several tens to several hundred square meters, forming together a marsh system.

Literature review and field investigations show that the following nesting bird species inhabit the wetland area:

1. Carduelis cannabina –Twite
2. Luscinia svecica-Robin - European (included in the Bern Convention lists[3])
3. Acrocephalus arundinaceus - Warbler,Cetti's
4. Emberiza schoeniclus - Reed bunting
5. Carpodacus erythrinus - Common rosefinch
6. Hirundo rustica-Barn – swallow
7. Ixobrychus minutus - Little bittern (included in the Bern Convention lists)
8. Gallinula chloropus - Common moorhen
9. Falco tinnunculus - Common kestrel
10. Circus aeruginosus - Western marsh harrier (included in the Bern Convention lists)

During annual migration, the following bird species cross these areas:

1. Motacilla alaba - White wagtail
2. Motacilla citreola - Citrine wagtail (included in RA Red Book and IUCN Red List[4])

[3] Bern Convention - Council of Europe Convention on the Conservation of European Wildlife and Natural Habitats, originally drafted in 1979, in Bern. Armenia joined this convention on 2006. This convention sets out to conserve wild flora and fauna and their natural habitats, promote co-operation between states, monitor and control endangered and vulnerable species and assist with the provision of assistance concerning legal and scientific issues. Four appendices set out particular species for protection. Appendix II sets strictly protected fauna species and Appendix III - protected fauna species .

3. Miliaria calandra - Corn bunting
4. Passer hispaniolensis - Spanish sparrow (included in RA Red Book and IUCN Red List)
5. Phalacrocorax pygmaeus - Pygmy cormorant (included in RA Red Book and IUCN Red List)
6. Tringa ochropus - Green sandpiper
7. Tringa stagnatilis - Marsh sandpiper
8. Egretta garzetta - Little egret (included in the Bern Convention lists)
9. Ardeola ralloides - Squacco heron (included in the Bern Convention lists)
10. Anas platyrhynchos – Mallard
11. Fulica atra-Common – coot
12. Larus armenicus - Armenian gull (Included in Armenian Red Book)
13. Chlidonias niger - Black tern
14. Sterna albifrons - Little tern (Included in Armenian Red Book and IUCN Red List, and Bern Convention lists)
15. Turdus merula - Eurasian blackbird
16. Lanius collurio - Red-backed shrike (included in the Bern Convention lists)

The dominant emergent plants are Club-rush *(Scirpus sp.)*, Branched Bur-reed *(Sparganium erectum),* Common reed *(Phragmites australis),* Spike rush *(Heleocharis quinqueflora).* Other common species are Sedges *(Carex spp.)* and Bulrush (Typha *spp.*).

Among invertebrates the diversity of dragonfly and damselfly is distinguished (*Calopteryx splendens, Coenagrion, Libellula, Sympetrum etc).* In the bottom of marshes, among the stones and aquatic vegetation mayfly larvaes *(Baetidae)* and mollusks *(Radix peregra)* are common.

In the river and ducts *Cobitis aurata* fish fries were found. According to locals in the marsh system coots *(Fulica atra)* are nesting.

The general conclusions following the investigations carried out are summarized below:

- The marsh system of River Shahverd mitigates microclimate, including that of adjacent areas (private orchards), affects positively on the formation of river flow, smooth floods, and has a great water security and water-regulating value;
- represents a wide range of habitats and provides important habitat for many wetland dependent species;

[4] The new edition of Red Book of RA was created based on IUCN categories and parameters.

- plays an important role for local birds in terms of nesting and feeding;
- is a stop-over point for migratory birds;
- has special aesthetic value, especially during the summer, as it is a unique green area of dried steppe vegetation.

The pre-design alignment will adversely affect this natural ecosystem for the following reasons:

- The area of the wetland is small enough, and during construction it will be reduced because of land filling during construction of embankments;
- the new road will separate the wetland into two parts, resulting in the disruption of regular water flow between marshes;
- birds, insects, water animals and plants will be affected seriously;
- trees will be cut;
- the wetland can be destroyed by construction equipment and polluted by construction wastes and spoil materials, etc.

In order to minimise possible adverse impact on wetland it will be appropriate a) to build a long-span bridge or b) to construct new highway with minimal deviation from the general alignment that would result in the usual 4-lane cross-section as opposed to the approximately 50-m separation in the pre-design drawings. The second alternative was choosen by supervision consultant.

Investigation of Flora and Fauna along the Ashtarak - Talin highway

The Ashtarak – Talin highway pass through steppe and dry steppe landscape zones. Almost all around highway are cultivated lands and big and small communities and only small areas of natural environment are along the road.

During investigations it was clarified that there are endangered Flora and Fauna Red Book species observed in this region. Species in those areas should receive special attention to comply with Armenia's Law on Flora (1999), Law on Fauna (2000) and the requirements of the Red Book for Flora (Governmental decree 29.01.2010, N 72-N), Red Book for Fauna (Governmental decree 29.01.2010, N 71-N).

Flora

Since the Supervision consultant's environmental team commenced its activities in October, when blossom of flowers was ended and vegetation cover was dried, the team members took the special literature, draft EIA's team conclusions and data available from field visits as a basis in order to make respective recommendations and conclusions.

There are three Red Book species near the highway.

Hohenackeria exscapa (Stev.) K.-Pol. - EN – A taxon is endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.

Habitat: Ujan, Kosh.
Limiting factors: Lost of habitat and degradation as a result of urban development, roads construction, and land cultivation.

Iris elegantissima Sosn. - EN – A taxon is endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future. It is endemic for Caucasus.
Habitat: West from Ashtarak, near Davtashen community.
Limiting factors: Loss of habitat and degradation as a result of urban development, land cultivation and intensive collection for sale.

Merendera greuteri Gabrielian - CR - A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future. It is Armenian endemic. It is found only in Shirak floristic region. The territory of its living and spreading is less than 10 sq. km.
Habitat: Between Katnakhbyur and Talin communities.
Limiting factors: Limited territory for living and spreading; loss of habitat and degradation as a result of land cultivation.

The Special mitigation measures should be included in the EMP to minimize the negative impact on flora and to avoid any detrimental effect to Red Book plants.

Contractor should engage botanist to survey the territory to be impacted by construction activities, report on the location and number of Red Book flora species, and propose methods to prevent or achieve minimal loss of biodiversity, including the replanting of those species in suitable locations, being mindful of appropriate soil conditions. The Red book flora species posters likely to be found in various areas of the project should be installed in work camps, etc.

Trees along the highway. There are several sections where trees and bushes are growing along the highway (about 300 m in the beginning of the highway from km 30+600 till km 30+900, about 1 km between Agarak and Ujan communities from km 34+280 till km 35+200, about 3.1 km in Ujan community from km 36+700 till km 39+800 and about 500 m near the Aruch intersection from km 49+400 till km 49+900). Among these trees registered Populus, Robinia, Acer, Salicx, Morus, Armeniaca, Crataegus, Pyrus salicifolia, Berberis, Fraxsinus excelsior, F.oxycarpa, Spiraea crenata, Berberis orientalis, Cotoneaster integerrima, Lonicera iberica, Ephedra procera, Jasminum fruticans, Ulmus, Prunus, Elaeagnus, Paliurus, Rosa.

Taking into account that trees and bushes planted along the highway have some important advantages, such as providing environmental and aesthetic value, protecting from wind and snow accumulation, serving also as a noise barriers, making visible the direction of road, and taking also into consideration that the highway is passing through dry steppe and steppe zones and that it is relatively difficult to grow trees in this environment, it is necessary to avoid as much as possible cutting of trees and bushes.

Mitigation measures are involved in EMP. During the construction works new trees should be planted with a ratio of 10 new trees per 1 tree cut. The new trees should be maintained for 3 years until they become viable (Note: 80% survival is considered excellent). It is very important to use dry and dust persistent local species.

Fauna

In this region among widely spread species we can find: mammals - hare (Lepus europaeus), fox (Vulpes vulpes), wolf (Canis lupus) and a number of representatives of rodents - meadow mouse (Msubterraneus), marten (Martes foina) and others. Amphibians and reptiles are represented by different species of toads, frogs, lizards and snakes.

No.	English Name	Latin Name	IUCN categories[5]	Note
		INVERTEBRATES		
		Insects		
1	Siberian Winter Damsel	Sympecma paedisca (Brauer, 1877)	VU B 1b+B 2b	
2	Kalashyan Philomessor	Philomessor kalashiani Khnzorian, 1988	CR B1a+ B2a	AE
3		Armenohelops armeniacus Nabozhenko, 2002	EN B1a	AE
4		Cylindronotus erivanus (Reitter, 1901)	EN B1a	AE
5	Hawk-moth	Hyles hippophaes caucasica (Denso, 1913)	VU B 1a+B2a	BC
6	Hornfaced bee	Osmia cerinthides F. Morawitz, 1876	VU B 1a+B 2a	
7		Archianthidium pubescens Morawitz, 1872	EN B2a	
		OSTEICHTIES		
1	Kura Riviergrondel	Gobio persus, Gnter, 1899	DD:	
2	Golden Spined Loach	Sabanejewia aurata, Filippi, 1863	DD:	
		REPTILES		
1	Golden Grass Mabuya	Trachylepis septemtaeniata Reuss, 1834	VU B1ab(iii)+2ab(iii)	
2	Schneider's Skink	Eumeces schneideri (Daudin, 1802)	VU B1ab(iii)+2ab(iii)	
3	Unisexual Lizard	Darevskia unisexualis (Darevsky, 1966)	VU B1a	
4	Caucasian Rat Snake	Zamenis hohenackeri (Strauch, 1873),	VU B1ab (iii)	
5	Armenian Steppe Viper	Vipera (Pelias) eriwanensis (Reuss, 1933)	VU B1ab(iii, v)	CE
6	Armenian Radde's (Rock) Viper	Vipera (Montivipera) raddei Boettger, 1890,	VU B1a+2b (ii, iii)	CE
		BIRDS		
1	White - tailed eagle	Haliaeetus albicilla Linnaeus, 1758	EN B1a; D	
2	Bartgeier	Gypaetus barbatus Linnaeus, 1758	VU D1	
3	Egyptian vulture	Neophron percnopterus Linnaeus, 1758	EN A2 bcde+3bcde+4bcde	
4	Eurasian Griffon Vulture	Gyps fulvus (Hablizl, 1783)	VU D1	
5	Short-toed Eagle	Circaetus gallicus (J. F. Gmelin, 1788)	VU D1	
6	Greater spotted eagle	Aquila clanga Pallas, 1811	VU C2a(ii)	
7	Steppe eagle	Aquila nipalensis orientalis Hodgson, 1833	VU C2a(i); D1	
8	Golden eagle	Aquila chrysaetos (Linnaeus, 1758)	VU D0	
9	Lesser Kestrel	Falco naumanni Fleischer, 1818	VU A2bce+3bce+4bce	
10	Saker falcon	Falco cherrug J. E. Gray, 1834	EN A2bcd+3cd+4bcd	
11	Peregrine falcon	Falco peregrinus Tunstall, 1771	VU D1	
12	Demoiselle crane	Arthropoides virgo Linneus, 1758	VU B1ab(iii)+2ab(iii)	
13	Eurasian roller	Coracias garrulus (Linnaeus, 1758)	VU B1ab(iii)	

[5] CR – Critically endangered, VU – Vulnerable, EN – Endangered, DD – Data deficient. For more details of IUCN categories look at http://www.iucnredlist.org/apps/redlist/static/categories_criteria_3_1#categories.

No.	English Name	Latin Name	IUCN categories[5]	Note
14	White-throated Robin	Irania gutturalis (Guérin, 1843)	DD	
15	Grey - necked bunting	Emberiza buchanani Blyth, 1844	VU B1ab(iii)+2ab(iii)	
		MAMMALS		
1	Long-eared Hedgehog	Erinaceus (Hemiechinus) auritus Gmelin, 1770	EN B1ab(iii)+2ab(iii)	
2	Transcaucasian Water Shrew	Neomys schelkovnikovi Sat., 1913	EN B1a+2a	
3	Mehely's Horseshoe Bat	Rhinolophus mehelyi Matschie, 1901	EN B1a+2ab(iii)	
4	Asia Minor Ground Squirrel	Spermophilus xanthoprymnus Bennet 1835	EN B2ab (ii, iii, iv)	
5	Schidlovsky Pine Vole[6]	Microtus (Sumeriomys) schidlovskii Argyropulo, 1933	EN B1ab (ii, iii, v)	
6	Small Five-toed Jerboa	Allactaga elater Lichtenstein, 1825	EN B1ab (ii, iii,iv)	
7	European Marbled Polecat	Vormela peregusna (Guldenstaedt, 1770)	VU A2c+B1 b(iii)	

The project can negatively affect fauna by:

- Destroying nesting places, burrows and holes of animals;
- Killing animals during construction;
- Making difficulties for their hunting, migrating and reproduction;
- Creating shocking circumstances by noise, vibration, and air and water pollution.

During field visits the locations of possible migration routes were investigated. About 16 possible areas for animal migration passages installation for crossing the road were revealed (km 41+506, 48+587, 49+231, 50+800, 53+094, , 54+703, 56+312, , 59+209, 69+187).

The chainage of some elements of dranage system (culverts, box culverts) coincides with possible locations of migration passages (km 41+506, 48+587, 54+381, 59+209), so the drainage system to be installed in that areas will also serve as passage to ensure safe migration, hunting, nesting, etc. of animalas.

To prevent and mitigate possible negative impacts on fauna it is important to include the following mitigation measures in EMP:

- if Red Book plant and/or nesting places, burrows, and holes of animals are discovered, respective information should be provided to PMU environmental specialist and MNP for future actions;
- during construction temporary protective walls should be erected on the sections where animals often appear;
- in the case of an injured animal is found the MNP should be contacted;
- avoid construction and blasting works on evening and night time, during animal's reproduction period, etc.

[6] Endemic subtype

ANNEX 3

Archaeological Impact Assessment Preliminary Report Part 1

The North-South Road Corridor Investment Programme
Tranche 2 (Ashtarak – Bazmaberd)

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Introductory note

A.

The Law on preservation and utilization of Immovable Monuments of History and Culture and of the Historic Environment (adopted November 11, 1989).

(http://www.parliament.am/legislation.php?sel=show&ID=1641&lang=arm)

- Chapter 1. Any building, construction or site, cultural value that is fixed by the State (State Registration), is a monument and is under protection and preservation of the Government of the Republic of Armenia.

- Chapter 13. The recorded list of the monuments has a power of law and is a basis for giving an official status to the monument.

- Chapter 19. Any type of the construction activity in the areas containing historical monuments or archaeological sites must be realized in agreement with the authorized body (Ministry of Culture).

- Chapter 20. Newly discovered sites are immediately getting a status of protection and are protected by law till they will be included in the State Lists.

- Chapters 21-22. Destruction of historical monuments and its environment is forbidden. Before the realization of any kind of activity at the area of the site the authorized body must study it and give corresponding permits or solutions.

B.

The Ashtarak-Gyumri highway (Aragatsotn and Shirak *marzes* (provinces) of the RA) in the line of Ashtarak-Bazmaberd is passing across or closely alongside at least 19 Archeological sites of different periods, and Historical monuments. The reasons for such high density of archaeological remnants are also different:

- One of the factors is the topographic-morphological and climatological characteristics of this area on the foothill of m-t Aragats. Presence of various natural resources, fertile mountainous black-earth, abundant water resources and pasture zones, together with the great number of naturally protected areas of habitation, had created favourable conditions of occupation from the earliest periods of Human Civillisations in the Near East.

- The present-day road closely follows the direction of the one of ancient trade routes running from the Ararat valley to the Shirak plateau. Its functioning is archaeologically confirmed at least from the IV-III millennia B.C. From the II-I centuries B.C. and through the Middle Ages this route was involved into the Great Silk Road network.

- From the mid-I century A.D., up to the Early Middle Ages, this region was included in the list of domains of the Armenian Arshakuni Royal dynasty. Later the several areas of the region (ancient provinces of Aragatsotn and Shirak) were under the control of the most powerful Principal clans of Medieval Armenia (Kamsarakans, Proshyans etc.), and the kings of the next Bagratuni dynasty.

All the above mentioned had a positive impact on the level of occupation of these regions. And the number of fortified settlements, tomb fields, caravanserais, fortresses and other archaeological, historical and cultic monuments, recorded here are going to highlight this fact. The same circumstances make the examining regions **extremely sensitive** to any construction activity.

Regarding potential impact from activities relating to the North-South Highway construction, it is noted that some of the sites are directly adjacent to the existing road while others are located in the general vicinity. The assessment and management of the cultural heritage within the project area is therefore a priority and it is considered prudent to include the services of an archaeologist. The objective of the services is to:

1). to identify potential impacts of the proposed projects on Physical Cultural Resources (PCR) - movable or immovable objects, sites, structures, and natural features and landscapes that have archaeological, historical, architectural, religious, ethnographic, cultural or natural significance;

2). to provide archaeological input to an Environmental Impact Assessment (EIA) report including an Environmental Management and Monitoring plan (EMP);

3). to undertake desk and field studies of the archaeological sites of the Project, identify the known and newly discovered sites, develop recommendations on mitigation measures and provide archaeological input to the Project EIA report and EMP. In this EIA, the sites will likely be divided into those two groups; i.e., sites with direct impact from construction activities and sites that are unlikely to be affected. Recommendations will be provided to address the impact of the projects for all affected sites.

For the realization of the undertaken tasks the following type of studies were conducted:

b) Preliminary desk study – Collection of information about the archaeological sites and historical monuments from archival and literary sources, their identification with the **State List of the Historical and Cultural Immovable Monuments of the Republic of**

Armenia (Aragatsotn and Shirak marzes). Mapping of the collected topographic information together with the alignment of the future construction area.

c) Fieldwork activities including intensive field survey along the projecting highway. Recording of the archaeological sites and structures, surface study of their boundaries in relationship with the area of future construction activities.
d) Complex analyses of the collected information in the context of the fieldwork results.
e) Recommendations aimed to minimize the impact of the project for all affected sites along the road-band. These recommendations can include:
    (i) relocation of the proposed road alignment,
    (ii) in some specific cases when the relocation is impossible - excavations of the sites (settlements, tomb fields), or the part of their areas, for the preservation of their cultural-historical value,
    (iii) relocation of some of historical or cultural monuments,
    (iv) strengthening (reinforcement) of the constructions of historical-cultural sites and monuments alongside the road to protect these objects from the negative impact in process of construction (blasting, technical activity etc.) and permanent vibration during further exploitation of the road,

All suggested solutions are based on the legislation and correlated regulation documents of the RA, acts to protect the archaeological sites or historical-cultural monuments and minimize potential destructions during any construction activity (see the “Introductory note:A”).

In the case of the North-South Road Corridor Investment Program, Tranche 2 Project (starting from the border of Ashtarak-Agarak communities up to Bazmaberd community of the Aragatsotn *marz*), was included in this study. The study (desk investigations and field survey) of the presenting part of the road area counted **29 objects or units**, represented by historical-archaeological monuments, and monuments of religious, aesthetic, or cultural significance (cultural monuments). These objects are in danger to be affected by the road construction activities **(General Map (GM) and Maps 1-7)**.

Most part of the Archaeological sites and Historical-Architectural monuments listed below are already included in the State List of Historical and Archaeological Monuments of the RA and are under protection of the State (supervision of the Ministry of Culture of the RA). The sites recently discovered during the intensive survey of the road zone are under the same protection (see: ***Introductory Note,* A, Chapter 20**).

Main list of the historical-archaeological and cultural monuments recorded along the Ahstarak-Gyumri Main Highway

(Ashtarak – Bazmaberd segment)

A. Archaeological sites of direct impact

11. Nerkin Naver archaeological complex (**#** 1 in GM and Map 1).
Aragatsotn marz, Parpi community,
Distance in correspondence to the "0 point" of the road: 0 – 0.60 km,
GPS coordinates: N 40°, 17', 40, 8''; E 44°, 18', 32, 0"
State List of Historical-Archaeological Monuments: **# 2. 110. 2.**

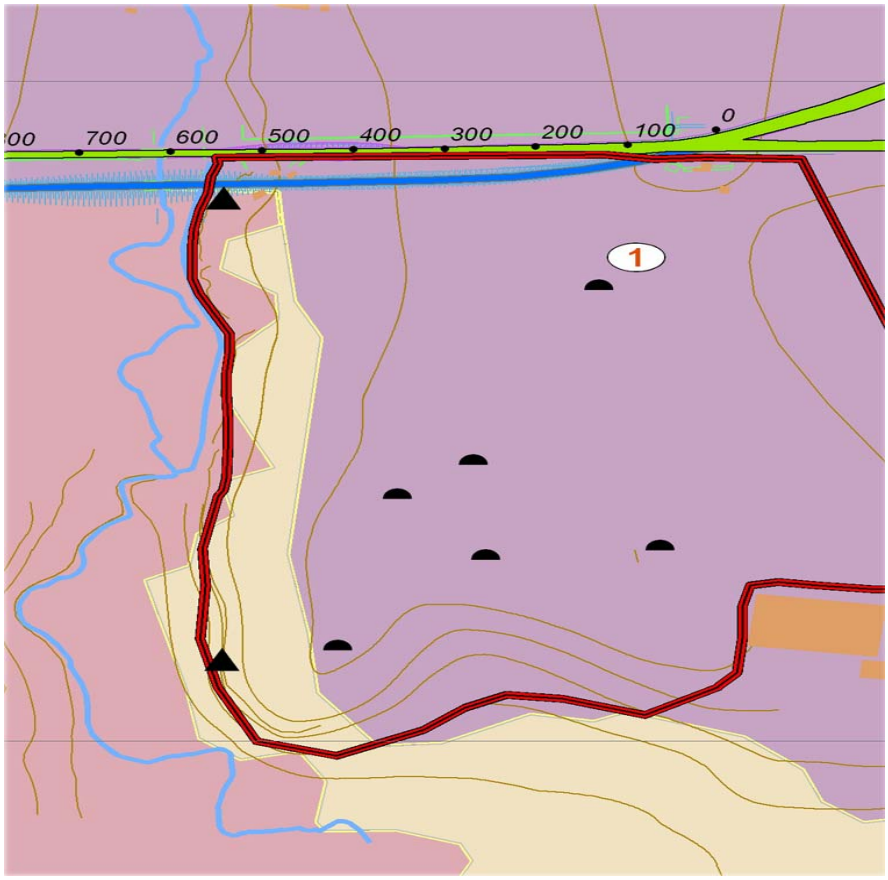
This site consists of Middle Bronze Age kurgan (burial mound) tomb field, several inhabited caves and remains of the Medieval settlement. The site is located on the left side of the Ashtarak-Gyumri Highway on the peninsula, formed by gorge of the Shahverd River. The systematic excavations that started here since 2001 opened rich Middle Bronze Age tombs with specific painted pottery and exclusive jewelry belonging to "Trialeti culture" of the Middle Bronze Age (22-18 centuries B.C.). Some of larger "royal" tombs were used as secondary burials later in I Millennium B.C. In 1970-ies the part of site area was used under agricultural activities, and external signs of many burials – particularly their mounds and "stone shields," were lost.

Fully preserved burial mounds and wall structures of the medieval settlement are visible is the southern part of the site area. The northern part of the cemetery, where the burial signs had been ameliorated, is endangered by the suggested road design.

The outline of the new road is passing closely upon the cave site within the Nerkin Naver archaeological complex. That's why it is necessary to suggest the following mitigation measures for the site:

- In process of the road construction openings or discoveries of tombs and archaeological finds during the soil removal are possible. All the chance-finds of this kind are under protection of the legislation of the RA (see the "Introductory note A");

- The construction contract should include provision of an archaeological stuff, for ensuring the proper chance-find procedures and archaeological research of the newly-discovered objects;
- The construction process has to be done carefully near the cave, in order not to destroy it by construction activity (blasting etc.);
- As the construction activities should run inside of the protection area of the site, it is **forbidden** to use the area of the site for parking the heavy construction mechanisms, for storing constructional materials or using local soil for constructional purposes.



Map 1. The Nerkin Naver archaeological complex and its Protection area in relationship to the new design of the Ashtarak-Gyumri Highway.

Selected publications related to the site:

- Simonyan H., 2003, Excavations of Nerkin Naver Tomb Field in 2002" in "Ancient Culture of Armenia 3", Proceedings of a Scientific Conference, Yerevan, pp. 38-45 (in Armenian);

- Simonyan H., 2004, "Royal" Tomb of the Middle Bronze Age Period from Nerkin Naver, in "Archaeology, Ethnology and Folklore of the Caucasus", Proceedings of an International Scientific Conference, Tbilisi, pp. 126-127.

12. Agarak historical-cultural preserve (# 2 in GM and Map 2)
Aragatsotn marz, Agarak community
Distance in correspondence to the "0 point" of the road: 2.600 – 3.200 km
GPS coordinates: N 40°, 17', 47,0'' ; E 44°, 16', 28,7"
State List of Historical-Archaeological Monuments: # **2. 4. 1.**

The site is located on the western (left) bank of the Amberd river, covering an area of about 200 hectares, a larger part of which (118 hectares) in 2001 has been declared a historical and cultural preserve by the government of Armenia (Map 2). The site is established on the horizontal flows of solidified tuf, bordered on the East with the river, while in the West turn into a hilly ridge. Taking into account the special characteristics of the local relief, the ancient inhabitants of this area transformed the landscape, turning natural masses of tuf into a spacious system of stone structures. For

many of kilometers along the Amberd river flow, on the tuf cliffs, rocky hills, and natural plateaus, as well as freestanding blocks of stone the traces of intensive stone working are seen. There are niches carved into the cliffs, as well as polygonal platforms leading to them, in addition to structures of other types. All of these structures, including unbroken series of round, horseshoe-shaped structures and channels linking them, as well as trapezoidal "altars," transform the natural landscape into a gigantic sacral monument. This ensemble of cultic structures is complemented by artificial constructions located around the plateaus and in the spaces between them. According the stratigraphic observations this cultic ensemble was created in the Early Bronze Age (29-27 centuries BC). Within the limits of the Armenian Highlands and the neighboring regions no other site of this type is known. It is unique in terms of its unusual composition and design, as well as its volume and area. In general, the site of Agarak is one of the outstanding historical monuments of Armenia, represented by open-air temples ("Ritual landscape"), as well as representing nearly all the phases of the material culture starting from the Early Bronze Age, through the Urartian and Classical periods, up to Late Medieval Ages.

The Ashtarak-Gyumri Highway built in Soviet period, went through the Northern complex of the site, which was unknown at that time yet, and separated the site into two parts. The suggested design of the new highway is passing through the excavated part of the site and will destroy it completely.

In case of Agarak, for minimizing the impact of new road construction on this important site, it is **strongly recommended**:

- To exclude any construction activity in southern (from the existing road) part of the site;

- To change the design of the road, trying to bypass the site and the present-days road from the north as much as it possible. Even in that case the construction activities will run inside of the protection area of the site and damage it;

- Taking into account the abovementioned fact, the construction contract has to include provision of an archaeological stuff, for the **excavations of the northern part of the site** (which is not examined yet) **before the beginning of the construction**;

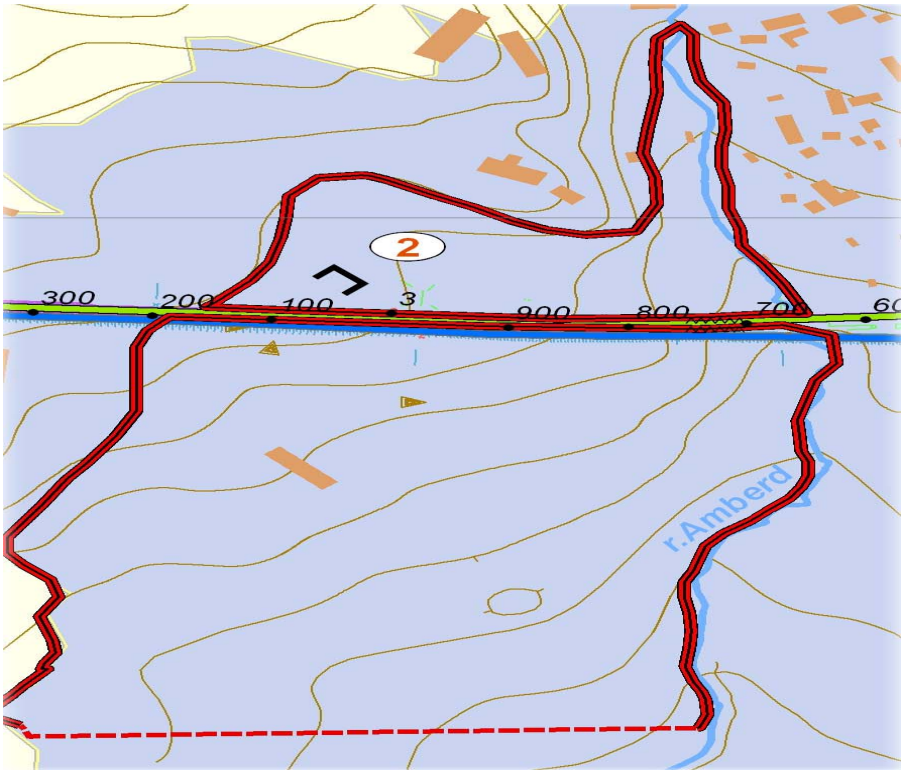
- To provide the reinforcement of the architectural constructions, excavated in the southern part of the site (under supervision of archaeologists), to protect these objects from the negative impact in process of construction (blasting, technical activity etc.) and permanent vibration during further exploitation of the road.

The mitigation measures for the site must include the next restrictions:

- Not to use the area of the site for parking heavy construction mechanisms, for storing constructional materials or using local soil for constructional purposes or covering the area of the site with constructional waste;

- The construction process in the northern part of the site has to be done carefully, in order not to destroy the rock-cut chambers and other architectural constructions of the site by construction activity (blasts etc.);

- After the rescue excavations, all the constructional activities must also run under the control of an archaeologist.



Map 2. Protection area of Agarak historical-cultural preserve in relationship with the new design of the Ashtarak-Gyumri Highway.

Northern part of the Agarak historical-cultural preserve on the left side of the Ashtarak-Gyumri road.

Selected publications related to the site:

- Stone R., 2002 “Armenia Uncovers a Bronze Age Treasure Trove”, Science, vol. 298, 20 December, pp. 2319-2320 (www.science.org);

- Badalyan R.S., Avetisyan P.S., 2007, “Bronze and Early Iron Age Archaeological Sites in Armenia”, I, Mt. Aragats and its Surrounding Region, Oxford, Bar International Series 1697, pp. 24-33.

13. Settlement of Kosh (# 14 in GM and Map 3)
Aragatsotn marz, Kosh community
Distance in correspondence to the “0 point” of the road: 14.280 – 14.650 km
GPS coordinates: N 40°, 17’, 31,0’’ ; E 44°, 08’, 55,0”

The site was discovered recently, during the survey activities. It has the same location characteristics as the site of Agarak (Map 3). The existing Ashtarak-Gyumri road cut it through. The Northern (right) side of the site was left under the houses of nowadays village of Kosh and lost its scientific potential. The southern (left) side of the site was partly destroyed and covered with a large mound of constructional waste of the road construction in Soviet period. The survived constructions are clearly visible on the distance of nearly 30-35 meters from the left side of the highway. The chronology of the settlement is still unclear, but the character of the surface material and construction technique of the dwellings are mainly correlated to the sites of the I Millennium B.C.

In case of widening of the new highway and construction activities, the survived part of the settlement will be directly affected, and it is important to recommend:

- To widen the new road mainly in northern direction;

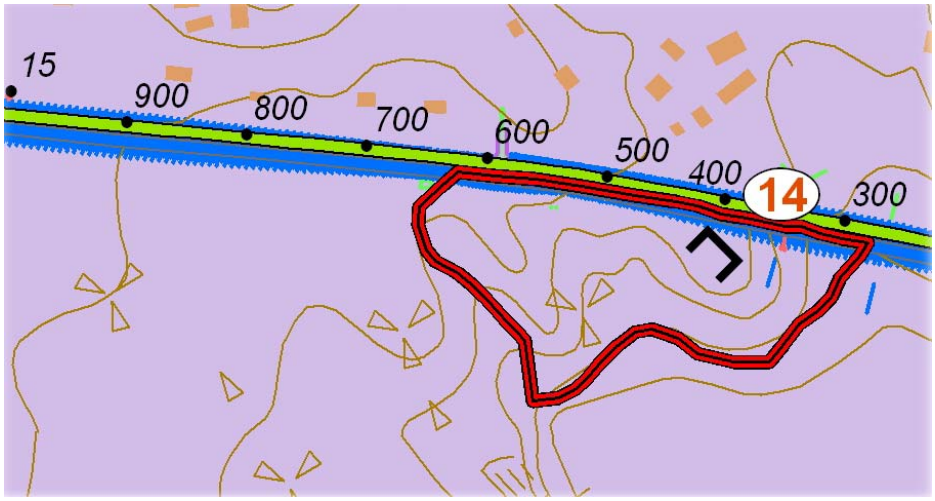
- In case of impossibility of that, or deficiency of space in the North from the existing road, to provide the salvage excavations of the widened band.

The mitigation measures for the site must include the next restrictions and actions:

- Not to push the constructive waste directly to the site, as it was done in Soviet times;

- To remove the existing waste from the site area;

- To run the construction process carefully, under the control of an archeologist. It is clear that proper chance-find procedures are implemented.



Map 3. Physical boundaries of Kosh settlement in relationship with the new design of the Ashtarak-Gyumri Highway.

Constructions of Kosh settlement visible on the distance of nearly 30-35 meters from the left side of the existing Ashtarak-Gyumri road

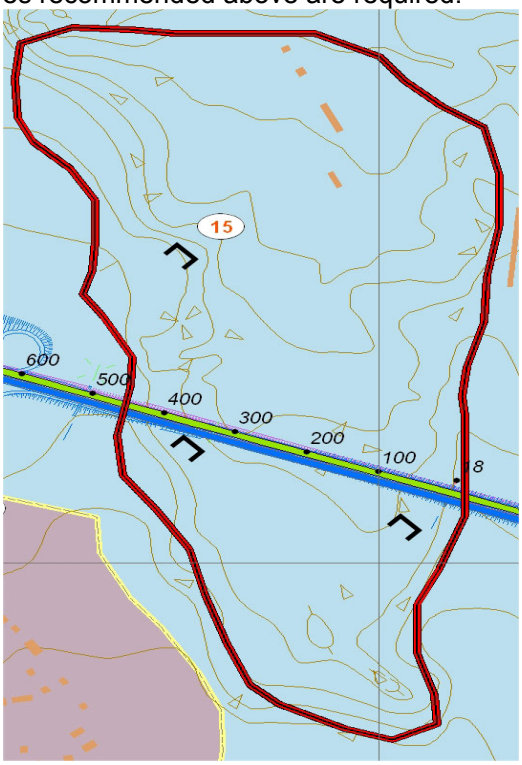
14. Medieval village of Shamiram (# 15 in GM and Map 4)
Aragatsotn marz, Shamiram community
Distance in correspondence to the "0 point" of the road: 18.000 – 18.500 km
GPS coordinates: N 40°, 18', 02,5'' ; E 44°, 06', 09,8"

The newly-discovered archaeological site occupies large area on both sides of the existing road (Map 4) in the limits of Shamiram community. The better preserved part of the settlement is located now on the right (northern) side of the acting Ashtarak-Gyumri road, which divides the site into two part almost equal in size.

At the northern part of the site, which is not affected by the suggested design of the new highway, bases of dwelling constructions, church foundations are clearly visible. Based on the pottery collected from the both sides of the site, it must be dated in the chronological limits of 11-15th centuries. The left side of the site which will be affected by the suggested

design is preserved mainly in its western part. House fundaments and traces of constructions are clearly visible. The rest of this portion of the site is completely destroyed by amelioration and agricultural activities.

It seems necessary to recommend the excavations at the existing portions of the left side of the settlement. After fixation of the results, this area of the site can be used under the road construction. This is the only way to protect the scientific and cultural values of the site.
For the rest of the site, continuing further to the South, during and after construction activities the mitigation measures recommended above are required.



Map 4. The physical boundaries of Shamiram Medieval village in relationship with the new design of the Ashtarak-Gyumri Highway.

Constructions of Shamiram Medieval village on the right side of the existing Ashtarak-Gyumri road

Constructions of Shamiram Medieval village on the left side of the existing Ashtarak-Gyumri road

15. Aruch Neolithic settlement and Medieval village (# 20 in GM and Map 5)
Aragatsotn marz, Aruch community
Distance in correspondence to the "0 point" of the road: 20.500 – 20.700 km
GPS coordinates: N 40°, 18', 13,1'' ; E 44°, 04', 42,1"

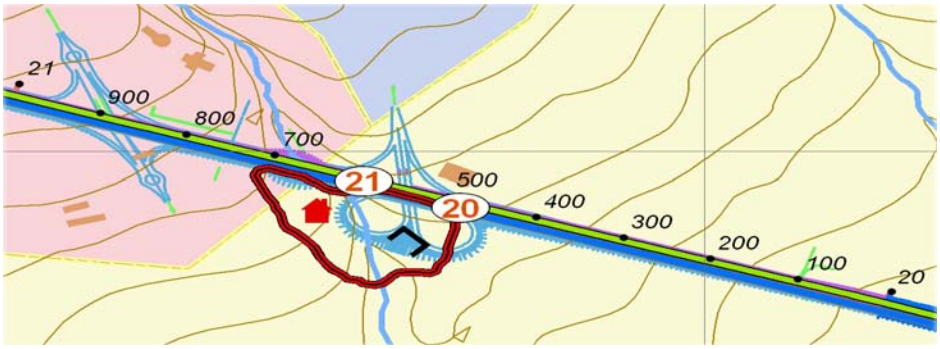
The newly-discovered medieval settlement of 10-13-th centuries spreading around the Aruch caravanserai, is one of the rare monuments of this type, seems to be an important trade point on the Silk Road.

The excavations here had opened a Neolithic site of "Pre-pottery phase" (VIII Millennium B.C.), under the remains of medieval constructions. Sites of both periods are very important from the scientific point of view. First one can be a source for understanding the character of functioning of a medieval town involved in intensive inter-regional trade and the second - to throw light on the problems of spread of Neolithic civilizations in the areas of the m-t Aragats foothills and the Ararat valley.

Suggested design of the road is affecting the site, covering most of its area with a *cloverleaf*, which is linking the main highway to the village of Agarak (in the Talin district). Such solution is not acceptable from the point of preservation of the archeological site and this significant site can loose its scientific potential.

Therefore it is preferable to think about relocation of the *cloverleaf* to the East, or West, outside the site area, or to change the full access system to the Agarak community. The *cloverleaf* is affecting the area of the famous Aruch caravanserai as well (see below).

View of Aruch Neolithic settlement and medieval village remains on the left side of the existing Ashtarak-Gyumri road



Map 5. Protection area of Aruch Neolithic settlement, medieval village remains and Caravanserai in relationship with the new design of the Ashtarak-Gyumri Highway.

16. Aruch Medieval Caravanserai (# 21 in GM and Map 5)
Aragatsotn marz, Aruch community
Distance in correspondence to the "0 point" of the road: 20.630 km
GPS coordinates: N 40°, 18', 14,6'' ; E 44°, 04', 37,9"
State List of Historical-Archaeological Monuments: **# 2. 22. 16.**

This construction is one of the outstanding monuments of civil architecture of the Medieval Armenia, was built in 13th century, on one of the active crossroads of the Great Silk Road. The three-nef building of the caravanserai is enforced by round towers, which are transforming it into a multifunctional fortified dwelling. Only a quarter of the building had been preserved to nowadays. In 2007 caravanserai was partly restored and prepared to become one of the important tourist objects of Armenia. This kind of buildings are rare enough not only in Armenia, but in the Near East as well. But the fortified caravanserai of Aruch is absolutely unique even among the known constructions of this type. In addition to that, the presence of synchronous settlement near the caravanserai makes it more significant both for the specialists and visitors.

Suggested design of the road is affecting the site, covering most of its protection area with a *cloverleaf*, and coming closer to the building from the North. Meanwhile, any construction activity is unacceptable in this area, particularly on southern (left) side of the road. So, the

cloverleaf must be redesigned and moved to the East or West, from the site, as it was suggested above (see # 5);

The mitigation measures for this important construction must include the following procedures:

- To provide the reinforcement of the architectural constructions of the site (under supervision of archaeologist and architect), to protect this outstanding object from the negative impact in process of construction (blasting, technical activity etc.) and permanent vibration during further exploitation of the road.

- Construction activities of the new highway must be carried out very carefully near the building, in order not to cause any damage to it (blasts, vibration, resonance);

- The highway has not to overpass the gorge, after which the boundary of protection area of the caravanserai begins, and where some constructional elements of the building could be covered by soil;

- To run all the construction process carefully, under the control of an archeologist. It is clear that proper chance-find procedures are implemented.

Selected publications related to the site:

- Harutyunyan V., 1960, Medieval caravanserais and bridges of Armenia, Yerevan (in Armenian);

- Harutyunyan V., 1992, History of the Armenian Architecture, Yerevan, pp. 266, 271, 344, 346 (in Armenian).

View of Aruch Medieval Caravanserai on the left side of existing Ashtarak-Gyumri road

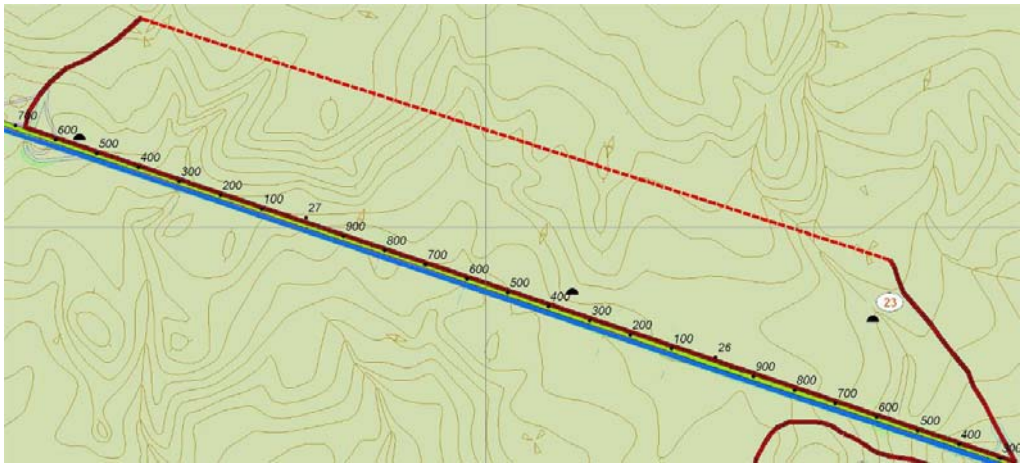
17. Nerkin Bazmaberd necropolis (tomb field) (# 23 in GM and Map 6)
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 25.280 – 25.700 km
GPS coordinates: N 40°, 19', 09,3'' ; E 44°, 01', 17,8"
State List of Historical-Archaeological Monuments: # **2. 73. 1. 1. 1.**

The site occupies a large area on the South from the village of Nerkin Bazmaberd, attached to the right side of the existing Ashtarak-Gyumri road. It is represented by groups of kurgan (burial mounds) and cromlech constructions (round stone "belts" around burials), preserved in and in between agricultural fields, mainly in rocky areas. It is very little known about the

tomb field: small scale excavations that were carried out here reveal the tombs and the materials of III - mid-I Millennia BC.

New design of the highway is suggested on the left side of the existing road, which means the lesser impact on the site. The only part which will be influenced by construction activities is the western end of the tomb field, the area around *cloverleaf* to the Nerkin Bazmaberd community.

It is recommended to excavate this portion of the site. After fixation of the results, the area of the site can be used under the road construction. This is the only way to protect the scientific and cultural values of the affected portion. For the rest of the site, the recommending mitigation measures aimed to neutralize the impact of construction activities are mentioned above (see also the “Conclusion” chapter).



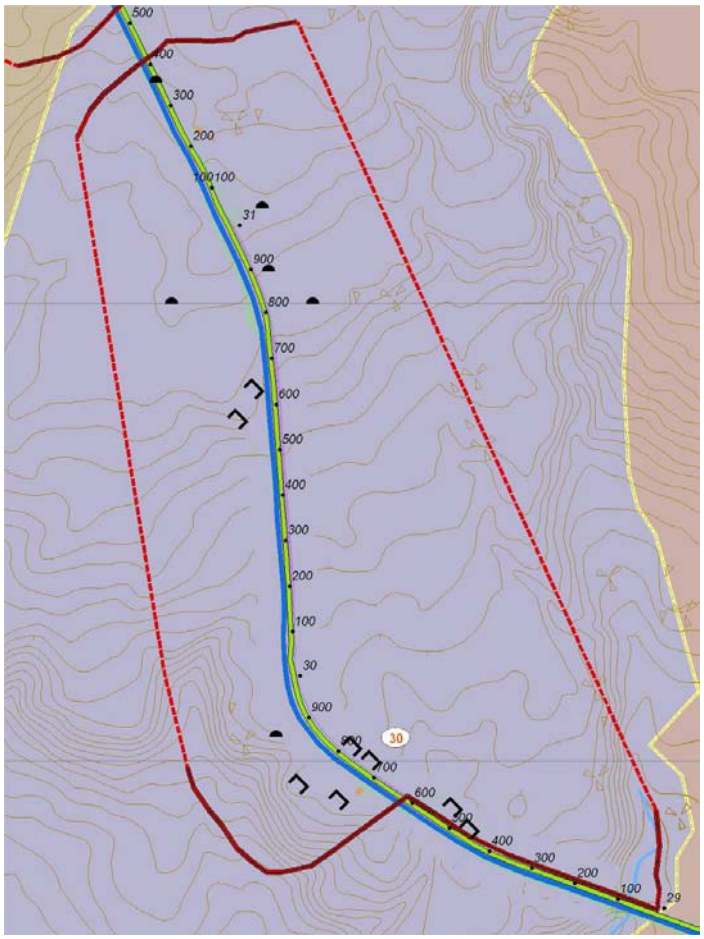
Map 6. Protection area of Nerkin Bazmaberd tomb field in relationship with the new design of the Ashtarak-Gyumri Highway

Bronze - Iron Age kurgans of the Nerkin Bazmaberd tomb field on the right side of the existing Ashtarak-Gyumri road in the area of the *cloverleaf* joining the road with the N-B community.

18. Verin Sasnashen archaeological complex (# 30 in GM and Map 7)
Aragatsotn marz, Verin Sasnashen community
Distance in correspondence to the "0 point" of the road: 29.000 – 31.400km
GPS coordinates: N 40°, 19', 51,8'' ; E 43°, 58', 35,3"
State List of Historical-Archaeological Monuments: # # **2.74. 4; 2.74. 2; 2.104. 1. 1; 2.104.1. 2.**

The archaeological complex of Verin Sasnashen in fact - is continuation to the North of the Nerkin Bazmaberd necropolis. The site consists of number of tomb-fields and settlements spread on the both sides of the existing Ashtarak-Gyumri road. The small-scale excavations had been carried out here and several burials of III-I Millennia B.C. were discovered. In some areas of the site traces of walls and other dwelling constructions of the Early Bronze Age (IV-III Millennia B.C.) and Early Medieval period (4th - 6th centuries A.D.) are visible.

Due to the suggested design of the new highway the left portion of the complex will be directly affected by the construction activities. It is strongly recommended to produce excavations here before the construction activities will start. They must include some groups of tombs and wall constructions which are spreading directly on the left side of the existing Ashtarak-Gyumri road. This is the only way to save the cultural value and the scientific potential of the site. The unexcavated portions of the site must be protected by the whole complex of mitigation measures (see the abovementioned recommendations).



Map 7. Protection area of Verin Sasnashen archaeological complex in relationship with the new design of the Ashtarak-Gyumri Highway

Series of Bronze - Iron Age burial mounds in Verin Sasnashen archaeological complex on the left side of the existing Ashtarak-Gyumri Highway

Selected publications related to the site:

- Badalyan R.S., Avetisyan P.S., 2007, “Bronze and Early Iron Age Archaeological Sites in Armenia”, I, Mt. Aragats and its Surrounding Region, Oxford, Bar International Series 1697, pp. 224-225.

B. Cultural (Memorial) objects of direct impact

The objects of this group are presented mainly by memorial monuments devoted to the victims of car accidents. Most of these objects are under the supervision of the communities and in case of necessity can be relocated in frames of co-ordination with the community authorities.

9. Memorial to Hayk (# 12 of GM)
Aragatsotn marz, Kosh community
Distance in correspondence to the "0 point" of the road: 13.830 km
GPS coordinates: N 40°, 17', 31,0'' ; E 44°, 09', 18,4"

10. Memorial to Khachik Ashotovich (# 16 of GM)
Aragatsotn marz, Shamiram community
Distance in correspondence to the "0 point" of the road: 18.320 km
GPS coordinates: N 40°, 17', 52,9'' ; E 44°, 06', 11,0"

11. Memorial to Armen, Arman, Yervand (# 17 of GM)
Aragatsotn marz, Shamiram community
Distance in correspondence to the "0 point" of the road: 18.610 km
GPS coordinates: N 40°, 17', 55,9'' ; E 44°, 06', 00,3"

Monument to Armen, Arman, Yervand (# 17)

12. Memorial Monument with Russian text (# 27 of GM)
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 27.200 km
GPS coordinates: N 40°, 19', 22,2''; E 44°, 00', 14,3"

13. Memorial to Leo Gmyur (# 28 of GM)
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 27.700 km
GPS coordinates: N 40°, 19', 27,4'' ; E 43°, 59', 54,4"

C. Archaeological Sites and Historical Monuments of Indirect Impact

The sites and other objects of the next two groups (**C** and **D**) are located in different distance from the existing road line and the newly constructing Highway as well. They are not under direct impact of the planning measures, but still may be damaged in case of carelessness during construction activities. Irrespective of the distance from the zone of road construction, the area of these sites must not be used for parking of the construction mechanisms, for storing constructional materials or using local soil for constructional purposes.

The Great Khachkar of Zakaryans – the outstanding Architectural and Historical monument of 1196 (# 17) listed here, needs a special care during blasting and use of heavy construction mechanisms. It can be also strongly recommended to reinforce its fundament to protect the monument from the vibration.

14. Aghtsk necropolis (tomb field)**.**
Aragatsotn marz, Aghtsk community
Distance in correspondence to the "0 point" of the road: 6.100 – 6.550 km
GPS coordinates: N 40°, 17', 31,2'' ; E 44°, 14', 21,1"

15. Karhanki Berd fortified settlement
Aragatsotn marz, border of Ujan-Kosh communities
Distance in correspondence to the "0 point" of the road: 10.650 – 11.000 km
GPS coordinates: N 40°, 16', 57,1'' ; E 44°, 11', 09,5"

16. Kurgan burial
Aragatsotn marz, Kosh community
Distance in correspondence to the "0 point" of the road: 11.350 km
GPS coordinates: N 40°, 16', 50,3'' ; E 44°, 10', 46,4"

17. The Great Khachkar of Kosh (Khachkar of Zakaryan princes)
Aragatsotn marz, Kosh community
Distance in correspondence to the "0 point" of the road: 11.750 km
GPS coordinates: N 40°, 17', 03,1'' ; E 44°, 10', 35,5"

18. Necropolis of I Millennium B.C. and Medieval village
Aragatsotn marz, Kosh community
Distance in correspondence to the "0 point" of the road: 12.400 – 12.900 km
GPS coordinates: N 40°, 17', 12,1'' ; E 44°, 09', 57,5"

19. Necropolis and Settlement of I Millennium B.C.
Aragatsotn marz, Kosh community
Distance in correspondence to the "0 point" of the road: 14.000 – 14.090 km
GPS coordinates: N 40°, 17', 35,4'' ; E 44°, 09', 13,2"

20. Aruch-2 Necropolis
Aragatsotn marz, border of Shamiram-Dprevank communities
Distance in correspondence to the "0 point" of the road: 18.600 – 18.800 km
GPS coordinates: N 40°, 17', 47,3'' ; E 44°, 05', 56,8"

21. Aruch-3 Necropolis
Aragatsotn marz, Aruch community
Distance in correspondence to the "0 point" of the road: 18.900 – 19.050 km
GPS coordinates: N 40°, 18', 03,3'' ; E 44°, 05', 44,1"

22. Fortified settlement and Necropolis
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 25.300 – 25.850 km
GPS coordinates: N 40°, 19', 01,1'' ; E 44°, 01', 16,2"

D. Cultural (Memorial) objects of indirect impact

23. Memorial to the victims of Maralik – Yerevan direction
Aragatsotn marz, Ujan community
Distance in correspondence to the "0 point" of the road: 9.150 km
GPS coordinates: N 40°, 17', 04,1'' ; E 44°, 12', 19,5"

24. Memorial to Nikolyan Khachik
Aragatsotn marz, Ujan community
Distance in correspondence to the "0 point" of the road: 10.150 km
GPS coordinates: N 40°, 16', 57,1'' ; E 44°, 11', 38,4"

25. Memorial to Ujantsi Rudik
Aragatsotn marz, Kosh community
Distance in correspondence to the "0 point" of the road: 11.900 km
GPS coordinates: N 40°, 17', 03,3'' ; E 44°, 10', 29,2"

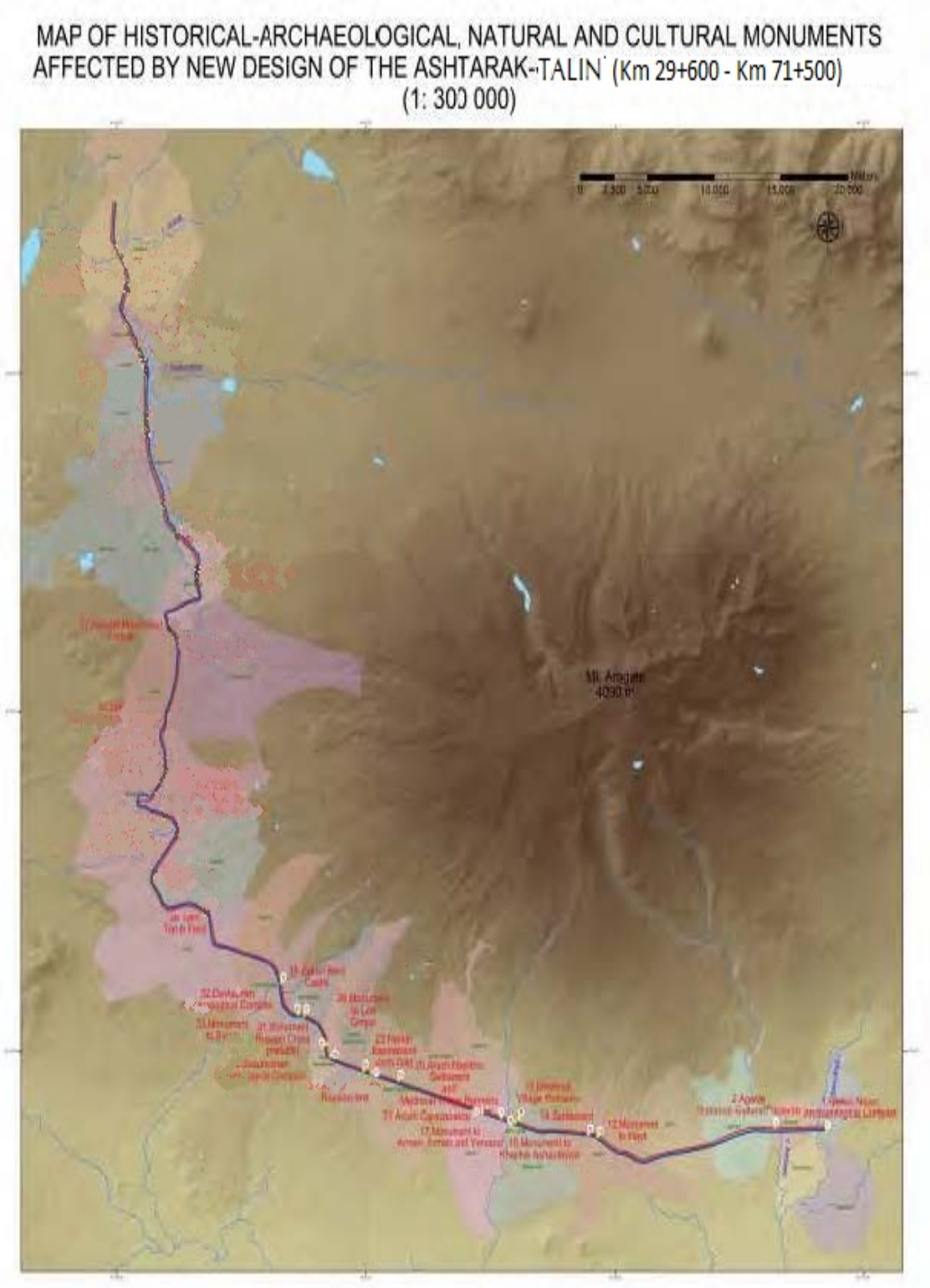
26. Monument "Armenian Alphabet"
Aragatsotn marz, Kosh community
Distance in correspondence to the "0 point" of the road: 12.500 km
GPS coordinates: N 40°, 17', 07,9'' ; E 44°, 10', 07,8"

27. Memorial to Serob
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 24.250 km
GPS coordinates: N 40°, 18', 53,2'' ; E 44°, 02', 14,2"

28. Memorial to Hamlet
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 26.300 km
GPS coordinates: N 40°, 19', 14,1'' ; E 44°, 00', 51,0"

29. Memorial to Tiko
Aragatsotn marz, Nerkin Bazmaberd community
Distance in correspondence to the "0 point" of the road: 26.400 km
GPS coordinates: N 40°, 19', 14,5'' ; E 44°, 00', 47,6"

General Map


MAP OF HISTORICAL-ARCHAEOLOGICAL, NATURAL AND CULTURAL MONUMENTS
AFFECTED BY NEW DESIGN OF THE ASHTARAK-TALIN (Km 29+600 - Km 71+500)
(1: 300 000)
Mt. Aragats
4090 m

Conclusions

Summarizing the study of the archaeological, historical and cultural (physical) resources along the new design of the Ashtarak-Gyumri Mian Highway (Ashtarak - Bazmabers segment), it has to be emphasized that at least **8 archaeological monuments** are affected by the suggested preliminary design. Those are:

(v) Nerkin Naver Archaeological complex (#1),
(vi) Agarak historical-cultural preserve (# 2),
(vii) Settlement of Kosh (# 3 (14)),
(viii) Medieval settlement of Shamiram (# 4 (15)),
(ix) Aruch Neolithic settlement and medieval village remains (# 5 (20)),
(x) Aruch medieval Caravanserai (# 6 (21)),
(xi) Nerkin Bazmaberd Cemetery (# 7 (23)),
(xii) Verin Sasnashen complex (# 8 (30)).

According the **Nerkin Naver site (# 1)** it may be recommended to conduct the construction with care, maintaining all the mitigation measures mentioned above. The chance-find regulations issued by the Ministry of Culture are strictly observed, because the discoveries of archaeological finds during any soil removal process are possible.

The territories of **Agarak historical-cultural-preserve (# 2), Settlements of Kosh (#3 (14)) and Shamiram (# 4 (15)), also Settlements and Cemeteries of Nerkin Bazmaberd (# 7 (23)), and Verin Sasnashen (# 8 (30))** are already divided by the existing road and during the new stage of construction will be strongly affected. Taking into account the sizes of the mentioned sites and character of landscape, that doesn't allow bypass the Cultural area, we stress the necessity of archaeological excavations of the new road line and adjacent bands going through these sites, for partial preservation their Historical – Cultural value.

The location of **Aruch Neolitic site (# 5 (20))** and **Medieval Caravanseray (# 6 (21))** makes **unacceptable** any construction activity in this area – especially on southern (left) side of the road. So, the project of *cloverleaf* must be redesigned and moved to the East or West, from the sites, as it was suggested above. Otherwise it will be impossible to save them from full destruction.

Taking into consideration the character of the mentioned activities and time limitations, it may be recommended to PMU to open a position for an archaeologist(s) who has to deal with this large amount of protection procedures and control over the activities of the contracting organizations and regulate the relations between the teams of archaeologists, providing the salvage excavations and construction bodies. The task of the mentioned expert(s) must also include the chance-find regulations all along the construction areas of the new Ashtarak-Gyumri Highway.

At the end it is important to underline that for the rest of the historical-archaeological and cultural monuments recorded along the Ahstarak-Gyumri Main Highway, which are not directly affected by the constructional activities of the new highway, mitigation measurements are required as well: the construction process has to be done carefully near the monuments in order not to destroy them, or to cover the structures by construction

waste. As the activities should run near the protection areas of the sites, it is forbidden to use those areas for parking the heavy mechanisms, for storing constructional materials or using local sediment for constructional purposes. The construction activities may not close the access to the sites.

Special attention must be paid to two historical-architectural monuments existing along the highway – Kosh Great Kahchkar (1196 A.D.) and Aruch Caravanserai (13th century). The construction activities have to be carried out very carefully in areas closer to the mentioned monuments. The dust and vibration during the construction process will cause some damage to them, especially to the completeness of Kosh Great Khachar.

The Kosh Great Khachkar (1196) from the South. The incline of the whole construction is clearly visible.

Kosh Great Khachkar (1196) on the right side of the existing Ashtarak-Gyumri road.

The last group of recorded monuments that are being affected by the suggested highway design, are represented by 5 modern, mainly memorial monuments dedicated to the victims of car accidents on the road (# 9, 10, 11, 12, 13) and have specific meaning. These monuments are not under state regulation, but are deeply respected by the public and remain under s.c. “public protection”: the communities or family members are taking care of them. For protection from the construction activities these memorials can be removed under the control and support of local communities in co-operation with the family members and re-erected approximately in the same places along the road boundary after the new road construction will be completed.

M. H. Zardaryan
28. 10. 2010

ANNEX 3-A

Archaeological Impact Assessment Preliminary Report Part 2

The North-South Road Corridor Investment Programme Tranche 2

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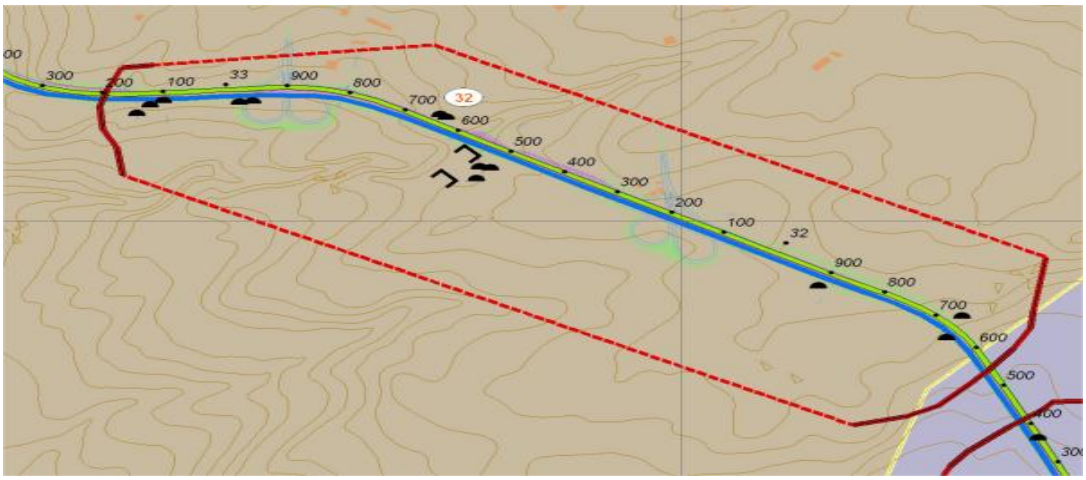
Main list of the historical-archaeological and cultural monuments recorded along the Ahstarak-Gyumri Main Highway (Bazmaberd - Talin segment)

A. Archaeological sites of direct impact

30. Davtashen archaeological complex (# 32 in GM and Map 8)
Aragatsotn marz, Davtashen community,
Distance in correspondence to the "0 point" of the road: 31.600 – 33.200 km,
GPS coordinates: N 40°, 21', 04, 1'' ; E 43°, 57', 32, 8"
State List of Historical-Archaeological Monuments: **# 2.36.1.**

Davtashen archaeological complex is the continuation to the North of the Sasnashen complex. Series of tomb fields and remnants of settlements spread on both sides of the existing Ashtarak-Gyumri road. Small scale excavations conducted here were able to date the burials between the III - I Millennia B.C. On the left side of the existing Ashtarak-Gyumri highway traces of different wall constructions are clearly visible, showing the existence of a settlement continuing South-East along the left side of the road.



Map 8. Protection area of Davtashen archaeological complex in relationship with the new design of the Ashtarak-Gyumri Highway

Bronze - Iron Age burial mounds in Davtashen archaeological complex on the left side of the existing Ashtarak-Gyumri road

Bronze Age tomb in Davtashen archaeological complex

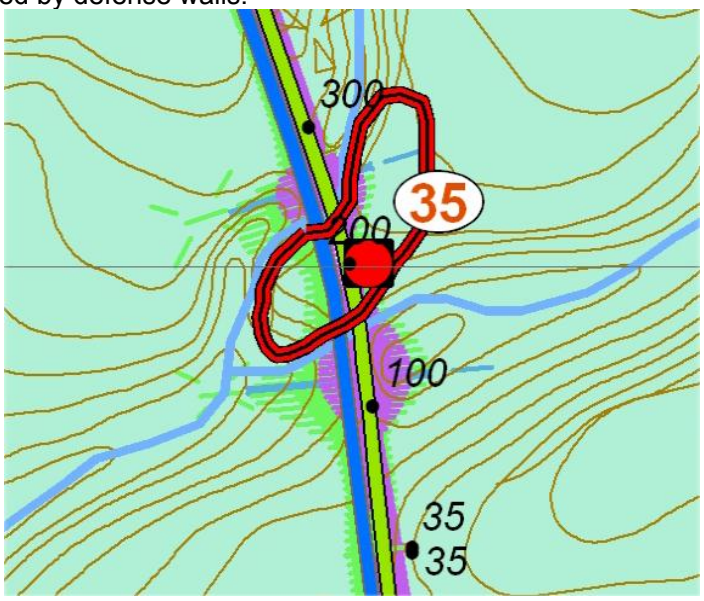
Due to the suggested design of the new highway the left side of the complex will be directly affected by the construction activities. It is strongly recommended to conduct excavations here before the construction activities will start. They must include some groups of tombs as well as wall constructions which are spread directly on the left side of the existing Ashtarak-Gyumri road. This is the only way to save the cultural value and the scientific potential of the site. The unexcavated portions of the site must be protected by the whole complex of mitigation measures (see the Part I of our Report).

Selected publications related to the site:

- Badalyan R.S., Avetisyan P.S., 2007, “Bronze and Early Iron Age Archaeological Sites in Armenia”, I, Mt. Aragats and its Surrounding Region, Oxford, Bar International Series 1697, pp. 224-225.

31. Zakari Berd archaeological complex (# 35 in GM and Map 9, 10)
Aragatsotn marz, Katnaghbiur community,
Distance in correspondence to the "0 point" of the road: 35.150 – 35.300 km,
GPS coordinates: N 40°, 22', 04, 0'' ; E 43°, 56', 37, 8"
State List of Historical-Archaeological Monuments: # **2.57.2.**

The first site of the complex is represented by a fortified settlement built on a peninsula formed by two small, but deep gorges on the distance of 1,5 km South-East from the village of Katnaghbyur. The excavations were conducted here from 1979, after the construction of the existing Ashtarak-Gyumri road, which cut the site into two parts. The initial investigation reveal a well designed settlement with different private and public constructions, workshops etc., surrounded by defense walls.



Map 9. Protection area of Zakari Berd medieval settlement in relationship with the new design of the Ashtarak-Gyumri Highway

Zakari Berd medieval settlement from the East, divided by the existing Ashtarak-Gyumri road.

According the archaeological data, the site was functioning in Early Medieval period (3rd-5th centuries A.D.). It was the "Komopolis" type of settlements, surrounding the royal residence of Arshakuni kings in the capital of Vagharshapat. It seems that the Arshakunis, who owned the territory of historical Aragatsotn province and Ararat plain (as the domains), had created series of such fortified settlements in order to control the area (military base-camps) and regulation of the trade routes, as well as for collecting the state taxes. Possibly, this settlement was serving as an administrative center for one of the local governors. Those kinds of monuments were never excavated in Armenia before, and Zakari Berd is the only studied monument of this type.

During the intensive survey of the site area which had been undertaken recently, at least two new archaeological objects were revealed here.

The remnants of large rectangular construction, built of worked blocks of local tuf and surrounded by separate line of defense wall was registered in the distance of about 400 m to the South-West from the settlement. Together with the dwelling sections, the ruins of a small chapel were mentioned in this construction. The building technique and the character of planning design of the rectangular block, together with the high level of its protection, allows to assume that it was the administrative center of Zakari Berd settlement, possibly - the "Governor's palace."

Map 10. Satellite image of the Zakari Berd site territory and the new limits of its Protection area (red)

Ruins of the “Governor’s palace” located to the South-West from the Zakari Berd settlement

Remnants of the chapel in the “Governor’s palace”

The defense wall of the settlement of I Millennium B.C. (to the South from Zakari Berd medieval settlement)

From the point of chronology this construction closely correlates to the settlement: according the surface finds and the building technique it has to be applied to the 3rd-5th centuries A.D.

The next archaeological object – remnants of settlement of the beginning of I Millennium B.C. was registered on the same territory. In comparison with the medieval settlement (together with the "Governor's palace") it occupies much larger area – up to the very end of plateau and the hill on the southern side of the gorge (see the Map 10, red line, red dots).

In the light of these new data, initially suggested design of the new highway seems unacceptable, as it will destroy completely the left part of the site complex. The recommended way to protect the site from destruction is to change design of the highway and to put it further to the South-West with a bridge passing over southern end of the gorge (Map 10, yellow dots).

The mentioned revision will save one of the unique Early Medieval sites of Armenia, as well as it's earliest "cultural predecessor"- the settlement of I Millennium B.C.

Selected publications related to the site:

- Asatryan E.A., 2005. "Zakari Berd (main results of excavations)". Archaeological excavations in Armenia. # 9. Yerevan (in Russian).

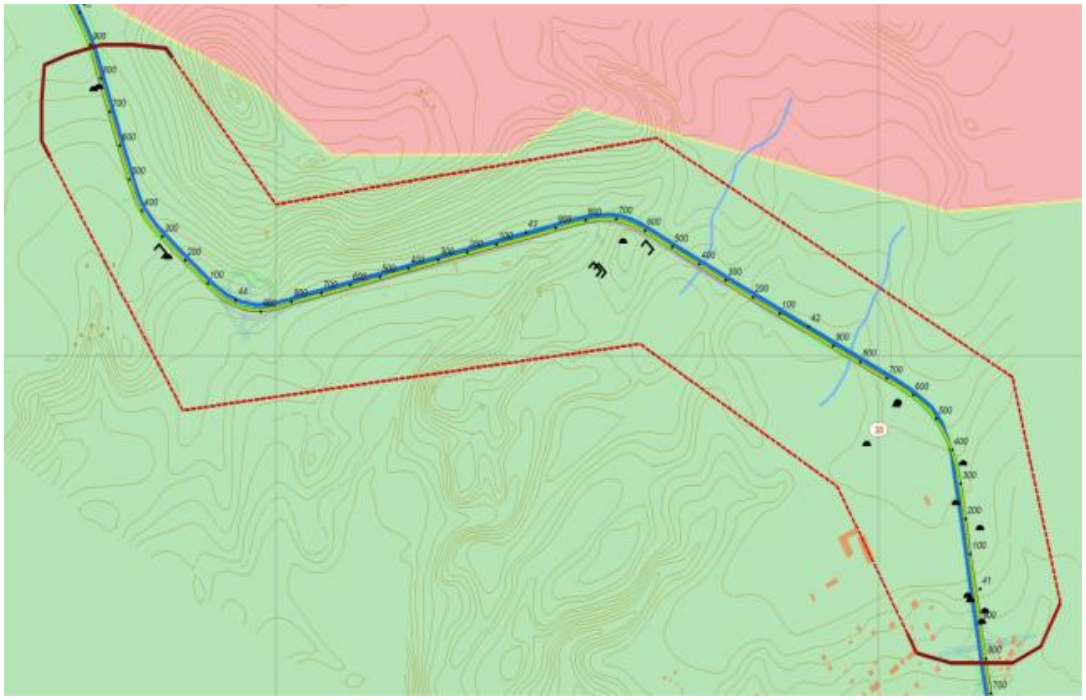
32. Talin tomb field (# 38 in GM and Map 10)
Aragatsotn marz, Talin community
Distance in correspondence to the "0 point" of the road: 40.800 – 44.900 km
GPS coordinates: N 40°, 24', 03, 0'' ; E 43°, 53', 30, 7"
State List of Historical-Archaeological Monuments: # **2.3.3.**

The site is represented by a large tomb field (necropolis), occupying a large area from the N-NE and southern suburbs of Talin and then continuing East towards the acting Ashtarak-Gyumri road. The burials are concentrated by separate groups survived between the agricultural fields, cleaned by melioration activities. During the excavations, conducted here since 1985 because of urban needs of Talin, were able to open around 90 separate tombs that belong to the Early Bronze Age and Late Bronze - Early Iron Ages (IV – I Millennia BC), with outstanding remains of the specific material culture. But, the numbers of tombs are still unexcavated. They are mostly visible on the both sides of the existing Ashtarak-Gyumri road. The suggested design of the highway is directly affecting the burials spread on the left and right sides of the highway, especially directly after the city of Talin (after the eastern cloverleaf entrance to the community). The only way to save the cultural and historical significance of the site is to organize excavations of these tombs and then after start the construction activities.

The unexcavated portions of the site must be protected by the whole complex of mitigation measures mentioned in the Part I of our Report.

Selected publications related to the site:

- Badalyan R.S., Avetisyan P.S., 2007. "Bronze and Early Iron Age Archaeological Sites in Armenia". I. Mt. Aragats and its Surrounding Region. Oxford, Bar International Series 1697. pp. 242-263.



Map 11. Protection area of Talin tomb field in relationship with the new design of the Ashtarak-Gyumri Highway

Bronze through Iron Age burial in Talin tomb field on the left side of the existing Ashtarak-Gyumri road

B. Cultural (Memorial) objects of direct impact

33. Metallic Cross (# 31 in GM).
Aragatsotn marz, Verin Sasnashen community
Distance in correspondence to the "0 point" of the road: 30.430 km
GPS coordinates: N 40°, 20', 11, 5'' ; E 43°, 58', 26, 2"

34. Memorial to Suren (# 33 in GM).
Aragatsotn marz, Davtashen community
Distance in correspondence to the "0 point" of the road: 32.990 km
GPS coordinates: N 40°, 21', 06, 2'' ; E 43°, 57', 18, 9"

C. Archaeological sites and Historical Monuments of indirect impact

35. Sev Berd Archaeological Complex (# 29 in GM).
Aragatsotn marz, Nerkin Sasnashen community
Distance in correspondence to the "0 point" of the road: 28.600 – 29.100 km
GPS coordinates: N 40°, 19', 30, 2'' ; E 43°, 59', 04, 0"

36. Katnaghbyur Tomb Field (# 34 in GM).
Aragatsotn marz, Katnaghbyur community
Distance in correspondence to the "0 point" of the road: 33.900 – 34.700 km
GPS coordinates: N 40°, 21', 39, 8'' ; E 43°, 56', 44, 7"

D. Cultural (Memorial) objects of indirect impact

37. Stele to the All-Armenian Dance circling Mt. Aragats (# 36 in GM).
Aragatsotn marz, Katnaghbyur community
Distance in correspondence to the "0 point" of the road: 37.150 km
GPS coordinates: N 40°, 22', 44, 4'' ; E 43°, 55', 45, 7"

38. Two Memorials: Sargis and Armen, Manouk and Azat (# 37 in GM).
Aragatsotn marz, Talin community
Distance in correspondence to the "0 point" of the road: 37.860 km
GPS coordinates: N 40°, 22', 51, 8'' ; E 43°, 55', 16, 7"

Conclusions

Summarizing the study of the archaeological, historical and cultural resources along the new design of the Ashtarak-Gyumri Mian Highway (Bazmaberd - Talin segment), it has to be emphasized that at least **3 archaeological monuments** are affected by the suggested preliminary design. Those are:

(i) Davtashen Archaeological complex (# 30 (# 32 in GM)),
(ii) Zakari Berd Archaeological complex (# 31 (35)),
(iii) Talin tomb field (# 32 (38)).

The territories of these sites are already divided by the existing road and during the new stage of construction will be strongly affected. In case of Zakari Berd the initial design of the new Highway is unacceptable and it will be preferable to move the latter at least 700 m to the South-East. The next two sites (Davtashen, Talin) are of different specific: taking into account their large sizes and the character of landscape, that does not allow bypass the Cultural area, we stress the necessity of archaeological excavations of the new Highway line and adjacent bands going through these sites, for partial preservation of their Historical and Cultural value. Otherwise it will be impossible to save them from full destruction.

These activities can be implemented by the archaeological structures collaborating with the PMU, as it was mentioned in the Conclusion of the Preliminary Report, Part 1.

The next group of recorded monuments that are being affected by suggested design of the Highway is represented by 2 memorial monuments dedicated to the victims of car accidents on the road (# 33, 34). As it was suggested for the previous group of the similar objects, these memorials can be removed before the construction activities and re-erected later approximately in the same places along the road boundary after the new road will be completed.

It is necessary to underline that for the rest of the historical-archaeological and cultural monuments recorded along the Ahstarak-Gyumri Main Highway, which are not directly affected by the constructional activities of the new Highway (## 35-38), the full complex of mitigation measurements is required as well (see the first Report).

M. H. Zardaryan
25. 11. 2010

ANNEX 3-B

Archaeological Impact Assessment Preliminary Report Part 3

The North-South Road Corridor Investment Programme
Tranche 2

Dr. Mkrtich. H. Zardaryan
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Archaeological Consultant of the Programme

List of the archaeological monuments of direct impact (settlements and tomb-fields) recorded along the Ahstarak-Gyumri Highway (Ashtarak - Talin segment)

The zones of the archaeological sites and the costs and timing of their investigations

1. **Nerkin Naver archaeological complex** (**#** 1 in our GM and Map 1).
   Aragatsotn marz, Parpi community,
   Distance in correspondence to the "0 point" of the road: 0 – 0.60 km [7]
   GPS coordinates: N 40°, 17', 40, 8'' ; E 44°, 18', 32, 0"
   State List of Historical-Archaeological Monuments: **# 2. 110. 2.**

   Length: 30+080 – 30+725 = 295 m
   Width: 50 m to the left (S) from the existing road
   Area: 14750 m2 (1, 5 hectares)
   Costs of investigation: $12.000 USD
   Time of investigation: 2 months.

2. **Agarak historical-cultural preserve** (**#** 2 in GM and Map 2)
   Aragatsotn marz, Agarak community
   Distance in correspondence to the "0 point" of the road: 2.600 – 3.200 km
   GPS coordinates: N 40°, 17', 47,0'' ; E 44°, 16', 28,7"
   State List of Historical-Archaeological Monuments: **# 2. 4. 1.**

   Length: 32+780 – 33+200 = 420 m
   Width: 50 m to the right (N) from the existing road
   Area: 21000 m2 (2, 1 hectares)
   Costs of investigation: $120.000 USD
   Time of investigation: 6 months.

[7] The "Zero" point mentioned in our Reports #1 and 2 (Tranche 2) = 30+080 of the General Map of the Constructors.

3. **Settlement of Kosh** (# 14 in GM and Map 3)
   Aragatsotn marz, Kosh community
   Distance in correspondence to the "0 point" of the road: 14.280 – 14.650 km
   GPS coordinates: N 40°, 17', 31,0'' ; E 44°, 08', 55,0"

   Length: 44+380 – 44+680 = 300 m
   Width: 50 m to the left (S) from the existing road
   Area: 15000 m2 (1, 5 hectares)
   Costs of investigation: $ 10.000 USD
   Time of investigation: 2 months.

4. **Medieval village of Shamiram** (# 15 in GM and Map 4)
   Aragatsotn marz, Shamiram community
   Distance in correspondence to the "0 point" of the road: 18.000 – 18.500 km
   GPS coordinates: N 40°, 18', 02,5'' ; E 44°, 06', 09,8"

   A. Length: 44+350 – 44+500 = 150 m
   Width: 50 m to the right (N) from the existing road
   Area: 7500 m2 (0, 75 hectares)
   Costs of investigation: $ 5.000 USD
   Time of investigation: 1 month.

   B. Length: 44+350 – 44+650 = 300 m
   Width: 50 m to the left (S) from the existing road
   Area: 15000 m2 (1, 5 hectares)
   Costs of investigation: $ 4.000 USD
   Time of investigation: 1 month.

5. **Nerkin Bazmaberd necropolis (tomb field)** (# 23 in GM and Map 6)
   Aragatsotn marz, Nerkin Bazmaberd community
   Distance in correspondence to the "0 point" of the road: 25.280 – 25.700 km
   GPS coordinates: N 40°, 19', 09,3'' ; E 44°, 01', 17,8"
   State List of Historical-Archaeological Monuments: **# 2. 73. 1. 1. 1.**

   Length: 55+450 – 57+750 = 300 m
   Width: 50 m to the right (N) and left (S) from the existing road
   Area: 30000 m2 (3 hectares)
   Costs of investigation: $ 8.000 USD
   Time of investigation: 2 months.

6. **Verin Sasnashen archaeological complex** (# 30 in GM and Map 7) [8]
   Aragatsotn marz, Verin Sasnashen community
   Distance in correspondence to the "0 point" of the road: 29.000 – 31.400 km
   GPS coordinates: N 40°, 19', 51,8'' ; E 43°, 58', 35,3"
   State List of Historical-Archaeological Monuments: **# # 2.74. 4; 2.74. 2; 2.104. 1. 1; 2.104. 1. 2.**

[8] The new Highway lines in the areas of Verin Sasnashen, Davtashen and Talin tomb-fields (## 6, 7, 8, highlighted in the list) were planned recently (Dec.22, 2010), without any coordination with the archaeologists and through the areas which were not framed by our field survey. Such methods of "collaborative" work are fraught with unexpected complications during the process of road construction.

Because of these innovations, the abovementioned GPS points of the sites ## 6, 7, 8 are not completely compatible with the new design of the road line.

Length: 60+000 – 63+000 = 3600 m
Width: 50 m to the right (N) and left (S) from the existing road
Area: 360000 m2 (36 hectares)
Costs of investigation: $ 15.000 USD
Time of investigation: 2 months.

7. Davtashen archaeological complex (**#** 32 in GM and Map 8)
Aragatsotn marz, Davtashen community,
Distance in correspondence to the "0 point" of the road: 31.600 – 33.200 km,
GPS coordinates: N 40°, 21', 04, 1'' ; E 43°, 57', 32, 8"
State List of Historical-Archaeological Monuments: **# 2.36.1.**

Length: 64+100 – 69+900 = 5800 m
Width: 50 m to the right (N) and left (S) from the existing road
Area: 580000 m2 (58 hectares)
Costs of investigation: $ 25.000 USD
Time of investigation: 3 months.

8. Talin tomb field (# 38 in GM and Map 10)
Aragatsotn marz, Talin community
Distance in correspondence to the "0 point" of the road: 40.800 – 44.900 km
GPS coordinates: N 40°, 24', 03, 0'' ; E 43°, 53', 30, 7"
State List of Historical-Archaeological Monuments: # 2.3.3.

The "Clover leaf" on the Talin crossing: 71+100
Adjacent area under construction: about 10 hectares
Costs of investigation: $ 10.000 USD
Time of investigation: 2 months.

It has to be stressed that the mentioned costs of investigations and their time limits are of **preliminary character**, since it is not realistic to concretize such details basing only on the field survey data. The cost of archaeological investigation depends on the size and number of cultural units on the given territory, the dept and density of the cultural deposits etc., which may be revealed only in process of excavations. Moreover, each site has its own characteristics and, depending of the certain historical period - methodology of investigation, that also may change the cost and timing.

Preliminary determination of the mentioned details is problematic also because of the level of preservation of some sites and objects: territories of the large tomb-fields, like Verin Sasnashen, Davtashen and Talin are, were partly ameliorised and many of burial mounds were lost. The examination of this kind of units needs a special approach.

The stuff and labour expenses as well as the cost of partial preservation of the finds are included in the main cost of investigation of each site.

The investigations of the archaeological sites registered along the Tranche 2 line will take about 6-8 months. Since the work will start simultaneously on the number of sites, it will not withhold the process of road construction.

M. H. Zardaryan
17. 01. 2011

The North-South Road Corridor Investment Programme

Tranche 2

Archaeological Impact Assessment

Supplement 1

The revision of the road alignment from the of Shahverd bridge and up to the Agarak bridge area, in its last point reaches the eastern border of the “Agarak” State archaeological reserve, that goes along the Amberd riverbed.

The widening and enlargement of the existing bridge to the South (the left side of the existing road) and West will drive to destruction of the riverside zone of archaeological site (up to 6000 sq. m., including the necessary “buffer line” between the edge/slope of the road and the site itself), which is **absolutely unacceptable** taking into account scientific importance of the latter and the status of its protection as well.

To avoid the destruction of the settlement and to provide of needs of the constructors, the widening and enlargement of the Agarak bridge must be planned to the North (right side of the existing road) and East.

M. H. Zardaryan

18.02.2011.

ANNEX 4

1st Public Consultation (advertisements, attendance lists and sheets, handout)

1st Public Consultation – 26 & 27 May 2010 (Yerevan, Kosh, Maralik, Gyumri)

Armenia: North-South Road Corridor Investment Program Tranches 2 & 3 – Environmental Impact Assessment Report

Newspaper Advertisement: Aragats World (24 May 2010)

Արագած աշխարհ — 24 ՄԱՅԻՍԻ 2010 թ.

ՀԱՆՐԱՅԻՆ ԽՈՐՀՐԴԱԿՑՈՒԹՅՈՒՆ

ADB

«Հյուսիս-Հարավ ճանապարհային միջանցք»
Ներդրումային ծրագիր - Փուլ 2
Աշտարակ - Գյումրի մայրուղի

Շրջակա միջավայրի ազդեցության գնահատում
Բնապահպանություն և հնագիտություն

ՀՀ կառավարությունն իրականացնում է «Հյուսիս-Հարավ ճանապարհային միջանցք» բազմափուլ ֆինանսավորմամբ ներդրումային ծրագիր:

Ասիական զարգացման բանկը ֆինանսական աջակցություն է ցույց տալիս ՀՀ տրանսպորտի և կապի նախարարությանը՝ վերոնշյալ ծրագրի երկրորդ փուլի իրականացման համար: Ծրագրով նախատեսվում է Աշտարակ-Գյումրի մայրուղին վերակառուցել 2 գծանոց մայրուղուց 4 գծանոց մայրուղու:

Դուք հրավիրվում եք մասնակցելու հանրային խորհրդակցությանը, որի ժամանակ Ձեզ կտրամադրվեն մանրամասն տեղեկություններ ծրագրի վերաբերյալ: Դուք հնարավորություն կունենաք նաև բնապահպանական ազդեցության գնահատման թիմի հետ քննարկելու բնապահպանական և հնագիտական հնարավոր ազդեցությունները ողջ 88 կմ-ոց ճանապարհի վերաբերյալ:

Ներկայացնում ենք խորհրդատվությունների իրականացման վայրերը, օրերն ու ժամերը.

Վայր	Ամսաթիվ	Ժամ
Երևան Տրանսպորտի նախարարության դահլիճ Նալբանդյան 28, Երևան	26 մայիսի	15:00
Կոշ Միջնակարգ դպրոցի դահլիճ	27 մայիսի	10:00
Մարալիկ Քաղաքապետարանի նիստերի դահլիճ Մաղաքյան 1, Մարալիկ	27 մայիսի	14:00
Գյումրի Ուսումնական դպրոց վարժարանի դահլիճ Միեր Մկրտչյան 47, Գյումրի	27 մայիսի	16:45

Կոնտակտային տվյալներ

ՀՀ ՏԿՆ - Տրանսպորտի և Կապի նախարարություն
Տնօրեն, ծրագրերի իրականացման գրասենյակ (ԾԻԳ)
Հեռ. 10 59 01 47

ԱԶԲ - Ասիական Զարգացման Բանկ
Հայաստանյան գրասենյակ
26/1 Վ. Սարգսյան փ
Էրեբունի Բիզնես Պլազա կենտրոն
Հեռ. 10 54 63 71 կամ 54 63 73

List of Attendees – Yerevan, 26 May 2010

No	Name	Organization
1	Levon Kurkchyan	"Artoun" OJSC
2	Hazkaz Chugunyan	"Artoun" OJSC
3	Arevik Yedigaryan	did not provide
4	R. Tangaranyan	did not provide
5	Gohar Tedevosyan	ADB consultant (LARP)
6	Yulia Kulesheva	"Delovoy Express" newspaper
7	Arusyak Stepanyan	resident of Yerevan
8	Hasmik Aslanyan	"Shogher Union" NGO
9	Silva Adamyan	NGO Forum on ADB
10	Armen Khachatryan	"ArmenPress" newspaper
11	Ani Gabrielyan	Ministry of Economy
12	Harutyun Avagyan	"Yerevan Design" CJSC
13	Nikita Zhamharyan	"Yerevan Design" CJSC
14	Knarik Hovhannisyan	"Eco Alliance"
15	Karen Afrikyan	"Geo Botanic"
16	Greta Gabrielyan	NGO Forum on ADB
17	Armen Poghosyan	Consumers' Association of Armenia
18	Armen Simonyan	not readable

List of Attendees – Kosh, 27 May 2010

N0.	Name	Organization
1	Armen Shahbazyan	Kosh Mayor's office
2	Fahrad Nersisyan	Kosh Secondary School
3	Khachatur Assatryan	owner of gasoline station
4	Tigran Khachatryan	Kosh Secondary School
5	Artak Simonyan	resident of Ashtarak
6	Ruzanna Tonoyan	Kosh Secondary School
7	Tsaghik Khudatyan	Kosh Secondary School
8	Ashot Yengibaryan	Kosh village Mayor's office
9	Hovik Karapetyan	Kosh Secondary School
10	Vardik Melkonyan	resident of Kosh village
11	Taguhi Kirakosyan	resident of Kosh village
12	Ashot Arakelyan	resident of Yeghnik village
13	Hakob Asatryan	resident of Kosh village
14	Serjik Meliksetyan	resident of Kosh village
15	Razmik Grigoryan	resident of Kosh village
16	Gevorg Mkrtchyan	resident of Kosh village
17	Ishkhan Arakelyan	resident of Parpi village
18	Artashem Mkrtchyan	resident of Parpi village
19	Hakob Khachatryan	resident of Kosh village
20	did not provide	Mayor of Ujan village

Actual Attendance Sheets

««Հյուսիս-Հարավ ճանապարհային միջանցք»» ներդրումային ծրագիր Փուլ 2 ▪ North-South Road Corridor Investment Program – Tranche 2
Շրջակա միջավայրի ազդեցության գնահատում ▪ 26 May 2010, Yerevan ▪ Environmental Impact Assessment - 1st Public Consultation

No.	Անուն (տպատառերով) ▪ Name	Կազմակերպություն ▪ Organization	Հեռախոս, էլ. փոստի հասցե ▪ Tel / Email	Ստորագրություն ▪ Signature
16	[illegible]	NGO [illegible], ADB	093 690-685 [illegible]@yahoo.com	[signature]
17	[illegible]	[illegible]	010- 56-11 47	[signature]
18	[illegible]	[illegible]	091-217721, [illegible]@yahoo.com	[signature]
	Անուն (տպատառերով) ▪ Name	Կազմակերպություն ▪ Organization	Հեռախոս, էլ. փոստի հասցե ▪ Tel / Email	Ստորագրություն ▪ Signature
1	[illegible]	"[illegible]" [illegible]	093 37 38 16	[signature]
2	[illegible]	[illegible]	093 90 60 65	[signature]
3	[illegible]	[illegible]	091 72 72 45	[signature]
4	[illegible]	[illegible]	091 43 86 35	
5	[illegible]	ADB	[illegible]	[signature]
6	Юлия Кулемова	[illegible] Деловой экспресс	093590648	[signature]
7	[illegible] Степанян	[illegible]	091-59-22-64	[signature]
8	[illegible]	«[illegible]»	093-558567[illegible]	[signature]
9	Сильва Арамя[illegible]	НПО форум по АБР [illegible]	094 87 40 70	[signature]
10	[illegible]	[illegible]	[illegible]	[signature]
11	[illegible]	[illegible]	094 82-18-72	[signature]
	Անուն (տպատառերով) ▪ Name	Կազմակերպություն ▪ Organization	Հեռախոս, էլ. փոստի հասցե ▪ Tel / Email	Ստորագրություն ▪ Signature
12	[illegible]	"[illegible]" [illegible]	58 61 85	[signature]
13	[illegible]	— " —	2219-[illegible]	[signature]
14	[illegible]	[illegible]	65-06-46	[signature]
15	[illegible]	[illegible]	52-20-71	[signature]

Actual Attendance Sheets

«Հյուսիս-Հարավ ճանապարհային միջանցք» ներդրումային ծրագիր Փուլ 2 ▪ North-South Road Corridor Investment Program – Tranche 2
Շրջակա միջավայրի ազդեցության գնահատում ▪ 27 May 2010, Kosh ▪ Environmental Impact Assessment - 1st Public Consultation

	Անուն (տպատառերով) ▪ Name	Կազմակերպություն ▪ Organization	Հեռախոս, էլ. փոստի հասցե ▪ Tel / Email	Ստորագրություն ▪ Signature
1			093 38-18-32	
2			093 60 8446	
3			077 199644	
4				
5			099332043	
6			093332641	
7			093498688	
8			093 784141	
9			077-93-70-90	
10			094-70-64-52	
11				
12			091-350-927	
13			094-41-45-56	
14			093241468	
15			091-32-12-18	
16			093-99163	
17			099 950 444	
18			099 82 34 06	
19			091 53 34 74	

1st Public Consultation – 26 & 27 May 2010 (Yerevan, Kosh, Maralik, Gyumri)

Armenia: North-South Road Corridor Investment Program Tranches 2 & 3 – Environmental Impact Assessment Report

Handout (Armenian EIA contains this handout in Armenian language)

Public Consultation

26 May 2010 in Yerevan ■ 27 May 2010 in Kosh, Maralik, and Gyumri

Environmental Impact Assessment
Ecology & Archaeology

Location: Aragatsotn and Shirak *marzes* (Ashtarak to Gyumri)

Need for the project and key benefits

The Government of Armenia is implementing the North-South Road Corridor Program in order to improve the transportation links with its neighbors Iran and Georgia to international standards.

The Asian Development Bank (ADB) is assisting the Ministry of Transportation and Communication (MOTC) with a financing facility to undertake Tranche 2: the upgrading of the highway from the outskirts of Ashtarak to Gyumri.

Environmental assessment

An environmental assessment is currently underway to identify potential impacts of the project on the ecology and archaeological sites along the 88 km route. The assessment report will include an environmental management plan with mitigation measures to ensure that Government of Armenia and ADB environment and social safeguard requirements are met.

Key design features

The project will improve the highway from Ashtarak to Gyumri from a 2-lane road to a 4-lane divided highway. All communities near the highway will have access via 2-directional interchanges.

Construction management

Construction impacts will be considered including temporary traffic management (access restrictions, heavy vehicles on local roads), dust, noise, air pollution, waste and spoil management, and social impacts.

Where the road crosses approximately 15 watercourses in gorges and is near some 21 archaeological sites, special care will be taken to minimize adverse impacts by carefully adhering to mitigation measures that are detailed in the environmental management and monitoring plan (EMP).

Environment – *Key topics and issues assessed*

- Preservation of archaeological sites and historical and cultural monuments
- Removal of vegetation and land degradation
- Impact on watercourses, wetlands, and reservoirs
- Air pollution
- Noise and vibration
- Tree removal and replacement (10:1 considered)
- Site restoration and solid waste management
- Health and safety of construction workers and nearby residents

Ministry of Transport & Communication
Director, Project Management Unit
Tel: +374 10 59 01 47
www.mtc.am

ADB - Armenia Resident Mission
Erebuni Plaza Business Center
Tel: +374 10 54 63 71 ~ 73
www.adb.org

Asian Development Bank

ANNEX 5

2nd Public Consultation (advertisements, attendance lists and sheets, handout)

2nd Public Consultation – 1 & 2 July 2010 (Kosh, Maralik, Gyumri, &Yerevan)

Armenia: North-South Road Corridor Investment Program Tranches 2 & 3 – Environmental Impact Assessment Report

Newspaper Advertisement: Republic Armenia (25, 26, 29 June 2010)

Newspaper Advertisement: Aragats World (28 June 2010)

Արագած աշխարհ
28 ՀՈՒՆԻՍԻ 2010 Թ

ԱՐԱԳԱԾԸ

ԻԳ ԵՂԲԱՅՐՆԵՐԸ

ՀԱՆՐԱՅԻՆ ԵՐԿՐՈՐԴ ԽՈՐՀՐԴԱԿՑՈՒԹՅՈՒՆ

ADB

«Գյումրի - Հարրաչ
ճանապարհային միջանցք»
ներդրումային ծրագիր - Փուլ 2
Աշտարակ - Գյումրի մայրուղի

**Շրջակա միջավայրի ազդեցության գնահատում
Բնապահպանություն և հնագիտություն**

ՀՀ կառավարությունն իրականացնում է «Գյումրի-Հարրաչ ճանապարհային միջանցք» ընդհանուր ներդրումային ծրագիր:

Նախատես գործընթացում ներգրավված կողմերի հետ հանդիպումներ կազմակերպելու մասին ՀՀ տրանսպորտի և կապի նախարարության վերոնշյալ ծրագրի հերթական փուլի իրականացման համար: Ծրագրով նախատեսվում է Աշտարակ-Գյումրի մայրուղին վերակառուցել 2 գծանոց մայրուղուց 4 գծանոց մայրուղու:

Որպես հետագիրում եք մասնակցելու հանդիպին երկրորդ խորհրդակցությանը, որի ժամանակ Ձեզ կտրամադրվեն մանրամասն տեղեկություններ ծրագրի, ինչպես նաև բնապահպանական ազդեցության գնահատման քիչի բաղադրությունների վերաբերյալ: Կուզ հնարավորության կրճատման նաև բնապահպանական ազդեցության գնահատման քիչի հետ քննարկելու բնապահպանական և հնագիտական հնարավոր ազդեցությունները ողջ 90 կմ-ոց ճանապարհի վերաբերյալ:

Հարցերազրությունների իրականացման վայրերը, օրերն ու ժամերը ներկայացված են ստորև.

Վայր	Ամսաթիվ	Ժամ
Կոչի միջնակարգ դպրոցի դահլիճ	Հուլիսի 1	10:00
Մաստարի համայնքապետարանի նիստերի դահլիճ	Հուլիսի 1	14:00
Գառնի – Ուրցաձոր դպրոց – վարժարանի դահլիճ	Հուլիսի 1	18:45
Երևանի քաղաքապետարան	Հուլիսի 2	15:00

Կոնտակտային տվյալներ

ՀՀ ԿԿՆ - Տրանսպորտի և կապի նախարարության ՏԻՄՊՀ, Ծրագրերի իրականացման գրասենյակ (ՏԻԿԳ)
Հեռ. 10 59 01 47

ԼԲԲ - Ամերիկան Բաղաքացիան Բանկ
Հայաստանյան գրասենյակ
2011 վ. Սաթոյան փ.
Էմերսոնի Բիզնես Պլազա կենտրոն
Հեռ. 10 54 53 71 կամ 54 63 73

2nd Public Consultation – 1 & 2 July 2010 (Kosh, Maralik, Gyumri, &Yerevan)

Armenia: North-South Road Corridor Investment Program Tranches 2 & 3 – Environmental Impact Assessment Report

List of Attendees – Kosh, 1 July 2010

No.	Name	Organization
1	Yengibaryan Ashot	Advisor to Kosh Mayor
2	Gabrielyan Babken	Kosh resident
3	Harutyunyan Makarianos	Kosh resident
4	Grigoryan Razmik	Kosh resident
5	Khachatryna Romik	Kosh resident
6	Knyazyan Arthur	Kosh resident
7	Petrosyan Robert	Kosh resident
8	Khachatryan Rubik	Kosh resident
9	Asatryan Khachatur	Ashtarak Petrol Station (Ujan)
10	Petrosyan Aram	“Ashocq” Ltd
11	Malkhasyan Vruyr	Kosh village
12	Khachatryan Hakob	Kosh resident
13	Khachatryan Anania	Kosh resident
14	Margaryan Shavarsh	Kosh resident
15	Hakobyan Kolya	Kosh resident

List of Attendees – Yerevan, 2 July 2010

No.	Name	Organization
1	Armine Yedigarian	MOTC (Environmentalist)
2	Susanne Hakobyan	Environmental Survival NGO
3	Ashot Mirzoyan	Consumers’ Association of Armenia NGO
4	Greta Gabrielyan	Ecological Academy NGO
5	Karen Afrikyan	Independent

2nd Public Consultation – 1 & 2 July 2010 (Kosh, Maralik, Gyumri, &Yerevan)

Armenia: North-South Road Corridor Investment Program Tranches 2 & 3 – Environmental Impact Assessment Report

Actual Attendance Sheets

««Հյուսիս-Հարավ ճանապարհային միջանցք»» ներդրումային ծրագիր Փուլ 2 ▪ North-South Road Corridor Investment Program – Tranche 2
Շրջակա միջավայրի ազդեցության գնահատում ▪ 1 June 2010, Kosh ▪ Environmental Impact Assessment – 2nd Public Consultation

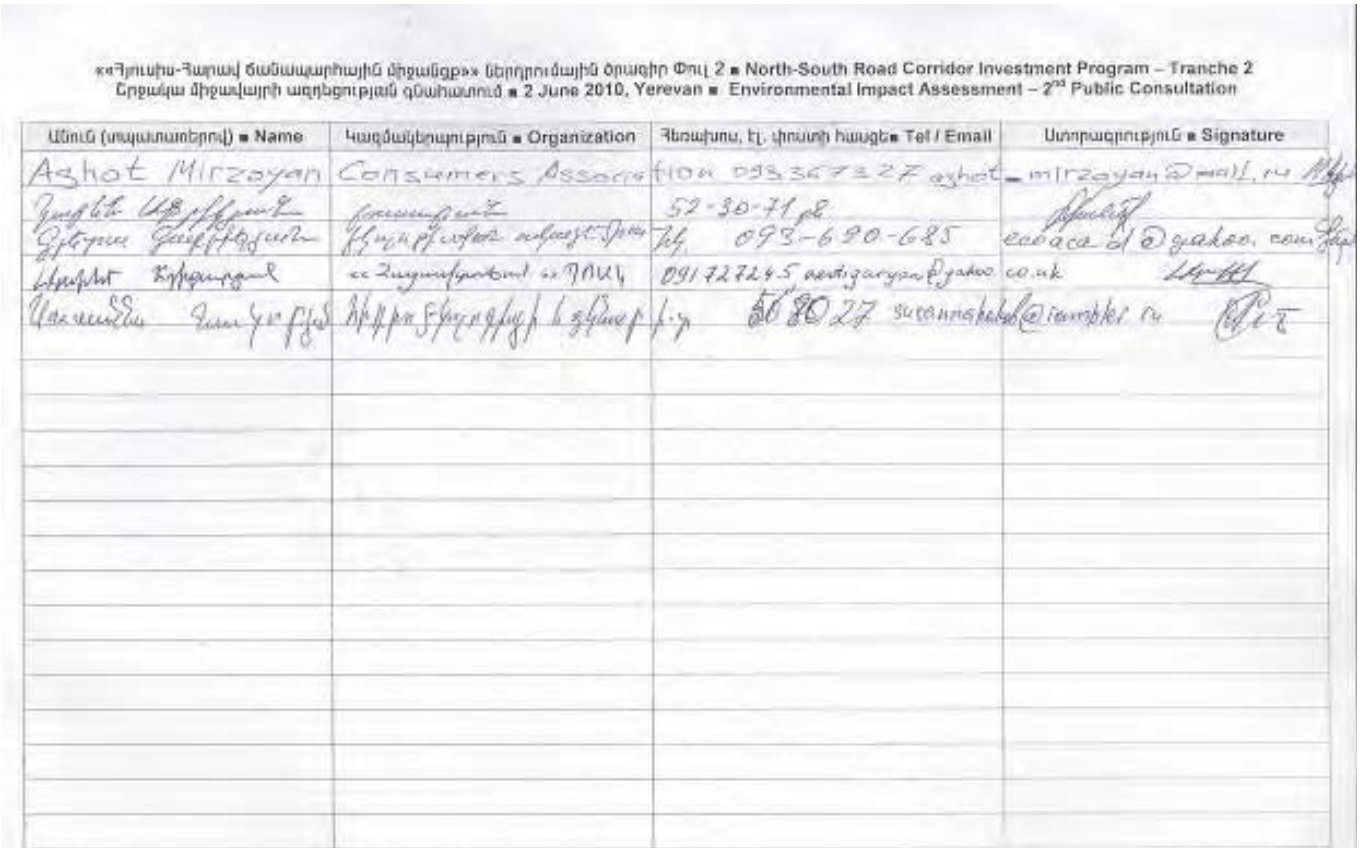
	Անուն (տպատառերով) ▪ Name	Կազմակերպություն ▪ Organization	Հեռախոս, էլ. փոստի հասցե ▪ Tel / Email	Ստորագրություն ▪ Signature
9	[illegible]	[illegible]	077 153 666	
10	[illegible]	[illegible]	099 09 28 12	
11	[illegible]	[illegible]	093 82-88-13	
12	[illegible]	[illegible]	091 53 74-34	
13	[illegible]	[illegible]	091-433-022	
14	[illegible]	[illegible]	093 908 909	
15	[illegible]	[illegible]	093 280600	

Շրջակա միջավայրի ազդեցության գնահատում ▪ 1 June 2010, Kosh ▪ Environmental Impact Assessment – 2nd Public Consultation

	Անուն (տպատառերով) ▪ Name	Կազմակերպություն ▪ Organization	Հեռախոս, էլ. փոստի հասցե ▪ Tel / Email	Ստորագրություն ▪ Signature
5	[illegible]	[illegible]	093 78 78 12	
6	[illegible]	[illegible]		
7	[illegible]	[illegible]	098 344 166	
8	[illegible]	[illegible]	093 58 98-25	

Շրջակա միջավայրի ազդեցության գնահատում ▪ 1 June 2010, Kosh ▪ Environmental Impact Assessment – 2nd Public Consultation

	Անուն (տպատառերով) ▪ Name	Կազմակերպություն ▪ Organization	Հեռախոս, էլ. փոստի հասցե ▪ Tel / Email	Ստորագրություն ▪ Signature
1	[illegible]	[illegible]	093 78 41 41	
2	[illegible]	[illegible]	093 355 146	
3	[illegible]	[illegible]	077 37-32-37	
4	[illegible]	[illegible]	091 32-12-18	



«Հյուսիս-Հարավ ճանապարհային միջանցք» ներդրումային ծրագիր Փուլ 2 ■ North-South Road Corridor Investment Program – Tranche 2
Շրջակա միջավայրի ազդեցության գնահատում ■ 2 June 2010, Yerevan ■ Environmental Impact Assessment – 2nd Public Consultation

Անուն (ազգանուններով) ■ Name	Կազմակերպություն ■ Organization	Հեռախոս, էլ. փոստի հասցե ■ Tel / Email	Ստորագրություն ■ Signature
Aghot Mirzoyan	Consumers Association	093367327 aghot_mirzoyan@mail.ru	
[illegible]	[illegible]	52-30-71 pr.	
[illegible]	[illegible]	093-690-685	[illegible]
[illegible]	[illegible]	091727245 [illegible]	[illegible]
[illegible]	[illegible]	50 80 27	[illegible]

Handout (Armenian EIA contains this handout in Armenian language)

Ministry of Transport & Communication

Public Consultation No. 2

1 July 2010 in Kosh, Maralik, and Gyumri ■ 2 July 2010 in Yerevan

Environmental Impact Assessment

Ecology & Archaeology

Asian Development Bank

Location: Aragatsotn and Shirak *marzes* (Ashtarak to Gyumri)

Need for the project and key benefits

The Government of Armenia is implementing the North-South Road Corridor Program in order to upgrade the transportation links with its neighbors Iran and Georgia to international standards.

The Asian Development Bank (ADB) is assisting the Ministry of Transportation and Communication (MOTC) with a financing facility to undertake Tranche 2: the upgrading of the highway from the outskirts of Ashtarak to Gyumri.

Environmental assessment

An environmental assessment was undertaken to identify potential impacts of the project on the ecology and archaeological sites along the 88 km route. The environmental impact assessment (EIA) report will be completed by end July 2010 and then posted on the websites of the MOTC, ADB, and ADB Armenian Resident Mission. The report will include an environmental management and monitoring plan (EMP) with mitigation measures to ensure that Government of Armenia and ADB environment safeguard requirements are met.

Key design features

The project will upgrade the highway from Ashtarak to Gyumri from a 2-lane road to a 4-lane divided highway. All communities near the highway will have access via 2-directional interchanges. Underpasses will be provided for cattle, farm and personal vehicles, and wild life.

Construction management

Construction impacts will be mitigated including temporary traffic management (access restrictions, heavy vehicles on local roads), dust, noise, air pollution, waste and spoil management, and social impacts.

Where the road crosses 15 gorges, 7 of which contain streams, and is near some 24 archaeological sites, special mitigation measures will be detailed in the environmental management and monitoring plan.

Environment - *Key topics and issues*

- Preservation of archaeological sites and historical and cultural monuments
- Removal of vegetation and land degradation & site restoration and solid waste management
- Impact on watercourses, wetlands, and reservoirs (baseline measurements in 7 watercourses)
- Identification of Red Book species and mitigation measures to preserve them
- Air pollution, noise and vibration effects on nearby residents (baseline measurements in 12 communities)
- Tree removal from public lands and replacement
- Health and safety of construction workers and nearby residents

Ministry of Transport & Communication
Director, Project Management Unit
Tel: +374 10 59 01 47
www.mtc.am

ADB - Armenia Resident Mission
Erebuni Plaza Business Center
Tel: +374 10 54 63 71 ~ 73
www.adb.org & www.adb.org/armenia

ANNEX 6

Environmental Report Forms

ENVIRONMENTAL AND MONITORING REPORTS

Environmental and Monitoring (Monthly Report)

1. Project Implementation Progress Overview

Reporting period (Date):	*Work program/Project Activities*
Project status: *a. On-going activities/site works: provide details of specific activities such as earthworks, vegetation clearing, borrow pit operation, establishment of construction camp, etc. including locations, schedule, etc.* *b. Construction activities during the previous month* *b. Construction activities for the next month*	
Previous report date:	
Persons met and dates:	
Report prepared by:	

2. Environmental Monitoring

a. Summary of Compliance with Environmental Mitigation Measures

Specific Mitigation Measures)	*Compliance Attained (Yes, No, Partial)*	*Comment on Reasons for Non-Compliance*	*Issues for Further Action*
1.			
2.			
3.			

b. Issues for Further Action

Issue	*Cause*	*Required Action*	*Responsibility*	*Timing*	*Resolution*
Old Issues from Previous Reports					

1.					
2.					
New Issues from this Report					
1.					
2.					
3.					
Report prepared by:					

3. Environmental Effects Monitoring

a. Environmental Inspection and Monitoring Results

Monitoring Parameter	*Comparison to Relevant Standard / Criteria*	*Comment on Incidences of Exceedance*	*Issues for Further Action*
1.			
2.			
3.			

b. Problems/Issues for Further Action

Issue	*Cause*	*Required Action*	*Responsibility*	*Timing*	*Resolution*
Old Problems/Issues from Previous Reports (if any)					
1.					
2.					
New Problems/Issues from this Report					
1.					
2.					
Report prepared by:					

4. Compliance with EMP

a. Determine if the required mitigation measures are sufficient or still appropriate considering current site conditions and on-going site works.
b. Describe any difficulties related to the implementation of the proposed mitigation measures. Indicate any changes proposed by the contractor to improve environmental protection.

5. Permits:

a. Indicate any environmental permit/license/consent obtained during the previous period or to be obtained for the coming month in order to continue the project construction activities.
b. Provide details of any environmental permit that the contractor failed to secure prior to conducting any specific activities.

6. Complaint(s)

a. Provide details of any complaints that have been raised by the local population and other stakeholders (who, what, where, when).
b. Document how the complaints were addressed or will be addressed, who are the responsible project staff, specific actions and dates.

7. Environmental Training/Orientation

Provide details of environmental training or orientation carried out during the previous month and the coming month (if any).

8. Summary of Problems/issues Encountered and Recommendations

9. Appendices

a. Correspondence
b. Monitoring Results, laboratory analysis
c. etc.

ANNEX 7
EMP (Management Plan and Monitoring Plan)

The Environmental Management and Monitoring Plan (EMP) provides for the set of mitigation and management measures to be taken during project implementation to avoid, reduce, mitigate, or compensate for adverse environmental impacts. It identifies the potential impacts and their locations or occurrences, proposed mitigation measures, the entities responsible for mitigation and their monitoring activities.

The EMP describes how the mitigation and other measures to enhance the benefits of environmental protection will be implemented. It explains how the measures will be managed, who will implement them, and when and where they will be implemented. The following elements are described in the EMP:

(i) implementation of mitigation measures during subproject design;
(ii) implementation of mitigation measures by contractors, and
(iii) an environmental monitoring plan that covers selected parameters to indicate the level of environmental impacts

It also describes how, when and where the monitoring activities will be undertaken, who will carry them out and who should receive the monitoring report. The EMP stress that all monitoring must be verified by independent expert or by an NGO.

MOTC and MNP have the responsibility to undertake environmental due diligence and monitor implementation of environmental mitigation measures for all sub-projects under each respective mandate.

The total estimated cost for archaeological site excavation/preservation activities is estimated at $368,000.00 and cost for environment protection is included in total construction cost, estimated to be maximum 2%.

ANNEX 7

Updated Environmental Management Plan & Monitoring Plan (EMP)

Armenia: North-South Road Corridor Investment Program: Tranche 2 Project

Table 1: Environmental Management Plan				
Project Activities	**Potential Issues/ Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Detail Design Phase				
Completion of alignment and bridge detail design	Blockage spring and stream flow; changed water regimes; degradation of wetland and encroachment of archaeological site	(i) **Revise and finalize Agarak bypass road alignment and bridge design over Shahverd river** to reduce if not eliminate the adverse impact to the wetland and protected flora and fauna species occurring in the area. (ii) **Revise and finalize the road alignment and design at the Agarak bridge.** The alignment must be planned to the North (right side of the existing road) away from the banks of Amberd River to avoid archeological excavations of the site prior to road construction. The realignment of the road **will** reduce adverse impact of project on Agarak State archaeological reserve to the minimum. (iii) **Undertake archeological excavations prior to road construction** so as to reduce adverse impact of project on Agarak archaeological site to feasible minimum. (iv) **Relocate alignment either to the east or west side** of Aruch caravanseri, the road alignment must not pass the gorge where associated settlement remain and revise the highway interchange.	**Supervision Consultant** **Review** revised road and bridge design alignments at environmentally, archaeologically, historically, and culturally sensitive areas described in EIA **PMU** **Coordinate** with supervision consultant details of relocations **ADB** Reviews relocation effectiveness and provides non-objection	**Supervision Consultant** included in supervision contract **PMU** included in PMU costs **ADB** included in corporate environmental due diligence budget

ANNEX 7

Updated Environmental Management Plan & Monitoring Plan (EMP)

Armenia: North-South Road Corridor Investment Program: Tranche 2 Project

Table 1: Environmental Management Plan				
Project Activities	**Potential Issues/ Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Detail Design Phase				
Construction planning for archaeological excavations/ preservation of historical and cultural sites	Impact to archaeological sites and chance-finds	(i) **Obtain** necessary approvals for construction in areas where archaeological finds have been identified, and follow the chance-find procedures of MOC. (ii) **Fix** borders of archeological sites to be excavated for preservation and/or investigated. (iii) **Incorporate** archaeological excavations in construction schedule. (iv) To avoid potential adverse impacts to historic and cultural resources, the Contractor shall: (a) Protect sites of known archeological, historic and cultural resources by the placement of suitable fencing and barriers. (b) Construction camps shall be located 500 meters away from cultural resources. (c) Adhere to accepted Ministry of Culture (MOC) practice and all applicable historic and cultural preservation requirements of the MOC. (d) In the event of unanticipated discoveries of cultural or historic artifacts (movable or immovable) in the course of the work, the Contractor shall take all necessary measures to protect the findings and shall notify the Engineer and the MOC. If continuation of the work would endanger the finding, work shall be suspended until a solution for preservation of the artifacts is agreed upon.	**Supervision Consultant** **Engage** an archaeologist **PMU** **Ensure** that appropriate approvals are in place **ADB** **Review** and provide non-objection	**Supervision Consultant** included in supervision contract **PMU** included in PMU costs **ADB** included in corporate environmental due diligence budget

ANNEX 7

Updated Environmental Management Plan & Monitoring Plan (EMP)

Armenia: North-South Road Corridor Investment Program: Tranche 2 Project

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Detail Design Phase				
EMP updates Environmental Protection	Cutting/removal of trees, degradation and displacement of Red Book flora and fauna species	(i) **Restrict** construction works and workers' activities along the road alignment by fencing to control encroachment, degradation and disturbance of Red Book species (ii) **Develop** protection measures and/or a relocation program in consultation with the MNP if protected species are identified on the site that would be affected. (iii) **Tree planting** of appropriate species to provide the needed protection and enhancement of the environment along the highway, including replacement planting ratio of 1:10 (10 trees to replace 1 cut tree). (iv) **Obtain** agreements from heads of communities for replanting trees. (v) **Engage** contractors to maintain trees until they are viable (usually 3 years). (vi) **Provide** animal crossings/tunnels in locations indicated by the design,	**Supervision Consultant** **Update EMP Engage** appropriate specialists **PMU** **Review** updated EMP **ADB** **Review** and provide non-objection	**Supervision Consultant** included in supervision contract **PMU** included in PMU costs **ADB** included in corporate environmental due diligence budget

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Detail Design Phase				
Preparation of bid and contract documents	Environmental protection and preservation requirements do not reflect detail design	**(i) Provide for environmental clauses** based on mitigation measures defined in the EMP to be incorporated in the General Specifications of the bid and contract documents: (a) Health and safety orientation, (b) Construction work camps, (c) Public consultation and communications, (d) Quarry operations, (e) Control of erosion and sediment, (f) Water quality, dust and emissions control, (g) Hazardous materials, waste and spoil disposal, emergency plan, (h) Utility protection and/or relocation, (i) Flora and fauna protection, site reinstatement, revegetation and landscaping (j) Historical- Cultural resources protection, (k) Traffic and access, (j) Baseline data and information on air, water and noise monitoring. (ii) **Include the following** specific requirement in bid and contract documents: (a) withholding of payment or penalty clauses, to ensure contractor's implementation of environmental and archeological mitigation measures; (b) employment of a designated Environmental Specialist and a designated Archeologist to oversee environmental and archeological issues and mitigation; and (c) provision of environmental and archaeological orientation/workshop.	**Supervision Consultant** **Update bid and contract documents to** include appropriate environmental clauses in bid and contract documents **PMU** **Review** bid and contract documents **ADB** **Review** updated EMP and bid and contract documents and provide non-objections	**Supervision Consultant** included in supervision contract **PMU** included in PMU costs **ADB** included in corporate environmental due diligence budget

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Updated Environmental Management Plan & Monitoring Plan (EMP)

Armenia: North-South Road Corridor Investment Program: Tranche 2 Project

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Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Hiring of Contractor's Labor force	Social conflicts from non-local workers and restriction towards female workers	(i) **Maximize** employment opportunities for local people by employing them as part of the project labor force. (ii) **Ensure** that employment opportunities are made available to qualified female workers.	**Supervision Consultant** **Stress** this requirement in bid and contract documents **PMU** **Include** this requirement in bid evaluations **ADB** **Review** and issue non-objection prior to construction	**Supervision Consultant** included in supervision contract **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget
Construction works and work camps activities	Impairment of the environment Destruction of archaeological, historical, and cultural sites and monuments Deleterious effects on nearby residents from air and noise pollution Health hazards to workers and nearby residents	(i) **Prepare and submit**, within 30 days of contract effectiveness, the following environmental management sub-plans: 1. Environmental Protection, Health & Safety Orientation Plan 2. Public Consultation and Communications Plan 3. Flora and Fauna Plan 4. Physical Cultural Resources Plan 5. Utility Protection and/or Relocation Plan 6. Construction Work Camps Plan 7. Quarry Management Plan 8. Erosion and Sediment Control Management Plan 9. Waste Management and Disposal Plan 10. Traffic and Access Plan 11. Spoil Disposal Planning and Management Plan 12. Emergency Plan For Hazardous Materials 13. Water Quality Monitoring Plan 14. Vegetation Clearing Plan 15. Dust and Emissions Control Plan 16. Noise Control Plan 17. Site Reinstatement, Landscaping, and Revegetation Plan (ii) The sub-plans should be based on the EIA report, bid and contract documents, best international environmental management practices, and as briefly outlined below.	**Contractor** **Prepare** and implement **PMU** **Review** and monitor implementation **ADB** **Review** and issue non- objection prior to construction	**Contractor** included in construction contract **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

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Updated Environmental Management Plan & Monitoring Plan (EMP)

Armenia: North-South Road Corridor Investment Program: Tranche 2 Project

Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Construction works and related activities	Workers lack of understanding and care to protect the environment and archaeological/ historical sites and cultural monuments Lack of information about the EMP and applicable environmental laws and regulations for the Project. Spread of communicable disease and sickness, No safety measures for the prevention of injury, or death of workers, road users and other people, Lack of preventive measures against exposure to hazardous substances; slips, falls and falling objects.	**1. Environment Protection, Health & Safety Orientation Plan** (i) The purpose of this sub-plan is to document the approach of the general contractor (GC), subcontractors (SCs), and their workers in the implementation of a training program for construction workers in relation to environmental, archaeological, and occupational health and Safety issues. (ii) **Orientation rationale**. The implementation of the EMP will require the involvement of all construction personnel. The nature of the EMP is such that personnel at all levels have a degree of responsibility in relation to environmental, archaeological, and occupational health and safety issues and the implementation of measures contained in the EMP. As such, orientation for all personnel in relation to environmental and archeological issues and the implementation of the EMP will be critical to ensuring the effectiveness of the EMP. (iii) **Orientation objective.** The objective is to raise and enhance the awareness of the construction workforce in relation relevant legislation and policy issues: a. General environmental awareness, including rules and regulations to be followed on archeological, historical, cultural sites, construction site and in the construction camps; b. general health and safety awareness, including an AIDS/HIV and STD awareness program; c. job-specific orientation for workers with responsibility for activities that could have adverse impacts on the environment or humans (e.g., PAH); and d. requirements for worker personal protective equipment including hard hats, safety boots,high-visibility vests, gloves, eye-glasses and ear defenders, and PAH masks or equivalent, as required. (iv) To include posters in work camps that illustrates the Red Book species likely to be found in various areas of the project. (v) Contractor should post a progressive penalty plan to discourage the hunting and consuming of wildlife. (vi) **Blasting.** Training should include a module on the safety aspects of blasting (if blasting is contemplated). Topics should include: a. public meetings to introduce the concept of blasting, b. signs posted that contain times of blasting, c. alarms prior to blasting, d. the use of blasting mattresses, and e. proper handling and storage of explosives. (vii) **Safety and Health risks prevention**. To include information and education for construction workers as part of the health and safety program at campsites during the construction period.	**Contractor** **Engage** training specialist to devise plan and implement orientation program **Record** and report environment and safety incidents to relevant authorities. **PMU** **Review** plan and monitor implementation **ADB** **Review** and issue non- objection prior to construction	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

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Updated Environmental Management Plan & Monitoring Plan (EMP)

Armenia: North-South Road Corridor Investment Program: Tranche 2 Project

Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Public consultation and awareness building	Lack of information and understanding by communities and affected parties about the planned works activities and schedule of implementation can lead to frustration and complaints which could result in delays.	**2. Public Consultation and Communications Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers in the implementation of a plan to relate to the general public and nearby residents prior to commencing site preparation and construction activities and during construction. (ii) This plan should be consistent with the LARP and social assessment, and should include the following: a. Procedures for communicating with local residents and other nearby receptors developedin advance of activities, particularly when noise, vibration, utility service disturbance, or other nuisances may be generated. b. Details on the dedicated project phone line. c. Complaints and grievance process developed whereby the public and other stakeholders may make complaints and be assured of receiving responses within a reasonable period (refer to Section V of the EIA report). (iii) Clear signs and notices posted around construction sites to provide project information.	**Contractor** **Engage** public liaison and awareness specialist to devise plan and implement awareness and grievance redress program. **PMU** **Review** plan and monitor the implementation **ADB** **Review** consultation reports and issue non-objection prior to construction	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Road construction works	Uncontrolled clearing and undue disturbance and displacement of Red Book flora and fauna species	**3. Flora and Fauna Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers to minimize the impact on flora and fauna and to protect areas that contain known Red Book species and Red Book species that are encountered during construction. (ii) The plan should comply with MNP policy and the RA laws on flora and fauna and include the following provisions: a. Vegetation removal and site clearing should be undertaken during late autumn and/or winter which are seasons most favorable to avoid impact to protected flora and fauna species. b. No clearance of vegetation other than that outlined within the plan. c. If Red Book plant and/or nesting places, burrows, and holes of animals discovered, inform PMU environmental specialist and MNP for appropriate actions. d. Provide animal pass according to design. e. Temporary protective fence during construction in the sections where animals appear often. f. Reporting and contacting the MNP in the case of an injured animal being found. (iii) See also Sub-plan 13. Vegetation Clearing Plan	**Contractor** **Engage Environmental Specialist** to report on extent of Red Book flora and Red Book fauna respectively and provide recommendations to minimize impact on each. **PMU** **Review** plans and monitor the implementation **ADB** **Review** implementation reports and issue non-objection	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

Table 1: Environmental Management Plan

Project Activities	Potential/Issues Constraints and Environmental Impacts	Proposed Mitigation Measures	Responsible Entities	Indicative cost of mitigation ($US)
Construction Phase				
Construction works Archeological Chance-find and excavations: a. Nerkin Naver archaeological complex = 2 months b. Agarak historical-cultural preserve = 6 months c. Settlement of Kosh = 2 months d. Medieval village of Shamiram = 2 months e. Nerkin Bazmaberd necropolis = 2 months f. Verin Sasnashen archaeological complex = 2 months g.Talin tomb field = 2 months	Uncontrolled encroachment and damage to archaeological, historical, and cultural sites and monuments	**4. Physical Cultural Resources Plan** (i) The purpose of this sub-plan is to document the approach of the GC and SCs and their workersto protect identified archaeological, historical, and cultural sites and monuments and to manage any physical cultural resources that are encountered during the construction works. (ii) The plan should comply with procedures set by MOC. (iii) For archeological chance find the procedures set by MOC shall be followed. (iv) Specifically, the following archeological/historical sites will be subjected to archeological excavations prior to road construction: a. Nerkin Naver Archaeological Complex- Length: 30+080 – 30+725 = 295 m., Width: 50 m to the left (S) from the existing road; b. Agarak historical-cultural preserve -Length: 32+780 – 33+200 = 420 m., Width: 50 m to the right (N) from the existing road; c. Settlement of Kosh -Length: 44+380 – 44+680 = 300 m., Width: 50 m to the left (S) from the existing road; d. Medieval village of Shamiram - A. Length: 44+350 – 44+500 = 150 m., Width: 50 m to the right (N) from the existing road, B. Length: 44+350 – 44+650 = 300 m., Width: 50 m to the left (S) from the existing road; e. Nerkin Bazmaberd necropolis (tomb field) - Length: 55+450 – 57+750 = 300 m., Width: 50 m to the right (N) and left (S) from the existing road; f. Verin Sasnashen archaeological complex - Length: 60+000 – 63+000 = 3600 m., Width: 50 m to the right (N) and left (S) from the existing road; g. Talin Tomb Field - “Clover leaf” on the Talin crossing.	**Contractor** **Engage** archaeologist to lead excavations and chance-finds, report on extent of archaeological impacts provide recommendations to minimize impact on each. **PMU** **Review** plan and monitor implementation. **Provide** liaison with MOC **ADB** **Review** implementation reports	**Contractor** $144,000 (archaeologist) $12,000 (site a) $120,000 (site b) $10,000 (site c) $9,000 (site d) $8,000 (site e) $15,000 (site f) $10,000 (site g) **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Utilities protection and relocation	Disruption to services impacting on end users	**5. Utility Protection and Relocation Plan** (i) The purpose of this sub-plan is to document the approach of the GC to protect or relocate identified utilities and to manage the protection or relocation of any utilities that are encountered during the construction works. (ii) Undertake a utilities survey and prepare a Utility Protection and Relocation Plan in consultation with relevant government agencies, user groups, and service providers. (iii) If there is potential for disturbance to services (i.e. cut off for periods), schedule the disturbances to take account of the time of year, week, and day to minimize the disturbance. (iv) Notify the potentially affected receptors well in advance of the works.	**Contractor** **Survey** utilities and prepare plan **Liaise** with local representatives, especially for irrigation facilities, and service providers **PMU** **Review** plan and monitor implementation. **Assist** with liaison with local representatives and service providers **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

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Updated Environmental Management Plan & Monitoring Plan (EMP)

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Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Accommoda-tion of workers and equipment and materials storage	Environment degradation, workers health, sanitation and safety; Water pollution	**6. Construction Work Camps Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers in the implementation of measures to manage construction work camps that will be part of the project. (ii) Issues associated with the design, construction, and use of the camps relate both to the potential environmental impacts of the camps, and the need to suitably plan camps to protect the environment and maximize worker health, safety, and amenity. The following aspects of camp development should be addressed in this sub-plan: a. definition of elements to be included in construction work camps. b. criteria/principles for the location of components of the work camps to minimize soil and water pollution, diseases and possible outbreaks, and conflict situation with villagers, local/central authorities and/or the contractor. c. specific management requirements for construction of components of the work camps, and d. management of camp operation. (iii) See also Sub-plan 8. Chemical Products & Spillage Management Plan.	**Contractor** **Prepare** plan **PMU** **Review** plan and monitor implementation. **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

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Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Quarrying	Dust and noise impact on nearby residents	**7. Quarry Management Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers in the implementation of measures to manage the effects of the quarrying activities to be carried during construction. (ii) It is assumed that most, if not all, quarries exist. It is assumed that permits are in place and that the quarry operations are monitored by MNP. (iii) In the event, however, that a new quarry is required, the appropriate agreement/license shall be obtained from the Ministry of Nature Protection and Ministry of Energy and Natural Resources prior to commencement of quarrying. In this case the all relevant documents required by Armenian legislation shall be developed and approved, including a separate EIA (if deemed necessary) addressing the following direct and indirect impacts: a. losses to biodiversity, b. losses to Physical Cultural Resources (PCR) include impacts by the project on the environment and on archaeological, historical, and cultural sites and monuments, c. losses to functional ecology, d. losses to aesthetics, e. disruption of local livelihood and communications patterns, f. presence of and interaction with the construction work force, g. pressure on surrounding natural resources and human services, as well as h. other direct impacts such as erosion and sedimentation, road damage, spoil and other waste disposal, noise and dust generation. (iv) If EIA is needed, then The environmental impact assessment should set out mitigation strategies for each identified potential impact, including: a. minimization of the extent of quarrying, b. avoidance of caves and underground water channels, c. minimization of visual impacts, d. timing of quarrying activities, and e. training	**Contractor** **Prepare** plan **PMU** **Review** plan and monitor implementation. **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% EIA cost for new quarries not included – will be in construction budget **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Earthworks	Erosion of soil, material piles, and discharge of sediment and pollutants into water courses	**8. Erosion and Sediment Control Management Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers in the implementation of measures to manage erosion and sedimentation caused as a result of the construction activities. (ii) One of the main risks to water quality during construction arises from the erosion of soils and the resulting effects of sediment-laden pollutants entering watercourses. Several elements of the construction activities have the potential to cause erosion and generate sediment that can have adverse effects on the surrounding environment in terms of water quality. However, the implementation of the following erosion and sediment control measures should reduce the risk of any impacts to an acceptable level: a. preserve existing ground cover where practicable; b. where ground cover is removed and if ground is to be exposed for long periods, provide temporary cover such as fast-growing grass species; c. avoid erosion and therefore, generation of sediment-laden runoff, through appropriate siting of works and minimization of exposed areas; d. ensure clean runoff is diverted around the construction site where possible; e. treat sediment-laden runoff generated by construction activities prior to it entering watercourses; f. regularly monitor operation and effectiveness of mitigation measures, record the results, and submit to PMU on a monthly basis; g. regularly maintain drains, runoff, erosion and sedimentation protective measures to ensure effectiveness; h. Inspect and repair or modify drainage structures and erosion controls as soon as practicable after rain events.	**Contractor** **Prepare** plan **PMU** **Review** plan and monitor implementation. **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Handling hazardous and non-hazardous substances	Leakage or spillage of diesel or oil may result in these toxic substances to enter the soil, surface water including reservoirs, and groundwater.	**9. Waste Management and Disposal Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers in the implementation of measures for the management of wastes produced during construction. (ii) Several elements of the construction activities have the potential to generate waste that can have adverse effects on the surrounding environment in terms of water quality, soil quality, air quality (odor and pollutants) and human health: (iii) **Non-hazardous solid waste** includes construction waste and domestic refuse. Improper storage, handling, and disposal may cause adverse effects via spills or being carried away by wind or vectors, may affect health and be unsightly. Non-hazardous solid waste can be further divided into putrescible and non-putrescible waste streams. (iv) **Hazardous solid wastes** can have the most severe impacts. A material is hazardous if it is ignitable; corrosive; reactive; or toxic (causing bodily damage, sickness, or death). The following categories of hazardous wastes will potentially be generated by the project: a. Chemical wastes b. Medical wastes c. Batteries, paint, and solvents d. Used oil and grease (v) **Wastewater** includes wastewater from construction activities (e.g. sediment pond outlets,crushing plant operation), domestic wastewater from activities such as from kitchens or showers (grey water) and may contain pollutants such as grease, soap and mild detergents, and liquid sanitary waste (black water) that contains nutrients, organic substances, and pathogens. (vi) The key waste management philosophy that is applied in this sub-plan is based on the following hierarchy of waste management approaches (highest to lowest priority): 1. Avoid waste generation 2. Minimize waste generation 3. Reuse as much waste as practical 4. Recycle as much waste as practical 5. Dispose of any remaining waste in an environmentally suitable manner in locations approved by the MNP. (vii) Implementation of this hierarchy, together with the use of appropriate collection, segregation, storage, disposal and education/training methods will ensure that the level of risk associated with waste management is low.	**Contractor** **Prepare** plan **Engage** sub-contractors to load and haul wastes to sites approved by MNP **PMU** **Review** plan and monitor implementation. **Provide** liaison with MNP **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

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Updated Environmental Management Plan & Monitoring Plan (EMP)

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Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Vehicle movements on and off-site	Traffic hazards and safety	**10. Traffic and Access Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers inthe implementation of measures to manage traffic and access on the construction site during the construction works. The sub-plan will cover vehicle management on and off-site and will include: a. Driver requirements (license, training) and safety requirements. b. Carefully selected construction vehicle routes including safe entry and exit points. c. Clear route directions. d. Designated parking areas. e. Appropriate signage. f. Established speed limits. g. Scheduling of vehicle movements to avoid peak periods where practicable. h. Traffic diversions on public roads including direction signs, markings, traffic signals, lighting, clearly visible solid barriers to channel traffic, flagmen employed as needed, and maintenance of diversions. i. Vehicles requirements including covering loads (when carrying sand, soil, spoil and waste material), exhaust attenuators, silencers, regular maintenance of vehicles to prevent fuel and oil leaks to meet national standards requirements and to ensure compliance.	**Contractor** **Prepare** plan **PMU** **Review** plan and monitor implementation. **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Construction works	Improper disposal of construction spoils and debris at the construction site and immediate vicinities	**11. Spoil Disposal Planning and Management Plan** **(i)** The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers in the implementation of measures to manage spoil generated by the construction of the project. **(ii)** Spoil should be disposed of in locations approved by MNP and local government. **(iii)** Top soil should be stored for site restoration and in medians. Surplus top soil should be distributed in the area based on recommendations by the local government. **(iv)** The Contractor shall be responsible for ensuring that no soil, rock or debris is deposited on public or private rights of way as a result of its operations, including any deposits arising from the movement of Construction Plant or vehicles. **(v)** The Contractor ensures that vehicles exiting from the Site do not have excessive material on their tires. **(vi)** The Contractor shall at all times ensure that all existing stream courses and drains within and adjacent to the Site are kept safe and free from any debris and excavated materials arising from the Works.	**Contractor** **Prepare** plan **Coordinate** disposal of surplus soil and excess topsoil with heads of local communities **PMU** **Review** plan and monitor implementation. **Provide** liaison with local communities **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

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Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Handling hazardous substances	Leakage or spillage of diesel or oil may result in these toxic substances to enter the soil, surface water, and groundwater.	**12. Emergency Plan For Hazardous Materials** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers for the handling, storage, use, and disposal of chemicals and in the implementation of measures in the event of spills or accidental releases of hazardous materials during the construction works. The implementation of the following measures should reduce the risk of any impacts to an acceptable level: a. Develop and implement procedures to ensure safe handling and storage of hazardous substances, e.g., diesel, waste oil. Material safety data sheets, emergency response procedures, and clean-up materials should be readily available on site and their proper use should be part of the workers' training. b. Spill clean-up materials should be appropriately located and stored to ensure availability. c. An Emergency Response Team (ERT) that is part of the Environment Protection team should be identified, include an organizational diagram, work and out of hours phone numbers, and reporting lines. d. Ensure that the ERT receives emergency response training. e. Ensure that the ERT and all personnel handling chemicals and hazardous substances receive hazard and risk management training. f. The area of spill should be cleaned in a timely manner to prevent potential contamination of surface and groundwater and soil and the spilled material, together with contaminated soil and absorbent materials should be disposed of in a site approved by MNP. (ii) Only necessary chemicals, hazardous substances, and fuel should be stored on site, within a covered, secure and naturally ventilated area that has an impervious floor and impervious bund around it. The bund should have a capacity of at least 150% of the capacity of the largest tank. (iii) The storage area should be located away from drainage lines and danger areas.	**Contractor** **Prepare** plan **Dispose** of hazardous materials per MNP directive **PMU** **Review** plan and monitor implementation. **Provide** liaison with MNP **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

ANNEX 7

Updated Environmental Management Plan & Monitoring Plan (EMP)

Armenia: North-South Road Corridor Investment Program: Tranche 2 Project

Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Construction works	Water pollution from liquid waste and effluents from construction sites, work camps and from quarries, crushing plant, and concrete batch plant	**13. Water Quality Monitoring Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers in the implementation of measures to monitor the effects of their activities on water quality in the project area during the construction works. The sub-plan should address monitoring requirements for the following: a. Storm water discharge from all construction sites (in-stream and point of discharge monitoring), b. run off from construction work camps, c. run off from waste disposal areas and construction work areas, d. effluent from quarries, crushing plant, and concrete batch plant (if any), and e. workers' potable water. (ii) In-stream monitoring should be carried out approximately 50 m upstream and 50 m downstream of the site discharge (2 monitoring points)	**Contractor** **Prepare** plan **Engage** water quality monitoring specialists **Report** results monthly **PMU** **Review** plan and monitor implementation. **Provide** liaison with MNP **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget
Earthworks and construction sites	Removal and/or destruction of protected species of plants	**14. Vegetation Clearing Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers to vegetation clearing activities during construction. The plan should comply with MNP policy and the RA Law on Flora and include the following provisions: a. Guidance on mulching removed vegetation, storage, and use. b. Storing and managing removed topsoil (graded, stabilized and drained) for re-use for landscaping activities. c. Vegetation removal and site clearing should be undertaken during late autumn and/or winter which are seasons most favorable to avoid impact to protected flora and fauna species. d. No clearance of vegetation other than that outlined within the plan. (ii) See also Sub-plan 3. Flora and Fauna Plan	**Contractor** **Prepare** plan **Engage** arborist to devise dendro design for tree replanting or replacement **Report** results monthly **PMU** **Review** plan and monitor implementation. **Provide** liaison with MNP **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

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Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Hauling and transport of construction and quarry materials; Road works	Nuisance from excessive dust along construction sites; Air quality	**15. Dust and Emissions Control Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers in the implementation of measures to control gaseous emissions and dust resulting from the construction activities, including quarry sites, crushing plants, road construction, haulage of materials, and establishment of construction work camps. The management measures in this sub-plan have been developed to minimize potential health and nuisance impacts by incorporating the following principles: a. Preserve existing ground cover where practicable. b. Provisions to use and using water spray of road surfaces to control dust. c. Minimize the amount of excavated material held on site and cover all materials wherever possible to prevent generation of dust. d. Avoid double handling of material. e. Ensure that vehicles used should be at their maximum load capacity to minimize the number of vehicles and journeys to and from the site. f. Do not leave construction equipment idling when not in use. g. Use mains electricity or battery power where possible (or practical for hand tools) rather than diesel. h. Avoid the use of diesel or petrol powered generators where practicable. i. Spray aggregate loading point at quarries and crusher plants	**Contractor** **Prepare** plan **Engage** local water trucks for dust control **Report** results monthly **PMU** **Review** plan and monitor implementation. **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Road works	Exceedence of allowable noise (decibel) limits	**16. Noise Control Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers in the implementation of measures to minimize and manage the impacts of noise generated during construction. (ii) A number of elements of the construction activities have the potential to cause noise impacts. The health effects of noise range from annoyance to hearing impairment and can impact both construction workers and nearby villages or settlements. The management measures in this sub-plan have been developed to minimize potential health and nuisance impacts by incorporating the following principles: a. minimization of noise generation at source; b. reduction of the transmission of noise from the source to sensitive receivers including nearby villages and settlements and construction workers on the construction site; c. schedule noisier activities towards the middle of the day where practicable; d. locate noisier activities away from sensitive receptors where practicable; e. fit vehicles and equipment with silencers to meet national noise standards and regularly check to ensure compliance; f. install noise control barriers (e.g. solid walls, earth barriers, noise-reflective panels, double- glazed windows) when necessary and practicable to shield houses and other sensitive receptors;and g. provide response mechanism for noise-related complaints (see also Table 1A for monitoring and Sub-plan 2. Public Consultation and Information).	**Contractor** **Prepare** plan **Report** results monthly **PMU** **Review** plan and monitor implementation. **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

Table 1: Environmental Management Plan				
Project Activities	**Potential/Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost of mitigation ($US)**
Construction Phase				
Site re-instatement of all areas Re-vegetation, landscaping	Construction materials that are not cleared from the site are potential safety hazards Localized flooding from impermeable surfaces if inadequate drainage Sediment and erosion of uncovered areas	**17. Site Reinstatement, Landscaping, and Revegetation Plan** (i) The purpose of this sub-plan is to document the approach of the GC, SCs, and their workers in the implementation of site clearance and restoration, landscaping, and revegetation measures as part of the construction works. The sub-plan should include the following: (ii) All construction-related materials and equipment cleared from the site including waste, unused materials, fencing etc. (iii) Natural drainage lines reinstated. (iv) Plan of areas to be landscaped. (v) Check-list to be prepared for final sign-off by the PMU Environment Specialist (vi) Procedures for planting, maintenance and monitoring to ensure stable growth of trees and groundcover. (vii) Species must be a. endemic to entire site or specific area, b. readily available (commercially or from seed collection), and c. relatively easy to propagate. (viii) Species should ideally be a. easily seeded (manual or mechanical methods), and b. relatively easy to maintain. (ix) Replant trees and bushes according to dendro design and agreements with heads of affected communities. (x) Plant new trees at a ratio of 10 new trees per 1 tree cut. (xi) Maintain new trees until viable or 3 years, whichever comes first as certified by qualified arborist (Note: 80% survival is considered excellent). (xii) See also Sub-plan 9. Waste Management and Disposal Plan	**Contractor** **Prepare** plan **Engage** arborist to prepare dendro design **Engage** landscape contractor to implement plan **PMU** **Review** plan and monitor implementation. **Monitor** tree survival **ADB** **Review** implementation reports	**Contractor** included in total construction cost, estimated to be maximum 2% **PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget

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Updated Environmental Management Plan & Monitoring Plan (EMP)

Armenia: North-South Road Corridor Investment Program: Tranche 2 Project

Table 1: Environmental Management Plan				
Project Activities	**Potential Issues Constraints and Environmental Impacts**	**Proposed Mitigation Measures**	**Responsible Entities**	**Indicative cost Of mitigation ($US)**
Operation and Maintenance Period				
Traffic movements	Noise impacts Air pollutants from vehicle emissions	(i) The PMU should engage an acoustic specialist to monitor noise on a periodic basis and in response to any complaints. (ii) The need for further investigation or mitigation should be identified. (iii) The PMU should engage a specialist to monitor air quality associated with vehicle emissions on a periodic basis and in response to any complaints. (iv) The need for further investigation or mitigation will be identified.	**PMU** **Engage** noise and air quality specialists **Report** results **ADB** **Review** reports	**PMU** included in PMU cost **ADB** included in corporate environmental due diligence budget
Revegetation	Does not establish	(i) Monitoring the health of the trees and replacement as required.	**PMU** **Engage** arborist and botanist **Report** results **ADB** **Review** reports	**PMU** included in PMU cost **ADB** included in environmental due diligence budget

[34] The general contractor is the entity who enters into a contract for the works with the EA and who is responsible, by contract, for the works and conduct of its subcontractors.

ENVIRONMENTAL MONITORING PLAN

The Contractor shall carry out environmental monitoring as specified in this Sub-Section 101.16. In the event that the Contractor fails to comply with such requirements, the Engineer shall arrange for the work to be conducted by others who are appropriately qualified and experienced in the performance of the various tests and monitoring. The selection of those people shall be at the absolute discretion of the Engineer. All costs in such actions shall be a debt due by the Contractor to the Employer.

Monitoring is important to ensure that environmental impacts are prevented and mitigated by following the EMP to ensure that sound engineering practices are followed for the protection of the people and environment. The Contractor has the responsibility to ensure the following:

- Implementation of impact prevention and mitigation measures
- Compliance with the Contract Specifications and the EMP
- Oversee construction at each road section
- Report on findings with respect to impact prevention and mitigation and the actions recommended to problems encountered.

The critical component covered by the monitoring program refers to construction management since the key impacts are those generated during this phase of work. The monitoring plan is based on the mitigation/enhancement measures identified for the environmental impacts and those that are moderately significant, but can have critical effects if not mitigated. The environmental monitoring plan including the key parameters to be monitored is presented in *Table 1A below.* This covers both the construction and operation stages.

Baseline Data and Routine Periodic Air Quality Monitoring

Pre-construction monitoring to establish baseline conditions shall be undertaken by the Contractor at locations as determined advisable by the Engineer. The instrumented monitoring shall be carried out over a period of not less than 21 days prior to the initiation of construction to establish baselines against which impacts can be measured. Baseline monitoring of total suspended particulates (TSP) shall be carried out at not less than two points in rehabilitation sites. Baseline air quality monitoring shall be carried out at Asphalt Plant and Crusher. The monitoring locations will be determined on the basis of actual construction plans, including the specific locations of pollution sources as required by the Engineer.

Routine instrumented monitoring of total suspended particulates (TSP) at the same locations at the earlier baseline monitoring points shall be carried out monthly along each separate construction section. Air quality monitoring shall occur not less than once

per month at each location and more frequently if determined necessary by the Engineer. Results will be submitted in a monthly report.

Other Air Quality Provisions

In addition to the provisions for the siting of asphalt plants, regulations regarding open burning must be adhered to.

Solvents and volatile materials shall be used properly to the satisfaction of the Engineer. Blasting (if any) shall be carried out using small charges. Dust-generating items will be conveyed under cover. Road surfaces, excavation and construction sites will be water sprayed to keep them moist for dust control at all times. Trucks carrying earth, sand or stone shall be covered with tarps to avoid spilling.

Baseline Data and Routine Periodic Water Quality Monitoring

Pre-construction monitoring to establish baseline conditions shall be undertaken at locations as determined advisable for the different construction sections, as required by the Engineer. Baseline monitoring of water quality shall be undertaken at a site approved by the Engineer and the receiving streams of effluent from labor camps, asphalt plants and other potentially polluting activities related to the Works. Measurements of suspended solids (SS), biological oxygen demand (BOD), dissolved oxygen (DO), conductivity and fecal coli form, and oil and grease levels are required. Additional baseline monitoring shall be undertaken at the location of major sources of potential water pollution (construction camps and other sources of significant run-off and liquid waste generation).

Routine instrumented monitoring of water quality and run-off from construction camps, staging areas and labour camps, not less than once every month, shall be undertaken for the different construction sections. This shall include measurements of suspended solids (SS), biological oxygen demand (BOD), dissolved oxygen (DO), conductivity and fecal coli form, and oil and grease levels.

Waste disposal shall be undertaken in an environmentally responsible manner, including providing for the disposal of waste oil, human waste, in accordance with regulations in force by the relevant authorities.

Baseline Data and Routine Periodic Noise Monitoring

Instrumented baseline noise monitoring shall be carried out over a period of at least 21 days prior to the initiation of construction to establish baselines against which impacts can be measured

Routine instrumented monitoring of noise levels shall be undertaken at not less than two Road Rehabilitation Sites at the same locations as the earlier baseline monitoring. Instrumented monitoring shall be undertaken for periods of 24 hours not less than once per month.

All Contractor project locations (including but not limited, construction areas, sites areas, plant and equipment areas and Contractor staff office and accommodations) that are directly or indirectly associated with the Contract shall be regularly inspected for compliance with requirements of the EMP and statutory regulations. Specific issues include but are not necessary limited to:

- dust control;
- waste handling and disposal;
- bitumen, oil and diesel handling and storage;
- the asphalt batching plant, and its immediate surroundings
- the quarry and crushing plant, and its immediate surroundings
- prevention of materials encroaching outside the right of way;
- temporary drainage;
- water quality and
- slope stability.

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Updated Environmental Management Plan & Monitoring Plan (EMP)

Armenia: North-South Road Corridor Investment Program: Tranche 2 Project

Table 1A: Environmental Monitoring Plan All monitoring must be verified by independent expert or NGO						
Location Activity Phase	**Parameters To be Monitored**	**Monitoring Locations**	**Instruments & Method**	**Environmental Performance Indicator**	**Responsible Entities**	**Frequency & Time**
Construction Phase **(To be updated by the Contractor together with the Environment Specialist prior to beginning construction and thereafter, as required)**						
Public consultation and education	Public notices, signs and notices around the site; complaints register	Contractor's field office and construction sites	Review of documents, Visual	Procedures for communicating, complaints and grievance process with local residents and stakeholders developed, Signs and notices posted around construction sites, Complaints logged and resolved.	**Contractor** **Keep** log and report **PMU** **Review** reports	Prior to commencing site preparation and construction activities, If complaint is received
Construction within 250 m of a sensitive receptor	Noise	Boundary of property of sensitive receptors to be identified in the Noise and Vibration Management Plan	Noise meter	Maximum at sensitive receptor: - 6am to 10pm (day) – 55dBA L_{Aeq}, 70dBA L_{Amax} - 10pm to 6am (night) – 45dBA L_{Aeq}, 60dBA L_{Amax} Or as agreed with the MNP and receptors	**Contractor** **Engage** specialists **PMU** **Monito**r results	Noise and Vibration Management Plan
All sites		Boundary of property of complainant				If complaint is received
	Dust-air pollution	Representative boundary between road and adjacent residences	Dust deposition gauge	Dust deposited below 0.15 mg/m^3 daily average	**Contractor** **Engage** specialists **PMU** **Monito**r results	Samples analyzed weekly
	Dust	Selected construction vehicle routes including safe entry and exit points Works sites, Traffic diversions on public roads	Visual/ocular inspection	No visible dust, vehicles covered if transporting wastes, soil, spoils, sand, and other materials, Established speed limits.	**Contractor** **Check, Monitor** and report **PMU** **Review** reports	Ongoing and weekly Inspection, Daily during earthmoving activities

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		Table 1A: Environmental Monitoring Plan All monitoring must be verified by independent expert or NGO				
Location Activity Phase	**Parameters To be Monitored**	**Monitoring Locations**	**Instruments & Method**	**Environmental Performance Indicator**	**Responsible Entities**	**Frequency & Time**
	Condition of flora and fauna	Shahverd wetland	Field survey, census and inventory	Presence of Red Book flora and fauna in the wetland	**Contractor Engage** Environment Specialists, keep and log report **PMU Review** reports	Quarterly
	Run-off control, slope protection and drainage	Site boundary and downhill	Visual/ocular inspection	Water is clear or contains minimal sediment, No evidence of significant erosion, Drainage control measures in place	**Contractor Keep** log and report **PMU Review** reports	Weekly inspection, After a rainfall event
7 water courses that are crossed by the alignment	Water quality: - Turbidity - Total suspended solids (TSS) - Total dissolved solids (TDS) - Acidity (pH) - Temperature - Dissolved oxygen	Approximately 50 m upstream and 50 m downstream of the site (2 monitoring points each site)	Water quality meter and laboratory analysis of samples	Pre-construction baseline data and information established, Results are not above measured baseline levels prior to construction	**Contractor Engage** specialists **PMU Monito**r results	Prior to the start of construction Monthly thereafter and if complaint is received
Material stockpiles	Stockpiled material	Stockpile locations	Visual	Stockpiles within designated area, Stockpiled correctly (height, slope, drainage lines around) Topsoil stockpiled correctly and not within drainage line	**Contractor Spot-check** **PMU Monito**r results	Weekly

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Location Activity Phase	**Parameters To be Monitored**	**Monitoring Locations**	**Instruments & Method**	**Environmental Performance Indicator**	**Responsible Entities**	**Frequency & Time**
Work sites safety	Workers' protective equipment, Knowledge of construction rules and procedures, points of contact	All workers	Visual, Question a sample of workers	Personal protective equipment worn by workers on site, Workers are informed and demonstrated knowledge of construction safety rules and regulations, Safety signage appropriately displayed at all work sites	**Contractor** **Conduct** awareness testing and report results **PMU** **Review** results	Ongoing and weekly, Monthly report
Waste management and disposal	Solid waste from work camps and construction spoils and debris, effluents from quarries, crushing plant	Designated waste disposal sites	Visual inspection	No construction litter, No waste outside designated areas	**Contractor** **Spot-check** **PMU** **Monito**r results	Ongoing Formally weekly
Handling hazardous materials	Diesel, asphalt mixed, bitumen, used oil and grease	Designated hazardous material storage area	Visual inspection Record	Appropriately stored and in designated areas Hazardous materials inventory up-to-date and tallies	**Contractor** **Keep** inventory current **PMU** **Check** inventory **MNP**	Monthly
Secured construction sites/camps	Security fence	Boundary of construction sites/camps	Visual inspection	Security fence properly set and intact	**Contractor** **Check** entire length	Weekly
Traffic and road safety	Traffic diversion measures and signage	Tranche 2 road works	Visual and records	Measures in place in accordance with the Traffic and Transport Management Plan, Number of accidents	**Contractor** **Check** facilities **PMU** **Spot** check	When measures and signage are installed Monthly

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Revegetation and Site rehabilitation	Vegetation cover, Exposed soils on slope areas, Natural drainage lines,Const-ruction waste	All sites as construction is completed	Visual inspection	Revegetation as per Landscaping and Site Reinstatement Sub-plan check-list Drainage lines reinstated Waste materials and construction equipment removed from the site	**Contractor** **PMU** **Check** compliance with Sub-plan	As required at the end of works until signed off as acceptable
Tree planting design	Planted trees and bushes	Along highway,	Visual inspection, counts of number of established and dead trees	Planted trees and bushes according to dendro design and 10:1 ratio. Tree replanting agreements with heads of affected communities. Maintenance and monitoring of new trees for 3 years or until viable.	**Contractor** **Obtain** arborist reports **PMU** **Check** compliance with Sub-plan	Monthly
Records and reporting	Inspection check-list, Complaints log Consultation record, Training records, Licenses, Approvals and permits	Recorded information	Visual review	Annex 6: Environmental and Monitoring Report Format is provided to record and document project's compliance to the requirements of the EMP. All records are available and recorded correctly.	**Contractor** **PMU** **Ensure** contract and check-list compliance	Monthly
Operation and Maintenance Phase (To be updated by the PMU Environment Specialist prior to operation of the road if required)						
Landscaped areas	Type and number of endemic and non-endemic species planted, or specific to the area	List of area identified for landscaping, graded, stabilized and drained areas	Visual inspection, counts of number of established and dead trees	Maintenance and monitoring the health of trees until viable within 3 years and replacement as required, No dead trees, soils covered by vegetation	**Contractor** **PMU** **Monitor** developments	Monthly during the 1st year, Quarterly on the 2nd year, and Bi-annually for the 3rd year